

Executive Summary

This analytical report is part of the European Construction Sector Observatory (ECSO) and aims to provide insights into the **Thematic Objective 3 “Improving resource efficiency, environmental performance and business opportunities”** of the EU Construction 2020 Strategy. It provides an overview of the current resource efficiency and energy performance of buildings situation in the construction sector in the EU-28, paying particular attention to the characteristics of the building stock and the waste and emissions generated by construction activity. This analysis presents the main drivers, namely regulatory measures, economic factors, and obstacles to resource- and energy efficient construction. Main policy responses adopted by Member States highlight best practices and lessons learned from various national and regional programmes.

1. State of energy and resource efficiency

Of the residential building stock in the EU Member States, on average 45.4% of the buildings were built before 1969 and 75.4% before 1990. This means that the building stock requires additional investment in energy efficiency and energy renovation in the coming decades.



The Roadmap for moving to a competitive **low carbon economy in 2050** estimated that emissions from the built environment could be reduced by around 90% by 2050, through the introduction of **passive housing technology** in new buildings, the **refurbishment of old buildings** to improve their energy performance and the **substitution of fossil fuels** by electricity and renewables in heating, cooling & cooking.

However, since regulatory instruments such as the 2010/31/EU [Energy Performance of Buildings Directive \(EPBD\)](#) and the 2012/27/EU [Energy Efficiency Directive \(EED\)](#) came into force, the Directives have had a positive impact on the energy performance of buildings. The introduction of energy efficiency requirements in national building codes resulted in reducing half of the energy consumption of new buildings compared to typical buildings constructed in the 1980s.

Technological advances also play a key role in fostering the energy performance improvement of the building stock.

Similarly, **research and development (R&D)** activities help to find new ways to recycle or reuse construction and demolition waste.

Smart technological approaches such as building information modelling (BIM) can contribute to simplify and support the construction of low energy buildings.

The EU targets for energy and climate change over the coming decades have major implications for the construction industry in terms of its overall **resource efficiency**. Specific attention goes into the reduction of waste through smart technologies and through the recycling and reuse of construction waste. The generation of waste has seen a decrease in half of the Member States between 2010 and 2014 and landfill rates are falling in the majority of EU-countries.

Recovery rate of construction and demolition waste (CDW) over the 2010-2016 period

 **15.3%**

Most countries have done significant efforts between 2010 and 2016 in increasing the CDW recovery rate. In fact, only five countries, namely Belgium, Sweden, Czech Republic, Germany and the Netherlands have not seen their rate increase.

2. Drivers of energy and resource efficiency

Regulations and resource constraints have emerged as two of the most influential drivers

Regulatory developments and the economic considerations of firms and households are the fundamental drivers for improvements in the energy performance of buildings and of resource efficiency in the construction industry.

["Transforming our World: the 2030 Agenda for Sustainable Development"](#) including its 17 Sustainable Development Goals (SDGs) and the [Paris Climate Accord](#) are the overarching regulatory frameworks, which are particularly relevant for the construction sector as they target improvements in energy and resource efficiency.

At the European level, there are several initiatives and Directives focusing on resource and energy performance, such as the [Energy Efficiency Directive \(EED\) \(2012/27/EU\)](#), the [Energy Performance of Buildings \(EPBD\) \(2010/31/EU\)](#), the [Renewable Energy Sources \(RES\) Directive \(2009/28\)](#), and the [Waste Framework Directive \(2008/98/EC\)](#), just to name a few. A longer-term perspective is set out in the [Roadmap for moving to a competitive low carbon economy in 2050](#) and the [Energy Roadmap 2050](#). Specifically, the [Climate and energy policy framework for 2030](#) sets a number of objectives for lowering energy consumption, greenhouse gas emissions and improving energy efficiency, aiming for a 27% improvement in energy efficiency by 2030.

The economic drivers for investment in residential, public and commercial buildings are quite different, with indicators such as individual payment capacity, ease of undertaking investments, the availability of tailored financial products and fiscal support being particularly important for attracting investments in the energy efficiency of residential property. Another economic factor is the potential for reduced waste management costs by decreased reliance on landfill disposal/improved resource efficiency. The targets set by the [Waste Framework Directive](#) include re-use and recycling of waste materials, such as at least paper, metal, plastic and glass, amounting to 50% reduction of the waste and a 70% target for material recovery from non-hazardous construction and demolition waste. This has led to increased restrictions and prices of landfill use. Consequently, innovative construction designs and processes - that reduce the amount of construction and demolition (C&D) waste - tend to gain competitive advantages from the deconstruction of buildings and the reuse of resources.

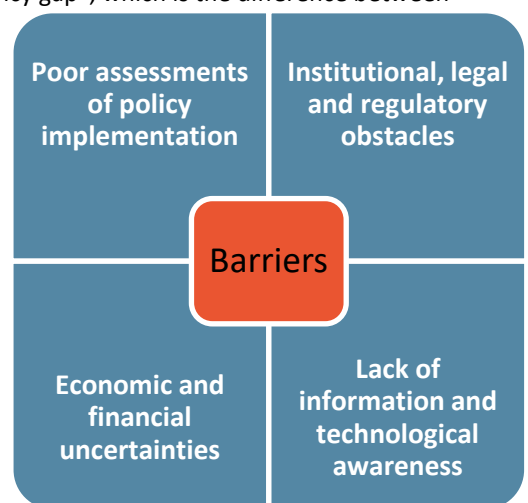
An increasing number of companies are interested in making their resource-efficiency efforts visible to the outer world by using environmental performance certification schemes such as the EU Eco-Management and Audit Scheme (EMAS) in order to achieve a competitive advantage.

3. Obstacles to energy and resource efficiency

A number of barriers remain present and contribute to the "energy efficiency gap", which is the difference between the optimal and actual level of energy efficiency in the sector.

An important obstacle for the EU construction sector can be found in the **skills shortage** present in general and specifically within the energy performance sub-sector; all of which can be a supply-side bottleneck. According to the national status quo analyses carried out under the [BUILD UP Skills initiative](#), over 3 million construction workers in the EU will need to increase their skills for working on energy efficiency (EE) and renewable energy systems (RES) by 2020. This stresses the pivotal role played by dedicated training.

Energy poverty is another obstacle to efficiency in these areas, and the combined result of inhabitant's low income, high energy expenditure and poor energy efficiency of dwellings. Low-income households, and particularly households in a situation of energy poverty, are much more



likely to lack both savings to cover the initial investment costs for clean energy technologies and access to credit.

Specifically, uncertainty about the robustness of methods to estimate savings from energy efficiency, along with a resultant under-appreciation of some of the wider financial benefits (such as reduced exposure to fuel price volatility), leads to the application of a high discount rate to returns, which increases the perceived risk.

4. Policy initiatives

Member States have introduced a variety of **policy instruments, schemes and initiatives** in order to address obstacles to the energy and resource efficiency of the construction sector. Policy responses range from incentive schemes, information and awareness raising measures to research support and skills development initiatives. **Training in energy efficiency** stands out as a major area of policy activity supported by EU funds.

The major trends of policy initiatives across the EU-28 are observed as such:

- Policy activity mostly targets the direct improvement of the **energy performance of the residential building stock**, in particular through **financing measures**;
- Most Member States focus their policies on **skills shortages** for energy and resource efficiency, which are a combination of formal Vocational Education and Training (VET) and non-formal training initiatives;
- Several Member States take measures to improve **awareness** of and **knowledge** about energy and resource efficiency;
- The majority of Member States have introduced financing or other types of measures to support **research** in the area of energy and resource efficiency.

“Train the trainers” initiatives are mostly developed in the framework of the BUILD UP Skills initiative

Most of the identified projects in the EU Member States aim to develop energy-efficiency skills through **continuous education and training programmes** that build on the current expertise of onsite workers and other construction professionals. A number of measures take place under the umbrella of the **EU BUILD UP Skills initiative**.

The renewable energy industry alone is predicted to employ up to 2 million people by 2020, with the majority of new jobs being created in the construction sector.

5. Conclusions

Going forward, future efforts should be focused on **increasing incentives for renovation and energy performance improvements** of residential buildings with the goal of enabling better accessibility of grants and subsidies to low-income residents.

Awareness-raising measures and technical assistance should be another priority to raise consumers’ awareness and understanding of the available options and overall benefits of energy performance improvements. National policies should better promote incentives supporting resource efficiency of construction materials and processes as well as foster further support for **R&D and skills development**.

These efforts will enable Member States to meet their national, European and global energy and climate policy commitments, as well as increase the wellbeing of their citizens.

In terms of **resource efficiency** progress has been made with the adoption and amending of the **Waste Framework Directive** (2018/851), which encompasses recycling, reuse and recovery through backfilling and now also includes provisions for the recording of data on recovery by backfilling. Additionally, **landfill rates** have dropped by 10.7% on average in the EU between 2010 and 2014, meaning that countries have increasingly treated the generated waste rather than disposing of it in landfills.

The use of smart technologies can further help reduce waste and increase the efficiency of resource use. The **Building Information Modelling (BIM)** approach makes it possible to keep track of the materials used in building and renovations, which facilitates potential deconstruction and reuse as opposed to demolition.