FACT SHEET - Clean Energy Sector sector skills challenges and opportunities

Webinar |Understanding Skills Challenges and Opportunities in the Clean Energy Sector across European regions

The information and data included in this fact sheet were shared during **EARLALL's webinar on "Understanding Skills Challenges and Opportunities in the Clean Energy Sector across European regions",** which took place on 22 May 2026. This initiative was promoted by EARLALL'S Working Group on Skills and Labour Market.

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The webinar presentations and the recording are available on **EARLALL's website**

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The clean energy sector refers to industries and activities focused on the generation, storage, and management of energy from renewable and low-carbon sources, including technologies such as wind, solar, hydrogen, batteries, and energy storage systems, contributing to the decarbonisation of the economy and the transition towards a sustainable and climate-neutral energy system.

FACTS & FIGURES

- The clean energy sector is central to the **EU's green transition and climate neutrality** objective by 2050 (European Commission).
- By 2035, **around 43% of jobs in Europe** will require high-level qualifications, reflecting the growing skills intensity of the clean energy transition (Cedefop).
- The **sector is expanding rapidly** across renewable energy, hydrogen, batteries, and energy storage, with strong job growth expected in wind and solar industries over the coming decade (IEA / European Commission).
- The EU is also facing significant skills gaps, with around **90 million Europeans** needing upskilling in digital competences, a key requirement for clean energy occupations (Cedefop).
- **Battery and hydrogen** value chains are rapidly growing strategic industries, driving strong demand for engineers, technicians, and specialised vocational profiles (European Commission/ industry data).

MAIN CHALLENGES AND NEEDS

- **Skills shortages** are emerging across the clean energy sector, particularly in technical, digital, and interdisciplinary profiles needed for renewable energy, hydrogen, and battery industries.
- The **green transition** is increasing demand for higher qualifications, with 43% of jobs expected to require academic or high-level vocational education by 2035, putting pressure on education and training systems.
- Rapid **technological change** is outpacing existing training systems, creating gaps between industry needs and available VET and higher education provision.
- There is a **strong need to reskill and upskill workers** from traditional energy and automotive sectors to support their transition into clean energy value chains.
- The **limited attractiveness** of technical and vocational pathways is making it difficult to attract young talent into hydrogen, battery, and renewable energy professions.
- **Regional disparities** in skills, intelligence and training capacity make it challenging to develop coordinated responses across Europe.

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FACTS AND FIGURES FROM EARLALL MEMBER REGIONS

Vestland County Council

Vestland County: Hydrogen skills and the H2CoVE project

H2CoVE project

- H2CoVE is a European project led by Vestland County, developing hydrogen skills across regions including Norway, the Netherlands, Austria, Estonia, and Ukraine.

Key figures:

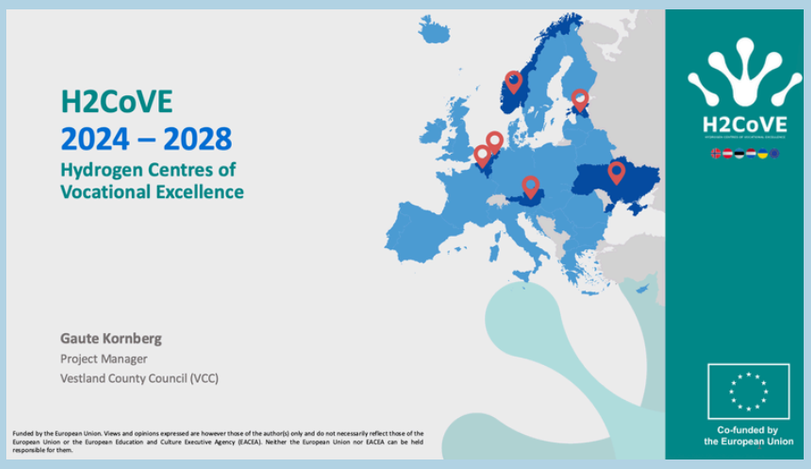
- The project has developed **25+ training courses** and education models supporting hydrogen skills development across different education levels.
- **Training ranges** from basic introductory modules to specialised vocational programmes in hydrogen technologies.
- **Key focus areas** include hydrogen production, storage, distribution, and applications in industry and maritime sectors (including ports).
- The project supports **reskilling of workers from fossil-based industries and emerging green energy sectors.**

Key challenge:

- Aligning **training provision** with fast-changing hydrogen technologies and differing national qualification systems.
- **H2CoVE** promotes a cross-regional skills ecosystem linking education providers, industry, and public authorities to support the hydrogen transition.

Looking ahead:

- Dialogue with stakeholders in all regions.
- A growing hydrogen vocational network.



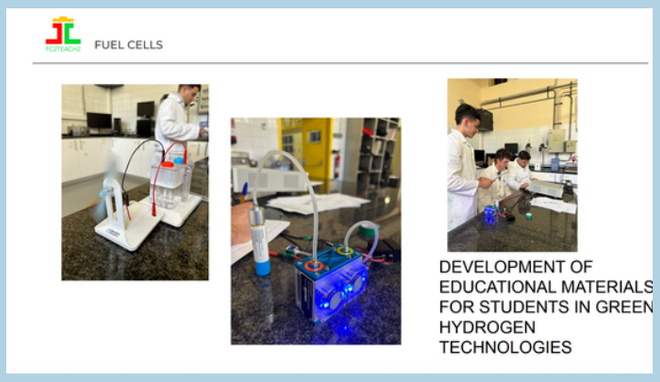
Generalitat de Catalunya

Catalonia: Hydrogen education and green energy training (Institut Escola del Treball)

- **Institut Escola del Treball** is one of Catalonia's leading vocational education centres, actively developing training for the **green energy transition, with a strong focus on hydrogen technologies and renewable energy skills.**
- The centre integrates **clean energy training** through a dedicated renewable energy and hydrogen laboratory, combining photovoltaic systems, electrolyser technology, and fuel cell applications for hands-on learning.

Key Focus

- The development of practical, applied learning environments, linking chemical, electrical, electronic, and energy-related disciplines in interdisciplinary training pathways.



Key Initiatives:

- Hydrogen education integrated into vocational and applied science programmes.
- Practical training using real renewable energy installations (PV, electrolyser, fuel cell systems).
- Interdisciplinary approach combining energy, ICT, chemistry, and engineering skills.
- Strong focus on project-based learning and real-world technical applications.

Good practice: Applied hydrogen learning lab

The "**renewable energy classroom"** functions as a real-life training environment, enabling students to work directly with hydrogen production and conversion technologies, strengthening both technical and transversal competences needed for the green transition.

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Baden-Württemberg: Battery industry qualification initiatives

Baden-Württemberg has developed large-scale qualification initiatives to support the transformation of the automotive industry and the growth of the battery value chain through the **QualiBattBW programme.**

The programme offers **50+ qualification modules covering** key areas such as battery production, system technology, recycling, digitalisation, and safety.

Key focus areas

- Battery cell development and production.
- Battery system design and operation.
- Recycling and circular economy.
- Digitalisation and industrial transformation.
- Safe battery systems and quality assurance.

Skills development approach:

- The initiative **offers free training** for SMEs to support upskilling and reskilling across the automotive and battery value chain, combining academic, vocational, and industry expertise for practical learning.
- It also focuses on **retraining automotive workers** for the transition to electric mobility and battery technologies.

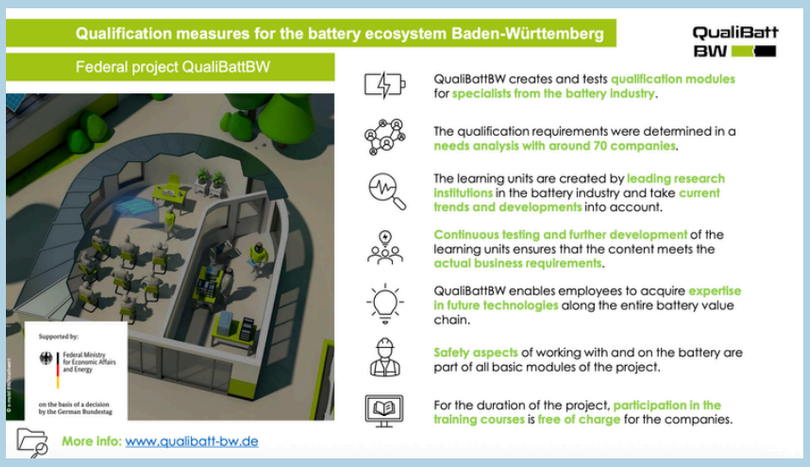
GOOD PRACTICES

Voltage (Erasmus+)

- Voltage is a European cooperation project that develops innovative vocational education and training approaches for the battery sector, involving multiple EU partners.

QualiBattBW training ecosystem

- The programme creates a structured skills ecosystem linking research institutions, education providers, industry actors, and regional clusters to deliver coordinated training solutions across the battery value chain.



Sweden: Battery Centre Gothenburg and manufacturing transition

- **Battery Centre Gothenburg** is a regional skills hub supporting Sweden's industrial transition towards electrification, battery production, and sustainable manufacturing.
- The centre is an **800 m² hands-on training** facility developed through collaboration between the Region Västra Götaland, City of Gothenburg, Gothenburg Region, and industry partners.
- The centre has **welcomed over 4,600 visitors in its first year**, including students, teachers, professionals, and industry representatives.

Key focus areas:

- Battery cell and pack production.
- Electromobility and industrial electrification.
- Automated manufacturing and quality processes.
- Work-based and experience-based learning.

Skills development approach

- The centre trains **both students and professionals,** supporting education, upskilling, and career transitions.
- It focuses on **hands-on learning** in simulated industrial environments aligned with industry needs.
- It also strengthens collaboration between education, industry, and public authorities to support regional skills supply.

Good practice: Collaborative skills ecosystem

- The centre is built on a triple-helix model (industry–education–public sector), ensuring training content reflects real industrial needs and supports continuous skills adaptation.

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INITIATIVES FOR THE DEVELOPMENT OF SKILLS IN THE CLEAN ENERGY SECTOR

- The EU Pact for Skills brings together industry, education providers, and public authorities to support large-scale upskilling and reskilling across industrial ecosystems, including renewable energy and clean technologies.
- The EU Skills Agenda provides the overarching framework for strengthening skills intelligence, lifelong learning, and sectoral cooperation in response to the green and digital transitions.
- Cedefop skills intelligence tools support regions in identifying emerging labour market needs and adapting vocational education and training systems to clean energy transitions.
- The H2CoVE project (Erasmus+ CoVE project) develops hydrogen-focused Centres of Vocational Excellence across Europe, creating modular training pathways and strengthening regional hydrogen skills ecosystems.
- Voltage (Erasmus+ CoVE project) supports innovation in battery sector training through cooperation between VET providers and industry across several EU countries.
- The Gothenburg Battery Centre provides hands-on, experience-based training environments supporting skills development from education to industrial application in battery manufacturing.
- QualiBattBW provides federally supported, free training for SMEs across the battery value chain, supporting upskilling in the automotive and clean energy transition.

KEY INSIGHTS & LESSONS LEARNED

- Clean energy is **central** to Europe's green transition and industrial transformation.
- **Skills shortages** are a key barrier, especially in technical and digital profiles.
- **Training systems** must adapt faster to technological change.
- Lifelong learning and reskilling are essential for workforce transition.
- **Regional cooperation** strengthens skills development and delivery.
- New training models are helping bridge education and labour market needs.