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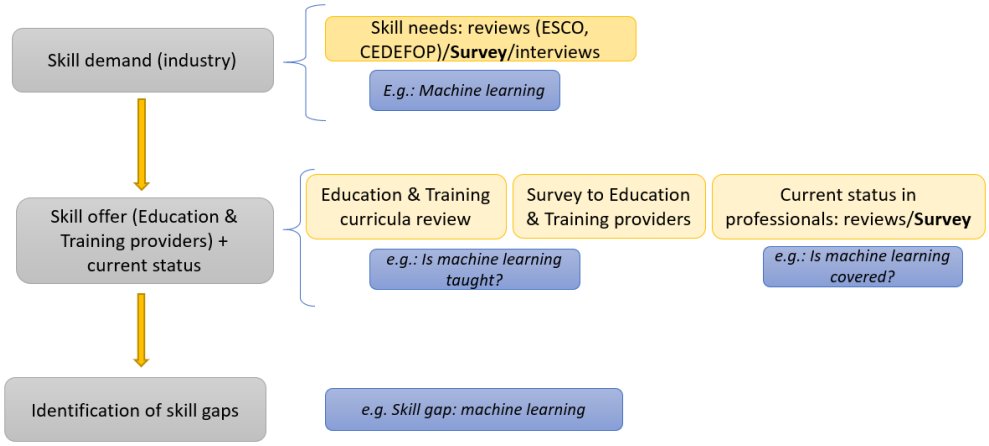
Education for Digitalization of Energy

Current and future skill needs in the Energy Sector

Authors:

Digital transformation of the energy sector is an important challenge, yet a great opportunity in achieving sustainability and efficiency. Due to digitalisation, there is an increasingly need of personnel with adequate skills to adapt and excel in this new era. To this end, the identification of skill gaps is an important step that will foster the necessary actions to mitigate these gaps. The first operational objective of EDDIE is to define a methodology to identify skill gaps for the digitalisation of the Energy sector. By developing a common approach for assessing the current situation and anticipating needs, progress is being monitored as well as evolution of the demand and supply of skills.

To keep up with the changing environment a multidimensional methodology was developed to address skill mismatches between the industry and the education and training providers, while also identifying relevant occupations and their respective requirements. The developed methodology is based on "Skills Intelligence" as it is defined by CEDEFOP. "Skills intelligence is the outcome of an expert driven process of identifying, analysing, synthesizing, 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". The skill gaps will serve as foundations for the Blueprint that will attempt to mitigate the mismatch and propose a strategy for upskilling or reskilling future employees.



In this direction, relevant occupations were identified with the purpose of extracting information on the recruiting trends in the industry, as well as the associated skills and knowledge that are necessary to succeed in these positions. The analysis drew information from reviews of ESCO, CEDEFOP and recruiting platforms, as well as directly by addressing the industry.

The first step for the identification of skill gaps was the identification of the skills needed from the industry to tackle challenges related to digitalisation, as well as to prepare for the digital transformation. The skill demand was addressed via a dedicated survey, which included the level of expertise required for specific skills, as well as the current coverage of those skills in the industry. About 60 prestigious industrial companies responded to the survey providing a clear overview of the skill demand in the energy sector. Moreover, 5 interviews with executives from the industry validated and complemented the survey's results.

Another crucial parameter to identify skill gaps, is the skill offer by Education and Training (ET) providers. This was performed by reviewing several European curricula focusing on both Universities and Vocational Education and Training (VET) institutions. In addition, a new survey was developed to gather information from ET providers regarding the skills and knowledge they provide and the corresponding skill level that a graduate is expected to reach while attending specific study programs. 33 important ET providers responded to the survey. In accordance with the skill demand approach, several interviews to ET providers were carried out to obtain qualitative data. Since education and training can come from different sources, online training platforms were reviewed, and relevant courses and skills were analyzed. Last, industrial training programs and corporate universities were reviewed to see how the industry itself reskills and upskills employees.

The analysis showed a discrepancy between current and future demand of abilities for multiple working domains, while digitalisation and technological changes are transforming the way of living and working. The digitalisation of the energy sector requests rapid transitions from the present level of knowledge to a more contemporary, and from one occupation to another, forcing people to continuously upskill and reskill.

Considering occupations, data handling abilities in job advertisements are emerging as the amount of information collected is increasing. A mandatory word associated with data is 'cybersecurity' as for creating a sustainable energy sector as well as a common ground based on trust between the industrial companies and consumers. Therefore, more occupations targeting all facets of cybersecurity must be considered on the labor market. Regarding the necessary qualifications to adapt to this changing framework, the industry itself indicated that usually, a most favored candidate brings experience and the ability to easy learn new technical innovations, combined with logical thinking and the ability to quickly analyze data. Although technical skills are especially important, they are also unlikely to be sufficient. In this perspective digital skills; green skills; resilience and adaptability techniques need to find a place in the curricula of the education institutions and on the agenda of the training providers.

The current education system in Europe still needs to improve in providing good employability to graduate students in relation to the knowledge and skills demanded by the ongoing transformation of the Energy sector. Alignment of academia with the labour market is needed to teach students both theoretical and practical, hands-on skills directly applicable in the work environment. To this end, significant effort in this direction is already being made by some universities and European initiatives. Areas such as Smart Grids, Information & Communication Technology, Innovative methods of simulation & analysis (machine learning, artificial intelligence, big data analytics) appear to be more and more present in several academic programmes throughout Europe.

Given the importance of an organization's human capital to business success, aligning training and competence development with business needs has become a key challenge. Thus, in the last 10 years, many companies created corporate universities (CU) to face this challenge. Corporate universities really come into place when companies see the education of their employees as a strategic instrument to create competitiveness and support overall corporate strategy and culture. They are generally dedicated units acting as partners with senior leadership to develop strategic skills and capabilities.

Online training platforms are another useful source of education and training as it is indicated by the interest in online courses which is rising in the last few years, and it has been further increased within the social context of the covid-19 pandemic.

The energy sector demands high level of expertise in many of the digitalisation related skill sets addressed through EDDIE's survey to industry. The highest expertise needs are observed in engineers & researchers' occupations, with technicians and specialists following in the expertise demand. Data capture, management and analysis skills are highly requested in the industry for all staff categories, while skills related to computing tools and programming & development are mostly requested for engineers and technicians in expert and intermediate levels accordingly. Moreover, it is evident that a combination of

hard and soft skills is important for the growth of the employees and company achievements, since many of the addressed stakeholders pointed out the importance of transversal and green skills. At the analysis of the survey results, significant skill gaps are considered when there is high level of expertise needed and low level of current coverage in the industry, or the skill is not adequately offered by ET providers. The analysis is performed, addressing different staff categories (Managers, Engineers, Technicians) while also addressing different energy sectors, countries, and types of operation. The analysis includes the following skill sets, each of whom consists of specific skills:

- Data capture and management
- Analytical methods
- Computing tools and platforms
- Programming, development, and technology related
- Transversal skills
- Green skills

Through addressing ET providers, either by reviewing curricula or via immediate feedback from the surveys, and while considering the demands for knowledge and skills from the industry, several skill gaps were identified. The results of the analysis show several gaps that can be assessed individually or aggregated under contextual categorization in skill sets, while trying to identify the source of the gaps. The source can be either a mismatch of demand by the industry and offer of the ET providers, or lack of coverage by already employed personnel. This is a significant insight since the mitigation of these mismatches can only be performed via targeted actions of either inserting new aspects in the education and training sector, or by re-skilling employees through several channels such as corporate universities and industrial training programmes. Apart from the technical skills that will play important role in the digital transformation of the energy sector, the interdisciplinary transversal, green and business skills will also be crucial during the transformation. Overall, the work performed by EDDIE partners to identify skill gaps, point out that the key areas towards digitalisation, as reflected by different analyses performed in this work, converge towards data management and analysis, big data, cybersecurity, and programming & development competences. An example of the analysis is shown in the following figure.