



Education and Culture DG

Lifelong Learning Programme



**TATA STEEL**

**GT VET**

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



**Work Package 3**

**Analysis of VET Systems**

**Reflecting Anticipated Future Requirements**

**Summary Report**

**D.7.1**

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## Introduction

This report presents a summary of the findings of Work Package 3. The research from all four participant nations has been analysed in order to deduce the implications for the fourth work package and these conclusions will be outlined within this document. This paper begins by summarising the European Union's VET strategy, followed by its 'green skills' policy and a discussion of how this is integrated with its overall approach towards VET. The document will then outline the VET and green skills initiatives that exist at the sectoral level i.e. those that pertain to the European steel industry. Each nation's general approach to initial vocational education and training (IVET) will then be presented, with a specific focus on the position of the apprenticeship system therein (beginning with Italy, followed by Poland, Germany and the UK). The relation between the 'green skills' agenda and the IVET system in the respective nations will then be discussed, within each national overview. Each of the national sections will end with an overview of the empirical data gathered through research conducted with relevant stakeholders (i.e. IVET providers, partner steel companies and apprentices). The report will end with a summation of the analysis of these findings and the implications for the overall training module, to be composed under the auspices of WP4.

### EU VET Strategy and 'Green Skills' Policy

In this section, the two main strategies with implications for VET will be outlined, prior to an identification of the specific mechanisms adopted to advance VET in member states, namely the Copenhagen Process and the Bruges Communique. This section will conclude with a brief overview of the EU's drive for sustainable development and its recognition of the role of green skills therein.

## Strategies - Lisbon and Europe 2020

The Lisbon Strategy, formulated by the European Council in 2000, articulated the EU's strategic intent to “become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth.” To these ends, a ten-year programme, aimed at revitalising growth and sustainable development across the EU, was established and this underpinned EU policy formulation within the last decade (ETUC, 2006).

EU education and training policies gained impetus with the adoption of the Strategy (Europa, 2011). The main objectives were, essentially, to raise the quality and effectiveness of education and training systems in the EU to the highest levels and to ease access of all to education and training. To these ends, the European Commission initiated the Education and Training 2010 work programme (Council of the EU, 2002), with specific education and training benchmarks set for attainment by 2010.

The Lisbon Strategy was updated through the EU2020 strategy. This latter maintains the themes of ‘growth and jobs’ and places the period 2010-20 in the context of recovery from the economic crisis and the urgent need for sustainable economic development. The EU 2020 strategy articulates three main priorities: *smart growth*, *sustainable growth* and *inclusive growth* (European Commission, 2011). Of course, for the purposes of this project, sustainable growth is of most interest. It is envisaged that the EU will stimulate sustainable growth through two flagship initiatives: ‘Resource-efficient Europe’, which aims to decouple economic growth from resource and energy use by reducing carbon emissions, promoting greater energy security and reducing the resource intensity of production and consumption; and ‘An industrial policy for the globalisation era’, which aims to support businesses as they respond to globalisation, the economic crisis and the shift to a low-carbon economy.

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## Specific EU Mechanisms for the Enhancement and Advancement of VET - The Copenhagen Process and the Bruges Communiqué

### The Copenhagen Process

The Copenhagen Process was launched in 2002, in order to strengthen pan-European co-operation in VET and concomitantly, the alignment of European and national-level practice. Member states have committed themselves to a set of common priorities and therefore, several universal European principles and instruments have been developed, so as to support lifelong learning, ensure enhanced quality of VET provision and facilitate educational and job mobility within and between member states. Principally, the instruments focus on the improved quality of VET provision at national level through the development of a European quality assurance system (EQAVET); the facilitation of comparisons of qualifications across Europe through the creation of the European Qualifications Framework (EQF) with which national qualification frameworks must align; and the development of a credit system (ECVET), so that work experience and qualifications gained in one member country can be validated and recognised in another.

### The Bruges Communiqué

In December 2010, the European Ministers for Vocational Training, the European Social Partners and the European Commission met in Bruges to set the priorities of the Copenhagen Process, and thus the common objectives for vocational training, for 2011-2020 (Europa, 2010.). In light of the challenges currently facing the EU, the need for responsive, flexible, high quality education and training systems is emphasised. The Communiqué states that the capacity of VET to respond to the changing requirements of the labour market must be enhanced, and that these changing labour market needs must be integrated into VET provision (content, infrastructure and methods) over the long-term. The transition to a green economy is also identified as a ‘mega trend’, which impacts on skill needs across many different jobs and sectors. The Communiqué establishes that the labour market

requires a balance between developing generic green skills (e.g. reducing waste, improving energy efficiency) and more specific skills (e.g. the development and utilisation of green technology).

### The EU and ‘Green Skills’ Policy

The EU’s Sustainable Development Strategy (SDS) was launched under the auspices of the Lisbon Treaty in 2000 and this overarching policy goal was renewed in 2006. The 2009 Review of the SDS outlines progress made, in addition to identifying areas for further action. The Review states that whilst the EU has mainstreamed SD into its policies, the economic crisis of 2008-09 served to highlight that sustainability is a key factor for member states’ financial systems and the economy as a whole (European Commission, 2009). It refers to the Recovery Plan for jobs and growth (a fiscal stimulus of EUR 200 billion) launched by the Commission in 2008 (which focused investment on clean technologies and infrastructure) and emphasises how crucial it is that measures to support the economy and reduce the social impact of the financial crisis are compatible with long-term sustainability goals. The Review emphasises that the EU must turn the crisis into an opportunity to address financial and ecological sustainability, and develop a dynamic low-carbon and resource-efficient, knowledge-based, socially inclusive society. This building of a green economy is increasingly vaunted as a vehicle for job creation at European and national levels (e.g. European Commission, 2009; Cedefop, 2009; Innovas, 2009; Levy, 2010). The EU has also explicitly recognised that green jobs require green skills, and that these play a critical role in supporting a low-carbon economy (Environment DG, 2011). EU policy documents in this area clearly advocate government intervention at national level through, for example, subsidising research and early stage deployment into new green technologies. This is seen as being crucial in supporting such job creation.

However, despite the fact that education and training have been identified as the critical foundation in attaining sustainable development and the creation of a green economy (European Commission, 2009; see also GHK, 2008), research by

ECORYS (2010) for the European Commission highlighted the existence of a ‘green skills gap’.

## **The Sectoral Level – Strategies for the European Steel Industry**

The green skills strategies, policies and practices of a number of influential sectoral bodies that operate at the European level were reviewed. The bodies were the European Metalworkers’ Federation, the European Confederation of Iron and Steel Industries (EUROFER) and the European Steel Platform, aimed at maintaining the global competitiveness and sustainable future of the European steel industry. In essence, the review found that whilst each of these institutions has issued policy statements on the subjects of climate change, environmental protection and sustainability, as well as on training, development and lifelong learning, there is currently very little explicit emphasis on a green skills agenda.

EUROFER exists to represent all steel producers operating within the EU. Its members are therefore steel companies and national steel federations. It represents the common interests of its members vis-à-vis third parties, notably the European institutions and other international organisations, and thus, aims to influence policy. Its general environmental position was outlined in WP2. Of particular salience is that in a number of policy documents, EUROFER has highlighted the growing challenge posed to the European steel sector by EU environmental and climate change regulation (Eurofer, 2010). Indeed, the very future of Europe’s steel industry is identified as being dependent on the European internal regulatory framework.

Training and lifelong learning policy are formulated through the process of social dialogue, with the other party being the European Metalworkers’ Federation (EMF). The EMF is the representative body defending the interests of workers in the European metal industry. It has a mandate for the external representation and

coordination of the metalworkers' unions as well as to engage in bargaining at European level. A specific objective of the social dialogue process in this case is the anticipation of the skills needed in the sector, as well as concomitant workforce development. In furtherance of this aim, EUROFER and the EMF submitted a joint proposal to the European Commission at the end of August 2010, regarding the establishment of a European Sector Council on Jobs and Employment for the Steel Industry. In terms of the role and functions of such a Council, the body would coordinate the monitoring, forecasting, analysis (professional and training requirements) and proposals for European and national legislation (in terms of compliance) concerning proficiency, training and the development of skills and job descriptions in the steel industry. Of particular salience here is that the proposal specifically identifies that such functions would encompass the provision of support for steel workforces in the transition toward more environmentally sustainable production technologies and products.

In addition to its participation in Social Dialogue, the EMF has launched two relevant initiatives in the area of education and training. These are the EMF Qualification Initiative of 2001 (EMF, 2001) and more recently, its 'Education, Training and Lifelong Learning – A Must for Sustainable Development' position (EMF, 2010). The former aims essentially to develop collective bargaining on training whilst the latter highlights the crucial role of education and training for sustainable development. In this latter, the EMF argues that the Commission's emphasis on education and initial training systems (basic school education and university) for the creation of new skills that fit with the requirements of new 'green' jobs is somewhat misplaced. The EMF's position is that the emphasis should be on continuing education, as it is through such mechanisms that effective responses to the cyclical requirements of competence needs can be made. To this end, the EMF argues that the EU and the Member States must mobilise substantial financial means in order to allow new green jobs to emerge, facilitate the transformation of those that already exist and engage in the adaptation and reconversion of existing competence mainly via vocational training (although a role for initial training is also envisaged). Thus, the EMF states that educational and training systems must be more responsive to the challenges of fast-



moving, disruptive technological change (ICT, green jobs and energy constraints, nanotechnologies, etc.

Both the EMF and EUROFER work in close co-operation with the European Steel Technology Platform (ESTEP) in order to promote training and lifelong learning in the steel industry.

ESTEP is a European-wide research network, which brings together the whole European steel industry, research centres, universities, the European Commission and Member States, as well as the other European institutions and trade unions, in order to create a coherent response to the challenges that impact on the European steel industry namely, the growing impact of globalisation, the matching of steel supply and demand and the climate change issue. In so doing, it aims to strengthen the EU-27 partnerships. More than 120 experts meet several times a year so as to implement and update the body's Strategic Research Agenda (SRA). The SRA is a key part of a sustainable development policy aimed at maintaining the global leadership of the European steel industry. Skills development of the workforce in line with technological advance is one of the anticipated outcomes of the research agenda.

# 1.0 Italy

## 1.1 Overview of IVET System and Position of Apprenticeship Scheme Therein

Italy is a democratic Republic, with 20 Regions. The State has exclusive legislative powers over general rules on education and essential levels of performance. Although the State is responsible for deciding the basic principles, the Regions have legislative powers over vocational education and training (apart from tasks connected with the European Union), and parallel legislative powers over general education.

Compulsory education in Italy has a duration of twelve years (from 6 up to 16 years old) and includes the ‘first cycle of education’ (primary and lower secondary levels, the latter for 11 to 14 year-olds) and the first two years of upper secondary school (in state and non-state schools possessing the requisites decided by the State). The ‘second cycle of education’, or general upper secondary education, is comprised of the various lycees, technical and vocational schools. There is also a universal right to education/training for at least 12 years or until a vocational qualification is obtained within the three/four year regional VET paths (FPI), up until age 18.

Thus, 14 year olds who have completed lower secondary school have access to Lycées (which aim to provide generic education for pupils who intend to pursue higher education), Technical Schools and Vocational Schools. Programmes studied at these institutions are all five years in duration. They also have access to the three-year pathways of Education and Vocational Training (FPI), managed by the Regions. Regions must ensure that their students attain nationally-defined minimum levels pertaining to language, mathematics, scientific, technological and social competences and that the qualifications that they offer correspond both with the needs of local enterprises, as well as nationally defined professional profiles.

Technical Schools, Vocational Schools and the three year FPI are aimed at developing technical profiles (IVET is not provided at lower secondary level).

The curriculum at Vocational School is based on general and technical education that enables pupils to develop knowledge and competencies for operating within a specific technical sector. Compared to Technical School, the competencies are more ‘applied’ i.e. directly usable in a working environment. At the end of the upper secondary school (both general and vocational upper secondary education), students take a state examination. Those who successfully pass the examination obtain an upper-secondary school leaving diploma, which allows them to continue their studies at higher level. For VET, this would mean IFTS courses (see below), or university for non-vocational, tertiary education.

The regional FPI pathways are aimed at the development of technical competencies directly usable in a working environment, with a specific focus on specificities of the local market, through the attainment of a qualification (vocational qualification certificate) in the third year (basic training for those who have completed the first cycle of education). Pupils also have the option of acquiring a vocational qualification after one more year of training (this second-level pathway is also available to those who have completed the upper secondary level of education). These pathways can be realized within accredited Vocational Training Centres, managed by the Regions. Apprenticeships are also offered under FPI. An apprenticeship contract is a “mixed” work contract - the apprentice is considered a worker. There are now three types of apprenticeship:

- An apprenticeship aimed at the fulfilment of the right to education and training: young people who have reached 16 years of age can be enrolled for all fields of activity. The contract lasts a maximum of three years and is aimed at helping students obtain a vocational qualification;
- A profession-oriented apprenticeship: students aged between 18 and 29 years can be enrolled. Depending on the type of qualification to be obtained,

the duration of the contract varies. It cannot, however, be less than two years or more than six years. There is also a minimum quota of 120 hours of formal worker training (internal and external). This type of apprenticeship is not yet available for all companies across the nation but it is being gradually implemented both through regulations and collective agreements. External training activities are mainly provided by accredited training bodies; activities are financed by public institutions (Regions or Ministry of Labour), while the expenditure for internal training is financed by the enterprise.

- A “high apprenticeship” for qualified students, which enables the student to obtain a second or third level diploma through a job contract.

The apprenticeship contract establishes the services required from the apprentice, the kind of training and the final qualification. The salary is established in the contract, on the basis of the prevailing collective agreement.

Post-secondary education and training (non-tertiary) is organised both in the Higher Technical Education and Training System (IFTTS) and in the second-level vocational training courses managed by the Regions. The former are one to two year courses, aimed at developing senior technicians. The regions are responsible for ensuring integration of IFTTS courses with educational systems, on the basis of national guidelines.

## 1.2 VET and ‘Green Skills’

Within the vocational education/school system, the researchers found that there was no specific ‘chapter’ on environmental issues in the national curricula handbooks. As such, no training modules on environmental issues have been prepared, or are being delivered. There is seemingly a growing awareness on the part of teachers about environmental issues, but this is currently at a very general level and is not being specifically applied to workplace procedures and practice.

Regarding the FPI provision, delivered and administered by the regions rather than the state, the vocational training centre in one region (Umbria) had recently incorporated a training module on 'legislative matters and professional procedures for making work environmentally safe' within the apprenticeship training handbook.

### 1.3 Stakeholder Perspectives – Interview Data

The company (Thyssen Krupp) requires that electrical and mechanical technicians have six months' on-the-job training, so as to be fully familiar with the operation of plant. This is supplemented by general off-the-job training, on topics such as maintenance operations. For apprentices in the region, this is carried out by the regionally-accredited vocational training centre, AST. AST's own technicians devise and deliver this off-the-job training, which encompasses fundamental principles of mechanics and electrics, as well as courses on the specific operation of plant and working procedures. In accordance with Italian law, safety training is carried out by relevant contract agencies.

The company interviewees identified that waste identification, handling, management and disposal is of particular salience for the role of maintenance technician and moreover, that such training is missing from current provision. It was identified that technicians could benefit from environmental training, targeted at raising awareness of the environmental impact of waste, relevant legislation, waste types and classification, waste minimisation techniques, as well as storage and disposal. It was recommended that these technicians need to understand the consequences of 'wrong' behaviour in such matters and the impact upon colleagues, the company and the environment. To change behaviour, it was advocated that eco-friendly behaviour be incentivised, alongside the running of collective awareness campaigns on environmental protection, with awards for improvement groups. Such measures would reinforce the provision of information on company wastes and handling techniques.

## 2.0 Poland

### 2.1 Overview of IVET System and Position of Apprenticeship Programme Therein

After graduation from a lower secondary school, compulsory education is fulfilled by attending an upper secondary school. The lower secondary school graduates start their education in upper secondary general education or vocational schools at the age of 16. Education in those schools lasts between 2 to 6 years depending on the type of school. Most vocational pupils finish their education in the school system at the age of 19 or 20. In the education system, the following types of upper secondary schools provide IVET:

- 3-year profiled general secondary school, which provides general education and offering tuition in individual general vocational profiles, leading to secondary school-leaving certificate (*matura*);
- 4-year technical secondary school- awarding a vocational qualification diploma. Furthermore, a secondary school-leaving certificate (*matura*) can be obtained after completion of the fourth grade of the school. After completion of technical secondary school, graduates may take an external exam, based on national examination standards, confirming their vocational qualifications
- 3-year supplementary technical secondary school–awarding a vocational qualification diploma, leading up to a *matura*, for basic vocational school leavers (offers a follow-up curriculum for the latter);
- 3 year basic vocational school - awarding a vocational qualification diploma but no *matura*; (option to proceed to supplementary technical secondary school or supplementary general secondary school);

- 2.5 year post-secondary schools- awarding a vocational qualification diploma for graduates from general secondary schools (starting operation in 2005);

The different forms of upper secondary schooling hold different educational objectives. Whilst general secondary schools (part of an academic pathway) prepare their students for obtaining an upper secondary school-leaving certificate after passing a *matura* exam and thereafter, pursuing higher education at university, the other upper secondary schools provide vocational qualifications or general vocational preparation. Thus, they offer different curricula and the educational process includes practical training. This latter is organised in schools, at the workplace, continuing education centres or practical training centres. In basic vocational schools, practical training corresponds to 50% of all hours envisaged for vocational subjects. In technical secondary schools, this proportion varies from 20 to 25%. Moreover, there are work placements in all types of VET, lasting four weeks and occurring once or twice in the education cycle.

Whether in secondary technical schools, basic vocational schools or post-secondary schools, vocational education is provided for those occupations included in 'The Classification of Vocations for Vocational Schooling.'

Graduates from all vocational schools can take an external vocational exam to have their qualifications confirmed. This vocational exam is based on external standards proposed by the Central Examination Board.

Apprenticeship training is regarded as a special type of VET in Poland. The main entry requirements for participating in this type of training are completion of lower secondary school and being at least 16 years of age. Apprenticeship training is organised in small and medium-sized enterprises. Employers are usually members of a guild. Apprenticeship in crafts is offered in 117 occupations – these include metalworking, machine mechanics, as well as electronics and electricity.

Apprenticeship training can take either of two forms:

(a) Apprenticeship for pupils of secondary technical schools: occupational training (ISCED 3) leading to qualification as an apprentice or a skilled worker. This comprises practical vocational training at the employer's organisation and theoretical training in the school system. When practical vocational education is organized outside school, the school director signs an agreement with the partner enterprise. This agreement stipulates the start and end date of the apprenticeship, the partners' rights and obligations and their share in apprenticeship funding. The vocational education program is appended to the signed agreement. The school is responsible for monitoring realization of the programme, accident insurance, approval or recruitment of vocational instructors from within enterprise, reimbursement of travel costs for commuting apprentices. Partner institutions accepting apprentices are obliged to ensure appropriate facilities for vocational training (i.e. training job posts with necessary equipment, technical documentation, protective clothes and shoes, free meals and drinks in case of physical work that requires regular calories intake). The employer is also obliged to familiarize young employees or apprentices with work organization, work rules and H&S regulations. These stipulations are relevant for apprenticeship organized for both mechanical and electrical technicians. The organisation of the apprenticeship and its detailed programme are responsibility of vocational education teacher(s)/school director.

(a) Apprenticeship as young worker: training to perform a specific job (ISCED 2), covering only selected work activities and within the framework of a professional training contract. This is limited to a small group who have not completed lower secondary school and are at least 15 years of age. The employer defines curriculum in line with existing core curricula. Training takes three to six months. After passing a test, the trainee receives a certificate stating acquisition of particular skills in a particular occupation. The certificate is issued by the enterprise where the training took place and is recognised by



the education system. After finishing training, the young workers (between 16 and 18 years old) can continue the apprenticeship, leading to a qualification (the duration of the first is included into the duration of the latter).

## 2.2 VET and Green Skills

A comprehensive approach to developing ‘green’ skills in Poland is missing; appropriate policy initiatives are lacking. Government activity is usually limited to raising general environmental awareness and encouraging pro-environmental behaviours.

Within the education system, the National Polish Ecological Education Strategy was adopted in 2001. It defined national goals for environmental education and established priorities. The first operational programme to ensue from this was the National Polish Ecological Education Programme, which specified the institutional framework, measures and funding sources. Starting from 4<sup>th</sup>-6<sup>th</sup> grade (the second level of primary education), it is possible to introduce educational pathways, which can be integrated with various subjects or taught separately. One such educational pathway is that of “environmental”, and this is aimed at conveying a pro-ecological message to pupils. In sum, there are no separate modules/lessons on ‘green’ issues within the framework of vocational education – there are only optional educational “environmental pathways”.

Indeed, ECORYS (2010) confirmed that many of the environment-related programmes and courses concentrate on general ecological education and are addressed to pupils from primary and secondary schools. Where other environmental training occurs, it is usually instigated by a promoter, such as an environmental NGO.

## 2.4 Interview Data – Company/Apprentice/VET Provider Perspectives

Currently, there are no dedicated ‘green’/environmental modules in the education curricula for either mechanical or electrical technicians. If, however, ‘green’ elements are introduced into other subjects within the framework of environmental pathway, they may be evaluated as a part of partial/final exam from the subject. The inclusion of environmental aspects is usually at the discretion (and preparation) of the teacher and it remains at the level of general principle. However, H&S modules constitute part of two of the required thematic blocs that comprise the curricula for the two occupations.

Indeed, interviewees confirmed that, within the educational provision at school, all issues connected with environmental protection are treated marginally or are not raised at all.

However, all apprentices are required to attend and participate in the internal training provided periodically by the host enterprise. The content of such training includes the subjects of health and safety, integrated management systems, environmental protection and the handling waste materials amongst others. Interviewees emphasised that during training, much weight is accorded to energy/electricity conservation, the safe storage and utilization of dangerous materials and general environmental issues. Moreover, the relationship between health & safety and environmental protection is similarly stressed. As a result of company training, apprentices exhibited a high level of environmental awareness and offered accurate definitions of ‘green skills’ and how they applied to their roles.

The conclusions and recommendations drawn from the research are as follows:

- More effective environmentally-oriented education at each stage of the school education process, and particularly from an early age, so as to change mindsets

- Company training should be specific, realistic and applied to roles and should include a lot of practical examples;
- Awareness training for employees – making workers aware of their impact on environment, and also of the potential for negative future consequences (at individual, organisational and societal levels) if there is a lack of environmental protection;
- Supplementing training programmes through running campaigns, organising events, provision of information on the subject of environmental protection;
- Co-operation between the education institutions and industry is essential, not least because teachers should be knowledgeable about the specific nature of roles.

## 3.0 Germany

### 3.1 Background

In the field of VET, the Federal Government is responsible for in-company vocational training, whilst the *Länder* are responsible for vocational training in schools, and hence also for vocational schools. Vocational training in enterprises is subject to co-determination, with the state, employer and trade unions working in partnership so as to ensure continued efficacy and relevance of vocational education and training.

### 3.2 IVET System, the ‘Dual System’ and Apprenticeships

In practice, young people are required to attend school from the ages of 6 to 18. After 4 years of primary school (6 years in Berlin and Brandenburg), pupils move into different educational branches either: secondary general school (*Hauptschule*), intermediate school (*Realschule*) or grammar school (*Gymnasium*). Often these different pathways merge through the ‘dual system’ (i.e. in-company training combined with part-time vocational schooling). Indeed, the dual system is the

largest provider of education at upper secondary level. In 2009, 64.8% of the school-leavers from general education opted for a dual-system apprenticeship (BIBB 2010). After completing their training in the dual system, the majority of participants then take up employment as a skilled worker.

After finishing lower secondary level education (from ages 10 to 15) and completing compulsory schooling, pupils may enter into vocational training in full time schools or within the framework of the dual system (or continue in the grammar school system, leading to university, or seek employment). Upper secondary education leads either to a higher education entrance qualification or a vocational qualification for skilled work. The vocational track means that pupils may enter into vocational training in full time schools or within the framework of the dual system.

The apprenticeship system is described as dual because training is conducted in two places of learning: companies and vocational schools. It normally lasts three years (some occupations only require two years and there are also regulations allowing a reduction in the training period for trainees with an *Abitur* - the school leaving certificate allowing entry to higher education). The trainees are, on average, between 16 and 18 years old at the beginning of the education and training.

The aim of training in the dual system is to provide broad-based basic vocational training and the qualifications and competences required to practise an occupation as a skilled worker in one of the 349 currently recognised training occupations. Compulsory full-time education must have been completed by the time of commencing vocational training. There are no further requirements for access to training in the dual system; it is essentially open to all although the majority of trainees hold either the intermediate certificate or the *Abitur*.

Training takes place on the basis of a private-law vocational training contract between a training enterprise and a young person. The apprentice is trained in an enterprise for three to four days a week and in the vocational school for up to two days a week. Enterprises bear the costs of the in-company training and pay the

trainee remuneration as regulated by collective agreement which increases with every year of training, and averages about one third of the starting pay for a trained skilled worker.

The professional competences in occupations to be acquired in in-company training are specified in a training regulation and included by the training enterprise in an individual training plan. The binding requirements of the training regulations guarantee a uniform national standard which corresponds to the requirements in the relevant occupation. Training may take place only in training enterprises in which the skills required by the training regulation can be imparted by training personnel who are appropriate both personally and in terms of specialised knowledge. The suitability of training enterprises and in-company training personnel is monitored by the relevant autonomous industrial bodies (Chambers). The proper provision of the training itself is also monitored by the Chambers.

Alongside the system of in-company training is the vocational school. These schools are autonomous places of learning and their task is to provide basic and specialised vocational training and to extend previously acquired general education. Vocational schools deliver framework curricula to students. These curricula are harmonised with training regulations, and are drawn up for every recognised training occupation. The core curricula are decided by the Standing Conference of Ministers for Education. The Lander adapts the core curricula or inserts it directly into their own teaching.

Curricula are composed of learning fields, each focused on different job-specific content. They contain subject content, time allocations and targets for achievement. They do not provide any stipulations as to teaching methods to be adopted.

The framework curriculum for industrial mechanics consists of 15 learning fields, whilst that for electrical technicians is comprised of 13. Although in both curricula, there is no dedicated specific learning field for environmental protection or occupational safety, these aspects are incorporated and integrated with relevant job-specific topics. The cultivation of green skills and their application are explicitly

names in 9 of the 15 learning fields for industrial mechanics and in 7 of the 13 fields for electrical technicians. Moreover, both curricula contain general instructions as to issues of environmental protection. Vocational schools have to commit to advising apprentices of the ‘environmental threats and accident risks’ that might arise in their occupational life’ and furthermore, to advise them how to avoid, prevent and minimize such risks. Students are also to be taught how to observe environmental rules and regulations, as well as those pertaining to health and safety.

### 3.3 Stakeholder Perspectives – Interview Data

The school staff interviewees stated that they aim to inculcate general environmental awareness in the apprentices, attempting to broaden their understanding of sustainability and how their actions can make an impact. Techniques such as Life Cycle Assessment are taught. Environmental aspects such as emissions, waste, resource efficiency and water are covered in class. The educators said that their challenge is to change behaviour, through sensitizing students to an environmental perspective and empowering them to take appropriate action. The benefits of such behaviours – for individual and company- are stressed, so as to increase motivation. The VET examination contains 5 obligatory questions on the environment and sustainability.

The trainees’ perspective, by way of contrast, is although they are very keen to have additional qualifications/educational provision in this area, that such issues are only covered in a superficial way in school and that there is hardly any emphasis on environmental aspects. As such, they stated that their levels of environmental awareness are a result of personal background and experience at secondary school. They identified waste, hazardous materials and particulates as particularly important for their roles, with emissions, resource and energy efficiency issues seen as less crucial.

The trainees emphasized that there should be stronger links between school and company, and that concrete, specific examples are essential for effective learning. They also stressed that applied learning – ‘learning by doing’ – was the most effective way to learn.

This perspective was reflected in the school/company data, where participants also stressed the need for cooperation between these parties, perhaps through the implementation of shared projects on an annual basis. The need for project and action-oriented learning was also stressed, in line with trainees’ own proposals. It was suggested that theoretical input should be reinforced with concrete actions. It was suggested that for the WP4 module, it would be useful to collect and develop examples of concrete learning, projects and applications of tools, for use as learning materials. It was also suggested that critical incidents could be documented and form the basis for analysis – students could work out what went wrong in a situation and how it could have been prevented through the identification of the appropriate actions at each stage. It was also recommended that several smaller modules might be a better option. These could be delivered over the whole training process.

## 4.0 The UK

### 4.1 Background to IVET System and Apprenticeship Programme

Schooling is compulsory in the UK from the ages of 5 to 16. All publicly funded schools must provide the National Curriculum. At age 16, most pupils take public examinations, the General Certificate of Secondary Education (GCSE), level 2 in England, Wales and Northern Ireland. GCSEs are normally taken in a range of single subjects, and a certificate is issued listing the grade achieved in each subject. After completion of compulsory education in secondary schools, young people may choose to continue in school, move to a sixth-form college or a FE college, enter

employment with training such as an apprenticeship, or enter employment without apprenticeship.

Students remaining in education at a school or a college may choose between general ('academic') and vocational subjects, or take a mixture of the two. Normally, the upper secondary phase lasts two years, from age 16 to 18 or 19. The dominant qualification is General Certificate of Education (GCE) A-levels (level 3).<sup>1</sup> A-levels are 'elective' single subject qualifications, which students choose on the basis of GCSE qualifications, interest and intended destination. School- and college-based vocational qualifications and pathways are developing. Vocational GCSEs and vocational A-levels have been available since 2000, part of the drive of successive governments to bridge the gap between general education and vocational training, through attempting to establish parity of esteem between different types of qualifications. The achievement of this goal, however, remains elusive.

Apprenticeships provide work-based training in a broad range of sectors to people who are gaining recognised qualifications while they are working. Apprentices have a contract and have the status of employee at the organisation where they work.

Apprenticeships normally last between one and three years. There are 190 types of Apprenticeships ( level 2, equal to five good GCSE passes) and Advanced Apprenticeships (equal to two good A-levels or level 3 qualification), available in over 80 different occupations. There are also Higher Apprenticeships that work towards work-based learning qualifications such as NVQ Level 4 and, in some cases, a knowledge-based qualification such as a Foundation degree.

Relevant Sector Skills Councils (SSCs) produce a framework of content for each apprenticeship qualification (for the two occupational groups in this study, the relevant SSC is SEMTA, the Sector Skills Council for Scientific, Engineering and Manufacturing Technologies). This is done in accordance with the design principles

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<sup>1</sup> The traditional academic subject qualifications (i.e. GCSEs, A-levels, most university qualifications) are not classified as vocational.



of the Apprenticeship Blueprint, the specification for apprenticeships in England and Wales.

For direct entry to an Advanced (level 3) Apprenticeship, the young person would normally be expected to have some GCSE passes at Grades A\* to C.<sup>2</sup> Success in a (level 2) Apprenticeship normally provides access to an Advanced (level 3) Apprenticeship, assuming that a training place is available. Access depends upon the availability of suitable places, which in turn depends upon the willingness of employers to participate in the scheme.

Although regulations are flexible, a common pattern in Apprenticeships is for practical training and experience to take place in the workplace on four days per week and study of the underpinning knowledge for the Technical Certificate to take place in college one day a week. Thus, the present apprenticeship is a mixture of work-based training and education, which includes the following basic elements:

- a National Vocational Qualification (NVQ), an occupationally specific qualification delivered and assessed mainly in the workplace. This is used to assess practical competence on the job and in performing the skill, trade or occupation. Apprentices are required to present 'evidence' of competence in logbooks or portfolios, or completed tasks;
- a Key Skills programme (e.g. communication, application of number and ICT at an appropriate level; or Functional Skills); and
- a technical knowledge qualification: this is the qualification required to demonstrate achievement of the technical skills, knowledge and understanding of theoretical concepts and knowledge, as well as an

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<sup>2</sup> Apprenticeships were originally intended for young people, but in May 2004, the upper age limit of 25 for Apprenticeships was removed in England.

understanding of the industry and its market relevant to the skill, trade or occupation to which the framework relates. This is delivered at a Further Education (FE) college.

The apprentice who successfully completes the apprenticeship receives an apprenticeship certificate, together with individual certificates for the NVQ, a technical certificate and a key skills certificate(s).

For the purposes of this study, the relevant apprenticeships come under the auspices of an Apprenticeship in Engineering (Framework Issue Number 9, Version 10 of the Engineering Framework 106). The relevant apprenticeships within this framework are Mechanical Manufacturing Engineering, Manufacturing Maintenance and Electrical and Electronic Engineering.

Within this framework, the apprenticeship lasts for three years. In the first year (Initial Engineering Training phase), apprentices attend FE college on a full-time basis and complete an NVQ Level 2, entitled Performing Engineering Operations. They also complete their Key Skills modules. In years 2 and 3 (the Development phase), apprentices are based in the workplace and undertake an NVQ Level 3 (pathways in report). This is assessed in the workplace, with assessors/verifiers employed by an FE college. Apprentices also attend college one day a week, in order to study for their Level 3 technical qualification (various pathways detailed in report).

## 4.2 VET and Green Skills

The UK Government has passed several significant pieces of environmental legislation, and has issued strategy documents aimed at securing the transition to a low carbon, resource-efficient economy (LCREE). Despite this, environmental skills training had not been a high priority within the UK until relatively recently (ECORYS, 2009).

There were a number of important developments from 2009 onwards. In this year, the previous Labour Government launched its Low Carbon Industrial Strategy. The importance of a ‘green skills’ base was explicitly identified therein as a determining factor in any transition. To these ends, the 2009 National Skills Strategy was to focus skills funding provision on developing sectoral skill needs in low carbon industries. At the same time, the Environmental Audit Committee Inquiry into Green Jobs and Skills Policies identified the pressing need for the development of a general green skills set, required to provide the entire economy with vital resource efficiency and leadership skills. Significantly, the Inquiry argued that an exclusive reliance on the market – the UK’s post-compulsory education and training system is ‘voluntarist’ i.e. left to employers and thus, demand-driven- to address skills gaps was, and is, responsible for delaying the transition to a green economy. The demand-led approach to skills is identified as deficient due to employers’ inability to effectively articulate their needs to the skills delivery bodies (i.e. the Sector Skills Councils) as well as these latter being unable to accurately forecast where demand for new skills will emerge. As research commissioned by DEFRA found, demand for environmental skills “is not being articulated by many employers and as a result the current ‘demand-led’ skills delivery framework is ill equipped to anticipate and respond.” Other influential and credible bodies have similarly identified this problem (e.g. TUC, IPPR, Pro Enviro, Aldersgate Group). All of these bodies recommended that government play a more active role in setting the direction, including the issuing of national skills strategies.

By way of response, the then Labour Government implemented National Skills Audits, to be conducted on an annual basis. The first of these was due in March 2010, and was to provide a comprehensive assessment of current and future gaps in low-carbon skills. It was intended that these results could form the basis for any future green skills strategy: indeed, the Government had stated that it would be issuing a dedicated Low Carbon and Resource Efficient Skills Strategy in late 2010. To this end, a Government consultation had been released in the spring of 2010. However, the strategy has not materialised and has seemingly been abandoned by the Coalition Government, which came to power in May 2010. Furthermore, this

Government has stated its own intention to move away from interventions such as centralised planning and target-setting in the skills system.

In 2008, Lantra, the Sector Skills Council (SSC) for the environmental and land based sector, commissioned the Institute of Environmental Management and Assessment (IEMA) to undertake research into existing National Occupational Standards (which underpin apprenticeships and NVQs) and training and qualifications in relation to environment and sustainability. A key finding of this research was the lack of a clear structure and framework for environmental and sustainability skills. Lantra and IEMA thus called for a mainstreaming of green skills and that in parallel with such a development, all Sectors Skills Councils should develop programmes relevant for green jobs. The ProEnviro report, a year later, found that integration of some LCREE skills into qualifications and National Occupational Standards has started to take place, but the authors emphasise that this has occurred in a limited capacity, and there is still much to be done.

### 4.3 Stakeholder Perspectives – Interview Data

Despite recommendations of key bodies that all technical qualifications should be ‘greened’, the interviewees from SEMTA stated that green skills are not a subject that is raised or discussed in the Sector Group meetings they attend with employers.

The college staff interviewees stressed that working safely was the main emphasis and that they do not deliver any dedicated environmental modules.

All apprentices interviewed were clear that there was no dedicated, specific module for environmental legislation or practice. They were all unfamiliar with the term ‘green skills’ and could not offer a definition (although they were able to list environmental factors associated with their jobs, namely waste disposal and cleaning up oil spillages) . They were in accordance that environmental legislation and practical issues were only briefly alluded to in the college provision. Health and safety, on the other hand, was covered in great detail but the links between this and environmental

aspects were not made explicit. Environmental issues are an implicit part of practice – trainees are taught about the ‘right’ and the safe way to do thing, but environmental risks/prevention/consequences are not drawn out or explicitly identified/analysed.

Moreover, as part of the qualification and prior to starting work onsite, apprentices have to work through a booklet entitled ‘Employee Rights and Responsibilities’. This provides detailed information about relevant legislation and apprentices have to demonstrate that they are aware of this and how it impacts on ways of working. ERR consists of health and safety and equalities legislation. Environmental legislation is entirely absent.

In the workplace, learning is experiential and somewhat unstructured. It takes place through observation, questioning and learning-by-doing, under supervision. Safety is strongly emphasised and apprentices are taught to undertake ‘two-minute’ risk assessments before starting any job. The two-minute assessment is designed to supplement the written RAs, which exist for all tasks.

In terms of formal training at the workplace, there is a brief introduction to environmental aspects and the impact on the plant on the formal induction that all apprentices are required to attend prior to starting work on-site. Thereafter, environmental matters are discussed on Journey Days, training days for the whole plant which are part of the culture-change programme at Tata Steel. Environmental issues might also be covered in ‘Toolbox Talks’, ad hoc briefings on relevant matters held by line managers in section.

Formal, dedicated training on environmental legislation, regulations and impact on the plant is provided to graduate trainees and managers (this is internal but some managers are required to undertake formal IEMA courses and qualifications), but this is not available to apprentices or operators (although a one-week IOSH [Institute of Occupational Safety and Health] course is now part of the apprentices’ learning, funded by the employer).

Apprentices were clear that they were taught work protocols and the correct practices that had to be adhered to. They knew what to do, for instance, if they spilt oil. However, as one apprentice highlighted, they are not told why this is what should be done or what the consequences would be, if they did not follow the procedure. They acquire skills then, without knowledge. This suggests that the technical certificate is not providing requisite underpinning knowledge. Apprentices also highlighted a lack of applied examples in the college provision, particularly in the first year of the programme, when they attend generic training with apprentices from other workplaces. Sector/company specific training in green skills would be beneficial.

In sum, there is no dedicated module at college and a lack of applied examples. Formal training at the workplace is restricted to a short session on induction and sporadic Journey Days thereafter. There is a lack of focus – health and safety and environment are treated as separate, rather than as integrated. Environment needs to become an implicit part of risk assessment. There is also a problem of delivery – given that line managers are responsible for development, practice varies across sections. Training for trainers is important.

## Conclusions

This report has presented a summary of the findings of Work Package 3. The research from all four participant nations has been analysed in order to deduce the implications for the fourth work package. The paper began by summarising the European Union's VET strategy, its 'green skills' policy and described how this is integrated with its overall approach towards VET. The document then outlined the VET and green skills initiatives that exist at the sectoral level. Each nation's general approach to IVET was presented, with a specific focus on the position of the apprenticeship system therein. The relation between the 'green skills' agenda and the IVET system in the respective nations was then discussed. Each of the national sections ended with an overview of the empirical data gathered through research

conducted with relevant stakeholders. What then are the implications of these findings for the overall training module, to be composed under the auspices of WP4?

Clearly, there are a varied set of curricula, policies and practices, which is indicative of different levels of skills, competence and knowledge across the case study countries. Within the companies varied practice was evident and given the lack of centralised guidance/policy, it can be inferred that the emphasis accorded to environmental matters differs, based on the importance placed on such issues by section heads. The GT-VET project requires a clear definition of green skills from which to work; such a definition should be formulated bottom-up to reflect the specificity of the steel sector and top-down to incorporate wider ‘green’ policy imperatives (such as those deriving from EU 2020 strategies).

Wider recommendations, common to a number of cases, are that there should be greater co-operation between companies and schools/colleges on (green) skills development, so as to ensure a clear, coherent and consistent message. More particularly, school content must be relevant, specific and applied to company practice. Further, it is important that in-company training programmes are reinforced by wider campaigns and information distribution.

In terms of module delivery, one apposite proposal is that a series of smaller modules be run over the course of the apprenticeship training. The focus of the introductory module could be relevant environmental legislation and its impact upon and application to the steel industry. Modules on specific practice could then ensue. The main consideration is that such training should be applied and role-specific, with numerous examples of concrete learning provided, and supplemented by the use of projects and applications of tools, such as Life Cycle Assessment. It was also suggested that critical incidents could be documented and form the basis for analysis – students could work out what went wrong in a situation and how it could have been prevented through the identification of the appropriate actions at each stage. These are deemed to be essential for effective learning by the trainees themselves. An

emphasis on consequences of behaviour – the ‘why’ as well as the ‘what’ – and the implications for individuals, the organization and society should be included.

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