



Education for Digitalization of Energy

Current challenges in the energy sector and state of the art in education/training

Authors:

Digitalisation is affecting all areas of Economy and Society. The Energy Sector in particular is subject to a deep transformation due to its critical importance in achieving sustainability. The Climate Change is a clear challenge that our society must address, and the Energy Sector has a fundamental role within. Together with many previous actions, the European Green Deal expresses the response of the EU to climate change setting it as a worldwide leader in this fight.

In addition, today the world is suffering an unprecedented health crisis due to the COVID 19 pandemic. This will impact beyond doubt all economic sectors in the near future. Digitalisation including telecommunications is becoming extremely important in order to continue and maintain the status of work. As a result of the pandemic, digitalisation expands in most sections of our society and as also a major effect on the Energy Sector.

Different scenarios involving new system paradigms in electrification, technology and sustainable resources, local energy communities and cultural preference will require a new mind-set. Designing the energy systems of the future, with legislative frameworks articulating sustainable cross-sectors regulations in energy sector, easing the implementation of all the technologies is needed for a smooth energy transition. This includes changes in design, construction, maintenance, inspection procedures and recovery practices for the network operators.

This evolution unlocks value creation and opportunities for innovation and technological development that will benefit society at large scale. The EDDIE project aims to create a Sector Skills Alliance (SSA) bringing together all the relevant stakeholders in the energy value chain such as industry, education and training providers, European organisations, social partners, and public authorities. The main objective of SSA is to develop a long-driven Blue-print for the digitalisation of the European Energy sector to enable the match between the current and future demand of skills necessary for the education and training in the digitalisation of the Energy sector and the provision of improved Vocational Education and Training (VET) systems and beyond.

The EDDIE project proposes an innovative strategic approach for Education in the European Energy sector as an industry-driven movement. Skills will emerge as a need of practical application instead of the classic approach, from fundamentals to application. This will be materialised in the educational Blueprint Strategy for the Digitalisation of the Energy value chain (BSDE) and will be demonstrated and validated in a pilot environment.

An interdisciplinary approach is also sought, including green and soft skills, social science, economics, and gender dimension, and by looking for synergies and collaboration with other blueprints and training initiatives through Europe. The involvement of professionals will be key for the success of the Blueprint, improving the attractiveness of the Energy sector by using participatory approaches and Information and Communication Technologies (ICT) methodologies.

The report D2.1 “Current challenges in the energy sector and state of the art in education/training” addresses the current situation in the Energy Sector and its digital transformation. It aims to establish the basis for the definition of the future skill needs, which will be the subject of following project documents (e.g., Deliverable D2.2). To jointly look for the future, VISION

2050, presented by European Technology & Innovation Platforms' Smart Networks for Energy Transition (ETIP SNET) as a consolidated view of the main energy stakeholders in Europe, has been used as a common framework of understanding. The VISION 2050 describes how the energy sectors are going to evolve, highlighting the role of the digitalisation in the evolution and analysing social, economic, and technological areas and expected benefits from digitalisation.

The key messages from the analysis based on ETIPS NET Vision 2050 are presented in the list below:

- Synergies among energy sectors and industries will reshape competition among energy vectors, requiring sustainable cross-sector regulation and innovative financial mechanisms. Industry skills should anticipate and actively enable sector integration.
- Digitalisation will enable companies and customer operations and processes to unlock a highly dynamic energy system at all layers and timescales. Digitalisation enables sharing economy and social participation evolving ownership relation between people and products with huge impacts on society dynamics and industry.
- Digitalisation, decarbonisation and decentralization tasks are paving the way for the platformization of the energy sector.
- Every energy sector will be transformed, including operational, technical, market and regulatory/ governance at local, national, and international level, including social behaviours
- Decentralization of the power system will require higher and extended visibility of the networks.
- Data intelligence and digital customer services will exponentially increase. Data will have a major technical and commercial value, to create services for society and industry with added value.
- Market disruptive dynamics, cybersecurity, large-scale social events and extreme climate conditions require a new approach to resilience. And a flexible back up system to cope with such disruptions
- Cross-sector partnerships, engagement of customers and new players are the key elements of this new approach, together with communities' and institutional support.
- The new innovative resilience approach requires stronger coordination among control layers and consider the new role of System Operators (SOs) as 'market catalyser's'.
- A comprehensive 'resilient and sustainable by design' concept, including technical and regulatory dimensions, should be translated into plans, based on specific local needs and constraints as well as worldwide best practices.
- Technology innovation must be open to everyone and specially incentivize consumers' engagement and empowerment.
- The golden rule and protocols of experimentation should drive decisions and actions through inception through design, execution, and monitoring, to allow joint learning from demonstration projects, sharing expertise, best practices, and experiences.
- Initiatives should be based on co-ownership of experiments to lead desired changes in behaviour patterns as well as foster new business models due to successful actions/experiences.

The EDDIE project's approach as an industry-driven activity, where the skills emerge as a need of practical application instead of the classic approach that starts from fundamentals to reach application, raises the need to consult the industry when addressing challenges in the energy sector. Taking this into account, the project's consortium developed a dedicated survey to obtain necessary feedback from actors across the whole energy system (all sectors), with diversity in terms of geographic location, size, type of organisation and operational focus (DSOs, TSOs, suppliers, service providers etc). The survey aimed to address the main challenges the industry faces towards the digitalisation of the energy system, the technologies and tools usage, the added value produced, and the new skills needed towards the new digital era. The survey was answered by 57 reference stakeholders applying best practice solutions representing the whole energy value chain. The key findings are mentioned below:

- The lack of adequate skills of employees is pointed out by most of the participants as an important matter to tackle. This finding clearly substantiates the need for the EDDIE project actions.
- Reduced costs are seen as the most impactful added value from digitalisation.
- Simplification of management and the improvement of Quality of Services (QoS) have also significant positive impact.
- Digitalisation is regarded as a key factor for enabling new and green technologies.
- Most of the companies provide training to their employees with a preference to in-house training, which can be utilized for the digital and green transition.

- Digitalisation is increasingly adopted in the energy sector as the majority of organisations use digital tools and technologies daily.
- Challenges are not particularly differentiated among energy system sectors, since all sectors face similar challenges regarding digitalisation, as shown by the answers in the survey.
- Business model adaptation and costs are major issues from economic and organisational point of view
- Acceptance of new technologies and privacy concerns are the main social challenges.
- Technology integration and data management are important technical challenges.
- Several challenges do not have the same importance for companies from different countries. National policies and educational approaches play a role in this and will be further investigated during EDDIE's WP4 ("Assessment of policies and requirements for VET and beyond").
- The recent COVID-19 crisis underlined the importance of digitalisation in the energy system.

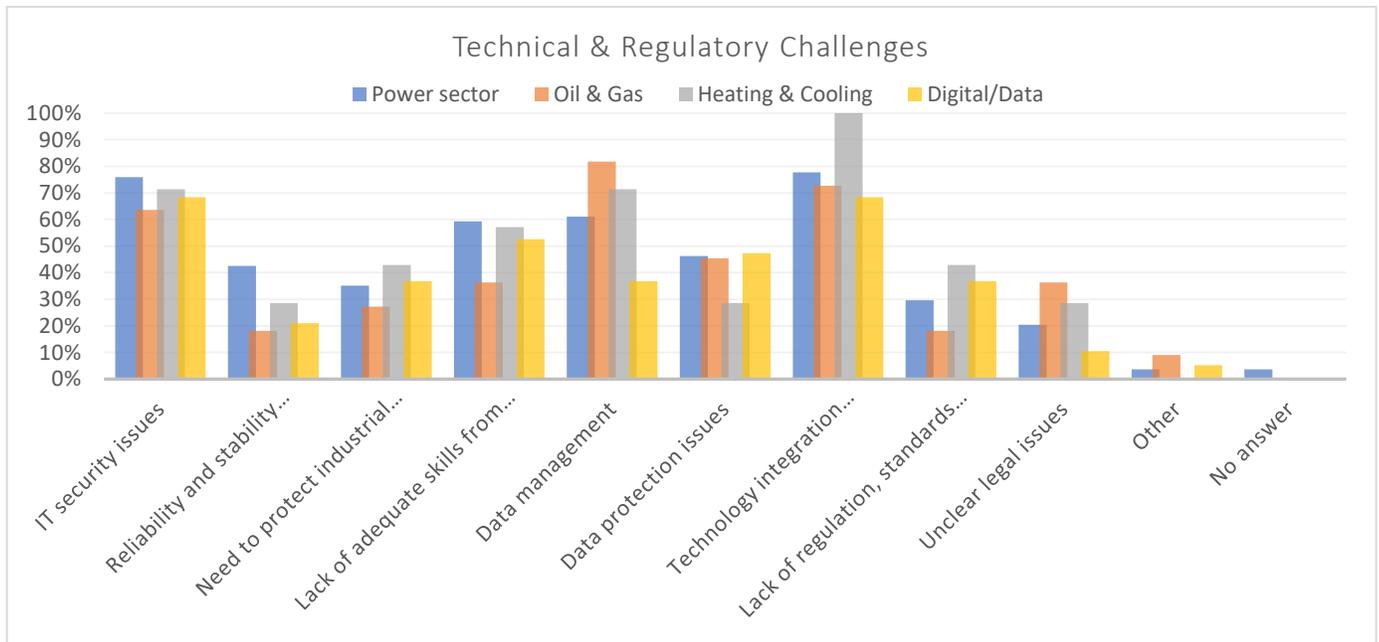


Figure 1 Example of Technical & Regulatory Challenges analysed by Sector

The second part of the report deals with the state of the art in education and training. Erasmus+ Sector Skills Alliance (SSA) Blueprint projects are reviewed in order to obtain valuable insights from other sectors on how they approach their respective area of operation in terms of the targeted educational levels, skills and technologies as well as educational tools used to achieve the defined objectives. 9 projects were selected and reviewed, some only just starting while others are well advanced. Throughout these projects, partnerships from each project developed a sectoral skills strategy to support the overall growth strategy for the sector at EU level to enable the 'blueprint' for the sector to be rolled out at national and regional level. This is achieved via the cooperation with national and regional authorities and key stakeholders. This is a useful learning experience for the EDDIE project. Therefore, the projects' analysis includes several learnings and results to be used by EDDIE partners on this and later Work Packages (WPs). The second part of this deliverable includes the review and analysis of several European projects and initiatives related to education/training related to the energy system. The analysis of previous and ongoing projects and initiatives in the energy sector has been performed based on 26 projects. This analysis is motivated by the need of reviewing the state of the art in similar educational projects in energy-related fields, aiming at identifying the main technologies and skills currently tackled by recent and ongoing initiatives. These projects address different issues related to the energy sector in Europe, focusing on the development of new skills and knowledge within the framework of European energy policies. Last, relevant literature has been reviewed to include a broader overview of the current state of the art in education/training for the energy sector, particularly related to digitalisation but not excluding general educational approaches. The review shows a clear gap concerning skill analysis for the digitalisation of the energy sector and the adoption of green technologies and skills.