Greening Technical VET – Sustainable Training Module for the European Steel Industry

Work Package 2
Industry Driven Analysis of Job Requirements

Summary Report

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CONTENT

Executive summary – main WP2 results

The following list is a summary of shared results and open questions of the GT-VET work done for work package 2 “Industry Driven Job Requirements”. We suggest to use this list as background information before conducting the work package 3 interviews. The structure of the list follows the chapters of the WP2 questionnaire.

(I) Environmental (and related health and safety) Legislation and Company Implementation

- Knowledge center for environmental issues in all major steel companies
- European contact point / bureau and “environmental networking” in Brussels
- “Translation” of legal requirements into procedural instructions / handbooks
- Good practice examples for “application-oriented diffusion” of environmental legislation have been developed (“every employee has to understand the message”)
- Strict corporate targets (“no accidents”) exceeding legal requirements to some extent (from complying to improving)
- Steering approach through highly diversified target figures on company / department / plant level
- High influence of environment-related instructions on everyday work

(II) Responsibility for environmental (and related health and safety) issues:

- Distinct departments for environmental issues and OHS
- Hybrid working groups meet and define implementation pathways (1) to comply with new legal directives and (2) to integrate new requirements into training (VET, further training)

- Different levels of autonomy of plants, e.g.: TKSE plants have recently installed their own environmental representative
- "Culture" of shared responsibility regarding environmental, but also other issues is a central objective
- Skilled workers are more and more considered as responsible for "green performance"

(III) Environmental/green aspects of skilled work within the plant (Electrical Technicians and Mechanical Technicians):

- Environmental regulations influence basically every maintenance routine
- Extensively integrated in VET and further training, plant protocols / operational instructions
- Additional "green projects" to improve environmental performance
- Training more and more resembles everyday work (integrative learning approach, autonomous problem solving and reflection as pedagogic concepts gaining importance)

Questions for WP3 VET Systems Reflections

Basic knowledge about environmental laws is obligatory in VET
Can we presuppose this knowledge while planning learning content?
How could the actuality, transparency and reflection of the different legislation be guaranteed?

Do skilled workers also have to be knowledge managers in their respective teams?

Does the module have to include basic knowledge management info / strategies, adapted to the specific occupation?

Would it be reasonable to choose a pedagogic approach which makes the learners act autonomously? (project / action oriented didactics)

Could the core of the module be a set of concrete, industry-related case studies on environmental topics?
Such a set of case studies could be modified / supplemented when industry requirements change, as foreseen in the proposal

Introduction

The Work Package no 2 is focusing to carry out an industry driven analysis of job requirements in the range of green aspects (ecological sustainability as well as health and safety) for chosen technical workers in three departments of steel enterprise:

- blast furnace (where appropriate),
- steelmaking shop (both basic oxygen and electric together with casting),
- hot rolled departments.

The job positions require qualifications, skills and competences of mechanical and electrical technicians in three above mentioned metallurgical shops were selected to be analyzed within the project.

The notions of “mechanical technician” and “electrical technician” conformed respectively International Labour Organization’ classification of occupations (document ISCO-08 Draft definitions, dated 9 July 2009):

- code 3115 “mechanical engineering technician”,
- code 3113 “electrical engineering technician”.

Mechanical engineering technicians perform technical tasks to aid in mechanical engineering research, and in the design, manufacture, assembly, construction, operation, maintenance and repair of machines, components and mechanical equipment.
Tasks include:

(a) providing technical assistance in research on and development of machines and mechanical installations, facilities and components, or testing prototypes;

(b) designing and preparing layouts of machines and mechanical installations, facilities and components according to the specifications given;

(c) preparing detailed estimates of quantities and costs of materials and labour required for manufacture and installation according to the specifications given;

(d) monitoring technical aspects of manufacture, utilization, maintenance and repair of machines and mechanical installations, facilities and components to ensure satisfactory performance and compliance with specifications and regulations;

(e) developing and monitoring the implementation of safety standards and procedures for marine survey work in relation to ships' hulls, equipment and cargoes;

(f) assembling and installing new and modified mechanical assemblies, components, machine tools and controls, and hydraulic power systems;

(g) conducting tests of mechanical systems, collecting and analyzing data, and assembling and installing mechanical assemblies in support of mechanical engineers;

(h) ensuring that mechanical engineering designs and finished work are within specifications, regulations and contract provisions.

Electrical engineering technicians perform technical tasks to aid in electrical engineering research, and in the design, manufacture, assembly, construction, operation, maintenance and repair of electrical equipment, facilities and distribution systems.

Tasks include:

(a) providing technical assistance in research on and development of electrical equipment and facilities, or testing prototypes;

(b) designing and preparing blueprints of electrical installations and circuitry according to the specifications given;

(c) preparing detailed estimates of quantities and costs of materials and labour required for manufacture and installation according to the specifications given;

(d) monitoring technical aspects of the manufacture, installation, utilization, maintenance and repair of electrical systems and equipment to ensure satisfactory performance and compliance with specifications and regulations;

(e) planning installation methods, checking completed installation for safety and controls or undertaking the initial running of the new electrical equipment or systems;

(f) assembling, installing, testing, calibrating, modifying and repairing electrical equipment and installations to conform to regulations and safety requirements.

Usually in steel plants there are not job positions called “mechanical technician” or “electrical technician”. Workers with qualifications, skills and competences of these two occupations are employed on different posts, often as maintenance technicians.

1. Analysis of EU environmental and health and safety legislation

1.1 Environmental legislation

Environmental issues are very important in the policy of European Union. In consolidated version of the Treaty on European Union and the Treaty on the Functioning of the European Union[1] Article 191 (ex Article 174 TEC) expresses Union policy related to environmental matters:

TITLE XX
ENVIRONMENT
Article 191
(ex Article 174 TEC)

1. Union policy on the environment shall contribute to pursuit of the following objectives:
   - preserving, protecting and improving the quality of the environment,
   - protecting human health,
   - prudent and rational utilisation of natural resources,
   - promoting measures at international level to deal with regional or worldwide environmental problems, and in particular combating climate change.
2. Union policy on the environment shall aim at a high level of protection taking into account the diversity of situations in the various regions of the Union. It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.
   In this context, harmonisation measures answering environmental protection requirements shall include, where appropriate, a safeguard clause allowing Member States to take provisional measures, for non-economic environmental reasons, subject to a procedure of inspection by the Union.
3. In preparing its policy on the environment, the Union shall take account of:
   - available scientific and technical data,
   - environmental conditions in the various regions of the Union,
   - the potential benefits and costs of action or lack of action,
   - the economic and social development of the Union as a whole and the balanced development of its regions.
4. Within their respective spheres of competence, the Union and the Member States shall cooperate with third countries and with the competent international organisations. The arrangements for Union cooperation may be the subject of agreements between the Union and the third parties concerned.

[1] OJ 2010/C 83/01

The previous subparagraph shall be without prejudice to Member States' competence to negotiate in international bodies and to conclude international agreements.

One of the indications of environmental activity within the European Union is creating Environmental Action Programmes, which have, since 1971, given direction to the work of the European Commission in the environmental field. They presented a systematic approach for tackling environmental problems, reflecting fundamental elements of contemporary thinking and problem perceptions. They have set ambitions and targets, identified priority areas of work and, progressively, also elaborated on the need to integrate environmental objectives and conditions into other policies. At present the Sixth Community Environment Action Programme is realized[2]. It expires in mid 2012. The priorities of this Action Programme are as follow:

- tackling climate change,
- protect nature and biodiversity,
- address environment and health and quality of life issues,
- preserve natural resources and manage waste.

At present the discussion process to prepare 7th Environmental Action Programme is carried out.

Europe-wide legislation plays an important part in achieving environmental objectives.

Legislation remains central to meeting environmental challenges and full and correct implementation of the existing legislation is a priority.

[2] OJ L 242, 10.9.2002, p.1

1.1.1 Generation of Waste

Maintenance technicians are able to influence the generation of waste and its subsequent disposal which has an impact on the environmental and economic sustainability of the business. The technicians would have an influence on the waste hierarchy (to prevent, reduce, reuse or finally dispose of waste); classifying the waste and ensuring the waste is stored in a suitable manner; ensuring the waste is disposed in accordance with the relevant legislation

1.1.1.1 The Waste Framework Directive (Directive on waste)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L312/3 of 22.11.2008).

This Directive is, among others, an effect of implementing recommendation of the Sixth Community Environment Action Programme.

General characteristic

This Directive lays down measures to protect the environment and human health by preventing or reducing the adverse impacts of the generation and management of waste and by reducing overall impacts of resource use and improving the efficiency of such use.

Directive focuses on hazardous waste, waste oils and bio-waste.

Directive repeals (from 12/12/2010) following directives:

- 75/439/EEC on the disposal of waste oils (OJ L 194, 25.7.1975, p. 23–25),
- 91/689/EEC on hazardous waste (OJ L 377, 31.12.1991, p. 20–27),
- 2006/12/WE on waste (OJ L 114, 27.4.2006, p. 9–21).

According to Directive "waste" means any substance or object which the holder discards or intends or is required to discard.

Influence on a daily work of mechanical and electrical technicians

A legal framework aimed at the whole waste cycle from generation to disposal, placing the emphasis on recovery and recycling. This promotes the waste hierarchy and when followed by plant level mechanical technicians would reduce the volumes of waste generated at steelworks and its associated disposal costs.

The mechanical technicians do not have an influence on amount of by-products (e.g. slag in steelmaking shop) or waste resulting from a production processes (e.g. scale in hot rolling mill). Their influence is limited to handle waste resulting from maintenance and repair of machines and mechanical installations. In context of analyzed Directive it refers mainly to oils. All waste from the iron and steel industry are specified in COMMISSION DECISION[3] of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste (2000/532/EC; OJ L 226/3, 6.9.2000):

10 02 wastes from the iron and steel industry
10 02 01 wastes from the processing of slag
10 02 02 unprocessed slag
10 02 07* solid wastes from gas treatment containing dangerous substances
10 02 08 solid wastes from gas treatment other than those mentioned in 10 02 07
10 02 10 mill scales
10 02 11* wastes from cooling-water treatment containing oil
10 02 12 wastes from cooling-water treatment other than those mentioned in 10 02 11
10 02 13* sludges and filter cakes from gas treatment containing dangerous substances
10 02 14 sludges and filter cakes from gas treatment other than those mentioned in 10 02 13
10 02 15 other sludges and filter cakes
10 02 99 wastes not otherwise specified
(any waste marked with an asterisk (*) is considered as a hazardous waste).

[3] with amendments introduced by: Commission Decision 2001/118/EC of 16 January 2001 (OJ L47/1, 16.2.2001); Commission Decision 2001/119/EC of 22 January 2001 (OJ L47/32, 16.2.2001); Council Decision 2001/573/EC of 23 July 2001 (OJ L203/18, 28.7.2001)

Especially mechanical technicians, among others employees, should pay special attention on hazardous waste 10 02 07, 10 02 11 and 10 02 13.

Detailed procedures for proceeding with waste and/or hazardous waste, if any, should be determined in individual job description for work-places were mechanical technicians are employed. In case of hazardous waste the proceeding must conform to *articles 17-19* of analyzed Directive, and in case of waste oils respectively the *article 21*.

The analyzed Directive does not have an influence on a daily work of electrical technicians.

1.1.1.2 The Landfill Directive (Landfill of waste)

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste (OJ L182/1 of 16.7.1999).

General characteristic

The aim of this Directive is, by way of stringent operational and technical requirements on the waste and landfills, to provide for measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and on the global environment, including the greenhouse effect, as well as any resulting risk to human health, from landfilling of waste, during the whole lifecycle of the landfill.

Influence on a daily work of mechanical and electrical technicians

The Directive is intended to prevent or reduce the adverse effects of the landfill of waste on the environment. Waste generated in the range of activity of electrical and mechanical technicians needs to be classified according to the provisions of

Directive mentioned in previous chapter (2008/98/EC on waste and Decision 94/3/EC establishing a list of wastes) and this dictates where waste may be landfilled (*article 4*):

- landfill for hazardous waste,
- landfill for non-hazardous waste,
- landfill for inert waste.

1.1.1.3 WEEE Directive and Packaging Directive

Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE)

and

Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

General characteristics

(Directive 2002/96/EC)

The purpose of this Directive is the prevention of waste electrical and electronic equipment (WEEE), and in addition, the reuse, recycling and other forms of recovery of such wastes so as to reduce the disposal of waste.

This Directive shall apply to electrical and electronic equipment falling under the categories set out in annex. For iron and steel industry the categories:

3. IT and telecommunications equipment
5. Lighting equipment
6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
9. Monitoring and control instruments

are suitable.

(Directive 94/62/EC)

This Directive aims to harmonize national measures concerning the management of packaging and packaging waste in order, on the one hand, to prevent any impact thereof on the environment of all Member States as well as of third countries or to reduce such impact, thus providing a high level of environmental protection, and, on the other hand, to ensure the functioning of the internal market and to avoid obstacles to trade and distortion and restriction of competition within the Community. To this end this Directive lays down measures aimed, as a first priority, at preventing the production of packaging waste and, as additional fundamental principles, at reusing packaging, at recycling and other forms of recovering packaging waste and, hence, at reducing the final disposal of such waste.

Influence on a daily work of mechanical and electrical technicians

These two pieces of legislation are greatly affect mechanical and electrical technicians in their day to day duties and how they consign waste packaging (both electrical and mechanical technicians) and electrical / electronic equipment (only electrical technicians) to meet the internal requirements of their company regulations and legislation. All their obligation in that range should be described in individual job description for work-places were mechanical technicians are employed.

1.1.2 Generation of Emissions to Atmosphere

Technicians have the potential to cause the uncontrolled release of emissions to atmosphere through maintenance activities (welding, burning, degassing, regassing) or through the setup of control instrumentation, monitoring systems or pollution abatement plant such as scrubbers, electrostatic precipitators (ESP's) or bag filter units.

1.1.2.1 Integrated pollution prevention and control (IPPC Directive)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (OJ L 24/8 of 29.1.2008).

General characteristic

The purpose of this Directive is to achieve integrated prevention and control of pollution arising from the activities listed in Annex I (*iron and steel industry is placed in section 2 of this Annex*). It lays down measures designed to prevent or, where that is not practicable, to reduce emissions in the air, water and land from the abovementioned activities, including measures concerning waste, in order to achieve a high level of protection of the environment taken as a whole, without prejudice to Directive 85/337/EEC (on the assessment of the effects of certain public and private projects on the environment; OJ L175/40 of 5.7.1985) and other relevant Community provisions.

Influence on a daily work of mechanical and electrical technicians

The European Union (EU) defines the obligations with which industrial activities with a high pollution potential must comply. It establishes a procedure for authorising these activities through a permit to operate and sets minimum requirements to be included in all permits, particularly in terms of pollutants released. The aim is to prevent or reduce pollution to the atmosphere, water and soil, as well as the quantities of waste arising from industrial installations, to ensure a high level of environmental protection. Technicians (both mechanical and electrical) should be aware of the requirements of the permit to ensure no uncontrolled releases occur (e.g. during maintenance activities). The mechanical technicians should apply the best available techniques BAT (see chapter 1.1.2.4) accepted for their workplaces.

1.1.2.2 Pure air for Europe

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L152/1 of 11.6.2008).

General characteristic

This Directive revises European legislation relating to ambient air quality with the aim of reducing pollution to levels which minimise the harmful effects on human health and on the environment and improving information to the public on the risks involved.

Influence on a daily work of mechanical and electrical technicians

This is relevant to the air quality issues surrounding many steelworks (particulate matter of size determined as PM_{10}, $PM_{2.5}$, NO_x, SO_x, etc). Technicians (both mechanical and electrical) should be aware of the regulation of the legislation to ensure no uncontrolled emissions occur (e.g. during maintenance activities).

1.1.2.3 Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast) (OJ L334/49 of 17.12.2010).

General characteristic

This supersedes the Integrated Pollution Prevention & Control Directive (Directive 2008/1/EC is repealed with effect from 7 January 2014) and entered into force on 6th January 2011 and EU member states have 2 years to implement it into national legislation.

Influence on a daily work of mechanical and electrical technicians

As in the chapter 1.1.2.1.

1.1.2.4 Best Available Techniques (BAT) Reference Documents for the Steel Industry (Iron & Steel BREF)

1. Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001

General characteristic

This document covers the environmental aspects of iron and steel making in integrated steelworks (sinter plants, pelletisation plants, coke oven plants, blast furnaces and basic oxygen furnaces including continuous or ingot casting) and electric arc furnace steelmaking.

Short characteristics of BAT for processes covered by this project facilitate the understanding of duties of electrical and mechanical technicians working on positions in the shops where these production processes are realized.

BAT for blast furnaces

The blast furnace remains by far the most important process to produce pig iron from iron containing materials. Because of the high input of reducing agents (mainly coke and coal) this process consumes most of the overall energy input of an integrated steelworks.

Relevant emissions to all media occur and these are described in detail. Therefore the techniques described to consider in the determination of BAT cover all these aspects including minimisation of energy input. The subsequent conclusions are mainly concerned with the reduction of dust from the cast house, treatment of wastewater from blast furnace gas scrubbing, reuse of slag and dusts/sludges and finally the energy input minimisation and the reuse of blast furnace gas.

For blast furnaces, the following techniques or combination of techniques are considered as BAT:

1. Blast furnace gas recovery;
2. Direct injection of reducing agents;

   e.g. a pulverised coal injection of 180 kg/t pig iron is already proven, but higher injection rates could be possible.
3. Energy recovery of top BF gas pressure where prerequisites are present;
4. Hot stoves
   - emission concentration of dust <10 mg/Nm^3 and of NO_x<350 mg/Nm^3 (related to an oxygen content of 3%) can be achieved
   - energy savings where design permits
5. Use of tar-free runner linings;
6. Blast furnace gas treatment with efficient de-dusting;

   Coarse particulate matter is preferably removed by means of dry separation techniques (e.g. deflector) and should be reused. Subsequently fine particulate matter is removed by means of:
   - a scrubber or
   - a wet electrostatic precipitator or
   - any other technique achieving the same removal efficiency;

   A residual particulate matter concentration of < 10 mg/Nm^3 is possible.
7. Cast house de-dusting (tap-holes, runners, skimmers, torpedo ladle charging points);

   Emissions should be minimised by covering the runners and evacuation of the mentioned emission sources and purification by means of fabric filtration or electrostatic precipitation. Dust emission concentrations of 1-15 mg/Nm^3 can be achieved. Regarding fugitive emissions 5-15 g dust/t pig iron can be achieved; thereby the capture efficiency of fumes is important.

   Fume suppression using nitrogen (in specific circumstances, e.g. where the design of the casthouse allows and nitrogen is available).

8. Treatment of blast furnace gas scrubbing wastewater:
   a. Reuse of scrubbing water as much as possible;
   b. Coagulation/sedimentation of suspended solids (residual suspended solids < 20 mg/l can be achieved as an annual average, a single daily value up to 50 mg/l may occur);
   c. Hydrocyclonage of sludge with subsequent reuse of the coarse fraction when grain size distribution allows reasonable separation.
9. Minimising slag treatment emissions and slag to landfill;

   Slag treatment preferably by means of granulation where market conditions allow.

   Condensation of fume if odour reduction is required.

   Whenever pit slag is produced, forced cooling with water should be minimised or avoided where possible and where space restrictions allow.
10. Minimising solid waste/by-products.

    For solid wastes, the following techniques are considered BAT in descending order of priority:

    a. Minimising solid waste generation;
    b. Effective utilisation (recycling or reuse) of solid wastes/by-products; especially recycling of coarse dust from BF gas treatment and dust from cast house de-dusting, complete reuse of slag (e.g. in the cement industry or for road construction);
    c. Controlled disposal of unavoidable wastes/by-products (fine fraction of sludge from BF gas treatment, part of the rubble).

In principle the techniques listed as points 1 - 10 are applicable to both new and existing installations considering the preface.

BAT for basic oxygen steelmaking and casting

The objective of oxygen steelmaking is to oxidise the undesirable impurities still contained in the hot metal from blast furnaces. It includes the pre-treatment of hot metal, the oxidation process in the basic oxygen furnace, secondary metallurgical treatment and casting (continuous and/or ingot). The main environmental issues are emissions to air from various sources as described and various solid waste/by-products which are also described. In addition wastewater arises from wet de-dusting (when applied) and from continuous casting. Consequently the techniques to consider in the determination of BAT cover these aspects as well as the recovery of basic oxygen furnace gas. The conclusions are mainly concerned with minimisation of dust emissions from the different sources and measures to reuse/recycle solid waste/by-products, wastewater from wet de-dusting and the recovery of basic oxygen furnace gas.

For basic oxygen steelmaking and casting, the following techniques or combination of techniques are considered as BAT:

1. Particulate matter abatement from hot metal pre-treatment (including hot metal transfer processes, desulphurisation and deslagging), by means of:
   - Efficient evacuation;
   - Subsequent purification by means of fabric filtration or ESP.

   Emission concentrations of 5-15 mg/Nm^3 are achievable with bag filters and 20-30 mg/Nm^3 with ESP.
2. BOF gas recovery and primary de-dusting, applying:
   - Suppressed combustion and
   - Dry electrostatic precipitation (in new and existing situations) or
   - Scrubbing (in existing situations).

   Collected BOF gas is cleaned and stored for subsequent use as a fuel. In some cases, it may not be economical or, with regard to appropriate energy management, not feasible to recover the BOF gas. In these cases, the BOF gas may be combusted with generation of steam. The kind of combustion (full

combustion or suppressed combustion) depends on the local energy management.

Collected dusts and/or sludges should be recycled as much as possible. Note the usually high zinc content of the dust/sludge. Special attention should be paid to the emissions of particulate matter from the lance hole. This hole should be covered during oxygen blowing and, if necessary, inert gas injected into the lance hole to dissipate the particulate matter.

3. Secondary de-dusting, applying:
   - Efficient evacuation during charging and tapping with subsequent purification by means of fabric filtration or ESP or any other technique with the same removal efficiency. Capture efficiency of about 90% can be achieved. Residual dust content of 5-15 mg/Nm^3 in case of bag filters and of 20-30 mg/Nm^3 in case of ESP can be achieved. Note the usually high zinc content of the dust.
   - Efficient evacuation during hot metal handling (reladling operations), de-slagging of hot metal and secondary metallurgy with subsequent purification by means of fabric filtration or any other technique with the same removal efficiency. For these operations emission factors below 5 g/t LS are achievable.

   Fume suppression with inert gas during reladling of hot metal from torpedo ladle (or hot metal mixer) to charging ladle in order to minimise fume/dust generation.
4. Minimisation/abatement of emissions to water from primary wet de-dusting of BOF gas applying the following measures:
   - Dry BOF gas cleaning can be applied when space permits;
   - Recycling of scrubbing water as much as possible (e.g. by means of CO_2 injection in case of suppressed combustion systems);
   - Coagulation and sedimentation of suspended solids; 20 mg/l suspended solids can be achieved.

5. Abatement of emissions to water from direct cooling at the continuous casting machines by:
   - Recycling of process and cooling water as much as possible;
   - Coagulation and sedimentation of suspended solids;
   - Removal of oil using skimming tanks or any other effective device;
6. Minimisation of solid waste

   For solid waste generation, the following techniques are considered BAT in descending order of priority:
   - Minimising waste generation
   - Effective utilisation (recycling or reuse) of solid wastes/by-products; especially
   - recycling of BOF slag and coarse and fine dust from BOF gas treatment
   - Controlled disposal of unavoidable wastes

In principle the techniques according to items 1 - 6 are applicable to new as well as to existing installations (if there are no other indications) considering the preface.

BAT for electric steelmaking and casting

The direct smelting of iron-containing materials, mainly scrap is usually performed in electric arc furnaces which need considerable amounts of electric energy and causes substantial emissions to air an solid wastes/by-products mainly filter dust and slags. The emissions to air from the furnace consist of a wide range of inorganic compounds (iron oxide dust and heavy metals) and organic compounds such as the important organochlorine compounds chlorobenzenes, PCB and PCDD/F. The techniques to consider in the determination of BAT reflect this and focus on these issues. In the conclusions, regarding emissions to air, dust and PCDD/F are the most relevant parameters. Scrap preheating is also considered as BAT just as reuse/recycling of slags and dusts.

For electric steelmaking and casting, the following techniques or combination of techniques are considered as BAT:

1. Dust collection efficiency
   - With a combination of direct off gas extraction (4th or 2nd hole) and hood systems or
   - dog-house and hood systems or
   - total building evacuation 98% and more collection efficiency of primary and secondary emissions from EAF are achievable.
2. Waste gas de-dusting by application of:
   - Well-designed fabric filter achieving less than 5 mg dust/Nm3 for new plants and less than 15 mg dust/Nm^3 for existing plants, both determined as daily mean values.

   The minimisation of the dust content correlates with the minimisation of heavy metal emissions except for heavy metals present in the gas phase like mercury.
3. Minimising of organochlorine compounds, especially PCDD/F and PCB emissions, by means of:
   - appropriate post-combustion within the off gas duct system or in a separate postcombustion chamber with subsequent rapid quenching in order to avoid de novo synthesis and/or
   - injection of lignite powder into the duct before fabric filters.

   Emission concentrations of PCDD/F 0.1 - 0.5 ng I-TEQ/Nm3 are achievable.
4. Scrap preheating (in combination with 3.) in order to recover sensible heat from primary off gas
   - With scrap preheating of part of the scrap about 60 kWh/t can be saved, in case of preheating the total scrap amount up to 100 kWh/t liquid steel can be saved. The applicability of scrap preheating depends on the local circumstances and has to be proved on a plant by plant basis. When apply-

ing scrap preheating it has to be taken care of possibly increased emissions of organic pollutants.

5. Minimising solid waste/by-products

For solid wastes, the following techniques are considered BAT in descending order of priority:

- Minimisation of waste generation
- Waste minimisation by recycling of EAF slags and filter dusts; depending on local circumstances filter dust can be recycled to the electric arc furnace in order
- To achieve a zinc enrichment up to 30%. Filter dust with zinc contents of more than 20% can be used in the non-ferrous metal industry.
- Filter dusts from the production of high alloyed steels can be treated to recover alloying metals.
- For solid wastes, which cannot be avoided or recycled, the generated quantity should be minimised. If all minimisation/reuse is hampered, controlled disposal is the only option.

6. Emissions to water

- Closed loop water cooling system for the cooling of furnace devices.
- Wastewater from continuous casting
- Recycling of cooling water as much as possible
- Precipitation/sedimentation of suspended solids
- Removal of oil in shimming tanks or any other effective device.

In principle the techniques according to items 1 - 6 are applicable to new as well as to existing installations considering the preface.

2. Reference Document on Best Available Techniques in the Ferrous Metals Processing Industry, December 2001

General characteristic

BAT for hot rolling

In hot rolling the size, shape and metallurgical properties of steel are changed by repeatedly compressing the hot metal (temperature ranging from 1050 to 1300 ^{0}C) between electrically powered rollers. The steel input for hot rolling varies in form and shape - cast ingots, slabs, blooms, billets, beam blanks - depending on the product to be manufactured. Products obtained from hot rolling are usually classified in two basic types according to their shape: flat and long products.

Hot rolling mills usually comprise the following process steps: conditioning of the input (scarfing, grinding); heating to rolling temperature; descaling; rolling (roughing including width reduction, rolling to final dimension and properties) and finishing (trimming, slitting, cutting). They are classified by the type of product that they produce and by their design features: blooming and slabbing mills, hot strip mills, plate mills, bar and rod mills, structural and section mills and tube mills.

The main environmental issues of hot rolling are emissions to air, especially NOx and SO_x; the energy consumption of furnaces; (fugitive) dust emissions from product handling, rolling or mechanical surface treatment; oil- and solid-containing effluents and oil-containing wastes.

For NO_x emissions of reheating and heat treatment furnaces, industry reported concentrations of 200 – 700 mg/Nm³ and specific emissions of 80 – 360 g/t; while other sources reported up to 900 mg/Nm^3 and – with combustion air preheating of up to 1000 ^{o}C – of up to more than 5000 mg/Nm³. SO_2 emissions from furnaces depend on the fuel used; ranges were reported from 0.6 – 1700 mg/Nm³ and 0.3 – 600 g/t. The scattering of energy consumption for these furnaces was 0.7 to 6.5 GJ/t; with a typical range being 1 – 3 GJ/t.

As for dust emissions from product handling, rolling or mechanical surface treatment, very few data were submitted referring to the individual processes. The concentration ranges reported were:

- Scarfing: 5 – 115 mg/Nm³
- Grinding: < 30 – 100 mg/Nm³
- Mill stands: 2 – 50 mg/Nm³ and
- Coil handling: approximately 50 mg/Nm³.

Emissions to water from hot rolling basically comprise oil- and solid-containing effluents in the range of 5 to 200 mg/l total suspended solids and 0.2 – 10 mg/l hydrocarbons. Oil-containing wastes from waste water treatment were reported ranging from 0.4 – 36 kg/t depending on the mill type.

The key findings regarding BAT for individual process steps and different environmental issues of hot rolling are summarized in Table 1. All emission figures are expressed as daily mean values. Emissions to air are based on standard conditions of 273 K, 101.3 kPa and dry gas. Discharges to water are indicated as daily mean value of a flow-rate-related 24-hour composite sample or a flow-rate-related composite sample over the actual operating time (for plants not operated in three shifts).

There was consensus in the TWG on the best available techniques and associated emission/consumption levels presented in the table, except where a “split view” is explicitly recorded.

Key findings regarding BAT and associated emission/consumption levels for hot rolling:

Best Available Techniques / Split views on BAT	BAT-associated emission and consumption levels / Split views on associated levels
Storing and handling of raw materials and auxiliaries	
• Collection of spillages and leakages by suitable measures, e.g. safety pits and drainage.	
• Separation of oil from the contaminated drainage water and reuse of recovered oil.	
• Treatment of separated water in the water treatment plant.	
Machine scarfing	
• Enclosures for machine scarfing and dust abatement with fabric filters.	split view on dust level: < 5 mg/Nm³ < 20 mg/Nm³
• Electrostatic precipitator, where fabric filters cannot be operated because of very wet fume.	split view on dust level: < 10 mg/Nm³ 20 - 50 mg/Nm³
• Separate collection of scale/swarf from scarfing.	
Grinding	
• Enclosures for machine grinding and dedicated booths, equipped with collection hoods for manual grinding and dust abatement by fabric filters	split view on dust level: < 5 mg/Nm³ < 20 mg/Nm³
All surface rectification processes	
• Treatment and reuse of water from all surface rectification processes (separation of solids).	
• Internal recycling or sale for recycling of scale, swarf and dust.	
Re-heating and heat treatment furnaces	
• General measures, e.g. regarding furnace design or operation & maintenance, as described in chapter A.4.1.3.1.	
• Avoiding excess air and heat loss during charging by operational measures (minimum door opening necessary for charging) or structural means (installation of multisegmented doors for tighter closure).	
• Careful choice of fuel and implementation of furnace automation/control to optimise the firing conditions: - for natural gas - for all other gases and gas mixtures - for fuel oil (< 1% S)	SO_2 levels: < 100 mg/Nm^3 < 400 mg/Nm^3 up to 1700 mg/Nm³
Split view: - limitation of sulphur content in fuel to < 1% is BAT - lower S limit or additional SO2 reduction measures is BAT	

Key findings regarding BAT and associated emission/consumption levels for hot rolling (continued):

Best Available Techniques / Split views on BAT	BAT-associated emission and consumption levels / Split views on associated levels
• Recovery of heat in the waste gas by feedstock pre-heating • Recovery of heat in the waste gas by regenerative or • recuperative burner systems • Recovery of heat in the waste gas by waste heat boiler or • evaporative skid cooling (where there is a need for steam)	Energy savings 25 - 50% and NO_x reductions potentials of up to 50% (depending on system).
• Second generation low-NO_x burners	NO_x 250 - 400 mg/Nm³ (3% O_2) without air pre-heating reported NO_x reduction potential of about 65% compared to conventional.
• Limiting the air pre-heating temperature. Trade-off energy saving vs. NO_x emission: Advantages of reduced energy consumption and reductions in SO2, CO_2 and CO have to be weighed against the disadvantage of potentially increased emissions of NO_x	
Split view: - SCR and SNCR are BAT - Not enough information to decide whether or not SCR/SNCR are BAT	achieved levels: SCR: NOx < 320 mg/Nm^3 SNCR: NOx < 205 mg/Nm³ , ammonia slip 5 mg/Nm3
• Reduction of heat loss in intermediate products; by minimizing the storage time and by insulating the slabs/blooms (heat conservation box or thermal covers) depending on production layout. • Change of logistic and intermediate storage to allow for a maximum rate of hot charging, direct charging or direct rolling (the maximum rate depends on production schemes and product quality).	
• For new plants, near-net-shape casting and thin slab casting, as far as the product to be rolled can be produced by this technique.	
Descaling	
• Material tracking to reduce water and energy consumption.	
Transport of rolled stock	
• Reduce unwanted energy loss by coil boxes or coil recovery furnaces and heat shields for transfer bars.	

Key findings regarding BAT and associated emission/consumption levels for hot rolling (continued):

Best Available Techniques / Split views on BAT	BAT-associated emission and consumption levels / Split views on associated levels
Finishing train	
• Water sprays followed by waste water treatment in which the solids (iron oxides) are separated and collected for reuse of iron content.	
• Exhaust systems with treatment of extracted air by fabric filters and recycling of collected dust.	split view on dust level: < 5 mg/Nm³ < 20 mg/Nm³
Levelling and welding	
• Suction hoods and subsequent abatement by fabric filters	split view on dust level: < 5 mg/Nm³ < 20 mg/Nm³
Cooling (machines etc.)	
• Separate cooling water systems operating in closed loops	
Waste water treatment/ scale- and oil-containing process water	
• Operating closed loops with recirculating rates of > 95%	
• Reduction of emissions by using a suitable combination of treatment techniques (described in detail in Chapters A.4.1.12.2 and D.10.1).	SS: < 20 mg/l Oil: < 5 mg/l Fe: < 10 mg/l Crtot: < 0.2 mg/l Ni: < 0.2 mg/l Zn: < 2 mg/l
• Recirculation of mill scale collected in water treatment to the metallurgical process • Oily waste/sludge collected should be de-watered to allow for thermal utilisation or safe disposal.	
Prevention of hydrocarbon contamination	
• Preventive periodic checks and preventive maintenance of seals, gaskets, pumps and pipelines. • Use of bearings and bearing seals of modern design for work- and back-up rolls, installation of leakage indicators in the lubricant lines (e.g. at hydrostatic bearings). • Collection and treatment of contaminated drainage water at the various consumers (hydraulic aggregates), separation and use of oil fraction, e.g. thermal utilisation by blast furnace injection. Further processing of the separated water either in the water treatment plant or in dressing plants with ultra filtration or vacuum evaporator.	Reduction in oil consumption by 50-70%.

Key findings regarding BAT and associated emission/consumption levels for hot rolling (continued):

Best Available Techniques / Split views on BAT	BAT-associated emission and consumption levels / Split views on associated levels
Roll shops	
• Use of water-based degreasing as far as technically acceptable for the degree of cleanliness required. • If organic solvents have to be used, preference is to be given to non-chlorinated solvents. • Collection of grease removed from roll trunnions and proper disposal, such as by incineration. • Treatment of grinding sludge by magnetic separation for recovery of metal particles and recirculation into the steelmaking process. • Disposal of oil- and grease-containing residues from grinding wheels, e.g. by incineration. • Deposition of mineral residues from grinding wheels and of worn grinding wheels in landfills. • Treatment of cooling liquids and cutting emulsions for oil/water separation. Proper disposal of oily residues, e.g. by incineration. • Treatment of waste water effluents from cooling and degreasing as well as from emulsion separation in the hot rolling mill water treatment plant. • Recycling of steel and iron turnings into the steelmaking process.	

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians should be aware in all their activities that Best Available Techniques assign limits of emission and consumption levels with reference to all environmental aspects.

1.1.3 Generation of Emissions to Water

1.1.3.1 Water Framework Directive (Water protection and management)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (OJ L 327/1 of 22.12.2000)[4].

General characteristic

The European Union (EU) has established a framework for the protection of: inland surface waters, groundwater, transitional waters and coastal waters.

This Framework-Directive has a number of objectives, such as preventing and reducing pollution, promoting sustainable water usage, environmental protection, improving aquatic ecosystems and mitigating the effects of floods and droughts.

Its ultimate objective is to achieve “good ecological and chemical status” for all Community waters by 2015.

Influence on a daily work of mechanical and electrical technicians

Technicians (both mechanical and electrical) have the potential to cause the uncontrolled release of contaminants to controlled waters through maintenance activities (replacement of fluids such as coolants/oils, etc., blow down of cooling towers, chemical storage, etc.) or through the setup of control instrumentation and monitoring systems.

[4] Amended by: Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 (OJ L331/1 of 15.12.2001); Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 (OJ L81/60 of 20.3.2008); Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 (OJ L348/84 of 24.12.2008); Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L140/114 of 5.6.2009).

1.1.3.2 Integrated pollution prevention and control (IPPC Directive)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

Described in chapter 1.1.2.1.

1.1.3.3 Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast)

Described in chapter 1.1.2.3.

1.1.4 Climate Change & Energy Efficiency

Technicians have the potential to impact the emissions and energy performance of the plants on which they operate through maintenance activities (replacement of drives/motors, balancing of extraction systems, furnace combustion optimisation) or through the setup of control instrumentation and monitoring systems. The relevant directives are described in chapters 1.1.2.1 and 1.1.2.3.

1.2 Health and safety legislation

Health and safety issues are very important in the policy of European Union. In consolidated version of the Treaty on European Union and the Treaty on the Functioning of the European Union[5] Article 156 (ex Article 40 TEC) expresses Union policy related to environmental matters:

> TITLE X
> **SOCIAL POLICY**
> *Article 156*
> (ex Article 140 TEC)
> With a view to achieving the objectives of Article 151 and without prejudice to the other provisions of the Treaties, the Commission shall encourage cooperation between the Member States and facilitate the coordination of their action in all social policy fields under this Chapter, particularly in matters relating to:
> — employment,
> — labour law and working conditions,
> — basic and advanced vocational training,
> — social security,
> — prevention of occupational accidents and diseases,
> — occupational hygiene,
> — the right of association and collective bargaining between employers and workers.
> To this end, the Commission shall act in close contact with Member States by making studies, delivering opinions and arranging consultations both on problems arising at national level and on those of concern to international organisations, in particular initiatives aiming at the establishment of guidelines and indicators, the organisation of exchange of best practice, and the preparation of the necessary elements for periodic monitoring and evaluation. The European Parliament shall be kept fully informed.
> Before delivering the opinions provided for in this Article, the Commission shall consult the Economic and Social Committee.

European Union legislation in the range of health and safety issues gives general framework. More specific, precise and detailed regulation, depending on local condition, was developed on company level (chapter 4).

[5] OJ 2010/C 83/01

All of the following directives should be combined with the most imported of them – The Health and Safety FRAMEWORK DIRECTIVE - Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OJ L181/1 of 29.6.1989).

General characteristic

This directive contains the basic information from the OHS (Occupational Health and Safety) and the following directives are to develop and refine its provisions.

The object of this Directive is to introduce measures to encourage improvements in the safety and health of workers at work. To that end it contains general principles concerning the prevention of occupational risks, the protection of safety and health, the elimination of risk and accident factors, the informing, consultation, balanced participation in accordance with national laws and/or practices and training of workers and their representatives, as well as general guidelines for the implementation of the said principles.

Influence on a daily work of mechanical and electrical technicians

Directive creates general frames both for employers and employees (independent on skills and posts – so including mechanical and electrical technicians). The duties of employers cover: general obligations; protective and preventive services; first aid, fire-fighting and evacuation of workers, serious and imminent danger; worker information; consultation and participation of workers; training of workers. The duties of employees cover the responsibility of each worker to take care as far as possible of his own safety and health and that of other persons affected by his acts or Commissions at work in accordance with his training and the instructions given by his employer.

1.2.1 Workplace requirements

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (OJ L393/1 of 30.12.1989).

General characteristic

This Directive applies to all employees in all workplaces.

Influence on a daily work of mechanical and electrical technicians

This Directive describes (independent on skills and posts – so including mechanical and electrical technicians) minimum safety and health requirements for workplaces used for the first time and for workplaces already in use.

1.2.2 Dangerous agents at work

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L131/11 of 5.5.1998).

General characteristic

This Directive lays down minimum requirements for the protection of workers from risks to their safety and health arising, or likely to arise, from the effects of chemical agents that are present at the workplace or as a result of any work activity involving chemical agents.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are at risk of exposure to hazardous chemicals and industrial gases while performing their daily duties such as repairs and maintenance of machines and installations, and moving around the site.

1.2.3 Exposure to chemical agents and chemical safety

There are many directives, which determine the maximal exposure limit values at workplace.

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company.

Directive 2004/37/EC - carcinogens or mutagens at work of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC (OJ L158/50 of 30.4.2004).

General characteristic

This Directive has as its aim the protection of workers against risks to their health and safety, including the prevention of such risks, arising or likely to arise from exposure to carcinogens or mutagens at work. It lays down particular minimum requirements in this area, including limit values.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company. In metallurgical processes or processes carried out in metallurgical companies (e.g. welding) carcinogens or mutagens (e.g. dioxins, furans, polycyclic aromatic

hydrocarbons, compounds of chromium, nickel) could be created or could be released.

Directive 2009/161/EU - indicative occupational exposure limit values of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC (Text with EEA relevance) (OJ L338/87 of 19.12.2009).

General characteristic

This Directive established a third list of Community indicative occupational exposure limit values for the chemical agents.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company. In metallurgical processes or processes carried out in metallurgical companies some agents listed in this Directive (e.g. sulphuric acid, hydrogen sulphide) could be created or could be released.

Directive 2009/148/EC - exposure to asbestos at work of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (Text with EEA relevance) (OJ L330/28 of 16.12.2009).

General characteristic

This Directive has as its aim the protection of workers against risks to their health, including the prevention of such risks, arising or likely to arise from exposure to asbestos at work. It lays down the limit values for this exposure, as well as other specific requirements.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company.

Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work (OJ L142/47 of 16.6.2000).

General characteristic

This Directive established a first list of Community indicative occupational exposure limit values for the chemical agents.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company. In metallurgical processes or processes carried out in metallurgical companies some agents listed in this Directive (e.g. chlorobenzene, hydrogen chloride, hydrogen fluoride) could be created or could be released.

Directive 2006/15/EC - indicative occupational exposure limit values of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC (OJ L38/36 of 9.2.2006).

General characteristic

This Directive established a second list of Community indicative occupational exposure limit values for the chemical agents.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company. In metallurgical processes or processes carried out in metallurgical companies some agents listed in this Directive (e.g. chlorine, phosphine, carbon dioxide) could be created or could be released.

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work (OJ L177/22 of 5.7.1991).

General characteristic

This Directive established a list of Community indicative occupational exposure limit values for the chemical agents.

Influence on a daily work of mechanical and electrical technicians

Mechanical and electrical technicians are exposed to the same risks while performing their duties (maintenance and repairs) like other workers in the company. In metallurgical processes or processes carried out in metallurgical companies some agents listed in this Directive (e.g. nitrogen monoxide, tin (inorganic compounds as Sn) could be created or could be released.

1.2.4 Noise

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L42/38 of 15.2.2003).

General characteristic

This Directive lays down minimum requirements for the protection of workers from risks to their health and safety arising or likely to arise from exposure to noise and in particular the risk to hearing.

Influence on a daily work of mechanical and electrical technicians

Whether employees (independent on skills and posts – so including mechanical and electrical technicians) move around the company, as well as performing their duties on different departments, they are exposed to background noise (from other workplaces) and they use the devices which are emitting noise and vibrations.

1.2.5 Artificial optical radiation

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L114/38 of 27.4.2006).

General characteristic

This Directive lays down minimum requirements for the protection of workers from risks to their health and safety arising or likely to arise from exposure to artificial optical radiation during their work.

Influence on a daily work of mechanical and electrical technicians

Whether employees (independent on skills and posts – so including mechanical and electrical technicians) move around the company, as well as performing their duties on different departments, they are exposed to artificial optical radiation from other workplaces.

1.2.6 Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment (OJ L399/18 of 30.12.1989).

General characteristic

The aim of the Directive is to ensure the free movement of personal protective equipment (PPE) within the Community market by completely harmonizing the essential safety requirements to which it must conform.

Influence on a daily work of mechanical and electrical technicians

Technicians and electricians while performing their duties should be provided with appropriate PPE in accordance with the scope of their work.

In addition, due to occurrence of different risks in different departments of the plant, they should do their work with appropriate collective protection or should be equipped with PPE provided for employees of this department.

2. Analysis of roadmaps and strategies for the European steel industry

Unfortunately steel sector does not have a document about its development prepared with foresight methods. The lack of this kind of the technological forecast is only partly replaced by other documents. In this chapter some of them, relevant to development of iron and steel industry, have been analyzed to determine these findings which influence the evolution of requirements in the range of environmental and health and safety issues, especially for those posts where employees with skills, qualifications and competences of mechanical and electrical technicians could be employed.

2.1 European Steel Technology Platform - vision 2030[6]

The ambition of European Steel Technology Platform (ESTEP) is to assume a sustainable and global leadership in the coming 30 years. The main challenges to achieve that are:

- growing impact of globalisation,
- matching steel supply to demand,
- environmental constraints,
- changing EU regulation,
- EU enlargement.

The strategic objectives were defined as:

- profit trough innovation,
- meet society needs in close partnership with its customers,
- meet environmental requirements,
- attract and secure qualified people.

[6] Report of the Group of Personalities, March 2004

Today, the European steel industry exploits the most modern and efficient facilities. This leadership has been achieved after a long process of restructuring and consolidation and now, facing up to globalisation, it's the industry's ambition to maintain this position through the implementation of a sustainable development policy that will meet society's need while remaining competitive.

It will face some important challenges such as competitiveness with emerging countries, the necessity to respond to more demanding markets, and the need to make a clear commitment to saving natural resources to meet exacting environmental regulations, in particular, to significantly reduce CO_2 emissions. These challenges will require determined long-term structured action supported by a coordinated system and the participation of all stakeholders.

In particular, environmental issues and the development of new steel solutions for many applications will necessitate the implementation of new production routes. In this respect, breakthrough technologies will be particularly important and, as a consequence, a large effort in R&D and innovation will be required. The issues of security and competence of human resources must also be developed in parallel with these activities.

The base for future development of European steel sectors, among others, is increased public awareness of environmental issues which have driven industry operations towards environmentally "friendly" and more "greener" products and technologies.

As far as environmental policies are concerned, various instruments are being introduced or considered, nationally and at EU level (majority of them discussed in chapters 1 and 3). For the steel industry, initiatives with a potentially significant impact include: integrated pollution prevention and control permits, air quality standards and the Clean Air For Europe programme, new product and waste legislation (such as the end-of-life vehicles directive) and the thematic strategies on natural resources and waste prevention and recycling, as well as new EU legislation on chemicals ("REACH"). Another new piece of EU legislation that is im-

portant for the EU steel industry is the greenhouse gas emissions trading scheme which was introduced in order to implement commitments made by EU Member States in the Kyoto Protocol. Across the whole EU economy the costs for implementing these commitments could be considerable. The risk that European steel producers could see a loss of business to non-EU competitors which are not subject to any CO_2 emissions limitations cannot be neglected.

The ambition of the European steel industry to maintain and reinforce a global leadership is developed around the concepts based on the four principles of sustainable growth:

- profit,
- partners,
- planet,
- people.

Profit should be ensuring through innovation and new technologies.

Integration of the production processes is the one of concepts which developing is based on success of so called “thin-slab-casting”, where slab casted in continuous casting machine to the reduced thickness is subsequently hot rolled to the coil. Further innovation in that field is focusing on the project called “thin strip casting”. This process is being operated in a few industrial pilot plants for stainless steels. Many problems remain to be solved before applying thin strip casting to the mass production of high- quality steel grades such as those used in automobile manufacturing.

Specific research activities are currently being conducted in investigating breakthrough concepts in annealing and coating operations. Much more compact lines for continuous annealing and hot dip galvanising with very short response times and extended ranges of capability would fit better, which is precisely the objective of present investigations. New technologies for heating and cooling steel strip in a fast and controllable way are under development. In parallel, intensive metal-

lurgical research is being conducted in order to profit from opportunities presented by new thermal cycles for designing new products, especially for cars.

A major challenge for the ongoing research work in the area of coating is to bring new processes into operation that are able to deposit several types of top-quality coatings, ideally suited to the specific application of the final product, in multi-purpose compact facilities. To achieve this target and to fulfil environmental obligations, vacuum and plasma technologies are being investigated.

Other field of innovation of production is intelligent manufacturing. Where conventional technologies are mature and robust enough to guarantee stable performance, intelligent manufacturing technology should contribute to developing more flexible production processes.

The utilisation of steel is essential for meeting the future requirements of society and creating new market opportunities. Society is still demanding more from materials to be used in these areas, and the steel sector is continually striving to provide solutions to these new challenges.

In the future it will have to address different needs, in particular the need for more green products (reduced energy demand and minimised pollution in production, less material consumption and optimised reuse), by taking new supply- and demand-side initiatives in the context of EU integrated product policy.

Over the last 50 years, the concentration of CO_2 in the atmosphere increased from 280 ppm to today's level of 360 ppm. This phenomenon could lead to a worldwide rise in temperature by 1.4 to 5.2℃ by th e end of this century.

On the other side the steel industry over the last 50 years made systematic progress in steel-making resulting in the halving of the CO_2 emissions per tonne of steel produced. This was achieved largely due to the reduction of coke consumption in blast furnaces and the increased availability of scrap to be recycled either in basic oxygen furnaces or mainly in electric arc furnaces.

The steel industry still represents an important share of the European anthropogenic CO_2 emissions (6%), and therefore remains a sector of specific importance.

Further major improvements in integrated steelmaking (blast furnace) cannot to be expected. In the integrated steel-making route, coke and coal are not primarily fossil fuels but are reducing agents that cannot be replaced currently under economically viable conditions. Today, about 1.8 tonnes of CO_2 are emitted per tonne of steel, which represents almost the theoretical limit for the process. Therefore, to make meaningful progress in the reduction of CO_2 emissions a new approach and breakthrough technologies for reduction of iron ore are required. This idea has led to the initiative of ULCOS project (Ultra Low CO_2 Mitigation), in which the most promising technologies will be studied in detail and tested on a pilot scale.

Recent collaborative studies by the steel sector (Ultra Light Steel Auto Body Programme - ULSAB, Ultra Light Steel Auto Suspension Programme - ULSAS, Ultra Light Steel Auto Closure Programme - ULSAC) have demonstrated the capacity to reduce the weight of car bodies, suspensions and closures by around 25%, leading to a decrease in CO_2 emissions in the environment, improved safety, and material recyclability. This has been made possible using new steel products and new steel solutions. These programmes demonstrate the potential of steel as a high-performance material for mass production and for achieving cost advantages with better or equal performance results.

It is estimated that steel-making activities in Europe produce about 10 million tonnes waste for disposal annually. This waste of resources and land area are not sustainable and must be reduced in the future. 80% of them consist of slag and iron-bearing dusts and sludges which can be transformed into raw materials for other users or usable products. It is called “zero waste” concept.

At present e.g., the recyclability of many iron-bearing process dusts or sludges is limited by their fine particle size, the presence of hazardous elements or com-

pounds, or other chemical/physical properties. Various technologies have been developed (e.g. Oxicup, RHF furnace, Shaft Furnace), or are under development (e.g. Primus, hydrometallurgy), to separate iron from other undesired elements and, at the same time, to ensure that the remaining non-ferrous fraction is returned to non-ferrous recycling streams. The development of such technologies should be encouraged in the future.

Summarizing it could be stated that development of new processing routes will create opportunities for new metallurgical processes and new families of products, changing and opening up further the opportunities for new product solutions.

2.2 Technology roadmap research program for the steel industry[7]

The United States Department of Energy (DOE) and the American Iron and Steel Institute (AISI) recently completed a cost shared research and development programme entitled "Technology roadmap research programmme for the steel industry" (TRP). The purpose of the programme was to save energy, increase competitiveness and improve the environment. It ran from July 14, 1997, to December 31.2008. During the decade-long history of technology Roadmap Programme (TRP), $38 million was invested in 47 research projects performed by 28 unique R&D organizations.

In 2008, an average of 1.19 tons of CO_2 was emitted for every ton of steel produced in the U.S. This is less than any major steel producing country in the world. The U.S. steel industry has reduced its energy intensity per ton of steel shipped by over 30% since 1990. It is difficult to say how much of this has been accomplished through the TRP. Some TRP technologies enter the industry very quickly, e.g. Laser Contouring of vessels and CFD modeling. Others, like Alternative Ironmaking, take longer.

[7] American Iron and Steel Institute, Final report, December 2010

Large improvements in the efficiency of the modern blast furnace are very difficult to accomplish. Process is over 100 years old and has reached a very high level of sophistication. Process is highly complex. Improving this process requires precise measurements, although understanding of all its operations and ability to visualize their interaction, predict their outcome, and control them.

One method to do it is building a “virtual blast furnace” using computational fluid dynamics (CFD). This modeling can increase the level of Pulverized Coal Injection (PCI) into blast furnace. PCI is not a new technology, however by to now the amount of coal that can be injected into blast furnace has been limited to 250 – 300 pounds per ton of hot metal. The CPD technology let to increase this amount over 500 pounds per ton of hot metal. Now the technology is almost ready to be implemented on commercial level.

Ways to eliminate CO_2 from the iron ore reduction process include the use of alternative fuels (e.g. hydrogen) and use of electricity directly to break the iron-oxygen bonds in iron ore. The carbon-hydrogen-electron triangle (by Jean-Pierre Birat) graphically represents some alternative ironmaking processes. The TRP investigated six potential alternative ironmaking processes. Three of them have the potential to greatly reduce CO_2 emissions:

- Suspension Reduction of Iron Ore Concentrates Using Hydrogen,

  suspension or flash type furnace to smelt iron ore concentrates; three different reductants are suitable for this type of vessel: hydrogen, natural gas or synthetic gas produced from the partial combustion of coal and / or waste plastics;

- Molten Oxide Electrolysis (MOE),

  in this process molten iron and oxygen gas are produced by passing an electric current between two electrodes immersed in a molten alt solution containing dissolved iron oxide;

- Paired Straight Hearth Furnace (PSH),

  furnace is charged with cold bound self-reducing pellets that are composed of iron oxide and coal; when heated, the iron oxide is chemically re-

duce to produce a 95% metalized pellets suitable for making steel in an electric arc furnace.

In steelmaking processes some innovation development were supported in the frame of TRP:

- Optimization of Post Combustion in the BOF (Basic Oxygen Furnace) and EAF (Electric Arc Furnace),

  project is dealing with optimization of CO post combustion in the way that majority of energy is transferring back into the steel making process;
- Optical Sensors for Prediction of Carbon and Temperature in BOF and EAF Furnaces,

  a laser-based sensor was designed that possible in situ monitoring the relative concentration of CO and CO_2 in the laser beam path and the off-gass temperature; this allows to tune the steelmaking process dynamically, thereby taking advantage of all the available energy;
- Laser Contouring System,

  system is measuring the refractory lining thickness in vessels processing molten steel; it facilitates to spray replacement refractories in proper locations.

There are two more TRP projects, which results in future could play significant role in steel industry:

- Sustainable Steelmaking Using Biomass and Waste Oxides,

  this process would replace the coke oven, blast furnace and basic oxygen furnace with a rotary hearth reduction furnace fed with self-reducing pellets and a "smelting" vessel; the partially reduced iron pellet from the rotary hearth is hot charged into a smelting vessel to produce hot metal; this process lends itself to small-scale operations that recycle solid iron-bearing waste oxides generated during ironmaking and steelmaking and coal, coke, or charcoal fines; as envisioned by researches, a self-reducing pellet is made from waste oxides and charcoal; this charcoal can come from any source, including sawmill waste;
- Sequestration of CO_2 by Hydrous Carbonate Formation with Reclaimed Slag,

  project demonstrates that a new process to react steelmaking slag with the off-gas from steelmaking has the potential of sequestering 6-11% of

the CO_2 emissions from integrated mills and 35-45% of the CO_2 emissions from electric furnace plants.

2.3 2008 sustainability report of the world steel industry[8]

This document is structured in three main parts:

- environmental sustainability,
- social sustainability,
- economic sustainability.

In the range of environmental sustainability breakthrough technologies are responsible for future shape of the sector.

Today's steelmaking processes have optimized energy use. Therefore, only fundamentally new processes and the next generation of steelmaking technology can make a significant further reduction in CO_2 emissions. The worldsteel CO_2 Breakthrough Programme is a platform for exchange on long-term research and development. As modern steelmaking is already highly energy and CO_2 efficient, 'breakthrough' refers to new technologies that will lead to major changes in the way steel is made. The time frame for the realisation of these technologies is 2020 and beyond.

The most promising breakthrough concepts to date include:

- recycling blast furnace top gas after decarbonising and further CO_2 storage (proposal of the ultra-low carbon dioxide steelmaking (ULCOS) programme),
- smelting reduction and direct reduction with oxygen use and CO_2 capture and storage,
- electrolysis of iron ore,
- use of hydrogen produced from CO_2 -lean sources,
- use of sustainable biomass.

[8] worldsteel Association

As a case studies several examples of technologies, which could be considers as breakthrough technologies. One of the examples is FINEX which is an innovative and eco-friendly iron-making process. As the world's first commercialised smelting reduction technology, FINEX opens a new chapter in steel production. With FINEX, the sintering and coke making steps are eliminated. This removes two steps compared to the conventional blast furnace (BF) method. The shorter process leads to lower costs and fewer pollutants.

FINEX also lowers emissions.With the elimination of sintering and cokemaking, the emission of sulphur oxides (SO_x) and nitrogen oxides (NO_x) fall to 19% and 10%, respectively, of the emissions from the BAT-equiped BF process. The levels of fugitive dust also fall sharply. Fewer emissions contribute to keeping POSCO competitive amid tightening environmental regulations.

In the range of safety and health it is stated that these issues are fundamental to sustainability. All injuries and work-related illness can and must be prevented. Management is responsible and accountable for the safety and health performance of a company. Employee training and engagement is essential to ensure that accidents are prevented. Accidents still occur at steel plants around the world. However, they are consistently decreasing in proportion to man-hours worked. One of the most common indicators of safety is lost-time injury frequency rate (LTIFR). A lost-time injury is an industrial injury causing loss of time from the job on which the injured person is normally employed beyond the day or shift on which the injury occurred. Worldsteel members reported an LTIFR of 8.8 injuries per million hours worked in 2006. However, there is no area, process or type of work that cannot be accident-free.

To prevent work-related accidents, steel companies implement safety policies to improve employee training and awareness.

2.4 Steel's contribution to a low carbon future[9]

This document is dealing with energy efficiency, recycling, use of by-products and use of finished steel. The member companies of worldsteel have agreed a framework for common endeavour to reduce the carbon footprint associated with the manufacture and use of steel. The framework consists of four building blocks. These are:

1. The development and application of new steels to improve the energy efficiency of steel-using products in society.
2. The need for major expenditure on research and development to identify breakthrough steelmaking technologies with potential to reduce steel's CO_2 emissions associated with steel production very significantly.
3. The importance of enabling all steel plants to move up to the level of performance of the best, in terms of current available technology through benchmarking and technology transfer.
4. The establishment of a common measurement and reporting system for steel plant CO_2 emissions that can be used by all steel companies around the world for benchmarking and to identify the scope and priorities for their own improvement programmes.

Worldsteel has an important role in helping its members use each of these four building blocks and has a number of dedicated initiatives.

- CO_2 breakthrough programme

  worldsteel provides a forum where the various national and regional research and development programmes on identifying breakthrough technologies for steel manufacture can exchange information on their projects. These include the ULCOS programme funded by the European Commission and the European steel industry; the COURSE 50 research programmes in Japan; the US steel industry and US Department of Energy programmes; the POSCO programme in Korea and many others.

- Market development programmes

[9] worldsteel position paper, worldsteel Association

worldsteel has a number of market development programmes which focus on improving energy efficiency of important steel-using sectors. The WorldAutoSteel partnership has a major programme on designing optimal steel-use in future vehicles including electric and hybrid. The Living Steel programme is aimed at designing steel residential housing with a high degree of energy efficiency in utilisation.

- LCI database

  Over the last 15 years worldsteel has established, and made available, the largest and most authoritative database of life cycle inventory (LCI) data for the production of a wide range of steel products based on actual data received from its members worldwide. This LCI database is increasingly being used by steel customers, governments and others in taking a life cycle approach.

- Climate Action recognition programme

  worldsteel encourages all its members, and indeed non-member companies, to participate in its climate action programme which is the collection and reporting, on a confidential basis, of CO_2 emissions plant-by-plant. The reporting framework uses a common agreed methodology and we are now working to have this methodology recognised as an ISO Standard. It is important that every steel plant in the world actively measures where it is today in terms of CO_2 emissions, if it is to establish the correct priorities for improvement and to monitor progress in reducing its emissions.

2.5 21st century steel, 2008-2009 update[10]

The worldsteel vision of the steel sector could be summarizing as:

- The steel industry should be profitable over the complete business cycle. It rewards shareholders and re-invests in new products and processes.
- Steel companies minimise their environmental footprint and conduct their operations in a sustainable way.
- The steel industry has strong growth potential in developing and industrialised countries.

[10] worldsteel Association

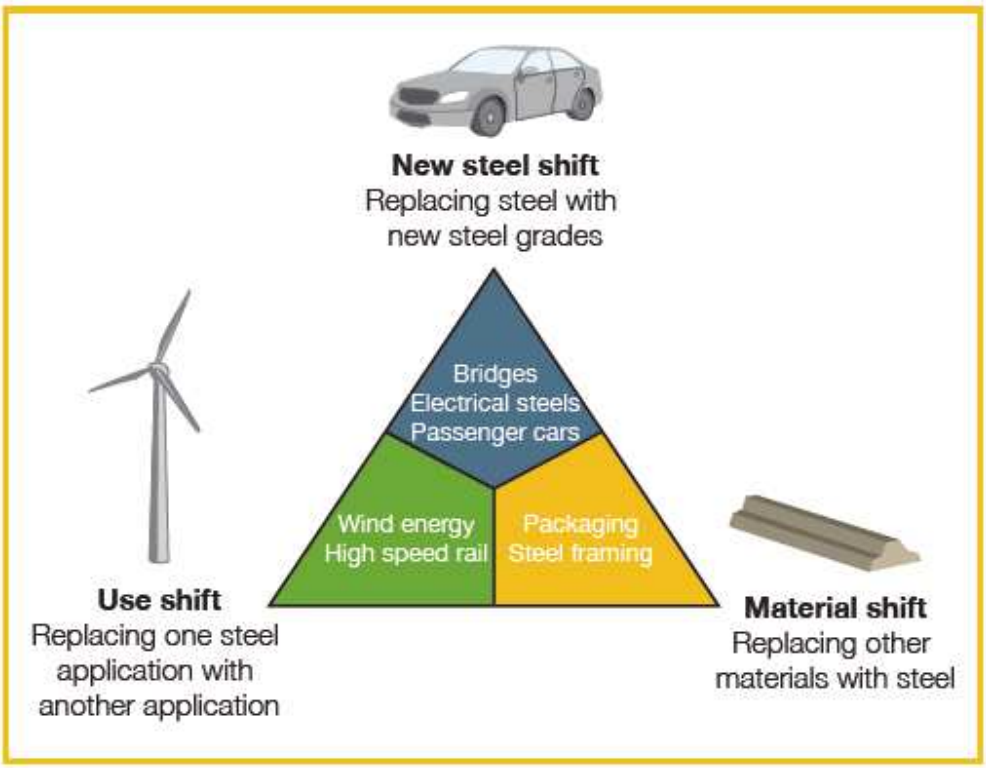
- The world steel industry must be free of government involvement that distorts the market and prevents fair competition.
- Steel is a high-tech industry with skilled people working in a safe environment. It attracts bright people to follow a career in steel. It aims to be an accident-free industry.
- Steel is the most innovative, recyclable and sustainable material of the 21st century.
- A sustainable steel industry in a sustainable world.

Looking to the future worldsteel found:

- Steel demand could double over the next 40 years to approximately 2.5 billion tones a year, based on the expected growth in developing countries.
- Steel has an important role in creating low carbon intensity construction, housing and transport.
- The difference in carbon emission intensity in steel production between various countries can be reduced by sharing best practices and technology.
- Maximising end-of-life steel recycling and using by-products from steelmaking will reduce CO_2 emissions.
- The best plants in the world are already operating close to the optimum that existing technology allows. Therefore, development of breakthrough steelmaking
- technologies are vital if global steelmaking CO_2 intensity is to be reduced in the long term.
- Implementation of appropriate new technologies requires significant major investment in research and development, testing in pilot plants and careful upscaling to commercial volumes.

- In the long term, a truly sustainable solution will depend on near carbon-free electricity generation.

Future steel use could be characterized by three strategies that reduce emissions through the use of steel.



The examples shown here only represent a few steel applications. All three shifts may apply to all applications, multiplying the total benefits of using steel.

- Use shift

  The use shift describes a change from one application that uses steel, to another application that serves the same purpose but is less GHG intensive.
  For example, the dependency on fossil fuels can be significantly reduced by alternative sources of energy such as wind-generated power. Steels represent approximately 85% of all materials used to construct a wind turbine, excluding the foundation. Producing 1 kWh of electricity with wind instead of coal reduces emissions by as much as 80%.

Steel is also critical for high-speed rail travel. It is expected that more Travelers increasingly prefer this mode of transport over air travel for journeys of between 1 and 2.5 hours. High-speed train tracks use steel rails measuring up to 120 m in one continuous stretch. For short distances, substituting air travel by rail reduces emissions by up to 90% per passenger km.

- Material shift

  The material shift involves replacing other materials with steel to achieve higher structural performance at lower costs and with less energy.
  For example, there is great potential for steel framing to replace concrete in buildings. Steel frames can be pre-assembled off-site. This helps to minimise waste and transport of materials. With the right design, steel framing offers better earthquake resistance and high end-of-life component reuse and recycling.
  Compared to a concrete-framed building, steel framing can reduce CO_2 emissions by about 20% over the life cycle of a building. Steel does not rot or split and it will not be consumed by mould or termites. Steel offers the highest strength-to-weight ratio of any building material.

- New steel shift

  In the new steel shift, traditional mild steels give way to new advanced steels, such as high-strength steels. These innovative steels help reduce CO_2 emissions over the life cycle of many products.
  For example, replacing the conventional steel of a typical five-passenger vehicle with advanced highstrength steel (AHSS) results in a lifetime GHG emissions reduction of 6%. This saving in emissions is more than the total amount of CO_2 emitted during the production of all the steel in the vehicle.
  For bridges, high performance steels enable longer span lengths, less maintenance and longer service life. As a result over the life cycle of a bridge the use of high-performance steel can result in as much as 40% in emissions reduction compared to traditional steels.
  Where electrical energy is generated, electrical steels are used. Continuous development and increased application of new electrical steel grades have reduced energy loss in transformers. This means less CO_2 emissions over the life cycle of every application.

2.6 A European Recovery Plan[11]

José Manuel Durão Barroso, among others, stated in Brussels on 26th November 2008 that the Plan sets out a comprehensive programme to direct action to "smart" investment. Smart investment means investing in the right skills for tomorrow's needs; investing in energy efficiency to create jobs and save energy; investing in clean technologies to boost sectors like construction and automobiles in the low-carbon markets of the future; and investing in infrastructure and interconnection to promote efficiency and innovation. All actions envisaged by the Plan will drive a competitive Europe ready for the low-carbon economy.

One of the strategic aims of the Plan is:

- Speed up the shift towards a low carbon economy. This will leave Europe well placed to apply its strategy for limiting climate change and promoting energy security: a strategy which will encourage new technologies, create new 'green-collar' jobs and open up new opportunities in fast growing world markets, will keep energy bills for citizens and businesses in check, and will reduce Europe's dependence on foreign energy.

Among 10 actions listed in the document actions 8 (Increase investment in R&D, Innovation and Education) and 9 (Developing clean technologies for cars and construction) are linked to promoting the modern low-carbon economy and society.

[11] Communication from the Commission to the European Council, Brussels, 26.11.2008, COM(2008) 800 final

2.7 Manifesto of the European steel industry for the European Commission 2010-2014[12]

The motto of manifesto is: no long-term prosperity in Europe without European steel production.

Six pillars have been defined in the document and one of them is directly linked to GT VET project:

2. Provide more support for R&D in breakthrough technologies to further reduce emissions from steelmaking and to utilise steel more effectively. The EU's research framework programme and revenues from the ETS (Emission Trading Scheme) must be used primarily for the development and demonstration of new technologies. Particular support should be given to the economically risky and very expensive pilot and demonstration phases. This will not only help Europe reduce its own emissions but also provide for alternative technologies and reductions in emissions worldwide.

2.8 Manifesto of the European steel industry for Members of the European Parliament 2009 – 2014[13]

In this manifesto the aims of Manifesto of the European steel industry for the European Commission 2010-2014 were reinforced:

- promote EU climate change policies that ensure a level playing field for European steelmakers with competitors from non-EU countries,

  European steelmakers have reduced CO_2 emissions by more than 50% since the 1970s and by more than 20% between the Kyoto reference year, 1990, and 2005. Emissions from existing technologies for integrated (blast furnace) steelmaking have almost reached their minimum, and there is little further improvement achievable in the EU without new process technologies. Nevertheless, European steelmakers are committed to further

[12] EUROFER, European Commission, European industry in a changing world, SEC (2009) 1111, pages 181-188
[13] EUROFER

contribute to the EU's climate change objectives, including those in the EU emissions trading scheme (ETS).
European steel companies are extremely vulnerable to unilaterally imposed costs, as the total volume of imports into and exports out of the EU27 is 30-40% of European market demand. Without a level playing field in climate change policy, non-EU steelmaking competitors will enjoy an unfair competitive advantage that will distort the global market for steel and restrict future investment in the EU, leading to carbon leakage.
Therefore, non-EU steel producers must commit themselves to equal, verifiable and enforceable CO_2 reduction targets within the framework of an international agreement on climate change that will cover at least 85% of world steel production. The EU and just nine countries – Brazil, China, India, Japan, South Korea, Russia, Turkey, Ukraine and the USA – account for about 90% of world crude steel production, which in 2007 totaled 1.35 billion tones. As China alone accounts for about 500 million tons (35%), its full participation in any international agreement is indispensable.
Until such an agreement is implemented the EU must mitigate ETS-related costs for sectors at risk of carbon leakage by continuing to allocate 100% of emissions allowances for free, based on challenging but achievable benchmarks. These benchmarks must fully take account of the fact that the steel industry sustainably recycles process (waste) gases, which overall account for about 80% of CO_2 emissions from primary steelmaking. The EU must also fully compensate for ETS-related increases in electricity costs. Steel plants using electric arc furnaces, which are fed almost entirely with steel scrap, represent 40% of European steel industry production. These plants are extremely dependent on electricity costs. Were this part of the steel industry to become uncompetitive because of ETS-related increases in energy costs, the effects on those European steelmakers and the scrap recycling industry would be extremely serious.

- seek EU support for R&D in new technologies to reduce emissions from steelmaking and to utilise steel more effectively,

  Research and development (R&D) is the basis for innovation of new, environmentally friendly technologies, which is essential for the prosperity of Europe. The European steel industry is constantly involved in this process through the development of new types of steel with specific characteristics, and innovative ways of using steel, that address the needs of specific applications. In this way the industry has widely contributed, for example, to the reduction in CO_2 emissions from vehicles and the improved energy efficiency of buildings and will continue to do so. However, to reduce its own CO_2 emissions further, the EU steel industry now needs to develop breakthrough technologies. Through participation in the European Steel

Technology Platform (ESTEP) the industry is working with the European Commission and Member States to finance long-term projects aimed at changed process technologies. The most ambitious being ULCOS (Ultra Low CO_2 Steelmaking), which aims to reduce CO_2 emissions from steelmaking by 50% by 2050. For the second phase of this project a budget of more than 800 million Euros was identified in March 2009, a large part of which will be for a two-stage project comprising a pilot of new blast furnace technology with top gas recycling and then a large-scale demonstration that further incorporates carbon capture and underground storage (CCS). If successful, this technology could be ready for wider industrial application after 2020.

The EU should stimulate R&D in innovative, environmentally friendly process technologies to a much greater extent than it has in the past, particularly the economically risky and very expensive pilot and demonstration phases. Financial support and close co-operation between EU institutions, Member States and the industry are preconditions for the achievement of the objectives of both the EU's climate change policy and the Lisbon strategy. The EU's research framework programme and revenues from the ETS must therefore be used primarily for the development and demonstration of new technologies to reduce emissions at source and to use steel efficiently in downstream products. This will not only help Europe reduce its own emissions but also provide for alternative technologies and reductions in emissions worldwide. Support for R&D is also needed to secure high-quality jobs in the European steel industry and thereby maintain the European Union as a region with a strong industrial backbone in which the steel industry remains a driver of technological innovation.

- support "better regulation" by reducing the administrative and financial burden of European environment legislation, whilst improving the levels of environmental protection.

  European environmental legislation is indispensable for the sustainable development of the European Union and the proper functioning of the internal market. It is therefore generally welcomed by the European steel industry, which is committed to constantly improving its environmental performance. However, there has been a major increase in the volume of environmental regulations adopted by the European institutions every year (almost 100 in 2008 alone!) and many of these concern the steel industry directly or indirectly. There has also been a steady increase in the amount of reporting and data collection. Together these new regulatory requirements represent a huge bureaucratic and financial burden, creating duplicate and sometimes contradictory legislation, and jeopardising the EU steel industry's competitiveness. In addition, legal uncertainty is created

and predictability diminished by the constant shifting of objectives and the corresponding quasi-continuous overhaul of legislative instruments. The costs associated with these constant changes far outweigh any benefits. The combined effects of the directives on Integrated Prevention Pollution and Control (IPPC, Industrial Emissions), National Emission Ceilings (NEC), Ambient Air Quality (AAQ) and the discussions around a potential SO_2/NO_x emissions trading scheme are examples.
Much greater thought and attention must be given to ensuring that EU legislation, in particular environmental legislation, is structured and implemented in a way that does not affect the international competitiveness of our industry. Legislators need to keep legislation simple, reduce the volume of new measures, avoid duplicate or contradictory regulation and excessive reporting requirements, and take account of national particularities and the subsidiarity principle. All new measures should be preceded by unbiased and pragmatic cost-efficiency analyses, be realistic in the level of ambition and technically achievable and be undertaken with realistic deadlines for their implementation. In particular, no new legislative proposals should be introduced until a reasonable time period has elapsed after full implementation in all EU Member States.

2.9 The European steel industry's contribution to an integrated product policy[14]

The aim of Integrated Product Policy (IPP) is to identify and minimise environmental impacts caused by products and services, which occur throughout the phases of their life cycle, whether from manufacture, use or disposal.

The project consists of three main parts:

- The development of product-specific eco-design packages to be used throughout the supply chain which are based on the requirements of key steel industry customers. These requirements were determined through a number of face-to-face interviews with the customers, initiating an open dialogue between the steel producers and product manufacturers. Current and future desired practices and information requirements were discussed so as to establish the most appropriate content and format of the eco-

[14] Final Report, EUROFER

design packages. Packages were developed for a number of case study products in different market sectors, namely:

- automotive – a tailor welded blank (TWB), comprising electro-galvanised carbon steel,
- construction – carbon steel: a composite flooring system, comprising steel sections (beams), hot dip galvanised steel (decking), reinforcement bars and electro-galvanised steel (studs),
- construction – stainless steel: a roofing system, comprising 304 2B cold rolled coil,
- white goods – a dishwasher casing, incorporating both carbon and stainless steel, comprising organic coated carbon steel and 304 2B cold rolled stainless steel coil,

- The development of a cradle to grave (excluding use phase) steel industry Life Cycle Assessment (LCA) methodology,
- The development of a material flow analysis (MFA) of steel throughout Europe to expand the level of detailed knowledge within the steel industry.

The Eco Design package provides information on the environmental performance of steel products as well as on more downstream applications where steel products are a major component. For this, the project's expert group has decided that the whole life cycle of the selected products should be analysed following the methodological approach of Life Cycle Assessment (LCA) as defined in the ISO 14040 series.

Within the project the social aspects were also discussed to be included within the Eco-Design packages. During this discussion, it was identified that the structured analysis of social aspects over a products life cycle faces some challenges:

- definition and selection of parameters characterising the "social performance" and social aspects of products is not yet decided upon,

- the methodological implementation of social aspects or parameters into standardized methods such as Life Cycle Assessment (LCA) is currently at a starting point,
- sources providing consistent information and / or data on social aspects and parameters are not available.

The Eco-design packages have been developed for use by the EUROFER members. It is intended that the format and design of these packages can be utilised for company specific and product specific applications, as desired by each company. The packages can then be used by all interested parties throughout the product lifecycle, be they steel manufacturers, product designers and manufacturers, the consumer or the end-of-life recycler.

2.10 Combating climate change, a global approach to foster growth, competitivity, and innovation for European steel[15]

The current cap and trade system (Emission Trade Scheme ETS) has significant flaws because it does nothing to reward those companies which have improved their efficiency in terms of emissions. By simply capping output levels it encourages companies to shift production outside the EU. Most tellingly it fails to make a measurable impact on emission levels at a world level.

EUROFER, with the unanimous support of the industry in Europe has engaged with the EU Commission on a different approach for the post-2012 period. An approach which focuses on plant efficiency rather than absolute output levels that promotes reductions in emissions per ton of production through improvements in efficiency rather than just imposing a cap on production levels. Such a system can deliver real results without damaging economic activity in the EU or the competitivity of the sector. Most importantly, it can become global and give measura-

[15] EUROFER

ble improvements in the environmental performance of the sector at a world level.

EUROFER believes ETS requires a fundamental review because the current arrangements are not working. In many cases, ETS is simply exporting GHG emissions from the EU to non-ETS countries, like China.

That's why EUROFER is proposing the EU adopts a new Baseline and Credits approach for our sector when it revises the ETS directive. The system needs to be redesigned so that it makes a significant impact on emissions at the global level. This requires a sectoral approach which encourages investment in innovative energy efficient technology, and promotes - not distorts - global competition. Most importantly, a Baseline and Credits approach can foster global industry participation in net global emissions reduction – with or without the implementation of the Kyoto commitments.

Problems with current ETS are as follow:

- flaws in its conception,
- it is failing to tackle world emission at their source,
- ETS leads to export of CO_2 emissions to non-ETS countries,
- ETS distorts competition in the global steel market,
- the present ex-ante allocation system is impractical and distorting,
- no penalties for underperformance and no incentives for innovation.

EUROFER proposes the Baseline and Credits system, which is the weighted average of emissions per ton of production for the sector. This would serve as the basis for the allocation of allowances per plant.

The performance of each plant is compared against the baseline. If they perform worse than they must pay for allocations traded from operators performing better than the baseline.

The price of these allocations will be set higher than the cost of investments in efficiencies. There is therefore a clear incentive to invest in efficiencies.

As efficiencies take hold, the baseline or sector average of emissions will move down, which will drive further investments in improvements.

So, the allocation system, which will be ex-post, will be truly performance-based with a clear discipline to improve performance.

European steel is ready and willing to take on its share to reduce greenhouse gas emissions. The steel sector internationally (IISI), aims to come forward with worldwide commitments on measurable emission reductions within the next six months. A Baseline and Credits system would help prevent the relocation of the European steel industry abroad and would support a global reduction of CO_2 emissions.

2.11 Future technologies for energy-efficient iron and steel making[16]

In this paper the potential for the improvement of energy efficiency in the iron and steel industry that can be realized in the long term was analyzed.

The exergy analysis to show that the main exergy losses in an integrated steel mill are due to the use of high temperatures was applied. On the basis of the results of this analysis, it was concluded that long-term energy-efficiency improvement should be directed toward reducing these losses by:

(a) avoiding intermediate heating and cooling steps;

(b) reducing the temperature required in various process steps;

(c) recovering and applying heat at high temperatures.

The focus in this paper was on smelting reduction processes, which avoid coke making and ore agglomeration and on near-net-shape casting techniques, which avoid or reduce the need for reheating before rolling. By a combination of these techniques, the specific energy consumption (SEC) might be brought down from the current best-practice figure of 19 GJ/trs (GJ per ton of hot rolled steel) to 12.5

[16] Jeroen de Beer, Ernst Worrell, Kornelis Blok, Annu. Rev. Energy Environ. 1998. 23:123–205

GJ/tcs (GJ per ton of crude steel), or a reduction of about 35%. The production costs of steel strip from a future integrated mill that uses smelt reduction and strip casting are far below those from a current integrated mill. Both smelting reduction and strip casting are likely to be available within next two decades.

Direct reduction (DRI) has a lower energy requirement than reduction of ore in a smelting reduction (SR) process, mainly because melting is avoided. However, subsequent melting remains necessary to shape the steel. Because of the low carbon content, DRI has to be melted in an electric arc furnace (EAF). The SEC of production of steel in the DRI-EAF route is about 2 GJ/trs higher than that of the SR-BOF route.

Electric arc furnaces can make steel from a 100% scrap charge, thus avoiding the need for iron ore reduction. The SEC of steel making of current best-practice EAF mills is about 7 GJ/tcs expressed in primary energy carriers, using a 40% efficiency of electricity generation. This may come down to 3.5 GJ/tcs by the use of more efficient melting furnaces, more efficient casting and shaping techniques, and assuming a 60% efficiency of electricity generation. Steel mills with an EAF have changed considerably over the past decade; they are now competitive with integrated steel mills in the production of flat products, a market that had previously been the monopoly of integrated steel mills. The use of scrap only for the production of steel is not possible, because not enough scrap is available and the quality of scrap is not sufficient to make all steel products. In the future, different routes to produce steel will continue to exist side by side.

For all process routes, a further reduction of up to 2.5 GJ/trs can be achieved when techniques will become available for recovering and applying the high temperature heat of hot steel and slag. Several concepts of slag heat recovery have been developed. Because of the high investments, none of these concepts has been commercially applied. Heat recovery of the hot steel at temperatures below 800^0C a commercial technology. R&D should be directed at recovering heat at

higher temperatures, including recovery of the heat of melting. No such technology is under development.

2.12 The future of steel - basic principles and general lessons[17]

Steel Making does not exist isolated and independent. It is governed by many laws, rules, regulations and restrictions:

- physical laws and technological boundaries,
- legal framework,
- market restrictions and trade rules,
- social framework.

Successful steel making requires operating within these frames and continuing to explore new sustainable ways forward.

Steel industry in 2050 will still depend on both – iron ore and scrap – inputs.

There are some doubts and uncertainties concerning some activities in the range of environment protection and major R&D efforts:

- ULCOS (Ultra - low CO_2 steelmaking):
  - industrial implementability not yet clear,
  - huge technical and economic uncertainties in upscaling,
  - natural replacement rate of equipment measures in decades;
- CCS (Carbon capture and storage or sequestration) – a solution or a dead end?:
  - CO_2 does not disappear;
- CCR (Carbon Capture Readiness) – ideas for a true future?

[17] Dr. Gunnar Still, Corporate Coordinator Environment and Climate, Dr. Hans-Jörn Weddige, Head of Corporate Climate Policies, ThyssenKrupp Steel Europe, presentation for OECD Meeting, 10.12.2009

2.13 Steel, Cement & Paper - Identifying the breakthrough technologies that will lead to dramatic greenhouse gas reductions by 2050[18] (Clean steel a blast from the future)[19]

In the document a few breakthrough technologies are indentified:

- Public/private partnerships generate important results

  The steel sector is at an advanced stage of piloting technologies that would lead to dramatically lower CO_2 emissions in steel production. Most of these technologies and pilot plants are originating from the ULCOS (Ultra Low CO_2 steel production) project supported by the European Commission and major steel making companies.
  Most of the emissions in steel production are the result of the reduction of iron ore in the blast furnace using cokes. Right now on average the production of one tone of hot metal in the EU results in 1.65 tones of CO_2 emissions. Current best practices come close to 1.4 tons of CO_2 per ton of hot metal produced.
  To reduce emissions further there are broadly 3 potential technological directions taken often in combination. They include: designing a new process that is intrinsically more energy efficient and/or carbon-neutral; the use of carbon reducing agents and fuels with a low(er) carbon content; and CO_2 emissions capture and storage.

- Blast Furnace top gas recycling

  Blast furnace top gas recycling (TGR) is a technology that recycles the energetic content of blast furnace gas. Top gas recycling has been demonstrated at the LKAB research plant in Sweden. It is an option for new plants and a retrofit option for existing blast furnaces. The final CO_2 emissions can be purified for deep geological storage. This process does not give a net reduction in energy consumption as reduced coke consumption is balanced by an increased electric power requirement for CO_2 separation. Greenhouse gas emissions are reduced if CO_2 is sequestered and can lead to up to a 50% reduction compared to the current EU average specific emissions. The technology is expected to be ready for market deployment by 2020.

- The Fastmelt process

  The Fastmelt process is a technology that uses a complete redesigned blast furnace in the form of a rotary hearth furnace that is more efficient in

[18] Climite Action Network Europe, October 2010
[19] Report, http://www.steelguru.com/08/03/2011

reducing iron ore. Direct energy consumption of the process is 10% lower on average as compared with an EU blast furnace. CO_2 emissions are 55% lower when the process is combined with Carbon Capture and Storage (CCS). The technology is capable of processing a wider spectrum of ores (including ores of lower quality) compared to the blast furnace process. It does not require coke as a reducing agent. Both characteristics result in significantly lower operational costs. Energy consumption and CO_2 emissions are slightly lower to or comparable with the blast furnace process. Specific investment costs for the Fastmelt process and associated electric arc furnace are significantly higher compared to large integrated and blast furnace based steel plants. The Fastmelt process without CCS is on the verge of market deployment.

- Electrolysis

  Steel production based on Electrolysis would reduce iron-ore by the addition of electrons to iron supplied by electricity. This theoretically allows for complete carbon neutral steel production (if the applied electricity is produced without generating CO_2 emissions). However, although the principle of the process has been proven, the technology is still in the early stages of development and might require another 20 years of development before the first commercial scale production facility could become operational. There is still a lot of basic research that has to be conducted to get a better understanding of the process. On the other hand, given the possibilities for very significant CO_2 emissions reductions without the need to combine it with CCS, electrolysis would appear to be the preferred technology for enhancing sustainable development in the steel sector. This may be an argument for extra incentives to develop this technology.

- Hisarna coke free steelmaking

  The Hisarna Coke-free steelmaking technology seems to be the most promising route to low carbon steel making at the moment. In this process there is no need for the production of coke from coal and iron ore sintering. Therefore the process is approximately 20% more energy efficient and produces less greenhouse gas emissions per ton of hot metal compared to current average blast furnace technology. This technology is being developed and piloted by the ULCOS project. It was first be demonstrated in a 60,000 tones/annum pilot installation currently being built at CORUS IJmuiden (the Netherlands) and planned to commence operations in the beginning of 2011. Further development may include a 700 ktonne/annum commercial scale plant, which will be designed in 2015-2016 (based on the experiences with the pilot plant) and constructed between 2017- 2018. Full scale market deployment of this technology is expected by 2025. Ultimately, the Hisarna technology will probably be applied on the market at

a 500– 1,000 ktonne/annum scale, which complies with the requirements for medium scale and flexible production capacity in the steel sector.
With respect to environmental performance, implementation of Hisarna technology is expected to yield a CO_2 reduction of 20% compared to the average blast furnace in Europe. When combined with CCS, reductions of up to 80% of emissions are expected to be achievable.
Looking at economic aspects, Hisarna will require significantly lower capital investment costs (CAPEX) and will produce semifinished products with the same quality as current breakthrough technology at significantly lower operational costs (OPEX), including reduced energy consumption. Hisarna will be capable of utilising a wider range of (lower quality) inputs. A potential practical drawback is that the penetration of Hisarna in the EU steel sector might be limited as increases in steel consumption in the EU are marginal and can still be met by increasing the productivity of existing blast furnaces. Furthermore, steel producers tend to overhaul the existing blast furnaces every 15 years or so to increase plant's lifetime. Costs amount to approximately 50% of the investment for a new blast furnace. As a consequence of both mechanisms,
under current policy frameworks, the rate of replacement of existing facilities is expected to be slow and determined by existing blast furnaces reaching the end of their lifetime. Without policy changes, opportunities for new plants will mainly be related to substitution of blast furnaces in existing integrated steel plants where one of the individual plants is at the end of its lifetime and further overhaul possibilities exist. Increasing the pace of replacement will require additional legislation, e.g. tightening the best available technology standard for oxygen steel production after the Hisarna technology has been proven to be commercially mature.

2.14 Sustainable development in iron- and steel research, CO_2 and wastes[20]

In this paper a survey of research and development from the year 1982 made in the department of Metallurgy at RWTH Aachen is given, e.g.:

- the possibility to bring CO_2 as dry-CO_2-ice blocks in the deep see,
- development of the specific CO_2 emission of the steel industry,
- to produce a reduction gas by gasification of coal, biomass or waste with air, oxygen and water steam the influence of CO_2 was studied in the High Temperature-Fluidizied-Bed-Reactor.

The authors made some forecasts:

- by research it was found that CO_2 increases the tertiary oil production – today it is planned to use the CO_2 from H_2-iron ore reduction for this purpose;
- with the better knowledge of blast furnace behavior by laser technique in the raceway and also at the top of the furnace and in the molten products it is proposed to use hot reduction gas.

2.15 Alternative ways of making steel: retrospective and prospective[21]

Steel will continue to be needed and used by mankind long into any foreseeable future. Indeed, no material yet in history has proved as sustainable as iron and steel and there is no sign of any emerging material that can compete with it at a global scale.

The steel industry would need technologies that have the potential of reducing GHG emissions by the "factor 4" that European governments are setting as tar-

[20] Gudenau H.W., Senk D., Banich A., G. Bottcher G., Frohling C., Kweon O. S., Wang S., Wieting T., ISIJ International, Vol. 44 (2004), No. 9., pp. 1469-1479
[21] Birat J.-P., Revue de Métallurgie, No. 11, 2004, pp. 937-955

gets for 2050 and this will make it necessary to re-examine this efficient mainstream steelmaking technologies of today and refocus them on lowering GHG gas emissions while maintaining the same energy efficiency level.

There are currently three ways of addressing this question.

One consists in staying close to the carbon-based blast furnace technology and to ensure that the ensuing CO_2 is captured and sequestrated; this would lead to deep changes in process in order to make CO_2 capture easier to achieve, such as recycling the BF top gas after decarbonatation and thus operating the furnace under nitrogen-free conditions.

Another solution would consist in replacing carbon by other reducing agents and fuels, such as natural gas, hydrogen or electricity. This might open the way to using electrolysis for producing steel, a proposal that was never seriously examined in the past because of the high cost of electricity. On the other hand, electricity or hydrogen would have to be produced by dedicated generation plants based on CO_2-free fuels, i.e. renewables, fossil fuels with CO_2 capture and sequestration or nuclear.

A third solution would be based on the use of biomass, which contains "short-cycle" carbon and would not contribute to GHG emissions because a steady-state production of biomass by agriculture or forestry would be included in the carbon loop.

Various programs are being started around the world to address these issues and come up with a commercial solution within the next 10 years. One of them is the Europe-wide ULCOS project but others are under way elsewhere coordinated from IISI in a "CO_2 breakthrough program". Any solution that comes out of this program would be a deep paradigm shift in steelmaking technologies as compared to the present routes. The new ones, which would at the beginning probably be more expensive to operate than the mainstream technology, would compensate this extra-cost by added environmental value, translatable into cash through CO_2 trading markets or CO_2 taxes. Whatever direction is eventually cho-

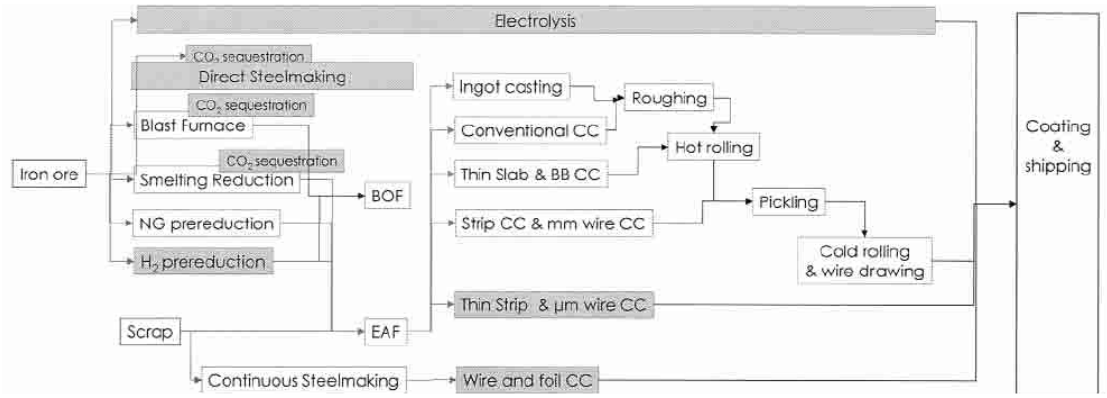
sen, it will prove a major breakthrough, on a par with those that took place in the long historical past that we have reviewed here.

Another important change is that the technology trend, which has been pointing towards larger output, more complexity and upscaling, will branch off to another direction: simpler, more frugal and rustic solutions will be preferred in parts of the world which are presently emerging into development. "Less is beautiful" will become a new slogan. In terms of steelmaking technologies this may mean that smaller plants, in equilibrium with local conditions, will appear as a countermodel to the large mainstream integrated mill of today, a path that the mini-mills have been treading since the 1960's. There is for example no reason to believe that the 5 Mt/annum mill that is the baseline "best" solution today would remain the best solution for an electrolysis-based steel mill. Other concepts based on the use of local raw materials are likely to be developed, provided that the new technology remains rustic and cheap to develop: A small blast furnace, either fed with charcoal or non-coking coal, in combination with a simple prereduction process (e.g. rotary kiln, carbon-based) could become very successful in countries like India.

Such a deconstruction of the steel mill model will probably be matched by a deconstruction of the steel market. The concept of "steel solutions" is the first step in this direction and has proved a major driver for generating economic value and for steering the creativity of the steel industry downstream of its present core-business. Among the longer-term trends, we might expect a departure from the comodification of steel that would be driven by aesthetic values under the influence of architects, artists and designers. Modern automobiles are beautiful because of the rounded shapes that deep-drawing steels allow. Weathering steels change aspect and surface texture with their ability to accommodate oxidation, a smart material behaviour.

2.16 Innovation paradigms for the steel industry of the 21st Century. Future directions for steel industry and continuous casting[22]

In 2050, the world has a population of 9 billion, steel production may by then have reached 2,300 Mt/year, if steel is to play its role and accompany the improvement of the standard of living in China, the Indian subcontinent, Indonesia, Russia and South America.



The production stream of steel in 2050 showing all production routes. In light grey rectangles are shown technologies, which will need to be fully developed by then

The first strong determinant concerns iron units. A large increase in steel production will generate a lot of scrap, the amount of which will become so important that it will have to be recycled at a high level, both volume and quality-wise. This would drive the scrap/ore ratio to the high levels that rich countries are reaching today, well above 50% of iron units. Scrap goes naturally into a modern version of an electric arc furnace, but is also largely used in converters, which will also be around because iron will continue to be produced by going through a hot-metal phase in large quantities. We assumed that the global warming constraint will make it compulsory to use maximum scrap additions of 250 kg/t of steel, probably a conservative estimate for 2050.

[22] Birat J.-P., Revue de Métallurgie, No. 11, 2002, pp. 958-979

The virgin iron routes, beyond the blast furnace, have been complemented by:

- some smelting reduction, which will probably replace some of the obsolete blast furnaces, even though this technology missed its window of opportunity in the 1990s;
- and low-C intensive routes, i.e. prereduction from natural gas, hydrogen prereduction, electrolysis and direct steelmaking;
- we have also provided for the possibility of assuaging GHG emissions of C-intensive processes by carbon sequestration;
- the proportion of each has been chosen rather conservatively, by assuming that developing new processes and adopting them commercially will continue to be time consuming, even at a distance of 50 years in the future. Thus the blast furnace remains at 59% of the ore routes, although all presently existing coke ovens will have been closed by then. This implicitly assumes that conventional integrated mills will still be built in the next 10 to 15 years, before any credible alternative is actually developed.

Solidification uses a whole range of devices, from ingot casting for producing plates to wire casting in the millimeter or the micrometer range and direct foil production. Complementary rolling devices are added where needed to obtain the desired geometry, but rolling is not assumed to be the panacea, which mends casting defects and extends the possibilities of steel metallurgy. Rather, it is assumed that thermomechanical microstructure control has been integrated into the technology of net-shape casting.

2.17 The CO_2 tool: CO_2 emission & energy consumption of existing and breakthrough steelmaking routes[23]

The CO_2 tool is part of a series of coordinated models, which actually constitutes a distributed meta-model of a steel mill, in its present and potential future avatars.

[23] Birat J.-P., Lorrain J.-P., de Lassat Y., Revue de Métallurgie, No. 9, 2009, pp. 325-336

The CO_2 has been a management tool built to provide decision makers in the ULCOS programme a sophisticated picture of the options open to them in selecting the ultimate set of ULCOS technologies – those which will eventually lead it close to its goal of bringing about breakthrough processes that can help cut the greenhouse gas emissions of the steel industry to less than 50% of those of the best performers today.

The simulations, which were run, have shown that there are indeed concepts that can achieve the large level of GHG mitigation level that is the goal of the ULCOS programme. The conclusions of the model show clearly that this can be achieved in number of ways, which can be broadly summarized by three main conclusions:

- Mitigation can only be achieved by un-coupling CO_2 cut from energy saving measures. This is rather original compared to the general strategies put forward by most industries and political organizations. This is due to the fact that the steel industry has already reaped most of the benefits from energy leanness and has therefore to move into bolder and more pro-active policies specifically designed at addressing Climate Change in a specific way.
- The steel industry needs reducing agents, which play the simpler role of fuels in other sectors, and fossil reducing agents are still the most common in terms of available resources and are also the cheapest. Carbon is therefore part of the process, as coal or natural gas, it oxidizes into CO_2, which needs to be captured and stored geologically. CCS, as customized to fit the needs of the steel industry, is therefore a key and essential part of the solutions. As much as CSS is seen as a bridging solution for alleviating the Climate threat, these solutions based on coal and natural gas should be understood as the most immediate potential response of the steel industry.

- There are other solutions which call on decarbonizing the reducing agents. Two paths are open, hydrogen and use of electricity to reduce iron ore by electrolysis. More massive use of biomass, provided it is sustainable, low-carbon footprint biomass, is also a potential solution. Because the technological concepts are new and need much R&D to reach industrial maturity and because they also require a drastic change in the hierarchy of fuels, these solutions should be seen as longer term, fit for a time horizon when the bridging solutions based on CCS will no longer be acceptable.

Needles to say, most of these future best technologies are still to be developed.

2.18 The cost tool: operating and capital costs of existing and breakthrough routes in the future studies framework[24]

The cost tool" is a model that calculates the CAPEX and OPEX of the ULCOS routes. The conclusions can be summarized as:

The qualitative criteria for selecting a breakthrough route relate to the feasibility of the technology, to the demonstration that it can be scaled up to the very large size of a modern steel mill and, until this is proven, to the belief that this is indeed the case.

The may quantitative criteria for selecting a breakthrough route are the specific CO_2 emissions and the production costs. While the first condition is rather straightforward to evaluate, once the process routes have been designed in enough detail, the second requires weaving together investment calculations and future studies. The former is clearly more precise, while the latter is uncertain and risky, although the holistic picture that is produced is rather robust. Anyway, there is not much else that can be proposed to base decision on a rational base.

[24] Birat J.-P., Lorrain J.-P., Revue de Métallurgie, No. 9, 2009, pp. 337-349

2.19 Issues behind Competitiveness and Carbon Leakage - Focus on Heavy Industry[25]

This document shows threats of so called "carbon leakage" (move the sectors to geographical regions without carbon emission constraints) of analyzed sectors (steel, cement and primary aluminium) due to lost of competitiveness caused by EU-ETS.

- Observation of phase I

  Steel product trade flow patterns before and after the implementation of the EU-ETS were observed. The analysis was focused on trade of semi-finished products (both long and flat) as well as all steel products. It was concluded that no significant changes in trade flows and production patterns were evident during the first phase of the EU-ETS. While the EU25 became a net importer of steel in 2006 for the first time at least since 1995, EU net imports actually decreased during the year 2005, while EUA (EU emission Allowance) prices on the spot market increased by 152% between January and December 2005. In fact, net imports increased following a surge in consumption in 2006. This is confirmed by an increase in the capacity utilisation rate (production/capacity) observed in 2006, from 83% to 90%. Had the rise in net imports been driven by a decrease in price competitiveness, the utilisation rate would have decreased. The explanation of the 2006 rise in net imports is most certainly a shortage in domestic production capacities to meet domestic demand.
  Regarding potential cost impacts, the steel sector benefited from an allocation above its reported emissions (CITL information, where CITL means Community Independent Transaction Log). The CITL indicates an allocation level some 17.5% above the level of reported emissions. At rare occasions, installations in this sector relied on foreign allowances to achieve compliance (namely in the Slovak Republic and Slovenia).
  Last, it is difficult to observe any effect of a CO_2 cost on the sector's profitability considering that the steel prices have been very dynamic over the last 4 years, with surges in global input and regional product prices. The Chinese steel sector triggered a sea change in steel trade but also in raw material markets. Between 2000 and 2006, Chinese crude steel production increased by 232% and its global share grew from 15 to 34%. Such an absolute increase in production, the prices of coking coal, coke and scrap were two to three times higher in January 2008 than a year before, while prices for iron ore fines were 66% higher.

[25] Julia Reinaud, International Energy Agency, OECD/IEA, October 2008

Further, it is not clear whether steel companies decided to treat CO_2 allowances (EUAs) as a new cost factor considering that this sector was over allocated.

- Future outlook:

  A typical Western BOF steel mill (i.e. integrated plant) emits about 1.95 t CO_2 per tonne of semi-finished steel in the form of slabs and 2.35 t CO_2 per tonne for hot rolled coil (HRC is representative of flat products). In contrast, an electric arc furnace plant emits CO_2 although in a much smaller quantity than the integrated route (direct emissions reach 0.36 t CO_2/tonne to produce hot rolled coil according to Eurofer based on BREF calculations). If allowances were fully auctioned to this sector post 2012, at a EUA price of EUR25/tCO_2 (as observed in July 2008), the opportunity cost of direct CO_2 emissions would reach EUR59 per tonne of steel (HRC) if produced in the integrated route. This figure represents about 12% of the prevailing market price for typical products in Western European countries during late 2005. Nonetheless, since 2006, this rate is lower in light of the extremely high price levels of steel and raw materials.
  Further, 40% of the steel manufactured in the EU-25 (2006) is produced through electric arc furnaces for which ETS-related competitiveness is not a significant issue (beyond the electricity price effect). Long products mostly dominantly produced by this type of mill are quite difficult to transport, although Europe has witnessed growing share of long products imported from non-EU imports since 2007, rising from 7% to 12% of total market supply.
  Could this sector pass-on the additional costs? While iron and semi-finished steel products are considered as homogeneous products, finished steel products differ in their quality level and their use – so cost pass-through depends on the product sold. Moreover, considering the high degree of concentration of this industry in Europe for some products (mostly HRC) and if current high freight prices sustain, there may be some room for cost recovery. Yet more research is needed on the pricing environment in this sector. In the long term, the sector is also concerned with overcapacity issues. Although global demand is projected to increase strongly, especially in China and India, any slowdown in these countries' domestic demand would entail excess supply worldwide.
  In the meantime, as the overall EU steel market is mature, no capacity expansion is scheduled, and investments are oriented towards improving product quality and complying with environmental legislation. Producers are investing in new capacities in third countries, near to raw materials and/or energy sources (e.g. Brazil), or to fast-growing markets (e.g. China), with less stringent environmental legislation and cheaper labour cost. Further, the specialisation in semi-finished slab production has been led

mostly by Brazil, but also Mexico, Russia and Ukraine. This phenomenon could participate in increasing loss of market share for European steel sector if demand growth is met by additional semi-finished product imports into Europe.

2.20 Breaking through the technology barriers[26] and Overview of the CO_2 Breakthrough Program and Linkage to worldsteel[27]

The best steel mills are now limited by the laws of thermodynamics in how much they can still improve their energy efficiency. With most major energy savings already achieved, further large reductions in CO_2 emissions are not possible using present technologies. The kind of further reductions being called for by governments and international bodies require the invention and implementation of radical new production technologies.

A set of breakthrough technologies is needed; the kind of paradigm shift in industrial production that can change the way steelmakers around the world operate. In 2003, the World Steel Association (worldsteel) launched the "CO_2 Breakthrough Programme", an initiative to exchange information on regional activities all over the world.

Five possible directions are under examination:

- Coal

  would continue to be used as a reducing agent but the ensuing CO_2 would have to be captured and stored. The approach is similar to the power industry's effort to cut emissions from fossil fuel power plants, although the steel production solutions propose oxygen operation and in-process CO_2 capture rather than oxyfuel combustion and pre- or post-combustion capture. Ironmaking solutions range from the blast furnace, deeply modified to accommodate CCS (the new field of carbon capture and storage) as in the ULCOS 'top gas recycling blast furnace', to smelting reduction processes such as Isarna, HIsmelt, Finex, etc., also similarly re-designed.

[26] worldsteel Association, Fact sheet
[27] Sharif Jahanshahi, CSIRO – Minerals Down Under National Research Flagship; John Mathieson, BlueScope Steel Research; CSRP'08 Conference, 18-19 November 2008, Brisbane

- Hydrogen

  could be used as a reducing agent, as its oxidation produces only water. Hydrogen, either pure, as a synthesis gas (syngas) produced by reforming methane or as natural gas, can be used in conventional direct-reduction reactors or in more futuristic flash reactors. The is hydrogen needs to be produced using carbon-lean processes: water electrolysis or natural gas reforming. Both may include CCS at their own level. This research direction is closely related to the model of the Hydrogen Society.

- Electrons

  could also be used as reducing agents. They can be provided by electricity, for which the corresponding process is the electrolysis of iron ore, or by bacteria. The EU and the US are exploring only the first path, as bacteria that fully reduce ore to metallic iron have not been identified. Electricity in this case would be produced using carbon-lean technologies.

- Biomass

  can be used to generate the reducing agent, either from charcoal for example or syngas. Biomass in such a scheme would need to be grown in a sustainable way, but can originate from plantations in tropical countries or from agriculture or forestry residues in more temperate climes. Interest in biomass is strong in Brazil, Australia, Canada and Europe. Biomass can be used in charcoal-based blast furnaces, added to the coke oven charge, burned as fuels in steelmaking reactors or used in direct reduction as syngas, etc.

- CCS

  use of carbon capture and storage technology is a necessary precondition to the continued use of fossil fuel based reducing agents in steel production. This emerging technology could be based on various capture and storage options, some of which only need to be adapted to the steelmaking context, while others still need basic research. Storage can be in deep saline aquifers, depleted oil or gas fields, in coal mines as geological storage, or turned back into carbonates (mineralogical storage). Waste-gas from steel production differs from that of other industries by its CO_2 content (usually higher), dust content, composition of minor gases (CO_2, CO, etc.), temperature and pressure. Specific studies are therefore actively being carried out in the various initiatives.

The various exploratory programmes have already identified more than 100 new technologies, and classified them in terms of the CO_2 reduction they could

achieve. Some technologies are ready to use but would deliver only a small reduction in CO_2 emissions. The more ambitious projects in terms of CO_2 reduction are now going through various steps of scaling up from lab to commercial reality. The coal-based ironmaking technologies associated with CCS are the most likely candidates for early maturity. Hydrogen and electrolysis are further into the future, as these technologies will require deeper re-engineering of steel production and the development of new processes from first principles. Biomass solutions are probably in the intermediate future.

Content of the Major Programs realized within framework of "CO_2 Breakthrough Programme"

- ULCOS (Ultra Low CO_2 Steelmaking) (Europe):
  - Nitrogen-free BF with top gas recycling,
  - HISARNA – direct smelting-reduction of iron ore,
  - Electrolysis based steelmaking,
  - H_2 based pre-reduction for EAF;
- COURSE50 (CO_2 Ultimate Reduction in Steelmaking Process by Innovative Technology for Cool Earth 50) (Japan):
  - CO_2 capture systems (CCS),
  - H_2 reduction based ironmaking;
- POSCO (Korea):
  - Prereduction of, and heat recovery from hot sinter,
  - CO_2 absorption using ammonia solution,
  - CO_2 fixation using marine bio-slag,
  - H_2 production and carbon-lean ironmaking process;
- AISI (American Iron and Steel Institute) (USA):
  - Flash smelting of iron ore using hydrogen reduction,
  - Steelmaking by molten oxide electrolysis.

3. Analysis of national legislation on environmental and health and safety issues at the angle of GT VET project

A directive is a legislative act of the European Union, which requires member states to achieve a particular result without dictating the means of achieving that result. It can be distinguished from regulations which are self-executing and do not require any implementing measures. Directives normally leave member states with a certain amount of leeway as to the exact rules to be adopted. Directives can be adopted by means of a variety of legislative procedures depending on their subject matter.

In this chapter the adopting measures (national execution measures) taken by each participating country to adopt European Union law described in chapter 1 for environmental and health & safety issues are shown based on data from EURLEX web sites.

For each participating country only important legislative act beyond EU legislation are described, if any.

3.A GERMANY

3.A.1 Environmental legislation[28]

WEEE Directive and Packaging Directive

- **Act for Promoting Closed Substance Cycle Waste Management and Ensuring Environmentally Compatible Waste Disposal** (German: KrW-/AbfG)

  On 30 March 2011 the Federal Government decided on the bill presented by the Federal Environment Ministry on the reorganization of the Closed Substance Cycle Waste Management and ensuring environmentally compatible Waste disposal. The bill will now be forwarded to the Federal Council and then to the German Bundestag. The new circular economy law (KrWG) transfers the EU's Waste Framework Directive (Directive 2008/98/EC) into German law and will modernizing the existing German waste law comprehensively. The aim of the new law is a sustainable improvement of environmental and climate protection and resource efficiency in waste management by strengthening the prevention and recycling of waste.

- **Ordinance on Landfills and Long-term storage** (German: DepV)

- **Electrical and Electronic Equipment Act** (German: ElektroG)

  This Act **implements Directive 2002/96/EC** on waste electrical and electronic equipment (WEEE) and **Directive 2002/95/EC** on the restriction of the use of certain hazardous substances in electrical and electronic equipment. The goal is to **prevent waste** from electrical and electronic equipment, to **reduce waste volumes** through reuse, provisions for collection, recovery and recycling quotas and to **reduce the content of hazardous substances** in equip-

[28] In brackets see the German abbreviation

ment. Based on the whole of Germany, at least 4 kg per inhabitant and year is to be collected from private households.

The ban on the use of certain hazardous substances in the production of new electrical and electronic equipment aims to prevent damage to the environment and human health from the outset and to prevent disposal problems from arising at all. The obligation to take on responsibility for disposal, in other words treatment, recovery or disposal of WEEE, aims to compel producers to incorporate the entire life cycle of their products into their calculations.

- **Ordinance on the Avoidance and Recovery of Packaging Wastes (Packaging Ordinance)** (German: VerpackV)

  The Ordinance shall apply to all packaging put into circulation within the area of validity of the Closed Substance Cycle and Waste Management Act (Kreislaufwirtschafts- und Abfallgesetz), regardless of whether it arises in industry, trade, administration, business, the service sector, households or elsewhere, and regardless of the materials of which it consists.

- **REACH-Ordinance (Registration, Evaluation, Authorisation and Restriction of Chemicals)**
  - Nationally integrated EU-system for Risk assessment of Chemicals

<u>Best Available Techniques (BAT) Reference Documents for the Steel Industry (Iron & Steel BREF)</u>

- **Federal Immission Control Act** (German: BImSchG)

  It is the purpose of this Act to protect human beings, animals and plants, soil, water, the atmosphere as well as cultural objects and other material goods against any harmful effects on the environment and to prevent the emergence

of any such effects. In the case of installations subject to licensing, this Act shall also:

- Ensure integrated prevention and control of any harmful effects on the environment caused by emissions to air, water and soil by securing the participation of the waste management sector in order to achieve a high level of protection for the environment as a whole and
- Ensure protection and the taking of precautions against any hazards, significant disadvantages and significant nuisances caused in any other way.

Moreover the EU-Directive 2008/50/EC was incorporated in 2010 into the German Law (§ 47 Federal Immission Control Act) in conjunction with the 39th Ordinance of the Federal Immission Control Act.

- **First General Administrative Regulation Pertaining the Federal Immission Control Act (Technical Instructions on Air Quality Control –** German: TA Luft**)**

  These Technical Instructions serve to protect the general public and the neighbourhood against harmful effects of air pollution on the environment and to provide precautions against harmful effects of air pollution in order to attain a high level of protection for the environment altogether.

- **Best Available Techniques (BAT)** (German: BVT) **/ Industrial Emissions Directive (IED)** (German: IVU-Richtlinie)

  The **IED Directive** (Directive on Integrated Pollution Prevention and Control) relies on the concept of **best available techniques (BAT)** which correspond to the concept used in Germany, traditionally the state of the art. The best available techniques will be developed for each affected industry in an infor-

mation exchange between Member States, industry and environmental groups and set out in BAT reference documents.

Currently the IED Diective is implemented into German law.

Industrial Emissions Directive

- **Federal Water Act (Act on Managing Water Resources)** (German WHG)
  The new Federal Water Act (31 July 2009) replacing the previous arrangements under the current Federal Water Act by full arrangements. The aim of the new rules is particularly to improve the clarity and practicality of water rights through greater standardization and a better system. In addition, the law convicted previously law of the Länder in federal law as far as a need for uniform federal regulation exists. It also creates the conditions for a nationwide uniform implementation of EC water legislation.
- **Industrial Emissions Directive (IED)** (German: the former IVU-Richtlinie)

Integrated pollution prevention and control (IPPC Directive)

- **Federal Water Act**
- **Promulgation of the Amendment to the Waste Water Charges Act** (German: AbwAG)
- **Waste Water Ordinance** (Ordinance on Requirements for the Discharge of Waste Water into Waters) (German: AbwV)
- **Chemicals Act** (Law on Protection from Hazardous Substances) (German: ChemG)
- **IED**

At the moment a new Ordinance concerning the Protection of surface waters and materials on priority (April 2011) (German: OGewV) is in an editing process and needs the approval of the German Bundesrat.

3.A.2 Health and safety legislation

Council Directive 89/391/EEC on the introduction of measures to encourage improvements in the safety and health of workers at work

- **Occupational Safety and Health Act (OSH)** (Act on the implementation of safety and health measures to improve safety and health of workers at work) (German: ArbSchG)

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

- **Occupational Safety and Health Act (OSH)**
- **Ordinance on workplaces** (German: ArbStättV)

  The Ordinance on Workplaces - ArbStättV was adopted as Article 1 of the Ordinance of 12 August 2004 (BGBl. I p. 2179) by the Federal Government and the Federal Ministry of Economics and Labour with the approval of the Bundesrat. It came into force in accordance with Article 4 sentence 1 of this Ordinance on 25.8.2004. The Ordinance was last amended by Article 4 of the Ordinance on 19 July 2010 (BGBl. I p. 965).

  In addition, there are “Technical regulations for workplaces” (German: SRA) as an integrated instrument to concrete the requirements for workplaces.

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

- **Ordinance on the protection from hazardous substances** (German: GefStoffV)

The Regulation on the protection from hazardous substances (Ordinance on Hazardous Substances - **Hazardous Substances Ordinance**) regulates comprehensively safeguards for employees when working with hazardous substances. Dangerous substances can possess such substances, preparations and products containing certain physical or chemical properties, such as highly flammable, toxic, corrosive, carcinogenic, to name only the most dangerous.

The Ordinance is based on **the Chemicals Act and on the OHS Act.**

- **Chemicals Act**
- **Ordinance on the Admission of Biocides** (Regulation on the registration of biocide products, chemicals and other legal proceedings on biocides and biocide active substances) (German: ChemBiozidZulv)
- **Chemicals Prohibition Ordinance** (Ordinance on bans and restrictions on the marketing of dangerous substances, preparations and products, under the Chemicals Act) (German: ChemGiftInfoV)
- **Poison Control Regulation** (Ordinance on the notification requirements under §16e of the Chemicals Act for the prevention and information about intoxication)

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work

- **Ordinance on the protection from hazardous substances**
- **Chemicals Act**
- **Federal Immission Control Law**
- **OSH**

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

a. **Ordinance on Noise and Vibration protection and OSH** (Ordinance to protect workers against risks arising from noise and vibration) (German: LärmVibrationsArbSchV)

   The Ordinance on Protection against Noise and Vibration entered into force in March 2007. The Federal Government implemented the EC health and safety directives on noise and vibration, and the Convention of the International Labour Office to noise and vibration (ILO Convention No. 148) into national law. The regulation is aimed exposed to all employers whose employees are noise or vibration. The aim is to protect workers from health problems.

- **Technical Regulation on Noise and Vibration protection and OSH** (German: TRLV Lärm)
  - These Regulations are one integrated instrument of the Ordinance on Noise and Vibration protection and OSH

b. **Ordinance on Equipment and Machinery Noise Protection** (32th Ordinance of the Federal Immission Control Law)

   The Ordinance on Equipment and Machinery Noise Regulation of 29 August 2002 (Federal Law Gazette I p. 3478), as last amended by Article 6 paragraph 5 of the Decree of 6 March 2007 (Federal Law Gazette I, p. 261), implements the "Directive 2000/14/EC of the European Parliament and the Council of May 8th 2000. It serves the approximation of the national laws on noise emission by equipment for use in outdoor equipment and machinery. The Ordinance also serves the regulation of operating hours for equipment and machinery.

c. **OSH**

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC)

- **Ordinance on artificial optical radiation** (German: OStrV)
  The new regulation to protect workers from exposure to artificial optical radiation was entered into force in July 2010 (Federal Law Gazette I. No. 38 P. 960). So now all three EU health and safety directives on noise, vibration and artificial optical radiation have been incorporated into national law. The Regulation was published in the 07/26/2010 Federal Law Gazette Part 1 No. 38 S. 960th.

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment. The aim of the Directive is to ensure the free movement of personal protective equipment (PPE) within the Community market by completely harmonizing the essential safety requirements to which it must conform

- **Ordinance on health and safety in the use of personal protective equipment at work** (German: PSA-BV)
  In December 1996 the European Directive 89/656/EEC was incorporated into German Law by the Ordinance on health and safety in the use of personal protective equipment at work (PSA-use regulation, PSA-BV). The PSA-use Regulation governs the selection, deployment, maintenance, repair, replacement and storage of personal protective equipment (PPE) by the employer for all activities. The employer is also obliged to instruct all employees about the security utility of the PSA

3.A.3 Adoption European legislation to the national law (the national execution measures) based on EURLEX database

3.A.3.1 Environmental legislation

Generation of Waste

The Waste Framework Directive (Directive on waste)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

The Landfill Directive (Landfill of waste)

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 17/07/2001

1. Verordnung zur Änderung der Verordnung über Deponien und Langzeitlager sowie zur Neubekanntmachung der Nachweisverordnung vom 26/11/2002 BGBI Teil I Nr. 81 vom 29/11/2002, S. 4417
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *26/11/2002*
2. Verwaltungsverfahrensgesetz (VwVfG) in der Fassung der Bekanntmachung vom 21. September 1998 BGBI. Teil I Seite 3050
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Page: *3050*, Entry into force: *21/09/1998*
3. Bundes-Immissionsschutzgesetz in der Fassung der Bekanntmachung vom 14. Mai 1990 (BGBl. Teil I Seite 880) zuletzt geandert durch Artikel 2 des Gesetzes vom 27. Juli 2001 BGBl. Teil I Nr. 40, 02/08/2001, Seite 1950
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 40*, Publication date: *02/08/2001*, Page: *1950*, Entry into force: *14/05/1990*
4. Vierte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über genehmigungsbedürftige Anlagen) in der Fassung der Bekanntmachung vom 14. März 1997 (BGBl. Teil I Nr. S. 504) zuletzt geändert durch Artikel 4 des Gesetzes zur Umsetzung der UVP-Änderungsrichtlinie, der IVU-Richtlinie und weitere EG-Richtlinien zum Umweltschutz (Artikelgesetz) vom 27. Juli 2001 (BGBl. Teil I Nr. 40, 02/08/2001, Seite 1950)
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 40*, Publication date: *02/08/2001*, Page: *1950*, Entry into force: *14/03/1997*
5. Neunte Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über genehmigungsbedürftige Anlagen) in der Fassung der Bekanntmachung vom 29. Mai 1992 (BGBl. Teil I Seite 1001), zuletzt geändert durch Artikel 5 des Gesetzes zur Umsetzung der UVP-Änderungsrichtlinie, der IVU-Richtlinie und weitere EG-Richtlinien

zum Umweltschutz (Artikelgesetz) vom 27. Juli 2001 (BGBl. Teil I Nr. 40, 02/08/2001, Seite 1950)
Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 40*, Publication date: *02/08/2001*, Page: *1950*, Entry into force: *29/05/1992*

6. Verordnung uber die umweltvertragliche Ablagerung von Siedlungsabfällen und über biologische Abfallbehandlungsanlagen vom 20. Februar 2001 BGBl. Teil I Nr. 10, 27/02/2001, Seite 305
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 10*, Publication date: *27/02/2001*, Page: *305*
7. Verordnung uber Deponien und Langzeitlager und zür Anderung der Abfallablagerungsverordnung vom 24/07/2002 BGBl Teil I n°52 du 29/0 7/2002 p. 2807
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *24/07/2002*
8. Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltvertraglichen Beseitigung von Abfällen (Kreislaufwirtschafts- und Abfallgesetz - KrW/AbfG) vom 27. September 1994, zuletzt geändert durch Artikel 8 des Gesetzes zur Umsetzung der UVP-Änderungsrichtlinie, der IVU-Richtlinie und weitere EG-Richtlinien zum Umweltschutz (Artikelgesetz) vom 27. Juli 2001 BGBl. Teil I Nr. 40, 02/08/2001, Seite 1950
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 40*, Publication date: *02/08/2001*, Page: *1950*, Entry into force: *27/09/1994*; Reference: *(SG(2001)A/11168)*

WEEE Directive and Packaging Directive

Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Adoption to the national law (the national execution measures)

Transposition deadline: 13/08/2004

1. Gesetz über das Inverkehrbringen, die Rücknahme und die umweltverträgliche Entsorgung von Elektro- und Elektronikgeräten(Elektro- und Elektronikgerätegesetz – ElektroG)
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *17*, Publication date: *23/03/2005*, Page: *00762-00774*; Reference: *(MNE(2005)53277)*
2. Richtlinie des Europäischen Parlaments und des Rates vom 27.01.2003 über Elektro- und Elektronik-Altgeräte
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *NR. 17*, Publication date: *23/03/2005*, Page: *00762-00774*, Entry into force: *13/08/2005*; Reference: *(MNE(2005)50059)*

Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 29/06/1996

1. Gesetz uber die Vermeidung und Entsorgung von Abfallen (Abfallgesetz - AbfG) vom 27/08/1986, BGBl Teil 1 Seite 1410, zuletzt geändert durch das Gesetz vom 11/05/1990 (BGBl. I S. 870)

Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil i*, Page: *1410*, Entry into force: *27/08/1986*

2. Gesetz zur Vermeidung, Verwertung und Beseitigung von Abfallen vom 27/09/1994, Bundesgesetzblatt Teil I Nr.66 vom 06/10/1994 Seite 2705
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 66*, Publication date: *06/10/1994*, Page: *2705*, Entry into force: *27/09/1994*
3. Gesetz zur Förderung der Kreislaufwirtschaft und Sicherung der umweltvertraglichen Beseitigung von Abfällen (Kreislaufwirtschafts- und Abfallgesetz- KrW-/AbfG) vom 27/09/1994, Bundesgesetzblatt Teil I Seite 2705
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Page: *2705*, Entry into force: *27/09/1994*
4. Verordnung uber den Abfallentsorgungssplan (Mecklenburg-Vorpommern (Abfallentsorgungsplan M-V - VAEP M-V) vom 27/03/1996, Gesetzblatt für das Land Mecklenburg-Vorpommern Nr. 5/1996 Seite 170
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *27/03/1996*
5. Erlauterungen und Planungsgrundlalagen zu der Verordnung uber den Abfallentsorgungsplan Mecklenburg-Vorpommern vom 26/09/1996, Gesetzblatt für das Land Mecklenburg-Vorpommern Nr. 43/1996 Seite 825
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *26/09/1996*
6. Verordnung uber die Vermeidung von Verpackungsabfallen (Verpackungsverordnung - VerpacktV) vom 12/06/1991, BGBl Teil 1 Nr.36, vom 20/06/1991 Seite 1234, zuletzt geändert durch die Verordnung zur Novel. der Gefahrstoffverordnung, zur Aufhebung der Gefährlichkeitsmerkmaleverordnung und zur Änderung der Ersten Verordnung zum Sprengstoffgesetz vom 26/10/1993 (BGBl. I S. 1782)
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *12/06/1991*
7. Abfallentsorgungsplan Berlin (ohne Bauabfalle), Amtsblatt fur Berlin Nr. 55 vom 01/11/1995 Seite 4297
   Official Journal: *Verwaltungsmassnahmen*
8. Vorlaufige Abfallentsorgungsplan fur Siedlungsabfälle im Regierungsbezirk Halle vom November 1993, Amtsblatt für den Regierungsbezirk Halle vom 17/12/1993 Seite 224
   Official Journal: *Verwaltungsmassnahmen*
9. Zweite Verordnung zur Änderung der Verpackungsverordnung vom 15. Mai 2002 Bundesgesetzblatt, Jahrgang 2002, Teil I Nr. 30 vom 17/05/2002, Seite 1572
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I nr 30*, Publication date: *17/05/2002*, Page: *1572*, Entry into force: *15/05/2002*
10. Zweite Verordnung zur Änderung der Verpackungsverordnung vom 15. Mai 2002, Bundesgesetzblatt Teil I Seite 1572.
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Page: *1572*, Entry into force: *15/05/2002*
11. Abfallentsorgungsplan fur das Land Sachsen-Anhalt, Teilplan Sonderabfall vom 28/05/1996, Ministerialblatt für das Land Sachsen-Anhalt Nr. 41/1996 Seite 1671
    Official Journal: *Verwaltungsmassnahmen*

Generation of Emissions to Atmosphere

<u>Integrated pollution prevention and control (IPPC Directive)</u>

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2050

1. Member State does not consider national execution measures necessary.

Pure air for Europe

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Adoption to the national law (the national execution measures)

Transposition deadline: 10/06/2010

1. Achtes Gesetz zur Änderung des Bundes-Immissionsschutzgesetzes
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *40*, Publication date: *05/08/2010*, Page: *01059-01060*, Entry into force: *06/08/2010*; Reference: *(MNE(2010)55181)*
2. Neununddreißigste Verordnung zur Durchführung des Bundes-Immissionsschutzgesetzes (Verordnung über Luftqualitätsstandards und Emissionshöchstmengen - 39.BImSchV)
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *40*, Publication date: *05/08/2010*, Page: *01065-01104*, Entry into force: *06/08/2010*; Reference: *(MNE(2010)55182)*

Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).

Adoption to the national law (the national execution measures)

NO DOCUMENTS

Generation of Emissions to Water

Water Framework Directive (Water protection and management)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy[29].

Adoption to the national law (the national execution measures)

Transposition deadline: 22/12/2003

1. Landesgesetz zur Änderung des Landeswassergesetzes. GVBl Rheinland-Pfalz n° 16 vom 5/11/2003 p. 309 (SG(2004)A/03645 du 31/03/2004)
   Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*
2. Verordnung zur Umsetzung der Anhänge II, III und V der Richtlinie 2000/60/EG des Europäischen Parlaments und des Rates vom 23. Oktober 2000 zur Schaffung eines Ordnungsrahmens für Massnahmen der Gemeinschaft im Bereich der Wasserpolitik vom 29 juni 2004 ref: Hamburgisches Gesetz- und Verordnungsblatt
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/32*, Publication date: *09/07/2004*, Page: *00277-00308*; Reference: *(MNE(2004)51156)*
3. Niedersächsische Verordnung zum wasserrechtlichen Ordnungsrahmen vom 27/07/2004 ref: Niedersächsisches Gesetz- und Verordnungsblatt n°21 vom 03/08/2004
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/21*, Publication date: *03/08/2004*, Page: *00268-00298*; Reference: *(MNE(2004)51157)*
4. Gesetz nr. 1545 - Fünftes Gesetz zur Änderung des Saarländischen Wassergesetzes vom 31 März 2004 ref: Amtsblatt des Saarlandes vom 06/05/2004
   Legal act: *Gesetz*, number: *2004/1545*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, Publication date: *06/05/2004*, Page: *00982-00988*; Reference: *(MNE(2004)51160)*
5. Verordnung des Ministeriums für Umwelt und Verkehr zur Umsetzung der Anhänge II und V der Richtlinie 2000/60/EG zur Schaffung eines Ordnungsrahmens für Massnahmen der Gemeinschaft im Bereich der Wasserpolitik (Gewässerbeurteilungsverordnung)(Baden-Wüttemberg
   Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/13*, Publication date: *08/10/2004*, Page: *00713-00739*; Reference: *(MNE(2004)52472)*
6. Verordnung zur Umsetzung der Anhänge II, III und V der Richtlinie 2000/60/EG des Europäischen Parlaments und des Rates vom 23. Oktober 2000 über die Bestandsaufnahme und Einstufung der Gewässer und zur Änderung der Brandenburgischen Qualitätszielverordnung

[29] Amended by: Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 (OJ L331/1 of 15.12.2001); Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 (OJ L81/60 of 20.3.2008); Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 (OJ L348/84 of 24.12.2008); Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L140/114 of 5.6.2009).

Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/27*, Publication date: *29/09/2004*, Page: *00698-00738*; Reference: *(MNE(2004)52473)*

7. Verordnung zur Umsetzung der Anhänge II und V der Richtlinie 2000/60/EG des Europäischen Parlaments und des Rates vom 23. Oktober 2000 zur Schaffung eines Ordnungsrahmens für Massnahmen der Gemeinschaft im Bereich der Wasserpolitik (EG-Wasserrahmen-richtlinien-Umsetzungsverordnung - WRRLVO) ((Saarland)
   Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/41*, Publication date: *16/09/2004*, Page: *01910-01949*; Reference: *(MNE(2004)52474)*
8. Bayerische Gewässerbestandsaufnahme- und -zustandseinstufungsverordnung (BayGewZustVO) vom 1. März 2004Ref: Bayerisches Gesetz- und Verordnungsblatt N°5 vom 15/03/2004
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/5*, Publication date: *15/03/2004*, Page: *00042-00082*; Reference: *(MNE(2004)51150)*
9. Zweites Gesetz zur Änderung des Sächsischen Wassergesetzes vom 9 August 2004 ref: Sächsisches Gesetz- und Verordnungsblatt N°11 vom 31/08/2004
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/11*, Publication date: *31/08/2004*, Page: *00374-00397*; Reference: *(MNE(2004)51184)*
10. Thüringer Verordnung zur Umsetzung der Richtlinie 2000/60/EG zur Schaffung eines Ordnungsrahmens für Massnahmen der Gemeinschaft im Bereich der Gewässerpolitik (Thüringer Wasserrahmenrichtlinienverordnung-ThürWRRLVO-) vom 28 April 2004 ref: Gesetz- und Verordnungsblatt für den Freistaat Thüringen n°11 vom 27/05/2004
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/11*, Publication date: *27/05/2004*, Page: *00522-00561*; Reference: *(MNE(2004)51192)*
11. Zehntes Gesetz zur Änderung des Berliner Wassergesetzes
    Legal act: *Gesetz*; Official Journal: *Gesetz und Verordnungsblatt (Länder)*, number: *7*, Publication date: *01/03/2005*, Page: *00106-00112*; Reference: *(MNE(2005)55733)*
12. Zehntes Gesetz zur Änderung des Berliner Wassergesetzes
    Legal act: *Gesetz*; Official Journal: *Gesetz und Verordnungsblatt (Länder)*, number: *7*, Publication date: *01/03/2005*, Page: *00106-00112*; Reference: *(MNE(2005)55734)*
13. Landesgewässerbestandsaufnahme- und zustandüberwachungs- Verordnung (LWBÜVO).GVBl Rheinland-Pfalz
    Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/20*, Publication date: *10/11/2004*, Page: *00465-00498*, Entry into force: *06/10/2004*; Reference: *(MNE(2004)53604)*
14. Verordnung zur Umsetzung der Anhänge II und V der Richtlinie 2000/60/EG vom 23/10/2000 zur Schaffung eines Ordnungsrahmens für Massnahmen der Gemeinschaft im Breich der Wasserpolitik. (WRRL-Umsetung-Verordnung- WRRLUmV)
    Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/41*, Publication date: *01/10/2004*, Page: *00400-00422*; Reference: *(MNE(2004)53606)*
15. Verordnung des Sächsischen Staatsministeriums für Umwelt und Landwirtschaft zur weiteren Umsetzung von Richtlinien der EG im Bereich der Wasserpolitik.Sächsisches GVBl
    Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *2004/14*, Publication date: *30/12/2004*, Page: *00610-00623*; Reference: *(MNE(2005)54719)*
16. Erstes Gesetz zur Änderung des Wassergesetzes des Landes Mecklenburg-Vorpommern
    Legal act: *Gesetz*; Official Journal: *Gesetz und Verordnungsblatt (Länder)*, Publication date: *06/06/2005*, Entry into force: *22/12/2003*; Reference: *(MNE(2005)52104)*
17. Verordnung zur Umsetzung der Wasserrahmenrichtlinie (VO-WRRL)

Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *H 13614*, Publication date: *17/05/2005*, Page: *00382-00418*; Reference: *(MNE(2005)51555)*

18. Verordnungzur Umsetzung der Richtlinie 2000/60/EGdes Europäischen Parlaments und des Ratesvom 23. Oktober 2000 zur Schaffungeines Ordnungsrahmens für Maßnahmender Gemeinschaft im Bereichder Wasserpolitik
    Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *3*, Publication date: *14/02/2006*, Page: *00052-00074*, Entry into force: *15/02/2006*; Reference: *(MNE(2006)51265)*
19. ichtlinie des Europäischen Parlaments und des Rates vom 23.10.2000 zur Schaffung eines Ordnungsrahmens für Maßnahmen der Gemeinschaft im Bereich der Wasserpolitik
    Legal act: *Gesetz*; Official Journal: *Landesgesetzblatt (Länder)*, number: *23/2005*, Publication date: *21/04/2005*, Page: *00208-00230*, Entry into force: *22/04/2005*; Reference: *(MNE(2005)50830)*
20. Verordnung zum Schutz des Grundwassers (Grundwasserverordnung - GrwV)
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *56*, Publication date: *15/11/2010*, Page: *01513-01529*, Entry into force: *16/11/2010*; Reference: *(MNE(2010)56971)*
21. Verordnung des Landes Sachsen-Anhalt über die Wasserrahmenrichtlinie (WRRL-VO LSA) vom 24. August 2005. GVBl. LSA
    Legal act: *Verordnung*; Official Journal: *Landesgesetzblatt (Länder)*, number: *52/2005*, Publication date: *29/08/2005*, Page: *00564-00596*, Entry into force: *30/08/2005*; Reference: *(MNE(2005)54352)*
22. Gesetzzur Änderung wasserrechtlicher Vorschriften
    Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, Publication date: *11/05/2005*, Entry into force: *12/05/2005*; Reference: *(MNE(2005)51112)*
23. Gesetzzur Änderung wasserrechtlicher Vorschriften
    Legal act: *Gesetz*; Official Journal: *Landesgesetzblatt (Länder)*, Publication date: *11/05/2005*, Entry into force: *11/05/2005*; Reference: *(MNE(2005)51111)*
24. Gesetz zur Anpasung des hessischen Wassergesetzes an europarechtliche Vorgaben und zur Änderung des Hessischen Naturschutzrechtes
    Legal act: *Gesetz*; Official Journal: *Landesgesetzblatt (Länder)*, number: *11*, Publication date: *12/05/2005*, Page: *00305-00348*, Entry into force: *07/05/2005*; Reference: *(MNE(2005)51042)*
25. Zweites Gesetz zur Änderung des Thuringer Wassergesetzes GVBl Thüringen n°14 vom 4/12/2003 p. 495 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*
26. Landesverordnung zur Umsetzung der Ahange II und V der Richtlinie 2000/60/EG zur Schaffung eines Ordnungsrahmens fur Massnahmen der Gemeinschaft im Bereich der Wasserpolitik (WRRLVO). GVBl Schleswig-Hol. n° 15 vom 27/11/2003 p. 567 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*
27. Landesgesetz zur Änderung des Landeswassergesetzes. GVBl Schleswig-Holstein n°11 vom 11/8/2003 p. 384 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*
28. Zweites Gesetz zur Änderung des Brandenburgischen Wassergesetzes vom 29 Juni 2004 ref: Gesetz - und Verordnungsblatt für das Land Brandenburg n°14 vom 5/7/2004
    Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/14*, Publication date: *05/07/2004*, Page: *00301-00320*; Reference: *(MNE(2004)51152)*
29. Gesetz zur Änderung des Niedersachsischen der Wassergesetzes. Nds. GVBl n°5 vom 25/2/2004 p. 76 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*

30. Verordnung zur Umsetzung der Wasserrahmenrichtlinie (WRRLUVO M-V) Meckl. GVBl n°1 vom 16/1/2004 p. 14 (SG(2004)A/03645 du 31/03/ 2004)
    Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*
31. Verordnung zum Schutz der Binnenoberflachengewässer, der Übergangsgewässer und des Grundwassers (Gewäss.- BremGSV). ref: Bremen GBl n° 10 vom 24/02/2004 p. 92 (SG(2004)A/03645 du 31/03/2004). 08 Elftes Gesetz zur Änderung des Hamburgischen Wassergesetzes. Hamb. GVBl n° 8 vom 16/02/2004 p. 5 3 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *24/02/2004*
32. Berichtigung des Gesetzes vom 6/2/2004 zur Änderung des Bremischen Wassergesetzes und des Bremischen Abwasserabgabengesetzes Bremen GBl n°10 vom 24/02/2004 p. 45 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*
33. Gesetz vom 24/7/2003 zur Änderung des Bayerischen Wassergesetzes und des Bayerischen Gesetzes zur Ausfuhrung des Abwasserabgabengesetzes. ref: Bayer. GVBl n° 16 vom 24/7/2003 p. 482 (SG(2004)A/03645 du 31/03/2004) 05 Wassergesetz. Bremen GBl n°49 vom 22/12/2003 p. 405 (SG(2004)A/03645 du 31/ 03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *31/03/2004*
34. Gesetz zur Änderung wasserrechtlicher Vorschriften. GBl Baden Wurrt. n° 1 vom 12/1/2004 p. 1 (SG(2004)A/03645 du 31/03/2004)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*
35. Neufassung des Wasserhaushaltsgesetzes BGBl. Teil I n°59 vom 23/08/2002 p. 3245
    Legal act: *Neufassung*; Official Journal: *Verwaltungsmassnahmen*
36. Siebtes Gesetz zur Änderung des Wasserhaushaltsgesetzes BGBl. Teil I n° 37 vom 24/06/2002 p. 1914
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*; Reference: *(SG(2003)A/00362)*

3.A.3.2 Health and Safety legislation

The Health and Safety FRAMEWORK DIRECTIVE - Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. Drittes Gesetz zur Änderung der Gewerbeordnung und sonstiger gewerberechtlicher Vorschriften vom 24/08/2002 BGBl. n°62 du 30/08/20 02 p. 3412
   Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *24/08/2002*
2. Arbeitsförderungsgesetz vom 25/06/1969, Bundesgesetzblatt Teil I Seite 582, zuletzt geändert durch des Gesetzes vom 15/12/1995 (BGBl. S. 1824)
   Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *25/06/1969*

3. Gesetz zur Regelung der gewerbsmäßigen Arbeitnehmerüberlassung (Arbeitnehmerüberlassungsgesetz - AÜG) vom 07/08/1972, Bundesgesetzblatt Teil I Seite 1393, zuletzt geändert durch Gesetz vom 20//07/1995 (BGBl I S.946)
   Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *07/08/1972*
4. Unfallverhütungsvorschriften für Unternehmen der Seefahrt (UVV See) (November 1989)
   Official Journal: *Verwaltungsmassnahmen*
5. Verordnung über bergbauliche Unterlagen, Einwirkungsbereiche und die Bergbau-Versuchsstrecke vom 11/11/1982, Bundesgesetzblatt Teil I vom 30/11/1982 Seite 1553
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *30/11/1982*, Page: *1553*, Entry into force: *11/11/1982*
6. Reichsversicherungsordnung (April 1992)
   Legal act: *Ordnung*; Official Journal: *Verwaltungsmassnahmen*
7. Gesetz zur Einordnung des Rechts der gesetzlichen Unfallversicherung in das Sozialgesetzbuch (Unfallversicherungs-Einordnungsgesetz -UVEG) vom 07/08/1996, Bundesgesetzblatt Teil I vom 20/08/1996 Seite 1254
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *20/08/1996*, Page: *1254*, Entry into force: *07/08/1996*
8. Seemannsgesetz vom 26/07/1957, Bundesgesetzblatt Teil II vom 07/08/1957 Seite 713
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil II*, Publication date: *07/08/1957*, Page: *713*, Entry into force: *26/07/1957*
9. Gesetz zur Umsetzung der EG-Rahmenrichtlinie Arbeitsschutz und weiterer Arbeitsschutz-Richtlinien vom 07/08/1996, Bundesgesetzblatt Teil I vom 20/08/1996 Seite 1246
   Legal act: *Gesetz*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *20/08/1996*, Page: *1246*, Entry into force: *07/08/1996*
10. Bundesberggesetz (BBergG) (Februar 1992)
    Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*

Workplace requirements

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. Druckluftverordnung vom 04/10/1972, Bundesgesetzblatt Teil I vom 14/10/1972 Seite 1909
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *14/10/1972*, Page: *1909*, Entry into force: *04/10/1972*
2. Unfallverhütungsvorschrift vom 01/04/1977
   Official Journal: *Verwaltungsmassnahmen*
3. Unfallverhütungsvorschrift vom 01/04/1979
   Official Journal: *Verwaltungsmassnahmen*
4. Arbeitsstättenverordnung vom 20/03/1975
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *20/03/1975*
5. Unfallverhütungsvorschrift vom 01/01/1981

Official Journal: *Verwaltungsmassnahmen*

6. Verordnung zur Ablösung von Verordnungen nach § 24 der Gewerbeordnung vom 27/02/1980, Bundesgesetzblatt Teil I vom 01/03/1980 Seite 173
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *01/03/1980*, Page: *173*, Entry into force: *27/02/1980*
7. Unfallverhütungsvorschrift vom 01/12/1978
   Official Journal: *Verwaltungsmassnahmen*
8. Unfallverhütungsvorschrift vom 01/04/1989
   Official Journal: *Verwaltungsmassnahmen*
9. Unfallverhütungsvorschrift vom 01/04/1987
   Official Journal: *Verwaltungsmassnahmen*
10. Unfallverhütngsvorschrift vom 01/04/1988
    Official Journal: *Verwaltungsmassnahmen*
11. Bekanntmachug der Neufassung der Gewerbeordnung vom 01/01/1987, Bundesgesetzblatt Teil I vom 29/01/1987 Seite 425
    Legal act: *Neufassung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *29/01/1987*, Page: *425*, Entry into force: *01/01/1987*
12. Verordnung über elektrische Anlagen in explosionsgefährdeten Bereichen (ElexV), Bundesgesetzblatt Teil I vom 19/12/1996 Seite 1932
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *19/12/1996*, Page: *1932*
13. Verordnung zur Umsetzung von EG-Einzelrichtilinien zur EG-Rahmenrichtlinie Arbeitsschutz vom 04/12/1996, Bundesgesetzblatt Teil I vom 10/12/1996 Seite 1841
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *10/12/1996*, Page: *1841*, Entry into force: *04/12/1996*
14. Unfallverhütungsvorschrift vom 01/10/1985
    Official Journal: *Verwaltungsmassnahmen*
15. Bekanntmachung der Neufassung des Schwerbehindertengesetz vom 26/08/1986, Bundesgesetzblatt Teil I vom 02/09/1986 Seite 1421
    Legal act: *Bekanntmachung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *02/09/1986*, Page: *1421*, Entry into force: *26/08/1986*
16. Verordnung über Arbeitsstätten vom 12 August 2004
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *2004/44*, Publication date: *24/08/2004*, Page: *02179-02189*; Reference: *(MNE(2004)50989)*
17. Unfallverhütungsvorschrift vom 01/05/1978
    Official Journal: *Verwaltungsmassnahmen*
18. Unfallverhütungsvorschrift vom 01/09/1988
    Official Journal: *Verwaltungsmassnahmen*
19. Unfallverhütungsvorschrift vom 01/08/1978
    Official Journal: *Verwaltungsmassnahmen*
20. Verordnung zur Novellierung der Gefahrstoffverordnung, zur Aufhebung der Gefährlichkeitsmerkmaleverordnung und zur Änderung der Ersten Verordnung zum Sprengstoffgesetz vom 26/10/1993, Bundesgesetzblatt Teil I vom 30/10/1993 Seite 1782
    Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *30/10/1993*, Page: *1782*, Entry into force: *26/10/1993*

Dangerous agents at work

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 05/05/2001

1. Verordnung zur Rechtsvereinfachung im Bereich der Sicherheit und des Gesundheitsschutzes bei der Bereitstellung von Arbeitsmitteln und deren Benutzung bei der Arbeit, der Sicherheit beim Betrieb uberwachungsbedürftiger Anlagen und der Organisation des betrieblichen Arbeitsschutzes BGBl. Teil I n° 70 vo m 02/10/2002 S. 3777 (SG(2002)A/10736 du 29/10/2002)
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*
2. Gesetz uber die Durchführung von Massnahmen des Arbeitsschutzes zur Verbesserung der Sicherheit und des Gesundheitsschutzes der Beschaftigent bei der Arbeit (Arbeitsschutzgesetz - ArbSchG) vom 7. August 1996 (BGBl. I S. 1246), zuletz geändert durch Artikel 3 des Gesetzes vom 27. Dezember 2000 BGBl. I S. 2048
   Legal act: *Gesetz*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *27/12/2000*; Reference: *(SG(2000)A/06629)*

Exposure to chemical agents and chemical safety

Directive 2004/37/EC - carcinogens or mutagens at work of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC.

Adoption to the national law (the national execution measures)

Transposition deadline: 20/05/2004

1. Verordnung zur Anpassung der Gefahrstoffverordnung an die EG-Richtlinie 98/24/EG und andere EG-Richtlinien
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *74*, Publication date: *29/12/2004*, Entry into force: *23/12/2004*; Reference: *(MNE(2005)52765)*

Directive 2009/161/EU - indicative occupational exposure limit values of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2009/148/EC - exposure to asbestos at work of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (Text with EEA relevance).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2050

1. Member State does not consider national execution measures necessary.

Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2006/15/EC - indicative occupational exposure limit values of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/09/2007

1. Verordnung zur Anpassung der Gefahrstoffverordnung an die EG-Richtlinie 98/24/EG und andere EG-Richtlinien
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *74*, Publication date: *29/12/2004*, Page: *03758-03816*; Reference: *(MNE(2006)56630)*
2. Neufassung der Technischen Regeln für Gefahrstoffe
   Legal act: *Bekanntmachung*; Official Journal: *Verwaltungsmassnahmen*, number: *28*, Publication date: *30/06/2008*, Page: *00558-00579*, Entry into force: *12/06/2008*; Reference: *(MNE(2008)55505)*

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1993

1. Verordnung zur Novellierung der Gefahrstoffverordnung, zur Aufhebung der Gefährlichkeitsmerkmaleverordnung und zur Änderung der Ersten Verordnung zum Sprengstoffgesetz vom 26/10/1993, Bundesgesetzblatt Teil I vom 30/10/1993 Seite 1782
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *30/10/1993*, Page: *1782*, Entry into force: *26/10/1993*

Noise

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 14/02/2006

1. Verordnung zur Umsetzung der EG-Richtlinien 2002/44/EG und 2003/10/EG zum Schutz der Beschäftigten vor Gefährdungen durch Lärm und Vibrationen
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *8*, Publication date: *08/03/2007*, Page: *00261-00277*; Reference: *(MNE(2007)52220)*

Artificial optical radiation

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 27/04/2010

1. Verordnung zur Umsetzung der Richtlinie 2006/25/EG zum Schutz der Arbeitnehmer vor Gefährdungen durch künstliche optische Strahlung und zur Änderung von Arbeitsschutzverordnungen vom 19. Juli 2010
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *38*, Publication date: *26/07/2010*, Page: *00960-00967*, Entry into force: *27/07/2010*; Reference: *(MNE(2010)55077)*

Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1991

1. Allgemeine Verwaltungsvorschrift zur Änderung der Allgemeine Verwaltungsvorschrift zum Gesetz über Technische Arbeitsmittel vom 06/08/1992, Bundesanzeiger Nr. 153 Seite 6950
   Legal act: *Verwaltungsmassnahmen*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *06/08/1992*
2. Verordnung zum Gerätesicherheitsgesetz und zur Aufhebung von Vorschriften der Verordnung über besondere Arbeitsschutzanforderungen bei Arbeiten im Freien in der Zeit vom 1. November bis 31. März vom 10/06/1992, Bundesgesetzblatt Teil I vom 17/06/1992 Seite 1019
   Legal act: *Verordnung*; Official Journal: *Bundesgesetzblatt Teil 1 (BGB 1)*, number: *Teil I*, Publication date: *17/06/1992*, Page: *1019*, Entry into force: *10/06/1992*
3. Verordnung über Sicherheit und Gesundheitsschutz bei der Benutzung persönlicher Schutzausrüstungen bei der Arbeit (PSA-Benutzungsverordnung - PSA-BV)

Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*

4. Achte Verordnung zum Gerätesicherheitsgesetz über das Inverkehrbringen von persönlichen Schutzausrüstungen- 8.GSGV vom 10/06/1992
   Legal act: *Verordnung*; Official Journal: *Verwaltungsmassnahmen*, Entry into force: *10/06/1992*

3.B ITALY

3.B.1 Environmental legislation

The Italian legislation on environment is organised, following the European, one with specification concerning waste, emission to atmosphere, emission to water, pollution of land and ground water and the most recent issue concerning climate change and efficient production and use of energy.

Waste

The following list shows a summary of the Italian legislation on waste organised in various chapter as indicated by the European relevant directives. It should also be noted that, due to the high level of autonomy of the regional government, a regional legislation could also exists for some of the following sub-chapter.

The complexity of such a framework make not easy for the steel enterprises, both the main ones and the subcontractors, to implement the legislation in all their parts.

The direct role and responsibility of maintenance technicians is very important in all the different chapters because, in many cases, they are the people directly involved in the generation of wastes due to their maintenance activity resulting is substitution of plants parts. They have also a fundamental role on classification of wastes as the first step for recycling of addressing them to appropriate disposals.

Generation of Emissions to Atmosphere

As in the former case, the legislation in this important part is organised as the European one. This chapter is also particularly important for the external “image” of the steel companies to the local communities and the territory where they operates their activities.

The impact is particularly heavy and visible for the integrated steel production sites (ex. coke quenching) with emission in atmosphere of steam, dustes and gases but is also relevant for the EAF production cycle.

Although the task of technicians is not easy they, together with the operators of plants, are deeply involved in the prevention and in quick intervention in case of emergency events. The complexity of the case need a full knowledge of the production cycle.

Generation of Emissions to Water

Without repeating what has bees written in the former chapters, it must be noted that in this case the technicians role is mainly related to the management of technical fluids, those used directly in the production processes and those used as lubricants. Due to the scale effect, is also very important to have full control of possible continuous leakages that in the past have been tolerated on the base of evaluation of cost-benefit. This oblige companies to a radical change of their approach to the problems pushing for a new awareness of problems.

Climate Change

In the last years, as a consequence of increased sensibility to the climate change issues, the new EU political orientation and international commitments, the climate change has become the top priority in the European legislation. Two fields are important in this context: the energy efficient production and use and the reduction of GHGs emissions.

Energy Intensive Industries are particularly affected by this new legislation and the quest of solutions is of fundamental importance for the future of these sectors.

The steel sector is strongly committed to fnd breakthrough technologies in the medium-long term but is important to implement day by day activities for a con-

tinuous improvement in this field. Maintenance technicians are in the front line of this activities.

	European Regulation	***Italian Regulation***
water	• Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 establishing the list of priority substances in the field of water policy and amending Directive 2000/60/EC (L 331 1 15.12.2001)	Addressed to member states, it was enacted the day following its publication on the EU Official Journal (16/12/2001)
	• Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 amending Directive 2000/60/EC establishing a framework for community action in the field of water policy, as regards the implementing powers conferred on the Commission (L 81 60 20.3.2008)	Legislative decree no. 219 dated 10/12/2010
	• Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council (L 348 84 24.12.2008)	Legislative decree no. 219 dated 10/12/2010
	• Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 (L 140 114 5.6.2009)	Law no. 96 dated 4/06/2010
air	2. DIRECTIVE 2008/50/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 21 May 2008 on ambient air quality and cleaner air for Europe (OJ L 152, 11.06.2008, p. 1)	Legislative decree no. 155 dated 13/08/2011
pollution (IPPC)	3. DIRECTIVE 2008/1/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 January 2008 concerning integrated pollution prevention and control (Codified version) (OJ L 24, 29.1.2008 p.8)	Enacted on 18/2/2008, repealed by art.81 of Directive 2010/75/EU
	4. DIRECTIVE 2010/75/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast) (OJ L 334, 17.12.2010, p. 17)	Enacted on 6/1/2011
	5. Integrated Pollution Prevention and Control (IPPC). Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001	
	6. Integrated Pollution Prevention and Control (IPPC). Reference Document on Best Available Techniques in the Ferrous Metals Processing Industry, December 2001	

	European Regulation	Italian Regulation
waste	7. DIRECTIVE 2008/98/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 November 2008 on waste and repealing certain Directives (OJ L 312, 22.11.2008, p. 3)	Legislative decree no. 205 dated 3/12/2010
	8. COUNCIL DIRECTIVE 91/157/EEC of 18 March 1991 on batteries and accumulators containing certain dangerous substances (L 078, 26.3.1991, p. 38)	Ministerial Decree 20/11/97 - directly enforced
chemicals	9. REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 136, 29.5.2007, p.3)	Enacted on 1/6/2007
	10. REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (OJ L 353, 31.12.2008, p.1) – introducing GHS in UE	Enacted on 20/06/2009
greenhouse trading system	11. DIRECTIVE 2003/87/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC (OJ L 275, 25.10.2003 p. 32)	Legislative decree no. 51/2008 + Legislative decree 216/2006
	12. DIRECTIVE 2004/101/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 October 2004 amending Directive 2003/87/EC establishing a scheme for greenhouse gas emission allowance trading within the Community, in respect of the Kyoto Protocol's project mechanisms (OJ L 338, 13.11.2004, p. 18)	Legislative decree 216 dated 4/4/2006
	13. DIRECTIVE 2009/29/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community (OJ L 140, 5.6.2009, p. 63)	Enacted on 25/06/2009, to be implemented by 31/12/2012
	14. COMMISSION DECISION of 24 December 2009 determining, pursuant to Directive 2003/87/EC of the European Parliament and of the Council, a list of sectors and subsectors which are deemed to be exposed to a significant risk of carbon leakage (OJ L 1, 5.1.2010, p.10)	Decision addressed to member states

3.B.2 Health and safety legislation

Several legislative acts are related to this particular issue. The “mother” of all the European legislation is the framework directive 89/391/EEC of 12 June 1989 followed by its “doughters2 specifying the various elements.

General employer duties.

The main objective of the EU legislation has been prevention through the identification-elimination of risks and companies’ responsible. For some EU countries, Italy is one of them, this has been a totally been approach related to their former traditions and quality of industrial relations.

One of the main innovations is the workers’ direct and indirect participation to the risk assessment procedures. The maintenance technicians, as written before, are in the front line with direct contacts with the real production sites and the relevant machinery, dangerous substances and noise sources.

Apart of the specific risks related to their activities, their role is also important for their colleagues continuously operating in the working places.

Personal Protective Equipment

Mechanical and electrical technicians should be provided with appropriate PPE, in accordance with the scope of their work and operate and use equipment as directed and should receive instruction on how to do so. Where the nature of the tasks in certain areas demands, workers should be provided with PPE, designed specifically to protect against hazards within in that particular department.

Exposure to Chemical and Physical Agents

Many European directives (see the following list) are dealing with the workers' exposure to physical and chemical agents and substances at the workplace.

Risk of exposure to hazardous chemicals and industrial gases for mechanical and electrical technicians while performing their daily duties such as repairs and maintenance of machines and installations, and moving around the site. They should also be protected against noise during their work activities and be trained to face potentially dangerous situations as those Potentially Explosive Atmospheres.

They must be aware and trained to the new European legislation on Registration, Evaluation, Authorisation and restriction of Chemicals in force since 2007, particularly to the new labelling regulation of chemicals.

	European Regulation	***Italian Regulation***
PPE	1. COUNCIL DIRECTIVE 89/686/EEC of 21 December 1989 on the approximation of the laws of the Member States relating to personal protective equipment *(OJ L 399, 30.12.1989, p. 18)*	Legislative decree 475/92
ATEX	2. DIRECTIVE 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres *(OJ L 100, 19.4.1994 p. 1)*	Decree by the President of the Republic no. 126 dated 23/03/1998
Chemical agents	3. COUNCIL DIRECTIVE 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) *(OJ L 131, 5.5.1998, p.11)*	Legislative decree 25/02 -> repealed by Legislative decree 81/08 Title IX Harmful substances Chapter I Protection against chemical agents
Vibrations	4. DIRECTIVE 2002/44/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) *(OJ L 177, 6.7.2002, p.13)*	Legislative decree 187/05 -> repealed by Legislative decree 81/08 Title VIII Physical Agents Chapter III Workers' protection against risks arising from vibration exposure

European Regulation		*Italian Regulation*
Noise	5. DIRECTIVE 2003/10/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) *(OJ L 42, 15.2.2003, p. 38)*	Legislative decree 195/06 -> repealed by Legislative decree 81/08 Title VIII Physical Agents Chapter II Workers' protection against risks arising from noise exposure.
Cancerogens and mutagens	6. DIRECTIVE 2004/37/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) of Council Directive 89/391/EEC) (codified version) *(OJ L 158, 30.4.2004, p.50)*	Legislative decree 81/08 Title IX Harmful substances Chapter II Protection against cancerogenic and mutagenic agents
AOR	7. DIRECTIVE 2006/25/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2006 on the minimum health and safety requirements regarding the exposure of workers to risks arising from physical agents (artificial optical radiation) (19th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC) *(OJ L 114, 27.4.2006, p. 38)*	Legislative decree 81/08 Title VIII Physical agents Chapter IV Workers' protection against risks arising from exposure to artificial optical radiations

The influence of the legislation on daily work of maintenance electrical and mechanical technicians for both for national and company levels Italy is presented in the table below: *GREEN SKILLS – ELECTRICAL, MECHANICAL AND ELECTRONIC MAINTENANCE OPERATORS AND ENVIRONMENTAL IMPACT AT AST*:

Role	**Main functions**	**Environmental impact**	**Protective actions**
Electrical maintenance operator	Takes all safety measures to plants for recovery operations; verifies the electric or electronic nature of failure; identifies electronic failures and calls electronic maintenance operator for repair; solves electric failures	Waste disposal	Capillary separate waste collection of: 1. copper; 2. alloys; 3. gloves; 4. oil-imbued cloths and garments; 5. unrecoverable electric spares
Mechanical	Identifies and solves	Oil and lubricant dis-	Application of leakage re-

maintenance operator	mechanical failures of plants	posal	ducing procedures e.g. changing stand speed; increasing temperature etc..
Electronic maintenance operator	Restarts electronic equipment that supervises the control of plant movements	Waste disposal	Capillary separate waste collection of: 1. control PCs; 2. cards; 3. sensors; 4. special equipment (e.g.: strip thickness gauges)

3.B.3 Adoption European legislation to the national law (the national execution measures) based on EURLEX database

3.B.3.1 Environmental legislation

Generation of Waste

The Waste Framework Directive (Directive on waste)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Adoption to the national law (the national execution measures)

Transposition deadline: 12/12/2010

1. Disposizioni di attuazione della direttiva 2008/98/CE del Parlamento europeo e del Consiglio del 19 novemnre 2008 relativa ai rifiuti e che abroga alcune direttive.
   Legal act: *Decreto legislativo*, number: *205*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *288*, Publication date: *10/12/2010*, Entry into force: *10/12/2010*; Reference: *(MNE(2010)57539)*

The Landfill Directive (Landfill of waste)

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 17/07/2001

1. Definizione dei criteri di ammissibilità dei rifiuti in discarica.
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *201*, Publication date: *30/08/2005*; Reference: *(MNE(2005)54406)*
2. Inserita nella Legge n. 422 del 29 dicembre 2000 (Allegato B - Legge comunitaria 2000) GURI n.16 del 20/01/2001 - S.O. n. 14/L

Legal act: *Legge*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *16*, Publication date: *20/01/2001*, Entry into force: *29/12/2000*; Reference: *(SG(2003)A/03601)*

3. Decreto Legislativo 13 gennaio 2003 n. 36 - Attuazione della direttiva 1999/31/CE relativa alle discariche di rifiuti GURI Suppl. Ordinario n° 40 L del 12/03/2003 alla GU Serie Generale n°59 del 12/03/2003 p. 5
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *12/03/2003*, Entry into force: *13/01/2003*
4. Decreto 13 marzo 2003 - Criteri di ammissibilita dei rifiuti in discarica GURI Serie generale n°67 del 21/03/2003 p. 31 (SG(2004)A/02092 du 24/02/2004)
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *21/03/2003*, Entry into force: *13/03/2003*
5. Definizione dei criteri di ammissibilità dei rifiuti in discarica, in sostituzione di quelli contenuti nel decreto del Ministro per l'Ambiente e della tutela del territorio 3 agosto 2005
   Legal act: *Decreto ministeriale*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *281*, Publication date: *01/12/2010*, Entry into force: *01/12/2010*; Reference: *(MNE(2011)50354)*

WEEE Directive and Packaging Directive

Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Adoption to the national law (the national execution measures)

Transposition deadline: 13/08/2004

1. Modalità di finanziamento della gestione dei rifiuti di apparecchiature di illuminazione da parte dei produttori delle stesse.
   Legal act: *Decreto ministeriale*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *151*, Publication date: *02/07/2009*, Entry into force: *02/07/2009*; Reference: *(MNE(2010)56314)*
2. Disposizioni per l'adempimento di obblighi derivanti dall'appartenenza dell'Italia alle Comunità europee. (Legge comunitaria 2007).
   Legal act: *Legge*, number: *34*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *S.O. n. 54/L - GU n. 56*, Publication date: *06/03/2008*; Reference: *(MNE(2008)51787)*
3. Istituzione del Comitato di vigilanza e di controllo sulla gestione dei RAEE, ai sensi dell'articolo 15, comma 1, del decreto legislativo 25 luglio 2005, n. 151.
   Legal act: *Decreto ministeriale*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *233*, Publication date: *06/10/2007*; Reference: *(MNE(2007)59033)*
4. Riduzione dell'uso di sostanze pericolose nelle apparecchiature elettriche ed elettroniche, nonché allo smaltimento dei rifiuti
   Legal act: *Decreto legislativo*, number: *151*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *175*, Publication date: *29/07/2005*, Page: *00001-00025*; Reference: *(MNE(2005)53048)*
5. Istituzione e modalità di funzionamento del registro nazionale dei soggetti obbligati al finanziamento dei sistemi di gestione dei rifiuti di apparecchiature elettriche ed elettroniche (RAEE), costituzione e funzionamento di un centro di coordinamento per l'ottimizzazione delle attività di competenza dei sistemi collettivi e istituzione del comitato d'indirizzo sulla gestione dei RAEE, ai sensi degli articoli 13, comma 8, e 15, comma 4, del decreto legislativo 25 luglio 2005, n. 151.

Legal act: *Decreto ministeriale*, number: *185*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *257*, Publication date: *05/11/2007*; Reference: *(MNE(2007)59034)*

6. Attuazione delle direttive 2002/95/CE, 2002/)+/CE e 2003/108/CE, relative alla riduzione dell'uso di sostanze pericolose nelle apparecchiature elettriche ed elettroniche, nonchè allo smaltimento dei rifiuti.
   Legal act: *Decreto legislativo*, number: *151*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *175 - S.O. 135/L*; Reference: *(MNE(2005)55496)*

Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 29/06/1996

1. Decreto legislativo del 05/02/1997 n. 22, attuazione delle direttive 91/156/CEE sui rifiuti, 91/689/CEE sui rifiuti pericolosi e 94/62/CE sugli imballaggi e sui rifiuti di imballaggio Supplemento ordinario n .33 alla GURI - Serie generale n°38 del 15/02/1997 pag. 3
   Legal act: *Decreto*, number: *22*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *15/02/1997*, Page: *3*, Entry into force: *05/02/1997*; Reference: *(SG(2003)A/05925)*
2. Testo aggiornato del decreto legislativo 5 febbraio 1997, n. 22, recante: "Attuazione delle direttive 91/156/CEE sui refiuti, 91/689/CEE sui rifiuti pericolosi e 94/62/CE sugli imballaggi e sui rifiuti di imballaggi" Supplemento ordinario n. 237/L alla GURI - Serie generale - del 28/11/1997 n. 278
   Legal act: *Administrative measures*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *237*, Publication date: *28/11/1997*, Entry into force: *05/02/1997*
3. Decreto legislativo del 08/11/1997 n. 389, modifiche ed integrazioni al decreto legislativo 05/02/1997, n. 22 in materia di rifiuti, di rifiuti pericolosi, di imballaggi e di rifiuti di imballaggio GURI - Serie generale - del 08/11/1997 n. 261 pag. 4
   Legal act: *Decreto*, number: *389*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *261*, Publication date: *08/11/1997*, Page: *4*, Entry into force: *08/11/1997*
4. Decreto ministeriale del 05/02/1998, individuazione dei rifiuti non pericolosi sottoposti alle procedure semplificate di recupero ai sensi degli articoli 31 e 33 del decreto legislativo 05/02/1997 n. 22 Supplemento ordinario n. 72 alla GURI - Serie generale - del 16/04/1998 n. 88
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *72*, Publication date: *16/04/1998*, Entry into force: *05/02/1998*
5. Decreto ministeriale del 01/04/1998 n. 148, regolamento recante approvazione del modello dei registri di carico e scarico dei rifiuti ai sensi degli articoli 12, 18, comma 2, lettera m), e 18, comma 4, del decreto legislativo 5 febraio 1997, n. 22 GURI - Serie generale - del 14/05/1998 n. 110 pag. 23
   Legal act: *Decreto*, number: *148*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *110*, Publication date: *14/05/1998*, Page: *23*, Entry into force: *01/04/1998*
6. Decreto ministeriale del 01/04/1998 n. 145, regolamento recante la definizione del modello e dei contenuti del formulario di accompagnamento dei rifiuti ai sensi degli articoli 15, 18, comma 2, lettera e), e comma 4, del decreto legislativo 5 febraio 1997, n. 22 GURI - Serie generale - del 13/05/1998 n. 109 pag. 24
   Legal act: *Decreto*, number: *145*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *109*, Publication date: *13/05/1998*, Page: *24*, Entry into force: *01/04/1998*

7. Decreto ministeriale del 11/03/1998 n. 141, regolamento recante norme per lo smaltimento in discarica dei rifiuti e per la catalogazione dei rifiuti pericolosi smaltiti in discarica GURI - Serie generale - del 12/05/1998 n. 108 pag. 22
   Legal act: *Decreto*, number: *141*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *108*, Publication date: *12/05/1998*, Page: *22*, Entry into force: *11/03/1998*
8. Legge regionale n° 15 del 7/5/2003-Modifica ed i ntegrazione al piano regionale di gestione rifiuti approvato con la legge regionale n° 6 del 2/2/2001. Bollettino Ufficiale della Reg. Basilicata n°33 del 10/5/2003 p. 3262
   Legal act: *Legge*, Entry into force: *07/05/2003*
9. Decreto 12/06/2002 n. 161 Regolamento attuativo degli articoli 31 e 33 del decreto legislativo 5/2/1997, n°22, relativo all'individuazione dei rifiuti pericolosi che è pssibile ammettere alle procedure semplificate GURI n°177 du 30/ 07/2002 p. 16
   Legal act: *Administrative measures*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *30/07/2002*

Generation of Emissions to Atmosphere

Integrated pollution prevention and control (IPPC Directive)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Pure air for Europe

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Adoption to the national law (the national execution measures)

Transposition deadline: 10/06/2010

1. Attuazione della direttiva 2008/50/CE relativaalla qualità dell'aria ambiente e per un'aria più pulitain Europa.
   Legal act: *Decreto legislativo*, number: *155*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *216*, Publication date: *15/09/2010*, Entry into force: *15/09/2010*; Reference: *(MNE(2010)55912)*

Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).

Adoption to the national law (the national execution measures)

NO DOCUMENTS

Generation of Emissions to Water

Water Framework Directive (Water protection and management)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy[30].

Adoption to the national law (the national execution measures)

Transposition deadline: 22/12/2003

1. Decreto legislativo 3 aprile 2006, n. 152 Norme in materia ambientale
   Legal act: *Decreto legislativo*, number: *2006/152*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *14/04/2006*, Page: *00013-00424*; Reference: *(MNE(2006)53748)*
2. Conversione in legge, con modificazioni, del decreto-legge 8 aprile 2008, n. 59, recante disposizioni urgenti per l'attuazione di obblighi comunitari e l'esecuzione di sentenze della Corte di Giustizia delle Comunità europee
   Legal act: *Legge*, number: *101*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *132*, Publication date: *07/06/2008*; Reference: *(MNE(2008)55517)*
3. Conversione in legge, con modificazioni, del decreto-legge 8 aprile 2008, n. 59, recante disposizioni urgenti per l'attuazione di obblighi comunitari e l'esecuzione di sentenze della Corte di giustizia delle Comunità europee.
   Legal act: *Legge*, number: *101*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *132*, Publication date: *07/06/2008*; Reference: *(MNE(2008)53442)*
4. Regolamento recante i criteri tecnici per la classificazione dello stato dei corpi idrici superficiali, per la modifica delle norme tecniche del decreto legislativo 3 aprile 2006, n. 152, recante norme in materia ambientale, predisposto ai sensi dell'articolo 75, comma 3, del medesimo decreto legislativo.

[30] Amended by: Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 (OJ L331/1 of 15.12.2001); Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 (OJ L81/60 of 20.3.2008); Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 (OJ L348/84 of 24.12.2008); Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L140/114 of 5.6.2009).

Legal act: *Decreto ministeriale*, number: *260*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *30*, Publication date: *07/02/2011*, Entry into force: *07/02/2011*; Reference: *(MNE(2011)51514)*

3.B.3.2 Health and Safety legislation

The Health and Safety FRAMEWORK DIRECTIVE - Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OJ L181/1 of 29.6.1989).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. Decreto legislativo del 19/09/1994 n. 626, attuazione delle direttive 89/391/CEE, 89/654/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE e 90/679/CEE riguardanti il miglioramento della sicurezza e della salute dei lavoratori sul luogo di lavoro Supplemento ordinario n. 141 alla GURI - Serie generale - del 12/11/1994 n. 265
   Legal act: *Decreto*, number: *626*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *141*, Publication date: *12/11/1994*, Entry into force: *19/09/1994*
2. Decreto legislativo del 19/03/1996 n. 242, modifiche ed integrazioni al decreto legislativo 19 settembre 1994, n. 626, recante attuazione di direttive comunitarie riguardanti il miglioramento della sicurezza e della salute dei lavoratori sul luogo di lavoro Supplemento ordinario n .75 alla GURI - Serie generale - del 06/05/1996 n. 104 pag. 3
   Legal act: *Decreto*, number: *242*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *104*, Publication date: *06/05/1996*, Page: *3*, Entry into force: *19/03/1996*
3. Decreto Legislativo n° 195 del 23/6/2003 -Modifi che ed integrazioni al decreto legislativo 19/9/1994, n. 626, per l'individuazione delle capacità e dei requisiti professionali richiesti agli addetti ed ai responsabili dei servizi di prevenzione e protezione dei lavoratori, a norma dell'articolo 21 della legge 1/3/2002, n. 39. GURI Serie generale n° 174 del 29/7/2003 p. 4 (SG(2003)A/08174 du 28/08/2003)
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *29/07/2003*, Entry into force: *23/06/2003*

Workplace requirements

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. Decreto legislativo del 19/09/1994 n. 626, attuazione delle direttive 89/391/CEE, 89/654/CEE, 89/655/CEE, 89/656/CEE, 90/269/CEE, 90/270/CEE, 90/394/CEE e 90/679/CEE riguardanti il miglioramento della sicurezza e della salute dei lavoratori sul

luogo di lavoro Supplemento ordinario n. 141 alla GURI - Serie generale - del 12/11/1994 n. 265
Legal act: *Decreto*, number: *626*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *141*, Publication date: *12/11/1994*, Entry into force: *19/09/1994*

2. Decreto legislativo del 19/03/1996 n. 242, modifiche ed integrazioni al decreto legislativo 19 settembre 1994, n. 626, recante attuazione di direttive comunitarie riguardanti il miglioramento della sicurezza e della salute dei lavoratori sul luogo di lavoro Supplemento ordinario n .75 alla GURI - Serie generale - del 06/05/1996 n. 104 pag. 3
Legal act: *Decreto*, number: *242*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *104*, Publication date: *06/05/1996*, Page: *3*, Entry into force: *19/03/1996*

Dangerous agents at work

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 05/05/2001

1. Decreto legislativo 2 febbraio 2002, n° 25 - Attuazione della direttiva 1998/24/CE sulla protezione della salute e della sicurezza dei lavatori contro i rischi derivanti da agenti chimici durante il lavoro Supplemento ordinario alla GURI - Serie generale - n°57 du 08/03/2002, page 58
Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, Publication date: *08/03/2002*, Page: *58*, Entry into force: *02/02/2002*
2. Inserita nella Legge N. 422 del 29 dicembre 2000 (Allegato A, legge comunitaria 2000) GURI n. 16 del 20/01/2001 - S.O. n. 14/L
Legal act: *Legge*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *16*, Publication date: *20/01/2001*, Entry into force: *29/12/2000*; Reference: *(SG(2002)A/03079)*

Exposure to chemical agents and chemical safety

Directive 2004/37/EC - carcinogens or mutagens at work of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2009/161/EU - indicative occupational exposure limit values of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2009/148/EC - exposure to asbestos at work of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2001

1. Decreto 26 febbraio 2004 - Definizione di una prima lista di valori limite indicativi di esposizione professionale agli agenti chimici .
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *58*, Publication date: *10/03/2004*, Page: *16*, Entry into force: *26/02/2004*; Reference: *(SG(2004)A/03045)*

Directive 2006/15/EC - indicative occupational exposure limit values of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/09/2007

1. Attuazione dell'articolo 1 della legge 3 agosto 2007, n. 123, in materia di tutela della salute e della sicurezza nei luoghi di lavoro.
   Legal act: *Decreto legislativo*, number: *81*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *S.O. n. 101*, Publication date: *30/04/2008*; Reference: *(MNE(2008)52965)*
2. Recepimento della direttiva 7 febbraio 2006, n. 2006/15/CE.Direttiva della Commissione che definisce un secondo elenco di valori indicativi di esposizione professionale, in attuazione della direttiva 98/24/CE del Consiglio, e che modifica le direttive 91/322/CEE e 200/39/CE.
   Legal act: *Decreto ministeriale*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *48*, Publication date: *26/02/2008*; Reference: *(MNE(2008)51526)*

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1993

1. Decreto del 15/08/1991 n. 277, attuazione delle direttive n. 80/1107/CEE, n. 82/605/CEE, n. 83/477/CEE, n. 86/188/CEE e n. 88/642/CEE, in materia di protezione dei lavoratori contro i rischi derivanti da esposizione ad agenti chimici, fisici e biologici durante il lavoro, a norma dell'art. 7 della legge 30 luglio 1990, n. 212 Supplemento ordinario n. 53 alla GURI - Serie generale - del 07/08/1991 n. 200
   Legal act: *Decreto*, number: *277*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *53*, Publication date: *07/08/1991*, Entry into force: *15/08/1991*

Noise

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 14/02/2006

1. Attuazione della direttiva 2003/10/CE relativa all'esposizione dei lavoratori ai rischi derivanti dagli agenti fisici (rumore).
   Legal act: *Decreto legislativo*, number: *195*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *124*, Publication date: *30/05/2006*; Reference: *(MNE(2006)53943)*

Artificial optical radiation

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 27/04/2010

1. Attuazione dell'articolo 1 della legge 3 agosto 2007, n. 123, in materia di tutela della salute e della sicurezza nei luoghi di lavoro.
   Legal act: *Decreto legislativo*, number: *81*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *S.O. N.108/L - GU N. 101*, Publication date: *30/04/2008*; Reference: *(MNE(2008)52938)*

Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1991

1. Decreto ministeriale del 10/05/1996, disposizioni transitorie concernenti le caratteristiche ed i requisiti delle cinture di salvataggio da utilizzare esclusivamente sulle unità da diporto. Gazzetta Ufficiale - Serie generale - dell'11/05/1996 n. 109 pag. 19
   Legal act: *Decreto*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *109*, Publication date: *11/05/1996*, Page: *19*, Entry into force: *10/05/1996*
2. Decreto legislativo del 04/12/1992 n. 475, attuazione della direttiva 89/686/CEE del Consiglio del 21 dicembre 1989, in materia di ravvicinamento delle legislazioni degli Stati membri relative ai dispositivi di protezione individuale, Supplemento ordinario n. 128 alla Gazzetta Ufficiale - Serie generale - del 09/12/1992 n. 289 pag. 5
   Legal act: *Decreto*, number: *475*; Official Journal: *Gazzetta Ufficiale della Repubblica Italiana*, number: *289*, Publication date: *09/12/1992*, Page: *5*, Entry into force: *04/12/1992*

3.C POLAND

3.C.1 Environmental legislation

The main Polish legal act in the range of protection the environment is act of parliament "*prawo ochrony środowiska*" (law on environmental protection) of 27.4.2001. This act covers (among others): protection of air, protection of water, protection of land, noise protection, protection of minerals, contamination counteraction.

All fields of environmental issues discussed in chapter 1.1 on European level are covered by Polish national law and Polish national execution measures for each Directive mentioned in chapter 1.1 are listed below in chapter 3.C.1 (except the Directive 2010/75/EU, because the transposition deadline expired on 07/01/2013).

There are no other (than in EU legislation) Polish national regulations influencing the daily work of mechanical and electrical technicians in steel industry.

3.C.2 Health and safety legislation

The main Polish legal act in the range of health and safety is act of parliament "*kodeks pracy*" (labour code) of 26.6.1974. This act regulates all relations between employers and employees, among others health and safety issues.

All fields of health and safety issues discussed in chapter 1.2 on European level are covered by Polish national law and Polish national execution measures for each Directive mentioned in chapter 1.2 are listed below in chapter 3.C.2.

Polish national regulations, covering the EU legislation, is enriched in one important decree issued by minister of economy influencing the daily work of mechanical and electrical technicians in steel industry. It is decree on "w sprawie bezpieczeństwa i higieny pracy w hutnictwie żelaza i stali" (health and safety in iron and steel metallurgy) of 14.7.2010. This decree defines general health and

safety conditions in main production departments of steel plant: blast furnaces, steel making shops, rolling mills, pickling shops, forging shops. The provisions of the decree give condition of the work in these departments and should be determined in individual job description for work-places were mechanical and electrical technicians are employed.

3.C.3 Adoption European legislation to the national law (the national execution measures) based on EURLEX database

3.C.3.1 Environmental legislation

Generation of Waste

The Waste Framework Directive (Directive on waste)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Adoption to the national law (the national execution measures)

Transposition deadline: 12/12/2010

1. Rozporządzenie Ministra Gospodarki, Pracy i Polityki Społecznej z 2 kwietnia 2004 r. w sprawie sposobów i warunków bezpiecznego użytkowania i usuwania wyrobów zawierających azbest.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *21/04/2004*; Reference: *(MNE(2003)53927)*
2. Rozporządzenie Ministra Środowiska z dnia 9 lipca 2007 r. w sprawie niezbędnego zakresu informacji objętych obowiązkiem zbierania i przetwarzania oraz sposobu prowadzenia centralnej i wojewódzkiej bazy danych dotyczącej wytwarzania i gospodarowania odpadami
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2007/133/930*, Publication date: *24/07/2007*; Reference: *(MNE(2011)51755)*
3. Rozporządzenie Ministra Środowiska z dnia 27 września 2001 r. w sprawie katalogu odpadów
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *08/10/2001*; Reference: *(MNE(2003)53349)*
4. Ustawa z dnia 27 kwietnia 2001 r. - Prawo ochrony środowiska
   Legal act: *Ustawa*, number: *2008/25/150*; Official Journal: *Dziennik Ustaw*, number: *2008/25/150*, Publication date: *15/02/2008*, Entry into force: *27/04/2001*; Reference: *(MNE(2010)50154)*
5. Rozporządzenie Ministra Gospodarki, Pracy i Polityki Społecznej z dnia 23 grudnia 2003 r. w sprawie rodzajów odpadów, których zbieranie lub transport nie wymagają zezwolenia na prowadzenie działalności

Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *04/02/2004*; Reference: *(MNE(2003)53568)*

6. Rozporządzenie Ministra Środowiska z dnia 8 grudnia 2010 r. w sprawie wzorów dokumentów stosowanych na potrzeby ewidencji odpadów
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2010/249/1673*, Publication date: *28/12/2010*; Reference: *(MNE(2011)51756)*
7. Ustawa z dnia 27 kwietnia 2001 r. o odpadach
   Legal act: *Ustawa*, number: *2010/185/1243*; Official Journal: *Dziennik Ustaw*, number: *2010/185/1243*; Reference: *(MNE(2011)50724)*
8. Rozporządzenie Ministra Gospodarki i Pracy z dnia 4 sierpnia 2004 r. w sprawie szczegółowego sposobu postępowania z olejami odpadowymi
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2004/192/1968*, Publication date: *03/09/2004*; Reference: *(MNE(2007)57333)*
9. Ustawa z dnia 11 maja 2001 r. o opakowaniach i odpadach opakowaniowych
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *22/06/2001*; Reference: *(MNE(2003)53351)*
10. Rozporządzenie Ministra Środowiska z dnia 4 listopada 2008 r. w sprawie wymagań w zakresie prowadzenia pomiarów wielkości emisji oraz pomiarów ilości pobieranej wody
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2008/206/1291*, Publication date: *21/11/2008*; Reference: *(MNE(2011)51754)*
11. Rozporządzenie Ministra Środowiska z dnia 20 grudnia 2005 r. w sprawie standardów emisyjnych z instalacji
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/260/2181*, Publication date: *29/12/2005*; Reference: *(MNE(2006)50062)*
12. Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 10 maja 2007 r. w sprawie ogłoszenia jednolitego tekstu ustawy o obowiązkach przedsiębiorców w zakresie gospodarowania niektórymi odpadami oraz o opłacie produktowej i opłacie depozytowej
    Legal act: *Obwieszczenie*; Official Journal: *Dziennik Ustaw*, number: *2007/90/607*, Publication date: *23/05/2007*; Reference: *(MNE(2008)55216)*
13. Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 28 listopada 2005 r. w sprawie ogłoszenia jednolitego tekstu ustawy o utrzymaniu czystości i porządku w gminach
    Legal act: *Obwieszczenie*; Official Journal: *Dziennik Ustaw*, number: *2005/236/2008*, Publication date: *05/12/2005*; Reference: *(MNE(2008)54236)*
14. Ustawa z dnia 27 lipca 2001 r. o wprowadzeniu ustawy - Prawo ochrony środowiska, ustawy o odpadach oraz zmianie niektórych ustaw
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2001/100/1085*, Publication date: *18/09/2001*; Reference: *(MNE(2003)52004)*
15. Ustawa z dnia 20 lipca 1991 r. o Inspekcji Ochrony Środowiska
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2007/44/287*, Publication date: *13/03/2007*; Reference: *(MNE(2007)57332)*
16. Rozporządzenie Ministra Środowiska z dnia 8 grudnia 2010 r. w sprawie zakresu informacji oraz wzorów formularzy służących do sporządzania i przekazywania zbiorczych zestawień danych o odpadach
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2010/249/1674*, Publication date: *28/12/2010*; Reference: *(MNE(2011)51759)*

The Landfill Directive (Landfill of waste)

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/07/2012

1. Rozporządzenie Ministra Środowiska z dnia 24 marca 2003 r. w sprawie szczegółowych wymagań dotyczących lokalizacji, budowy, eksploatacji i zamknięcia, jakim powinny odpowiadać poszczególne typy składowisk odpadów
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *10/04/2003*; Reference: *(MNE(2003)53286)*
2. Ustawa z dnia 27 kwietnia 2001 r. o odpadach
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2001/62/628*, Publication date: *20/06/2001*; Reference: *(MNE(2003)51999)*
3. Ustawa z dnia 27 lipca 2001 r. o wprowadzeniu ustawy - Prawo ochrony środowiska, ustawy o odpadach oraz zmianie niektórych ustaw
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2001/100/1085*, Publication date: *18/09/2001*; Reference: *(MNE(2003)52004)*
4. Rozporządzenie Ministra Środowiska z dnia 8 grudnia 2010 r. zmieniające rozporządzenie w sprawie zakresu, czasu, sposobu oraz warunków prowadzenia monitoringu składowisk odpadów
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2010/238/1588*, Publication date: *17/12/2010*; Reference: *(MNE(2010)58136)*
5. Ustawa z dnia 22 stycznia 2010 r. o zmianie ustawy o odpadach oraz niektórych innych ustaw
   Legal act: *Nowelizacja*, number: *2010/28/145*; Official Journal: *Dziennik Ustaw*, Publication date: *25/02/2010*; Reference: *(MNE(2010)51767)*
6. Rozporządzenie Ministra Środowiska z dnia 26 lutego 2009 r. zmieniające rozporządzenie w sprawie szczegółowych wymagań dotyczących lokalizacji, budowy, eksploatacji i zamknięcia, jakim powinny odpowiadać poszczególne typy składowisk odpadów
   Legal act: *Rozporządzenie*, number: *2009/39/320*; Official Journal: *Dziennik Ustaw*, Publication date: *13/03/2009*; Reference: *(MNE(2010)51766)*
7. Rozporządzenie Ministra Gospodarki z dnia 24 lutego 2006 r. zmieniające rozporządzenie w sprawie kryteriów oraz procedur dopuszczania odpadów do składowania na składowisku odpadów danego typu
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/38/264*, Publication date: *07/03/2006*; Reference: *(MNE(2007)57338)*
8. Rozporządzenie Ministra Gospodarki i Pracy z dnia 7 września 2005 r. w sprawie kryteriów oraz procedur dopuszczania odpadów do składowania na składowisku odpadów danego typu
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/186/1553*, Publication date: *28/09/2005*; Reference: *(MNE(2007)57337)*
9. Ustawa z dnia 22 kwietnia 2005 r. o zmianie ustawy - Prawo geologiczne i górnicze oraz ustawy o odpadach
   Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2005/90/758*, Publication date: *23/05/2005*; Reference: *(MNE(2005)51583)*
10. Ustawa z dnia 4 lutego 1994 r. Prawo geologiczne i górnicze.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *01/03/1994*; Reference: *(MNE(2003)52900)*
11. Rozporządzenie Ministra Środowiska z dnia 9 grudnia 2002 r. w sprawie zakresu, czasu, sposobu oraz warunków prowadzenia monitoringu składowisk odpadów
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *19/12/2002*; Reference: *(MNE(2003)53285)*

12. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie zasad sporządzania raportu wojewódzkiego
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53279)*
13. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie zakresu informacji oraz wzorów formularzy służących do sporządzania i przekazywania zbiorczych zestawień danych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53273)*
14. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie warunków i zakresu dostępu do wojewódzkiej bazy danych dotyczącej wytwarzania i gospodarowania odpadami
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53270)*
15. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie wzorów dokumentów stosowanych na potrzeby ewidencji odpadów
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53262)*
16. Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *20/06/2001*; Reference: *(MNE(2003)51903)*

WEEE Directive and Packaging Directive

Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Adoption to the national law (the national execution measures)

Transposition deadline: 13/08/2004

1. Ustawa z dnia 21 listopada 2008 r. o zmianie ustawy o zużytym sprzęcie elektrycznym i elektronicznym oraz o zmianie niektórych innych ustaw
   Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2008/223/1464*, Publication date: *18/12/2008*, Entry into force: *01/01/2009*; Reference: *(MNE(2009)50198)*
2. Ustawa z dnia 29 lipca 2005 r. o zużytym sprzęcie elektrycznym i elektronicznym
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2005/180/1495*; Reference: *(MNE(2005)54329)*
3. Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 14 lutego 2007 r. w sprawie ogłoszenia jednolitego tekstu ustawy - Prawo atomowe
   Legal act: *Obwieszczenie*; Official Journal: *Dziennik Ustaw*, number: *2007/42/276*, Publication date: *09/03/2007*; Reference: *(MNE(2008)54237)*
4. Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 28 listopada 2005 r. w sprawie ogłoszenia jednolitego tekstu ustawy o utrzymaniu czystości i porządku w gminach
   Legal act: *Obwieszczenie*; Official Journal: *Dziennik Ustaw*, number: *2005/236/2008*, Publication date: *05/12/2005*; Reference: *(MNE(2008)54236)*
5. Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 1 lutego 2007 r. w sprawie ogłoszenia jednolitego tekstu ustawy o odpadach
   Legal act: *Obwieszczenie*, number: *2007/39/251*; Official Journal: *Dziennik Ustaw*, number: *2007/39/251*; Reference: *(MNE(2007)57872)*
6. Concordance table

Legal act: *Concordance table*; Reference: *(MNE(2005)54527)*

7. Ustawa z dnia 29 lipca 2005 r. o zmianie niektórych ustaw w związku ze zmianami w podziale zadań i kompetencji administracji terenowej
   Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2005/175/1462*, Publication date: *12/09/2005*, Entry into force: *01/01/2006*; Reference: *(MNE(2006)53265)*
8. Ustawa z dnia 12 marca 2004 r. o krajowym systemie ekozarządzania i audytu (EMAS)
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2004/70/631*, Publication date: *21/04/2004*, Entry into force: *01/05/2005*; Reference: *(MNE(2005)51724)*
9. Ustawa z dnia 27 kwietnia 2001 r. - Prawo ochrony środowiska
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2006/129/902*, Publication date: *19/07/2006*; Reference: *(MNE(2007)57350)*

Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2009

1. Ustawa z dnia 13 września 1996 r. o utrzymaniu czystości i porządku w gminach
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *20/11/1996*; Reference: *(MNE(2003)53294)*
2. Ustawa z dnia 11 maja 2001 r. o obowiązkach przedsiębiorców w zakresie gospodarowania niektórymi odpadami oraz o opłacie produktowej i opłacie depozytowej.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *22/06/2001*; Reference: *(MNE(2003)52492)*
3. Ustawa z dnia 27 kwietnia 2001 r. o odpadach
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2001/62/628*, Publication date: *20/06/2001*; Reference: *(MNE(2003)51999)*
4. Ustawa z dnia 12 września 2002 r. o normalizacji
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *11/10/2002*; Reference: *(MNE(2003)52207)*
5. Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *20/06/2001*; Reference: *(MNE(2003)51903)*
6. Rozporządzenie Ministra Środowiska z dnia 23 listopada 2006 r. w sprawie wzoru rocznego sprawozdania o wysokości należnej opłaty produktowej
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/226/1654*, Publication date: *11/12/2006*; Reference: *(MNE(2007)57365)*
7. Rozporządzenie Ministra Środowiska z dnia 14 listopada 2006 r. w sprawie wzoru sprawozdania o wielkościach wprowadzanych na rynek krajowy opakowań i produktów, osiągniętych wielkościach odzysku i recyklingu odpadów opakowaniowych i poużytkowych oraz wpływach z opłat produktowych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/220/1611*, Publication date: *01/12/2006*; Reference: *(MNE(2007)57364)*
8. Rozporządzenie Ministra Środowiska z dnia 27 września 2006 r. zmieniające rozporządzenie w sprawie zawartości ołowiu, kadmu, rtęci i chromu sześciowartościowego w opakowaniach
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/183/1362*, Publication date: *11/10/2006*; Reference: *(MNE(2007)57360)*

9. Rozporządzenie Ministra Środowiska z dnia 31 grudnia 2004 r. w sprawie wzorów formularzy służących do składania rocznych sprawozdań o masie wytworzonych, przywiezionych z zagranicy oraz wywiezionych za granicę opakowań
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/4/30*, Publication date: *10/01/2005*; Reference: *(MNE(2007)57358)*
10. Rozporządzenie Ministra Środowiska z dnia 8 lipca 2002 r. w sprawie szczegółowych zasad i kryteriów gospodarowania środkami z opłat produktowych
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2002/122/1052*, Publication date: *01/08/2002*; Reference: *(MNE(2007)57356)*
11. Rozporządzenie Ministra Środowiska z dnia 14 lutego 2006 r. w sprawie wzorów dokumentów stosowanych na potrzeby ewidencji odpadów
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/30/213*, Publication date: *24/02/2006*; Reference: *(MNE(2007)57331)*
12. Ustawa z dnia 29 lipca 2005 r. o zmianie ustawy o odpadach oraz o zmianie niektórych innych ustaw
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2005/175/1458*; Reference: *(MNE(2005)54882)*
13. Rozporządzenie Ministra Środowiska z dnia 31 grudnia 2004 r. w sprawie raportów wojewódzkich dotyczących gospodarki opakowaniami
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/4/29*, Publication date: *10/01/2005*; Reference: *(MNE(2005)55001)*
14. Rozporządzenie Ministra Środowiska z dnia 23 kwietnia 2004 r. w sprawie określenia wzorów oznakowania opakowań
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2004/94/927*, Publication date: *30/04/2004*; Reference: *(MNE(2004)50993)*
15. Rozporządzenie Ministra Środowiska z dnia 8 kwietnia 2003 r. w sprawie sposobu ustalenia sumy zawartości ołowiu, kadmu, rtęci i chromu sześciowartościowego w opakowaniach
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2003/66/619*, Publication date: *17/04/2003*; Reference: *(MNE(2004)50991)*
16. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie niezbędnego zakresu informacji objętych obowiązkiem zbierania i przetwarzania oraz sposobu prowadzenia centralnej i wojewódzkiej bazy danych dotyczącej wytwarzania i gospodarowania odpadami
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53300)*
17. Ustawa z dnia 20 lipca 1991 r. o Inspekcji Ochrony Środowiska
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *1991/77/335*, Publication date: *29/08/1991*; Reference: *(MNE(2003)53148)*
18. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie zasad sporządzania raportu wojewódzkiego
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53279)*
19. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie zakresu informacji oraz wzorów formularzy służących do sporządzania i przekazywania zbiorczych zestawień danych
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53273)*
20. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie warunków i zakresu dostępu do wojewódzkiej bazy danych dotyczącej wytwarzania i gospodarowania odpadami

Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53270)*

21. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie wzorów dokumentów stosowanych na potrzeby ewidencji odpadów
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53262)*
22. Rozporządzenie Ministra Środowiska z dnia 11 grudnia 2001 r. w sprawie rodzaju odpadów lub ich ilości, dla których nie ma obowiązku prowadzenia ewidencji odpadów oraz kategorii małych i średnich przedsiębiorstw, które mogą prowadzić uproszczoną ewidencję odpadów
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53293)*
23. Rozporządzenie Ministra Środowiska z dnia 23 grudnia 2003 r. w sprawie wzoru sprawozdania o wielkościach wprowadzonych na rynek krajowy opakowań i produktów, osiągniętych wielkościach odzysku i recyklingu odpadów opakowaniowych i poużytkowych oraz wpływach z opłat produktowych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *31/12/2003*; Reference: *(MNE(2003)53365)*
24. Rozporządzenie Ministra Środowiska z dnia 15 grudnia 2003 r. w sprawie wzoru rocznego sprawozdania o wysokości należnej opłaty produktowej
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *23/12/2003*; Reference: *(MNE(2003)53362)*
25. Rozporządzenie Ministra Środowiska z dnia 12 lipca 2002 r. w sprawie raportów wojewódzkich dotyczących gospodarki opakowaniami
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *01/08/2002*; Reference: *(MNE(2003)53360)*
26. Rozporządzenie Ministra Środowiska z dnia 12 lipca 2002 r. w sprawie wzorów formularzy służących do składania rocznych sprawozdań o masie wytworzonych, przywiezionych z zagranicy oraz wywiezionych za granicę opakowań
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *01/08/2002*; Reference: *(MNE(2003)53358)*
27. Rozporządzenie Ministra Środowiska z dnia 30 grudnia 2002 r. w sprawie zawartości ołowiu, kadmu, rtęci i chromu sześciowartościowego w opakowaniach
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *31/12/2002*; Reference: *(MNE(2003)53357)*
28. Ustawa z dnia 11 maja 2001 r. o opakowaniach i odpadach opakowaniowych
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *22/06/2001*; Reference: *(MNE(2003)53351)*

Generation of Emissions to Atmosphere

Integrated pollution prevention and control (IPPC Directive)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Pure air for Europe

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Adoption to the national law (the national execution measures)

Transposition deadline: 10/06/2010

1. Ustawa z dnia 17 lipca 2009 r. o systemie zarządzania emisjami gazów cieplarnianych i innych substancji
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2009/130/1070*, Publication date: *18/08/2009*, Entry into force: *18/09/2009*; Reference: *(MNE(2010)55212)*

Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).

Adoption to the national law (the national execution measures)

NO DOCUMENTS (transposition deadline 07/01/2013)

Generation of Emissions to Water

Water Framework Directive (Water protection and management)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy[31].

Adoption to the national law (the national execution measures)

Transposition deadline: 01/05/2004

1. Ustawa z dnia 20 kwietnia 2004 r. o zmianie i uchyleniu niektórych ustaw w związku z uzyskaniem przez Rzeczpospolitą Polską członkostwa w Unii Europejskiej
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *2004/96/959*, Publication date: *30/04/2004*, Entry into force: *01/05/2004*; Reference: *(MNE(2004)58672)*

[31] Amended by: Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 (OJ L331/1 of 15.12.2001); Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 (OJ L81/60 of 20.3.2008); Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 (OJ L348/84 of 24.12.2008); Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L140/114 of 5.6.2009).

2. Rozporządzenie Ministra Środowiska z dnia 31 stycznia 2003 r. w sprawie dopuszczalnych mas substancji, które mogą być odprowadzane w ściekach przemysłowych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/02/2003*; Reference: *(MNE(2003)53125)*
3. Rozporządzenie Ministra Środowiska z dnia 29 listopada 2002 r. w sprawie warunków jakie należy spełnić przy wprowadzaniu ścieków do wód lub do ziemi, oraz w sprawie substancji szczególnie szkodliwych dla środowiska wodnego
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *16/12/2002*; Reference: *(MNE(2003)53128)*
4. Ustawa z dnia 5 stycznia 2011 r. o zmianie ustawy - Prawo wodne oraz niektórych innych ustaw
   Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2011/32/159*, Publication date: *15/02/2011*; Reference: *(MNE(2011)51640)*
5. Rozporządzenie Ministra Środowiska z dnia 22 lipca 2009 r. w sprawie klasyfikacji stanu ekologicznego, potencjału ekologicznego i stanu chemicznego jednolitych części wód powierzchniowych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2009/122/1018*, Publication date: *04/08/2009*; Reference: *(MNE(2009)54167)*
6. Rozporządzenie Ministra Środowiska z dnia 13 maja 2009 r. w sprawie form i sposobu prowadzenia monitoringu jednolitych części wód powierzchniowych i podziemnych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2009/81/685*, Publication date: *02/06/2009*; Reference: *(MNE(2009)54166)*
7. Rozporządzenie Ministra Środowiska z dnia 20 sierpnia 2008 r. w sprawie sposobu klasyfikacji stanu jednolitych części wód powierzchniowych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2008/162/1008*, Publication date: *09/09/2008*; Reference: *(MNE(2009)54165)*
8. Rozporządzenie Ministra Środowiska z dnia 23 lipca 2008 r. w sprawie kryteriów i sposobu oceny stanu wód podziemnych
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2008/143/896*, Publication date: *26/08/2008*; Reference: *(MNE(2009)52001)*
9. Rozporządzenie Rady Ministrów z dnia 18 czerwca 2009 r. w sprawie szczegółowego zakresu opracowywania planów gospodarowania wodami na obszarach dorzeczy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2009/106/882*, Publication date: *03/07/2009*; Reference: *(MNE(2009)53112)*
10. Rozporządzenie Ministra Budownictwa z dnia 14 lipca 2006 r. w sprawie sposobu realizacji obowiązków dostawców ścieków przemysłowych oraz warunków wprowadzania ścieków do urządzeń kanalizacyjnych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/136/964*, Publication date: *28/07/2006*; Reference: *(MNE(2007)57386)*
11. Rozporządzenie Ministra Budownictwa z dnia 28 czerwca 2006 r. w sprawie określania taryf, wzoru wniosku o zatwierdzenie taryf oraz warunków rozliczeń za zbiorowe zaopatrzenie w wodę i zbiorowe odprowadzanie ścieków
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/127/886*, Publication date: *17/07/2006*; Reference: *(MNE(2007)57385)*
12. Rozporządzenie Rady Ministrów z dnia 27 czerwca 2006 r. w sprawie przebiegu granic obszarów dorzeczy i regionów wodnych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/126/878*, Publication date: *17/07/2006*; Reference: *(MNE(2007)57383)*

13. Rozporządzenie Rady Ministrów z dnia 20 grudnia 2005 r. w sprawie wysokości jednostkowych stawek kar za przekroczenia warunków wprowadzania ścieków do wód lub do ziemi
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/260/2177*, Publication date: *29/12/2005*; Reference: *(MNE(2007)57382)*
14. Rozporządzenie Rady Ministrów z dnia 20 grudnia 2005 r. w sprawie opłat za korzystanie ze środowiska
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/260/2176*, Publication date: *29/12/2005*; Reference: *(MNE(2007)57381)*
15. Rozporządzenie Ministra Środowiska z dnia 3 października 2005 r. w sprawie szczegółowych wymagań, jakim powinny odpowiadać dokumentacje hydrogeologiczne i geologiczno-inżynierskie
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/201/1673*, Publication date: *14/10/2005*; Reference: *(MNE(2007)57380)*
16. Rozporządzenie Rady Ministrów z dnia 8 grudnia 2004 r. zmieniające rozporządzenie w sprawie granic między śródlądowymi wodami powierzchniowymi a morskimi wodami wewnętrznymi i wodami morza terytorialnego
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2004/264/2632*, Publication date: *15/12/2004*; Reference: *(MNE(2007)57379)*
17. Rozporządzenie Ministra Zdrowia z dnia 29 marca 2007 r. w sprawie jakości wody przeznaczonej do spożycia przez ludzi
Legal act: *Rozporządzenie*, number: *2007/61/417*; Official Journal: *Dziennik Ustaw*, number: *2007/61/417*, Publication date: *06/04/2007*; Reference: *(MNE(2007)54018)*
18. Rozporządzenie Ministra Środowiska z dnia 24 lipca 2006 r. w sprawie warunków, jakie należy spełnić przy wprowadzaniu ścieków do wód lub do ziemi, oraz w sprawie substancji szczególnie szkodliwych dla środowiska wodnego
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/137/984*, Publication date: *31/07/2006*; Reference: *(MNE(2007)57293)*
19. Rozporządzenie Ministra Środowiska z dnia 10 listopada 2005 r. w sprawie wykazu substancji priorytetowych w dziedzinie polityki wodnej
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/233/1987*, Publication date: *30/11/2005*; Reference: *(MNE(2005)60464)*
20. Ustawa z dnia 3 czerwca 2005 r. o zmianie ustawy - Prawo wodne oraz niektórych innych ustaw
Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2005/130/1087*, Publication date: *15/07/2005*; Reference: *(MNE(2005)52946)*
21. Rozporządzenie Ministra Środowiska z dnia 28 kwietnia 2004 r. w sprawie zakresu i trybu opracowywania planów gospodarowania wodami na obszarach dorzeczy oraz warunków korzystania z wód regionu wodnego
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *03/06/2004*; Reference: *(MNE(2005)56159)*
22. Rozporządzenie Ministra Środowiska z dnia 4 sierpnia 2003 r. w sprawie standardów emisyjnych z instalacji
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/09/2003*; Reference: *(MNE(2003)53266)*
23. Rozporządzenie Ministra Środowiska z dnia 4 października 2002 r. w sprawie wymagań, jakim powinny odpowiadać wody śródlądowe bedące środowiskiem życia ryb w warunkach naturalnych
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *23/10/2002*; Reference: *(MNE(2003)53209)*
24. Ustawa z dnia 18 lipca 2001 r. Prawo wodne

Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *11/10/2001*; Reference: *(MNE(2003)53116)*

25. Rozporządzenie Ministra Środowiska z dnia 11 lutego 2004 r. w sprawie klasyfikacji dla prezentowania stanu wód powierzchniowych i podziemnych, sposobu prowadzenia monitoringu oraz sposobu interpretacji wyników i prezentacji stanu tych wód
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2004/32/284*, Publication date: *01/03/2004*; Reference: *(MNE(2003)53229)*
26. Rozporządzenie Ministra Środowiska z dnia 23 grudnia 2002 r. w sprawie szczegółowych wymagań, jakim powinny odpowiadać programy działań mających na celu ograniczenie odpływu azotu ze źródeł rolniczych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *15/01/2003*; Reference: *(MNE(2003)53227)*
27. Rozporządzenie Ministra Środowiska z dnia 23 grudnia 2002 r. w sprawie kryteriów wyznaczania wód wrażliwych na zanieczyszczenie związkami azotu ze źródeł rolniczych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *31/12/2002*; Reference: *(MNE(2003)53223)*
28. Rozporządzenie Ministra Środowiska z dnia 27 listopada 2002 r. w sprawie wymagań, jakim powinny odpowiadać wody powierzchniowe wykorzystywane do zaopatrzenia ludności w wodę przezaczoną do spożycia
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *09/12/2002*; Reference: *(MNE(2003)53212)*
29. Rozporządzenie Ministra Środowiska z dnia 19 grudnia 2001 r. w sprawie szczegółowych wymagań, jakim powinny odpowiadać dokumentacje hydrogeologiczne i geologiczno-inżynierskie
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/12/2001*; Reference: *(MNE(2003)53720)*
30. Rozporządzenie Rady Ministrów z dnia 11 grudnia 2001 r. w sprawie wysokości jednostkowych stawek kar za przekroczenie warunków wprowadzenia ścieków do wód lub do ziemi
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *19/12/2001*; Reference: *(MNE(2003)53719)*
31. Rozporządzenie Ministra Środowiska z dnia 9 grudnia 2003 r. w sprawie substancji stwarzających szczególne zagrożenie dla środowiska
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/12/2003*; Reference: *(MNE(2003)53717)*
32. Rozporządzenie Rady Ministrów z dnia 18 marca 2003 r. w sprawie opłat za korzystanie ze środowiska
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *31/03/2003*; Reference: *(MNE(2003)53706)*
33. Rozporządzenie Rady Ministrów z dnia 10 grudnia 2002 r. w sprawie przebiegu granic obszarów dorzeczy, przyporządkowania zbiorników wód podziemnych do właściwych obszarów dorzeczy, utworzenia regionalnych zarządów gospodarki wodnej oraz podziału obszarów dorzeczy na regiony wodne
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *27/12/2002*; Reference: *(MNE(2003)53703)*
34. Rozporządzenie Rady Ministrów z dnia 23 grudnia 2002 r. w sprawie granic między śródlądowymi wodami powierzchniowymi a morskimi wodami wewnętrznymi i wodami morza terytorialnego
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2002/239/2035*, Publication date: *31/12/2002*; Reference: *(MNE(2003)53702)*

35. Ustawa z dnia 21 marca 1991 r. o obszarach morskich Rzeczypospolitej Polskiej i administracji morskiej
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *18/04/1991*; Reference: *(MNE(2003)53700)*
36. Rozporządzenie Ministra Środowiska z dnia 17 czerwca 2003 r. w sprawie określenia wzoru publicznie dostępnego wykazu danych o dokumentach zawierających informacje o środowisku i jego ochronie
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2003/110/1058*, Publication date: *27/06/2003*; Reference: *(MNE(2003)53372)*
37. Rozporządzenie Ministra Infrastruktury z dnia 12 marca 2002 r. w sprawie określenia taryf, wzoru wniosku o zatwierdzenie taryf oraz warunków rozliczeń za zbiorowe zaopatrzenie w wodę i zbiorowe odprowadzanie ścieków
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *25/03/2002*; Reference: *(MNE(2003)53722)*
38. Rozporządzenie Ministra Infrastruktury z dnia 20 lipca 2002 r. w sprawie sposobu realizacji obowiązków dostawców ścieków przemysłowych oraz warunków wprowadzania ścieków do urządzeń kanalizacyjnych
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *14/08/2002*; Reference: *(MNE(2003)53320)*
39. Rozporządzenie Ministra Środowiska z dnia 4 października 2002 r. w sprawie wymagań, jakim powinny odpowiadać morskie wody wewnętrzne i wody przybrzeżne będące środowiskiem życia skorupiaków i mięczaków
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *23/10/2002*; Reference: *(MNE(2003)53304)*
40. Ustawa z dnia 27 kwietnia 2001 r. Prawo ochrony środowiska.
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *20/06/2001*; Reference: *(MNE(2003)51903)*
41. Rozporządzenie Ministra Zdrowia z dnia 16 października 2002 r. w sprawie wymagań, jakim powinna odpowiadać woda w kąpieliskach
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *05/11/2002*; Reference: *(MNE(2003)51583)*
42. Ustawa z dnia 7 czerwca 2001 r. o zbiorowym zaopatrzeniu w wodę i zbiorowym odprowadzaniu ścieków
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *13/07/2001*; Reference: *(MNE(2003)51988)*
43. Rozporządzenie Ministra Zdrowia z dnia 19 listopada 2002 r. w sprawie wymagań dotyczących jakości wody przeznaczonej do spożycia przez ludzi
Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *05/12/2002*; Reference: *(MNE(2003)51983)*
44. Ustawa z dnia 4 lutego 1994 r. Prawo geologiczne i górnicze.
Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *01/03/1994*; Reference: *(MNE(2003)52900)*

3.C.3.2 Health and Safety legislation

The Health and Safety FRAMEWORK DIRECTIVE - Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OJ L181/1 of 29.6.1989).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2005

1. Ustawa z dnia 6 marca 1981 r. o Państwowej Inspekcji Pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *12/10/2001*; Reference: *(MNE(2003)51948)*
2. Ministra Pracy i Polityki Socjalnej z dnia 28 maja 1996 r. w sprawie szczegółowych zasad szkolenia w dziedzinie bezpieczeństwa i higieny pracy.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *01/06/1996*; Reference: *(MNE(2003)52755)*
3. Rozporzadzenie Ministra Gospodarki z dnia 14 sierpnia 1998 r. w sprawie sposobów bezpiecznego użytkowania oraz warunków usuwania wyrobów zawierających azbest.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *14/11/1998*; Reference: *(MNE(2003)52767)*
4. Rozporządzenie Rady Ministrów z dnia 28 lipca 1998 r. w sprawie ustalania okoliczności i przyczyn wypadków przy pracy oraz sposobu ich dokumentowania, a także zakresu informacji zamieszczanych w rejestrze wypadków przy pracy.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *04/09/1998*; Reference: *(MNE(2003)52769)*
5. Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 2 kwietnia 1998 r. w sprawie zasad bezpieczeństwa i higieny pracy przy zabezpieczaniu i usuwaniu wyrobów zawierających azbest oraz programu szkolenia w zakresie bezpiecznego użytkowania takich wyrobów.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *10/04/1998*; Reference: *(MNE(2003)52770)*
6. Konstytucja Rzeczypospolitej Polskiej
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/07/1997*; Reference: *(MNE(2003)51778)*
7. Rozporzadzenie Ministra Gospodarki z dnia 30 października 2002 r. w sprawie minimalnych wymagań dotyczących bezpieczeństwa i higieny pracy w zakresie użytkowania maszyn przez pracowników podczas pracy.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/11/2002*; Reference: *(MNE(2003)52706)*
8. Ustawa z dnia 24 czerwca 1983 r. o społecznej inspekcji pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *30/06/1983*; Reference: *(MNE(2003)52734)*
9. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*
10. Ustawa z dnia 23 maja 1991 r. o związkach zawodowych
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *31/07/2001*; Reference: *(MNE(2003)51800)*
11. Ustawa z dnia 7 maja 2009 r. o zmianie ustawy - Kodeks pracy
    Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2009/115/958*, Publication date: *21/07/2009*, Entry into force: *05/08/2009*; Reference: *(MNE(2009)53670)*
12. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 6 czerwca 2008 r. zmieniające rozporządzenie w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2008/108/690*, Publication date: *24/06/2008*, Entry into force: *09/07/2008*; Reference: *(MNE(2008)53945)*
13. Ustawa z dnia 21 listopada 2008 r. o zmianie ustawy - Kodeks pracy

Legal act: *Nowelizacja*; Official Journal: *Dziennik Ustaw*, number: *2008/223/1460*, Publication date: *18/12/2008*, Entry into force: *18/01/2009*; Reference: *(MNE(2009)50500)*

14. Rozporządzenie Ministra Spraw Wewnętrznych i Administracji z dnia 21 kwietnia 2006 r. w sprawie ochrony przeciwpożarowej budynków, innych obiektów budowlanych i terenów
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2006/80/563*, Publication date: *11/05/2006*; Reference: *(MNE(2007)54140)*
15. Rozporządzenia Ministra Pracy i Polityki Społecznej z dnia 2 marca 2007 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2007/49/330*, Publication date: *20/03/2007*; Reference: *(MNE(2007)54047)*
16. Rozporządzenie Ministra Gospodarki z dnia 25 sierpnia 2006 r. w sprawie zmiany rozporządzenia zmieniającego rozporządzenie w sprawie ograniczeń, zakazów lub warunków produkcji, obrotu lub stosowania substancji niebezpiecznych oraz zawierających je produktów
    Legal act: *Rozporządzenie*, number: *2006/159/1131*; Official Journal: *Dziennik Ustaw*, number: *2006/159/1131*, Publication date: *06/09/2006*; Reference: *(MNE(2006)56752)*
17. Rozporządzenie Ministra Gospodarki z dnia 4 lipca 2006 r. zmieniające rozporządzenie w sprawie ograniczeń, zakazów lub warunków produkcji, obrotu lub stosowania substancji niebezpiecznych oraz zawierających je produktów
    Legal act: *Rozporządzenie*, number: *2006/127/887*; Official Journal: *Dziennik Ustaw*, number: *2006/127/887*, Publication date: *17/07/2006*; Reference: *(MNE(2006)54669)*
18. Rozporządzenie Ministra Zdrowia z dnia 22 kwietnia 2005 r. w sprawie szkodliwych czynników biologicznych dla zdrowia w środowisku pracy oraz ochrony zdrowia pracowników zawodowo narażonych na te czynniki
    Legal act: *Rozporządzenie*, number: *2005/81/716*; Official Journal: *Dziennik Ustaw*, number: *2005/81/716*, Publication date: *11/05/2005*; Reference: *(MNE(2005)50941)*
19. Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2003/169/1650*, Publication date: *29/09/2003*; Reference: *(MNE(2003)52139)*
20. Ustawa z dnia 27 czerwca 1997 r. o służbie medycyny pracy
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *1997/96/593*, Publication date: *13/08/1997*; Reference: *(MNE(2003)51581)*
21. ROZPORZĄDZENIE MINISTRA ZDROWIA I OPIEKI SPOŁECZNEJ z dnia 11 września 1996 r. w sprawie czynników rakotwórczych w środowisku pracy oraz nadzoru nad stanem zdrowia pracowników zawodowo narażonych na te czynniki
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *11/10/1996*; Reference: *(MNE(2003)51580)*
22. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 30 maja 1996 r. w sprawie przeprowadzenia badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *1996/69/332*, Publication date: *25/06/1996*; Reference: *(MNE(2003)51579)*
23. Ustawa z dnia 30 października 2002 r. o ubezpieczeniu społecznym z tytułu wypadków przy pracy i chorób zawodowych
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *28/11/2002*; Reference: *(MNE(2003)52206)*
24. Rozporządzenie Rady Ministrów z dnia 2 września 1997 r. w sprawie służby bezpieczeństwa i higieny pracy

Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/09/1997*; Reference: *(MNE(2003)51892)*

25. Ustawa z dnia 14 marca 1985 r. o Państwowej Inspekcji Sanitarnej
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *17/07/1998*; Reference: *(MNE(2003)51874)*
26. Ustawa z dnia 24 sierpnia 1991 r. o ochronie przeciwpożarowej.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *12/09/2002*; Reference: *(MNE(2003)52752)*
27. Ustawa z dnia 21 listopada 1967 r. o powszechnym obowiązku obrony Rzeczypospolitej Polskiej.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *13/03/2002*; Reference: *(MNE(2003)52750)*
28. Ustawa z dnia 6 kwietnia 1990 r. o Policji.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *29/01/2002*; Reference: *(MNE(2003)52748)*

Workplace requirements

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2004

1. Ustawa z dnia 9 listopada 1995 r. o ochronie zdrowia przed następstwami używania tytoniu i wyrobów tytoniowych
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *30/01/1996*; Reference: *(MNE(2003)51890)*
2. Rozporządzenie Ministra Infrastruktury z dnia 12 kwietnia 2002 r. w sprawie warunków technicznych, jakim powinny odpowiadać budynki i ich usytuowanie
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *15/06/2002*; Reference: *(MNE(2003)52498)*
3. Rozporządzenie Ministra Spraw Wewnętrznych i Administracji z dnia 16 czerwca 2003 r. w sprawie ochrony przeciwpożarowej budynków, innych obiektów budowlanych i terenów.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *11/07/2003*; Reference: *(MNE(2003)52011)*
4. Rozporzadzenie Ministra Gospodarki z dnia 30 października 2002 r. w sprawie minimalnych wymagań dotyczących bezpieczeństwa i higieny pracy w zakresie użytkowania maszyn przez pracowników podczas pracy.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/11/2002*; Reference: *(MNE(2003)52706)*
5. Ustawa z dnia 24 czerwca 1983 r. o społecznej inspekcji pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *30/06/1983*; Reference: *(MNE(2003)52734)*
6. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*

7. Ustawa z dnia 23 maja 1991 r. o związkach zawodowych
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *31/07/2001*; Reference: *(MNE(2003)51800)*
8. Rozporządzenie Rady Ministrów z dnia 16 lipca 2002 r. w sprawie rodzajów urzadzeń technicznych podlegajacych dozorowi technicznemu.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *29/07/2002*; Reference: *(MNE(2003)52741)*
9. Rozporządzenia Ministra Pracy i Polityki Społecznej z dnia 2 marca 2007 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2007/49/330*, Publication date: *20/03/2007*; Reference: *(MNE(2007)54047)*
10. Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2003/169/1650*, Publication date: *29/09/2003*; Reference: *(MNE(2003)52139)*
11. Ustawa z dnia 21 grudnia 2000 r. o dozorze technicznym.
    Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *31/12/2000*; Reference: *(MNE(2003)52744)*

Dangerous agents at work

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 01/05/2004

1. Rozporządzenie Ministra Pracy i Polityki Socjalnejz dnia 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
   Legal act: *Rozporządzenie*, number: *1997/129/844*; Official Journal: *Dziennik Ustaw*, number: *1997/129/844*, Publication date: *23/10/1997*; Reference: *(MNE(2005)55385)*
2. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 29 listopada 2002 r. w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/12/2002*; Reference: *(MNE(2003)52711)*
3. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 30 maja 1996 r. w sprawie przeprowadzenia badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *1996/69/332*, Publication date: *25/06/1996*; Reference: *(MNE(2003)51579)*
4. Rozporządzenie Ministra Zdrowia z dnia 2 lutego 2011 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2011/33/166*, Publication date: *16/02/2011*, Entry into force: *03/03/2011*; Reference: *(MNE(2011)51626)*

5. Rozporządzenie Ministra Zdrowia z dnia 3 listopada 2008 r. zmieniające rozporządzenie w sprawie bezpieczeństwa i higieny pracy związanej z występowaniem w miejscu pracy czynników chemicznych
   Legal act: *Rozporządzenie*, number: *2008/203/1275*; Official Journal: *Dziennik Ustaw*, number: *2008/203/1275*, Publication date: *17/11/2008*; Reference: *(MNE(2008)56324)*
6. Rozporządzenie Ministra Zdrowia z dnia 18 grudnia 2007r. zmieniające rozporządzenie w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*, number: *2007/241/1772*; Official Journal: *Dziennik Ustaw*, number: *2007/241/1772*, Publication date: *27/12/2007*; Reference: *(MNE(2008)50050)*
7. Rozporządzenie Ministra Gospodarki z dnia 25 sierpnia 2006 r. w sprawie zmiany rozporządzenia zmieniającego rozporządzenie w sprawie ograniczeń, zakazów lub warunków produkcji, obrotu lub stosowania substancji niebezpiecznych oraz zawierających je produktów
   Legal act: *Rozporządzenie*, number: *2006/159/1131*; Official Journal: *Dziennik Ustaw*, number: *2006/159/1131*, Publication date: *06/09/2006*; Reference: *(MNE(2006)56752)*
8. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*
9. Rozporządzenie Ministra Gospodarki i Pracy z dnia 27 lipca 2004 r. w sprawie szkolenia w dziedzinie bezpieczeństwa i higieny pracy
   Legal act: *Rozporządzenie*, number: *2004/180/1860*; Official Journal: *Dziennik Ustaw*, Publication date: *18/08/2004*; Reference: *(MNE(2005)53628)*
10. Rozporządzenie Ministra Zdrowia z dnia 20 kwietnia 2005 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/04/2005*; Reference: *(MNE(2005)53626)*
11. Rozporządzenie Ministra Gospodarki z dnia 4 lipca 2006 r. zmieniające rozporządzenie w sprawie ograniczeń, zakazów lub warunków produkcji, obrotu lub stosowania substancji niebezpiecznych oraz zawierających je produktów
    Legal act: *Rozporządzenie*, number: *2006/127/887*; Official Journal: *Dziennik Ustaw*, number: *2006/127/887*, Publication date: *17/07/2006*; Reference: *(MNE(2006)54669)*
12. Rozporządzenie Ministra Zdrowia z dnia 30 grudnia 2004 r. w sprawie bezpieczeństwa i higieny pracy związanej z występowaniem w miejscu pracy czynników chemicznych
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2005/11/86*, Publication date: *18/01/2005*; Reference: *(MNE(2005)54755)*
13. Rozporządzenie Ministra Gospodarki i Pracy z dnia 5 lipca 2004 r. w sprawie ograniczeń, zakazów lub warunków produkcji, obrotu lub stosowania substancji niebezpiecznych i preparatów niebezpiecznych oraz zawierających je produktów
    Legal act: *Rozporządzenie*, number: *2004/168/1762*; Official Journal: *Dziennik Ustaw*, number: *2004/168/1762*, Publication date: *28/07/2004*; Reference: *(MNE(2004)50309)*

Exposure to chemical agents and chemical safety

Directive 2004/37/EC - carcinogens or mutagens at work of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC.

Adoption to the national law (the national execution measures)

Transposition deadline: 20/05/2004

1. Rozporządzenie Ministra Zdrowia z dnia 1 grudnia 2004 r. w sprawie substancji, preparatów, czynników lub procesów technologicznych o działaniu rakotwórczym lub mutagennym w środowisku pracy
   Legal act: *Rozporządzenie*, number: *2004/280/2771*; Official Journal: *Dziennik Ustaw*, number: *2004/280/2771*, Publication date: *29/12/2004*; Reference: *(MNE(2005)54730)*
2. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*
3. Rozporządzenie Ministra Zdrowia z dnia 2 lutego 2011 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2011/33/166*, Publication date: *16/02/2011*, Entry into force: *03/03/2011*; Reference: *(MNE(2011)51626)*

Directive 2009/161/EU - indicative occupational exposure limit values of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2009/148/EC - exposure to asbestos at work of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (Text with EEA relevance).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2050

1. Rozporządzenie Ministra Gospodarki z dnia 13 grudnia 2010 r. w sprawie wymagań w zakresie wykorzystywania wyrobów zawierających azbest oraz wykorzystywania i oczyszczania instalacji lub urządzeń, w których były lub są wykorzystywane wyroby zawierające azbest
   Legal act: *Rozporządzenie*, number: *2011/8/31*; Official Journal: *Dziennik Ustaw*, number: *2011/8/31*, Publication date: *11/01/2011*, Entry into force: *25/01/2011*; Reference: *(MNE(2011)51722)*
2. Rozporządzenie Ministra Zdrowia z dnia 2 lutego 2011 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2011/33/166*, Publication date: *16/02/2011*, Entry into force: *03/03/2011*; Reference: *(MNE(2011)51626)*

Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/05/2004

1. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 29 listopada 2002 r. w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/12/2002*; Reference: *(MNE(2003)52711)*
2. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*

Directive 2006/15/EC - indicative occupational exposure limit values of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/09/2007

1. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 30 sierpnia 2007 r. zmieniające rozporządzenie w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2007/161/1142*, Publication date: *06/09/2007*; Reference: *(MNE(2007)57004)*

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/05/2004

1. Ustawa z dnia 26 czerwca 1974 r. - Kodeks pracy.

Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *16/02/1998*; Reference: *(MNE(2003)51793)*

2. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 29 listopada 2002 r. w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *18/12/2002*; Reference: *(MNE(2003)52711)*

Noise

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 14/02/2006

1. Rozporządzenie Rady Ministrów z dnia 30 lipca 2002 r. w sprawie wykazu chorób zawodowych, szczegółowych zasad postępowania w sprawach zgłaszania podejrzenia, rozpoznawania i stwierdzania chorób zawodowych oraz podmiotów właściwych w tych sprawach
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *19/08/2002*; Reference: *(MNE(2003)51887)*
2. Rozporządzenie Ministra Gospodarki i Pracy z dnia 5 sierpnia 2005 r. w sprawie bezpieczeństwa i higieny pracy przy pracach związanych z narażeniem na hałas lub drgania mechaniczne
   Legal act: *Rozporządzenie*, number: *2005/157/1318*; Official Journal: *Dziennik Ustaw*, number: *2005/157/1318*; Reference: *(MNE(2005)53654)*
3. Ustawa z dnia 26 czerwca 1974 r. Kodeks Pracy
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, number: *1998/21/94*; Reference: *(MNE(2004)52855)*
4. Rozporządzenie Ministra Zdrowia z dnia 2 lutego 2011 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2011/33/166*, Publication date: *16/02/2011*, Entry into force: *03/03/2011*; Reference: *(MNE(2011)51626)*
5. Rozporządzenie Rady Ministrów z dnia 30 lipca 2002 r. zmieniające rozporządzenie w sprawie wykazu prac wzbronionych kobietom
   Legal act: *Rozporządzenie*, number: *2002/127/1092*; Official Journal: *Dziennik Ustaw*, number: *2002/127/1092*; Reference: *(MNE(2005)54320)*
6. Rozporządzenie Ministra Zdrowia z dnia 5 kwietnia 2001 r. zmieniające rozporządzenie w sprawie przeprowadzania badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
   Legal act: *Rozporządzenie*, number: *2001/37/451*; Official Journal: *Dziennik Ustaw*, number: *2001/37/451*; Reference: *(MNE(2005)53649)*
7. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 17 grudnia 1998 r. zmieniające rozporządzenie w sprawie przeprowadzania badań lekarskich pracowników,

zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
Legal act: *Rozporządzenie*, number: *1998/159/1057*; Official Journal: *Dziennik Ustaw*, number: *1998/159/1057*; Reference: *(MNE(2005)53648)*

8. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 20 maja 1997 r. zmieniające rozporządzenie w sprawie przeprowadzania badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
   Legal act: *Rozporządzenie*, number: *1997/60/375*; Official Journal: *Dziennik Ustaw*, number: *1997/60/375*; Reference: *(MNE(2005)53645)*
9. Rozporządzenie Ministra Zdrowia z dnia 16 stycznia 2003 r. zmieniające rozporządzenie w sprawie rodzajów dokumentacji medycznej służby medycyny pracy oraz sposobu jej prowadzenia i przechowywania
   Legal act: *Rozporządzenie*, number: *2003/37/328*; Official Journal: *Dziennik Ustaw*, Publication date: *04/03/2003*; Reference: *(MNE(2005)53643)*
10. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 15 września 1997 r. w sprawie rodzajów dokumentacji medycznej służby medycyny pracy oraz sposobu jej prowadzenia i przechowywania
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *06/10/1997*; Reference: *(MNE(2003)51885)*
11. Rozporządzenie Ministra Zdrowia i Opieki Społecznej z dnia 30 maja 1996 r. w sprawie przeprowadzenia badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *1996/69/332*, Publication date: *25/06/1996*; Reference: *(MNE(2003)51579)*
12. Rozporządzenie Rady Ministrów z dnia 24 sierpnia 2004 r. w sprawie wykazu prac wzbronionych młodocianym i warunków ich zatrudniania przy niektórych z tych prac
    Legal act: *Rozporządzenie*, number: *2004/200/2047*; Official Journal: *Dziennik Ustaw*, number: *2004/200/2047*; Reference: *(MNE(2005)54330)*
13. Ustawa z dnia 27 czerwca 1997 r. o służbie medycyny pracy
    Legal act: *Ustawa*, number: *2004/125/1317*; Official Journal: *Dziennik Ustaw*, Publication date: *02/06/2004*; Reference: *(MNE(2005)53629)*
14. Rozporządzenie Ministra Gospodarki i Pracy z dnia 27 lipca 2004 r. w sprawie szkolenia w dziedzinie bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*, number: *2004/180/1860*; Official Journal: *Dziennik Ustaw*, Publication date: *18/08/2004*; Reference: *(MNE(2005)53628)*
15. Rozporządzenie Ministra Gospodarki i Pracy z dnia 28 czerwca 2005 r. zmieniające rozporządzenie w sprawie szkolenia w dziedzinie bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*, number: *2005/116/972*; Official Journal: *Dziennik Ustaw*, Publication date: *29/06/2005*; Reference: *(MNE(2005)53627)*
16. Rozporządzenie Ministra Pracy i Polityki Socjalnej z dnia 26 września 1997 r. w sprawie ogólnych przepisów bezpieczeństwa i higieny pracy
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2003/169/1650*, Publication date: *29/09/2003*; Reference: *(MNE(2003)52139)*
17. Rozporządzenie Ministra Gospodarki, Pracy i Polityki Społecznej z dnia 10 kwietnia 2003 r. w sprawie zasadniczych wymagań dla maszyn i elementów bezpieczeństwa
    Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *23/05/2003*; Reference: *(MNE(2003)53960)*
18. Rozporządzenie Ministra Zdrowia z dnia 20 kwietnia 2005 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy

Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *28/04/2005*; Reference: *(MNE(2005)53626)*

19. Ustawa z dnia 26 lipca 2002 r. o zmianie ustawy - Kodeks pracy oraz zmianie niektórych innych ustaw
    Legal act: *Nowelizacja*, number: *2002/135/1146*; Official Journal: *Dziennik Ustaw*, number: *2002/135/1146*; Reference: *(MNE(2005)53653)*
20. Ustawa z dnia 24 sierpnia 2001 r. o zmianie ustawy - Kodeks pracy oraz o zmianie niektórych innych ustaw
    Legal act: *Nowelizacja*, number: *2001/128/1405*; Official Journal: *Dziennik Ustaw*, number: *2001/128/1405*; Reference: *(MNE(2005)53652)*
21. Ustawa z dnia 14 listopada 2003 r. o zmianie ustawy - Kodeks pracy oraz o zmianie niektórych innych ustaw
    Legal act: *Nowelizacja*, number: *2003/213/2081*; Official Journal: *Dziennik Ustaw*, number: *2003/213/2081*; Reference: *(MNE(2005)53650)*

Artificial optical radiation

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 27/04/2010

1. Rozporządzenie Ministra Zdrowia z dnia 8 grudnia 2010 r. zmieniające rozporządzenie w sprawie przeprowadzania badań lekarskich pracowników, zakresu profilaktycznej opieki zdrowotnej nad pracownikami oraz orzeczeń lekarskich wydawanych do celów przewidzianych w Kodeksie pracy
   Legal act: *Rozporządzenie*, number: *2010/240/1611*; Official Journal: *Dziennik Ustaw*, number: *2010/240/1611*, Publication date: *21/12/2010*, Entry into force: *21/12/2010*; Reference: *(MNE(2010)58077)*
2. Rozporządzenie Ministra Zdrowia z dnia 2 lutego 2011 r. w sprawie badań i pomiarów czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2011/33/166*, Publication date: *16/02/2011*, Entry into force: *03/03/2011*; Reference: *(MNE(2011)51626)*
3. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 27 maja 2010 r. w sprawie bezpieczeństwa i higieny pracy przy pracach związanych z ekspozycją na promieniowanie optyczne
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2010/100/643*, Publication date: *09/06/2010*, Entry into force: *24/06/2010*; Reference: *(MNE(2010)54036)*
4. Rozporządzenie Ministra Pracy i Polityki Społecznej z dnia 29 lipca 2010 r. zmieniające rozporządzenie w sprawie najwyższych dopuszczalnych stężeń i natężeń czynników szkodliwych dla zdrowia w środowisku pracy
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, number: *2010/141/950*, Publication date: *06/08/2010*, Entry into force: *21/08/2010*; Reference: *(MNE(2010)55310)*

Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/05/2004

1. Ustawa z dnia 30 sierpnia 2002 r. o systemie oceny zgodności.
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *07/10/2002*; Reference: *(MNE(2003)51845)*
2. Rozporządzenie Ministra Gospodarki, Pracy i Polityki Społecznej z dnia 31 marca 2003 r. w sprawie zasadniczych wymagań dla środków ochrony indywidualnej.
   Legal act: *Rozporządzenie*; Official Journal: *Dziennik Ustaw*, Publication date: *10/05/2003*; Reference: *(MNE(2003)51900)*
3. Rozporządzenie Ministra Gospodarki z dnia 21 grudnia 2005 r. w sprawie wymagań dla środków ochrony indywidualnej
   Legal act: *Rozporządzenie*, number: *2005/259/2173*; Official Journal: *Dziennik Ustaw*, number: *2005/259/2173*; Reference: *(MNE(2006)52118)*
4. Ustawa z dnia 14 czerwca 1960 r. - Kodeks postępowania administracyjnego
   Legal act: *Ustawa*; Official Journal: *Dziennik Ustaw*, Publication date: *17/11/2000*; Reference: *(MNE(2003)51643)*

3.D UNITED KINGDOM

3.D.1 Environmental legislation

The purpose of this part is to identify and describe the environmental legislation that pertains and applies to the UK steel industry. Arguably, environmental protection and preservation, essential elements in programmes of 'sustainable development'[32], presents particular challenges for primary industries such as steel production, because environmental sustainability requires the conservation and prudent use of non-renewable resources, as well as the management of environmentally damaging impacts associated with the extraction (the mining of iron ore and coal) and – crucially for our purposes - processing of these resources. The challenges arise, in part, because iron and steel production is intrinsically carbon-intensive (EEF, 2009) as well as energy-intensive (e.g. the electricity required to create the 'arc' in an electric arc furnace is enough to power a town with a population of 100,000 (EEF, 2011)); utilises large amounts of finite raw materials, such as coal and iron ore; releases significant amounts of emissions (Environment Agency, 2004); and the production process creates high levels of waste, some of which is hazardous (Environment Agency, 2004: 8).

However, such challenges must be addressed, not just as a matter of corporate social responsibility, but because regulation of environmental issues and concomitant 'punishment for polluters' (Eur-Lex, 2005), although a relatively recent policy direction, is an arena that is growing in both importance and scope. As it is estimated that approximately eighty per cent of UK legislation on environmental affairs originates from the EU (Civitas, 2007: EEF, 2010a), a primary focus of this report will be the implementation of these EU-initiated directives and regulations at the national level. Thus the report will identify the specific pieces of UK legisla-

[32] Sustainable development has been defined as 'development that meets the needs of present generations without jeopardising the ability of future generations to meet their own needs' (European Commission, 2011a).

tion that have been enacted in order to ensure compliance with the European directives. Furthermore, given that the ultimate aim of the project is the 'greening' of VET programmes for skilled technicians (mechanical/maintenance and electrical) employed within the UK steel sector, the implications of each piece of legislation for these two occupational groups will be examined. The relevant environmental legislation can be divided into five key areas:

- generation of waste;
- generation of emissions to the atmosphere;
- generation of emissions to water;
- contamination of land and groundwater; and
- climate change and energy efficiency.

Thus, this structure will be adopted in the subsequent text. After this review, a discussion of policy and initiatives in evidence at both sectoral and company levels will be provided.

In order to contextualise the report, a brief overview of some key statistical data pertaining to the UK steel industry will be provided, and subsequently, a concise discussion of the origins and principles of EU environmental policy.

The UK Steel Industry

Steel is one of the commonest structural metals in the UK (Dahlstrom et al, 2004). In 2009, the UK steel industry produced 10.1 million tonnes of crude steel (with 8 million of this being produced through the blast furnace/basic oxygen steelmaking process and the remaining 2.1 million tonnes produced through electric arc steelmaking) (EEF, 2010a: 2). Total output has been in decline since 1990 (when total production of crude steel stood at 17.7 million tonnes (ibid.)); a decline of 42%. In 2009, the industry directly employed 23,000 workers, a fall from 58,000 in 1990 (ibid.); a percentage decrease of 60%. Despite these reductions, the UK sector is the sixth largest manufacturer in the world, contributing a substantial £7 billion to GDP in 2009 (EEF, 2010b). It provides £3billion per an-

num to the UK trade balance, with approximately half of UK steel production being exported) (EEF, 2010b).

The European Union and Environmental Policy

To reiterate, environmental policy is a relatively recent EU policy area. The issue of environmental protection was not included within the founding Treaty of Rome (1957) and it was the early 1970s before the first of a series of European Environmental Action Plans (EAPs) were launched (Civitas, 2011).

The passing of the Single European Act (1986) entailed a more prominent role for environmental protection in EU policymaking, introducing the principle that it should be considered in all new Community legislation (ibid.). The policy area was substantially expanded by the Treaty of Amsterdam (1997), which made sustainable development one of the EU's core objectives (Eur-Lex, 2005). In 2001, the EU adopted its Sustainable Development Strategy (SDS) in Gothenburg (ibid.), making environmental protection part of the Lisbon Strategy (Schauer, 2006). In 2006, the European Council adopted a comprehensive and renewed SDS for the enlarged Europe (European Commision, 2011a). The strategy outlines a stated commitment to gradual change of current unsustainable consumption and production alongside the creation of 'sustainable communities, able to manage and use resources efficiently.' Environmental protection is re-affirmed as a key Union objective therein (Eur-Lex, 2005), with all subsequent EU policy incorporating a commitment to:

- Ensuring a high level of protection and improvement of the quality of the environment,
- Preventing and reducing environmental pollution,
- Promotion of sustainable production and consumption, in order to break the link between economic growth and environmental degradation.

Concomitantly, the EU pledged that polluters will be made to pay for damage to human health and the environment (ibid.), the 'polluter pays' principle.

The stated commitment to sustainable development was reinforced in the 'Europe 2020' strategy (European Commission, 2010), with sustainable growth, incorporating efficient resource use and the prevention of environmental degradation, as one of three stated priorities. 'Resource-Efficient Europe' is one of seven flagship initiatives, aimed at building a resource efficient and low-carbon economy (ibid.). The aim is to decouple economic growth from resource and energy use, reduce CO2 emissions, enhance competitiveness and promote greater energy security.

To achieve the complementary aims of sustainable development and environmental protection then, the EU has passed legislation aimed at improving the quality of water, tackling air and noise pollution, assuring the safety of chemicals, setting standards for waste disposal and protecting the EU's wildlife and plants (Civitas, 2011). The current EAP, which runs from 2002-12, identifies four environmental areas for priority action:

- climate change;
- nature and biodiversity;
- environment, health and quality of life, and
- natural resources and waste (e.g. the EU Landfill Directive requires states to reduce landfill waste by 50% from 1995 levels by 2013 and 65% by 2020).

This latter will be the first area of environmental legislation (i.e. waste management, disposal and reduction) to be considered in this report: the salient EU directives on this matter, how such legislation has been enacted in the UK context, alongside a consideration of the specific implications for the steel industry and the two technical occupations therein will now be discussed.

Generation of Waste

Background

Three billion tonnes of waste are generated each year in the European Union; some ninety million tonnes of which are hazardous (European Commission, 2011b). Manufacturing activity is estimated to account for three hundred and sixty million tonnes (European Union, 2010). According to the OECD (2002), the amount of waste produced in Europe increased by ten per cent between 1990 and 1995. Furthermore, the OECD estimates that by 2020, Europe will be generating forty five per cent more waste than in 1995.

The treatment and disposal of such vast amounts of waste, in a way that does not have a detrimental impact on the environment, is obviously an issue of major importance. The majority of waste is disposed of through incineration or landfill, both of which create environmental damage.[33]

To reiterate, the EU's Sixth Environment Action Programme identifies waste prevention and management as one of four top priorities. Its primary objective is to decouple waste generation from economic activity. The aims are to achieve a significant cut in the amount of rubbish generated, through new waste prevention initiatives, better use of resources, and encouraging a shift to more sustainable consumption patterns.

The European Union's approach to waste management is based on three principles:

> *Waste prevention*: The aim is to reduce the amount of waste generated in the first instance and to reduce its hazardousness through decreasing the presence of dangerous substances in products. Thus, its disposal will au-

[33] For instance, landfilling takes up more and more valuable land space, and moreover, it also causes air, water and soil pollution, discharging carbon dioxide (CO_2) and methane (CH_4) into the atmosphere and chemicals and pesticides into the earth and groundwater.

tomatically become simpler. Waste prevention is closely linked with improving manufacturing methods.

Re-use and Recycling: If waste cannot be prevented, as many of the materials as possible should be recovered, preferably by re-using the waste without physical and chemical processing, followed by recovery through recycling. The European Commission has defined several specific 'waste streams' for priority attention, the aim being to reduce their overall environmental impact. This includes packaging waste, end-of-life vehicles, batteries, electrical and electronic waste. As will be detailed below, EU directives now require Member States to introduce legislation on waste collection, reuse, recycling and disposal of these waste streams.

Improving final disposal and monitoring: Where possible, waste that cannot be reused or recycled should be safely incinerated, with landfill only used as a last resort. Both these methods need close monitoring because of their potential for causing severe environmental damage. As such, the EU has recently approved a directive setting strict guidelines for landfill management. Certain types of waste are prohibited and targets have been set for the reduction of quantities of biodegradable rubbish. Another recent directive lays down stringent limits on emission levels from incinerators.

Relevant EU legislation regarding the Management of Waste and the UK Legislation that has transposed these Directives into UK law

Specifically, the relevant EU legislation regarding the management of waste is as follows:

- The **Waste Framework Directive (Directive on Waste)** of 2008 is a legal framework aimed at the waste cycle in entirety, from generation to disposal, which places a strong emphasis on recovery and recycling.[34] It is de-

[34] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008.

scribed as the 'cornerstone of EU waste policy' (European Union, 2010). This framework directive repealed a number of earlier Directives, namely 75439/EEC, 91/689/EEC and 2006/12/EC, with a view to streamlining waste legislation. It incorporates rules on a number of issues such as the management of hazardous waste and waste oils (European Union, 2010).

The framework directive introduced and promotes the waste hierarchy. This is a five-stage waste hierarchy where prevention is the best option, followed by re-use, recycling and other forms of recovery, with disposal such as landfill as the last resort. Moreover, it represents a step-change in the conceptualisation of waste, from a burden to a potentially valuable re-source (EU, 2010).

- The **Landfill Directive (Landfill of Waste) -** Council Directive 1999/31/EC of 26 April 1999, entered into force on the 16 July 1999. The deadline for implementation in the Member States was 16 July 2001. The objective of the Directive is to prevent or reduce, as far as possible, the negative effects on the environment from land-filling of waste, by introducing stringent technical requirements for waste and landfills. The Directive is intended to prevent or reduce the adverse effects of the landfill of waste on the environment, in particular on surface water, groundwater, soil, air and human health.

  The Directive defines the different categories of waste (municipal waste, hazardous waste, non-hazardous waste and inert waste) and applies to all landfills, defined as waste disposal sites for the deposit of waste onto or into land. Landfills are divided into three classes:

  - landfills for hazardous waste;
  - landfills for non-hazardous waste;
  - landfills for inert waste.

  The Directive lays down a standard waste acceptance procedure, so as to avoid any risks:

- waste must be treated before being landfilled;
- hazardous waste within the meaning of the Directive must be assigned to a hazardous waste landfill;
- landfills for non-hazardous waste must be used for municipal waste and for non-hazardous waste;
- landfill sites for inert waste must be used only for inert waste;

Certain categories of waste, including liquid waste, flammable waste, explosive or oxidising waste, may not be accepted in a landfill. Finally, the Directive sets up a system of operating permits for landfill sites.

In England and Wales, the ongoing requirements of the Directive are applied under the **Environmental Permitting (England and Wales) Regulations 2010** (Environment Agency, 2011a) (previously the **Landfill (England and Wales) Regulations 2002 (SI 2002 No 1559),** the **Environmental Protection (Duty of Care) Regulations 1991** and the **Environmental Protection Act 1990**.

o The **Controlled Management of Hazardous Waste** - Council Directive 91/689/EEC of 12 December 1991 on hazardous waste (OJ L 377 of 31.12.1991). This is a framework for the management, recovery and correct disposal of waste considered to be hazardous. Currently, around 5 million tonnes of hazardous waste are produced in England and Wales every year (AEA Technology, 2004). Roughly, 43% of hazardous waste goes to landfill; the rest is either destroyed or recycled. The Hazardous Waste Directive aims to control the movement and handling of this type of waste. It requires the recording and tracking of waste moving from producer to final disposal site. The scope of the directive is defined by the Hazardous Waste List, which has recently been amended to include televisions, computer monitors and fluorescent tubes.

The Directive was transposed into UK legislation through the **Hazardous Waste (England and Wales) Regulations 2005 SI 894** and the **List of**

Wastes (England) Regulations 2005 SI 895 (Environment Agency, 2011b)**.**

Moreover, implementation of the revised Waste Framework Directive entailed some changes to the Hazardous Waste Regulations. These changes have been brought in by the **Waste (England and Wales) Regulations 2011** and the **Waste (Miscellaneous Provisions) (Wales) 2011 Regulations** (ibid.).

- The **Waste from Electrical and Electronic Equipment (WEEE) Directive** (2002/96/EC) introduces, amongst other things, requirements on selective treatment of collected WEEE with the aim that hazardous materials and components are removed and for some particular items are specially treated. These operations are to be performed in such a way that environmentally-sound reuse and recycling are not hindered.[35]

  The WEEE Directive was transposed into UK law in January 2007 by the **Waste Electronic and Electrical Equipment Regulations 2006** (Environment Agency, 2011c).

- **Packaging and Packaging Waste**

  Packaging was identified as a priority waste stream in the European Commission's Fifth Environmental Action Programme (DEFRA, 2007).[36] As such, the European Parliament and Council **Directive 94/62/EC** on packaging and packaging waste was agreed on 20 December 1994. The Directive is aimed at preventing excessive production of packaging waste, promoting the re-use of packaging where possible, and increasing the recovery and recycling of packaging waste (ibid.). The Directive also set ob-

[35] One possible application is the use of Refractory Ceramic Fibres (RCFs). Total usage of RCFs in the UK is around 8000 tonnes per annum with *50% of the material being used for furnace/heater/kiln linings*. Domestic appliances account for a further 20%, and metal processing, such as steel foundry and forging use, about 10%. Automotive use, fire protection and general industrial processes make up the remaining 20%. It is possible that building heating appliances may contain RCFs.
Respirable RCFs are classified as category 2 carcinogens. Any work with RCF is thus subject to stringent controls.

[36] Packaging, together with end of life vehicles, waste electrical and electronic equipment and batteries, was identified as a priority waste stream because of the amounts of waste arising, the trend for these to continue to rise and concern about the impact of these waste streams on the environment (DEFRA, 2007).

ligatory target levels of packaging waste recovery and recycling for member states to achieve by 31 December 2008 (DEFRA, 2007).[37]

Moreover, Articles 9 and 11 provide for certain 'essential requirements' that packaging must meet if it is to be placed on the market within the European Community.

The provisions of this Directive are implemented in the UK through two sets of regulations:

- The **Producer Responsibility Obligations (Packaging Waste) Regulations 2007** (the 'packaging regulations') **(SI 2007, No. 871)** and the **Producer Responsibility Obligations (Packaging Waste) (Amendment) Regulations 2010 (SI 2010, No. 2849)**
- the **Packaging (Essential Requirements) Regulations 2003** (as amended) (the 'Essential Requirements Regulations').

The UK has taken a producer responsibility approach to managing packaging waste, whereby the regulations require producers of packaging waste to contribute towards recovering and recycling a proportion of the packaging produced (NetRegs, 2011a). The regulations apply to businesses that produce packaging and a) have an annual turnover of more than £2 million and b) produced or handled packaging weighing over 50 tonnes in the preceding year (ibid.). Such businesses are required to register with the Environment Agency and certify that their obligations have been met.

The Essential Requirements Regulations aim to ensure that:

- packaging volume and weight must be the minimum amount to maintain necessary levels of safety, hygiene and acceptance for the packed product and for the consumer;

[37] The Directive targets that the UK had to meet by 31 December 2008 were 60% recovery of packaging waste; 55% recycling of packaging waste; 60% recycling of glass packaging waste; 60% recycling of paper/board packaging waste; 50% recycling of metals packaging waste; 22.5% recycling of plastics packaging waste; and 15% recycling of wood packaging waste (DEFRA, 2007).

- packaging must be manufactured so as to permit re-use or recovery in accordance with specific requirements;
- noxious or hazardous substances in packaging must be minimised in emissions, ash or leachate from incineration or landfill (DEFRA, 2007).

Specific application to the work of mechanical and electrical engineering technicians at plant level

Maintenance technicians are able to influence the generation of waste and its subsequent disposal, which has an impact on both the environmental and economic sustainability of the business. The technicians would have an influence on the waste hierarchy (to prevent, reduce, reuse or finally dispose of waste); classifying the waste and ensuring the waste is stored in a suitable manner; ensuring the waste is disposed of in accordance with the relevant legislation.

Thus, when the stipulations of the Waste Directive are followed by plant level technicians, this should reduce the volumes of waste generated at steelworks and the associated disposal costs.

The Landfill Directive means that the waste generated by electrical and mechanical technicians needs to be classified as hazardous, non-hazardous or inert, and this dictates where waste may be sent for landfill.

The Controlled Management of Hazardous Waste Regulations is relevant as maintenance activities are likely to generate waste classified as hazardous, and additional measures are therefore required for its management and disposal.

Both the Waste Electrical & Electronic Equipment (WEEE) and Packaging Regulations will greatly impact upon the daily duties of mechanical and electrical technicians in how they consign waste packaging and electrical / electronic equipment to meet the requirements of their company and legislation.

Generation of Emissions to Atmosphere

Background

Air pollution has been one of Europe's main political concerns since the late 1970s (European Commission, 2011c). European Union policy on air quality aims to develop and implement appropriate instruments to improve air quality. This includes controlling emissions from industrial installations/operations (ibid.).

To reiterate, the contemporaneous Sixth Environment Action Programme includes ‘Environment and Health’ as one of the four main target areas, with air pollution being one of the issues included under this auspice (ibid.). The Thematic Strategy on Air Pollution includes clear objectives for the reduction of a number of important air pollutants in order to achieve levels of air quality that do not give rise to significant negative impacts on, and risks to, human health and the environment.

The Community’s averred focus for the next decade will be the implementation of air quality standards and coherency of all air legislation and related policy initiatives.

Relevant EU Legislation regarding Air Pollution and the UK Legislation that has transposed these Directives into UK law

- **Integrated Pollution Prevention and Control (IPPC Directive) - Directive 1996/61/EC** and codified in 2008 **2008/1/EC of the European Parliament and of the Council of 15 January 2008**.

  Through this Directive, the European Union (EU) defined the obligations – in terms of pollutants released - with which industrial (and agricultural) activities with a high pollution potential must comply (Europa, 2010; European Commission, 2011c).[38] This directive represents an integrated approach to the control of all environmental impacts of certain listed industrial activities (Environment Agency, 2004).[39] It involves determination by the Regulator (i.e. the Environment Agency in the UK) of the appropriate controls, aimed at the protection of all environmental media, for specified industries, which are to be implemented, maintained and monitored through a single permitting process. This unified approach should ensure that all of the salient environmental issues for an installation are considered in an integrated way.

  In order to gain a Pollution Prevention and Control (PPC) Permit, an operator has to systematically demonstrate in its application that the techniques it is using (or is proposing to use) both represent the use of Best Available Techniques (BAT) and take account of relevant local factors. This would be in addition to meeting any other relevant statutory requirements. Gaining and operating under a permit means compliance with the following mandatory obligations (Europa, 2011):

[38] The IPPC concerns new or existing industrial and agricultural activities with a high pollution potential. These are defined in Annex I to the Directive (energy industries, **production and processing of metals**, mineral industry, chemical industry, waste management, livestock farming, etc.) (Europa, 2011).

[39] The integrated approach means that the permits must take into account the whole environmental performance of the plant, covering emissions to air, water and land, generation of waste, use of raw materials, energy efficiency, noise, prevention of accidents, and restoration of the site upon closure. The purpose of the Directive is to ensure a high level of protection of the environment as a whole (European Commission, 2011d).

- use all appropriate pollution-prevention measures, namely the Best Available Techniques (which produce the least waste, use less hazardous substances, enable the substances generated to be recovered and recycled, etc.);
- prevent all large-scale pollution;
- prevent, recycle or dispose of waste in the least polluting way possible;
- use energy efficiently;
- ensure accident prevention and damage limitation;
- return sites to their original state when the activity is over.

In sum, the aim of the IPPC Directive is thus to prevent or reduce pollution of the atmosphere (as well as water and soil, and the quantities of waste arising from industrial installations) so as to ensure a high level of environmental protection.

o **Industrial Emissions Directive - Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast)**

More recently, on 21 December 2007, the Commission adopted a Proposal for a Directive on industrial emissions. The Proposal recasts seven existing Directives related to industrial emissions into a single clear and coherent legislative instrument – the Industrial Emissions Directive. The recast includes the IPPC Directive (European Commission, 2011c).

The review was undertaken with all stakeholders to examine how the IPPC and related legislation on industrial emissions could be improved so as to offer the highest level of protection for the environment and human health, whilst simplifying the extant legislation and cutting unnecessary administrative costs (ibid.).

The Industrial Emissions Directive entered into force on 6th January 2011 and EU member states have two years to implement it into national legislation.

See Environment Agency (2004; 12-15) for a summary of the key IPPC issues in the coke, iron and steel industries.

- **Best Available Techniques (BAT) Reference Documents for the Steel Industry (Iron & Steel BREF)**

  Best Available Technique (BAT) is defined in the IPPC Directive as the most effective techniques to achieve a high level of environmental protection, taking into account the costs to operators and the environmental benefits (Environment Agency, 2004). BAT not only refer to the technology used at an installation, but also to the way the installation is designed, built, operated and maintained.

  In the determination of the Best Available Techniques, the authorities that issue permits have to take into account the BAT Reference Documents (BREF) adopted by the European Commission. The BREF documents are based on an exchange of information through technical working groups consisting of experts from industry, Member State authorities, research institutes and NGOs (European Commission, 2011d). The BREF describe what is considered to be BAT at EU level for each activity covered by the directive.

  With specific regard to the steel industry, the relevant BREF documents are:

  - **Best Available Techniques Reference Document on the Production of Iron and Steel, December 2001**
  - **Reference Document on Best Available Techniques in the Ferrous Metals Processing Industry, December 2001**

  Documents are in the final review stages and newer versions are imminent.

- **Pure Air for Europe - Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008** on ambient air quality and cleaner air for Europe.

  This Directive revises European legislation relating to ambient air quality with the aim of reducing pollution to levels which minimise the harmful effects on human health and on the environment and improving information to the public on the risks involved (European Commission, 2011d). This is relevant to the air quality issues surrounding many steelworks, as iron and steel-making works are significant emitters of SO_2, particulate matter (PM10 and PM2.5 – fine particulate), NOx, CO, iron and its oxides, heavy metals and organochlorides including dioxins and furans (PCDD/F). Coke works emit dust and VOC (volatile organic compounds), including benzene and polycyclic aromatic hydrocarbons (PAH) (Environment Agency, 2004). The Pure Air for Europe Directive merges the majority of the extant legislation (with the exception of the Fourth Daughter Directive) into a single directive with no change to existing air quality objectives (European Commission, 2011d). This incorporates the Air Quality Framework Directive (Council Directive 96/62/EC) on ambient air quality assessment and management; the First Daughter Directive (Council Directive 1999/30/EC) relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air; the Second Daughter Directive (Directive 2000/69/EC) of the European Parliament and of the Council relating to limit values for benzene and carbon monoxide in ambient air; and the Third Daughter Directive (2002/3/EC) of the European Parliament and of the Council relating to ozone in ambient air. The Directive also incorporates new air quality objectives for PM2.5 (fine particulate).
- The Fourth Daughter Directive (2004/107/EC) of the European Parliament and of the Council relates to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (ibid.).

UK Legislation embodying these Directives

- **The Environmental Permitting Regulations (England and Wales) 2010 SI 2010/675**

  The regulations provide a consolidated, single regulatory system for environmental permits (and exemptions) for industrial activities, through streamlining and integrating:
  - Waste Management Licensing,
  - Pollution Prevention and Control,
  - Water discharge Consenting,
  - Groundwater Authorisations, and
  - Radioactive Substances Regulation (DEFRA, 2011).

    It also sets out the powers, functions and duties of the regulators including the control of pollution from water discharge activities (Business Link, 2011).
- **Clean Air Act 1993**

  The Clean Air Act gives powers to local councils to control domestic and industrial smoke to improve local air quality and meet EU air quality standards for sulphur dioxide and particulates. It enables local councils to create 'smoke control areas' and order the use of cleaner fuels in these areas (NetRegs, 2011b).

  Part 1 bans the emission of dark smoke from chimneys and industrial or trade premises; Part II requires new furnaces to be as smokeless as possible, limits emissions of smoke, grit, dust and fumes, as well as specifying chimney heights; Part III authorises local councils to declare 'smoke control areas' in order to improve air quality, where only 'authorised fuels, can be used (with limited exceptions). The Clean Air Act is enforced by local

councils, largely through abatement notices. Businesses found responsible for producing dark smoke can be fined up to £20,000 (ibid.).

Specific Application to the work of mechanical and electrical technicians at plant level

Technicians should be aware of the requirements of the Environmental Permit so as to ensure that no uncontrolled releases to atmosphere occur. Technicians have the potential to cause the uncontrolled release of emissions to atmosphere through maintenance activities (welding, burning, degassing, re-gassing) or through the setup of control instrumentation, monitoring systems or pollution abatement plant such as scrubbers, electrostatic precipitators (ESPs) or bag filter units.

Generation of Emissions to Water

Relevant EU Legislation regarding Water Pollution and the UK Legislation that has transposed these Directives into UK law

- **Water Framework Directive (Water protection and management)**
  Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy (**OJ L 327 of 22.12.2000**)
  Amending Acts: Decision 2455/2001/EC; Directive 2008/32/EC; Directive 2009/31/EC.
  The European Water Framework Directive came into force in December 2000 and became part of UK law in December 2003. It aims to deliver a better water environment, and has a strong focus on ecology (Environment Agency, 2011d).
  The Directive has established a framework for the protection of:
  - inland surface waters ;

- groundwater;
- transitional waters; and
- coastal waters.

The objectives of the Framework-Directive are to prevent and reduce pollution, promote sustainable water usage, environmental protection, improve aquatic ecosystems as well as mitigate the effects of floods and droughts. Its ultimate objective is to achieve "good ecological and chemical status" for all Community waters by 2015 (Eur-Lex, 2010).

Member states were charged with the responsibility of analysing each national river basin district by 2013 (to be revised every six years thereafter). On the basis of these analyses, management plans were produced in 2009, to be implemented in 2012. These plans should aim to:

- prevent deterioration, enhance and restore bodies of surface water, achieve good chemical and ecological status of such water by 2015 at the latest and to reduce pollution from discharges and emissions of hazardous substances;
- protect, enhance and restore the status of all bodies of groundwater, prevent the pollution and deterioration of groundwater, and ensure a balance between groundwater abstraction and replenishment;
- preserve protected areas (Eur-Lex, 2010).

Member States must introduce arrangements to ensure that effective, proportionate and dissuasive penalties are imposed in the event of breaches of the provisions of this Framework Directive.

A list of priority substances selected from among the ones which present a significant risk to the aquatic environment has been drawn up at European level. This list is set out in Annex X of the Framework-Directive.

- **Integrated pollution prevention and control (IPPC Directive)**

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

See above.

With specific reference to the steel industry, the key issues to be addressed regarding water management include the following (Environment Agency, 2004):

- consumption levels,
- monitoring and management of mass flows of individual pollutants,
- management of surface water run-off and treatment facilities
- security of underground drains,
- pollution prevention systems and contingency arrangements;

- **Industrial Emissions Directive**

  Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).

  See above.

UK Legislation:

- **The Environmental Permitting Regulations (England and Wales) 2010 SI 2010/675**

  The regulations provide a consolidated, single regulatory system for environmental permits (and exemptions) for industrial activities, through streamlining and integrating:

  - Waste Management Licensing,
  - Pollution Prevention and Control,
  - Water discharge Consenting,
  - Groundwater Authorisations, and

- Radioactive Substances Regulation (DEFRA, 2011b).

It also sets out the powers, functions and duties of the regulators including the control of pollution from water discharge activities (Business Link, 2011).

- **Water Industry Act 1991 SI 57**

  This Act consolidates existing legislation on water supply and sewerage services. It introduces a framework that requires industrial sites that discharge process effluent to water and sewers to have formal trade discharge consent for such activities.

- The **Water Resources Act 1991** established the National Rivers Authority (now replaced by the Environment Agency), and regulates water pollution (NetRegs, 2011c). The Act defines the Environment Agency's role in water pollution, water resource management, flood defence, fisheries and navigation. It covers discharges to controlled waters (including surface and ground waters), including rivers, lakes, estuaries and coastal waters, and controls abstracting and impounding water.

  Industrial operators are liable for costs incurred through the repair of damage caused by their polluting discharges, largely by reimbursing the Environment Agency for the anti-pollution works it has carried out (ibid.).

  Businesses must not cause, or knowingly permit, any poisonous, noxious or polluting material or solid waste to enter controlled water without consent from the Environment Agency. Penalties for failure to take adequate care to prevent unauthorised discharges to controlled waters include fines or imprisonment (ibid.).

- **Control of Pollution (Oil Storage) Regulations SI 2001/2954**

  These regulations impose general requirements for the prevention of pollution of surface water and groundwater from oil storage, including from fixed tanks, drums and mobile bowsers. The regulations include require-

ments for ensuring that oil tanks, drums, pipes and pipelines including fill-points are within secondary containment. The regulations make contravention a criminal offence (Business Link, 2011).

Specific Application to the work of mechanical and electrical engineering technicians at plant level

Technicians have the potential to cause the uncontrolled release of contaminants to controlled waters through maintenance activities (replacement of fluids such as coolants/oils etc, blowdown of cooling towers, chemical storage etc) or through the setup of control instrumentation and monitoring systems. They therefore need to be cognisant of the implications of their activities, which have the potential to cause pollution of drains and watercourses. As such, technicians should be aware of the requirements of the site's Environmental Permit relating to effluent, as well as the requirements of the Oil Storage Regulations.

Contamination of Land and Groundwater

Relevant European Legislation regarding Land and Groundwater Pollution and the UK Legislation that has transposed these Directives into UK law

- **Integrated pollution prevention and control (IPPC Directive)**
  Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.
  See above.
- **Industrial Emissions Directive**
  Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).
  See above.

UK Legislation:

- **The Environmental Permitting Regulations (England and Wales) 2010 SI 2010/675**

  The regulations provide a consolidated system for environmental permits and exemptions for industrial activities, water discharge activities and groundwater activities. It also sets out the powers, functions and duties of the regulators including the control of pollution from water discharge activities (Business Link, 2011).

- **Environment Protection Act 1990 (Part IIA)**

  The Environmental Protection Act 1990 establishes businesses' legal responsibilities for the duty of care for waste, contaminated land and statutory nuisance in England, Scotland and Wales (NetRegs, 2011d).

  Part IIA sets out businesses' 'duty of care' responsibilities for producing, collecting, disposing of or treating controlled waste. It also creates the legal basis for requiring businesses to identify and remedy contaminated land, which was then brought into force by the Environment Act 1995 (NetRegs, 2011d).

- **Environmental Damage (Prevention and Remediation) Regulations 2009 SI 153**

  These regulations establish liability for polluters to prevent and remedy environmental damage that they have caused - the 'polluter pays' principle (NetRegs, 2011e). If an individual or a business carries out an activity that causes environmental damage, then that person/entity is responsible for the remedy of the damage. If there is a risk of damage from business activities, the business must act so as to prevent such damage occurring.

  Under the regulations, environmental damage is defined as:

  - serious damage to surface or ground water

- contamination of land where there is a significant risk to human health
- serious damage to EU protected natural habitats and species, or damage to Sites of Special Scientific Interest (SSSIs).

- **Control of Pollution (Oil Storage) Regulations SI 2001/2954**
  These regulations impose general requirements for the prevention of pollution of surface water and groundwater from oil storage, including from fixed tanks, drums and mobile bowsers. The regulations include requirements for ensuring that oil tanks, drums, pipes and pipelines including fill-points are within secondary containment. The regulations make contravention a criminal offence (Business Link, 2011).

Specific Application to the work of mechanical and electrical engineering technicians at plant level

Technicians have the potential to contaminate land through maintenance operations (replacement of fluids, storage of oil and chemicals, repair of leaks, secondary containment, refuelling of vehicles etc).
Technicians should therefore be aware of the requirements of the site's Environmental Permit relating to the storage and handling of oils and chemicals which could potentially contaminate land, as well as the implications that their activities may have on meeting these requirements.

Climate Change

Background

EU publications aver that 'combating climate change is a top priority' (European Commission, 2011e). The European Union has taken a leading role in the international negotiations that led to agreement on the two United Nations climate

treaties, the UN Framework Convention on Climate Change (UNFCCC) in 1992 and the Kyoto Protocol in 1997.

The Kyoto Protocol requires that the 15 countries that were EU members at the time (the EU-15) reduce their collective emissions in the 2008-2012 period, to 8% below 1990 levels. Emissions monitoring and projections show that the EU-15 is well on track to meet this target (European Commission, 2011e).

In 2007, EU leaders endorsed an integrated approach to climate and energy policy and committed to transforming Europe into a highly energy-efficient, low carbon economy. They made a unilateral commitment that Europe would cut its emissions by at least 20% of 1990 levels by 2020 (as well as for 20% of energy to come from renewable sources and a 20% reduction in primary energy, to be achieved by improving energy efficiency – 'the 20:20:20 targets' [Civitas, 2011]). This commitment is being implemented through a package of binding legislation, known as the 'climate and energy package'. This was agreed in 2008 by the European Parliament and Council and became law in June 2009 (see below).

The EU has also offered to increase its emissions reduction to 30% by 2020, on condition that other major emitting countries in the developed and developing worlds commit to do their fair share under a future global climate agreement. This agreement should take effect at the start of 2013 when the Kyoto Protocol's first commitment period will have expired (European Commission, 2011e).

The Cancún Agreement, a package of decisions adopted at the end of the UN Climate Conference in Mexico (December 2010), represents an important step on the road to building a comprehensive and legally binding framework for climate action for the period after 2012.

The European Emissions Trading System

Directive 2009/29/EC amending **Directive 2003/87/EC** so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community; OLJ 140/63.

The EU ETS commenced in 2005 and is the largest multi-national, multi-sector greenhouse gas emissions trading system in the world. It includes around 11,000 installations, accounting for about 45 per cent of EU carbon dioxide (CO_2) emissions (Environment Agency, 2011e).

The EU ETS operates by the allocation and trading ('cap and trade' principle) of greenhouse gas emissions allowances throughout the EU - one allowance represents one tonne of carbon dioxide equivalent (ibid.). The Governments of member states have to set a 'cap', or limit, on the total amount of certain greenhouse gases that can be emitted by the factories, power plants and other installations in the system. Within this cap, companies receive emission allowances, which they can sell to or buy from one another as needed. The limit on the total number of allowances available ensures their value (European Commission, 2011e).

To elaborate, at the end of each year, each company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances. The capacity for businesses to buy additional allowances (on top of their free allocation), or to sell any surplus allowances generated from reducing their emissions, means that this is a flexible compliance regime for operators that concomitantly ensures that emissions are effectively capped across the EU (Environment Agency, 2011e).

The scheme currently has two operating phases (ibid.):

- **Phase I** ran from 1 January 2005 to 31 December 2007 and was a 'learning by doing phase';

- **Phase II** runs from 1 January 2008 to 31 December 2012 and includes revised monitoring and reporting rules, more stringent emissions caps and additional combustion sources;

Phase III will run from 1 January 2013 to 31 December 2020. A single EU-wide cap on emission allowances will apply from 2013 and will be cut annually, reducing the number of allowances available to businesses to 21% below the 2005 level in 2020. The free allocation of allowances will be progressively replaced by auctioning, and the sectors and gases covered by the system will be expanded (European Commission, 2011e).

Installations covered by the EU ETS are those which carry out activities listed in Annex I of the EU ETS Directive. These include electricity generation and the major energy-intensive industries – power stations, refineries and offshore, **production and processing of ferrous metals** (i.e. iron and steel production), cement and lime, paper, food and drink, glass, ceramics, engineering and the manufacture of vehicles. In combination, these sectors account for approximately 48% of UK carbon dioxide emissions (DECC, 2011a).

The EU ETS Directive requires all installations carrying out activities listed in Annex I to hold a greenhouse gas emissions permit. The conditions of the permit will require installations to monitor and report emissions in accordance with the Commission's guidelines for monitoring and reporting.

Each year emissions data must be verified, and the equivalent number of allowances surrendered. All transactions and surrendering of allowances take place on a national registry.

- **The Carbon Capture and Storage Scheme (CCS)**

The EU has also established a legal framework to promote the development and safe use of carbon capture and storage (CCS). CCS is a family of technologies that capture the carbon dioxide emitted by industrial processes and store it in underground geological formations where it cannot contribute to global warming.

Although the different components of CCS are already deployed at commercial scale, the technical and economic viability of its use as an integrated system has yet to be shown. The EU therefore plans to set up a network of CCS demonstration plants by 2015 to test its viability, with the aim of commercial update of CCS by around 2020. Revised EU guidelines on state aid for environmental protection, issued at the same time as the legislative package was proposed, enable governments to provide financial support for CCS pilot plants (European Commission, 2011e).

Relevant UK Legislation

- **Climate Change Act**

  The UK has passed legislation which introduces the world's first long-term, legally binding framework designed to tackle the dangers of climate change. The Climate Change Bill was introduced into Parliament on 14 November 2007 and became law on 26 November 2008 (DECC, 2011b).

  The Act sets 2050 as the target year for a legally binding 80% reduction in greenhouse gas emissions. An interim target of a reduction in emissions by at least 34% by 2020 has also been set (with both targets set against a 1990 baseline) (DECC, 2011b). In order that these targets are achieved, the Act outlines a carbon budgeting system which caps emissions over five-year periods, greenhouse gas emissions trading schemes as well as financial incentives for businesses to reduce waste and recycle more.

- **The Climate Change Levy (CCL) Regulations 2001 (SI 838)**

  The CCL Regs (and Climate Change Agreements Regs – see below) were passed under the Finance Act 2000. The CCL is a tax on the use of energy (coal, gas, electricity, lignite and non-transport LPG), in industry, commerce and the public sector (DECC, 2011c; EEF 2010d). Its aim is to en-

courage businesses to become more energy-efficient and to reduce their greenhouse gas emissions, thus playing a central role in assisting the UK meet its targets for such emissions reductions. According to Government publications, all revenue raised through the levy is recycled back to business through a 0.3 percentage point cut in employers' national insurance contributions, introduced at the same time as the levy, as well as support for energy efficiency and low carbon technologies (DECC, 2011c cf. EEF, 2010d)[40].

- **Climate Change Agreements (Eligible Facilities) Regulations 2001 (SI 662); 2006 (SI 60); (Amendment) 2006 (SI 1931); Climate Change Agreements (Energy-intensive Installations) Regulations 2006 SI 59**

  These sets of regulations identify the types of energy-intensive business activities and sites that can claim a discounted rate of climate change levy, provided that energy-efficient targets or carbon-reduction targets negotiated with the government are met (EF, 2010d; NetRegs, 2011f). Businesses have the option of choosing to reduce their carbon emissions or to reduce energy use relative to production (EEF, 2010d). Performance against targets is assessed every two years – if targets are not met, the business is not eligible for a discount for the following two years. The discount rate was set at 80% until April 2011; it has now fallen to 65% (EEF, 2010d).

  A Negotiated Agreement has been made between the UK Steel Association and the Government concerning a rebate of the Climate Change Levy (CCL). Signatories will be subject to a reduced level of site specific regulation on energy efficiency matters, in particular capital expenditure is not required on energy efficiency improvements beyond baseline measures (Environment Agency, 2004).

[40] The EEF claim that the levy introduced 15% to the energy bill of a typical UK business. In 2007-8, £716 million was raised via the levy. The EEF also point out that NI contributions have continued to rise, thus any offsetting reductions have been cancelled out.

Specific Application to the Work of Mechanical and Electrical Engineering Technicians at Plant-level

Technicians have the potential to impact upon the emissions and energy performance of the plants in which they operate, through maintenance activities (replacement of drives/motors, balancing of extraction systems, furnace combustion optimisation) or through the setup of control instrumentation and monitoring systems.

Technicians should be aware of the mechanisms of climate change in relation to the steel industry, of the existence of the EU Emissions Trading Scheme, as well as an understanding of energy efficiency.

3.D.2 Health and safety legislation

The purpose of this part is to identify and describe the health and safety legislation that pertains and applies to the UK steel industry. The protection of employees, the preservation of their health and the prevention of accidents will present challenges, as the processes of iron and steel production, by their very nature, have the potential to expose workers to a wide range of hazards.[41] The ILO has identified the major hazards as those arising from the operation of machinery and on-site moving equipment; exposure to molten metal; exposure to inhalable agents (gases, vapours, dusts and fumes); contact with chemicals (irritants, acids [e.g. an essential element in the 'pickling' process], alkalis, solvents and sensitizers); exposure to high temperatures (e.g. furnaces, scarfing); noise and vibration; fire and explosion; as well as slips, trips and falls and hazards presented by falling objects (ILO, 2005).

It is axiomatic that, given what is at stake, that such challenges be addressed. This is not just as a matter of the highest corporate social responsibility, but also

[41] A 'hazard' is some entity with the potential to cause harm, whilst 'risk' is the likelihood of harm occurring (TUC Hazards, 2005).

because health and safety is – understandably - a highly regulated area, with criminal sanctions (i.e. heavy fines and/or the potential for imprisonment for the worst transgressions). This system of criminal sanctions exists alongside the right for victims to pursue compensatory damages in the civil courts for injuries/illnesses incurred as a result of employer negligence in the duty of care owed towards employees.

Prior to European emanations in the field, the UK had an extant tradition of health and safety regulation, extending back over a period of 150 years (HSE, 2009). The present system came into being with the Health and Safety at Work Act (HASAWA) in 1974, arguably the most important piece of health and safety statute in the UK (TUC, 2005). Given its pivotal position with the field of UK health and safety (H&S hereafter) regulation, this report will commence with an overview of this Act, with a focus on the principal employer duties contained therein and moreover, the 'enabling' aspect of this statute. After this summation, the report will briefly review the legal foundations of the EU's approach to H&S and the principal directives that have derived from Treaty aims and provisions. Thus, an overview of the Framework Directive of 1989 will be supplied, prior to describing other EU directives that relate specifically to the hazards presented by the production of iron and steel. An identification and discussion of the specific pieces of UK legislation, enacted to ensure compliance with the European directives, will immediately succeed the identification of these latter. Furthermore, the implications of each piece of legislation for these two occupational groups will be examined. The H&S legislation to be reviewed can be divided into the following key areas (following the categorisation/structure utilised by the European Agency for Safety and Health at Work):

- Workplaces (including workplace requirements and welfare provisions), equipment/machinery and personal protective equipment.

- Provisions on workload and ergonomic risks, including working time and display screen equipment.
- Control of exposure to dangerous agents at work, including chemicals, industrial gases and carcinogens/mutagens, dangerous and explosive atmospheres and control of major hazards and accidents that could result from such environments.
- Exposure to physical hazards at work including artificial optical radiation, exposure to vibration, exposure to noise and electricity at work.

Thus, this structure will be adopted in the subsequent text. After this review, a discussion of policy and initiatives in evidence at both sectoral and company levels will be provided.

The Health and Safety at Work Act (HASAWA) 1974

The HASAWA was passed in 1974, two years after the UK accession to the EC and some years prior to the EU Framework Directive of 1989 (which led to the implementation of the 'Six-Pack' Regulations in 1992).

The HASAWA was designed so as to:

- remedy the deficiencies of earlier H&S legislation;
- ensure that all workers in all occupations are protected by H&S legislation - the Act covers people rather than premises and as such, brought seven million more workers under protection (Turner, 2002);
- provide a broad framework within which H&S can be regulated (TUC, 2005).

In addition to modernising the extant body of regulation, the Act created the Health and Safety Commission, which had overall responsibility for the control and development of occupational H&S. It also created a unified inspectorate, with

pre-existing government inspectorates brought under the auspices of the Health and Safety Executive, the operating and enforcing arm of the Commission.[42]

The effect of the HASAWA has been to provide for a unified institutional structure and legal framework for health and safety regulation, as it is an 'enabling' act under which more detailed H&S regulations - including those which implement European directives - are made. The approach to reform of H&S law under the Act has been, wherever possible, the enactment of regulations (usually introduced via statutory instruments) which articulate general duties, goals and principles, with subordinate detailed requirements placed in accompanying approved codes of practice (ACOPs) and guidance notes. The purpose of these latter is to identify ways in which set standards might be achieved. By 2005, the Act had been supplemented by more than four hundred regulations, fifty approved Codes of Practice (ACoPs) and a wide range of guidance for employers (TUC, 2005).[43]

The Act is written in very general terms and imposes duties on employers (as well as on the self-employed, employees, designers, manufacturers, importers and suppliers). Under the main provisions of the Act, employers have legal responsibilities in respect of the health and safety of their employees and other people who may be affected by their undertaking and exposed to risks as a result. Section 2 of the Act outlines the general duty of employers to ensure the health, safety and welfare at work of their employees. Section 2(2) elaborates on this general duty, stating that the employer must, as far as is 'reasonably practicable', provide:[44]

[42] The HSC and HSE merged in 2008, thereby forming a unitary body which brings together their functions and powers, retaining the name of Health and Safety Executive (HSE, n.d.).

[43] The HASAWA has achieved some success: between 1974 and 2007, the number of fatal injuries to employees fell by 73 per cent; the number of reported non-fatal injuries fell by 70 per cent. Between 1974 and 2007, the rate of injuries per 100,000 employees fell by a huge 76 per cent, and Britain had the lowest rate of fatal injuries in the European Union in 2003, which was the most recent year for which figures are available at the time of writing. The EU average was 2.5 fatalities per 100,000 workers; the figure in the UK was 1.1 (Hansard, 2008).

[44] Many of the duties outlined in sections 2 to 9 of the Act are qualified by the phrase 'as far as is reasonably practicable'. This means that the extent of the risk must be balanced against the difficulty involved (in terms of time, money or trouble) in controlling the risk further; additional controls are not necessary if the difficulty in implementing them would be grossly disproportionate to the risk, or to the reduction in risk that would be achieved. Making such judgments is an essential part of the risk assessment process and should be informed by approved codes of practice, published standards as well as

- safe plant, maintenance and systems of work;
- safe use, handling and transport of articles and substances;
- information, instruction, training and supervision;
- a safe place of work and safe means of access and egress;
- a safe working environment; and
- adequate welfare facilities (Turner, 2002).

To reiterate, the 'enabling' nature of the Act means that it facilitates the passing of more detailed sets of regulations. Increasingly, as the European H&S agenda (developed principally since the passing of the Single European Act in 1986, the Social Charter of 1989 and the subsequent Treaty of the European Union) has acquired substance and momentum, much new legislation in the field has originated from the Union, particularly as the European legislative process sometimes requires more specific requirements than would be envisaged under the Act. The next section briefly outlines the antecedents and foundations of the EU's approach to regulation of H&S.

Background: EU Law and Health and Safety

Articles A136-A145 of the founding EC Treaty (Treaty of Rome) established the basis for future developments in social integration and H&S, by stating that 'Member states agree upon the need to promote better conditions of living and work for workers, so as to make possible their harmonisation, whilst improvement is being maintained' (cited in Threlfall, 2003).[45] However, little progress was made on the 'social dimension' and improved worker rights up until the mid-80s (Turner, 2005). At this time, the Single European Act 1986 represented a major development in the regulation of workplace H&S at European level, in that it in-

HSE or industry guidance on good practice where available. The size of the business and its financial strength do not determine the health and safety standards to be achieved (HSE, 2009: 13).

[45] This has since been re-numbered, under the provisions of the Treaty of Amsterdam 1997. Health and safety matters are now covered by Article 153, rather than A136 and A137

troduced new legal provisions (Article A118A and A118B) on social policy to the EC Treaty. This provision was aimed at the securing of 'improvements, especially in the working environment, as regards the health and safety of workers'. The insertion of this provision emphasised the importance attached to the creation of safe working conditions across workplaces in member states.

The right to improved living and working conditions was also enshrined in the Social Charter of 1989 (Turner, 2005). The right to protection of health and safety at work was one of the thirteen principles contained therein (ibid.). The Social Chapter of the Treaty of the European Union (TEU), which affirmed member states' recognition of, and commitment to implementing, the principles of the Charter via legislative programmes, was accepted by eleven of the then twelve member states, with the exception of the UK. Due to UK opt-out, the Social Protocol of the TEU was adopted at Maastricht.

With the Treaty of Amsterdam (ToA) in 1997, the UK signed the Social Chapter and legislative competence in the fields of European social policies was expanded by the incorporation of the social agreement into the EC Treaty. Articles A136 and A137 were inserted, recognising the Charter. Specifically, A136 includes reference to the promotion and maintenance of improved working conditions.[46]

The Lisbon Treaty re-numbered the Articles on social policy, but retained the substance of the provisions of ex Article 136 ff TEC. As such, EU directives on safety and health at work now have their legal foundation in Article 153 of the Treaty on the Functioning of the European Union (ex A136 and A137 TEC), which gives the EU the authority to adopt directives in this field.

A relatively high number and wide variety of EU directives, setting out health and safety requirements for the protection of workers, have since been adopted. Member States are free to adopt stricter rules for the protection of workers when

[46] A137 states that Qualified Majority Voting will be the decision-making procedure adopted in order to implement objectives, including the improvement of the working environment (Turner, 2005).

transposing EU directives into national law, and so legislative requirements in the field of safety and health at work can vary across EU Member States.

A key element is the health and safety Framework Directive (**89/391/EEC**). The provisions of this important Directive will now be outlined, followed by an overview of the specific pieces of legislation that have transposed the requirements of this Directive into UK law.

EU Directives and specific legislation transposing these into the UK

The Framework Directive (89/391/EEC)

The Framework Directive of 12 June 1989 was aimed at guaranteeing minimum health and safety standards for workers across all workplaces in all member states (European Agency for Safety and Health at Work, 2011a). A central element of the directive is that employers are obliged to risk assess all work activities, so as determine all potential hazards (i.e. something with the potential to cause harm), the likelihood of harm occurring (i.e. risk) and to identify and implement appropriate preventative and protective measures. The elimination of risks at source is a key priority (ibid.). The obligation to implement prevention measures implicitly emphasises the importance of particular forms of safety and health management as part of general management processes.

Also of significance is that the Framework Directive has an 'enabling' capacity and a series of individual directives, focusing on specific aspects of safety and health at work, were adopted on this basis.[47] Although the Framework Directive continues to apply to all areas covered by the individual directives, where these

[47] The standards set in these individual directives are minimum standards for the protection of workers. Member States are able to maintain or establish higher levels of protection.

latter contain more stringent and specific provisions, these will prevail. Individual directives tailor the principles of the Framework Directive to:

- specific tasks (e.g. manual handling of loads)
- specific hazards at work (e.g. exposure to dangerous substances or physical agents)
- specific workplaces and sectors (e.g. temporary work sites, extractive industries, fishing vessels)
- specific groups of workers (e.g. pregnant women, young workers, workers with a fixed duration employment contract)
- certain work related aspects (e.g. organisation of working time).

The individual directives define how to assess these risks and, in some instances, set limit values for certain substances or agents. A number of these, as they apply to the steel industry, will be outlined below. Prior to this though, the report now turns to the implementation of the Framework Directive within the UK context, before proceeding to specifically apply the provisions to the work of mechanical and electrical technicians.

➢ *Application of the Framework Directive into the UK context:*

- *The Management of Health and Safety at Work Regulations 1999 (*SI 1999, No. 3242*);*
- *Health and Safety at Work Act 1974; Employers' Liability (Compulsory Insurance) Act 1969; Employers' Liability (Compulsory Insurance) Regulations 1998 (*SI 1998, No. 2573*) as amended 2008 (*SI 2008, No. 1765*); Safety Reps and Safety Committees Regs 1977* (SI 1977, No. 500*) and/or depending on whether workplace has a recognised union(s), the Health and Safety (Consultation with Employees) Regulations 1996 (*SI 1996, No. 1513*); The Corporate Manslaughter and Corporate Homicide Act 2007; Health and Safety Offences Act 2008; The Health and Safety Information for Employees Regulations 1989* (SI 1989 No. 682); *The Health and Safe-*

ty Information for Employees (Amendment) Regulations 2009 (SI 2009 No. 606); *Social Security (Medical Evidence) and Statutory Sick Pay (Medical Evidence) (Amendment) Regulations 2010* (SI 2010/137); *OHSAS18001:2007 Occupational Health and Safety Management Systems*.

The Management of Health and Safety at Work Regulations 1999 (MHSWR) generally make more explicit what UK employers are required to do to manage health and safety under the HASAWA. As with the Act, the MHSWR apply to all work activities.

The main requirement on employers is to carry out a risk assessment (see above). Employers with five or more employees need to record the significant findings of the risk assessment.

Under the MHSWR, there are a number of duties with which employers must comply. These include the following (TUC, 2005):

- making arrangements for the effective planning, organisation, control, monitoring and review of the protective and preventative measures (Regulation 5);
- ensure that employees are provided with health surveillance, with regard to the risks that have been identified by the assessment (Regulation 6):
- establishing procedures to be followed in the event of serious and imminent danger to persons at work (Regulation 8):
- provide employees with comprehensible and relevant information on risks, preventative and protective measures, procedures for serious and imminent danger (Regulation 10):
- provide training (Regulation 13).

Application to the work of mechanical and electrical technicians

All work activities must be risk-assessed. As stipulated under the HASAWA, employees have a duty to take care, as far as possible, of their own safety and health and that of other persons affected by his or her acts or omissions at work. Employees must also in accordance with his training and the instructions provided by the employer.

Workplace (including workplace requirements and welfare provisions), Work Equipment and Personal Protective Equipment

Workplace Requirements - Directive 89/654/EEC

This directive was passed in November 1989, and establishes the minimum safety and health requirements for the workplace (European Agency for Safety and Health at Work (2011b).

Under the directive, the employer must ensure that:

- traffic routes to emergency exits and the exits themselves are kept clear at all times;
- technical maintenance of the workplace and of the equipment and devices is carried out as quickly as possible;
- the workplace and the equipment and devices are regularly cleaned to an adequate level of hygiene;
- safety equipment and devices intended to prevent or eliminate hazards are regularly maintained and checked (ibid.).

➢ *Application of the Directive into the UK context*

- *The Workplace (Health, Safety and Welfare) Regulations 1992 (*SI No. 3004 of 1992*)*

Employers have a general duty under section 2 of the Health and Safety at Work etc Act 1974 to ensure, so far as is reasonably practicable, the health,

safety and welfare of their employees at work. The Workplace Regulations expand on these duties and are intended to protect the health and safety of everyone in the workplace, and ensure that adequate welfare facilities are provided for people at work (HSE, 2007).

Health aspects include ventilation, temperature, lighting, cleanliness and waste storage and disposal, room dimensions and space, as well as workstations and seating (ibid.). Safety aspects cover maintenance of the workplace and certain equipment, systems and devices, the condition of buildings, floors and traffic routes, which must be sufficient in number and safe to use, stairs and handrails, fencing and covering of pits, tanks etc that hold dangerous substances, windows, doors, gates and escalators are also included. Finally, welfare aspects cover sanitary conveniences, washing facilities, drinking water, accommodation for clothing and facilities for changing as well as facilities for rest and for eating.

Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment (OJ L399/18 of 30.12.1989).

This directive was passed on the 30 November 1989, and specifies the minimum health and safety requirements for the use by workers of personal protective equipment at the workplace (third individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC) (European Agency for Safety and Health at Work, 2011c).

Personal protective equipment (PPE) is to be used when the risks cannot be avoided or sufficiently limited by technical means of collective protection or procedures of work organization (ibid.).

Employers must ensure that all PPE complies with the relevant Community provisions on design and manufacture with respect to safety and health (ibid.).

In addition, all PPE must:

- be appropriate for the risks involved, without itself leading to any increased risk;
- correspond to existing conditions at the workplace;
- take account of ergonomic requirements and the worker's state of health;
- fit the wearer correctly after any necessary adjustment.

The employer must provide the appropriate equipment free of charge and he must ensure that it is in good working order and hygienic condition.

Where the presence of more than one risk makes it necessary for a worker to wear simultaneously more than one item of personal protective equipment, such equipment must be compatible.

Employers shall organize training and demonstration on the use of PPE. Workers shall be informed of all measures to be taken. Consultation and participation shall take place on the matters covered by this directive (ibid.)

➢ *Application into the UK Context:*

- *The Personal Protective Equipment (EC Directive) Regulations 1992 (*SI 1992, No. 3139*);*
- *The Personal Protective Equipment (EC Directive) (Amendment) Regulations 1994 (*SI 1994, No. 2326);
- *Health and Safety (Miscellaneous Amendment) Regulations 2002 (*SI 2002, No. 2174) *and Guidance*.

The contents of these regulations concur with the above. Regulation 4 covers the suitability of PPE (appropriate for the risks involved, fits the wearer, effective, compliance with design and manufacture provisions under European law). Regulation 5 covers compatibility of PPE, whilst Regulation 9 pertains to the adequate and appropriate instruction, provision of information and training of employees (TUC, 2005).

Application to the work of mechanical and electrical technicians

Whilst carrying out their duties, mechanical and electrical technicians should be provided with appropriate PPE, in accordance with the scope of their work.

In addition, due to the presence of different hazards and risk levels in different areas of the plant, they should carry out their work with appropriate collective protection but where the nature of the tasks in certain areas demands, workers should be provided with PPE, designed specifically to protect against hazards within a particular department.

Use of Work Equipment

Directive 2009/104/EC – Use of Work Equipment (second individual directive within the meaning of Article 16(1) of Directive 89/391/EC)

Directive 89/655/EC is repealed by Directive 2009/104/EC

This Directive lays down minimum safety and health requirements for the use of work equipment by workers at work. After numerous amendments, this new Directive on the use of work equipment was adopted in the interests of clarity and rationality, and the previous directive 89/655/EEC and its amendments were repealed (European Agency for Safety and Health at Work, 2011d).

The Directive lays down a number of obligations for employers (ibid.):

- The employer shall take every measure to ensure the safety of the work equipment made available to workers. During the selection of the work equipment the employer shall pay attention to the specific working conditions which exist at the workplace, especially in relation of safety and health of the workers. If risks cannot be fully eliminated during the operation of the work equipment, the employer shall take appropriate measures to minimise them. Furthermore the work equipment should comply with relevant Community directives and/or minimum requirements laid down in Annex I to the Directive.

- Throughout its working life, the employer shall keep the work equipment compliant by means of adequate maintenance. The employer shall ensure that the work equipment is installed correctly and is operating properly by inspection/testing of the work equipment (initial, after assembly, periodic and special) by competent persons. The results of inspections shall be recorded and kept.
- If the use of work equipment is likely to involve a specific risk, the employer shall ensure restricted access to its use, and any modifications can be made by expert personnel only.
- The employer shall provide workers with adequate, comprehensible information (e.g. written instructions) on the work equipment, which must detail: the conditions of use, foreseeable abnormal situations, as well as any additional conclusions drawn from experience. Workers shall be made aware of dangers relevant to them.
- The employer shall ensure that workers receive adequate training, including risks and specific training on specific-risk equipments (European Agency for Safety and Health at Work, 2011d).

➢ *Transposition of directive into UK context:*

- *The Provision and Use of Work Equipment Regulations (PUWER) 1998 (*SI 1998, No. 2306);
- *Lifting Operations and Lifting Equipment Regulations 1998 (*SI 1998, No. 2307)
- *Health and Safety (Miscellaneous Amendment) Regulations 2002 (*SI 2002, No. 2174);
- *Health and Safety (Safety Signs and Signals) Regulations 1996 (*SI 1996, No. 341)

PUWER 98 applies to the provision of all work equipment, with mobile and lifting equipment covered by the supplementary Lifting Operations and Lifting Equip-

ment Regulations. The regulations apply to all workplaces and work situations where the Health and Safety at Work etc Act 1974 applies (HSE, 1999).

PUWER came into effect in December 1998, replacing and amending PUWER 1992 (ibid).

In general terms, the Regulations require that equipment provided for use at work is:

- suitable for the intended use, and for the purpose and conditions in which it is used;
- accompanied by suitable safety measures, e.g. protective devices, markings, warnings.
- safe for use, maintained in a safe condition and, in certain circumstances, inspected to ensure this remains the case. Inspections are to be carried out by competent persons and records must be kept;
- used only by people who have received adequate information, instruction and training (HSE, 1999).

Employers should also ensure that risks, created by the use of the equipment, are eliminated where possible or controlled by:

- taking appropriate 'hardware' measures, e.g. providing suitable guards, protection devices, markings and warning devices, system control devices (such as emergency stop buttons) and personal protective equipment; and
- taking appropriate 'software' measures such as following safe systems of work (e.g. ensuring maintenance is only performed when equipment is shut down etc), and providing adequate information, instruction and training (HSE, 1999)

Part IV of the Regulations also contains specific requirements regarding power presses. Power presses, and associated guard or protection devices, must be thoroughly examined at specified intervals and inspected daily in use to ensure

that it is safe. Such work should only be performed by a competent person and records must be kept (ibid.).

Also of relevance in this section are considerations as to safe use of electrical equipment. There are a number of regulations that pertain to electricity at work, namely the Electrical Equipment (Safety) Regulations 1994 (SI 194, No. 3260), the Electricity at Work Regulations 1989 (SI 1989, No. 635) and the BS7671:2008 Requirements for Electrical Installation - IEE Wiring Regulations (17th Edition). In particular, the Electricity at Work Regulations require primarily that all electrical systems are constructed so as to prevent danger and that such systems are maintained. Electrical equipment must be of appropriate strength and capability. Conductors, earthing, connections and means for cutting off supply and isolation are also covered (TUC, 2005).

Application to work of mechanical and electrical technicians

For technicians involved in maintenance work, such activities can expose those who carry it out to a wide range of hazards (European Agency for Safety and Health at Work, 2010). Maintenance activities include the following processes (ibid.):

- setting up, preparation, installation, mounting, disassembling, dismantling
- maintenance, repair, tuning, adjustment
- mechanised of manual cleaning of working areas and machines
- monitoring, inspection of manufacturing, work areas, means of transport, equipment, with or without monitoring equipment.

Comparative research across a number of European countries by Eurostat in 2006 (for the year 2005/06) found that around 20% of all accidents in Belgium were related to maintenance operations. Similar figures were also found for Finland (18-19%); Spain (14-17%) and Italy (10 – 14% from 2003 - 2006). Moreover, the data from several European countries indicate that, in 2006, around 10-15%

of all fatal accidents were related to maintenance operations. Other studies have indicated that occupational diseases and work-related health problems (such as asbestosis, cancer, hearing problems, and musculoskeletal disorders) are also more prevalent among workers involved in maintenance activities (ibid.).

Thus, it is essential to implement appropriate risk assessment procedures for maintenance operations, as well as employing adequate preventive measures to ensure the safety and health of workers involved in maintenance activities.

Workload and Ergonomic Requirements

These include provisions relating to the use of display screen equipment and limits to working time.

Display Screen Equipment

> **Directive 90/260/EC** *of 29 May 1990 on the minimum safety and health requirements for work with display screen equipment (fifth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC)*

This Directive lays down minimum safety and health requirements for work with display screen equipment. Under this directive, employers are obliged to perform an analysis of workstations in order to evaluate the safety and health conditions as they might impact upon their workers, particularly as regards to possible risks to eyesight, physical problems and problems of mental stress. They shall take appropriate measures to remedy the risks found taking account of the additional and/or combined effects of the risks so found (European Agency for Safety and Health at Work, 2011e).

Employers must take the appropriate steps to ensure that workstations meet the minimum requirements laid down in the Annex of the directive.

The employer must plan the worker's activities in such a way that daily work on a display screen is periodically interrupted by breaks or changes of activity reducing the workload at the display screen (ibid.).

Workers shall receive information on all aspects of safety and health relating to their workstation. Workers or their representatives shall be informed of any health and safety measure taken in compliance with this directive.

Every worker shall also receive training in use of the workstation before commencing this type of work and whenever the organization of the workstation is substantially modified.

Workers are entitled to an appropriate eye and eyesight test carried out by a person with the necessary capabilities before commencing display screen work, at regular intervals thereafter, and if they experience visual difficulties during work. Moreover, workers are entitled to an ophthalmological examination if the results of the test show that this is necessary (ibid.).

- *Transposition into UK Context*
- *The Health and Safety (Display Screen Equipment) Regulations 1992 (as amended in 2002).*

  The regulations meet the stipulations of the directive as outlined above.

Working Time

Directive 2003/88/EC working time

The Directive aims at protecting workers from negative health effects due to shift and night work. It lays down minimum general safety and health requirements for the organisation of working time with regard to maximum working time. In addition, the Directive sets out requirements for periods of daily rest, breaks, weekly rest and annual leave (European Agency for Safety and Health at Work, 2011f).

Member States shall take the measures necessary to ensure that every worker is entitled to a minimum daily rest period of 11 consecutive hours per 24-hour period. They shall take the measures necessary to ensure that, per each seven-day period, every worker is entitled to a minimum uninterrupted rest period of 24 hours (plus the 11 hours' daily rest if possible) (ibid.).

Every worker is entitled to a rest break, whenever the daily working time exceeds six hours. Details including duration and the terms on which it is granted, shall be laid down in collective agreements or agreements between the two sides of industry or by national legislation (ibid.).

The average weekly working time shall not exceed 48 hours (ibid.).

It shall be ensured that every worker is entitled to paid annual leave of at least four weeks. This minimum leave cannot be replaced by other allowances except for in cases of termination of the employment.

Member States shall ensure that normal hours of work for night workers do not exceed an average of eight hours in any 24-hour period. They shall also ensure that night workers whose work involves special hazards or heavy physical or mental strain do not work more than eight hours in any period of 24 hours during which they perform night work (ibid.).

Night workers are entitled to a free health assessment before their assignment and to frequent check-ups. Night workers suffering from health problems recognised as being connected with the fact that they perform night work are to be transferred whenever possible to day work to which they are suited.

Member States shall ensure that night workers and shift workers have safety and health protection appropriate to the nature of their work and that appropriate protection and prevention services or facilities with regard to the safety and health of night workers and shift workers are equivalent to those applicable to other workers and are available at all times.

Member States shall take the measures necessary to ensure that an employer who intends to organise work according to a certain pattern takes account of the general principle of adapting work to the worker.

- *Transposition into UK Law*
- *The Working Time Regulations 1998 (as amended, 2003)*

  The regulations meet the requirements of the directive.

Exposure to Chemical Agents and Chemical Safety

This category will incorporate discussion of the directives pertaining to risks arising from chemicals, carcinogens and mutagens as well as those that specify indicative occupational exposure limit values.

Risks related to chemical agents at work – Directive 98/24/EC (fourteenth individual directive within the meaning of Article 16(1) of Directive 89/391/EC.[48]

The directive provides for the drawing up of indicative and binding occupational exposure limit values as well as biological limit values at Community level. Member States must establish a national occupational exposure limit value, taking into account the Community limit value (European Safety and Health at Work, 2011g).

Along the same lines, binding occupational exposure limit values may be drawn up at Community level. For any chemical agent for which a binding occupational exposure or biological limit value is established at Community level, Member States must establish a corresponding national binding occupational exposure that does not exceed the Community limit value (ibid.).

The employer must determine whether any hazardous chemical agents are present at the workplace and assess any risk to the safety and health arising from their presence. This assessment shall be kept up-to-date, particularly if there have been significant changes, or if the results of health surveillance show it to be necessary (ibid.). Moreover, in the case of activities involving exposure to several hazardous chemical agents, the risks must be assessed on the basis of the risk presented by all such chemical agents in combination.

[48] See also Directive 99/ 92/EC (also known as 'ATEX 137' or the 'ATEX Workplace Directive'), implemented in the UK under the DSEAR Regulations 2002 (HSE, 2011a).

If the assessment reveals a risk, the employer must take the necessary preventive measures and risks must be eliminated or reduced to a minimum following the hierarchy of prevention measures.[49]

The employer must ensure that the risk is eliminated or reduced to a minimum, preferably by substitution (replacing a hazardous chemical agent with a chemical agent or process which is not hazardous or less hazardous).

The employer must regularly measure chemical agents which may present a risk to workers' health, in relation to the occupational exposure limit values, and must immediately take steps to remedy the situation if exceeded.

The employer must establish procedures (action plans) which can be implemented in the event of an accident, incident or emergency related to the presence of hazardous chemical agents at the workplace

The employer must inform all workers:[50]

- of emergency arrangements;
- as to the results of the risk assessment;
- as to the hazardous chemical agents present at the workplace, providing access to safety data sheets;
- by training on the appropriate precautions and on the personal and collective protection measures that are to be taken.

The employer must ensure that the contents of containers and pipes and any hazard that they represent are clearly identifiable.

Annex III to the Directive specifies limits above which certain chemical agents and activities involving chemical agents are prohibited. Member States may permit derogations from these prohibitions in special circumstances.

[49] The hierarchy of control measures sets out a priority of order for measures: 1 Eliminate the use of a harmful product or substance and use a safer one.2 Use a safer form of the product, eg paste rather than powder.3 Change the process to emit less of the substance.4 Enclose the process so that the product does not escape.5 Extract emissions of the substance near the source.6 Have as few workers in harm's way as possible.7 Provide personal protective equipment (PPE).

[50] The requirements, as stipulated in the Health and Safety Information for Employees (Amendment) Regulations 2009, are to inform all staff of exposure and not just those deemed to be at risk from exposure.

Member States must introduce arrangements for carrying out appropriate health surveillance of workers for whom the results of the assessment made by the employer reveal a risk to health. Health surveillance is compulsory for work with a chemical agent for which a binding biological limit value has been set. Individual health and exposure records must be made and kept up-to-date for each worker who undergoes health surveillance. The individual worker must have access to his personal records.

- *Transposition into UK context*

  The directive has been implemented in the UK via the Control of Substances Hazardous to Health Regs 2002 and the Dangerous Substances and Explosive Atmospheres Regs 2002 (see below).

- *The Control of Substances Hazardous to Health Regulations 2002 (*SI 2002, No. 2677).

  The COSHH Regulations require UK employers to comply with the above requirements: to assess the risk to their employees, and to prevent or adequately control those risks, through both equipment and ways of working, if risk cannot be eliminated/substituted (HSE, 2009b).[51] Employers must monitor exposure levels and provide health surveillance, as well as provide information, instruction and training.

- *The Dangerous Substances and Explosive Atmospheres Regulations 2002 (*SI 2002, No. 2776).[52]

[51] Any potentially hazardous substances must be risk assessed before introduction into the workplace. Local exhaust ventilation equipment, a control measure, must be thoroughly examined and tested at a maximum frequency of every 14 months (or as laid down in Schedule 4 for certain processes and substances).

[52] There are two other directives that effected the implementation of the DSEAR Regs. These are Directives ATEX 95 (94/9/EC) and ATEX 137 (1999/92/EC) (HSE, 2011b). The first, ATEX 95, concerns the supply of equipment, protective systems, components etc, where these are for use in potentially explosive atmospheres. In the UK, these were implemented under the Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations, 1996 (EPS). ATEX 137, on the other hand, is implemented by HSE under The Dangerous Substances and Explosive Atmosphere Regulations, 2002 (DSEAR). ATEX 137 (1999/92/EC) concerns worker health, safety and protection in those workplaces where potentially explosive atmospheres may be present (HSE, 2011b).

Dangerous substances can put peoples' safety at risk from fire and explosion and therefore, DSEAR puts duties on employers to protect people from such risks (HSE, 2011a).

Dangerous substances are any substances used or present at work that could, if not properly controlled, cause harm to people as a result of a fire or explosion. They can be found in nearly all workplaces and include flammable gases and dusts from machining.

DSEAR requires that employers:

- find out what dangerous substances there are in their workplace and what the fire and explosion risks are;
- put control measures in place to either remove those risks or, where this is not possible, control them;
- put controls in place to reduce the effects of any incidents involving dangerous substances;
- prepare plans and procedures to deal with accidents, incidents and emergencies involving dangerous substances;
- make sure employees are properly informed about and - significantly for our purposes - trained, to control or deal with the risks from the dangerous substances;
- identify and classify areas of the workplace where explosive atmospheres may occur and avoid ignition sources (from unprotected equipment, for example) in those areas (ibid.).

Application to work of mechanical and electrical technicians

Mechanical and electrical technicians are at risk of exposure to hazardous chemicals (e.g. metalworking fluids) and industrial gases while performing their daily duties such as repairs and maintenance of machines and installations, and moving around the site. The ATEX 1995 (94/9/EC) Directive, implemented in the UK

as the Equipment and Protective Systems for Use in Potentially Explosive Atmospheres Regulations 1996 (EPS), is also of relevance (HSE, 2011b). Technicians need to understand the requirements to only install and use safe and suitable equipment.

Council Directive 96/82/EC known as the Seveso II Directive, as amended by Directive 2003/105/EC

Directive 96/82/EC on the control of major accident hazards involving dangerous substances (the Seveso II directive) is aimed at preventing major accidents involving large quantities of dangerous substances (or mixtures thereof) as listed in its Annex I, so as to limit the consequences of such accidents on humans and the environment (European Commission, 2010). Major hazard sites are industrial sites that manufacture, process or store dangerous chemicals and substances in quantities that could pose a risk to workers, people in the vicinity of the site, and the environment in the event of a major accident (HSE, 2008). These 'major accidents' include fires, explosions or incidents in which dangerous substances are released.

Although the Directive applies mainly to the chemical industry, it also pertains to some storage activities, explosives and nuclear sites, and other industries where threshold quantities of dangerous substances identified in the directive are kept or used. Integrated steel-making sites and blast furnaces are covered by the directive's provisions. There is a tiered approach to the level of controls, with the larger the quantities of substances, the stricter the rules. Integrated steel-making sites are categorised as Tier 1 (European Commission, 2008).

The Directive is due to be further amended as a result of changes in the EU system of classification of dangerous substances to which the Directive refers (ibid.).

- *Transposition into the UK Context*
- *The Control of Major Accidents and Hazards Regulations 1999*

- *The Control of Major Accidents and Hazards (Amendment) Regulations 2005*

The COMAH regulations replaced the Control of Industrial Major Accident Hazards Regulations 1984 (CIMAH).

Under the Regulations, operators of sites with dangerous substances above specified quantities, have to take all necessary measures to:

- prevent major accidents; and
- in the event of such accidents, limit the effects on people and the environment.

For certain sites, with particularly high quantities of dangerous substances, operators must also describe their control measures to prevent major accidents in a 'safety report'. Safety reports are sent to the Competent Authority (CA), which enforces the COMAH Regulations. In England and Wales, the CA comprises the Health and Safety Executive (HSE) and the Environment Agency. The CA is responsible for checking that site operators take steps to prevent and limit the effects of major accidents (HSE, 2008).

Safety reports demonstrate that all the necessary measures have been taken to prevent major accidents and to limit their consequences. Site operators have to systematically review how they manufacture, store and use dangerous substances. This helps them to identify any necessary improvements to their management systems, plant, equipment or safety procedures, thereby reducing the risk of a major accident occurring (ibid.).

Operators must review the safety report at least every five years, and also when any significant changes occur. The operator must inform the CA of any such changes made to the safety report (ibid.).

Major hazard sites are subject to a system of inspections. Inspectors who regularly visit the site will assess the adequacy of the information contained in safety reports (ibid.).

Application to the work of mechanical and electrical engineering technicians

Technicians need to be aware of the provisions of the regulations and to act in accordance with the stipulations of the safety report. They should also be familiar with the procedures to be followed in the event of any major accident or hazard.

Indicative Occupational Exposure Limits: Directive 91/332/EEC – indicative limit values; Directive 2000/39/EC – indicative occupational exposure limit values; Directive 2006/15/EC – indicative occupational exposure limit values; ***Directive 2009/161/EU – indicative occupational exposure limit values:***

- Directive 91/332/EEC – indicative limit values: establishes indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work (European Agency for Safety and Health at Work, 2011h).
- Directive 2000/39/EC – indicative occupational exposure limit values: establishes a first list of indicative occupational exposure limit values through implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.
- Directive 2006/15/EC – indicative occupational exposure limit values: establishes a second list of indicative occupational exposure limit values through implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC
- Directive 2009/161/EU – indicative occupational exposure limit values: establishes a third list of indicative occupational limit values through imple-

mentation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC

- *Control of Substances Hazardous to Health Regulations 2002*
  Table 1 of the COSHH Regulations lists the workplace exposure limits (WELs) for all relevant substances, which are updated so as to consolidate amendments made through the passing of more recent directives.

Application to the work of mechanical and electrical technicians

Whilst performing their duties (maintenance and repairs), mechanical and electrical technicians are exposed to the same risks as other workers in the company. In metallurgical processes, some agents listed in the 2009/161/EU Directive (i.e. sulphuric acid, hydrogen sulphide) could be created or could be released.
Moreover, a number of agents listed in Directive 2006/15/EC (i.e. chlorine, phosphine, carbon monoxide (present in large quantities in BFG and BOS gases) and carbon dioxide could also be generated and/or emitted, as could a number of those listed in Directive 2000/39/EC (i.e. chlorobenzene, hydrogen chloride, hydrogen fluoride. Finally, agents listed in Directive 91/322/EEC (i.e. nitrogen monoxide, tin, inorganic compounds as Sn) also pose a risk.[53]

***Directive 2004/37/EC - Carcinogens or Mutagens at work,* on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC.**

This Directive replaces Directive 90/394/EEC and its subsequent amendments (Directive 97/42/EC and Directive 1999/38/EC).

[53] Nitrogen (a major component of air) is not listed, but many areas will be purged with nitrogen for safety and this causes an asphyxiating atmosphere

The directive stipulates that employers shall assess and manage the risk of exposure to carcinogens or mutagens. This process shall be renewed regularly and data shall be supplied to authorities at request. Special attention is made to take account of all possible ways of exposure routes (including the skin), and to persons at particular risk (European Agency for Safety and Health at Work, 2011i).

Workers' exposure must be prevented. The employer shall reduce the use of a carcinogen or mutagen by replacing it with a substance not, or less, dangerous. If replacement is not possible, the employer shall use a closed technological system. Where a closed system is not technically possible, the employer shall reduce exposure to minimum. Exposure shall not exceed the limit value of a carcinogen set out in Annex III of the directive (ibid.).

Wherever a carcinogen or mutagen is used, the employer shall:

- limit the quantities of a carcinogen or mutagen at the place of work;
- keep as low as possible the number of workers exposed;
- design the work processes so as to minimise the substance release;
- evacuate carcinogens or mutagens at source, but respect the environment;
- use appropriate measurement procedures (especially for early detection of abnormal exposures from unforeseeable event or accident);
- apply suitable working procedures and methods;
- use individual protection measures if collective protection measures are not enough;
- provide for hygiene measures (regular cleaning);
- inform workers;
- demarcate risk areas and use adequate warning and safety signs (including ”no smoking”);
- draw up emergency plans;
- use sealed and clearly and visibly labelled containers for storage, handling, transportation and waste disposal.

Employers shall make certain information available to the competent authority if requested (activities, quantities, exposures, number of exposed workers, preventive measures) and inform the workers if abnormal exposure has occurred.

The employer shall also provide appropriate training on potential risks to health, precautions to prevent exposure, hygiene requirements, protective equipments, clothing and incidents. Moreover, employers shall inform workers on objects containing carcinogens or mutagens, and label them clearly and legibly, together with warning and hazard signs. Consultation and participation of workers shall take place in accordance with Directive 89/391/EEC (ibid.).

The Member States shall establish arrangements for health surveillance of workers if there is a risk for health and safety (prior to exposure, at regular intervals thereafter). If a worker is suspected to suffer ill-health due to exposure, health surveillance of other exposed workers may be required, and the risk shall be reassessed. Individual medical records of health surveillance shall be kept (ibid.).

Information and advice must be given to workers regarding any health surveillance that they may undergo following the end of exposure. Workers shall have access to the results of the health surveillance that concern them. Workers concerned or the employer may request a review of the results of the health surveillance. All cases of occupational cancers shall be notified to the competent authority. Records shall be kept for at least 40 years following the end of exposure, and transferred to the authority concerned if the firm ceased to exist (ibid.).

- *Control of Substances Hazardous to Health Regulations 2002 (transposition into UK law)*

  As detailed above in 6.2.

<u>Application to the work of mechanical and electrical technicians</u>

Whilst performing their duties (maintenance and repair), mechanical and electrical technicians are exposed to the same risks as other workers in the company. Metallurgical processes, such as welding, could generate and/or emit carcino-

gens or mutagens (e.g. dioxins, furans, polycyclic aromatic hydrocarbons, compounds of chromium, nickel).

Regulation EC 1907/2006 – REACH NB. As the legal act of REACH is a regulation, as opposed to a directive, it is directly binding on member states. No national implementing measures are required.

REACH became law in the UK on the 1st of June 2007 (UK REACH Competent Authority, 2009).

REACH (Registration, Evaluation, Authorisation and restriction of Chemicals) is the system for controlling chemicals in the EU (ibid.). The **registration** aspect requires that any company manufacturing or importing into the EU a substance on its own, in a preparation (mixture of substances), or intentionally released from articles (finished manufactured goods) at or above 1 tonne per year may have to register it. This is done by submitting a dossier to the European Chemicals Agency (the Agency; ECHA). The dossier must contain details of the substance's properties, other relevant information about risks and how these risks can be managed**.** Companies will not be able to manufacture or import a substance within the EU, or import an article that intentionally releases a substance, unless the substance has been registered.

Evaluation: a chemical safety assessment shall be performed and a chemical safety report completed for all substances subject to registration in quantities of 10 tonnes or more per year per registrant. A chemical safety assessment of a substance shall include the following steps:

- human health hazard assessment
- physicochemical hazard assessment
- environmental hazard assessment

- persistent, bioaccumulative and toxic (PBT) and very persistent and very bioaccumulative (vPvB) assessment (European Agency for Safety and Health at Work, 2011g).

If a substance meets the criteria for classification as dangerous or is assessed to be a PBT or vPvB, the chemical safety assessment shall include additional steps (ibid.).

Any registrant shall identify and apply the appropriate measures to adequately control the risks identified in the chemical safety assessment, and where suitable, recommend them in the safety data sheets which he supplies (see below).[54]

Authorisation: Substances of very high concern (SVHC) will need to be authorised for specific uses if they appear in Annex XIV of the regulations. The first proposed list for Annex XIV was published by the Agency on the 1st June, 2009. Applications for authorisation may be made by companies that register the substances, or by those that use them. When a substance is placed on Annex XIV, a 'sunset date' is set, after which its use will be prohibited, unless an authorisation has been granted for that use. Authorisation will be granted if the use is considered safe as long as the risks are adequately controlled, and the conditions of the authorisation are met or if the use of the substance can be demonstrated to be so important on socio-economic grounds that its continued use outweighs the risks to human health and the environment (UK REACH Competent Authority, 2009).

Information: REACH requires that there is clear provision of information about any dangerous properties a chemical may have. The introduction of REACH has prompted the development of a new classification and labelling system (compliant with the UN Globally Harmonised System). The European Regulation (EC) No1272/2008 on Classification, Labelling and

[54] Steel and cement industries have been slow to act and as such, are now having to get up to required standards with substances such as limestone, iron ore, slags etc

Packaging of Substances and Mixtures (CLP Regulation) has repealed and replaced the extant Chemical Hazard Information and Packaging Regulations (CHIP), although CHIP requirements will not be fully phased out until June 2015. Until then, suppliers must classify substances according to both CHIP and CLP, but labelling and packaging will be carried out in accordance with CLP.

There was an established EU system for the classification of different chemicals according to their characteristics (for example, those that may cause cancer, or are toxic to the aquatic environment). However, since the introduction of REACH, a world-wide classification and labelling system has been developed – the Globally Harmonsied System.

The passage of information up and down the supply chain is one of the key features of REACH – downstream users of chemicals (i.e. those who use them at work) should be able to understand what manufacturers and importers know about the dangers involved in using chemicals. As such, REACH adopts and builds on an existing system for passing information in a structured way down to chemicals users – the **Safety Data Sheet** (SDS). This should accompany materials down through the supply chain, providing the information that users need to ensure chemicals are safely managed. REACH will also allow for information on uses of chemicals to be passed back up the supply chain, so that these can be reflected in the SDS.

Downstream users of chemicals will need to comply with any conditions described in the SDS. Where SDSs have attached exposure scenarios that detail how chemicals may be used, then users should implement the required risk management measures (or use equivalent measures).

Application to the work of mechanical and electrical engineers

Specific compliance with the Regulations regarding the submission of dossiers for registration of substances would be handled at a senior level within a compa-

ny. However, technicians would need to be aware of the new chemical safety data sheets which have been generated as a result of REACH. The chemical warning symbols have also changed as a result of REACH/CLP and technicians would need to be cognisant of what these changes involve.

Exposure to Physical Hazards

This category covers the hazards of noise, vibration and artificial optical radiation at work.

Directive 2003/10/EC – NOISE of 6 February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

The objective of this directive is to lay down minimum requirements for the protection of workers from risks to their health and safety arising or likely to arise from exposure to noise and in particular the risk to hearing (European Agency of Safety and Health at Work (2011j).

The Directive defines the physical parameters that serve as risk predictors, such as peak sound pressure, daily noise exposure level and weekly noise exposure level. It sets exposure limit values and exposure action values in respect to the daily and weekly noise exposure level as well as peak sound pressure. The exposure limit values fixed at 87 decibels shall take into account of the attenuation provided by personal protective equipment (hearing protectors) worn by the workers. The exposure action value is fixed at 80 decibels (lower value) and 85 decibels (upper value) (ibid.).

The employer shall assess and, if necessary, measure the levels of exposure to noise to which workers are exposed. This has to be done in accordance with the obligations laid down in the framework directive. Results of the risk assessment

have to be recorded on a suitable medium and regularly updated. The risk assessment itself shall be similarly updated, particularly if there have been significant changes which could render it out of date, or if the results of health surveillance show it to be necessary (ibid.).

Whilst carrying out the risk assessment, the employer must give particular attention to level, type and duration of exposure, exposure limit / action values, health effects spreading from particular sensitivity of the worker, interractions with other risks (ototoxic substances, vibrations), the exposure to noise beyond normal working hours under the employer's responsibility, and noise caused by warning signals at work.

The risks arising from exposure to noise shall be eliminated or reduced to a minimum. The reduction of risks arising from exposure to noise shall be based on the general principles of prevention set out in the Framework Directive (e.g. by working methods or equipment that require less exposure to noise, instructions on the correct use of equipment, technical measures [shield, noise absorbing covering] or organisational measures in order to reduce duration and intensity of exposure). If risk cannot be eliminated or reduced by other means, the employer has to provide properly fitting personal protective equipment (hearing protectors), in accordance to that directive.

The exposure limit values must not be exceeded. If they are exceeded, the employer has to take adequate measures immediately in order to reduce the exposure.

The employer shall ensure that workers who are exposed to risks from noise at work and/or their representatives receive any necessary information and training relating to the outcome of the risk assessment provided for in Article 4 of the Directive.

Member States must adopt provisions to ensure the appropriate health surveillance of the workers (preservation of the hearing function).

- *The Control of Noise at Work Regulations 2005 SI 2005 Number 1643*

The Control of Noise at Work Regulations 2005 (the Noise Regulations) came into force for all industry sectors in Great Britain on 6 April 2006 (except for the music and entertainment sectors where they came into force on 6 April 2008). These regulations replace the Noise at Work Regulations 1989 (HSE, 2011b).

The Noise Regulations comply with the stipulations of the directive, aiming to ensure that workers' hearing is protected from excessive noise at their place of work, which could cause them to lose their hearing and/or to suffer from tinnitus (permanent ringing in the ears). In line with the prescriptions outlined above, the level at which employers must provide hearing protection and hearing protection zones is now 85 decibels (daily or weekly average exposure) and the level at which employers must assess the risk to workers' health and provide them with information and training is now 80 decibels. There is also an exposure limit value of 87 decibels, taking account of any reduction in exposure provided by hearing protection, above which workers must not be exposed (HSE, 2011b).

Application to the work of mechanical and electrical technicians

As employees, including mechanical and electrical technicians, traverse the company, and perform their duties in different departments, they are exposed to background noise from other workstations and are also exposed to noise emissions from the devices an equipment that they use.

8.2 Directive 2002/44/EC – Vibration of the of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

The Directive aims at ensuring health and safety of workers through creating a minimum basis of protection against exposure to mechanical vibration, through

emphasising the timely detection of adverse health effects (particularly musculo-skeletal disorders) arising, or likely to arise, from exposure to mechanical vibration (European Agency of Safety and Health at Work, 2011k).

The Directive distinguishes between vibration affecting the hand-arm-system and vibration being transmitted to the whole body. Exposure limit values (using a standardised eight-hour reference period) for both hand-arm-vibrations and whole-body-vibrations are defined. Additionally, exposure action values for both kinds of vibration, also on the basis of an eight hour reference period, are defined (ibid.).

Employers shall assess, and if necessary measure, the levels of exposure to mechanical vibration on the basis of technical specifications given in the annex of the Directive. Such risk assessments must be carried out in accordance with the obligations laid down in the Framework Directive. The results of risk assessment must be recorded on a suitable medium and updated on a regular basis. Furthermore, the risk assessment itself shall be updated on a regular basis, particularly if there have been significant changes which could render it out of date, or if the results of health surveillance show it to be necessary (ibid.)

When assessing the exposure, the employer must take into account working practices and working equipment. This information will be provided by the manufacturer. Measurements must be taken using adequate technical apparatus and appropriate methodology (ibid.).

The employer shall give attention to level, type and duration of exposure, limit and action values defined in the Directive, particular sensitivity of workers, interaction with vibrations caused by other equipment at work place, unusual working conditions (especially cold work) and the exposure to vibration beyond working hours under employer's responsibility. Based on the results of the risk assessment, the employer must deploy measures that reduce risks at source (ibid.).

If the action values are exceeded once, the employer must implement an action plan to prevent exposure from exceeding the exposure limit values. Such action

might include adequate technical and / or organisational measures, aimed at reducing exposure to mechanical vibration to a minimum. If exposure limit values are exceeded, the employer must take immediate action to reduce exposure below the set limit (ibid.).

The employer shall ensure that workers who are exposed to risks from vibration at work and/or their representatives receive all necessary information and training relating to the outcome of the risk assessment.

Member States were also required to adopt provisions to ensure the appropriate health surveillance of the workers. Surveillance is aimed at the timely diagnosis of any health effect caused by mechanical vibration at work. Member States shall also ensure that in cases of positive diagnosis, the worker is informed immediately and receives any required information and advice. Moreover, the employer will be required to review the risk assessment, as described above.

Member States must establish arrangements to ensure that health records are made on individual basis, accessible to the worker in question (ibid.).

Member states had to transpose the Directive until 6 July 2005. Every five years, Member States are to provide a report on practical implementation of this Directive to the Commission.

- *The Control of Vibration at Work Regulations 2005 SI 2005 Number 1093 (transposition into UK context)*

  The Control of Vibration at Work Regulations 2005 require more specific duties compared to earlier general health and safety regulations such as the Management of Health and Safety at Work Regulations 1999. The HSE s of the opinion that if employers comply with the Vibration Regulations and follow set guidance, it may be possible to eliminate any new incidence of disability from hand-arm vibration by 2015, as well as prevent employees developing advanced stages of these diseases (HSE, 2011c).

In compliance with the directive as outlined above, the regulations introduce action and limit values for hand-arm and whole-body vibration. For hand-arm vibration, the regulations introduce an:

- Exposure action value of 2.5m/s^2 A(8) at which level employers should introduce technical and organisational measures to reduce exposure.
- Exposure limit value of 5.0m/s^2 A(8) which should not be exceeded.

  For whole-body vibration (that which is transmitted through the seat or feet of employees who drive mobile machines, or other work vehicles, over rough and uneven surfaces), the regulations introduce an:
- Exposure action value of 0.5m/s^2 A(8) at which level employers should introduce technical and organisational measures to reduce exposure.
- Exposure limit value of 1.15/ms^2 A(8) which should not be exceeded.

Employers must carry out risk assessments, deploy preventative measures as appropriate and ensure apposite health surveillance, as instructed by the directive provisions.

Application to the work of mechanical and electrical technicians

These groups of employees are particularly at risk from hand-arm vibration, due to the nature of maintenance activities and the equipment utilised (e.g. furnace and/or ladle wrecking/re-lining [HSE 2002]).

Thus, there is a range of European legislation in the form of both regulations and directives, which are of particular salience. These will be identified below.

In order to contextualise the report, and subsequently, a concise discussion of the origins and principles of EU health and safety policy will now be outlined.

Directive 2006/25/EC – Artificial Optical Radiation on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

This directive establishes limit values for exposures of workers to artificial optical radiation to eyes and skin. Exposure to natural optical radiation (sunlight) and its possible health consequences are not covered by Directive 2006/25/EC (European Agency for Safety and Health at Work, 2011l).

The directive provides legal definitions of optical radiation, wavelength ranges (visible, ultraviolet, infrared), types of artificial optical radiation (laser radiation and non-coherent radiation), exposure limit values, compliance with which ensures the physical health of workers exposed to artificial optical radiation at work, as well as on parameters for measurement such as irradiation, radiance and radiant exposure (ibid.).

Under the directive, employers are obliged to assess and measure/calculate the levels of exposure to artificial optical radiation to which workers are likely to be exposed. When doing so, the employer shall take account of

- the level, wavelength range, duration of exposure to artificial sources of optical radiation and the exposure limit values set out in the Annexes of the Directive.
- special circumstances such as multiple sources, indirect effects (blinding, explosion, fire), particularly sensitive risk groups of workers and possible effects resulting from workplace interactions between optical radiation and photosensitising chemical substances.
- standards of the International Electrotechnical Commission (IEC) in respect of laser radiation, and the recommendations of the International Commission on Illumination (CIE) and the European Committee for Standardisation (CEN) in respect of non-coherent radiation.

- principles of prevention set out in the Framework Directive (ibid.).

Risk assessment shall be recorded on a suitable medium. It shall be carried out periodically and be updated, particularly if significant changes in working conditions can be observed or if it is indicated by health surveillance results (ibid.).

The reduction of risks shall be based on the principles of prevention set out in the framework directive. The risks arising from exposure to artificial optical radiation shall be eliminated or reduced to a minimum, taking account of technical progress and of the availability of measures to control risk at source. If the results of the risk assessment indicate that exposure limit values may be exceeded, the employer shall devise and implement an action plan comprising technical and organisational measures in order to prevent the exposure exceeding the limit values (ibid.).

The employer shall ensure that workers who are exposed to risks from artificial optical radiation and their representatives receive any necessary information and training relating to the outcome of the risk assessment.

Member States shall adopt provisions to ensure appropriate health surveillance of workers in order to prevent and to detect timely any adverse health effects, long term health risks and any risk of chronic diseases resulting from the exposure to artificial optical radiation. Such health surveillance shall be done by a doctor, an occupational health professional or a medical authority. Individual health records are to be made.

Member States shall transform the Directive into national law until 27 April 2010. National law shall provide for adequate penalties to be applicable in the event of infringement of the national legislation adopted pursuant to this directive. These penalties must be effective, proportionate and dissuasive (ibid.).

- *The Control of Artificial Optical Radiation at Work Regulations (AOR) 2010 (transposition into UK law)*

As stipulated by the directive, these regulations require employers to protect the eyes and skin of their workers from exposure to hazardous sources of artificial optical radiation. To reiterate, AOR includes light emitted from all artificial sources in all its forms, such as ultraviolet, infrared and laser beams, but excludes sunlight (HSE, 2010).

The regulations identify hazardous light sources that present a 'reasonably foreseeable' risk of harming the eyes and skin of workers and where control measures are needed. These include arc and oxy-fuel welding and plasma cutting, used in metal working , as well as the AOR from 'hot industries', or furnaces (ibid).

Risk assessments must be carried out and appropriate control measures (eg using faceshields, coveralls and gloves for welders) must be implemented and reviewed (HSE, 2010).

Application to the work of mechanical and electrical technicians

Employees, including mechanical and electrical technicians, can be exposed to AOR as they traverse the company, as well as performing maintenance and repair duties (such as welding and furnace operations).

3.D.3 Adoption European legislation to the national law (the national execution measures) based on EURLEX database

3.D.3.1 Environmental legislation

Generation of Waste

The Waste Framework Directive (Directive on waste)

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Adoption to the national law (the national execution measures)

Transposition deadline: 12/12/2010

1. The Waste Management Licensing (Scotland) Regulations 2011
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *2011 No. 228*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No. 228*, Publication date: *16/03/2011*, Entry into force: *27/03/2011*; Reference: *(MNE(2011)52552)*
2. The Waste (Scotland) Regulations 2011
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *2011 No. 226*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No. 226*, Publication date: *16/03/2011*, Entry into force: *27/03/2011*; Reference: *(MNE(2011)52551)*
3. WASTE (INCINERATION) ACT 2003 (AMENDMENT)REGULATIONS 2011
   Legal act: *Gibraltar Regulations*, number: *Legal Notice 53 of 2011*; Official Journal: *Gibraltar Gazette*, number: *3844*, Publication date: *12/04/2011*, Entry into force: *12/04/2011*; Reference: *(MNE(2011)53116)*
4. PUBLIC HEALTH ACT (AMENDMENT) REGULATIONS 2011
   Legal act: *Gibraltar Regulations*, number: *Legal Notice 52 of 2011*; Official Journal: *Gibraltar Gazette*, number: *3844*, Publication date: *12/04/2011*, Entry into force: *12/04/2011*; Reference: *(MNE(2011)53115)*
5. The Waste (Miscellaneous Provisions) (Wales) Regulations 2011
   Legal act: *Welsh Statutory Instrument*, number: *2011 No.971 (W.141)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No.971 (W.141)*, Publication date: *28/03/2011*, Entry into force: *29/03/2011*; Reference: *(MNE(2011)52744)*
6. The Waste (England and Wales) Regulations 2011
   Legal act: *Statutory instrument (SI)*, number: *2011 No. 988*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No. 988*, Publication date: *28/03/2011*, Entry into force: *29/03/2011*; Reference: *(MNE(2011)52716)*
7. The Waste Regulations (Northern Ireland) 2011
   Legal act: *Statutory Rules of Northern Ireland*, number: *2011 No. 127*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No. 127*, Publication date: *16/03/2011*, Entry into force: *08/04/2011*; Reference: *(MNE(2011)52384)*

The Landfill Directive (Landfill of waste)

Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 17/07/2001

1. The Landfill (Amendment) Regulations (Northern Ireland) 2011
   Legal act: *Statutory Rules of Northern Ireland*, number: *2011 No. 101*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2011 No. 101*, Publication date: *14/03/2011*, Entry into force: *15/04/2011*; Reference: *(MNE(2011)52776)*
2. The Landfill (England and Wales) Regulations 2002 S.I. n°1559 of 2002 of 15/06/2002
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *15/06/2002*; Reference: *(SG(2002)A/06646)*
3. Waste and Emissions Trading Act 2003
   Legal act: *Act of the UK Parliament*, number: *No. 2003 Chapter 33*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *No. 2003 Chapter 33*; Reference: *(MNE(2006)50987)*
4. The Landfill Allowances Scheme (Amendment) Regulations (Northern Ireland) 2005

Legal act: *Statutory Rules of Northern Ireland*, number: *2005 No.588*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2005 No.588*; Reference: *(MNE(2006)50811)*

5. The Landfill Allowances Scheme (Wales) Regulations 2004
   Legal act: *Welsh Statutory Instrument*, number: *2004 No.1490 (W.155)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2004 No.1490 (W.155)*; Reference: *(MNE(2006)50810)*
6. The Landfill Allowances Scheme (Scotland) Regulations 2005
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *2005 No.157*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2005 No.157*; Reference: *(MNE(2006)50809)*
7. The Landfill Allowances and Trading Scheme (England) (Amendment) Regulations 2005
   Legal act: *Statutory instrument (SI)*, number: *2005 No.880*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2005 No.880*; Reference: *(MNE(2006)50807)*
8. The Landfill Allowances Scheme (Northern Ireland) Regulations 2004
   Legal act: *Statutory Rules of Northern Ireland*, number: *2004 No.416*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2004 No.416*; Reference: *(MNE(2006)50808)*
9. The Landfill Allowances and Trading Scheme (England) Regulations 2004
   Legal act: *Statutory instrument (SI)*, number: *2004 No.3212*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2004 No.3212*; Reference: *(MNE(2006)50806)*
10. The Landfill (Maximum Landfill Amount) (Northern Ireland) Regulations 2004
    Legal act: *Statutory instrument (SI)*, number: *2004 No.3027*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2004 No.3027*; Reference: *(MNE(2006)50805)*
11. The Landfill (Scheme Year and Maximum Landfill Amount) Regulations 2004
    Legal act: *Statutory instrument (SI)*, number: *2004 No.1936*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2004 No.1936*; Reference: *(MNE(2006)50804)*
12. The landfill (Scotland) Amendment Regulations 2003 SSI 2003 N°343 (ENV/A 801179 of 9 February 2004)
    Legal act: *Scottish Statutory Instrument (SSI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
13. The Landfill Regulations (Northern Ireland) 2003 SRNI 2003 N°496 of 01/12/2003 (SG(2003)A/11877 du 03/12/2003)
    Legal act: *Administative measures*; Official Journal: *Administrative measures*, Publication date: *01/12/2003*
14. Waste and Emissions Trading Act 2003 - Chapter 33 Waste and Emissions Trading Act 2003 of 13/11/2003 (SG(2003)A/11877 du 03/12/2003)
    Legal act: *Statutory instrument (SI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *13/11/2003*
15. Landfill Ordinance 2003 - Gibraltar - Strategy for the implementation of the reduction of biodegradable waste going to landfill.
    Legal act: *Gibraltar Ordinance*; Official Journal: *Administrative measures*
16. The Landfill (Scotland) Regulations 2003 SSI 2 n° 235 of 10/04/2003 (SG(2003)A/4745 du 15/05/2003)
    Legal act: *Scottish Statutory Instrument (SSI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *10/04/2003*
17. Landfill Ordinance 2002 Gibraltar Gazette n° 33 04 of 12/09/2002 (SG(2002)A/12315 du17/12/2002)
    Legal act: *Gibraltar Ordinance*; Official Journal: *Gibraltar Gazette*, Publication date: *12/09/2002*
18. Landfill (Amendment) Act 2007

Legal act: *Gibraltar Regulations*, number: *No. 35 of 2007*; Official Journal: *Gibraltar Gazette*, number: *No. 35 of 2007*; Reference: *(MNE(2008)54835)*

Directive and Packaging Directive

Council Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE).

Adoption to the national law (the national execution measures)

Transposition deadline: 13/08/2004

1. The Waste Electrical and Electronic Equipment (Amendment) Regulations 2010
   Legal act: *Statutory instrument (SI)*, number: *2010 No1155*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2010 No1155*, Entry into force: *01/06/2010*; Reference: *(MNE(2010)54391)*
2. Government of Gibraltar - The Environment (Waste) Regulations 2007
   Legal act: *Gibraltar Regulations*, number: *125*; Official Journal: *Gibraltar Gazette*, Publication date: *29/11/2007*, Page: *00001-00030*, Entry into force: *29/11/2007*; Reference: *(MNE(2007)58475)*
3. The Waste Electrical and Electronic Equipment (Waste Management Licensing) (England and Wales) Regulations 2006
   Legal act: *Statutory instrument (SI)*, number: *2006 No.3315*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2006 No.3315*; Reference: *(MNE(2006)58840)*
4. The Waste Management Licensing Amendment (Waste Electrical and Electronic Equipment)(Scotland) Regulations 2007
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *2007 No. 172*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *14/12/2006*, Entry into force: *30/03/2007*; Reference: *(MNE(2006)58552)*
5. Waste Electrical and Electronic Equipment (Waste Management Licensing) Regulations (Northern Ireland) 2006
   Legal act: *Statutory Rules of Northern Ireland*, number: *2006 No.519*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2006 No.519*; Reference: *(MNE(2006)58842)*
6. The Waste Electrical and Electronic Equipment Regulations 2006
   Legal act: *Statutory instrument (SI)*, number: *2006 No. 3289*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *14/12/2006*, Entry into force: *02/01/2007*; Reference: *(MNE(2006)58553)*

Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste.

Adoption to the national law (the national execution measures)

Transposition deadline: 29/06/1996

1. The Packaging (Essential Requirements) (Amendment) Regulations 2009, Standing Order 2009 No.1504
   Legal act: *Statutory instrument (SI)*, number: *2009 No.1504*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *ISBN978-0-11-148088-5*, Publication date: *16/06/2009*, Entry into force: *10/07/2009*; Reference: *(MNE(2009)53871)*

2. The Packaging (Essential Requirements) Regulations 1998 S.I. n°1165 of 1998
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
3. The producer Responsability Obligations (Packaging Waste) (Amendment) Regulations (Northern Ireland) 1999 S.R. Northern Ireland n°49 6 of 1999
   Legal act: *Administative measures*; Official Journal: *Administrative measures*
4. The producer Responsability Obligations (Packaging Waste)(Amendment n° 2) Regulation 1999 S.I. n°3447of 1999
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*

Generation of Emissions to Atmosphere

Integrated pollution prevention and control (IPPC Directive)

Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control.

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Pure air for Europe

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.

Adoption to the national law (the national execution measures)

Transposition deadline: 10/06/2010

1. The Air Quality Standards (Scotland) regulations 2010
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *SSI 2010 No 204*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *9780111497739* , Entry into force: *11/06/2010*; Reference: *(MNE(2010)53671)*
2. The Air Quality Standards (Northern Ireland) 2010
   Legal act: *Statutory Rules of Northern Ireland*, number: *SR 2010 No. 188*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *SR 2010 No. 188*, Entry into force: *11/06/2010*; Reference: *(MNE(2010)53581)*
3. The Air Quality Standards Regulations 2010
   Legal act: *Statutory instrument (SI)*, number: *SI 2010 No. 1001*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *SI 2010 No. 1001*, Entry into force: *11/06/2010*; Reference: *(MNE(2010)53580)*
4. The Air Quality Standards (Wales) Regulations 2010
   Legal act: *Welsh Statutory Instrument*, number: *2010 No.1433 (W.126)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2010 No.1433 (W.126)*, Entry into force: *11/06/2010*; Reference: *(MNE(2010)53458)*
5. Environment (Air Quality Standards) Regulations 2010
   Legal act: *Gibraltar Regulations*, number: *Legal Notice 126 of 2010*; Official Journal: *Gibraltar Gazette*, number: *No. 3798*, Publication date: *15/07/2010*, Page: *00712-00830*, Entry into force: *15/07/2010*; Reference: *(MNE(2010)54968)*

Industrial Emissions Directive

Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (Recast).

Adoption to the national law (the national execution measures)

NO DOCUMENTS

Generation of Emissions to Water

Water Framework Directive (Water protection and management)

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy[55].

Adoption to the national law (the national execution measures)

Transposition deadline: 22/12/2003

1. Public Health (Water Framework) (Amendment) Regulations 2011
   Legal act: *Gibraltar Regulations*, number: *Legal Notice 25 of 2011*; Official Journal: *Gibraltar Gazette*, number: *3840*, Publication date: *17/03/2011*, Page: *00147-00165*, Entry into force: *17/03/2011*; Reference: *(MNE(2011)52527)*
2. The Water Environment (Water Framework Directive) Regulations (North Ireland) 2003 SI n°544 of 22/12/2003
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *22/12/2003*
3. The Water Environment and Water Services (Scotland) Act 2003 (Designation of Scotland River Basin District) Order 2003. SI n°610 of 18/12/2003
   Legal act: *Scottish Statutory Instrument (SSI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *18/12/2003*
4. Public Health (Water Framework) Rules 2004
   Legal act: *Gibraltar Ordinance*, number: *2004/3431*; Official Journal: *Gibraltar Gazette*, number: *2004/3431*; Reference: *(MNE(2004)51968)*
5. Water Resources England and Scotland -The Water Environment (Water framework Directive)(Northumbria River Basin District) Regulations 2003. SI n°3245 of 10/12/2003
   Legal act: *Scottish Statutory Instrument (SSI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *10/12/2003*
6. The Water Environment (Water framework Directive)(England and Wales) Regulations 2003. SI n°3242 of 10/12/2003
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *10/12/2003*; Reference: *(SG(2004)A/01316)*
7. Water Resources England and Scotland -The Water Environment (Water framework Directive)(Solway Tweed River Basin District) Regulations 2004. SI n°99 of 19/01/2004
   Legal act: *Scottish Statutory Instrument (SSI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *19/01/2004*

[55] Amended by: Decision No 2455/2001/EC of the European Parliament and of the Council of 20 November 2001 (OJ L331/1 of 15.12.2001); Directive 2008/32/EC of the European Parliament and of the Council of 11 March 2008 (OJ L81/60 of 20.3.2008); Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 (OJ L348/84 of 24.12.2008); Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L140/114 of 5.6.2009).

3.D.3.2 Health and Safety legislation

The Health and Safety FRAMEWORK DIRECTIVE - Council Directive 89/391/EEC of 12 June 1989 on the introduction of measures to encourage improvements in the safety and health of workers at work (OJ L181/1 of 29.6.1989).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. The Fire Safety (Scotland) Amendment Regulations 2010
   Legal act: *Scottish Statutory Instrument (SSI)*, number: *2010 No. 393*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2010 No. 393*, Publication date: *10/11/2010*, Entry into force: *21/01/2011*; Reference: *(MNE(2011)51202)*
2. The Management of Health and Safety at Work Regulations 1992 S.I. n°2051 of 1992
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
3. The Management of Health and Safety at Work and Fire Precautions (Workplace) (Amendment) Regulations 2003. SI n° 2457 of 24/9/20 03 (SG(2003)A/10031 du 20/10/2003)
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *20/10/2003*
4. Police (Health and Safety) Act, 1997
   Legal act: *Administative measures*; Official Journal: *Administrative measures*
5. The Fire Precautions (Workplace) Regulations 1997 S.I. n°1840 of 1997
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
6. The Factories (Safety) Regulations 1996, Legal Notice No. 10 of 1996 Gibraltar Gazette n°2,894 of 25/01/1996
   Legal act: *Notice*; Official Journal: *Gibraltar Gazette*, Publication date: *25/01/1996*
7. The Employment (Maternity and Health and Safety) Regulations 1996 Legal notice number 14 of 1996 Gibraltar Gazette n°2894 of 25/01/1 996
   Legal act: *Notice*; Official Journal: *Gibraltar Gazette*, Publication date: *25/01/1996*
8. The Health and Safety (Consultation with Employees) Regulations 1996 S.I. n°1513 of 1996
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
9. The Managment of Health and Safety at Work Regulations 1996 Legal notice number 11 of 1996 Gibraltar Gazette n°2894 of 25/01/1996
   Legal act: *Notice*; Official Journal: *Gibraltar Gazette*, Publication date: *25/01/1996*
10. The Trade Union Reform and Employment Rights Act 1993 (Commencement) (No. 3) and Transitional Provisions Order 1993 S.I. n°2503 of 1993
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
11. The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985 S.I. n°2023 of 1985
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*

12. The Health and Safety (First-Aid) Regulations 1981 S.I. n°917 of 1981
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
13. The Employment Protection (Consolidated) Act 1978
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
14. The Safety Representatives and Safety Committees Regulations 1977 S.I. n° 500 of 1977
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
15. The Health and Safety at Work Act 1974
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
16. The Industrial Relations (Northern Ireland) Order 1976 S.R. Northern Ireland n° 1043 of 1976
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
17. The Fire Service (Northern Ireland) Order 1984 S.R. Northern Ireland n°1821 of 1984
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
18. The Health and Safety (First-Aid) Regulations (Northern Ireland) 1982 S.R. Northern Ireland n°429 of 1982
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
19. The Personal Protective Equipment at Work Regulations (Northern Ireland) 1993 S.R. Northern Ireland n°20 of 1993
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
20. The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (Northern Ireland) 1986 S.R. Northern Ireland n°247 of 1986
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
21. The Health and Safety at Work Order (Northern Ireland) 1978 S.R. Northern Ireland n° 1039 of 1978
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
22. The Management of Health and Safety at Work Regulations (Northern Ireland) 1992 S.R. Northern Ireland n°459 of 1992
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
23. The Safety Representatives and Safety Committees Regulations (Northern Ireland) 1979 S.R. Northern Ireland n°437 of 1979
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
24. The Manual Handling Operations Regulations 1992 S.I. n°2793 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
25. The Personal Protective Equipment at Work Regulations 1992. Statutory Instruments number 2966 of 1992
    Legal act: *Statutory instrument (SI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2966*
26. The Provision and Use of Work Equipement Regulations 1992 S.I. n°2932 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
27. The Workplace (Health, Safety and Welfare) Regulations 1992 S.I. n°3004 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
28. Management of Health and Safety at Work and Fire Precautions (Workplace) (Amendment) Regulations (Northern Ireland) 2003 SI n° 454 of 20/10/2003 (SG(2003)A/11149 du 14/11/2003)

Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *20/10/2003*

Workplace requirements

Council Directive 89/654/EEC of 30 November 1989 concerning the minimum safety and health requirements for the workplace (first individual directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1992

1. The Fire Precautions (Workplace) Regulations of 1997 S.I. n°1840 of 1997
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
2. The Management of Health and Safety at Work Regulations 1992 S.I. n°2051 of 1992
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
3. The Fire Precautions Act 1971
   Legal act: *Administative measures*; Official Journal: *Administrative measures*
4. The Health and Safety at Work Act 1974
   Legal act: *Administative measures*; Official Journal: *Administrative measures*
5. The Safety Representatives and Safety Committees Regulations 1977 S.I. n° 500 of 1977
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
6. The Building Regulations 1991 S.I. n°2768 of 19 91
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
7. The Building Standards (Scotland) Regulations 1990 S.I. Scotland n°2179 of 1990
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
8. The Electricity at Work Regulations 1989 S.I. n° 635 of 1989
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
9. The Control of Substances Hazardous to Health Regulations 1988 S.I. n°1657 of 1988
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
10. The Health and Safety (First-Aid) Regulations 1981 S.I. n°917 of 1981
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
11. The Noise at Work Regulations 1989 S.I. n°1790 of 1989
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
12. The Workplace (Health, Safety and Welfare) Regulations (Northern Ireland) 1993 S.R. Northern Ireland n°37 of 1993
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
13. The Fire Services (Northern Ireland) Order 1984 S.R. Northern Ireland n°1821 of 1984
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
14. The Health and Safety Order (Northern Ireland) 1978 S.R. Northern Ireland n° 1049 of 1978
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
15. The Management of Health and Safety at Work Regulations (Northern Ireland) 1992 S.R. Northern Ireland n°459 of 1992
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
16. The Safety Representatives and Safety Committees Regulations (Northern Ireland) 1979 S.R. Northern Ireland n°437 of 1979
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
17. The Building Regulations (Northern Ireland) 1990 S.R. Northern Ireland n°59 of 1990
    Legal act: *Administative measures*; Official Journal: *Administrative measures*

18. The Building (Amendment) Regulations (Northern Ireland) 1991 S.R. Northern Ireland n° 169 of 1991
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
19. The Electricity at Work Regulations (Northern Ireland) 1991 S.R. Northern Ireland n° 13 of 1991
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
20. The Control of Substances Hazardous to Health Regulations (Northern Ireland) 1990 S.R. Northern Ireland n° 374 of 1990
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
21. The Health and Safety (First-Aid) Regulations (Northern Ireland) 1982 S.R. Northern Ireland n° 429 of 1982
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
22. The Noise at Work Regulations (Northern Ireland) 1990 S.R. Northern Ireland n° 147 of 1990
    Legal act: *Administative measures*; Official Journal: *Administrative measures*
23. The Manual Handling Operations Regulations 1992 S.I. n° 2793 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
24. The Personal Protective Equipment at Work Regulations 1992 S.I. n° 2966 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
25. The Provision and Use of Work Equipement Regulations 1992 S.I. n° 2932 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
26. The Workplace (Health, Safety and Welfare) Regulations 1992 S.I. n° 3004 of 1992
    Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
27. The Health, Safety and Welfare in the Workplace, Legal Notice No. 28 of 1996 Gibraltar Gazette
    Legal act: *Notice*; Official Journal: *Gibraltar Gazette*

Dangerous agents at work

COUNCIL DIRECTIVE of 7 April 1998 (98/24/EC) on the protection of the health and safety of workers from the risks related to chemical agents at work (fourteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 05/05/2001

1. The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Chemical Agents) Regulations 2010
   Legal act: *Statutory instrument (SI)*, number: *2010 No. 330*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2010 No. 330*, Publication date: *11/02/2010*, Entry into force: *06/04/2010*; Reference: *(MNE(2011)51296)*
2. Dangerous Substances and Explosises Atmospheres Regulations (N.I.) 2003. S.I. Northern Ireland n° 152 of 25/04/2003 (A/2003/4337 du 30/04/2003)

Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *25/04/2003*

3. The Control of Asbestos at Work Regulations (Amendment) Regulations 2003 Second Supplement to the Gibraltar Gazette n°3332 of 20/0 3/2003 (L. N. 34/2003)(A/2003/4337)
   Legal act: *Administative measures*; Official Journal: *Gibraltar Gazette*, Publication date: *20/03/2003*
4. The Control of Substances Hazardous to Health Regulations 2002 SI n° 2677 du 24/10/2002 (SG(2003/A/0053 du 09/01/2003)
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *24/10/2002*; Reference: *(SG(2002)A/02176)*
5. The Dangerous Substances and Explosive Atmospheres Regulations 2002 SI n°2776 du 07/11/2002 (SG(2003/A/0053 du 09/01/2003)
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *07/11/2002*
6. The Control of Lead at Work Regulations 2002 SI n° 2676 du 24/10/2002 (SG(2003/A/0053 du 09/01/2003)
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *24/10/2002*
7. Control of Asbestos at Work Regulations 2002 SI n° 2675 du 24/10/2002 (SG(2003/A/0053 du 09/01/2003)
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, Publication date: *24/10/2002*
8. The Factories (Control of Chemical Agents at Work) Regulations 2003. Second Supplement to the Gibraltar Gazette n°3332 of 20/03/2003 (L. N. 35/2003)(A/2003/4337)
   Legal act: *Administative measures*; Official Journal: *Gibraltar Gazette*, Publication date: *20/03/2003*

Exposure to chemical agents and chemical safety

Directive 2004/37/EC - carcinogens or mutagens at work

of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work (Sixth individual Directive within the meaning of Article 16(1) Directive 89/391/EEC.

Adoption to the national law (the national execution measures)

Transposition deadline: 20/05/2004

1. FACTORIES (CONTROL OF CARCINOGENS AND MUTAGENS AT WORK) (AMENDMENT) REGULATIONS 2005
   Legal act: *Gibraltar Regulations*, number: *91*; Official Journal: *Gibraltar Gazette*, number: *3472*, Publication date: *02/06/2005*, Entry into force: *02/06/2005*; Reference: *(MNE(2005)52594)*
2. The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Carcinogens and Mutagens) Regulations 2007
   Legal act: *Statutory instrument (SI)*, number: *2007 No. 3100*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2007 No. 3100*, Publication date: *19/10/2007*, Entry into force: *01/03/2008*; Reference: *(MNE(2011)51326)*

Directive 2009/161/EU - indicative occupational exposure limit values of 17 December 2009 establishing a third list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Commission Directive 2000/39/EC (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2009/148/EC - exposure to asbestos at work of 30 November 2009 on the protection of workers from the risks related to exposure to asbestos at work (Text with EEA relevance).

Adoption to the national law (the national execution measures)

NO REFERENCE AVAILABLE

Directive 2000/39/EC - indicative occupational exposure limit values of 8 June 2000 establishing a first list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to chemical agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/2001

1. Factories (Occupational Exposure Limit Values) Regulations, 2002 Second Supplement to the Gibraltar Gazette n°3275 of 12/03/2002, pag e 217
   Legal act: *Administative measures*; Official Journal: *Gibraltar Gazette*, Publication date: *12/03/2002*; Reference: *(SG(2002)A/03927)*

Directive 2006/15/EC - indicative occupational exposure limit values of 7 February 2006 establishing a second list of indicative occupational exposure limit values in implementation of Council Directive 98/24/EC and amending Directives 91/322/EEC and 2000/39/EC.

Adoption to the national law (the national execution measures)

Transposition deadline: 01/09/2007

1. EH40 Workplace Exposure Limits

Legal act: *Administative measures*, number: *EH40*; Official Journal: *Administrative measures*, number: *EH40*, Entry into force: *15/06/2007*; Reference: *(MNE(2007)57016)*

2. Factories (Control of Chemical Agents at Work) (Amendment No. 2) Regulations 2008
   Legal act: *Gibraltar Regulations*, number: *Legal Notice 50 of 2008*; Official Journal: *Gibraltar Gazette*, number: *3662*, Publication date: *19/06/2008*, Page: *00234-00242*, Entry into force: *19/06/2008*; Reference: *(MNE(2008)53579)*
3. EH40 Workplace Exposure Limits
   Legal act: *Administative measures*, number: *EH40*; Official Journal: *Administrative measures*, number: *EH40*, Entry into force: *15/06/2007*; Reference: *(MNE(2007)56721)*
4. Factories (Control of Chemical Agents at Work) (Amendment) Regulations 2008
   Legal act: *Gibraltar Regulations*, number: *Legal notice 35 of 2008*; Official Journal: *Gibraltar Gazette*, number: *3655*, Publication date: *08/05/2008*, Page: *00180-00186*, Entry into force: *08/05/2008*; Reference: *(MNE(2008)52891)*

Directive 91/322/EEC - indicative limit values of 29 May 1991 on establishing indicative limit values by implementing Council Directive 80/1107/EEC on the protection of workers from the risks related to exposure to chemical, physical and biological agents at work.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1993

1. The Control of Substances Hazardous to Health Regulations 1988 S.I. n°1657 of 1988
   Legal act: *Administative measures*; Official Journal: *Her Majesty's Stationery Office (HMSO)*
2. The Control of Substances Hazardous to Health Regulations (Northern Ireland) 1990 S.R. Northern Ireland n°374 of 1990
   Legal act: *Administative measures*; Official Journal: *Administrative measures*

Noise

Council Directive 2003/10/EC of 6th February 2003 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise) (Seventeenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 14/02/2006

1. The Merchant Shipping and Fishing Vessels(Control of Noise at Work) Regulations 2007
   Legal act: *Statutory instrument (SI)*, number: *2007 No. 3075*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2007 No. 3075*, Publication date: *25/10/2007*, Entry into force: *23/02/2008*; Reference: *(MNE(2011)51291)*

2. UK Health and Safety Guidance (HSG260) - Sound advice - Control of noise at work in music and entertainment
   Legal act: *Administative measures*, number: *HSG260*; Official Journal: *Administrative measures*, number: *HSG260*, Entry into force: *11/07/2008*; Reference: *(MNE(2008)55115)*
3. CONTROL OF NOISE AT WORK REGULATIONS 2006
   Legal act: *Gibraltar Regulations*, number: *No 81 of 2006*; Official Journal: *Gibraltar Gazette*, number: *No 81 of 2006*, Publication date: *01/06/2006*, Entry into force: *01/06/2006*; Reference: *(MNE(2006)53974)*
4. The Control of Noise at Work Regulations (Northern Ireland) 2006
   Legal act: *Statutory Rules of Northern Ireland*, number: *SR 2006 No 1*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *SR 2006 No 1*, Publication date: *10/01/2006*, Entry into force: *06/04/2006*; Reference: *(MNE(2006)50619)*
5. The Control of Noise at Work Regulations 2005
   Legal act: *Statutory instrument (SI)*, number: *SI 2005 No 1643*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *SI 2005 No 1643*, Publication date: *28/06/2005*, Entry into force: *06/04/2006*; Reference: *(MNE(2005)54922)*

Artificial optical radiation

Council Directive 2006/25/EC on the minimum health and safety requirements regarding the exposure of the workers to risks arising from physical agents (artificial optical radiation, 19th individual directive within the meaning of Article 16(1) of Directive 89/391/EEC).

Adoption to the national law (the national execution measures)

Transposition deadline: 27/04/2010

1. The Control of Artificial Optical Radition at Work Regulations (Northern Ireland) 2010
   Legal act: *Statutory Rules of Northern Ireland*, number: *SR of NI 2010 No.180*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *SR of NI 2010 No.180*, Entry into force: *14/06/2010*; Reference: *(MNE(2010)53445)*
2. The Control of Artifical Optical Radiation at Work Regulations 2010
   Legal act: *Statutory instrument (SI)*, number: *GB SI 2010 No. 1140*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *GB SI 2010 No. 1140*, Publication date: *06/04/2010*, Entry into force: *27/04/2010*; Reference: *(MNE(2010)52479)*
3. Factories (Protection of Workers from Physical Agents) (Artifical Optical Radiation) Regulations 2010
   Legal act: *Gibraltar Regulations*, number: *2010/131*; Official Journal: *Gibraltar Gazette*, number: *3801*, Publication date: *29/07/2010*, Entry into force: *29/07/2010*; Reference: *(MNE(2010)55103)*
4. The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Artificial Optical Radiation) Regulations 2010
   Legal act: *Statutory instrument (SI)*, number: *2010 No. 2987*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2010 No. 2987*, Publication date: *17/12/2010*, Entry into force: *10/01/2011*; Reference: *(MNE(2010)57583)*

Personal Protective Equipment

Council Directive 89/686/EEC on the approximation of the laws of the Member States relating to personal protective equipment.

Adoption to the national law (the national execution measures)

Transposition deadline: 31/12/1991

1. The Personal Protective Equipment (EC Directive) (Amendment) Regulations 1994. Statutory Instruments number 2326 of 1994
   Legal act: *Statutory instrument (SI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *2326*
2. The Personal Protective Equipment (EC Directive) Regulations 1992. Statutory Instruments number 3139 of 1992
   Legal act: *Statutory instrument (SI)*; Official Journal: *Her Majesty's Stationery Office (HMSO)*, number: *3139*

4. Analysis of company directives on environmental and health and safety with list of analyzed documents

4.A GERMANY

With approximately 18,500 employees, ThyssenKrupp Steel Europe AG is a company within the ThyssenKrupp Group, which has around 180,000 employees worldwide. The fields of environmental protection and occupational safety[56] are extremely relevant to the company and have a long tradition both at ThyssenKrupp Steel Europe AG and ThyssenKrupp AG.

4. A.1 Climate and Environmental Protection

The group environment and climate guideline[57] of ThyssenKrupp AG describes the organisation and task of climate and environmental protection throughout the ThyssenKrupp Group. On the basis of this guideline, the climate and environmental policy of ThyssenKrupp Steel Europe AG is laid down in addition to the basic legal principles and operator's obligations by means of the environmental guidelines of ThyssenKrupp Steel Europe AG. The environmental policy is based on the principles of long-term sustainable development. These principles have been published in the Charter of the International Chamber of Commerce (ICC) and by the World Steel Association (WSA). The environmental policy is described with the following **guidelines**[58]:

- Environmental protection is an overriding aim of the corporate policy,
- We protect the natural resources,

[56] Occupational safety includes the fields of safety at work and health protection.
[57] Cf. the group environment and climate guideline dated October 26, 2009
[58] Cf. the current version of the environmental guidelines dated March, 2010.

- We use environmentally compatible production facilities and processes that protect the resources,
- We assume responsibility for our products,
- We deal with the recycling of our products,
- We further refine environmental protection together with our customers,
- We search for new knowledge,
- We participate in joint initiatives,
- We provide information in all honesty,
- Environmental protection is everyone's task.

At ThyssenKrupp Steel Europe the environmental targets specified by DIN EN ISO 14001 form part of the general corporate objectives. They take into account the environmental policy of ThyssenKrupp Steel Europe. The environmental targets are achieved by structural and organisational measures. Structural measures which lead to an improvement in environmental performance are incorporated into the investment plans. The targets formulated in these plans are laid down by the management of the respective management area - if necessary in consultation with the Environmental and Climate Protection management area - and - depending on their scope - approved by the Executive Board. They are essentially determined quantitatively and accompanied by time targets. Organisational measures (e.g. training/instruction of employees, compilation of operating/working instructions) improve the Environmental Management System.

The implementation of the environmental policy of ThyssenKrupp Steel Europe AG is guaranteed by a comprehensive **Environmental Management System (EMS)**. This EMS is strictly aligned with the internationally valid environment standard DIN EN ISO 14001. In accordance with the requirements of this standard, the company's EMS contains clear regulations on:

- Environmental guidelines,
- Environmental aspects,

- Individual environmental targets and programs,
- Organisational structure and responsibility,
- Training, awareness and competence,
- Communication,
- Documentation of the EMS,
- Document control,
- Operational control,
- Emergency preparedness and measures,
- Monitoring and measurement,
- Deviations, corrective and precautionary measures,
- Recordings,
- EMS audit,
- Assessment by top management.

All of the regulations listed are documented in an environmental management handbook which is accessible to all members of the workforce.

In February 2001 the Environmental Management System (EMS) of ThyssenKrupp Steel Europe AG was certified for the first time. The EMS is regularly recertified by an independent authorised expert.

Environmental Management Procedural Instructions

Environmental management procedural instructions (EMPI) contain special regulations concerning environmental management. Their compilation and approval is the sole responsibility of the Environmental Protection management area. The environmental management procedural instructions are presented below together with explanations.

No. 1 Qualification, Training and Motivation with respect to Environmental Protection

Measures are described which are required for training, information and motivation with regard to the environmental behaviour of the staff members and management staff. The aim is to ensure that everyone who carries out work which is relevant to the environment is trained in line with requirements and therefore has sufficient specialised knowledge to correctly perform the tasks with which they are entrusted.

No. 3 Document Control

The EMPI specify the compilation, verification, distribution and storage of environmentally relevant documents.

No. 4 Control of the Legal Provisions

The EMPI specify the procedure for the systematic recording and maintenance of the environmental legislation that is applicable to ThyssenKrupp Steel Europe AG.

No. 5 Corrective Measures

These EMPI specify the processes which are to be complied with at ThyssenKrupp Steel Europe AG with respect to the fundamental handling of corrective and preventive actions.

No. 6 Purchasing

With these EMPI it is ensured that in the selection of suppliers and the procurement of material goods and services, not only economic and qualitative aspects are taken into account, but also ecological ones.

No. 7 Minimisation of Diffuse Dust Emissions

Dust-emitting procedures are to be reduced to the minimum possible level. In addition to the known sources from which dust has been removed, the diffuse sources also have a significant potential for emissions. In particular, the employees should be made aware of the necessity of avoiding diffuse dust emissions if possible. These EMPI apply to all employees of ThyssenKrupp Steel Europe AG.

Guidelines on Environmental Protection

Environmental protection guidelines are guidelines which apply throughout the company and which contain general and specific regulations on environmental protection within the company and environmental management. Their compilation is normally the responsibility of the Environmental Protection management area, with approval being given by the Executive Board. The applicable environmental protection guidelines are presented and briefly explained below.

Responsibility for Environmental Protection within the Company

The guideline specifies the fundamental tasks, duties and competencies of the employees at ThyssenKrupp Steel Europe AG with regard to environmental protection.

This guideline applies to all employees of ThyssenKrupp Steel Europe AG.

Environmental Protection Obligations for Property owned by ThyssenKrupp Steel AG

For the heads of the organisation units (OU) at ThyssenKrupp Steel Europe AG which are assigned directly to the Executive Board, the guideline lays down the duties and responsibilities which apply to the properties based on the environmental protection legislation.

The guideline applies to all of the organisation units at ThyssenKrupp Steel Europe AG which are assigned directly to the Executive Board and relates to all developed and undeveloped land belonging to ThyssenKrupp Steel Europe AG.

Reporting of Environmentally-relevant Events

The guideline specifies the immediate provision of information by staff members concerning environmental disturbances to the Plant Safety Department and the fulfilment of statutory duties by ThyssenKrupp Steel Europe AG with respect to the immediate reporting of environmentally-relevant events to the appropriate authorities.

This guideline applies to all employees of ThyssenKrupp Steel Europe AG.

Management Area Representative for Environmental Protection (DfU)

The guideline lays down the tasks and competencies of the management area representative for environmental protection (DfU).

The guideline applies to all organisation units which are assigned directly to the Executive Board.

Approval Procedures according to Environmental and Building Legislation

The guideline specifies compliance with the legal provisions, in particular the Federal Immission Protection Act (BImSchG) and the Building Code of North Rhine-Westphalia (Bau ONW) with respect to the procedure when constructing, operating, modifying or closing down plants.

The guideline applies to all organisation units which are assigned directly to the Executive Board.

Implementation of the Recycling Act/Waste Management Act at ThyssenKrupp Steel AG

The guideline specifies the economic implementation of the Recycling Act/Waste Management Act (KrW-/AbfG) and lays down the necessary ThyssenKrupp Steel Europe AG procedure required for compliance with the provisions in the recording/disposal of waste and in-plant materials.

The guideline applies to all of the organisation units of ThyssenKrupp Steel Europe AG which are assigned directly to the Executive Board. In addition to the statutory regulations, the "Conditions for the Deployment of External Companies" also apply to external companies.

Conditions for the Deployment of External Companies

The conditions are part of the contract between ThyssenKrupp Steel Europe AG and the respective external company and stipulate in particular the correct performance of the services on the side of ThyssenKrupp Steel Europe AG.

The conditions apply to all employees on the works premises of ThyssenKrupp Steel Europe AG who do not belong to the workforce of ThyssenKrupp Steel Europe AG.

Approval Procedures according to Environmental and Building Legislation

The guideline specifies compliance with the legal provisions, in particular the Federal Immission Protection Act (BImSchG) and the Building Code of North Rhine-Westphalia (Bau ONW) with respect to the procedure when constructing, operating, modifying or closing down plants.

The guideline applies to all organisation units which are assigned directly to the Executive Board.

Course of Action for the Planning of New and the Modification of Existing Plants and Procedures within the Scope of the German Hazardous Accident Ordinance (StörfallV)

The guideline specifies the procedure in the planning of new and significant amendments to existing plants and procedures in which substances contained in the Appendix 1 to the German Hazardous Accident Ordinance (StörfallV) are or will be present above a certain quantity threshold or above a certain throughput rate.

The guideline applies to the operational areas of Bruckhausen, Beeckerwerth, Schwelgern and Hamborn.

Determination and Assessment of the Dangers of Hazardous Accidents

This guideline specifies the systematic determination of the dangers of hazardous accidents under conditions of proper and improper operation for the fulfilment of the requirements of the German Hazardous Accident Ordinance (StörfallV) (section 12 of the German Federal Immission Protection Ordinance (BImSchV)).

The guideline applies to the operational areas of Bruckhausen, Beeckerwerth, Schwelgern and Hamborn.

Course of Action for the Planning of New and the Modification of Existing Plants and Procedures within the Scope of the German Hazardous Accident Ordinance (StörfallV)

The guideline specifies the procedure in the planning of new and significant amendments to existing plants and procedures in which substances contained in the Appendix 1 to the German Hazardous Accident Ordinance (StörfallV) are or will be present above a certain quantity threshold or above a certain throughput rate.

The guideline applies to the operational areas of Bruckhausen, Beeckerwerth, Schwelgern and Hamborn.

Quality Assurance of CO_2 Emission Reports/CO_2 Management

This management instruction specifies the procedure for complying with the orders and obligations of European emissions trading. It provides a framework of action for all plant operators (companies) which already have plants that are subject to emissions trading or which will be affected in the future in the third trading period from 2013 on with plants that have a firing thermal capacity of more than 20 MW.

4. A. 2 Occupational Safety

Occupational safety is one of the top themes at ThyssenKrupp Steel Europe AG. ThyssenKrupp Steel Europe AG pursues the aim of becoming the benchmark in the German steel industry in the field of occupational safety.

In August 2002 ThyssenKrupp AG and the group works council jointly laid down for the first time the **occupational safety guidelines** for the entire ThyssenKrupp Group.[59] The first guideline describes in no uncertain terms the relevance of the topic of occupational safety (cf. ibid. "The safety and health of our staff members during their work are of paramount importance and make an important contribution to the success of the company. As a result, alongside the quality of our products and economic success, these matters are a company aim of equal importance."

These guidelines are a part and the basis of the **"Mission statement on occupational safety"** of ThyssenKrupp Steel Europe AG.[60] Besides the mission statement, the **statement of principles of the Executive Board**[61] is a central

[59] The current version of the "ThyssenKrupp occupational safety guidelines" with explanations goes back to the year 2006.
[60] The 16-page document was last updated in April 2010.
[61] Cf. page 4 of the "Mission statement on occupational safety"

document, which together with the mission statement defines the aims of occupational safety in detail. Here the overriding motto is "zero accidents/no fires".

The occupational safety program of ThyssenKrupp Steel Europe AG is designed to be a continuous improvement process and is repeatedly updated. As a central document, the **Occupational Safety Master Plan** contains all occupational safety themes at ThyssenKrupp Steel Europe AG. The master plan contains all measures that must be implemented in order to achieve a good level of occupational safety, as well as optional proposals for improving occupational safety. The master plan pursues not only the aim of determining the level of occupational safety, but also that of integrating occupational safety management into the plants in order to achieve continuous improvement in the occupational safety level. The master plan was introduced in 2008.

Besides the tried and tested expert and regulation-based action approaches, occupational safety now includes the systematic and proactive control of preventive work across management processes that are firmly anchored within the organisation. The **"Occupational Safety Management Handbook of ThyssenKrupp Steel Europe AG"** in accordance with OHSAS 18001 comprises all planning, organisational and monitoring measures for the goal-oriented control and improvement of safety at work and is the central document for the proactive implementation of safety at work. The handbook is accessible to all staff members and is continuously updated. The occupational safety management handbook explains not only the principles and processes within the company, but also the implementation of the organisational obligation with respect to occupational safety at ThyssenKrupp Steel Europe AG as required by section 3 (2) subsection 1 of the Law on Health and Safety in the Workplace.

Besides the laws, EU regulations, ordinances and other provisions, as well as sets of rules, there are also the internal regulations of ThyssenKrupp Steel Europe AG. These relate to the organisation of occupational safety, the behaviour of

staff members and the method of handling specific products. The in-house instructions and guidelines are presented below together with brief explanations.

In-house Instructions and Guidelines

7 Basic Rules for Safe Working at ThyssenKrupp Steel Europe AG

The 7 basic rules form the framework for safe working.

Operating Instructions for "Respiratory Protection Equipment"

The sample operating instructions contain all important regulations for the procurement and use of respiratory protection equipment.

Operating Instructions for the "Fire Extinguishing System - Argon"

The sample operating instructions contain all important regulations for behaviour associated with fire extinguishing systems operated with argon gas.

Operating Instructions for the "Fire Extinguishing System - CO_2"

The sample operating instructions contain all important regulations for behaviour associated with fire extinguishing systems operated with CO_2 gas.

Operating Instructions for the "Fire Extinguishing System - Novec 1230"

The sample operating instructions contain all important regulations for behaviour associated with fire extinguishing systems operated with Novec 1230 gas.

Operating Instructions for "Personal Gas Hazard Indicators"

The sample operating instructions contain all important regulations for the procurement and use of personal gas hazard indicators.

Operating instructions for "Safety Harnesses"

The sample operating instructions contain all important regulations for the procurement and use of safety harnesses.

Working Instructions "Load Securing Measures"

There are corresponding working instructions for load securing measures for finished products such as coils, sheet metal packs or four-high plates. For legal safeguards, confirmation of the correct load securing measures is provided on the part of the driver and shipping agent.

- Working Instructions - Load Securing Measures on Road Vehicles (Coils, Slit Coils and Sheet Metal Packs),
- Working Instructions - Load Securing Measures on Road Vehicles (Four-High Plate and Sheet Metal Packs) Working Instructions - Load Securing Measures on Road Vehicles (Miscellaneous Loading - not Product-related),
- Confirmation of load securing measures/packing (German),
- Confirmation of load securing measures/packing (foreign languages).

Product storage guidelines

For different products the guidelines describe specified requirements concerning storage within the plants.

- Product position guideline slabs,
- Product position guideline heavy plate,
- Product position guideline sheet metal pack,
- Product position guideline coils with horizontal axis,
- Product position guideline coils with vertical axis,
- Product position guideline steel strip rings with horizontal axis.

Recommendations/Standard Values for the Operation of (Hydraulic) Hoselines

In conjunction with hydraulic hoselines, recommendations have been made for the safe use of such lines by various regulations.

Securing and Approval of Work on Operational Plants

These working instructions are to be applied during maintenance, modification and cleaning work to operational plants and plant sections.

Approval for Work in Containers and Cramped Spaces (Access Permit)

A permit is to be issued for work in "cramped spaces".

Approval for the Performance of Work Representing a Fire Hazard

Before the start of work which represents a fire hazard (outside workplaces specifically set up for this purpose) the work environment is to be checked and any necessary safety measures taken. These are to be documented in the permit for the performance of work representing a fire hazard.

Written Application for the Use of Work Equipment

Work equipment associated with special hazards may only be used by suitable individuals assigned to do so. According to the regulations currently in force, a written assignment is required for ground conveyors, aerial work platforms and mobile cranes.

Procedure in the Case of Cable and Plastic Fires

In the case of a cable or plastic fire, the procedure to be adopted for the plant concerned and the individuals involved is described in a guideline.

Creation of Gas Work Schedules / Implementation of Gas Work

Gas work is work that has a particular hazard potential. This may only be performed on the basis of co-ordinated procedure schedules.

Implementation of the Operational Safety Ordinance at ThyssenKrupp Steel Europe AG

The specialist guideline contains an overview of the work equipment that requires testing. For areas in which an explosion hazard cannot be excluded an explosion protection document must be compiled.

4.B ITALY

4.B.1 Environmental Position

ThyssenKrupp Acciai Speciali Terni (recently INOXUM) is strongly committed to respect and implement the legislation concerning environment involving all the personnel at all the different level of responsibility.

This commitment has been stated in many official documents and positions papers.

It is important to note that recently the attention has shifted from the traditional environmental problems related to the steel production technologies to the ones related to climate changes, particularly the efficient use of energy and climate change.

The efficient use of energy has always been one of the main objective of the company due to the high energy costs in Italy compared to other countries both in the European and International context.

The climate change is mainly related to the CO2 emissions and the company participate to the ETS as implemented by the European directive.

Involvement of Mechanical and Electrical operators

GREEN SKILLS – ELECTRICAL, MECHANICAL AND ELECTRONIC MAINTENANCE OPERATORS AND ENVIRONMENTAL IMPACT AT AST			
Role	**Main functions**	**Environmental impact**	**Protective actions**
Electrical maintenance operator	Takes all safety measures to plants for recovery operations; verifies the electric or electronic nature of failure; identifies electronic failures and calls electronic maintenance operator for repair; solves electric failures	Waste disposal	Capillary separate waste collection of: 1. copper; 2. alloys; 3. gloves; 4. oil-imbued cloths and garments; 5. unrecoverable electric spares
Mechanical maintenance operator	Identifies and solves mechanical failures of plants	Oil and lubricant disposal	Application of leakage reducing procedures e.g. changing stand speed; increasing temperature etc..
Electronic maintenance operator	Restarts electronic equipment that supervises the control of plant movements	Waste disposal	Capillary separate waste collection of: 1. control PCs; 2. cards; 3. sensors; 4. special equipment (e.g.: strip thickness gauges)

The table summarize the main tasks of the mechanical and electrical-electronic operators related to the environmental issues.

Responsibility for environmental (and related health and safety) issues and specific regulations impacting upon electrical and mechanical technicians tasks are:

- Correct waste disposal, after maintenance operations (respect of maintenance plants for steam cutting down; exhaust gas system; promoting of capillary waste disposal);
- Checking that no occasional pollutant flowing back of the plant, overflows to the water after maintenance operations.

At TK AST, the Mechanical and Electrical Technicians are involved in Environmental/green aspects of skilled work, namely:

- Slag and refractory recycling project

- Water recirculation
- Separated waste collection
- Energy optimisation

Furthermore, company promotes and monitors environmental/health and safety strategy/policy with periodical meetings with corporate entities and contractors.

Over the last year the most important developments for the steel industry changed in relation to environmental issues within the company with direct impact on the tasks of mechanical and electrical technicians, trough:

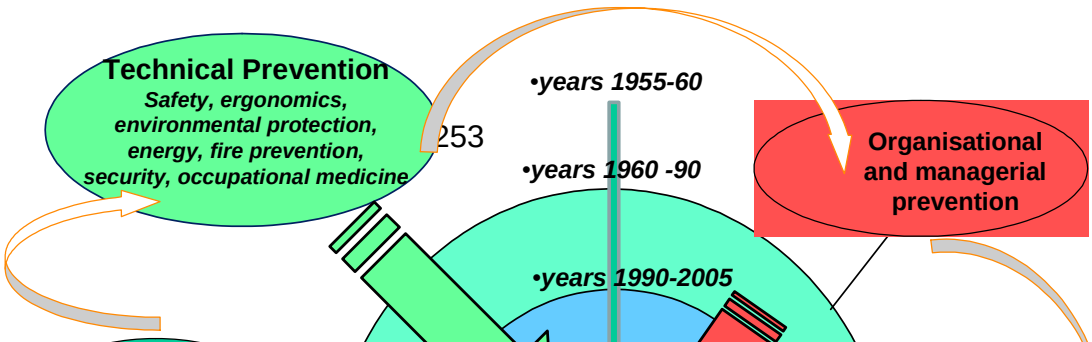
- REACH to record the effects on health of chemical substances
- IPPC directive (integrated pollution, prevention and control)
- The fulfilment of prescription included in AIA (integrated company permit)
- Emissions trading (Kyoto protocol for emissions of CCo2), with reference to the period 2013/20

4.B.2 Position on Health and Safety

The following scheme shows the main principles of the TK AST concerning the health and safety management in the company.

Priority is given to the human factor an to the organisational managerial aspects as the result of the evolution of policies in the last decades up to the actual situation.

The implementation of this company policy is done utilising powerful tools as the continuous education (TK AST has a very advanced and effective training and education centre within the Terni's steelworks), the technical prevention by means of all the available knowledge in all the main domains and the management system for the coordination of activities including the corporate social responsibility and the sustainable development.



Workers are continuously directly and indirectly (through their representatives) informed and involved in all the activity stages from the risk evaluation to the implementation of appropriate remedies.

Appropriate statistical continuous monitoring, based on indexes for accidents and diseases, is provided to assess the degree of policy implementation in the real production cycle.

In this general context, the company established the relevant tasks for the Mechanical and electrical maintenance technicians as follows:

The **Mechanical technician** assures functioning of plants by means of maintenance operations. His main tasks are:

- Minute maintenance of mechanical parts
- Mechanical inspections

- Safety measures on the mechanical parts of plants
- Troubleshooting
- Plant cleaning and tidying up
- Waste disposal
- Wastewater control

The **Electrical Technician** assures functioning of plants by means of operating maintenance. His main tasks are:

- Minute maintenance of electrical equipment
- Electrical maintenance
- Preventive maintenance of electrical parts
- Safety measures on the electric parts of plants
- Troubleshooting
- Gearing recovery
- Electric black-out recovery
- Plant cleaning
- Waste disposal

4.C POLAND

The analysis covers internal regulations that have influence on work of mechanical and electrical technician.

Analyzed areas:

- Blast Furnaces in Dąbrowa Górnicza
- Blast Furnaces in Kraków
- Steel Shop in Dąbrowa Górnicza
- Steel Shop in Krakow
- Heavy Section Mill in Dąbrowa Górnicza
- Medium Section Mill in Dąbrowa Górnicza
- Hot Strip Mill in Kraków
- Hot Rolling Mill Huta Królewska

Documents of ArcelorMittal Poland S.A. include:

- books – documents containing Policies and describing the Integrated Management System,
- policies,
- corporate procedures – documents determining the actions to be taken for execution of operations or processes in ArcelorMittal Group.
- system procedures - documents determining the actions to be taken for execution of operations or processes in ArcelorMittal Poland S.A. The procedure defines the purpose, object, scope and methods of operation, tasks, responsibilities and records to be made,
- operating procedures - documents determining the actions to be taken for execution of operations or processes in an organizational unit or ArcelorMittal Poland S.A. as a whole,

- instructions – description of operations to be performed at a given work-station, explaining how to perform such operations or procedure on how to deliver a given goal,
- quality, environment and OH&S plans,
- Directive of the General Director – document that is a governing internal regulation, addressing topics of key importance for the company, determining the procedures and responsibility in AMP S.A. and implementing the instructions for application,
- Circular Letter – an internal regulation providing rules for specific areas of activity of the respective organizational units or as an executive regulation accompanying the Directive – explaining in detail or defining the methods of implementing the Directive,
- other documents issued by organizational units.

4.C.1 ENVIRONMENTAL ISSUES

Integrated Management System Policy in ArcelorMittal Poland S.A. 1st edition, August 2010

General characteristics

One of the objectives of the policy is to prevent and eliminate any irregularities related to any injuries or occupational diseases, as well as any irregularities related to environment protection. It makes management responsible for safety and environment results, as well as introduces the rule of communication, engagement and training in respect of employees and contractor's employees in order to deliver safety, environment and quality results.

Excellence in OH&S, environment and quality leads to excellent business results. Issues related to OH&S, environment and quality must be an inseparable element of all business management processes.

Influence on everyday work of electrical technician and mechanical technician

The policy is documented, implemented, communicated and disseminated.

The policy is effective for all employees of ArcelorMittal Poland S.A., including mechanical technician and electrical technician.

Integrated Management System Policy at ArcelorMittal Poland S.A. Unit in Dąbrowa Górnicza July 2010

Integrated Management System Policy at ArcelorMittal Poland S.A. Unit in Dąbrowa Górnicza July 2010 3rd edition August 2010

Integrated Management System Policy at ArcelorMittal Poland S.A. Huta Królewska Unit in Chorzów, edition of 2010.03.09.

General characteristics

The policies focus on:

- observance of effective legal acts and standards applicable for steel industry in the conducted business,
- application of technical, technological and organizational solutions making it possible to make the processes less burdensome at their source,
- systematic supervision over and monitoring of significant environmental aspects,
- readiness for operational and rescue activities in case environment hazards occur in the plant,
- consideration for environment protection issues at all management levels,
- keeping equipment technically operational and improving the environmental awareness of employees,
- cooperation with local and regional authorities and shaping of pro-environmental culture, continuous promotion of environment protection accomplishments,

- cooperation with research and scientific centers to find solutions to environment protection problems.

Influence on everyday work of electrical technician and mechanical technician

The policies are documented, implemented, communicated, disseminated and reviewed to keep them up-to-date - they are effective for mechanical technicians and electrical technicians.

Process Safety Policy at ArcelorMittal Poland S.A. Unit in Dąbrowa Górnicza, edition of 2009.10.15

Process Safety Policy at ArcelorMittal Poland S.A . Unit in Kraków, 1st edition November 2007

General characteristics

The purposes of Process Safety Policies of ArcelorMittal Poland S.A. for the Units in Dąbrowa Górnicza and in Kraków are, among others, to:

- identify the risks of the occurring industrial breakdowns and identify and analyze the potential risks of an industrial breakdown,
- risk management through analysis, assessment and monitoring of risk,
- effective utilization of technical resources and means to counteract the occurrence and remove industrial breakdowns,
- determine employees' responsibilities in case of an industrial breakdown, provide trainings for employees.

Influence on everyday work of electrical technician and mechanical technician

The policies are documented, implemented, communicated, disseminated and systematically reviewed to keep them up-to-date. The policy is effective for all employees of ArcelorMittal Poland S.A., Units in Dąbrowa Górnicza and in Kraków, including mechanical technician and electrical technician.

Procedure PS/US/S.21 Identification, assessment and supervision over environmental aspects

General characteristics

The purpose of the procedure is to ensure identification, assessment and supervision over environmental aspects in order to determine their environmental impact and to set up a program to reduce environmental impact of ArcelorMittal Poland S.A.

The procedure covers the principles and procedures for registration and qualification of environmental aspects, as well as their supervision, determination of environmental objectives and tasks, setting up the Environment Management Program and Integrated Management System Policy.

The procedure covers the documents related to the supervision over environment aspects of the Integrated Management System.

Each Unit keeps a register of important environment aspects, defining the scope of functioning where such aspects occur, and defining the type of environment impact.

Influence on everyday work of electrical technician and mechanical technician

An employee, including an electrical technician and a mechanical technician should demonstrate their knowledge of environmental aspects in their area of functioning. Environmental aspects may be specified in job instructions:

Examples of environmental aspects defined in a job description:

No.	Environmental aspect	Source of origin	Existing devices that mitigate the effect	Comments
1.	Organized emission - dust - gases	-	-	
2.	Fugitive emission - dust - gases	- repair of sections	-	
3.	Water and sewage management - sewage	- saw cooling	-	- closed water circuit
4.	Waste management - scrap, crops, strips, wires - safety clothes	-cutting out the defects, grinding	-	Transport: - to the steel making shop - clothing warehouse
5.	Oil and grease management	-	-	
6.	Hazardous materials	-	-	
7.	Noise	- transport devices, saw, grinders	-	Noise in the bay which does not reach external environment
8.	Radioactive radiation	-	-	
9.	Heat radiation	-	-	
10.	Electromagnetic field	-	-	
11.	Other	-	-	

Procedure PS/ZJ-5/Z.18 Response to breakdowns, potential breakdowns and major breakdowns

General characteristics

The purpose of the procedure is to define actions to be taken when:

- reporting and conveying information about breakdowns, potential breakdowns and major breakdowns,
- ensuring identification of risks and potential breakdown sites,
- assessing breakdown risk,
- properly responding to potential breakdowns, breakdowns and major breakdowns.

The purpose of the procedure is to define particular steps while identifying the sites of potential breakdowns, proper response to breakdowns and major break-

downs and mitigating the related negative environment impact and risks at particular work stations.

Influence on everyday work of electrical technician and mechanical technician

In line with the provisions of the procedure, each employee, including electrical technician and mechanical technician, who notices a breakdown or a potential breakdown is responsible for:

- taking immediate actions, if possible, to mitigate or remove the effects of a breakdown/potential breakdown,
- inform the supervisor about a risk or a breakdown and participate actively in breakdown removal.

Procedure PS/ZJ-5/Z.20 Operating control of works and actions related to major risks and significant environment aspects

General characteristics

The purpose of the procedure is to determine responsibility and procedures in scope of operations and actions related to identified significant environmental aspects that will result in an attempt to keep a stable level or to improve environmental impact wherever ArcelorMittal Poland S.A. considers it possible.

The object of the procedure is to determine the operating control of the works and actions related to production and operation of equipment/installations, purchasing, investment projects, upgrade projects and repairs, as well as services provided on behalf of the Company related to significant environment aspects in a manner ensuring the delivery of objectives and environment tasks in line with the Integrated Management Policy in the area of environment management.

Influence on everyday work of electrical technician and mechanical technician

In line with this procedure, any works and actions, as well as works performed by an electrical technician and a mechanical technician, of significant environmental impact, should be planned and realized in a manner :

- ensuring a possibility of supervision, control and elimination of risks or breakdowns,
- which does not deviate from the Integrated Management System Policy and which makes it possible to deliver the environment-related targets and tasks.

Integrated permit for the Units in Kraków, Dąbrowa Górnicza and Huta Królewska:

1) Integrated permit for ArcelorMittal Poland S.A. Unit in Dąbrowa Górnicza for the facilities of metal ore sintering, crude hot metal melting of a capacity of over 2,5 Mg heat/ hour, secondary melting of hot metal, processing of ferrous metals through hot rolling, of a capacity of over 20 Mg of crude steel per hour, lime production in kilns of a capacity of over 50 Mg per day / Decision of the Province Governor of Silesia no. ŚR-III-6618/PZ/151/18/7 of 14.06.2007 as amended/
2) Integrated permit for ArcelorMittal Poland S.A. Unit in Kraków, for: coke plant, sinter plant, blast furnaces, steel melting shop, continuous casters, hot rolling mill (old and new), cold rolling mill. /Decision of the Province Governor of Małopolska, no. SR.III.JD.6663-26-06 of 30.10.2007 as amended/
3) Integrated permit for ArcelorMittal Poland S.A. Huta Królewska ŚR-II-6618/125/3/11/07 /decision of August 7, 2007, as amended/
4) Integrated permit for Hutu Królewska for generation of waste in the accessories production facility: rail accessories, mining and automotive accessories and facilities for reclamation of guides for rolling mills, and installations for production and reclamation of rolls, which are not technologically connected

with the IPPC facility /decision of the Province Governor of Silesia, no. ŚR.II.6620/26/2/07 of May 2, 2007/

5) Integrated permit for the facilities located in Sosnowiec Unit ŚR-III 6618/PZ/99/9/06 as amended
6) Integrated permit ŚR-II-6618/14/06/9/07 for the installation for ferrous metals processing by metallic coating and two installations for surface treatment of substances, objects and products with the application of organic solvents, dated April 20, 2007 as amended (Świętochłowice Unit)
7) Integrated permit ŚR-III-6618/PZ/145/06/16/07 for ferrous metals processing by hot rolling dated October 26, 2007 as amended (Batory Plant)

General characteristics

Permits are an administrative decision, which also is a form of a license for industrial operations. They cover, depending on type of installation, emission of pollutants to the air, waste generation and management, operational conditions and installation parameters, water and sewage management, noise emissions, electromagnetic radiation, methods to achieve the level of BAT, and overall environmental protection methods.

Influence on everyday work of electrical technician and mechanical technician

Provisions of the integrated permit have impact on work of the electrical technician and mechanical technician. It is critical for the electrical technician and mechanical technician to be aware that the operation of the plant, as well as their work must fit within the frameworks specified in the permit and any change, e.g. implementation of a new installation or manufacturing different type of waste than the one specified in the permit requires an application to be filed with the competent office with the request for change in the permit.

1) Generation of Waste

Circular Letter no. 2/2010 DL dated August 25, 2010 on disposal of waste and by-products and management of non-moving materials in ArcelorMittal Poland S.A. warehouses.

General characteristics

The regulation implements Instruction which determines the procedure to be followed in ArcelorMittal Poland S.A. for:

a) disposal of waste and by-products,
b) management of non-moving materials in warehouses, including identification, sales and scrapping of obsolete materials.

In the respective plants, there are lists of waste prepared based on the effective catalogue of waste and the integrated or sectoral permit and the list of waste under disposal. Storage of waste/by-products for disposal may take place exclusively in places intended for this purpose, in accordance with the integrated or sectoral permit held.

Influence on everyday work of electrical technician and mechanical technician

Electrical technicians and mechanical technicians are aware of types and character of waste generated in the course of their daily duties. They are obligated, as all employees, to strictly follow the provisions under the instruction.

Procedure for waste management in ArcelorMittal Poland S.A. Kraków Unit.

General characteristics

The goal of the procedure is to establish the principles and responsibility for management of waste generated in relation to actions, products, services of organizational units and in relation to operation of external contractors carrying out

repairs on premises of the Unit or managing waste in the Unit installation, e.g. using the landfill.

Influence on everyday work of electrical technician and mechanical technician

The procedure introduces responsibility of the Unit employees, among others of electrical technician and mechanical technician, for performance of their duties related to waste management in line with the procedure and the plant instructions on waste management, as well as the obligation to inform supervisors on any irregularities occurring in relation to waste management.

Plant instructions on waste management.

In the respective Plants of ArcelorMittal Poland S.A., the plant instructions on waste management are effective. All employees working in a given plant, including electrical technicians and mechanical technicians, are obligated to strictly comply with the provisions of the instruction.

Permit for ArcelorMittal Poland S.A. Dąbrowa Górnicza Unit for generating waste on premises of Ore Reloading Base located at the border of two cities: Dąbrowa Górnicza and Sławków /Decision of the Marshall of the Province of Silesia no. 4145/05/2009 dated December 15, 2009 as amended/

General characteristics

The permit covers:

- types and parameters of installations, type and admissible volume of waste for a given year.
- maximum allowable duration of operational conditions non-complying with the standard but justified for technological reasons, especially in case of startup and decommissioning of installation and release of substances or

energy to the environment under such conditions, as well as emission conditions.

- sources generating waste, place and method of waste storage and methods of waste management.
- scope and methods of monitoring technological processes, including emission measurement and recording
- required actions, including technical conditions aimed at preventing or limiting emissions.

Influence on everyday work of electrical technician and mechanical technician

Provisions of the integrated permit have impact on work of the electrical technician and mechanical technician. It is critical for the electrical technician and mechanical technician to be aware that the operation of the plant, as well as their work must fit within the frameworks specified in the permit and any change, e.g. implementation of a new installation or generating different type of waste than the one specified in the permit requires an application to be filed with the competent office with the request for change in the permit.

Integrated permit for ArcelorMittal Poland S.A Kraków Unit for "Installation no. 1 for storage of waste other than hazardous or neutral waste" - landfill in Pleszów /Decision of the Marshall of Małopolska Province no. SW.II.JD.7673-13/08 dated March 26, 2008 as amended/

Integrated Permit for ArcelorMittal Poland S.A. Kraków Unit for "Installation no.2 for storage of waste other than hazardous and neutral waste" i.e. landfill of iron-bearing waste – plots no. 1, 2, 3, storage of ash and slag – plot no. II, IIa, III /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-28-06/07 dated August 10, 2007 as amended/

integrated Permit for ArcelorMittal Poland S.A. Kraków Unit for "Installation no. 3 for storage of waste other than hazardous and neutral waste" – sludge storage

yard plot 1 N /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-29-06/07 dated October 17, 2007 as amended/

General characteristics

Permits cover operations in scope of neutralization of waste other than hazardous waste, generating waste other than hazardous waste and operations in scope of recycling of waste other than hazardous waste.

Permits determine, respectively:

- type of operations, operational conditions and parameters of installation, including water and sewage management, emissions to the air, noise emissions,
- conditions for operations in scope of generating waste other than hazardous and neutral waste on landfills owned by ArcelorMittal Poland S.A. in Kraków,
- conditions for operations in scope of neutralization of waste in the landfill in Pleszów - plot D, including admissible types and volumes of waste,
- conditions for operations in scope of waste recycling in Pleszów landfill – plot D.
- assessment of compliance with BAT in scope of surface and underground water protection, in scope of cooperation with external sewage treatment installations, waste management, air protection and noise protection,
- scope and methods of environment monitoring, including measurement and recording of emission levels and control of installation use.
- transboundary impact,
- evaluation of compliance with BAT.

Influence on everyday work of electrical technician and mechanical technician

Provisions of the integrated permit have impact on work of the electrical technician and mechanical technician. It is critical for the electrical technician and me-

chanical technician to be aware that the operation of the plant, as well as their work must fit within the frameworks specified in the permit and any change, e.g. implementation of a new installation or generating different type of waste than the one specified in the permit requires an application to be filed with the competent office with the request for change in the permit.

Decision of the Province Governor of Silesia dated May 2, 2007 no.ŚR.II.6620/26/2/07 granting permit for waste water generation at Rail Accessories Department. (Huta Królewska Unit)

Influence on everyday work of electrical technician and mechanical technician

The decision has impact on work of the electrical technician and mechanical technician working in the above-mentioned area.

2) Generation of Emissions to Atmosphere

Besides the conditions specified in integrated permits for Units:

Permit for AMP S.A. Huta Królewska for emission of gas and dust from installation not requiring the Integrated Permit. /Decision of the Province Governor of Silesia ŚR-III-P6610/4/2/07 dated April 16, 2007. /

General characteristics

The permit regulates:

- type and parameters of the installation, heat management, materials and raw materials balance for the installation,
- sources of emissions, environment protection equipment and gas and liquids release from installations producing hot rolled products,
- emission conditions, emissions monitoring – scope and method of measurement and marking.

Influence on everyday work of electrical technician and mechanical technician

The decision has impact on work of the electrical technician and mechanical technician working in the above-mentioned area.

Internal standards concerning emissions of substances to the environment and principles of controlling their observance – p.o. 2/2004 DN

General characteristics

The regulation implements internal standards concerning quality of waste water at control points and substances emitted to the atmosphere.

Influence on everyday work of electrical technician and mechanical technician

Each employee of the Steelworks, including electrical technician and mechanical technician, is obligated to strictly follow the provisions set in the regulation.

The provision in question classifies the following cases as violation of regulations and standards of environment protection:

- operation of equipment without the required permits from environmental bodies,
- failure to take measurements of pollution within the required deadline, including acceptance measurements for new installations,
- overrun of internal emission standards and failure to take immediate countermeasures,
- gross negligence of technological discipline and principles of plant and machinery operation, including operation of environmental protection equipment (failure to remove dust from dust-catching equipment, settling tank overfilled with sediment and scales, production waste storage in places where it is not allowed etc.),

- technological operations with inactive or damaged environment protection devices,
- failure to meet the conditions required by the Polish standards (PN), necessary to take measurements of substances concentration,
- failure to implement recommendations specified after inspection.

The regulation refers to the principle that an employee responsible for damage to the natural environment or who violates the universally binding regulations on environment protection comes under civil or criminal liability.

The procedure of minimizing the day-to-day impact of installations of ArcelorMittal Poland S.A. Kraków on quality of air (including z instructions for Coking Plant, Blast Furnaces, Steel Shop, Power and Utilities Department) dated June 2008

General characteristics

Determines principles and procedure for day-to-day monitoring of emissions that have impact on quality of air, especially when weather conditions are bad.

Influence on everyday work of electrical technician and mechanical technician

Procedure and related instructions have influence on work of electrical technician and mechanical technician.

3) Generation of Emissions to Water

Regulations under the integrated permits for ArcelorMittal Poland S.A. and:
Integrated Permit for ArcelorMittal Poland S.A Kraków Unit:

- "Installation no. 1 for storage of waste other than hazardous or neutral waste" - landfill in Pleszów /Decision of the Marshall of Małopolska Province no. SW.II.JD.7673-13/08 dated March 26, 2008 as amended/,

- "installation no.2 for storage of waste other than hazardous and neutral waste" i.e. landfill of iron-bearing waste – plots no. 1, 2, 3, storage of ash and slag – plot no. II, IIa, III /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-28-06/07 dated August 10, 2007 as amended/,
- "Installation no. 3 for storage waste other than hazardous and neutral waste" – sludge storage yard plot 1 N /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-29-06/07 dated October 17, 2007 as amended/

in scope of water and sewage management of installations covered by the permit and protection of surface and underground water.

Regulation discussed in 1) Generation of Waste

Circular Letter no. 2/2004 DN on internal standards concerning emissions of substances to the environment and principles of compliance monitoring in scope of standards of waste water quality at control points.

The regulation was discussed under item 2) Generation of Emissions to Atmosphere

4) Climate Change & Energy Efficiency

Permit for ArcelorMittal Poland S.A. Dąbrowa Górnicza Unit for participation in the ETS as amended / Decision of the Province Governor of Silesia ŚR-III/P/6610/D/CO2/2a/2/05/06 dated April 10, 2006 as amended/
Decision concerning participation in the ETS for ArcelorMittal Poland S.A. Kraków Unit installations dated March 16, 2010 (SR.III.JD.6610-16-1-05/06) as amended

General characteristics

Regulations provide for, among others, substances covered by the system, type of substances covered by the system, requirements for monitoring of emission levels

Influence on everyday work of electrical technician and mechanical technician

The above regulations have no direct impact on work of mechanical technicians and electrical technicians, however it is important for them to be aware that GHG emission is regulated by additional regulations binding on the Company units.

5) Contamination of Land and Groundwater

Integrated Permit for ArcelorMittal Poland S.A Kraków Unit for:

- "Installation no. 1 for storage of waste other than hazardous or neutral waste" - landfill in Pleszów /Decision of the Marshall of Małopolska Province no. SW.II.JD.7673-13/08 dated March 26, 2008 as amended/,
- "Installation no.2 for storage of waste other than hazardous and neutral waste" i.e. landfill of iron-bearing waste – plots no. 1, 2, 3, storage of ash and slag – plot no. II, IIa, III /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-28-06/07 dated August 10, 2007 as amended/,
- "Installation no. 3 for storage waste other than hazardous and neutral waste" – sludge storage yard plot 1 N /Decision of the Province Governor of Małopolska no. ŚR.III.JD.6663-29-06/07 dated October 17, 2007 as amended/.

in scope of water and sewage management of installations covered by the permit and protection of surface and underground water.

Regulation discussed in 1) Generation of Waste

4.C.2 HEALTH AND SAFETY ISSUES

2) *Foundation – the most important element*

Directive no. 2/2009 DG dated January 15, 2009 on implementation of operating standards of ArcelorMittal Group in scope of work health and safety, as amended

General characteristics

The regulation implements ArcelorMittal standards:

- AM 002 "Confined spaces": Observance of the locally binding regulations for work in confined space is the minimum requirement for the Group Companies. This AM standard is applicable wherever it is more stringent than other regulations effective in this scope.
- AM 003 "Works at height": the standard is applicable for any task where the risk assessment highlights a danger of falling. For work at height above 1.8 m (6 feet), fall prevention or protection must be used.
- AM 004 "Rail Safety": Observance of the locally effective regulations near routes (tracks) and rail infrastructure is the minimum requirement for the Group Companies. This AM standard is applicable wherever it is more stringent than other regulations effective in this scope.
- AM 006 "Vehicles and driving": The standard concerns all vehicles, including mobile mining equipment, owned or leased and used by ArcelorMittal or providers of services on premises of ArcelorMittal or outside ArcelorMittal for its purposes.
- AM 007 "Cranes and lifting": The standard is applicable to all cranes, including vehicle-mounted cranes, equipment used as cranes, hoists, equipment for lifting and suspensions. This standard is not applicable for lifting operations in mines.

- AM 008 Contractors: The standard concerns all Contractors performing work on premises of ArcelorMittal (operational and non-operational) and covers contractors supplying materials to ArcelorMittal plants.
- AM 009 "Emergency": The goal of the procedure is to notify the top management of ArcelorMittal about serious accidents immediately after they occur.
- AM 012 – "Work in gas hazard zones": The standard provides for minimum requirements for work in environment where gas risks are present (gas hazard zones) and their goal is to prevent generation of explosive mixes, suffocating or toxic gas, and to manage oxygen content so as to prevent either excessively fast combustion or the cases of suffocation (dangerous atmosphere). The standards are applicable for areas where gas hazard has a permanent character, such as blast furnaces and coking plants, which however do not meet the requirements for access to confined spaces, which are regulated separately in AM Standards on confined spaces.

Observance of the local regulations is mandatory. Additionally, these standards must be applied wherever they are more stringent than the local regulations.

Influence on everyday work of electrical technician and mechanical technician

The above regulation has impact on work of mechanical technician and electrical technician, for whom application of the above is mandatory in their work for AM.

Policy of the Integrated Management System ArcelorMittal Poland S.A. 1st edition August 2010

Policy of the Integrated Management System of ArcelorMittal Poland S.A. Dąbrowa Górnicza July 2010.

Policy of the Integrated Management System of ArcelorMittal Poland S.A. Krakow Unit 3rd edition August 2010

Policy of the Integrated Management System of ArcelorMittal Poland S.A. Huta Królewska Unit at Chorzów edition of 2010.03.09.

Policies discussed in part ***ENVIRONMENTAL ISSUES***

Policy of the Process Safety of ArcelorMittal Poland S.A. Dąbrowa Górnicza Unit edition of 2009.10.15

Policy of the Process Safety of ArcelorMittal Poland S.A. Kraków Unit 1st edition of November 2007.

Policies discussed in part ***ENVIRONMENTAL ISSUES***

Circular Letter no.10/2006 DG dated October 17, 2006 on: supervision over fire safety in Mittal Steel Poland S.A.

General characteristics

Legal regulations aimed at ensuring correct functioning of fire service in Mittal Steel Poland S.A.

Influence on everyday work of electrical technician and mechanical technician

Each employee, including electrical technician and mechanical technician, is obligated to strictly follow provisions covered by the circular letter.

3) *Workplace requirements*

Circular Letter no. 8/2005 dated May 3, 2005 on working conditions improvement plans.

General characteristics

Based on the above regulation, safety conditions improvement plans are established. Tasks related to plans take into account technical projects aimed at working conditions improvement, especially limiting major risks resulting from hazard identification and risk assessment at the workplace and meeting legal requirements. As much as it is possible, each task has a specific goal and measurable indicator of the effects of activity on health and safety, related to implementation of a given task.

Influence on everyday work of electrical technician and mechanical technician

Tasks to be included in the plan are prepared in cooperation with managers of organizational units and employees. The regulation has impact on work of the electrical technician and mechanical technician, who may submit their comments during creation of the plan.

Circular Letter no.10/2005 DG of December 1, 2005 on training of employees in occupational health and safety

General characteristics

The Circular Letter implements instruction on safety trainings in Mittal Steel Poland S.A., to implement the Regulation of the Minister of Labor and Economy dated July 27, 2004 on trainings in occupational health and safety (Journal of Laws of 2004 no.180 item 1860 as amended) in Mittal Steel Poland.

Influence on everyday work of electrical technician and mechanical technician

The above regulation has impact on work of electrical technician and mechanical technician.

Trainings of employees in scope of occupational health and safety are aimed at:

- providing information on the environmental factors at workstations and occupational risk related to work performed, safety measures to avoid threats that these factors may cause, and methods of safe work,
- providing information on laws and rules of work health and safety in scope required for performance of work at the workplace and at a given position, and also in relation to work, duties and responsibilities in scope of occupational health and safety,
- acquiring skills of working in a way that is safe both for the employee and other persons, actions to be taken in emergency situations and providing first aid to a person involved in an accident.

Circular Letter 7/2009 DB dated August 6, 2009 on health and safety of work on electrical power equipment, installations and networks

General characteristics

The regulation implements the instruction on principles of organization of safe work on electrical power equipment, installations and networks or in their vicinity, for employees working on such equipment, installations and networks in ArcelorMittal Poland S.A Krakow Unit. The instruction is applicable during use, measurement, trials, inspections, maintenance, repairs, redesign, extension and startup of electrical power equipment, installations and networks. Instruction is addressed to employees monitoring or supervising operation of electrical power equipment, installations and networks and persons employed for their operation. The instruction is the basis for updating or developing detailed job descriptions and operation manuals, and it may also be a component of these instructions.

The instruction does not settle all the operational details, it provides for basic procedures and actions to be taken.

The instruction implements the principle of informing employees about the occupational risk and threats for life and health, in relation to their work with electrical power equipment, installations and networks. Managers of organizational units are obligated to take measures aimed at eliminating or mitigating occupational risk and threats on these workstations. This concerns electric, magnetic and electrostatic field strengths, with values exceeding the admissible level for a given workstation – provided for in the regulations.

Influence on everyday work of electrical technician and mechanical technician

The regulation has an impact on work of electrical technician and mechanical technician, who are obligated to strictly follow the provisions under the Instruction.

Circular Letter no. 16/2008 on gas safety in ArcelorMittal Poland S.A. Krakow Unit

General characteristics

The regulation implements Gas Safety Instruction, the goal of which is, among others to determine:

- tasks and obligations related to gas safety for organizational units of ArcelorMittal Poland S.A. Krakow Unit, which produce, consume or transfer gas fuel for production purposes, carry out chemical processing operations, hire employees to carry out repairs and maintenance of equipment in gas hazard zones,
- methods of organizing work with gas equipment and installations and gas hazard zones.

The regulations under the Instruction were based on the national regulations effective in this scope.

Influence on everyday work of electrical technician and mechanical technician

The regulation has an impact on work of electrical technician and mechanical technician, who are obligated to strictly follow the provisions under the Instruction during performance of works in gas hazard zones. The employees performing works in accordance with the principles of the instruction should hold certified and appropriate qualifications for use of a given type of gas equipment and installations, confirmed with a relevant certificate and they should unconditionally observe the provisions under the Instruction. Employees who are not regular employees of the plant, using a given device and gas installation should perform works exclusively based on a written order, except for the works for which actions related to operation permit were determined separately in writing. Employees who are the team members are responsible for:

- performance of work in accordance with the principles and regulations of work safety and instructions and guidelines from work manager,
- use of the required PPE, work clothes and footwear and the tools and equipment required for performance of a given type of work,
- notify the team leader on the necessity to stop work if it is impossible to perform it in accordance with the safety rules and regulations.

Circular Letter no. 11/2008 on safety and organization of work with gas equipment and installations in ArcelorMittal Poland S.A. Dąbrowa Górnicza Unit

Circular Letter no. 3/2010 DD dated April 26, 2010 on safety and organization of work with gas equipment and installations in ArcelorMittal Poland S.A. Huta Królewska Plant

General characteristics

The regulations implement the Instruction on safety and organization of work on gas equipment and installations in ArcelorMittal Poland S.A. for the organizational units located on premises of Dąbrowa Górnicza and Rules on safety and organization of work on gas equipment and installations in ArcelorMittal Poland S.A. in Huta Królewska Plant respectively.

The regulations determine general rules of operation, repairs and inspections of gas networks and equipment as well as safety requirements related to their operation.

The regulations define rooms, places and zones of gas hazard, rules to be followed during repairs of such installations, defines types of works under gas hazard, detailed regulations on procedure for work related to gas hazard, rules for operations of cutting and welding of gas pipelines, principles of handing over equipment and installations for use after repair, startup of gas equipment and installations, principles of work in pits, tanks and chambers and principles for operation of equipment and installations with oxygen and neutral gases.

Influence on everyday work of electrical technician and mechanical technician

The regulation has an impact on work of electrical technician and mechanical technician, who during performance of work in gas hazard zones should hold the required permits and strictly follow the instruction.

The detailed regulations on work safety and organization of work on gas installations and equipment are included in job descriptions and equipment operation manuals.

Directive no. 1/2010 DG dated January 19 2010 on works for which assistance of the other employee is required – Directive 1/2010 DG, Appendix 1/2010

General characteristics

The Directive implements a list of works for which assistance of the other employee is required. The list of works included, among others:

- live working on electrical power equipment, e.g. removal of defects in electrical operation rooms except for exchange of fuses and light bulbs in networks with voltage up to 1 KV,
- any inspection, maintenance and repair work on belt conveyors.
- works at height for which it is required to use PPE for fall prevention (works on ladders, scaffoldings, with the use of manlift etc.)
- electrical works – measurements on live networks.
- other works specified in the Directive.

Influence on everyday work of electrical technician and mechanical technician

The above regulation is effective for the electrical technician and mechanical technician, provided that they perform works covered by the list.

The list of works for which assistance of the other person is required may be defined in the job description or operation manual.

Circular Letter no. 1/2010 DG dated January 19, 2010 on preventive medical checkups for employees of ArcelorMittal Poland S.A.

General characteristics

The regulation determines the principles of conducting pre-employment medical examinations, periodic examinations and health screening. All employees of the company AMP undergo medical examinations. Frequency and scope of the examinations is specified by a medical doctor depending on the patient's health determined as a result of medical examination and assessment of risks for life and

health present in the working environment at a given workstation. The scope of preventive healthcare, required due to working conditions, also covers periodic checkups carried out in addition to the regular checkup schedule whenever a negative impact of work performed on an employee's health is identified, symptoms of occupational disease are diagnosed, an employee becomes unable to continue with their former duties, an employee suffered an accident at work or was diagnosed with occupational disease but does not have a medical decision determining the level of disability, performance of targeted tests and exposure tests on employees at workstations where cases occupational disease were diagnosed, health monitoring for employees performing work in conditions of exceeded maximum allowable concentrations (Polish - NSD) and threshold limit values (Polish - NDN) of harmful substances, biological monitoring of employees exposed to carcinogenic substances and application of other methods of early detection of consequences of such an exposure.

The supervisor of an employee who undergoes the above checkups may not allow such an employee to perform work without a valid medical certificate stating the lack of medical contraindications for an employee to perform work at a given workstation.

An employee exposed to carcinogenic substances or dusts that may lead to pulmonary fibrosis undergoes periodic checkups also after he/she is no longer exposed to such substances as well as after the employment of such a person is terminated – upon the employee's request.

Influence on everyday work of electrical technician and mechanical technician

The regulation is binding on all employees, including electrical technician and mechanical technician.

Directive No. 8/2010 DG of December 22, 2010. Raising the awareness in scope of safety and health protection.

General characteristics

The policy introduces the Occupational Health and Safety Awareness Management Program in ArcelorMittal Poland S.A. One of the objectives of the Occupational Health and Safety Awareness Management Program in ArcelorMittal Poland S.A. is to ensure the delivery of occupational health and safety objectives set for a given calendar year. The Program is used as one of the tools applied to identify threats and near misses in the Company.

The Program consists of three elements: _Minutes for Safety,_Behavior-Based Audit,_Shop Floor Audits.

The purpose of Minutes for Safety, Behavior and Shop Floor Audits is to determine near misses and near miss threats.

Minutes for Safety are short meetings with up to 6 participants. The objective of such meetings is to engage employees in safety issues and develop new rules/forms of behavior with the aim of improving OH&S and eliminating near misses/near miss threats. Minutes for Safety constitute the register of near misses/near miss threats. The meetings are held 4 times a year.

Well-conducted Minutes for Safety provide a precise description on how to safely perform a given task, which is used as the basis for formulation of job instructions.

Behavior-based and shop floor audits are talks with employees that are based on the observation of the employees' forms of behavior with special emphasis attached to work standards. The aim of such audits is to determine safe forms of behavior and methods of work along with the areas of responsibility. Behavior-based audit is an audit and/or multi-level assessment, as specified in operational standard of ArcelorMittal Group no. OH&S AM 005 "Audits at plants/ Multi-level assessment".

The objective of the audit is to:

- review work practices,

- reinforce safe behavior,
- identify obstacles hindering employees from behaving in a safe manner,
- convey health and behavior-related standards and Company's expectations to each employee individually during discussions,
- identify key areas to be improved.

Where it is noticed that an employee uses unsafe work practices, it is necessary to immediately stop the work and oblige employees to correct their behavior or implement accident prevention measures.

An audit should focus on the observation and evaluation of employees' behavior at work rather than on the assessment of work conditions. It should also focus on the observation and evaluation of support provided to safety-related actions, participation in Minutes for Safety, manner of reporting to direct superiors any accidents, hazardous situations, weak points regarding safety issues and proposals concerning the improvement, manner of drawing employees' attention to dangerous forms of behavior noticed, compliance with occupational health and safety regulations.

Influence on everyday work of electrical technician and mechanical technician

The policy affects the work performed by electrical technician and mechanical technician, who, by participating in the Awareness Management Program, may contribute to the improvement of OH&S conditions at their workplace.

Supervision over safety of employees of ArcelorMittal Poland S.A. performing work at workplaces where explosive atmospheres may occur – circular letter 15/2009 DG

General characteristics

The policy introduces an obligatory risk assessment to be performed at least once a year regarding workplaces where explosive atmospheres may occur as well as imposes an obligation to mark the areas endangered by explosion.

Influence on everyday work of electrical technician and mechanical technician

All employees have been obliged to comply with the regulations resulting from this policy. The policy in itself does not have a direct impact on the work performed by mechanical technician and electrical technician. Detailed regulations regarding the performance of work at workplace where explosive atmospheres may occur have been specified in operational instructions and job instructions.

Directive no. 3/2007 DG of May 25, 2007 on determining circumstances and causes of accidents at work (acc. to distribution list 25/2007 DN), Enclosure 1/2008, Enclosure 2/2009, Enclosure No. 3/2011

General characteristics

The directive introduces the instruction for determining circumstances and causes of accidents at work effective for all AMP employees.

Influence on everyday work of electrical technician and mechanical technician

The policy is effective for both a mechanical technician and electrical technician. The policy guides an employee through the whole post-accident procedure, determines rights and obligations of the injured employees and those who noticed the accident as well as their superiors. The policy specifies also actions undertaken to determine circumstances and causes of accidents.

Circular letter no. 1/2004 DP on detailed rules and procedure for classifying incidents as accidents on way to or from work

General characteristics

The rule of law issued in relation to the regulations resulting from the Directive of the Ministry of Labor and Social Policy of December 24, 2002 on detailed rules and procedures for classifying incidents as accidents on way to or from work, manner of the accident documentation, templates of card of accidents on way to or from work and deadline for the card completion (Journal of Laws. no. 237, item 2015. The Act introduces the instruction which provides the definition of the accident on way to or from work and specifies detailed procedure for actions in case such accident occurs.

Influence on everyday work of electrical technician and mechanical technician

All employees, including electrical technicians and mechanical technicians, are obliged to demonstrate the knowledge and strict adherence to the above mentioned act in law.

Circular letter no. 8/2009 DD of November 03, 2009 on implementation of fire safety instruction in Huta Królewska Plant

General characteristics

In order to provide fire protection, "Fire Safety Instruction for Huta Królewska Plant" has been implemented in line with Journal of Laws of 2006, no. 80, item 563.

Influence on everyday work of electrical technician and mechanical technician

Every employee of Huta Królewska Plant, including mechanical technician and electrical technician, is obliged to comply with the regulations included in the circular letter.

Procedure PS/ZJ-5/Z.15. Response to near misses/ near miss threats

General characteristics

The purpose of this procedure is to define procedure for actions regarding:

- reporting, recording and conveying information on near-misses/ near miss threats,
- responding properly to near-misses/near-miss threats,
- raising awareness of employees of ArcelorMittal S.A. regarding OH&S.

The procedure focuses on the principles of reporting, recording and handling near-misses/near-miss threats.

Influence on everyday work of electrical technician and mechanical technician

In line with this procedure, each employee, including mechanical technician and electrical technician, who notices a near miss or near miss threat is responsible for:

- taking immediate action, if possible, to mitigate or eliminate consequences of a near-miss/near-miss threat,
- reporting the occurrence of near miss/ near miss threat.

Methods of threat prevention as well as potential accident and health threats are specified in job instructions and/or occupational hazard assessment sheet as well as in operational instructions. The above mentioned documents specify the type of risk factor, source of threat and manners of threat prevention.

Procedure PS/ZJ-5/Z.18 Response to breakdowns, potential breakdowns and major breakdowns

General characteristics

The purpose of the procedure is to define procedure for actions regarding:

- reporting and conveying information about breakdowns, potential breakdowns and major breakdowns,
- ensuring identification of threats and sites of potential breakdowns,
- evaluating the risk of a breakdown,
- responding properly to potential breakdowns, breakdowns and major breakdowns.

The subject of the procedure covers the determination of further procedure to be followed during the identification of sites of potential breakdowns, proper response to breakdowns and serious breakdowns and reduction of negative environmental impact related thereto, as well as reduction of threats existing at individual workplaces.

Influence on everyday work of electrical technician and mechanical technician

In line with this procedure, each employee, including mechanical technician and electrical technician, who notices a breakdown, potential breakdown is responsible for:

- taking immediate action, if possible, to mitigate or eliminate consequences of a breakdown/ potential breakdown,
- reporting the occurrence of a breakdown/ potential breakdown.

Procedure PS/ZJ-5/Z.20 Operating control over the works and activities related to serious risks and significant environmental aspects

General characteristics

The purpose of the procedure is to define responsibility and procedure for actions regarding:

- works and activities related to serious risk, i.e. planning and performing particularly hazardous works.

The subject of the procedure covers the establishment of operating control over works and activities related to:

machine/installation manufacturing and operation, purchases, investment, upgrading and repair works as well as services rendered on the behalf of the Company with regard to:

- serious risk in the way that ensures the delivery of general and specific OH&S objectives in line with the Policy of Integrated Management Systems in the scope of OH&S management and Corporate Standards of ArcelorMittal Group.

Influence on everyday work of electrical technician and mechanical technician

In line with this procedure, any works and activities, as well as works performed by an electrical technician and mechanical technician, of significant OH&S impact, should be planned and realized in a manner:

- enabling control, management and elimination of hazards, accident or breakdown,
- which does not deviate from the Integrated Management System Policy and which makes it possible to deliver general and specific OH&S objectives.

Procedure PS/ZJ-5/B.19 Monitoring and control of OH&S condition

General characteristics

The purpose of this procedure is to determine the procedure for actions during monitoring and control of OH&S condition, in particular:

- tests and measurements of health risk factors present at workplace,
- control of activities conducted by ArcelorMittal Poland S.A. in terms of their compliance with accepted Integrated Management Policy and general and specific targets resulting therefrom, as well as legal requirements and other requirements related to OH&S aspects,
- determination of rules of efficiency in relation to supervision and control ensuring safe and hygienic work conditions,
- compliance with requirements resulting from "Document regarding protection against explosions".

The subject of the procedure covers the procedure for actions regarding conducting tests and measurements of health risk factors during the monitoring and control of OH&S condition and employees' behavior.

Influence on everyday work of electrical technician and mechanical technician

In line with this procedure, each employee, including an electrical technician and mechanical technician, must perform their work in compliance with OH&S regulations. Both an electrical technician and mechanical technician are obliged to control the efficiency of machines and installations in line with OH&S requirements and report to the superior new threats, non-compliance, which may have impact on the safety at work.

3) Dangerous agents at work

General characteristics

Methods of threat prevention as well as potential accident and health threats are specified in job instructions and/or occupational hazard assessment card as well as in operational instructions. The above mentioned documents specify the type of risk factor, source of threat and manners of prevention.

Examples of types of factors, source of threat and manners of prevention - job description:

No.	Type of risk factor	Source of risk:	Manners of prevention
1.	Noise	- machines in operation - material transported on roller tables	- staying in zones of high noise level limited to minimum - using hearing protectors
2.	Dustiness	- technological process - repairs - welding works	- using dust masks
3.	Temperature	- technological process conducted at high temperatures - draughts due to structure of production bay	- using appropriate protection and working clothing in line with allocation norms
4.	Difference in levels at workstation and while ascending/descending to workstation	- gangways over roller tables - Works on heights	- walking along marked paths only - using equipment preventing falls from heights
5.	equipment operating at height	- overhead cranes and other hoisting equipment in operation	- protective helmets to be used in the whole production bay - standing/ walking underneath suspended loads and overhead cranes in operation is strictly prohibited
6.	Machines in operation	- roller tables - tilters - transfers - overhead cranes	- it is necessary to exercise due care when the machines are in operation - only trained employees with appropriate qualifications in special cases (e.g. hook operator) - getting access to machines in operation is strictly prohibited
7.	rotating parts of machines	- rotors - rolls	- using proper protection / safety devices on rotating elements of machines - standing/ remaining within close proximity to rotating elements is strictly prohibited
8.	Thermal and visible radiation	- Technological process - welding and burning process	- avoiding remaining unnecessarily in areas where the above mentioned radiation occurs - using protective screens - using appropriate protection clothing and equipment while welding and burning
9.	Metal and scale spalls, chips and filings	- welding and burning process - descaling machines - grinding machines - machining equipment (saws, lathes, drills, etc.)	- employees other than the operator are prohibited from remaining near the machines in operation - work to be performed only after putting on appropriate protective equipment (glasses, welder's helmets)
10.	Electrocution	- electrical machines and equipment - electrical wires:	- using machines and equipment checked for the efficiency of fire prevention equipment by means of measurements performed at least once a year - touching unprotected or unknown electrical wires is strictly prohibited

Influence on everyday work of electrical technician and mechanical technician

In order to eliminate threats to life and health as well as circumstances, in which an employee may be involved in an accident, each employee is obliged to comply with the requirements included in the instructions for work organization involving the operation of a particular machine as well as general instructions issued in the plant.

4) Exposure to chemical agents and chemical safety

Carcinogen or mutagen substances, preparations, agents or technological processes – p.o. 9/2005 DG (acc. to distribution list 55/2005 DN), Enclosure 1/2008, acc. to distribution list

General characteristics

An act in law issued to implement the regulations of the Ministry of Health of December 1, 2004 (Journal of Laws no. 280 of 2004, item 2771 as amended). The regulation imposes an obligation to prepare a register of works, the performance of which requires the employees to remain in contact with the above mentioned substances, processes etc. along with the list of employees exposed to risk. The registers are made available to employees who may view the information pertaining to them. Employees exposed to the above mentioned agents should receive regular up-to-date information about containers, tanks and installations containing the above mentioned agents as well as information on requirements regarding marking and warning signs. Employees should participate in training courses in scope of: risk to health which results from the assessment of occupational exposure and precautionary measures which should be undertaken to limit the exposure, hygienic requirements to limit the exposure, accident prevention activities and activities to be undertaken during the accidents and rescue operations. Employees should be informed about the exposure to the above mentioned agents.

In case of the exposure due to breakdown, repair, maintenance works and other works, employees should receive the information on the causes of the exposure and preventive measures.

Influence on everyday work of electrical technician and mechanical technician

The policy has an impact on the work of mechanical technicians and electrical technicians if their professional duties involve handling carcinogen or mutagen substances, etc.

Information about the exposure of an employee, including mechanical technician and electrical technician, to carcinogenic and mutagen substances, preparations, agents and technological processes is included in job description and/or occupational hazard assessment card as well as operating instructions.

Circular letter no. 13/2004 DN on handling dangerous substances and chemical preparations in „Ispat Polska Stal" S.A. Unit in Kraków
Circular letter no. 7/2004 DN on handling dangerous substances and chemical preparations in Unit in Dąbrowa Górnicza

General characteristics

The policy introduces the instructions, the subject of which covers the procedure for actions regarding purchase, transportation, storage and usage of chemical substances and preparations posing a threat to human health, life or natural environment. The instructions do not contain any detailed information on handling individual hazardous substances and chemical preparations. This information is included in the safety data sheet prepared by the producer or distributor and attached to the delivered product. The regulation introduces an obligation to prepare a list of hazardous chemical preparations, substances and materials used in

the Unit as well as a safety data sheet. The instruction includes regulations regarding transportation and storage of hazardous wastes.

The user of the hazardous substances and preparations is obliged to:

a) have the up-to-date list of hazardous substances and preparations used in the organizational unit, the safety data sheet on such substances as well as instructions defining manner of storing, packing, loading, transporting, applying such substances as well as the manner of appropriate usage of personal and collective protective equipment,

b) while placing an order, specify in an requisition form whether the ordered substance is hazardous or not,

c) familiarize themselves with the substance and preparation marks,

d) familiarize themselves with the safety data sheet and specify the conditions of substance or preparation usage by taking into consideration information included therein,

e) take threat prevention actions,

f) properly mark: tanks and receptacles containing hazardous substances or preparations at workplace and pipelines and at a site, where substantial amounts of hazardous substances and preparations are stored; installations and machines, in which substances posing a threat to natural environment were or are still being used; containers and machines containing controlled substances.

Influence on everyday work of electrical technician and mechanical technician

Employees responsible for transportation, storage and employees who use hazardous substances and chemical preparations in production process or in laboratories should be trained in this scope and are obliged to strictly comply with the regulations following from this instruction The policy has an impact on the work of a mechanical technician and electrical technician.

Circular Letter no. 1/2006 DT of May 17, 2006 on the procedure for actions regarding machines and installations which contain or are intended to contain PCB, asbestos-containing products and ozone-depleting substances

General characteristics

The policy regulates the procedure for actions regarding:

- rendering harmless and removing PCB from machines and installations containing or intended to contain PCB,
- purchasing, transporting, using and disposing of asbestos-containing products,
- products, machines and installations containing ozone-depleting substances.

Influence on everyday work of electrical technician and mechanical technician

The policy has an impact on the work of electrical technicians and mechanical technicians who are obliged to comply with the policy if their professional duties involve handling the above mentioned substances

5) Noise

Noise exposure is specified in job instructions and/or occupational risk assessment card and operational instructions.

6) Artificial optical radiation

Using sources of ionizing radiation in Tadeusz Sendzimir Steelworks Unit – circular letter 6/2003 DN,

General characteristics

The circular letter introduces an instruction regarding utilization of sources of ionizing radiation in AMP Unit in Kraków. It introduces conditions regarding the utilization of the sources of ionizing radiation, including an obligation to participate in relevant training courses.

The user is responsible for the state and proper exploitation of sources of ionizing radiation and the apparatus. He is also responsible for assuring compliance with the regulations on radiation protection. While performing works involving the use of ionizing sources, the user is obliged to use dosimeters and equipment designed to protect the work environment according to the scope and type of work performed. Furthermore, the user is obliged to mark the workstations and hazard zones, to provide training to employees in scope of fire prevention, activities being performed, radiation protection, and to demonstrate the knowledge of the relevant regulations.

The policy introduces doses of ionizing radiation specified for employees performing the work connected with the risk of exposure to radiation. The policy introduces also an obligation to of systematic measurements to be performed by appropriate service teams, an obligation to perform works related to assembling, disassembling, activating, deactivating and maintaining or repairing the sources of radiation by authorized fitters, an obligation to store sources of radiation in specially designated warehouses. Redundant unused apparatus with sources of radiation is to be reported by the users to the Inspector of Radiation Protection who controls the process of apparatus liquidation in line with the national regulations. The users are obliged to promptly inform the Inspector of Radiation Protection on changes regarding the state or relocation of sources of radiation.

The policy specifies the procedure to be followed in the event of the radiation accident.

Influence on everyday work of electrical technician and mechanical technician

The policy has an impact on the work of electrical technicians who while performing their official professional duties are particularly exposed to ionizing radiation.

7) Personal Protective Equipment

Circular Letter no. 2 / 2009 DG of April 8, 2009 on the regulations on using anti-dust glasses, protective steel capped footwear, protective helmets and reflective vests.

General characteristics

The policy introduces a strict obligation to use anti-dust glasses, protective steel capped footwear and protective helmets by employees who:

- remain permanently or periodically at production bays and stockyards,
- perform or supervise works in all types of tunnels, passages, collecting centers, ditches, etc.
- perform repair and maintenance works regarding facilities, machines and equipment,
- perform works on the premises of the production units commissioned by all external contractors,
- visit production units/ bays.

Machine operators who perform machining works are exempted from an obligation to wear protective helmets on condition that they remain in the cabins or roofed control rooms and replace a helmet with any other type of headgear.

Exemption from an obligation to wear steel capped footwear refers to employees performing their work at workstations where specialist type of footwear specified in separate regulations and technological requirements is required.

Exemption from an obligation to wear anti-dust glasses refers to employees who:

- perform works requiring them to use other type of individual eye/ face protection equipment,
- wear corrective anti-dust glasses,
- perform works in designated, confined rooms where there is a risk of eye injury with foreign particles.

Personal protective equipment as well as working footwear and clothing is specified in the Table of allocation norms regarding working clothing, protective clothing and protective equipment for all workstations.

Influence on everyday work of electrical technician and mechanical technician

The policy is effective for both mechanical technician and electrical technician.

Directive No. 3/2009 DG of January 19, 2009 on safety rules for works at heights in ArcelorMittal Poland S.A.

General characteristics

The directive introduces safety rules for works at heights in ArcelorMittal S.A. The purpose of the rules is to assure the safety in ArcelorMittal S.A. while performing works at heights in compliance with the ArcelorMittal S.A. operating standard no. OH&S AM 003 „Works at heights". The act regulates the manner of performing works at heights with the use of scaffolding, ladders, movable platforms or a bucket mounted under the crane. It also specifies personal protection equipment against fall from height.

Influence on everyday work of electrical technician and mechanical technician

The directive is effective for both mechanical technician and electrical technician whose professional duties include performing works at heights.

4.D UNITED KINGDOM

4.D.1 Environmental

(EEF) UK Steel is the trade association for the British steel sector and is a division of EEF, the manufacturers' organisation. Its members include every steel producing company in the UK, as well as many steel-processing companies (EEF/UK Steel, 2011).

The body represents the interests of the UK steel industry to government at all levels, promotes the industry and the importance of steel to the public. In addition, it provides information and services to its members. This latter includes informing members of relevant developments in European, UK and other legislative or statutory bodies. The association also seeks to influence those developments to the benefit of its members, so as to try to ensure that they are not disadvantaged compared with their competitors in world steel markets or in other industries (ibid.).

The association also promotes and develops standards within the industry. UK Steel is one of the major representational bodies at BSI (the British Standards Institution) and provides expertise in all the standards-making fora. It is also active in promoting the use and assessing the wider impact of modern standards (ibid).

Finally, UK Steel has two subsidiary companies, which provide specific services to members and to other companies within the wider steel sector. These are firstly, the Iron and Steel Statistics Bureau (ISSB Ltd), which offers both standard and tailor-made statistical services to the steel industry, governments and international organisations.

The second subsidiary company, and of particular relevance here, is UK Steel (Environmental) Ltd. This company was established in 2000 so as to facilitate UK Steel's management and administrative activities on behalf of the industry. These

duties pertain to the sector's collective commitments to reduce energy consumption under the steel industry's Climate Change Levy agreements.

The association also negotiated an agreement (CCA) for a rebate of the Climate Change Levy.

Background

Tata Steel Europe (formerly Corus) is the second largest steel producer in Europe, with major steelmaking operations located primarily in the UK and the Netherlands (Tata Steel, 2011a). It is a subsidiary of Tata Steel Group, one of the world's top ten steel producers. The combined Group has an aggregate crude steel capacity of more than 28 million tonnes and approximately 80,000 employees across four continents (ibid.).

Tata Steel supplies a broad range of products to a variety of markets, including the construction, automotive, packaging and mechanical engineering sectors.

Tata's Position on the Environment

The Tata website states that 'respecting and safeguarding the environment is a fundamental principle held by all Tata Group companies' (Tata Steel, 2011b). Its' Corporate Citizenship Report 2009/10 states the Group's commitment to respecting and safeguarding the natural environment and the biodiversity of areas in which it currently operates or seeks to expand in. Responsibility (including responsibility for the environment) is one of the Group's five core values (Tata Steel, 2011c).

In its published material on its environmental responsibilities, the Group focuses mainly on climate change, reducing carbon dioxide emissions and energy consumption, improving air and water quality and material efficiency. The Group's statements on each of these aspects will now be detailed.

- **Position on Climate Change**

Reducing Carbon Dioxide Emissions and Energy Consumption

A perusal of the 2009/10 Corporate Citizenship Report indicates a strong Group focus on tackling climate change. The Group concedes that the global steel industry is a significant generator of CO_2 emissions but also emphasises its belief that the Group has a positive contribution towards addressing the problem of climate change, in part because its products (i.e. high-strength steels) are making it possible to design and produce lighter and more fuel-efficient vehicles, including hybrid and electric vehicles, and buildings that are more energy efficient and less material intensive (ibid.).

Moreover, over the last forty years, the Group has halved the energy required to make a tonne of steel and the Group is committed to making further substantial reductions in its total CO_2 emissions. The Group had made the reduction of carbon dioxide emissions to less than 1.7 tonnes per tonne of crude steel by 2012, with a longer-term target to reduce CO_2 emissions to less than 1.5 tonnes for every tonne of crude steel produced by 2020.

(ibid.). However, due to the difficulties associated with the economic downturn of 2008/09, the Group has since declared these targets to be unattainable, and will be issuing revised targets later this year (ibid.).

The Group has identified five strategic priorities that underpin its vision with regard to climate change (ibid). These priorities remain:

- To continue to achieve emission reductions,
- To invest in longer-term breakthrough technologies for producing low-carbon steels,
- To develop new products and services that generate lower CO_2 emissions through the life cycle,
- To actively engage its entire workforce in this challenge, and

- To lead by example within the global steel industry.

The strategies for achieving these aims include making ongoing improvements to current manufacturing processes as well as investment in longer term break-through technologies. The Group states that "The scope for achieving further substantial CO_2 emission reductions from conventional iron and steel-making processes is limited. The production of hot metal via the blast furnace route must therefore be placed on a completely new technological path if a step change in emissions is to be achieved" (2011: 18).

As such, Tata Steel Europe is a leading member of ULCOS (Ultra-Low CO_2 Steelmaking), a pioneering partnership of 48 companies and organisations from 15 European countries, established in 2004. ULCOS is engaged in a €59 million (US$79 million) co-operative research initiative to achieve just such a step change. The ultimate and ambitious aim of the ULCOS project, which is supported by the European Commission, is to reduce CO_2 emissions per tonne of steel produced by at least 50% by 2050.

On the subject of carbon emissions, Tata Steel Europe is required to participate in the EU Emissions Trading Scheme (EU ETS). Phase II of the scheme began on 1 January 2008, and during 2010, the business emitted fewer tonnes of CO_2 than its total allocation of emission allowances. This is at least partly attributable to the impact of the economic downturn on production levels and output (UK Steel EEF, 2011). At normal production levels, the Group states that it would expect to be in balance or slightly short of its allowances overall.

The steel industry in Europe, along with various other sectors of industry, faces further tightening of emission allowance allocations from 2013, when the EU ETS enters its third phase (Phase III). The European Commission has identified the iron and steel sector, among others, as an energy-intensive sector that is exposed to international competition. As such, it is recognised that without free allocation of emission allowances to steel companies in the EU, there is a risk of a

shift in global production trends towards countries applying a lower level of carbon constraint – something often referred to as 'carbon leakage.'

Tata Steel signed a Climate Change Agreement with the UK government to achieve reductions in energy consumption equivalent to 15.8% by the end of 2010 compared to the 1997 level, and the company is on course to achieve this.

In April 2010, at the Port Talbot facility, the company commissioned a £60 million (US$91 million) energy efficiency scheme. UK. This investment has already begun to reduce the site's CO2 emissions through the re-use of gases from the Basic Oxygen Steelmaking (BOS) plant. The BOS gas generated from the process is recovered and is being used to generate an extra 15MW of power – 10% of the facility's total electricity needs. This in turn is allowing the higher quality coke oven gas to be utilised more effectively in the hot strip mill, reducing natural gas consumption at the mill by approximately 60%. Overall, the scheme will reduce CO_2 emissions from the steelworks by 297,000 tonnes per year, which in turn will reduce the total carbon footprint of Tata's European operations by 1% – equivalent to the national emission reduction target for Wales (ibid.).

Air Quality

The company identifies its other most significant releases to air (in addition to carbon dioxide) as being particulate material (including fine particulate such as PM10), sulphur dioxide (SO_2) and oxides of nitrogen (NO_x). The Group utilise measurement and modelling around its steelmaking facilities, in order to analyse its contribution to airborne levels of pollutants. The Group states that, with the exception of PM10, air quality limits are currently being met in the areas around all of its major facilities (Tata Steel, 2011c: 18).

The company recognised that, with regard to PM10, point source and diffuse releases from integrated steelworks can make a significant contribution to airborne concentrations. As such, air quality management areas have been declared in

the vicinity of the Group's operations at Port Talbot and Scunthorpe in the UK (Tata Steel, 2011c: 19).

Tata Steel Europe has established an Air Quality Strategy Group, in order to share good practices, identify and coordinate improvement activities, and direct a strategic R&D programme focused on increasing understanding of the sources and effects of particulate emissions, and identifying the best means of abating them, across European operations. Each of the Group's European integrated steelworks has developed an emission reduction strategy for diffuse emissions of PM10, which sets out short, medium and long-term improvement measures, with progress reviewed on an annual basis.

Water Quality

The Group states that it deploys a wide range of techniques in order to reduce water consumption and to prevent water pollution. Most of the water utilised in the steel-making process is used for non-contact cooling and is returned directly to the watercourses from which it is taken, with no deterioration in quality. In order to minimise the impact of its process effluents, the Group reports that it has installed a complex range of biological, chemical and physical effluent treatment technologies across its sites, with systems in place to monitor effectiveness..

The company is also looking to systematically substitute hazardous substances utilised within its manufacturing processes with safer alternatives, so as to reduce risk of harm to natural watercourses. At the Orb site in South

Wales, Tata implemented a project that, by the end of 2009, completely eliminated acid pickling on the site's two thermal flattening lines by introducing an alternative mechanical cleaning system for steel strip prior to thermal flattening. The new system has significantly reduced the risk to the local surface water and

groundwater environment, while also reducing energy consumption associated with heating the pickling bath.

In recognition of the fact that fresh water is a finite and increasingly valuable resource, the Group is working to develop a water foot-printing tool that will provide a more accurate measure of fresh water consumed per tonne of steel produced. This will enable the company to target additional water saving schemes where they are most needed.

Material Efficiency

Steelmaking is reliant on large amounts of virgin and increasingly costly raw materials such as iron ore and coal (2011c: 21). The Group therefore recognises that it must optimise its consumption of these materials, by minimising waste and ensuring that by-products meet tight quality control standards, in order that they can be used in other industry sectors and processes.

Tata identifies its most significant by-product, in terms of volume, as being blast furnace slag. This has now become a valuable raw material for the concrete industry, where it is used as a clinker substitute, thereby simultaneously reducing mineral extraction and CO_2 emissions. Steelmaking slags are also used extensively in civil engineering and agricultural applications, and tar and benzole from Tata's coke-making processes are used within the chemicals industry (2011c: 21).

Tata (2011c) states that it already applies advanced techniques at all its integrated steelworks in order to extract valuable components such as iron and carbon, through the re-use of most of the residual materials through sinter plants, BOS plants and coke ovens.

In 2009-2010, the Group internally re-used over seven million tonnes of residual materials, replacing primary raw materials and reducing overall CO_2 emissions (2011c: 22). The Group aims to ensure that as much waste product generated

by its processes as possible can be re-used, recycled or recovered by third parties.

The report cites an example of a project launched at Port Talbot in 2008, aimed at reducing waste disposed of at landfill. Through the application of a number of innovative recovery processes, ranging from thermal desorption of oil to the establishment of a state-of-the-art waste slag recovery facility, waste to landfill from the site was reduced by over 50% within a year (ibid.). By redirecting materials back into the steelmaking process, raw material consumption and CO_2 emissions have also been reduced. The project has proved so successful, that the relevant authorities have granted permission for the extraction of existing land-filled materials so that the useful constituents of these can be recycled back into the process (ibid.).

In another example of applying a systematic approach to reducing waste disposal, Tata Steel Tubes at Hartlepool established a recovery project that has resulted in only 7% of all waste from the site now being land-filled, compared to 90% previously (ibid.).

4.D.2 Health and Safety

A review of the extant legislation, at both Community and national level, did not reveal any sector-specific regulation. Rather, relevant legislation operates at a general level and covers workplace, workplace activities and hazards arising.

A perusal of the HSE website found that that this body consults with two groups when drawing up industry-specific guidance. These are the Molten Metals National Interest Group and the Foundries Industry Advisory Committee (HSE, 2006). The latter's primary remit is to provide a forum for member industries to

promote improved standards of health and safety, as well as the "Revitalising agenda" within the foundries industry.[62]

Tata Steel - Company Position on Health and Safety

The following section outlines the company's position on, and approach to, health and safety, based on a perusal of its website and company documents available therein.

Health and Safety Strategy and Policy

Tata Steel Europe makes an explicit and unequivocal commitment to the health and safety of its people, which it declares to be the Group's first priority (Tata Steel, 2011a). This policy also states that the Group works on the principles that 'all injuries and work-related illness can and must be prevented' and that the Group wishes to ensure 'zero harm to its employees, contractors and the communities in which it operates' (ibid.). This pledge is described as integral to the Group's business process and as being embedded in its business systems and processes, health and safety policies, standards and working procedures (Tata Steel, 2011a, 2011b).

To this end, every Tata Steel Group board meeting includes a detailed review of health and safety issues. The Group has a board-level Safety, Health and Environment Committee, which provides overall leadership in SH&E matters across the global business (Tata Steel, 2010).

Each of the Group's four regional businesses has a comprehensive health and safety policy, with supporting principles, standards and procedures. Moreover, a Tata Steel group-wide health and safety policy has been introduced from January 2011. Clear objectives for process safety, occupational safety and health are

[62] Enquiries: Secretary, FIAC, Health and Safety Executive, Arden House, Regent Centre, Gosforth, NE3 3JN. Tel: 0191 2026272

embedded within the health and safety management plans of each business (ibid.).

In 2009/10, the Group sought to increase the level of integration and shared learning on safety matters throughout its global operations. A meeting of safety professionals from India and Europe was held in November 2009 to promote shared learning and adoption of best practices across the Group's four regional businesses. For example, the Red Stripe Bulletin system that was originally devised within the European arm of the business has now been extended to cover all of the Group's operations. The system cascades information, findings and recommendations about serious and potentially serious incidents as soon as they are available, and requires feedback on actions taken to be disseminated, so as to prevent similar occurrences (Tata Steel, 2010).

In October 2009, the World Steel Association (Worldsteel) recognised Tata Steel for demonstrating excellence in health and safety, particularly in relation to its contract workforce programme.

Key Performance Indicators and Progress Made

The Group states that clear objectives are set regarding health, process safety and occupational safety and that these are constantly monitored (Tata Steel, 2011c). The Group's key safety performance indicators are fatalies and the lost time injury frequency (LTIF) rate (defined as the number of lost time incidents per million hours worked), which covers both employees and contractors.

There was one fatality recorded for the European Group in 2007/08 as well as 2009/10 (Tata Steel, 2011d).[63] No details were provided in the Corporate Responsibility report as to how these fatalities occurred.

[63] There have been several fatalities more recently at Scunthorpe, at Holland and India.

In terms of the LTIF measure, Tata Steel states its aspiration "to be the health and safety benchmark for the steel industry globally", setting itself an overall target of attaining a lost time injury frequency (LTIF) rate of 0.4 or lower by 2012 (Tata Steel, 2011b). This is one of four key corporate goals (Tata Steel, 2010).

Progress on this measure is recorded and the Group's global performance data indicated an improvement in LTIF from 1.38 in 2008/09 to 0.95 in 2009/10 (Tata Steel, 2010, 2011c).[64]

For the Group's European organisation, safety performance for 2009/10 was the best in its recorded history. The year's average combined employee and contractor rate was 1.5; a figure that shows a 16% reduction from the 2008/09 data. The figure for 2007/08 was 2.38 (Tata Steel, 2009). Tata Steel Europe is targeting a 25% year-on-year improvement in LTIF and recordables in general for 2010/11 (2011c).

Health Promotion

Tata Steel states its commitment to the safeguarding and promotion of the physical, mental and social well-being of its employees (Tata Steel, 2011d).

The Group declares that it aims to eliminate, reduce or isolate hazards wherever possible, as opposed to a simple reliance upon the provision of adequate personal protective equipment (ibid.). It states that some of the potential health hazards associated with its processes include noise, vibration, hazardous substances, manual handling, driving and climatic conditions (ibid.) The 2008/09 Corporate Safety Report alludes to a programme that has been introduced at all of the Group's European sites, which is aimed at identifying, controlling and minimising potential health hazards. The goal is to reduce the number of employees exposed (without personal protective equipment) to the site's five main health hazards by 25% by 2015 (Tata Steel, 2010).

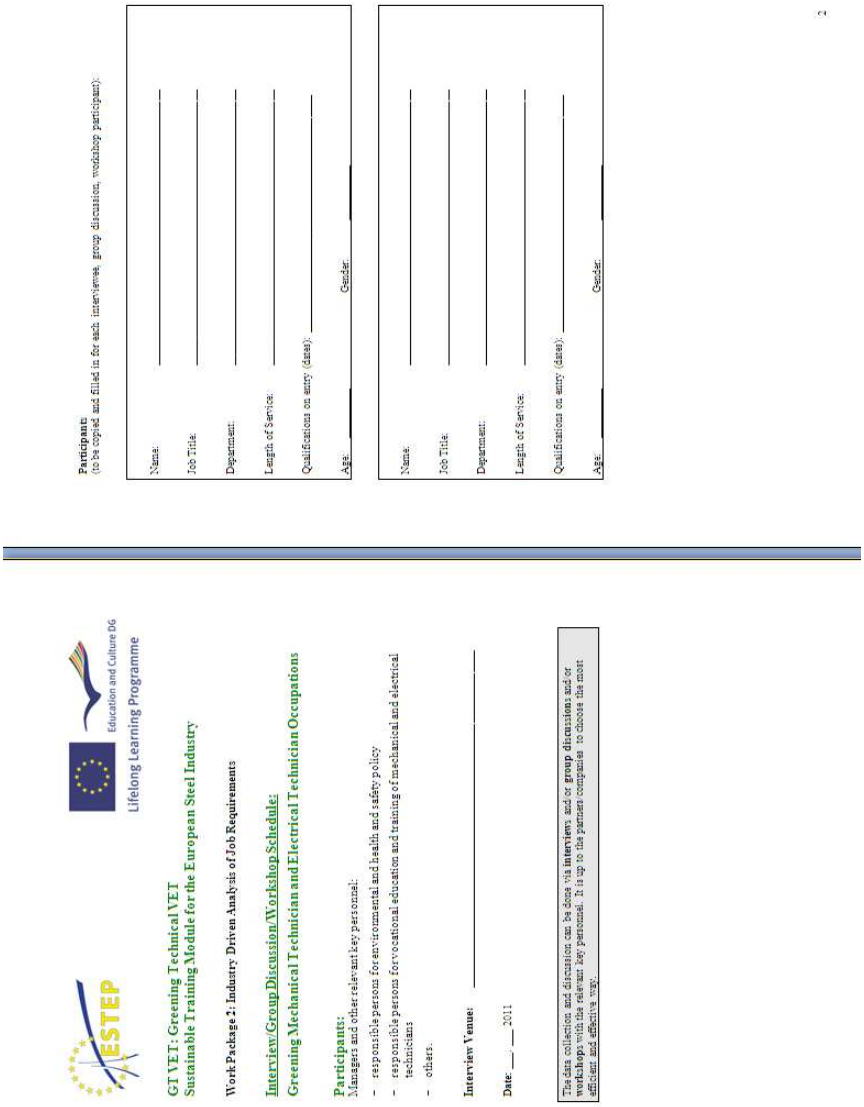
[64] The figures reported in the 2008/09 CSR report cite a higher figure of 1.82 for 2008/09 (Tata Steel, 2009).

The company avers that it is currently in the process of establishing baseline exposure levels, so that it can prioritise is improvement plans, as well as measuring their effect (Tata Steel, 2011).

In order to promote safety awareness, Tata Steel Europe developed and ran a campaign over 2010, targeted at reducing the six hazards that present the most frequently occurring risks in the workplace. These have been identified as forklift truck operations; slips, trips and falls; loading and unloading; working at height; noise; and man-machine contact (Tata Steel, 2010). These six hazards accounted for over 60% of Tata Steel Europe's lost-time injuries in 2009, and each became the theme of the campaign for a period of two months each.

5. Preparing the surveys with the companies – developing the concept of survey document(s)

The questionnaire developed to carry out the research within the steel companies involved in the project is presented below:



GT VET : Greening Technical VET
Sustainable Training Module for the European Steel Industry

Work Package 2: Industry Driven Analysis of Job Requirements

Interview/Group Discussion/Workshop Schedule:
Greening Mechanical Technician and Electrical Technician Occupations

Participants:
Managers and other relevant key personnel:
- responsible persons for environmental and health and safety policy
- responsible persons for vocational education and training of mechanical and electrical technicians
- others.

Interview Venue: _____

Date: ___ ___ 2011

The data collection and discussion can be done via interviews and/or group discussions and/or workshops with the relevant key personnel. It is up to the partners companies to choose the most efficient and effective way.

Participants:
(to be copied and filled in for each interviewee, group discussion, workshop participant):

Name: _____
Job Title: _____
Department: _____
Length of Service: _____
Qualifications on entry (dates): _____
Age: _____ Gender: _____

Name: _____
Job Title: _____
Department: _____
Length of Service: _____
Qualifications on entry (dates): _____
Age: _____ Gender: _____

Education and Culture DG
Lifelong Learning Programme

Introduction

The interviews with key post-holders in the environmental / health and safety and vocational education and training departments of the steel companies involved in the GT-VET project are aimed at **identifying current and future job requirements** for two occupations:

- electrical technicians
- mechanical technicians.

In particular, current working conditions, critical situations and the appropriate action and behaviours in relation to **environmental issues** and associated health and safety **aspects** will be explored.
Please note: Health and safety is only addressed in relevance to environmental issues (e.g. working with dangerous chemicals), because we are dealing with **greening** technical VET (not with health and safety directly).

Based on these results, the qualification requirements for these two professions, with specific regard to 'green' awareness and skills (including health and safety) will be defined as a **basis for the training module** we will develop.

In addition to the "green skills" focus, the potential for short term implementation of new skills in general (concerning new skills for the implementation and operationalisation of new technologies in general) will be considered in the workshops or interviews from an industry perspective.

Remark: *The interviews, group discussions, workshops should concentrate wherever possible on the concrete occupations (electrical and mechanical technicians). If possible, it has to be differentiated between* ***general*** *environmental (and related health and safety issues) for almost every employee and those which are* ***specifically relevant for electrical and mechanical technicians.***

Using this schedule:

This schedule provides a series of questions for the interviews, group discussions or workshops, which are designed to address the aims of the GT-VET project. The schedule of questions is not designed to be used verbatim, but to be **used to guide discussion and to structure the comparative report** of the results. Each section of the schedule addresses a particular aim. The first section provides contextual information. The second section provides data on the specific occupations. The third section asks for general reflections on the past and future in relation to the overall discussion. Some questions use prompts to probe for further information.

SECTION ONE: OVERVIEW

Part 1: Environmental (and related health and safety) Legislation and Company Implementation

Remark: *The following question should describe the framework of legislation and its* ***relevance, potential and challenges*** *for greening the work of electrical and mechanical technicians. No general discussion on environmental and health and safety is required and necessary.*

1. Can you please provide an overview of your role? What is your responsibility?
   (Description of role and responsibilities of the involved participants)

2. Can you provide an outline of the main pieces of environmental/health and safety legislation – at EU, national and company level - that apply to operations at this plant?
   (Expecially in relation to the work of electrical and mechanical technicians)
   (Please refer to the list that is already produced by GET VET)
   - Are there any pieces of these legislations/regulations that indirectly impact upon your operations? (e.g. Renewables Obligation, Climate Change Levy, REACH)
   - Are there any which are currently of particular significance? Does the company prioritise certain aspects of these legislation/regulations?
   - Are there any which are set to increase in importance?

3. Are there further environmental, health and safety issues of significance that are not specifically covered by legislation?

4. What is the company's strategy regarding environmental legislation/issues? What are the 'planks'/constituent elements of this strategy? Where do these relate to health and safety?

5. What opportunities/problems does legislation present? Can you please outline both aspects across environmental and related health and safety aspects?

6. Is there a published (environment and health and safety) strategy/policy document? (If so, would it be possible for us to have a copy)

7. Does the company aim to achieve compliance or to go beyond this (i.e. establish best practice/be an industry leader)? In what ways? What best practice has it established?

8. Does the plant have set environmental/health and safety objectives at company-level? Please provide examples. (Reduction of waste, scrap reduction, energy reduction, recycling)

9. How is the company's environmental/health and safety strategy/policy 'cascaded' down/disseminated/promoted and how is compliance achieved/monitored?

10. What data relating to environmental/health and safety issues is collected by the company?

    Is this information used to monitor progress?

    Are the data published? In an annual report, made available to staff, the trade unions, or reported to any government body?

    Is any qualitative monitoring carried out within the company? (e.g. attitude surveys, focus groups)

11. In general, how does the company promote/ensure employee awareness of/compliance with environmental and health and safety legislation/strategy?

Part 2: Responsibility for environmental (and related health and safety) issues

1. How many people of the entire workforce work on environmental/health and safety matters? Is their work connected to the education and training departments?

2. Does anyone have the specific job of keeping up to date with environmental (and related health and safety) legislative requirements and ensuring that the company adopts these as standard practice?

3. Are the two occupations (electrical and mechanical technician) given set targets/goals in relation to the environmental/health and safety aspects of their jobs?

4. Are they formally appraised on these aspects?

5. Is any proportion of their reward package linked to meeting such objectives?

SECTION TWO: SKILLS, QUALIFICATIONS AND OCCUPATIONS

Remark: It may be reasonable or necessary to pass on some questions to the statistics, training and/or VET department. If this is the case, please do so and make sure when and by whom the answers will be delivered.

Part 1: Environmental/green aspects of skilled work within the plant: Electrical Technicians and Mechanical Technicians

1. How many skilled and qualified workers in the following categories (mechanical technician, electrical technician) do you employ within this plant/across the company? How many do you employ directly in the steel making and processing parts of the plant?

2. Can you please give me an indication of the qualifications that are required for these occupations?
   a. What qualifications do Electrical Technicians and Mechanical Technicians hold? (e.g. degree/advanced apprenticeship/modern apprenticeship)?
   b. Are all qualified to this level or do some perform these tasks based on other measures of skill/competency (e.g. experience, seniority, workplace learning)?

3. What work do these occupations undertake across the plant (in the steel making and processing parts of the plant)? Please outline their roles and responsibilities.

4. At the present time, for each occupation, what aspects of their work could be described as having an environmental/green orientation?
   a. In what ways do their current responsibilities relate to environmental/green issues?
   b. Are there overlaps between the environmental features of their fields of work and the health and safety aspects? If so, can you please describe these?
   c. How do these occupations currently contribute to meeting the company's environmental/green (health and safety) policy goals?
   d. With regard to the environmental/health and safety objectives outlined above, what targets are set for these occupations?
   e. How is compliance monitored? What data is collected?

5. Does the company have a specific programme of formal training courses covering environmental issues?
   a. What are the titles of each package/what content is covered (e.g. water, waste, atmosphere, land, climate change, health and safety)?
   b. How delivered (on or off job, formally/informally)?
   c. How funded?

6. Does some training relate indirectly to environmental developments / health and safety concerns? (For example, training on risk assessment may include aspects on energy efficiency).
   a. What are the titles of each package/what content is covered?
   b. How delivered (on or off job, formally/informally)?
   c. How funded?

7. With regard to the two occupations, is the study of environmental issues and related health and safety issues required as part of the vocational education and training (formal and informal)?
   a. Is there, for example, instruction in EU (e.g. IPPC, ETS, REACH) / national / company directives and regulations?
   b. If so, which particular directives/regulations? (covering Generation of Waste, Generation of Emissions to Atmosphere, Generation of Emissions to Water, Climate Change & Energy Efficiency, Contamination of Land and Groundwater, Health and Safety e.g. REACH and similar regulations)

c. Do such directives/regulations (on the matters listed above) shape the training for these occupations? In what ways?
d. Which of the packages identified above, if any, are incorporated into the formal training provision for these two occupations?

8. What developments/changes in the environmental aspects of their work are anticipated in the future?
   a. If so, which aspects particularly? (e.g. changes to technologies, changes to the steel making process, changes to regulations, cultural changes to working practices, improving efficiency)

9. What might be the implications of any potential developments for the health and safety practices of these occupations?

10. In ways do you expect the work of these occupations to develop in the future, particularly with regard to environmental/green issues and safe/environmentally friendly ways of working?

11. What new skills might be required as a result of these developments?
    a. What are the environmental drivers of change?
    b. What are the health and safety drivers of change?
    c. Will such skills demands have implications for formal training programmes and the content of qualifications/and recruitment?
    d. What is the process by which such developments take place?

12. What direction might training take in the future, particularly with regard to training for these occupations and the management of environmental aspects of their work (including with regard to health and safety)?

SECTION THREE: CONCLUSION / ASSESSMENT

1. Over the last year what would you say has been the most important development in environmental/health and safety issues for the steel industry?

2. Over the last year what would you say has been the largest problem in addressing environmental (health and safety) matters more generally for the steel industry, but particularly for the work conducted by mechanical technicians and electrical technicians?

3. Over the last five years, how would you assess how things have changed (if at all) in relation to environmental (health and safety) issues within the company more generally for the steel industry, particularly for the work conducted by mechanical technicians and electrical technicians?

4. In your view, what could the company/union/employees do to improve sustainability/environmentally friendly/safe working in the company?

5. Is there anything else you would like to add?

6. Carrying out the surveys with the companies (interviews and/ or work-shops)

6.A GERMANY

The structure of the following chapter is based on the interview guidelines developed for work package 2 within the GT-VET project to determine industry-driven job requirements. This was also the key interest for implementing the German GT-VET workshop with employees of the company's own TKSE AG Training Center in Duisburg on 15 June 2011.

I. Environmental Legislation and Company Implementation

Concerning environmental protection issues, a central contact point is located on parent company level. The parent company also maintains corresponding offices in Brussels. Additionally, there are links to associations (Eurofer, World Steel Ass) covering topics such as environmental and climate protection across sectors. On company level contacts to national authorities are considered important because these are implementing legislation and carry out company inspections. In addition, the company is constantly in contact with the plant operators to discuss environment-related decisions and to keep the Board constantly informed (including the case of larger investments). At organizational level important changes are displayed in the work instructions.

Important Legislation

For the Department of Environment and Climate Change as well as for the engineers, especially CO_2 is an important legislative issue which involves lobbying efforts and for which legislation is continually updated. Maybe this dynamics lead to a situation in which the engineers of the company inadequately prepared for their

prospective management tasks by the universities. The TEHG Amendment (Greenhouse Gas Immission Trading Act) constitutes an important law through which an energy management system will be established. In this context the EEG (Renewable Energy Sources Act) is relevant. For the division of hazardous substances the program REACH and the Compliance Program (CLP) are important, especially for the hazardous material labeling and work safety.

Another important area, especially in education, is the issue of hazardous substances (storage, recycling and substitutes). Therefore, important laws have to be “translated” into practical instructions. The high pace of hazardous substances definition and re-definition also requires a permanent operational adaptation. In vocational education the ordinance of disposal rules (e.g. container and waste management, prevention of fires) as well as the handling of hazardous materials is important. Currently a comprehensive ‘white education’ without contact to hazardous substances is available only to a minor extent.

The company implementation - Obligations and guidelines of TKSE

The Environmental Management Handbook is the key instrument to communicate objectives and regulations of the company concerning environmental protection. It contains all requirements and principles decided upon by the management board, described in practical and applicable guidelines to make it understandable for the whole workforce. The higher the corporate level, the more theoretical is the reference to the Handbook.

The Occupational Safety Handbook contains the essential corporate guidelines and all the institutions, programs and processes which are involved in occupational safety. For further development of the handbook, a risk assessment of every workplace is supplied, including corresponding health and safety measures in a very complex procedure. Finally, the staff receives a set of behavioral related

core rules and procedures only for its operating areas. In training sessions the employees are regularly instructed concerning these measures. This risk assessment and instruction is required by law; the design of the training is left to the company.

With regard to environmental standards the company moves simultaneously between exercising their duties ('working rules off') and individual initiative to be better than legally necessary. On the one hand, the company has to enforce the regulations; on the other hand internal processes have to be analyzed continuously to improve performance independently from legal requirements. A focus was set i.e. on the issue of resource efficiency through an in-depth analysis of the process flow. In this area seminars have been offered to the workforce. On the operational level an internal or external benchmarking (among companies) is considered important (amount of energy consumption and steel production).

Although the legislature does not require accident-free operations TKSE has set the guideline 'zero accidents' and focuses 'behavioral occupational safety'. In this context the internal 'ADAM program' ("safety through attentive workers") was developed on the premise that 'everyone takes responsibility for everyone' in order to avoid misconduct. Without these extensive guidelines TKSE would not be competitive because this policy is an international 'State of the Art'.

Targets on environmental protection

Targets concerning environmental protection are collected annually from every division. Approximately 150 targets are set per year and are divided into five to six categories (e.g. energy saving). For the year 2009/2010 there were about 146 measures and about 88 (60%) were completed (result of the monitoring). In turn, individual goals (e.g. reduction of emissions), the corresponding action (installation of a water spray) and the required investment are derived from this point.

The compliance rate of TKSE in general is 60% and only less than 5% are stopped completely (e.g. not conducive anymore; changing targets; target is identified as unreachable). The remaining measures will be transferred to subsequent years.

The companies define 'its contribution to environmental protection' on their own initiative and have no guidelines imposed from the management level. Only if a company formulates no targets the management will take measures. Then, the figures for environmental protection (operation phase; data from measuring devices, e.g. emissions) will be awarded. Although TKSE is 'at the top' of the competition in environmental protection, it is not the only company worldwide that takes into account environmental issues. It is exposed to a greater competitive pressure and relies more on the initiative of the departments to implement various internal company guidelines. In the context of occupational safety, 'reactive targets' like accident rates are in the centre of attention. These are also relevant for bonus payments.

Trainees and work instructions

The info-point project has recently been implemented in order to provide the trainees with information on health and safety lines (mind map), a safety manual, and facts about environmental protection, documentation and information about accidents and responsibilities of various persons in the company. The info-point is a clearly visible element of the everyday workplace and therefore easily accessible. This is supposed to encourage everyday learning and interest of the trainees. The project was launched by the personnel department together with the trainees two years ago. According to the workshop participants, it reflects massive changes in the educational approach in the German dual training which started with the new design of the technical training occupations in 2003. The key

phrase ‘holistic” or “integrated” training refers to the ‘business or process orientated provision of training content’.

Cooperation of departments

If a department has a concrete problem (e.g. hazardous substances) and is not able to find a solution on its own, the occupational health and safety department (OHS) will be contacted. Together with the working group the problem is discussed on the basis of operational instructions and procedures. The OHS contacts the responsible hazardous substance officer to further discuss solutions. This happens several times a year. On top of this there is regular communication between the officer and the hazardous substance department. There is also a working group composed of the hazardous substance division, the hazardous substance officer and the company medical officers. Since the beginning of 2011 the working group ‘safety at work’ is part of the education centre Duisburg. Once a month the security officers meet (approximately 15 participants, including the security officer of the trainees) and talk about current events in the education center such as accidents, hazardous substances or environmental issues and formulate action targets promptly. The working group follows the top OHS premise of ‘zero fires, zero accidents’ derived from the corporate targets. In this context the focus is the learning experience of new trainees.

Conflicts between departments arise more at the level of legislation if European and German law is incompatible. Then the departments need different instructions to react to these requirements. Thus the legislation for the corporate level must ‘be practical as possible’ and provide alternate instructions for action. Otherwise this will lead to rule violations (e.g. replacement of banned substances). Meanwhile the motivation of employees to use prohibited substances has decreased significantly during the past years.

Increasing competence requirements in the field of environmental and climate protection

At TKSE the competences of the workforce in the fields of climate and environmental protection have increased. This is a common observation of all workshop participants. Management officers for climate and environmental protection have been installed as contact partners for the parent company at operational level. They are supposed to do daily inspections checking and discussing safety issues, and they are responsible for the training and internal audits of employees. The audit was introduced in the course of the “decentralized restructuring” (e.g. reducing the number to five auditors). The management representatives are regularly trained and subject to disciplinary action of the local management. But they complete the audits independently. This system has proven to be very efficient.

II. Skills, qualifications and occupations (Electrical and Mechanical Technicians)

Competences of trainees in the field of environmental and climate protection

The German legislature sets the basis for training occupations in the training plan. The issue of environmental protection is almost identical for all the technical occupations. The training plan provides a general overview of relevant environmental protection laws. But there are no specific environmental objectives or fields of action (‘The trainee can do...’). The trainees only have general knowledge about the legislation which is just relevant in forms of regulations. The company relies on single projects in order to illustrate legislation in practice. For example, in this context many trainees get to know a lot about REACH (EU directive: **R**egistration, **E**valuation, **A**uthorisation and Restriction of **Ch**emicals) alt-

hough it is only relevant for a few employees. However, a distinction must be made which training occupation is involved because a laboratory assistant will have to cope with REACH more often than an electrical or industrial mechanic.

At the beginning of the training several courses are conducted which require initial safety at work instructions. As part of the documentation and compliance with the General Plan, the trainees must confirm their participation by signature. The teaching of basic skills is achieved by a greater orientation on business processes and increased autonomy of trainees. It is less the legislation that is supposed to be the centre of attention but practical communication. Most accidents in the plants are the result of wrong behavior. There are regular meetings to analyze errors and to provide trainees behavior pattern (What is the trainee allowed to do and why?). The trainees of both occupations spend 18 months in the technology center to learn – besides others - skills in environmental protection, occupational safety and management and then progress through various departments in the company.

The workshop participants say that it is sometimes difficult to combine company demands with curricular demands of trainees and satisfy these at the same time. For example, while the trainee will have on-site visits in the company as one part of their occupational health and safety and environment related training; on the other hand, the compulsory content has to be paid enough attention because of its relevance for the intermediate and final examinations. Therefore TKSE has developed its own examination model in the sense of an integrated or holistic education approach. In the course of reorganization of training based on this approach a mere ‘test query’ does not exist anymore. The main goal of education is on the one hand to get the trainees into analyzing the working process (what is to do and what are the options?) and on the other hand to enable the trainee to

make a proper assessment of his actions (Did the trainee acted responsibly according to the guidelines of environmental protection?).

Further education to environmental issues

Altogether there are selected issues which are taught in the course of further training (e.g. German Water Act). In addition, the prevention officer for environmental protection is supposed to communicate developments regularly. For all managers, there is an annual “retraining”. If employees would like to be offered a concrete training topic (e.g. water pollutants), they contact the personnel department. One of the main instruments to keep the employees up to date is an occupational qualification plan assessing systematically what issues are relevant and which offers qualifications are needed at the various workplaces. These areas cover for example legal mandatory qualifications and requirements that arise in the context of commissions (e.g. formal certification for taking office, forklift operating license). Therefore regular votes are taking place in the enterprise (department manager / employee) in order to organize additional training. For further training the company claims measures by the professional association because they work over a wide range of topics. This framework measures are obligatory for the company.

Prospective issues for the training of skilled workers

Conservation of resources is an important issue as well as possible alternatives which are already part of in-house projects. Furthermore, the workshop participants think that issues like energy (wind and solar power) and nuclear phase-out will receive an even higher priority. In turn this has strengthened the work on occupational safety: not only technical skills are important, but the awareness of the possible impact of one’s own actions on the environment.

For skilled workers, operating instructions and operational procedures to cope with hazardous substances or equipment will be of special importance (energy resources, filters, etc.). In addition, the skilled workers have to have a high level of knowledge of product and process characteristics (e.g. replacing a pump: how long is the duration of a pump? How energy efficient is the product and are there any alternatives?). In this context skilled workers are taught the use of new technologies and techniques to expand and deepen their knowledge. Moreover, machines are changing due to technical progress (e.g. access and safety precautions) demanding new 'creative solutions'. Working with 'conflict cases' and monitoring process will also be challenging for the workers. These aspects are also relevant for vocational training.

III. Core elements of a 'training module' for the steel industry

Review: the most important legislation and developments

In vocational training, the workshop participants consider the development of a deeper understanding of work processes, the awareness of possible impacts of one's own actions and an increased autonomy as central job requirements for trainees. Still, the question concerning concrete training targets remains. A controversial point during the workshop was the discussion about basic skills and elementary knowledge. Despite the fact that new content was constantly introduced into the training plan, there were only few reductions to compensate this. Time to reflect is considered important in order to be able to 'think and act independently'. And furthermore, there appear to be some skills which are required in the steel industry but which are not part of the training plan. So for the trainees, learning on site should be a central objective.

Desirable elements for the training module

The workshop members think that the module should include measurable goals to provide the trainees with options to evaluate their own actions and to become concretely aware of climate and environmental issues (e.g. resource conservation to understand input / output sizes; wasting energy). The cooperation with the German Federal Institute for Vocational Training (BiBB), already foreseen in GT-VET, is appreciated. The comparability and teaching of basic skills could also play an essential role (What is solar energy? What is wind?). The best possible advancement of basic knowledge seems paramount because it could support the trainees, but also older workers, in increasing their capabilities to reflect upon environmental issues and therefore develop practical “green skills”.

Requirements and outlook

The framework curricula of the VET plan are not static and leave the company some considerable leeway for introducing learning opportunities which also reflect the company’s requirements. However, one central result of the workshop is that there is no way yet to include environmental issues in the VET curricula by means of practical projects. As long as this does not exist, “companies have to act on their own”, as the participants say. Altogether, the issues of energy conservation and scarcity of resources will become more central, as well as the issue of CO_2. The use of new technologies will also become more important to keep up with automation and efficiency opportunities, from blast furnace to hydrogen technology. All in all, specific industry-based case studies are considered necessary to complement existing curricula and provide application-oriented knowledge and awareness in everyday work. These case studies are considered to carry educational values which are not covered by the daily business of education. So the cooperation of the vocational schools and companies should be deepened.

6.B ITALY

Background - Structure

No interviews were conducted: the company only provided information concerning the European, national legislations and the internal applied regulations without giving any possibility to submit interview related to organisational aspects in the period under examination.

TK AST allocate responsibilities on both the environmental and H&S issues to the same single department to underline the strict connections between the two fields in the concrete production and service activities and the external context (territory, city, local community)

Regulation and Legislation

Compliance with environmental legislation is sought in the areas of waste, air, water, land and groundwater contamination, as well as carbon dioxide emissions under the ETS scheme.

In some cases the legislation is implemented extensively while in other cases only specific parts of it are applied, particularly where risks of internal and external pollution or contamination are higher.

The geographic location of the steelwork within the Terni's urban area contributed to rise the level of awareness together with the positive effect of the correct environment management on costs and economic results.

Workforce engagement is seen as an essential element in securing such compliance. Although the company is positively willing to implement the EU and national legislation, the burden of bureaucratic procedures is considered by the company too much time consuming and costly.

Company Strategy

The company aim is however to move from compliance to improvement, with regulation seen as the baseline from which to progress.

Environmental protection and producer waste responsibility are and will increasingly be a challenge and a critical aspect in the neat future for the survival of industries.

Levers should be used to set up the basis for future development such as:

- Collective awareness campaigns on environmental protection *(improvement groups; awards)*
- General information on company-produced wastes and handling techniques;
- Location of waste disposal areas serving individual working areas;
- Incentives of eco-friendly behaviours

Workplace Culture and Practice

Changing behaviours and culture are an important aspect of a strategy.

A complete reversal in taking care also the environmental issues and not only production cycle, need time and an everyday effort in changing many behaviours kept for a long time.

TK AST has already point out several target to reach in a short time and strengthen with a continuous specific training:

- To develop/increase the awareness of how maintenance may impact the environment
- To develop and/or spread environmentally friendly behaviours
- To know the distinction between ordinary and special wastes, the related handling methods and the location of storage and disposal places
- To be aware of industrial waste disposal systems and waste reduction practices

Occupational/Job Requirements

As stated in a former chapter, the environmental aspects of the work of mechanical and electrical technicians were identified.

TK AST clearly identified the need to develop, increase the awareness of how maintenance may impact the environment. The main point of this strategy is developing and spreading environmentally friendly behaviours

To this purpose, it is of paramount importance to know the distinction between ordinary and special wastes, the related handling methods and the location of storage and disposal places, as far as to be aware of industrial waste disposal systems and waste reduction practices.

Training

At TK AST training is worked out and administered at the internal Training Centre, an entity recognized as a training agency and qualified to issue certificates and qualifications. On-the-job technical training is developed by AST's own technicians.

Safety training is provided by contract agencies in compliance with the Italian safety regulation. Training includes a base refresher course on the fundamental principles of electricity, mechanics and electronics and courses on the operation of specific plants *(e.g.: operating practices).*

Concerning the environmental aspects, for the time being, training on the job is the only existing way to train new employees in strict cooperation with more experienced colleagues.

Specific training for operators on issues as reference laws and regulations, waste types, classifications and volumes, environmental impact, storage and disposal methods and waste minimization techniques is still missing.

Future Developments

In the recent past, production/operational issues were the priorities, with other issues (including environmental aspects) perceived as secondary. This is now felt to be changing – environmental aspects are 'moving up the agenda' and will ultimately become as central as health and safety actually is.

However, greater environmental awareness and workforce engagement is seen as essential to the progress of such an agenda. Environmental protection and producer waste responsibility are and will increasingly be a challenge and a critical aspect in the neat future for the survival of industries.

Levers should be used to set up the basis for future development such as collective awareness campaigns on environmental protection *(improvement groups; awards),*

general information on company-produced wastes and handling techniques; location of waste disposal areas serving individual working areas, incentives of eco-friendly behaviours.

6.C POLAND

SKILLS, QUALIFICATIONS AND OCCUPATIONS

According to definition of occupations in Company 600 maintenance technicians are employed:

- 219 mechanical technicians,
- 381 electrical technicians.

Required qualifications:

- Secondary technical education, personal experience min 1 year, substantive and practical knowledge coming from professional experience as well as from education. Professional qualifications necessary to execute some tasks (e.g. professional qualifications for electricians, conservator of lifting equipment, welding course).
- Not all employees have required education. It is possible to have primary or vocational education followed by several years professional experience and/or training. Example, company additionally employs about 150 electrical technicians and 350 mechanical technicians without secondary technical education but with professional experience and/or training.
- The level of education level and professional experience influence on salary.
- Type of work performed by electrical and mechanical technicians:

- preparation of equipment for repair, overhaul works (dismantling, testing, commissioning equipment after repair), maintenance,
- measurements of operating machinery, equipment and installations,
- detection and removal of defects in electrical, mechanical, hydraulic and energy systems,

- implementation of new technical solutions in the framework of ongoing modernization work and new starts,
- elimination of breakdowns, job control facilities, ongoing maintenance and repair of mechanical, electrical, installation, automation and energy systems,
- reporting of current operational needs, damages of equipment, the risks for the correct operation of control systems and process equipment,
- monitoring of activities and the functioning of any equipment associated with the production process; implementation and modification of individual components of machines or electrical and mechanical equipment and their maintenance and repairs.

▪ Workers allowed to work must have the adequate qualifications depending on the type of work

Ecological aspects of the work

▪ correct waste management (waste segregation), freons, oils, lubricants, isotopes, and sustainable management of resources, materials, energy and packaging,
▪ obligation to follow environmental regulations in each activity,
▪ anticipation of environmental threats occurring during work operation,
▪ appropriate organization of the workplace,
▪ correct operation of equipment and proper performance of duties - to reduce emissions to the atmosphere and minimizing noise.

Done work directly affects the formation of hazardous wastes and other wastes and materials and energy consumption, while indirectly affects on machinery and equipment condition. During their work, employees can meet with e.g. unor-

ganized emissions, where the source of its creation is, for example equipment failure, fire of conveyor belts, fire, explosion, contamination.

Ecological aspects of labour related to health and safety aspects

- appropriate execution of maintenance and repair work influences on the health and safety of workers employed in machinery and equipment operation; correct waste disposal or hazardous materials deduces the risk to workers and others; also those associated with the possibility of a major industrial accident (fire, explosion, pollution of air, water, ground),
- for example, in fugitive emissions, where the source of its creation is, for example equipment failure, it is necessary to use safety glasses, dust masks,
- another example: replacement of fluorescent lamps for energy-efficient light sources (hazardous waste disposal combined with the improvement of lighting in the workplace - the elimination of the stroboscope effect.

The contribution of professions to achievement the aims of Integrated Management System Policy

Each employee should:

- protect the environment and systematic minimize negative impact of their daily work on environment by reducing energy and media consumption, used machinery and equipment in good condition (especially protective), appropriate treatment of wastes, correct organization of the workplace,
- actively participate in the Program Management of Awareness,
- absolutely comply with applicable safety standards, procedures and other rules relating to safety and environment protection,

- specific tasks for each employee are defined also in job instructions and operating instructions.
- Example tasks:
  - Turn off unnecessary lighting
  - Using energy-efficient appliances, care of the state of machinery and equipment
  - Segregation of waste, waste oil recovery
  - Elimination and minimizing risks to health and life of employee
  - Compliance with safety standards AMP
- Active participation in the Program Management of Awareness Monitoring of realized tasks is carried out to date by the operational control of the employees, performed by their superiors. Actions to eliminate abnormal behaviour in environmental protection and health and safety are taken currently. According to existing procedures, monitoring of realized tasks take place also in a monthly analysis of results of the traced aspects of the environment. According to the Program Management of Awareness the workplace and operational audits are performed. External and internal audits take place periodically.

Training System in the Company

- The Company has an annual training plan. Scope of training depends on the realized tasks; training proposals to the plan are reported by individual organizational units. The Company does not have a formal training program only in environmental protection. Environmental aspects are discussed both in health and safety training and training management systems and training by their direct superior.

- Examples of training packages: Health and safety periodically for persons employed in blue-collar workers, environmental protection, waste management, industrial serious breakdowns.
- Training takes place officially, usually during working hours and are funded by employer.
- Obligatory training are conducted in health and safety: the initial, periodic, etc.
- There are conducted also formal and informal training for people whose responsibility is related to EU directives and regulations (e.g. in the field of integrated permits IPPC, Emissions Trading Scheme ETS, REACH) / National legislation / regulations at Company level. Each employee has access to the intranet „studnia" („well"), where he can become familiar witch legal requirements: in integrated permits IPPC, Emissions Trading Scheme ETS, REACH / National legislation / regulations at Company level and other information on the environment. In addition, in part of plants are conducted environmental training project implemented within the framework of WCM. Additionally, the employee may be aimed at training by the supervisor after the acceptance of training department. Staff familiarity with the requirements of the directives and regulations is carried out mainly by familiarizing employees with the internal normative acts (circulars letters, Directives of the General Director, etc.) system procedures and instructions which these requirements are fully reflected.
- Directives and regulations shape the training for analyzed occupations, because workers should be aware of the rules in order to perform his professional activity properly.

Changes / development of environmental aspects in the future

- reducing CO_2 emissions and related with it improvement of machines and equipment energy efficiency
- changes in technology - towards adaptation to the best available techniques and changes in the production process - optimization of the manufacturing process, minimizing consumption of energy, media, raw materials, amount of waste generated
- changes in laws - intensify regulation, increased fees for use of the environment, strengthen penalties
- cultural changes - increase number of civil intervention, increase pressures from local communities and "green" organizations

The development of working methods

- The development of working methods will be directed at increasing the awareness of workers in the field of environmental protection, the introduction of environmentally friendly working techniques (use of innovative, energy-and materials saving techniques, efficient use of resources (reduction in electricity consumption, water, natural resources) and the recycling of waste, minimizing the potential risks for the environment in case of failure)

Important changes in environmental protection and health and safety

- application of new technologies and solutions designed to reduce the impact on the environment (reducing emissions, reducing energy consumption, better waste management)
- greater emphasis on health and safety through the introduction of operational health and safety standards, work in accordance with

the standards, decrease number of accidents and increase the level of safety in plants

- raising awareness of employees in health and safety and environmental protection matters
- amend the provisions of REACH in form of data sheets of substances and preparations
- cover new installations by trading system for greenhouse gas emissions
- investments in projects related to environmental protection (building of sewage treatment plants, investments in new filters reducing harmful substances emissions, aspiration to eliminate key hazards)

Problems concerning of the environment issues (and the related health and safety issues) – the last year

- necessity familiarize employees with new substance characteristics cards (REACH)
- reducing CO_2 emissions to the atmosphere, dust emissions, the amount of waste products, water purification
- failures of equipment and machinery, due to the high rainfall in 2010
- reduce the number of accidents and their severity.

Changes in environmental, health and safety – the last 5 years

- Increasing pressure on protecting the environment and paying special attention on health and safety. Thanks to implementation of the Program Management of Awareness the ecological and safe awareness of employees raised – e.g. green competitions and events has been organized.

- A lot systemic solutions to improve waste management, modernized much of the existing machinery and equipment and made major changes in infrastructure, automated many processes have been introduced.
- Many internal procedures which influenced positively to improving occupational safety and reducing environmental negative impact have been intensified.

Efforts to improve the sustainable development and safe work

- pro-awareness and pro-motivation activities among employees to care for the environment and safety work
- constant increasing the awareness of employees and environmental culture and observance of safety rules
- increasing the number of internal environmental controls, in particular for installations with a significant impact on the environment
- introduction of motivational elements into salary system
- conducting environmental education: ecological picnics and awareness action through fun / entertainment, eco-mails, ecological contests, describing the current environmental problems related to individual departments
- increasing financial investments for environmental investment, modernization and renovation

6.D UNITED KINGDOM

Background - Structure

Three interviews were conducted: two with managerial staff from the Environmental Department and one with the Health and Safety Manager. It is worthy of note that these are two departments, which function separately from each other and with discrete structures. Indeed, they were described as 'very separate' by one interviewee, despite recognition that 'environmental issues are clearly safety issues.'

The Environmental Department was established in the mid-1990s. It is comprised of twelve staff and undertakes both compliance work (ie ensuring that legislation and regulation is adhered to) and improvement work (through step-change projects e.g. capital expenditure on air quality, waste management and recycling projects). The Environmental Manager reports directly to Director level, which shows the increased significance of the role.

Regulation and Legislation

Compliance with environmental legislation is sought in the areas of waste, air, water, land and groundwater contamination, as well as carbon dioxide emissions under the ETS scheme. One interviewee stated that 'The Port Talbot plant has struggled to meet compliance targets.' Workforce engagement is seen as an essential element in securing such compliance, although the environmental department has 'limited resources to communicate with the workforce.'

Environmental regulation emanating from the EU was described as having 'a good underpinning logic' but as being highly inflexible and prescriptive. Moreover, it was described as counterproductive at times and as 'driving behaviour in the wrong way'. An example was given, where waste oil from process was being collected, in order to recycle it through the spraying of coal prior to coking. However,

this was a breach of the Waste Incineration Directive, despite the 'waste' oil being purer than oil bought in for such purposes. Moreover, the ETS was described as highly bureaucratic, with a vast amount of time and money having to be spent on monitoring, assessment, calibration as opposed to trying to reduce. This is seen as proliferating jobs for bureaucrats and the private accreditation firms.

Company Strategy

The company aim is however to move from compliance to improvement, with regulation seen as the baseline from which to progress. Improvement activities, which are comprised of capital investment in key areas of the business, are based on cost-benefit analysis and auditing. There is a pre-allocated 'pot' of £5 billion and applications have to be made for that funding for schemes identified within the department. Improvement is seen as coming from the changing of behaviours/culture, as well as the implementation of current technology and the identification of new technologies (these latter through capital expenditure and collaboration with R&D).

The Tata takeover is seen as being influential in moving 'environmental issues up the agenda', with more emphasis placed on such aspects in the last two years than 'over the past twelve.' Tata is said to have a different approach to capital expenditure and is spending the money required 'to get the facility to a world-class level.

Changing behaviours and culture are an important aspect of strategy.

Workplace Culture and Practice

Participants referred to 'The Journey', the on-going culture change programme being implemented at the plant. Fundamentally, the 'Journey' aims to change attitudes to work and therefore, behaviours, instilling a sense of pride in work and ensuring that all see 'continuous improvement' as an essential and habitual part of their work.

Behaviour and attitude change are seen as interchangeable and thus, there are a raft of practical measures in place, designed to change behaviours and reinforce attitudinal change. Work protocols/standard operating procedures are explicitly specified – and accessible – for all tasks. Environmental and safety aspects are incorporated within these protocols. For example, the procedures for dealing with acid leaks, oil spills or preventing gas emissions are documented within the protocols. Such behaviours are reinforced by 'environmental/health and safety walkovers', conducted by staff from the respective departments (these supplement more formal 'Lead Safe Audits'). Walkovers essentially involve staff asking those carrying out tasks about what they're doing and questioning them as to the environmental/safety aspects of the work being undertaken. Workers might be asked to explain correct procedures in the event of spillage, for example, or how waste should be disposed of. There are occasions where a task/job has changed/evolved, but the safety/environmental aspects have not been incorporated into procedures; the right adjustments do not get made. Moreover, respondents identified that walkovers take time and there are a limited number of staff available.

Behaviours are also reinforced through target-setting and appraisals which incorporate measurement against such goals.

The key role of management 'buy-in' to the environmental agenda was emphasised – if the area has a 'good' manager, this is reflected down the hierarchy. Heavy-end areas, with the greatest potential for environmental risk, were described as those requiring most improvement.

Occupational/Job Requirements

The environmental aspects of the work of mechanical/electrical technicians were identified (e.g. for the former, waste disposal, oil and grease, what to do with removed parts and the latter, removal and disposal of cables etc.). The need to ensure that new contractors are made aware of the environmental/safety aspects

of their work was stressed. It also emerged that heavy-end was a particular focus for raising environmental awareness, and one interviewee stressed that operators should be the targets of any awareness training.

Training

The formal induction for employees, including apprentices, includes a section on environmental issues, which is delivered by staff from the Environmental Department. There are also specific environmental training packages, which will be tailored by occupation and section. How frequently such training is delivered was unclear, as were the reasons that prompt delivery. Environmental staff will attend departmental meetings, held every month for managers. In such meetings, any environmental breaches will be discussed, with a view to implementing appropriate action. Moreover, updates and briefings on any new environmental developments will be delivered in such forums.

For the workforce in general, there is an emphasis on task-based learning, or learning by doing. Protocols and procedures, which specify correct and safe ways of working, are aimed at shaping behaviour and work performance. However, there was acknowledgement that procedures might change, but practice does not always keep pace. Moreover, novel safety and environmental issues that evolve out of changes to work practice are not always recognised and incorporated into procedure or practice. It was also recognised that the 'worst offenders' (contractors and sub-contractors) might be missed.

In terms of more formal training, the workforce attends Journey Days, where environmental aspects might be discussed; has 'Toolbox Talks' with section management; and might attend 'Industrial Forums', where speakers from the Environment Agency or the Welsh Assembly might speak about the broader implications of environmental breaches.

Future Developments

Interviewees were unanimous in the view that previously, production/operational issues would be the priority, with other issues (including environmental aspects) perceived as secondary. This is now felt to be changing – environmental aspects are 'moving up the agenda' and will ultimately become as central as health and safety has. However, greater environmental awareness and workforce engagement is seen as essential to the progress of such an agenda. Training is acknowledged to be a central plank in any such programme – so as to move away from the "current fire-fighting, reactive approach of the Environment Department" - but gaps in current provision were recognised.

Possible recommendations were the use of 'Training Champions' located within sections (following the model of the new Energy Optimisation department, who are based in sections, working on specific projects), who would disseminate and reinforce good practice and ongoing education in correct protocols. Another idea was to incorporate and emphasise environmental perspectives into training and practice on risk assessments. All workers are trained in the process of risk assessment and are encouraged to conduct an on-the-spot, two-minute risk assessment for all jobs (alongside the written, formal risk assessments that are located in, and can be accessed from, a computerised database). The Safety manager proposed that the identification of any potential environmental hazards and associated protective and preventative measures should be emphasised, alongside the assessment of personal safety hazards.

7. SUMMARY

Summarizing the results of WP2 it is indispensably to underline that steel will remain the industrial backbone of the post-modern society. Steel with its mechanical properties and ability to be recycled in 100% was, is and will the most important structural substance in the world.

This project is focusing on two occupations broadly used in metallurgical plants, i.e. mechanical and electrical technicians (according to International Labour Organization' classification of occupations – doc. ISCO-08 Draft definitions; 9 July 2009), employed on posts in three crucial departments: blast furnace, steelmaking shop and hot rolled mills.

This summary is developed following similar issues discussed in this report. So environmental and health and safety issues, mentioned in chapters 1, 3 and 4 are summarized together with distinction of the level of legislation: European, national and company.

The environmental legislation on European level is developed on the level of directives and for the purposes of this project structured on categories of environmental threats.

<u>Wastes</u>

The mechanical technicians influence is limited to handle waste resulting from maintenance and repair of machines and mechanical installations. It refers mainly to oils. Mechanical technicians, among others employees, should pay special attention on hazardous waste. The Framework Directive does not have an influence on a daily work of electrical technicians.

From the Landfill Directive one can come to the occlusion that waste generated in the range of activity of electrical and mechanical technicians needs to be properly classified and this dictates where waste may be landfilled.

The WEEE and Packaging Directives are greatly affect mechanical and electrical technicians in their day to day duties and how they consign waste packaging (both electrical and mechanical technicians) and electrical / electronic equipment (only electrical technicians) to meet the internal requirements of their company regulations and legislation. All their obligation in that range should be described in individual job description for work-places were mechanical technicians are employed.

Emissions to Atmosphere

Technicians (both mechanical and electrical) should be aware of the requirements of the permit (based on IPPC Directive) to ensure no uncontrolled releases occur (e.g. during maintenance activities). The mechanical technicians should apply the best available techniques BAT accepted for their work-places.

Based on Pure Air for Europe Directive Technicians (both mechanical and electrical) should be aware of the regulation of the legislation to ensure no uncontrolled emissions occur (e.g. during maintenance activities).

Emissions to Water

Technicians (both mechanical and electrical) have the potential to cause the uncontrolled release of contaminants to controlled waters through maintenance activities (replacement of fluids such as coolants/oils, etc., blow down of cooling towers, chemical storage, etc.) or through the setup of control instrumentation and monitoring systems.

The health and safety legislation on European level is developed on the level of directives. The legislation in this range is rather of general character. It describes different threats and risks (e.g. dangerous agents at work, chemical agents, noise, vibrations, and artificial optical radiation). From the point of view of analysed Directives mechanical and electrical technicians are exposed to the same

threats and risks while performing their duties (maintenance and repairs) like other employees in the company.

The European environmental and health and safety law is completely implemented into national law in countries being partners in this project. In some countries additional legal documents were implemented to law systems (e.g. Poland in the range of law on health and safety the main obligatory legal document is labour code, and for steel sector the decree on health and safety in iron and steel metallurgy).

The companies legislation (i.e. steel companies involved in this project) is in line with national/European legislation and reflects specific needs of steel companies. It is developed in different forms depending of management systems of these companies. For example in Tata Steel there are strategies (e.g. Air Quality Strategy Group) and policies (e.g. Environmental Policy), in ThyssenKrupp Steel it is organized in guidelines (e.g. " Environmental protection is an overriding aim of the corporate policy") and in ArcelorMittal Poland books, policies, operating procedures, plans and Directive of the General Director (e.g. Procedure PS/US/S.21 Identification, assessment and supervision over environmental aspects) exist. In each considered company Environmental Management System (EMS) guarantees the implementation of the environmental policies, rules, strategies and legislation.

The development of the sector and vision of it in the future is strongly linked to external conditions of functioning, where political ambitions play crucial role. The second factor is international competitiveness. The increasing demand for steel product inspires engineers to innovate the technological routes to produce more, better and cheaper than competitors. The world-wide trend to orient sustainable development to low carbon economy overlaps for regular technological progress the challenge of severe environmental requirements.

European Union is the world leader in promoting environmental sustainability. The environmental legislation is tending to minimize the influence of industry to natural environment. For iron and steel industry it does mean more costs not only in devices to mitigate pollution but much more significantly in innovative technologies. This is the way in which steel producer may lost competitiveness in relation to those competitors which do not have to obey restrictive environmental law. That is the serious threat of so called “carbon leakage”, i.e. transfer production to geographical regions without limitation of CO_2 emissions. In that case the threat of lost jobs, among them mechanical and electrical technician would be observed. History of EU-ETS functioning and present situation does not indicate that this scenario could be realized in the short future, but the threat still exists. Some others measures to keep high requirements to reduce GHG emissions with another solution as in EU-ETS were proposed by EUROFER as Baseline and Credit system.

The European steel industry exploits the most modern and efficient facilities. Emissions from existing metallurgical technologies have almost reached their minimum, and there is little further improvement achievable without new process technologies.

Almost all research and development metallurgical centers are working on breakthrough technologies which could minimise influence the natural environment, decrease energy use and cut production costs. There are three fields of concentration:

1. Staying close to the carbon-based blast furnace technology and development various methods decrease CO_2 emissions and effective ways to capture and storage CO_2,
2. Replacing carbon by other reducing agents and fuels such as natural gas, hydrogen or electricity,
3. Using a biomass which contains “short-cycle” carbon.

The best example of first solution is project ULCOS.

For the steel sector, the public/private partnership under the umbrella of the Ultra Low CO_2 Steel (ULCOS) project is leading to some very promising technological innovations.

The most advanced and promising technology is the Hisarna coke free steelmaking process, which will be able to reduce greenhouse gas emissions from steel production by 80% (in combination with Carbon Capture and Storage (CCS) and 20% without CCS) compared to the current reference steel plant. This technology is expected to reach market maturity around 2025. Both the capital investment and operational costs of this type of steel production look promising.

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