

# Renovation in Buildings

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## Key questions

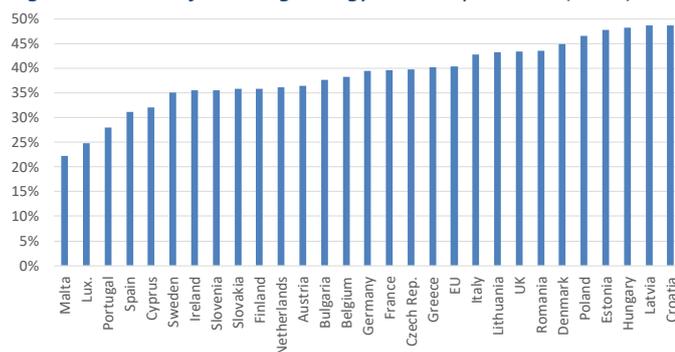
- Why are the buildings in the focus of energy efficiency policy?
- What measures are undertaken to stimulate energy renovation of buildings?
- What are the main challenges to large-scale building renovation?

This policy brief is based on the ODYSSEE-MURE project published in 2015: <http://www.odyssee-mure.eu/publications/br/energy-efficiency-in-buildings.html>

## Triple 'win' of buildings' energy renovation

The ODYSSEE data clearly show the significance of buildings in the overall energy consumption. In 2014, the building sector accounted for 40% of final energy consumption, which enthrones it as the largest end-use sector in the EU-28. In some Member States (MS) this share even exceeds 45% (Figure 1). Residential sector consumes more than ¼ of total energy and accounts for two thirds of building's consumption.

Figure 1: Share of building energy consumption-EU (2014)



Source: ODYSSEE

### Win #1: Secure and sustainable energy

The EU is highly dependent on energy imports, with import dependency reaching 53.5% in 2014 (Eurostat). The dependency rate of natural gas, which is the dominant energy carrier for heating in buildings

at the EU level (although this varies significantly across the MS), was 67.4% (JRC, 2015). Imported gas dominantly originates from Russia and Norway, whereas eastern and Baltic Member States are highly exposed to any disruption of Russian gas supplies. Clearly, renovation of the EU's existing building stock would reduce the need for energy, especially gas, imports, thus improving European energy security. Additionally, expenditure for energy imports, which were 2.5 times higher than the EU trade balance in 2013-2014 would be reduced and available for re-allocation to other purposes. Due to the dominance of fossil fuels for heating purposes (37% of space heating consumption comes from fossil fuels in EU residential sector in 2014, ODYSSEE database), buildings sector is responsible for 38% of the EU's total CO<sub>2</sub> emission (JRC, 2015). Given the fact that buildings in Europe are more likely to be refurbished than replaced, energy renovation based on energy sufficiency and energy efficiency measures combined with the use of renewables is essential for reaching climate goals at the EU level.

### Win #2: Economic growth

The building sector is responsible for 7% of the EU GDP (JRC, 2015). It employs over 11 million people,

whereas specialised construction activities that include renovation work and energy retrofits account for two thirds of overall employment in the sector. These activities are dominantly provided by SMEs. Therefore, stable demand for energy renovation induced by smart policies would trigger further development of building related SME sector, enhance the prominent role specialised activities already play in terms of value added and employment, contributing this way to overall economic growth.

#### *Win #3: Social cohesion*

Energy poverty is a growing problem at the EU level. It denotes the situation where consumers, due to inability to cover energy costs, dominantly heating, compromise on the comfort level in their dwelling. Poor quality of dwellings has significant influence on energy consumption and related bills, leading consumers, to fuel poverty. In 2012, 11% of European population was unable to keep their homes warm in the winter (JRC, 2015<sup>1</sup>). This is especially the case in the MSs with per capita GDP below the EU average. Therefore, reducing energy needs of buildings and consequently the energy bills of the households is essential for alleviating fuel poverty and achieving social and territorial cohesion at the EU level.

#### **Policy efforts to stimulate energy renovation**

Due to incontestable triple 'win' of energy efficiency improvements in buildings, the sector has a strategic position in overall European energy-climate policy. This was additionally confirmed with the EU's Winter Package "Clean Energy for all Europeans" by launching a smart finance for smart buildings initiative that is aimed to unlocking private financing for energy efficiency and renewables in buildings at a greater scale. Currently, the Energy Performance of Buildings Directive (EPBD), Energy Efficiency Directive (EED) and the Renewable Energy Directive (RED)

define an EU framework that creates the conditions for long-term improvements in the energy performance of Europe's building stock. In particular, the article 4 of the EED calls the MS „to establish a long-term strategy beyond 2020 for mobilising investment in the renovation of residential and commercial buildings with a view to improving the energy performance of the building stock". All 28 MS have developed their long-term strategies, with varying level of details and far-reaching views (JRC, 2016<sup>2</sup>). Most of the MS failed to provide long-term visions for building renovation, keeping their focus only on existing measures without elaboration of plans for ensuring phasing-out of inefficient building stock by the mid of the century. Renovation targets are not clearly presented nor are the benefits beyond energy savings (e.g. indoor comfort/air quality, impact on construction sector, externalities) elaborated and evaluated. Strategies will be revised in 2017, and every 3 years thereafter. With the boost from the Winter Package, it is essential that the updated strategies become more far-sighted and provide both critical assessment of existing policy measures and a roadmap for establishing new ones that will boost large-scale building renovation. Nonetheless, there is a number of policies across the MS in place for stimulating energy efficiency improvements and renewables utilisation in buildings.

The MURE database provides information on more than 420 measures currently implemented in the MS. Figure 2 shows the types of measures targeting residential and service sector buildings and their number at the EU level. In both residential and service sectors, financial measures aiming at investments in energy renovation of buildings including introduction of renewables dominate and are heavily supported by

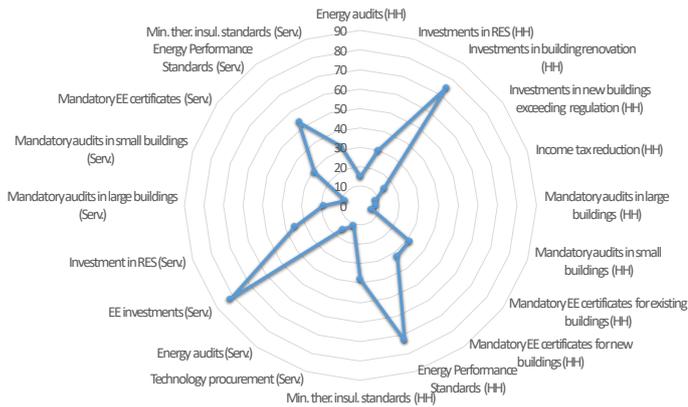
<sup>1</sup> Data for this section are taken from the report Energy Renovation: The Trump Card for the New Start for Europe, Joint Research Centre (JRC), 2015

<sup>2</sup> Data for this section are taken from the assessment of all building-renovation long-term strategies that was performed by

Joint Research Centre (JRC) and publish in the Synthesis Report, available at: [http://iet.jrc.ec.europa.eu/energyefficiency/system/tdf/synthesis\\_report\\_building\\_renovation\\_strategies\\_online\\_fin.pdf?file=1&type=node&id=9117](http://iet.jrc.ec.europa.eu/energyefficiency/system/tdf/synthesis_report_building_renovation_strategies_online_fin.pdf?file=1&type=node&id=9117)

mandatory energy performance and thermal insulation standards. Other measures include mandatory energy audits, energy certificates and technology procurement (in services) and income tax reductions (in residential).

Figure 2: Measures for building renovation in the MS

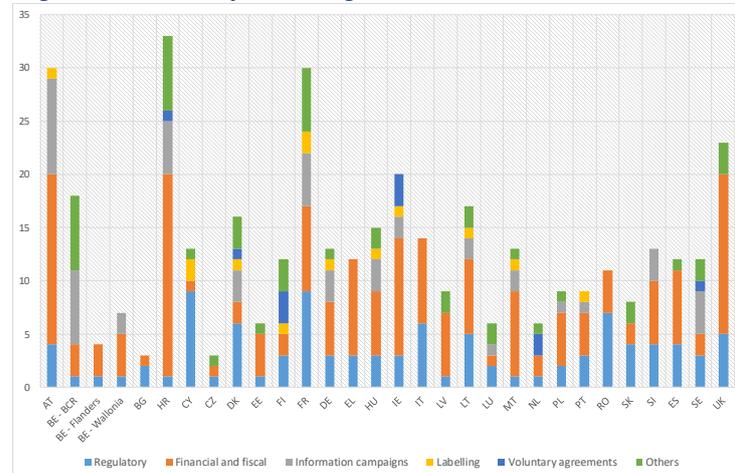


Source: MURE database - policies by topics facility  
 The number and the types of policy measures vary significantly across the MS, as demonstrated through analysis of long-term building renovation strategies (JRC, 2016). However, the domination of financial and regulatory measures is again confirmed – 43 % of all undergoing measures in the MS are financial measures, while 25% are regulatory (Figure 3).

Financial measures mostly include various co-financing programmes offering grants and subsidies to building owners. Subsidy programmes usually target residential sector and successful examples can be found for instance in Austria (Federal Government programme providing subsidies for energy efficiency measures for existing and new residential buildings run since 1982 and has undergone continuous tightening of technical requirements to be achieved in order to gain a subsidy), Bulgaria (grants for multi-family residential buildings under the Operational Programme "Regional Development" and Energy Efficiency credit line for households) or Lithuania (grants to multi-apartment buildings financed by EU Structural Funds, private, state and municipal budgets). Tax relief on energy efficiency upgrades for residential buildings is used only in few MS, with Italy having the tax credit scheme for building renovations

as a flag-ship measure for households. Loan programmes are offered by very few MS, with the most successful program being KfW scheme in Germany. The KfW scheme provides support depending on the efficiency levels achieved after the renovation. Through this scheme more than 3.5 million homes were renovated or newly built with the highest energy efficiency standards in the period 2006 – 2014. Also, more than 1,940 buildings of municipal or social bodies were renovated through this scheme. Investments of just under 162 billion Euro were initiated in this period. The most recently introduced financial measures are Energy Efficiency Obligation Schemes (EEOs), implemented in Austria, Flanders region of Belgium, Bulgaria, Denmark, France, Italy, Ireland, Latvia, Luxembourg, Malta and the United Kingdom. The EEOs places obligations on energy suppliers to achieve specific annual energy savings targets across the end-use sectors, including buildings.

Figure 3: Measures for building renovation across the MS



Source: JRC, 2016  
 Regulatory measures reported by the MS mostly include measures related to the EPBD requirements, more specifically on minimum energy performance requirements for new and existing buildings, which have been continuously tightened to ensure new and renovated buildings are built with highest energy efficiency standards. Moreover, the MSs have developed their national plans to increase the number of nearly zero-energy buildings (nZEB), which

are aimed not only to stimulate the construction of new nZEB, but also to renovate existing buildings to the nZEB standard. The third largest group of measures include information campaigns, which are present in most of the MS and are aimed at providing advice and awareness-raising in both residential and service sectors, whereas in service SMEs are of particular interest. Advising is organised through various types of public services, while awareness campaigns are often linked to financing programmes in the residential sector. The selection of policy measures reflects the greatest challenges in ensuring lasting demand for energy renovation of buildings. While the regulatory framework aims to ensure renovation of building stock respects minimal energy performance requirements and is based on cost-optimal choices, teaming-up financial and informational measures is vital for making decisions to even start renovating buildings.

### Main challenges to large-scale building renovation

#### *Challenge #1: Deep renovation*

Deep renovation of existing buildings is needed to phase-out inefficient buildings from the EU building stock. It implies implementation of all cost-effective measures that will reduce both delivered and final energy consumption by a significant percentage as compared with pre-renovation levels, leading to a very high energy performance. Additional efforts for introducing renewables at the supply side will push renovation towards the nZEB standard. By stimulating deep renovation, a full economic potential for energy savings will be utilised, avoiding this way a lock-in-effect. However, the decision on the depth of renovation is governed by the investment costs and overall cost-effectiveness of the investment. Therefore, the reduction of deep renovation costs is needed. This is to be achieved through a number of coordinated measures that include: stimulating technological innovation related to both building envelope and technical systems, tailoring

standardised solutions for each construction period, climatic zone and building type and bundling properties into single, large-scale energy renovation projects.

#### *Challenge #2: Financing renovation*

High up-front cost of (deep) energy renovation is the major barrier to its large-scale implementation. The success of energy efficiency policy in the building sector heavily depends on the households' involvement. In the EU over 70% of the population are owner-occupiers, with the highest rates in the eastern and Baltic Europe. At the same time, these countries have the highest proportion of the population facing fuel poverty. Therefore, a majority of citizens cannot afford themselves to bear the costs of energy renovation. On the other hand, in rented accommodation 'split incentive' barriers hinder energy renovation. Solutions can be sought in on-the-bill financing, linked to the property and not individuals, that overcome the up-front cost barrier as well as split-incentives and allows repayment for energy renovation works from energy savings. Given the huge potential that exists at the EU level and the scale of potential investments in energy renovation, a pure reliance on public subsidies is not a sustainable solution. New business models that will stimulate energy renovation market and engagement of private capital are necessary to boost large-scale energy renovation of buildings in the EU. Some of innovative financing concepts that should be further developed and utilised for building renovation include energy performance contracting, on-bill financing schemes and revolving funds with the use of European structural and investment funds (ESIF).

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*For further reading or information, please visit <http://www.odyssee-mure.eu/>*