



EUROPEAN  
COMMISSION  
RTD - Energy  
ENER - Renewables, R&I, Energy  
Efficiency  
JRC – Institute for Energy and  
Transport  
**SET Plan Secretariat**



## SET-Plan – Declaration of intent on strategic targets in the context of Action 5 "Develop new materials and technologies for energy efficiency solutions for buildings"

### **1. Purpose of this document**

This document<sup>1</sup> is intended to record the agreement reached between representatives of the European Commission services, representatives of the EU Member States, Iceland, Norway, Turkey and Switzerland, (i.e. the SET-Plan Steering Group) and representatives of stakeholders, on the definition of strategic R&I targets for the SET-Plan Action 5 on material and technological solutions to increase energy efficiency in buildings. With this declaration of intent, the interested parties agree to put forward their best efforts in a coordinated way between public and private sectors, and to jointly address all relevant issues in order to attain the agreed targets.

This agreement follows a broad consultation with a panel of Stakeholders' organisations (see Annex A) representing the different actors involved in the construction value chain, a broad range of energy efficiency solutions as well as the research and academic community. This document takes into consideration the corresponding input papers available on SETIS (<https://setis.ec.europa.eu/towards-an-integrated-SET-Plan>) and the discussion with Stakeholders which took place on 19 February 2016.

### **2. Introduction – materials and technologies for energy efficiency solutions for buildings**

The EU building stock represents a total floor area of around 25 billion m<sup>2</sup> (2012). Buildings surround us and they occupy a central position in the European energy system. Altogether, they consume 40% of our final energy demand, which is more than any other sector of the European economy. In return, buildings offer the largest potential for energy savings in Europe as it is estimated that around 75% of our buildings are energy inefficient and that 80% of the energy efficiency potential in buildings remains untapped. This large energy saving reserve is also an opportunity for the EU to support job creation and retention, health improvements, better energy security, competitiveness and fuel poverty alleviation.

Due to their long lifespan, existing buildings are the main source of potential energy savings. It is estimated that more than two thirds of the savings potential arise from the refurbishment of existing buildings (envelope, heating & cooling systems, management and control systems etc.). Energy savings from highly energy performance new buildings are also important but limited by the size of the new construction market.

In most cases, commercially available technologies, materials and products can, in principle, be used to reduce energy consumption of buildings by more than half, or to achieve Nearly Zero-Energy Building (NZEB) performance levels. However, the market for NZEB is developing slowly and the current rate of renovation is

---

<sup>1</sup> This document has no legally binding character, and does not prejudice the process or final form of any future decisions by the European Commission.

very low with only 0.4-1.2% of our buildings being renovated each year. This low deployment rate is the result of various obstacles ranging from social, financial, legal, technical to market barriers.

To address these barriers and achieve its climate and energy targets, the EU has put in place a comprehensive regulatory framework built around the Energy Performance of Buildings Directive (EPBD) (2010/31/EU), the Energy Efficiency Directive (EED) (2012/27/EU), the Renewables Directive (2009/28/EC) and the Eco-design (2009/125/EC) and Energy-labelling (2010/30/EU) Directives. As part of the Energy Union Strategy<sup>2</sup> of 25 February 2015, the European Commission will review both the EPBD and the EED in order to create the appropriate framework for progress.

In line with action 5 of the Strategic Energy Technology Plan Communication, this declaration aims at defining how research and innovation could further underpin the implementation of this EU policy framework and accelerate the transformation of our building stock, by focussing on the principal technological barriers. However, R&I objectives on non-technological elements e.g. on socio-economics, financing, legal barriers are also essential. Whereas they are not the purpose of this specific action, they would require dedicated actions in close coordination with the upcoming review of legislation.

Coordinated R&I in technological and material developments represent an opportunity to accelerate greater energy efficiency in buildings by offering new or improved solutions that better respond to the market's needs. In particular, technological solutions have a key role to play in addressing the following specific barriers:

- Renovations are too often lacking a holistic approach (at the building level, but also at neighbourhood and city level, in order to optimise urban planning). They include insufficient energy efficiency measures and they are sometimes facing comfort, operation and moisture issues. In addition, the pay-back time for ambitious energy renovations is considered too long by most building owners.
- In many countries, Nearly Zero-Energy Buildings (NZEB) are more expensive to construct and sometimes maintain than buildings that only comply with standard building codes and regulation (with estimated average additional costs being in the order of 10%).
- Delayed and lengthy construction works tend to increase costs and disturbance for occupants in case of refurbishment. Construction processes are currently carried out alongside largely different patterns, involving a large number of players, mainly SMEs, which are not sufficiently interconnected along the different stages of the construction processes.
- The gap between the predicted and the measured energy performance creates uncertainties for investors and hampers future investments.

The substantial changes to come driven by both consumer demand and legislation need to be taken into perspective when planning and monitoring R&I activities: for instance, the trend towards more m<sup>2</sup> of living space per inhabitant, increased comfort requirements, smart solutions for buildings, requirements regarding climate change resilience, adaptation to ageing population etc.

In this context, four specific R&I targets have been defined. The most important objective is to concentrate and coordinate our R&I efforts to master the renovation of the most representative groups of buildings that share similar constraints (e.g. construction periods, climatic zones, building types) across Europe with ambitious, cost-effective and holistic refurbishment packages. The second objective aims at reducing the construction and maintenance costs of new NZEB in order to support their large-scale deployment. The last two objectives aim at improving construction processes and practices by making energy efficiency works in new and existing buildings less costly, less disruptive for occupants and more reliable in their performance.

---

<sup>2</sup> COM(2015) 80 final

R&I activities in these areas should build upon the accumulated experience at the national and EU level (e.g. EeB PPP projects<sup>3</sup>).

Similar to the central position of buildings in the energy system, the R&I targets for SET-Plan action 5 interlink with a number of other SET-Plan actions. Namely the holistic approach at the neighbourhood/city level is covered under action 3 related to smart solutions to energy consumers, smart-homes, buildings-to-grid integration and smart cities and communities which will require sound coordination between the implementation plans. Similarly, coordination is needed with action 1 related to renewable energy systems for buildings and their integration, as well as for action 7 on becoming competitive in the global battery sector to drive e-mobility forward.

### 3. Specific targets

Building on the Integrated Roadmap (IR) of the SET-Plan and some parts and aspects of the multi-annual roadmap prepared by the Energy-efficient Buildings (EeB) PPP<sup>4</sup>, public (e.g. EU, Member States or Regions funds) and private investment must focus on targeted R&I actions to achieve the following goals in terms of developing materials and technologies for energy efficiency solutions for buildings, while striving to reduce GHG emissions:

#### 1. Mastering the renovation of the main existing building typologies in Europe with ambitious, cost-effective and holistic refurbishment packages (for residential and non-residential buildings):

By 2025, R&I will lead to the development and demonstration of highly replicable, standardised and holistic refurbishment packages tailored to the main building typologies in Europe (including historical buildings). The objective is to reduce on average the primary energy of buildings by 60% while reducing total cost of ownership and limiting the payback time to 10 years.

These packages should lead to optimal system design and control aiming at maximising energy saving opportunities while covering the remaining energy demand by renewable energy sources to the largest possible extent. They should be based on a holistic approach considering the building and its context (i.e. energy networks, systems and planning at neighbourhood/city level), they should respond to consumers' needs (e.g. comfort, healthy indoor climate), be durable, reusable and recyclable, easy to install, operate and maintain. Based on interoperability among systems, they should combine together existing and emerging sustainable technologies and materials to address energy efficiency throughout the building envelope, technical building systems (including renewable energy technologies and storage) and optimised operation and building performance levels throughout its life time, including with modern ICT-based solutions.

*Monitoring approach: monitoring of R&I activities (number of building typologies addressed, energy and financial performance of the refurbishment packages, etc.), analysis of future building renovation strategies, building stock observatory and market survey. The estimation of the financial performance should take into account the monetisation of the multiple benefits of energy efficiency (e.g. higher property value, higher productivity).*

---

<sup>3</sup> [http://www.ectp.org/cws/params/ectp/download\\_files/36D3750v3\\_EeB\\_PPP\\_Project\\_Review.pdf](http://www.ectp.org/cws/params/ectp/download_files/36D3750v3_EeB_PPP_Project_Review.pdf)

<sup>4</sup> EEB roadmap: [http://www.ectp.org/cws/params/ectp/download\\_files/36D2981v1\\_Eeb\\_cPPP\\_Roadmap\\_under.pdf](http://www.ectp.org/cws/params/ectp/download_files/36D2981v1_Eeb_cPPP_Roadmap_under.pdf)

## 2. Reducing the construction and maintenance costs of new Nearly Zero Energy Buildings (for residential and non-residential buildings)

By 2025, develop and demonstrate market ready solutions to reduce the construction and maintenance costs of Nearly Zero Energy Buildings (NZEB) or positive energy buildings by at least 10% compared to their costs in 2015 with a view to reach a cost reduction of 15%. While reducing cost, these energy-related solutions should lead to optimal holistic system design and control and they should respond to consumers' and societal needs.

*Monitoring approach: monitoring of R&I activities, market survey - costs reduction being calculated without inflation and by offsetting costs related to changes in the market trends for non-energy related works (e.g. interior design).*

## 3. Making energy efficiency works in new and existing buildings less costly and less disruptive for occupants (for residential and non-residential buildings)

By 2025, develop and demonstrate market ready solutions to reduce the average duration of energy-related construction works by more than 20% for renovation and for new buildings compared to current national standard practices. Activities could include solutions capable of being adapted to the final conditions with a lower execution time (e.g. offsite construction) or other solutions to increase the effectiveness of construction processes.

-

*Monitoring approach: monitoring of R&I activities, market survey.*

## 4. Closing the gap between predicted and measured energy performance for new and refurbished buildings (for residential and non-residential buildings)

By 2025, R&I will develop and demonstrate market ready solutions to reduce the difference between the predicted and the measured energy performance to maximum 15% after the commissioning period with the ambition to reach 10%. These solutions should for instance result in more accurate energy performance prediction for new and refurbished buildings (e.g. better baseline, better understanding of occupants' behaviour), optimised control systems or solutions to increase the quality of workmanship.

*Monitoring approach: monitoring of R&I activities, market survey, database of ex-post and ex-ante data on energy performance.*

## 4. Next Steps

The interested parties agree to develop within 6 months a detailed implementation plan for the support of these targets by 2025; to determine joint and/or coordinated actions; to identify the ways in which EU and national research and innovation programmes could most usefully contribute in complement to other R&I efforts; to identify the contributions of the private sector, research organizations, and universities; to identify all issues of a technological, socio-economic, regulatory or other nature that may be of relevance in achieving the targets and report regularly on the progress with the purpose of monitoring the realisation of the targets and taking corrective action wherever and whenever necessary.

## Annex A – List of consulted Stakeholders<sup>5</sup>

- Energy efficient Buildings association (European construction technology platform)- ECTP AISBL (X-E2BA)
- Buildings Performance Institute Europe (BPIE)
- The European Alliance for Companies for Energy Efficiency in Buildings (EuroAce)
- European Heat Pump Association (EHPA)
- Architects' Council of Europe (ACE)
- Federation of European Heating, Ventilation, and Air Conditioning Association (REHVA)
- The European Association for the Promotion of Cogeneration (COGEN Europe)
- The Energy Materials Industrial Research Initiative (EMIRI )
- Construction Product Europe (CPE) (<http://www.construction-products.eu/>).
- Renewable Heating & Cooling Technology Platform (TPRHC)
- European Alliance to Save Energy (EU-ASE)
- European Partnership for Energy and the Environment (EPEE)
- Euroheat & Power (Association representing the District Heating and Cooling and Combined Heat and Power sector)
- Association of the European Heating Industry (EHI)
- European Insulation Manufacturers Association (Eurima)
- PU Europe, European Polyurethane Insulation Industry
- Eurowindoor
- Eurovent (European Committee of Air Handling & Refrigeration Equipment Manufacturers)
- European Solar Thermal Industry Federation (ESTIF)
- EU PV Technology Platform, Working Group Building Integrated Photovoltaics (BIPV)
- European university association (EUA)
- Joint programming initiative on cultural heritage
- European Building Automation and Controls Association (eu.bac)
- European Builders Confederation (EBC)
- Glass for Europe
- KIC InnoEnergy
- EERA
- European Geothermal Energy Council (EGEC)

---

<sup>5</sup> Not all the consulted stakeholders have participated to the SET Plan Action 5 discussion