

Skills for Green Digital Buildings:

A new step-by-step approach for Upskilling on Sustainable Energy for design, construction and facility management professionals and workers

A graphic illustrating energy efficiency. It features a large green arrow pointing upwards, with a small plant growing from its top. To the right of the arrow is a vertical stack of seven horizontal bars, each labeled with a letter from A to G. The bars are colored in a gradient from green at the top to red at the bottom. Below this graphic, the words 'ENERGY EFFICIENCY' are written in large, bold, white capital letters, slanted upwards from left to right. The background of the graphic is a blurred image of a person's hands typing on a computer keyboard.

ENERGY EFFICIENCY



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Disclaimer

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1. Executive Summary

New competencies are essential for the smooth introduction of new technologies in any field, none so more than the building industry. Here new technologies can impact the entire working construction cycle. Designers have to learn how to introduce new technology to make the buildings more efficient and resilient to climate changes; producers need to provide the correct information for a proper design and installation in digital form to be used by architects in their software editors and by the constructor for the installations; in turn, the installers and the maintainers need information for the installation, maintenance and management of the end of life; and last but not least, the owners need specific competences to evaluate the benefits compared to other traditional solutions and make informed decisions. National approaches, such as on-the-job learning, have not successfully deployed the necessary skills, especially for green construction. In addition, learning is only half the story. Measuring impact at an individual and task level is crucial as we look forward to a more digital future.

This booklet addresses these challenges by developing green building technologies for the Architecture, Engineering, Construction (AEC) sector in terms of energy efficiency, renewable energy, and ‘nearly zero energy buildings.’ Its efforts and accomplishments include improving capacity and skills within the Heat Pumps (HP) industry, securing HP technology’s energy efficiency benefits, increasing market readiness, promoting sustainable energy skills visibility, enabling the validation of energy skills, developing Building Information Modelling (BIM) scheme, establishing permanent education resources, developing skills and providing an operational framework for workers to enhance their qualifications, establishing future-oriented training and qualification quality standards.

1.1 Policy challenges

The improvement of green construction faces several policy challenges:

1. Heat Pumps

- 🔒 Implementation issues due to the lack of skilled workers in the market.
- 🔒 Public distrust in using a heating system that uses electricity.
- 🔒 Not enough incentives for large-scale installations (tax breaks).
- 🔒 Lack of skills and understanding of heat pumps and heating systems among policymakers.

2. Innovative technology and techniques

- Due to time lapses between innovative technology and the qualification update, innovative solutions remain unknown among most public and private building owners.
- The standardisation process of identifying new parameters for placing innovative products on the market is too slow and laborious.
- Innovative solutions need to be embedded along the supply chain to ensure the correct design, installation, management, maintenance, and end-of-the-life cycle.
- Single-integrated competencies to innovative techniques/approaches must be integrated without increasing new qualifications.

3. Qualifications

- Qualification systems differ among European countries (and even regions), making the mutual recognition of qualification impossible and creating workforce movement barriers.
- European directives do not request the verification of competencies of the workforce employed in public tenders. As a result, new and reformed buildings often do not meet the required energy performance.

4. Internationalisation

Although internationalisation of the approach toward enhancing the value of construction skills is a promising strategy, replication challenges vary across EU regions:

- The characteristics of the construction market in a country - e.g., the percentage of skilled workers, the characteristics of the building stock, and market barriers.
- Language barriers - training materials need to be translated into several languages.
- Geographical issues - energy efficiency schemes are more easily applicable among groups of countries with similar climatic conditions.
- Differences in legislation - replication chances depend on the similarity of legal frameworks for construction skills education/qualifications construction sector and a similarly structured qualification framework/CVET (continuing vocational education and training) system.



- ☞ National interpretation of EU recommendations for EE (energy efficiency) measures.
- ☞ National employment policies can clash with the EU's rigid legal requirements for member states toward energy efficiency in the Clean Energy for All Europeans package.
- ☞ Lack of investments in qualified workers - Public authorities are not concentrated on these issues, and construction companies have little interest in providing employee training due to the financial burden.

2. Recommendations

2.1 Value of skills-based upskilling

Incentivising government-funded upskilling programmes, which provide the opportunity to work with government bodies, would accelerate standardisation processes and identify new parameters for placing innovative products on the market. In addition, recognition of new technologies within European and national legislation needs to be more immediate and transparent. This can incentivise production companies to propose increasingly innovative solutions. Possible solutions include recognising the required skills and teaching how to use new products and technologies in the construction supply chain.

The innovations proposed by the PG are designed to recognise the skills necessary to carry out a specific activity within the construction process. These include training programs for skills-based energy demand simulations through an online skills registration (i.e. Integrated Register of energy skills) repository. The repository would make skills available and accessible, enabling interregional cross VALIDATION of energy skills and raising their VALUE. An integrated energy skills register should also incorporate three different databases offering multiple functionalities: 1) a database of qualification schemes showing how to obtain skills; 2) a database of skilled and certified workers and professionals; 3) a database of EE construction materials.

Smart financial incentives (e.g., tailored subsidiary schemes and installation bonuses) should also be used to re-train existing heating system installers. Furthermore, new approaches to training regulations should be set up with exemptions for the traditional certification process (e.g., in Germany, exemption from the Craftsman rule, where a “Meister” title is required to be an independent craft person). In addition, the capacity of installers should be increased through the introduction of a “renewable heat installer” – joint test education of PV (photovoltaics) and heat pump installers – and a new category of a “fitter” (to be obtained through limited specific training).

2.2 Digitisation of upskilling in the construction sector

Creating a digital skills certificate (similar to the Covid pass or the safe pass) could help build customer trust. The certificate could be used to demonstrate qualifications, courses/workshops attended, and contractors’ experience. As well as increasing consumer confidence in workers, it could also be the foundation of a registry of professionals in the field.

Time-served workers must also be able to be accredited and certified.



Digitalisation should be seen as a new way to design, realise, maintain, manage, and consider the life cycle of a building and every single component.

The development of new skills is key, perhaps even more so than the creation of new jobs. However, providing training schemes for a wide range of users and across borders requires the digitalisation of the training process itself. E-learning or blended learning should be introduced to meet learners' current needs and ease the uptake of new technologies. The general move towards greater digitisation worldwide can transform the construction sector. The introduction of a web-based platform for e-learning would ensure widespread use of the E-RPL tool. This, in turn, would mean better online processes (e.g., documentation submission and evaluation, certification issuing).

A final step toward digitalising upskilling processes is a web-based solution for Digital badges. This would show worker skills, knowledge and competence, enable staff mobility, and provide a way to identify the upskilling needs of the worker within the company. In addition, by demonstrating staff experience and expertise, the information could also be used to show a company's competitiveness.

2.3 Green Public Procurement

Public buildings are changing to incorporate green elements into their design and planning. This can be incentivised through reductions in local property tax (LPT) for each green element introduced. For example, heat pumps can meet a minimum COP (coefficient of performance) requirement of 3.0 (a good COP) through external and high-quality heat and electricity meters. This will ensure that heat pumps are properly monitored and well installed. In this context, the digitalisation of the building supply chain can facilitate the application of green procurements. For instance, a digital library of local products with a carbon footprint could support the designer in choosing the product with less environmental impact. The BIM (building information modelling) methodology can accelerate the “dynamic” evaluation of environmental impact through technical design and construction.

Moreover, comparing different legal obligations in EU countries and sharing good practices could help draft national “micro” roadmaps for legislation changes necessary to stimulate demand for energy skills. These roadmaps may be offered to public authorities and sector organisations to support the changes or development of new legislative frameworks. In addition, awareness-raising activities among the salesforce and consumers can be tackled by introducing the database of energy-efficient products/materials linked with their producers and containing the scope of product properties, especially in terms of energy efficiency and its “greenness”. Finally, the initiatives reinforcing the link between skills/education and energy performance/quality of construction can be incorporated into the actions toward expressing the value of energy skills through digital tools like BIM.

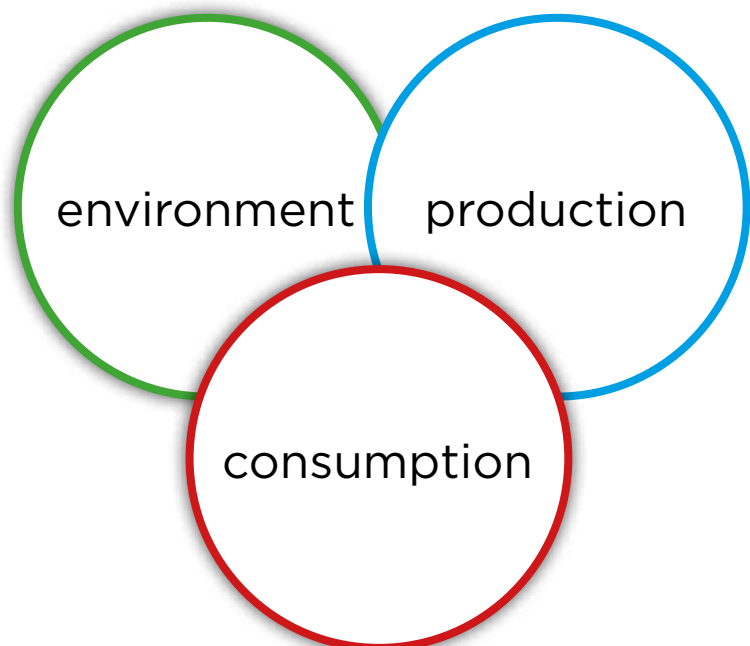
2.4 Recommendations for energy efficiency

1) Global policy over local (EU level): European Union legislators should pursue a global policy on energy efficiency and exert political and economic pressure on the largest CO₂ emitters. The situation is similar to reducing plastic consumption; belt-tightening and restrictive laws in the EU do not prevent the littering of the environment. By taking a broader view, EU politicians could be pressured to start exerting influence on non-EU countries. This requires a great deal of change in the global economy, such as bringing production back to EU countries or significantly reducing imports.

2) Diversification of production: Quality should be prioritised over quantity in shaping production policy. Production should focus on sustainable and energy-efficient products, cheaper, less durable products should not be abandoned altogether, but attention should be paid to increasing the use of recycled materials and ensuring that new products can also be reused at the end of their life.

3) Uniform and transparent regulation: there is a need for uniform regulations, at least within the EU, regarding the technical parameters of products manufactured in the construction value chain. It is also essential to properly define the percentage of recyclates used in manufacturing, access to raw materials and the introduction of transitional periods so that national economies and individual companies can adapt.

4) National and European social programmes (in the context of education): a crucial issue is the introduction of elements of public education on energy efficiency. To increase knowledge of the subject, solutions should be implemented at the compulsory school level, with dedicated technical and energy studies classes. Global social campaigns targeting the older part of society should also be considered. Grassroots work is an essential element in raising awareness. Furthermore, several projects should be implemented to promote energy reduction and efficiency measures, such as tax incentives for home renovations (insulation, alternative energy installations), subsidy programmes for such renovations, or programmes for purchasing cleaner technologies.



3. Project Group



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