Towards a Skills Intelligence Framework

Mapping of Hydrogen Skills Initiatives in Germany and Austria

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A CIRCULAR ECONOMY DRIVEN BY THE EUROPEAN STEEL

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ONE STEP AHEAD.

PRIMETALS TECHNOLOGIES

1. Introduction

- The EU has been pushing since 2014 to develop a framework and a narrative for **a collective transition to the circular economy in key 4** areas (EC, 2014; Lazarevic et al., 2017):
  - **Material circularity**
  - Shifting from a consumer to a **user-based economy**
  - Circular growth and **reducing resource consumption**
  - Advancing solutions for **renewable energy and competitiveness**

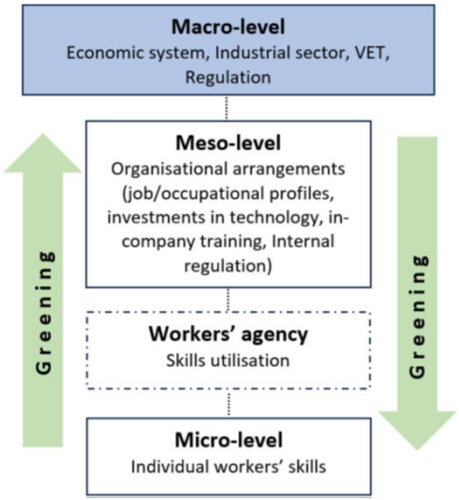
- There is a **high expectation for circular economy (CE)** in Europe whereas the implementation of it is very complex -> **disruptive innovation require new skills**

- **Circular economy theory** pointed out the need to **better understand** the **different dimensions** of it:
  - **social** (Ziegler et al., 2023)
  - **political** and **ecological impacts** of circularity (Friant et al.2020)

1. Introduction

- In response to the growing demand for hydrogen-related skills, European projects focused on green skills.

- However, the **idea of greening is so complex** that it involves **policies at different levels** and needs to be understood as such
  - "an emergent property at the **macro-level** (either societal, economic or industrial) that becomes pivotal, **while considerations on skills policy** should be seen through these lenses“ (Stroud et al, 2024:3).



(Stroud et al, 2024:11)

Stroud, D., Antonazzo, L., & Weinel, M. (2024). Green skills" and the emergent property of “greening. *Policy Studies*, 1-20

- **Policies**
- **Skills & stakeholders**
- **Skill intelligence**
- **Disruptive innovation**

1. Introduction

- Objectives in this research:

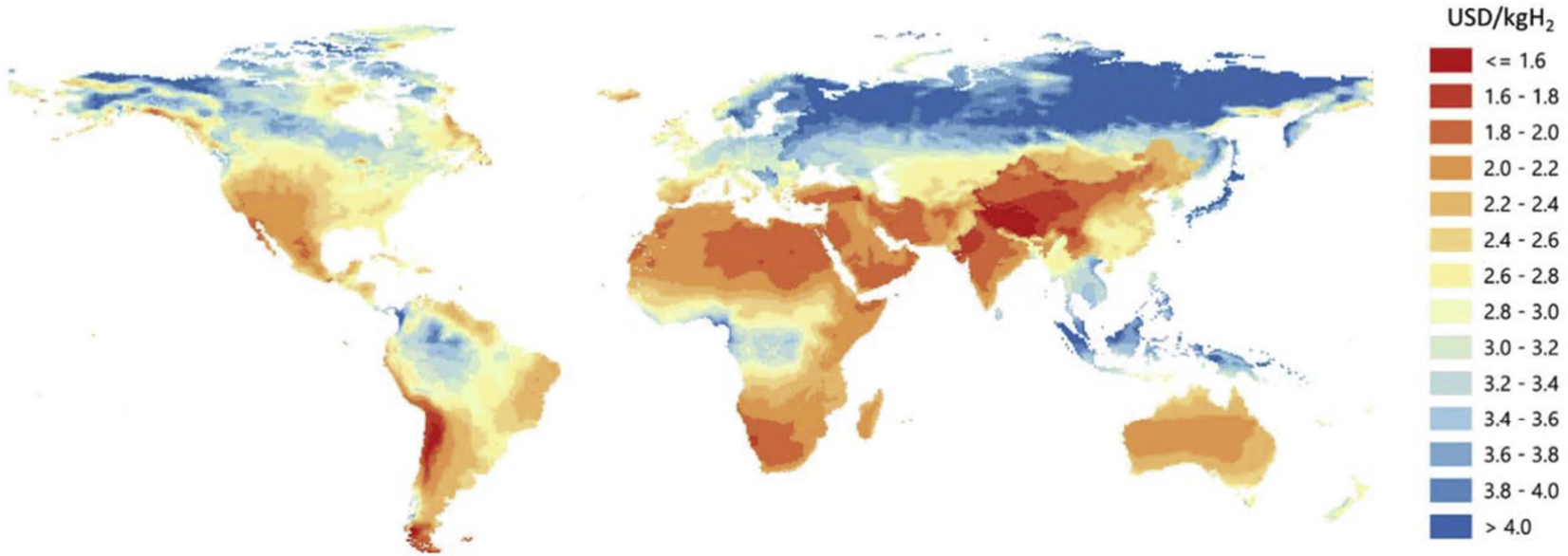
1) to better understand **different hydrogen policies for the steel industry** in Germany and Austria

2) to **map out the skills and stakeholder**, which helps us to better understand where to focus resources and how to build a workforce that is capable of driving the hydrogen economy forward

3) reflect on the **potential applications of the skills intelligence framework to hydrogen in the steel industry** and its implications

4) To **better understand disruptive innovation** (hydrogen energy) **with respect to skills**

Hydrogen production costs from hybrid solar and wind plants



(Trattner et al., 2022)

2. Framework

- **Steel Industry** an innovative case for understanding **socio-environmental transitions**

- **Hydrogen** has been recognised **as a pathway to follow for a transition in steel** (Quitzow et al., 2023; Wolkinger et al., 2019).
  - **This shift requires** not only new technological innovations, but also **new social and industrial practices**

- **Skills intelligence in steel** (Maldonado-Mariscal et al., 2023:5).
  - Data processing, data preparation, updated information

- Disruptive innovations-> **"Research and policy** should mind the **timing and interaction among phase-out** and **innovation efforts"** (Rinscheid et al., 2021)

3. Mapping

Projects

- ✓ Green Skills for Hydrogen blueprint project- **skills gaps** (Greece, Austria, France, Belgium, Denmark, Spain, Germany, Romania, Bulgaria, Netherlands, Ireland, Estonia, Italy, Poland)(https://hydrogeneuroperesearch.eu/projects/)

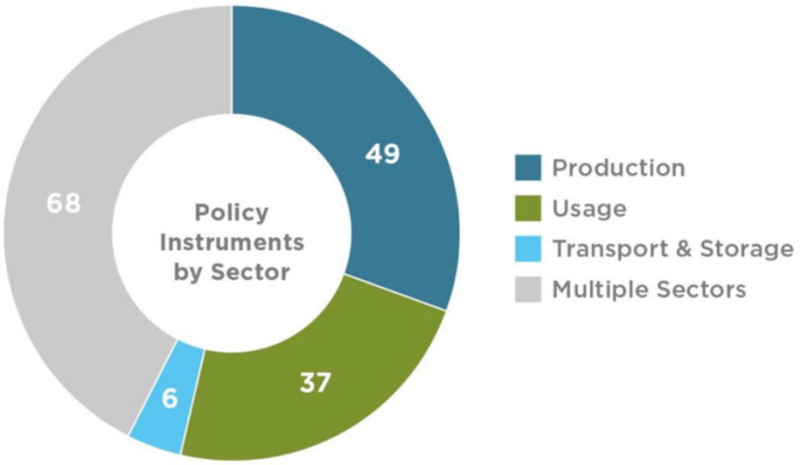
- ✓ H2FUTURE - a European flagship project for the **generation of green hydrogen from electricity** from renewable energy sources (Austria, Germany, Netherlands) (https://www.h2future-project.eu/en)

- ✓ H2 for Hamburg (H2H) (Hamburg Green Hydrogen Hub) **in steel production** (http://www.h2future-project.eu)

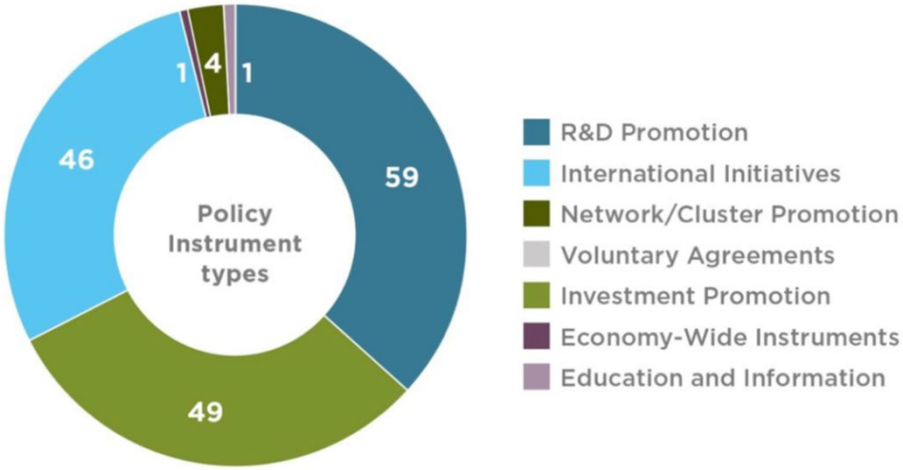
- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

3. Mapping

Number of policy instruments by sector of intervention along the hydrogen value chain (Germany)



Number of policy instruments in the hydrogen sector by instrument type (Germany)



(Quitzow et al., 2023: 8-9)

Skills and stakeholders

- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

Current occupations	Missing occupations	Future occupations
Managers Experts & Specialists Environmental, HSE Engineers Technicians	Managers **Policy & Legal** Environmental, HSE Engineers Technicians	Managers Experts & Specialists Environmental, HSE Engineers Technicians

(European HSS, 2023: 17)

Skills and stakeholders

- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

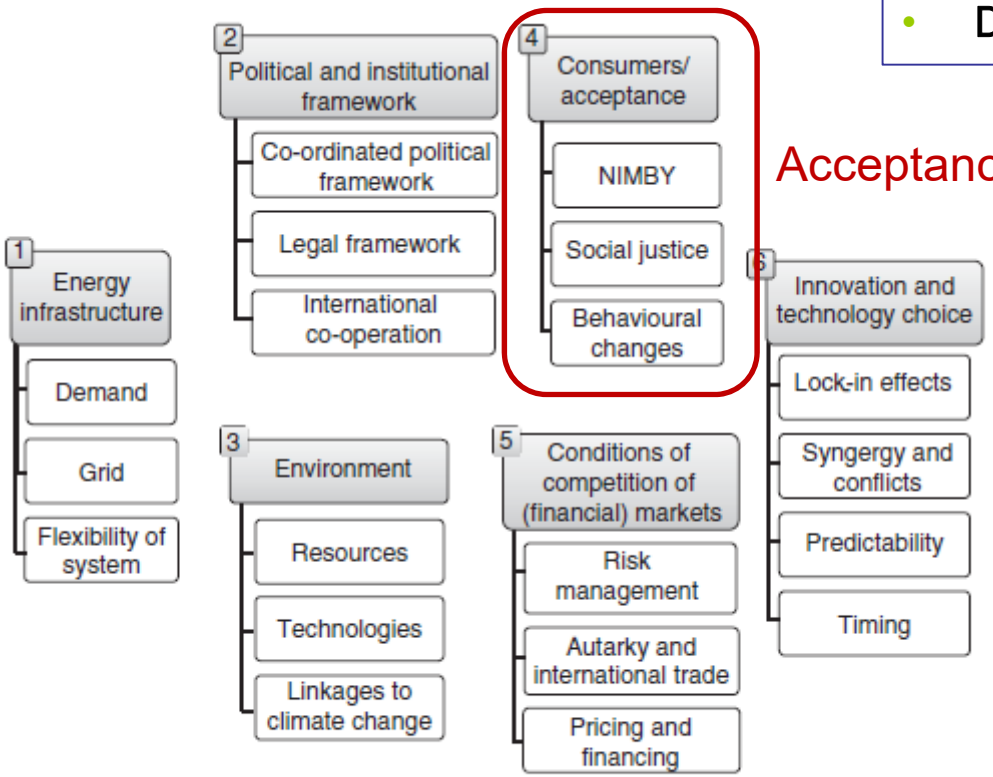
SKILLS & KNOWLEDGE REQUIRED	OCCURRENCE	%
Production	103	11%
Hazards	87	10%
Systems	61	7%
Operation	57	6%
Maintenance	57	6%
Electrolysis	57	6%
Storage	55	6%
Fuel cell	55	6%
Transport	44	5%
Refuelling	29	3%
Legal & permitting	23	3%

Data from:
146 stakeholders across 23 countries, interviewed between November 2022 and March 2023 as part of the **Green Skills for Hydrogen project**

(European HSS, 2023: 17)

A transition in the steel industry in Austria: Risk cluster

- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation



Acceptance of society

Figure 3.1 Risk clusters for the transition in the iron and steel sector and the energy sector.

Wolkinger, B., Mayer, J., Tuerk, A., Bachner, G., & Steininger, K., 2019: 34

Skills intelligence framework

- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

Skills intelligence according to CEDEFOP is:

"the outcome of an expert-driven process of **identifying, analysing, synthesising and presenting quantitative and/or qualitative skills** and **labour market information**. These may be drawn from multiple sources and adjusted to the needs of different users. To remain relevant, **skills intelligence must be kept up-to-date** and adjusted when user needs change. This requires the expert-driven process to be continuous and iterative."

(Maldonado-Mariscal et al., 2023:5).

Maldonado-Mariscal K., Cuypers M, Götting A, Kohlgrüber M. (2023) Skills Intelligence in the Steel Sector. *Machines*, 11(3):335. https://doi.org/10.3390/machines11030335

Skills intelligence framework

- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

- Steel Industry as a exemplary case study for a socio-environmental transitions

Skills intelligence

Table 1. Two dimensions of skills intelligence analysis.

Dimensions for the Development of Skill Intelligence	
Geographical scope	*Purposes*
• national • regional • European	• for company-specific (individual) skills demand and supply • for policy strategy/policy development

(Maldonado-Mariscal et al., 2023:5).

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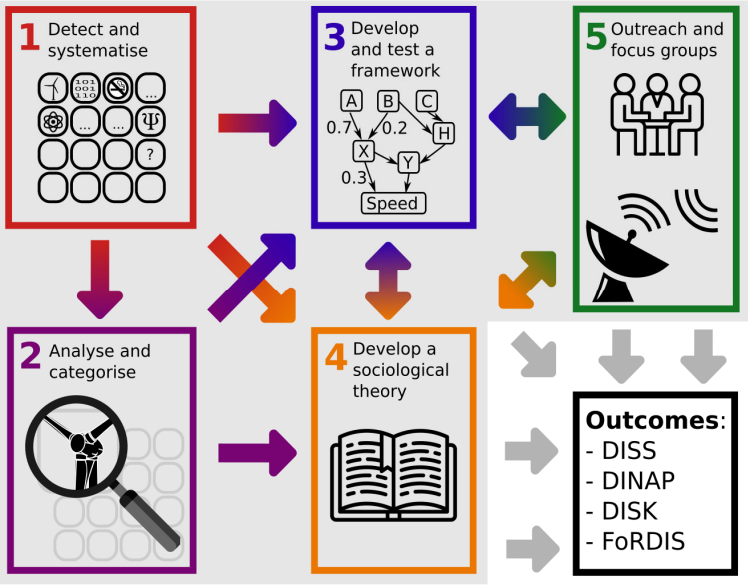
- Policies
- Skills & stakeholders
- Skill intelligence
- Disruptive innovation

Disruptive innovation

- disruptive innovation with respect to skills

Dimensions
- renew a business model
- actors, networks
- regulation, policies, institutions
- disruption of a new culture
- speed of disruption
- scope of disruption



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(1) the nature of disruption
(2) their different speed
(3) their different levels of social disruption

Key reflections

- We need to systematically analyse **policies, skills and stakeholders at different levels** (macro-meso-micro) to develop an integrated skill intelligence strategy in hydrogen

- The **steel industry**, highlights the **urgent need for a coordinated approach to skills development** and the need to **create ecosystems capable of co-creating** in the application of new technologies, new social practices and new competences (Kohlgrüber et al.,2021).

- Wstablishment of a comprehensive **skills intelligence framework** to ensure that the **workforce, industry and society** are prepared for the challenges and opportunities of a hydrogen future.

- **Integrate an understanding of how disruptive innovation is changing the landscape** (research, economy, ecology and social aspects) and how we can better prepare ourselves in terms of skills.

Thank you for your attention!

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