Antonius Schröder, TU Dortmund University

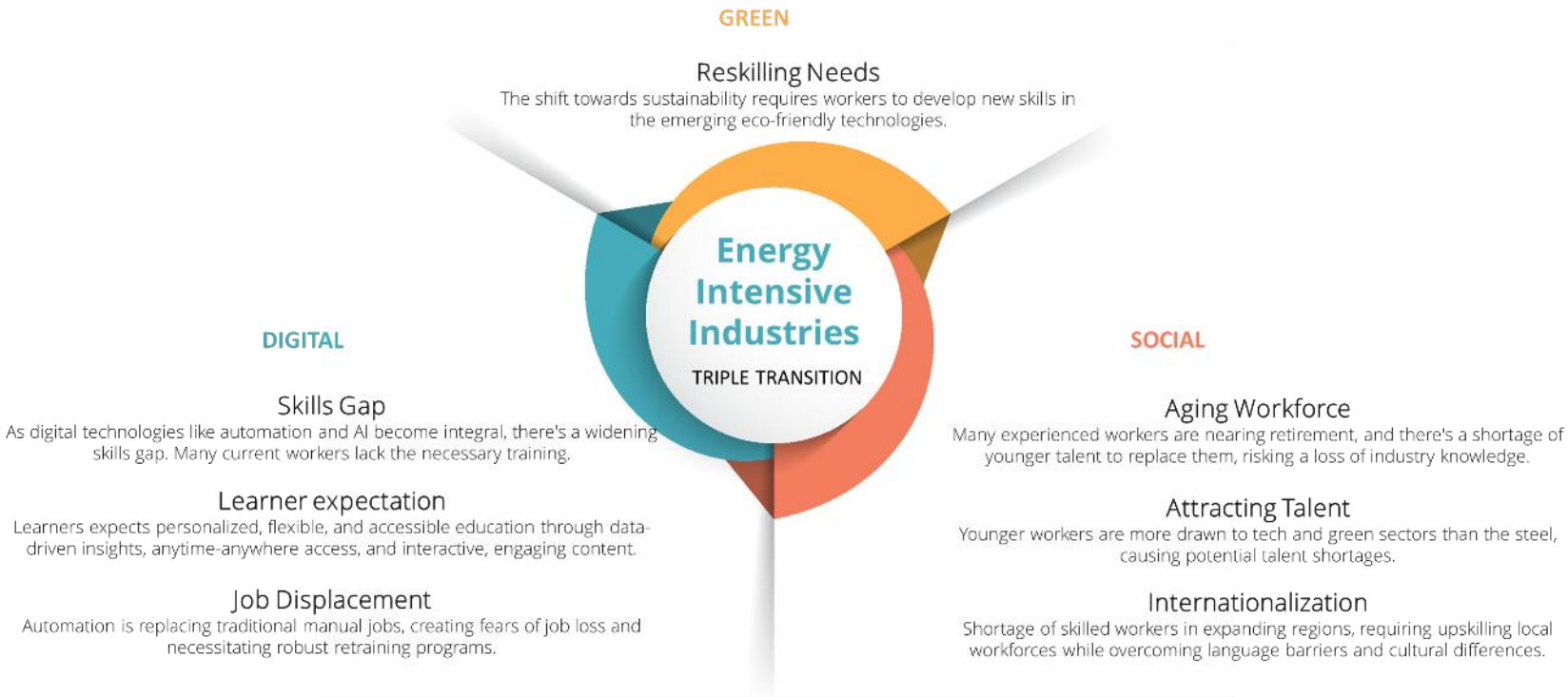
The Relevance of Skills for Industrial Symbiosis

Industrial Symbiosis in Steelmaking

Accelerating Circularity, Resource Efficiency and Net-Zero Transformation in the Steel Industry

Digital Webinar | 15 October

Problem statement



Triple Transition enhances efficiency, sustainability, and workforce resilience for long-term competitiveness of energy intensive industries

Sustainable Skills Alliances

SKILLS4EII

Skills Alliance for the Green, Digital and Social Transformation of the Energy Intensive Industries (Skills4EII)

PACT FOR SKILLS Leader

An initiative of the European Commission

ESSA EUROPEAN STEEL SKILLS AGENDA

SPIRE-SAIS

Co-funded by the European Union

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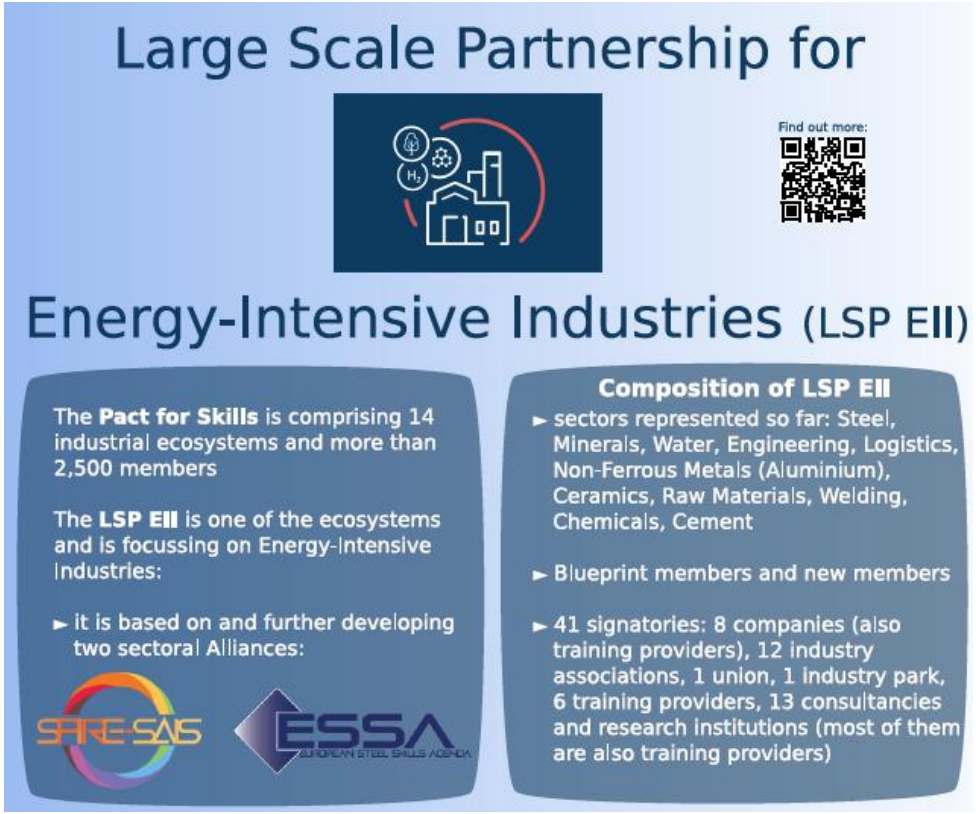
LSP Energy Intensive Industries of the Pact for Skills





PACT FOR SKILLS Leader

An initiative of the European Commission

https://pact-for-skills.ec.europa.eu/about/industrial-ecosystems-and-partnerships/energy-intensive-industries_en

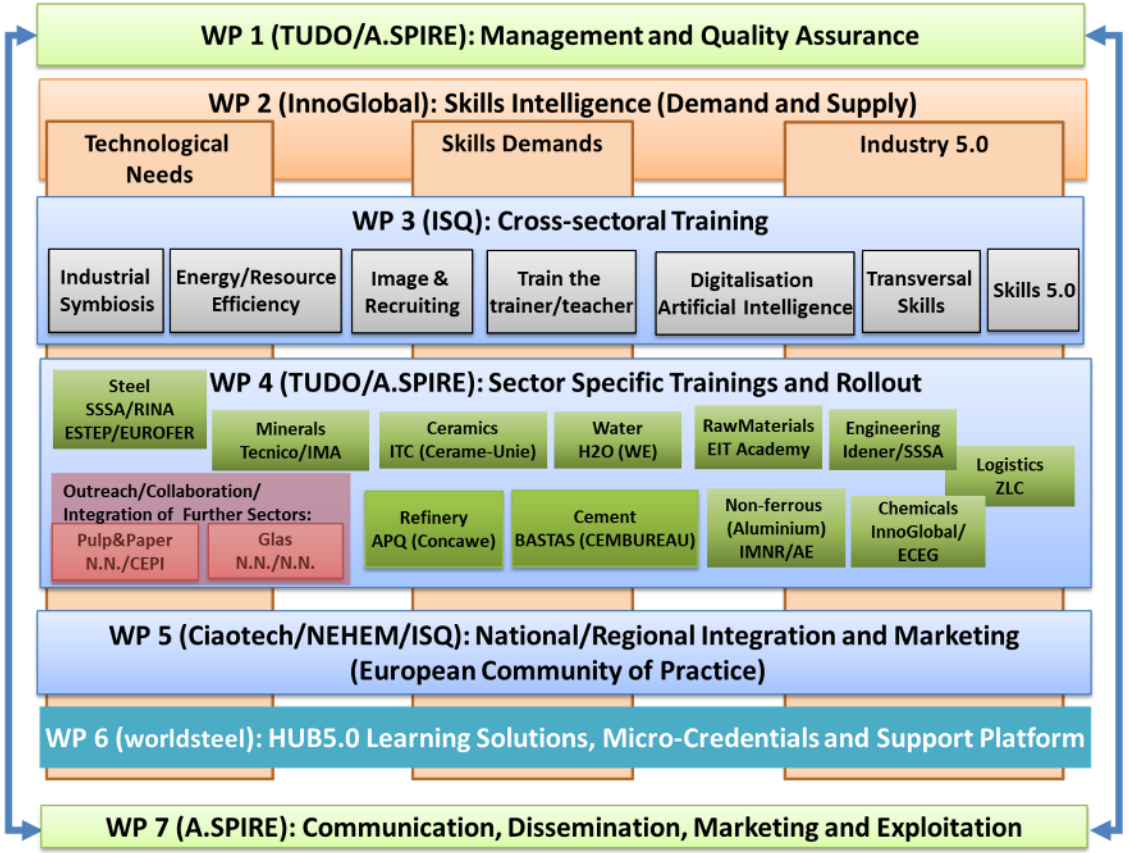
Skills4EII Work Program

SKILLS4EII

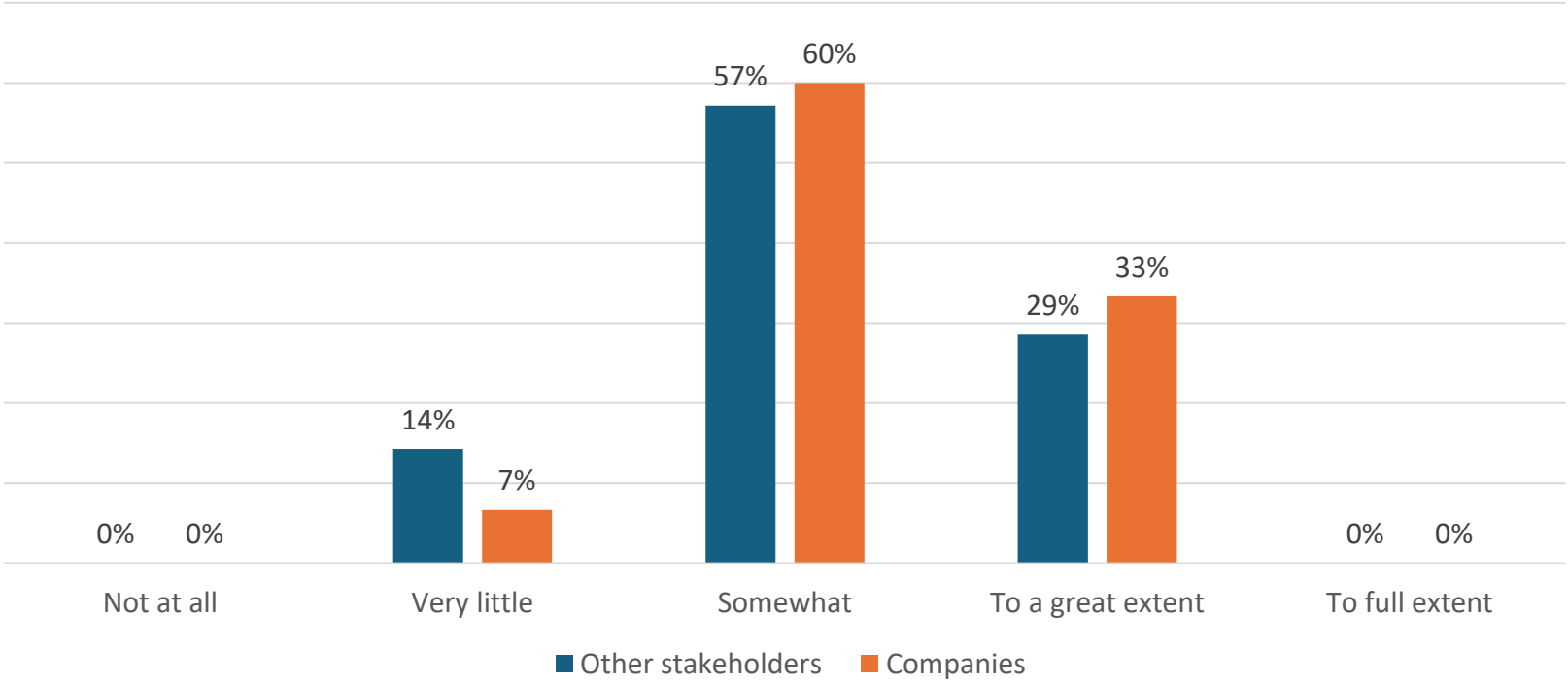
Skills Alliance for the Green, Digital and Social Transformation of the Energy Intensive Industries

INDUSTRY 5.0

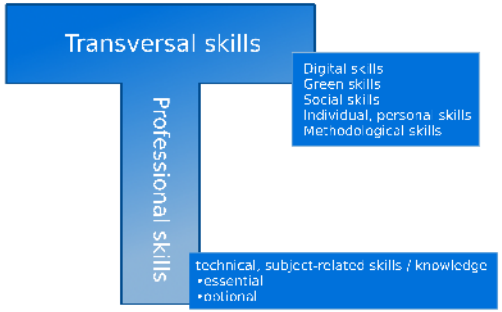
Human-centric | Sustainable | Resilient

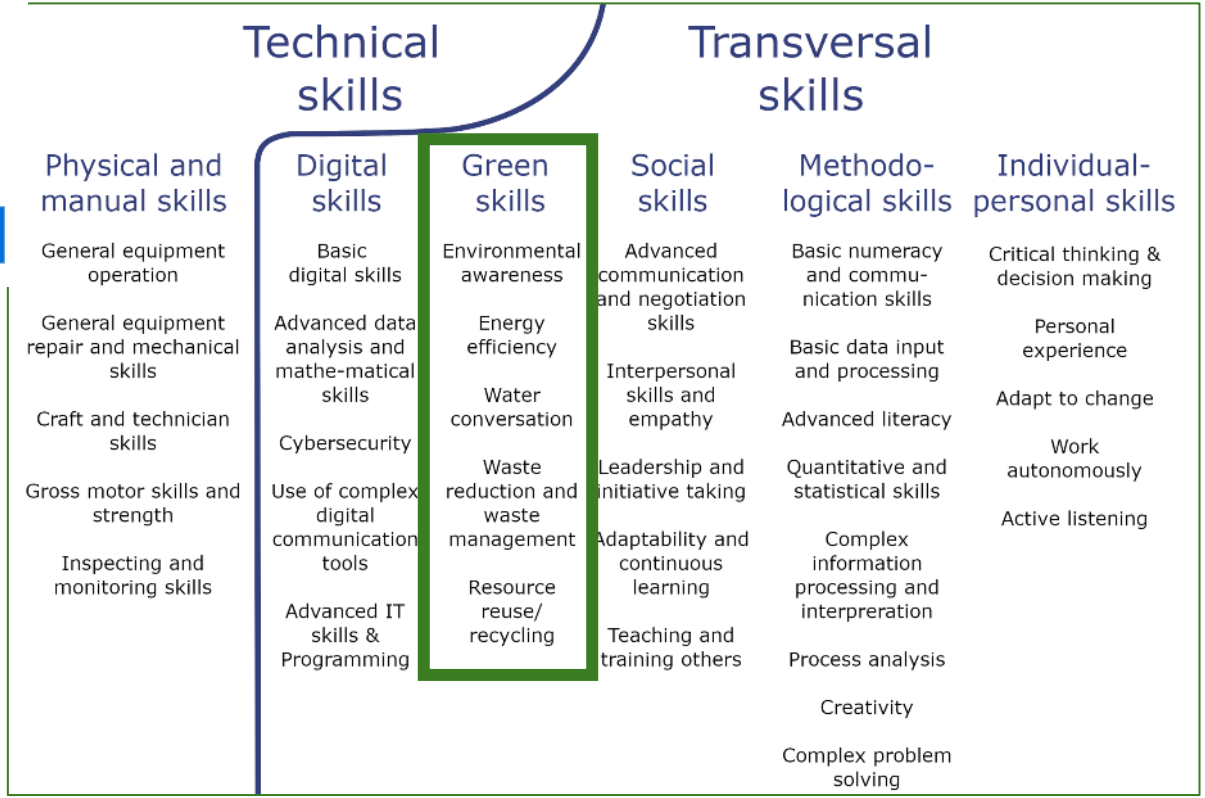


Does the steel industry have the necessary skills for the next 3 years? (ESSA Technology and Skills Radar 2025)



Skills Demand of the Steel Industry





ESSA
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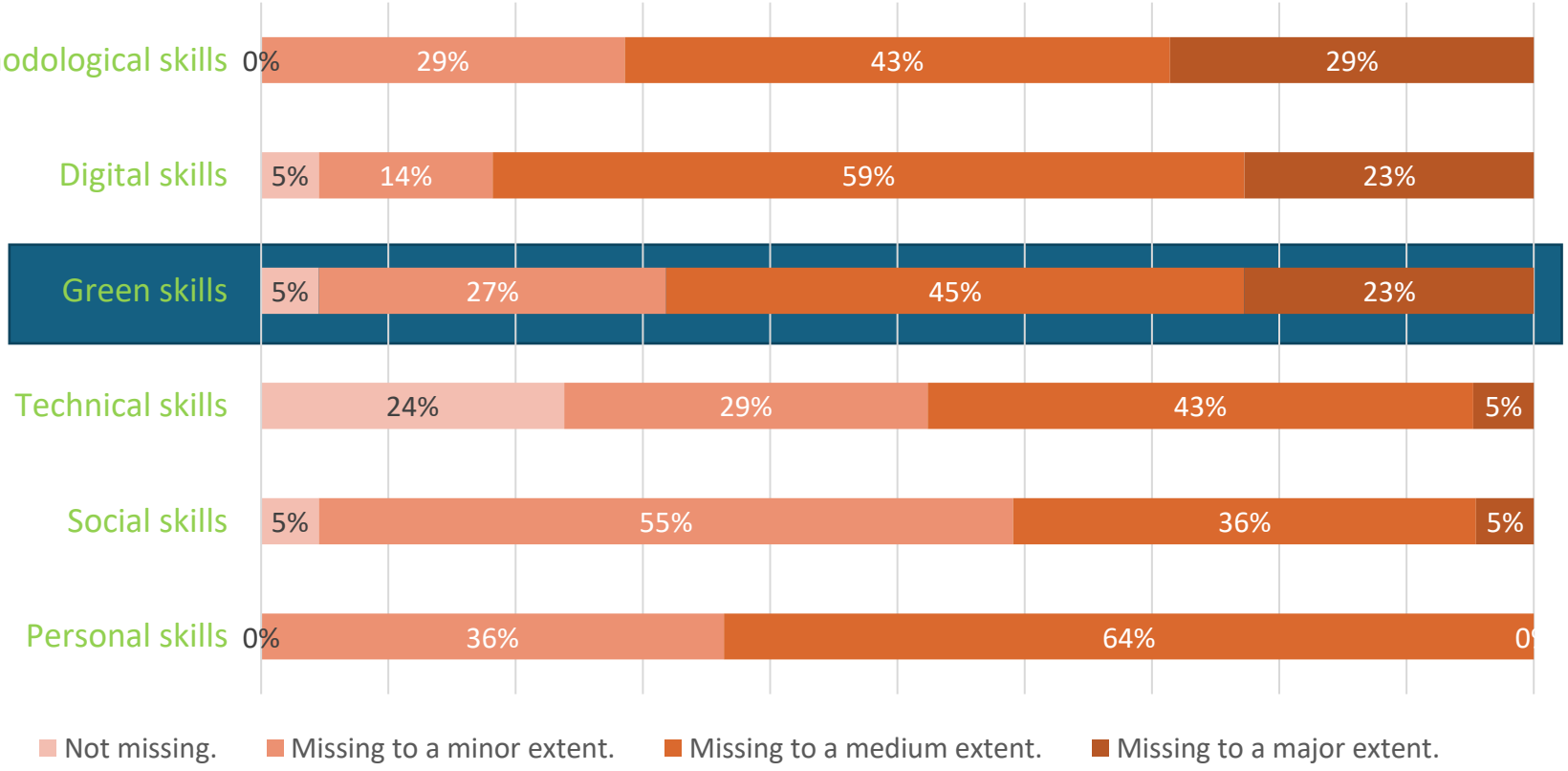
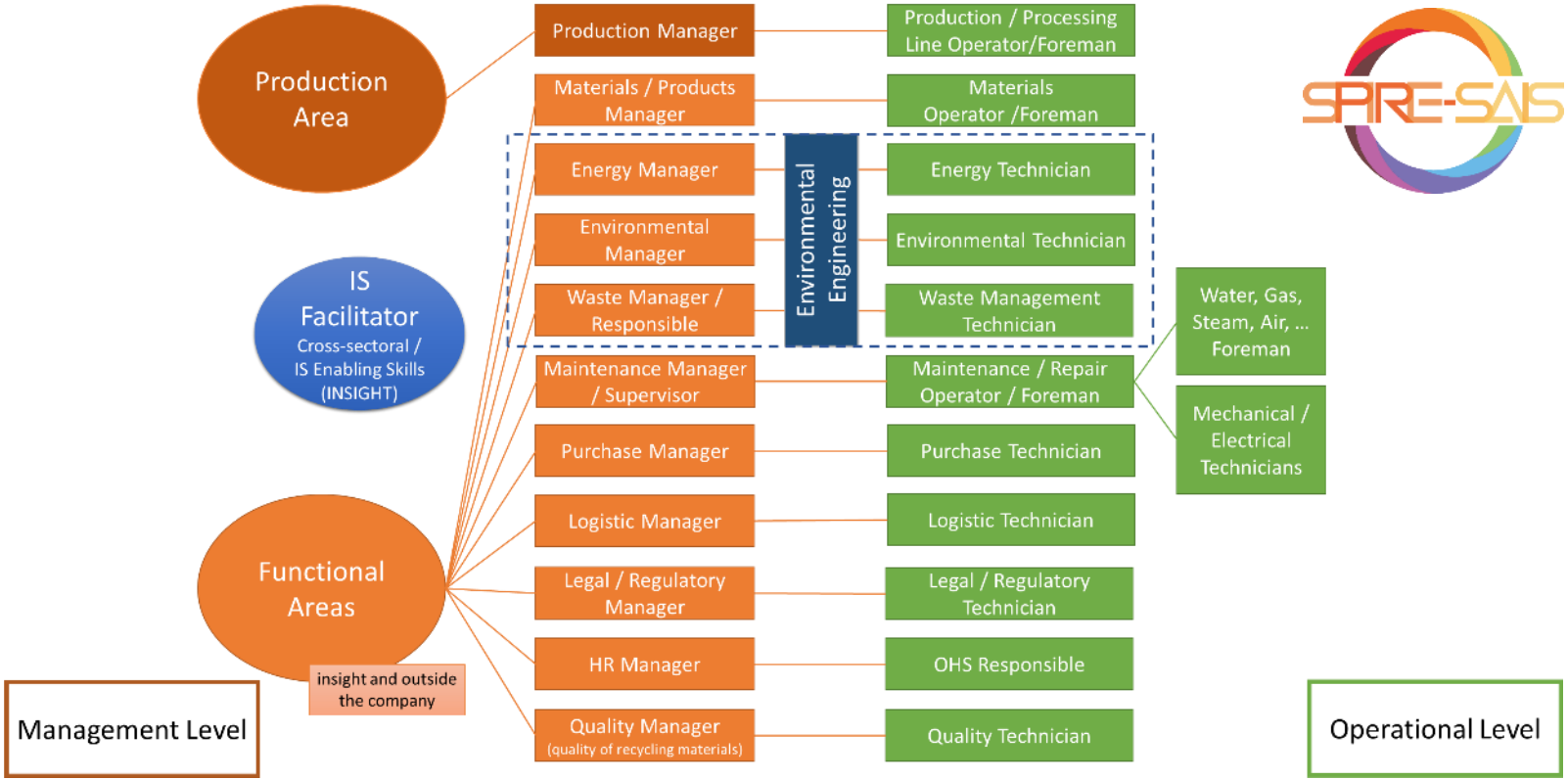
Types of Skills Missing

(ESSA Technology and Skills Radar 2025)

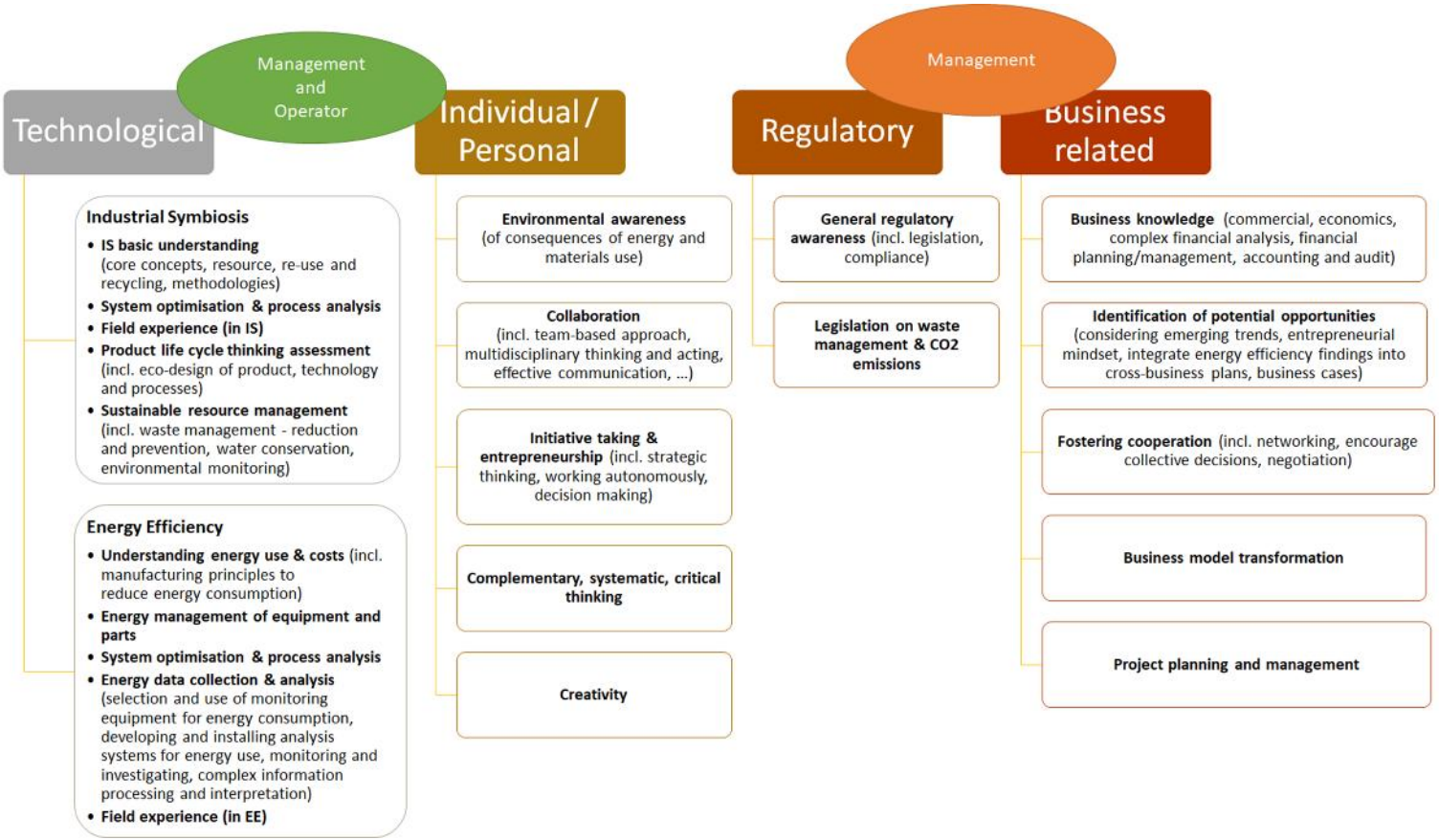


Cross-sectoral Generic Job Profiles for Industrial Symbiosis and Energy Efficiency

Cross-sectoral Generic Job Profiles

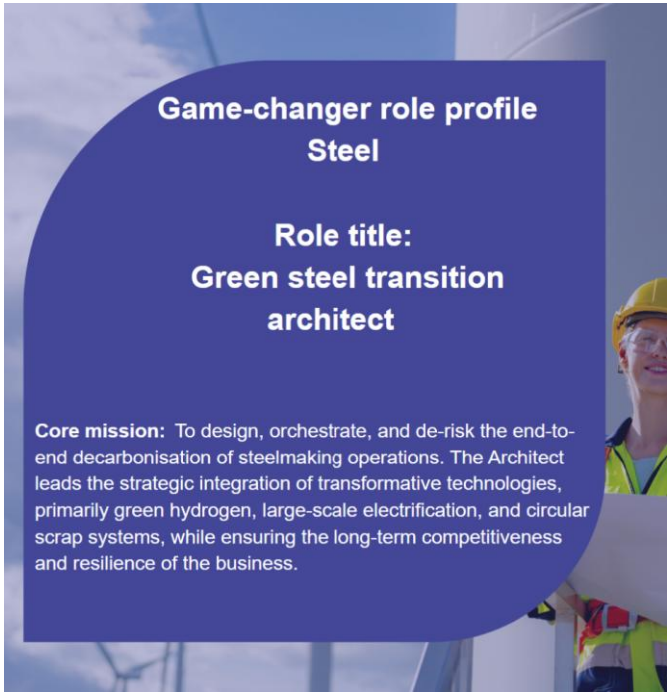


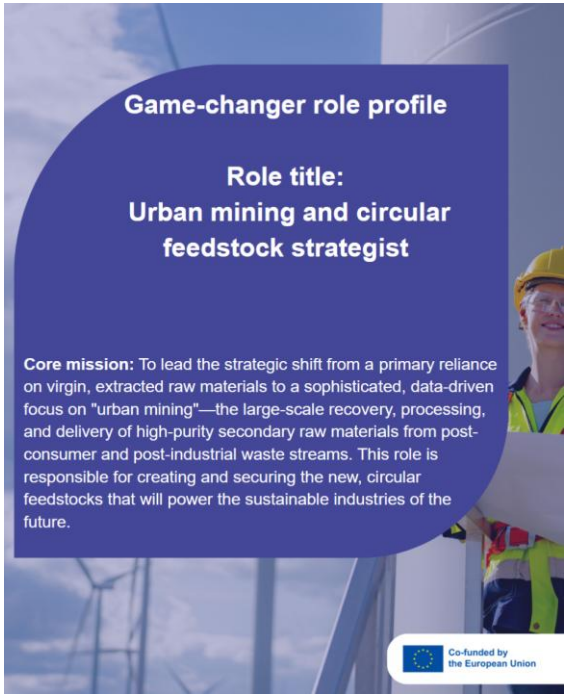
Industrial Symbiosis and Energy Efficiency Skills Classification

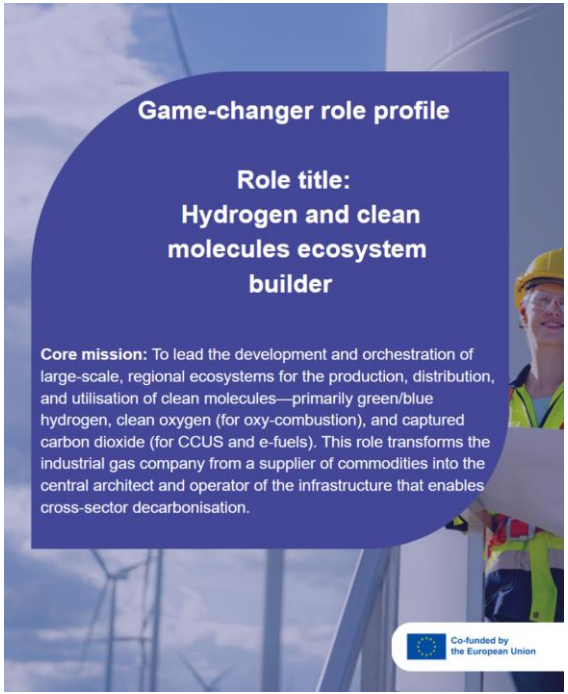


Game-changer Job Profiles

10 cross-sectoral and 15 sector specific game-changer job profiles







Specific Game Changer Job Role Profile
Circular Resilience Strategist



Core Mission:

- To design, architect, and manage the organization's resource and supply chain ecosystems to be simultaneously circular (zero-waste) and highly resilient to disruption.
- This strategic role moves beyond simple operational efficiency to build systems that are regenerative, adaptive, and shock-proof, securing the company's long-term viability in a volatile world.

Circular Resilience Strategist

CONTEXT:

- Large-scale industrial transformation
- Circularity
- Supply-chain resilience
- Long-horizon sustainability competitiveness

Coordination of suppliers · recycling enterprises · regulators · logistics networks · product-development teams · executive governance

Proficiency Level 4 needed:
Repeated ecosystem-orchestration responsibilities occur across industrial symbiosis partnerships, resource-sharing agreements, and collaborative circular infrastructure development.
The role frequently governs novel cross-industry contractual arrangements, shared-value agreements, and resource-exchange partnerships.

KEY RESPONSIBILITIES (Symbiosis):

- Ecosystem Development
- Circular Technology Integration
  → Framed around building cross-industry resource-sharing networks

STRATEGIC SKILLS:

- Strategic Partnership & Ecosystem Building
- Circular Economy & Resource Management
- Systems Thinking & Integration
- Risk & Failure Analysis
- Climate & Environmental, Social and Governance (ESG) Risk Analysis
- Circular Business Model Innovation
- Complex Negotiation & Partnership Contracting

Circular Resilience Strategist

L1 – Foundation: Basic awareness and understanding. Can participate under guidance.

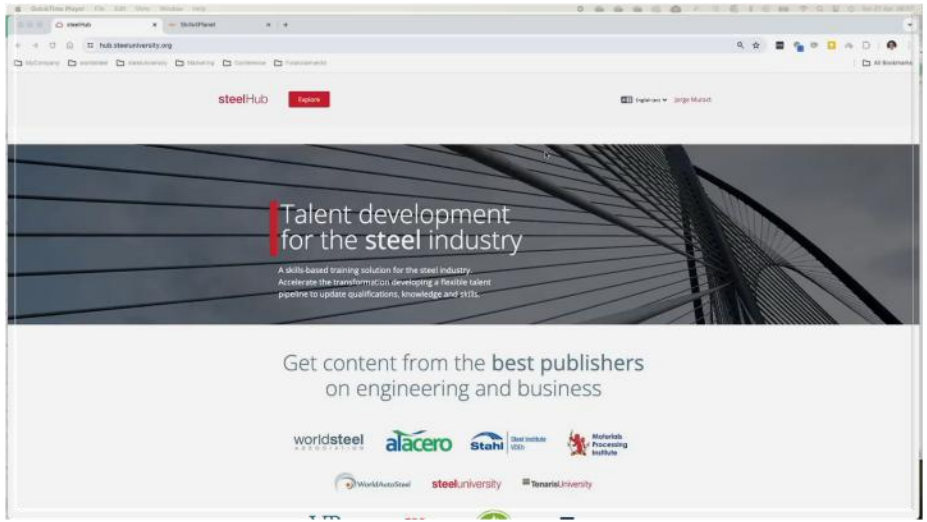
L2 – Practitioner: Able to apply skills independently in bounded and supervised contexts.

L3 – Expert: Able to integrate knowledge independently and apply deep expertise in complex operational and transformation contexts.

L4 – Strategic: Able to shape systems, governance, ecosystem direction, and long-term organisational transformation.

Skills	Proficiency Core Level
Systems Thinking & Integration	**L4**
Circular Economy & Resource Management	**L4**
Risk and Failure Analysis	**L4**
Strategic Partnership & Ecosystem Bldg	**L4**
LCA & Environmental Assessment	L3
LCA for Product Sustainability	L3
Carbon Accounting & Emissions Mgmt	L3
Sustainable Product & System Design	L3
Policy & Regulatory Acumen	L3
Climate & ESG Risk Analysis	**L4**
Digital Twins & Simulation	L3
Applied Data & Sustainability Analytics	**L4**
Digital Tools for Sustainability & Circularity	L3
Influential Leadership & Change Navigation	L3
Circular Business Model Innovation	**L4**
Advanced Materials Science (Circularity)	L3
Complex Negotiation & Partnership Contracting	**L4**

Online Training and Support Platform steelHub (worldsteel)





https://hub.steeluniversity.org

More than **80 online training courses** covering different parts of the steel value chain, such as:

- Steelmaking and metallurgy
- Rolling and finishing processes
- Materials and applications
- Environment and sustainability
- Safety and operations

More than **30.000 learners worldwide**
about **2.000 learners every month**
25 publishers, more than 1000 training hours

New Energy Intensive Industry Online Platform HUB5.0



HUB5.0

Technological Platform to facilitate coordination, communication and collaborative partnership between stakeholders of the Eco-System.

- Global e-learning Platform
- Cutting Edge Educational Content
- Tailored Talent Development
- Supplier, Contractor and SMEs Training
- University and High School Partnerships for Future Talent
- Support development of national and regional ecosystems

Co-funded by the European Union

Establish a european alliance for effectively addressing triple transition

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Thanks for your attention!

ESSA: https://www.estep.eu/essa

SPIRE-SAIS: www.spire2050.eu/sais

Skills4EII: https://www.aspire2050.eu/skills4eii

LSP EII: https://pact-for-skills.ec.europa.eu/about/industrial-ecosystems-and-partnerships/energy-intensive-industries-large-scale-partnerships_en

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