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Paper supporting European Copper Institute's response to
Energy efficiency in buildings – consultation on 'renovation wave' initiative

Contents

European Copper Institute (ECI) represents the copper industry. Copper is used extensively in technical building systems for delivering electricity, heating and water services which represent 34% of annual copper use in the EU. ECI makes the below recommendations for accelerating delivery of ambitious clean energy and efficiency objectives, together with employment and growth, through the Renovation Wave. Investment in digitalization, energy efficiency, renewables, energy flexibility, and safety of buildings can help realise the untapped potential of a 5-fold reduction in energy demand from the bulk of the EU building stock. Buildings are an ideal focal point to reinforce a systems approach in the Green Deal.

The Renovation Wave should prioritise sustainable, circular materials, like metals such as copper which is highly recyclable without loss of properties and has well-established recovery chains. Sustainability should be defined in a coherent frame, based on fair and robust assessment methods and indicators.

An ambitious and successful Renovation Wave should be a vital part of post COVID-19 European recovery if decarbonisation objectives are to be achieved

1. Stimulate renovation volume & depth

Building energy management can be improved rapidly across a broad mass of the building stock without disruptive interventions.

Energy Performance Certificates (EPCs) should reflect operational energy consumption and become more informative to empower building owners/occupiers.

A revised EPC based on actual operational energy performance should be used by Member States to drive both the rate and depth of renovation, through the setting of mandatory minimum requirements (making renovation mandatory for buildings below a certain EPC rating).

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Building Renovation Passports (BRPs) have been shown to complement EPCs and increase renovation rates and depth and accelerate energy savings. Member States should be required to include BRPs in their Long-term Renovation Strategies.

A building renovation passport outlines the long-term (15-20y) staged renovation plan for an individual building and is based on an on-site energy audit. BRPs are useful tools to support owners with personalised renovation advice and ensure coordination of works during the different stages of the renovation for all involved parties.

Including mandatory BRPs (potentially as part of EPCs) is a good example of a policy measure Member States can take to encourage staged, deep renovation.

2. Mobilisation of investments

Digitalisation technology allows energy savings to be measurable and bankable but monetisation requires a strong policy framework–targets to create an energy savings market. Credible energy performance of a building translates into property value and can be linked to financial measures to drive life-cycle energy performance.

Renovation financing should be linked to energy performance, and mandatory minimum requirements provide a useful tool to ensure real energy savings are achieved.

Energy Service Companies (ESCOs) can help deliver real energy and cost savings as they are incentivized to provide state-of-the-art solutions to maximise energy savings. Clients avoid upfront capital expenditure and do not need to take on the risk of energy efficiency measures failing to make projected savings.

3. Energy poverty & electrical safety

Safe electrical installations are a prerequisite for a clean and just energy transition and the sustainable energy model focused on electrification. 25 - 30% of EU domestic fires have an electrical source, with dramatic consequences in terms of fatalities, injuries and economic cost to society. Energy poverty is observed as a significant catalyst for electrical safety issues. Domestic building stock renovation must integrate an electrical safety check.

Electrical safety is an essential consideration for any renovation, a fundamental step towards a safe home environment for all European citizens.

Electricity has become the predominant energy source in daily life. Its applications have improved occupants' comfort and safety and multiplied the means of entertaining and communicating. Electricity is at the heart of building systems and cannot be avoided when energy efficiency is evocated.

But it must be recognised, as shown by the recent Forum for European Electrical Domestic Safety (**FEEDS) report**[1], that the safety of older existing electrical installations is a concern in the countries of the European Union, given the low renovation rate of dwellings and the age and condition of their electrical installations. At the same time, the uses of domestic electricity continue to diversify and

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[1] FEEDS (2020) Residential electrical safety. Forum for European Electrical Domestic Safety, Second edition, March 2020. [>>link]

develop and are set to increase with energy efficiency and energy transition measures, posing increasingly important challenges in terms of quality and safety.

The safety deficiencies of old electrical installations are well-established and generally result from the aging of components, the lack of maintenance and inappropriate usage. The dangers they represent are also clearly recognised. The risks of electrification and electrocution are well known and have reduced during the last decades, but **fires from an electrical source** and their consequences are the most worrying today.

Data from several European countries reveal that **electrical fires account at least for 25 - 30% of domestic fires**. The total number of electrical fires in the EU is estimated to be 273,000 per year. Their consequences are dramatic in terms of fatalities, injuries, and the economic cost to society. It has been observed that energy poverty is a significant catalyst for electrical safety issues and requires special attention.

Most electrical fires are preventable. Although Europe and European countries have advanced standards to ensure the safety of domestic electrical installations, their application is generally reserved for new electrical installations. To improve the safety of old electrical installations, among the recognised solutions, periodic inspections informing occupants about the risks of their old electrical installations are key.

European Union countries therefore face a major challenge regarding domestic electrical safety, especially as, in practice, the number of hazardous installations is expected to continue to rise if nothing is done. The renovation wave, and its resulting measures, is an opportunity to address this challenge.

The European Commission has already sent a strong signal to the Member States with its revised Energy Performance of Buildings Directive (July 2018). It advocates the development of national policies for safety inspections and upgrading domestic electrical installations as part of more extensive programs to renovate old buildings. It needs to be strengthened: the renovation of the domestic building stock must integrate an electrical safety check – a proven preventative measure – as a mandatory requirement to increase the fire safety of the growing vulnerable community by ensuring safer electrical installations.

4. Skills & employment

As an example, by incentivising building automation control systems (BACS) deployment, up to 300,000 highly specialized direct jobs will be created in the EU, which will benefit national economies.

Many of those jobs are direct jobs related to the production, distribution, retail, installation, and maintenance of building automation, from which mainly the national economies will benefit. These will accelerate fulfilment of the EU's ambition for the post COVID-19 Green Recovery strategy.

With the growing potential of electrification, installation of on-site renewables, smart system integration and digitalisation, there is a need for an impetus in apprenticeship, up-skilling and reskilling to deliver the Renovation Wave.

5. Smart technologies, cabling, digital & data

Available advanced metering and BACS allow policies to be fully pinned on bridging the energy performance gap (over-estimation of energy savings from design-based calculated promises) to ensure energy savings in buildings are real. Accelerating renovation rates and

operation-based energy performance standards delivers huge energy and CO2 savings, and provides buildings that can evolve with the needs of the energy transition.

Building automation control systems

BACS help close the energy performance gap. Low carbon buildings often do not deliver on their design expectations. Renovation strategies must tackle this performance gap, or the accelerated renovation rates would result in an accelerated locking-in of poor (or at least far from optimal) energy performance. BACS help close this performance gap as they (1) adequately control energy services equipment; (2) extensively and reliably monitor post occupation energy performance; and (3) drive optimal user behaviour.

BACS make energy savings measurable and bankable. To monetise them requires a strong policy framework that creates a market for energy savings.

Proper application of BACS would save between 15-22% of the total energy consumed in buildings (Waide, 2014)[2]. Even more significant are the contributions towards climate change mitigation: with an estimated annual abatement potential of almost 0.5 GtCO2 by 2030, measures to promote savings through BACS are likely to have a similar impact to the EU ETS but to be fully complementary in that they concern a sector outside the scope of the EU ETS. These savings are highly cost-effective, with energy bill savings being 9 times higher than additional investment costs (typically <€30/m² to procure, install and commission building automation for service sector building floor area and, for residential, around €12/m²). The average payback periods (2-5 years) are much shorter than the service life of the technology.

BACS is complementary to deep renovation. Even with tripled annual renovation rates, a carbon-neutral building stock in 2050 is impossible to achieve with building envelope related measures alone (insulation, glazing, ...). Measures that improve the efficiency of operation of building energy services equipment, such as BACS, help bridge this gap and produce quick wins towards the EU objectives. They can be deployed more rapidly across a broader mass of the building stock and because they don't involve such disruptive intervention, are much more acceptable to building owners and occupiers. With a coordinated programme most of the calculated savings could be delivered by 2030.

BACS are the missing link in the successful implementation of nearly zero-energy buildings (nZEB) and the deployment of the European smart grid, as they (1) complement smart meters; (2) facilitate the use of renewable energy sources; and (3) increase the overall grid stability (massive load shifting and storage management capabilities).

The Smart Readiness Indicator (SRI) will make the added value of building smartness more tangible for building users, owners, tenants and smart service providers. An unabated roll-out of the SRI would promote the uptake of smart building technologies in Europe. The Commission should carefully consider its design and establishment in the market to optimally interact and reinforce other regulatory instruments driving the energy renovation of the building stock.

Digitalization of EPC schemes

Digitalization of EPC schemes would make them more dynamic and informative, with more frequent updates based on credible standards with verification, and this will help accelerate renovation.

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[2] WSE (2014). The scope for energy and CO2 savings in the EU through the use of building automation technology. Waide Strategic Efficiency, Second Edition, 13 June 2014. >>link

Digitized EPC data would improve knowledge about the real performance of the building stock for policy making, monitoring and planning energy services.

Heating & cooling

Space heating, still the highest energy demand in buildings, uses predominantly fossil fuels. Market-ready, mature technologies (e.g. heat pumps, in combination with on-site solar thermal or photovoltaic renewables) can complement architectural solutions. Through built-in energy storage and demand response capabilities, they provide wider system benefits for smart integration as well as healthier in- and outdoor air quality and stimulation of local jobs.

In the EU, 31% of the total energy consumed is used for space and water heating. This makes it one of the largest elements of consumption in the European energy system, and 75% of this heat is still generated from fossil fuels[3]. Cooling accounts for a lower share in most countries but it is expected to grow strongly in the future. Without decarbonising heating & cooling, it clearly will be impossible to achieve greenhouse gas reduction targets envisaged by the European Green Deal. Given the scale of the carbon reduction requirement and the speed of change in the heating sector, rapid and transformational change in how heat is used and generated is needed now.

The first step of any heat decarbonisation policy must always be to cost-effectively reduce heat demand. The remaining demand should then be satisfied by energy carriers with low- or, even better, zero-carbon emissions supplied by low-carbon heat technologies. Those technologies should operate flexibly in such a way that is most beneficial for the energy system, integrating local, variable renewable resources such as solar thermal, photovoltaic systems or waste water heat recovery, lowering carbon emissions, and reducing cost for consumers.

Smart heat policy maximises the benefits of heat decarbonisation for the energy system. It encourages flexible operation of highly energy efficient electric heating systems, such as heat pumps, through pricing and smart technology. Time-of-use tariffs or more sophisticated pricing strategies, coupled with thermal storage through efficient buildings and hot water tanks, reduce operational cost of heat pumps and incentivise load shifting.

Whilst heat decarbonisation poses many challenges, it could also offer tremendous opportunities if approached holistically. It can offer significant comfort benefits for households alongside wider socioeconomic benefits, such as the creation of new supply chains, employment, health system savings, improvements in out- and indoor air quality and enhanced energy security. We need integrated policies to exploit those opportunities and capture the many benefits heat decarbonisation can deliver.

Rapid progress can and needs to be made now. Europe can reduce its CO2 emissions by using mature, market-ready technologies which are already existing and in use within the heating and cooling sector today.

Efforts should focus on known and proven options for heat decarbonisation, such as improving building fabric efficiency, phasing out fossil fuel boilers in new installations, converting fossil-fuel-based heating systems to zero-carbon and renewable technologies as well as deploying renewable based district heating in urban areas. Financial support should be linked to minimum mandatory requirements for increased energy performance of buildings.

[3]Profile of heating and cooling demand in 2015, Heat Roadmap Europe, D 3.1 2017. >>link

E-Mobility

Renovation is an opportunity to expand charging infrastructure for e-mobility (conduits for electric cables, simplified permitting) and to leverage the additional storage capacity provided by e-vehicle batteries (smart charging).

Electric vehicles are market ready and will not only dramatically improve CO2 emissions and air quality in cities, but also allow integration of renewable generation, at both utility scale and in buildings, in a cost-efficient way.

However, around half of European cars park on the street[4] and don't always have access to a public charging point. Wider availability of charging points in non-residential buildings (e.g. workplaces, retail and entertainment) will help to alleviate the situation. In some Member States, installing charging points in multi-family residential buildings may be difficult because of the provisions of national regulation. Renovation should also be used to increase the provision of charging points in single-family dwellings to further increase the infrastructure and grid flexibility.

Financial support for renovation should be linked to the requirement to install ducting infrastructure for all parking spaces within the building or physically adjacent to the building. This should not be limited, as currently under the EPBD, by size of renovation and a minimum number of parking spaces, but should apply to all non-residential and residential buildings, including single-family dwellings.

Energy demand for vehicle charging should be met by increased renewable energy provision to reduce demand from conventional generation. At grid scale, with thousands of EVs connected to the grid, this fleet of electric vehicles could balance the variations of a bigger share of renewable generation, taking or injecting electricity when needed.

Economic cable-sizing

At least 10% of electrical energy generated in the EU gets lost before it reaches a final consumer. Of this, 30 TWh/year of electricity losses in buildings could be saved by applying the principle of economic cable sizing, the untapped opportunity confirmed by the Ecodesign Working Plan 2012-2014.

Approximately 10% of the electrical energy generated in the EU gets lost in wires between generation and end-use. From this, 30 TWh of electricity losses in non-residential buildings could be saved by applying the principle of economic cable sizing, consisting of upsizing cable sections to reduce electricity losses, up to an economically optimal point.

This opportunity was confirmed by the Ecodesign Working Plan 2012-2014[5] and further analysed by the corresponding Preparatory Study (2013-2015)[6], as its savings potential is as big as that of many products already subject to Ecodesign regulations. However, it was decided that Ecodesign was not an adequate regulatory tool to deal with it. Therefore, the opportunity remains untapped.

Economic cable sizing is efficient (payback period ranges between three and five years), creates local jobs and improves fire safety in buildings.

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[4] Driving and parking patterns of European car drivers --- a mobility survey, Joint Research Centre of the European Commission, 2012. >>link

[5] Establishment of the Working Plan 2012-2014 under the Ecodesign Directive, European Commission, 7.12.2012 SWD (2012). >>link

[6] Preparatory Studies for Product Group in the Ecodesign Working Plan 2012-2014: Lot 8 - Power Cables Task 1 -7 report, Vito, 2015. >>link

6. Copper and circularity

The Renovation Wave should prioritise sustainable, circular materials, like metals such as copper which is highly recyclable without loss of properties and has well-established recovery chains.

Assessment of sustainability of construction products (under Construction products Regulation BWR#7), should be based on fair and robust methods and indicators, that take recycling and reuse at end-of-life into account.

Circularity in construction could be further improved by introducing reuse and recycling targets for the whole construction and demolition waste flow and its material specific fractions (i.e. metals) in addition to a recovery target. When only recovery targets are set, waste used for backfilling (and not reused or recycled further) can also be taken into account by Member States to reach such targets, missing opportunities like metal scrap that can actually be recycled or reused.

Also, the Renovation Wave must incentivize and create favourable market conditions for by-products from metallurgical processes, like iron silicates and final slags. Facilitating the use of such by-products, which comply with EN standards, in the construction sector will contribute to the reduction of CO2 emissions and to a better use of readily available resources. Such facilitation can occur, among others, through the definition of circularity criteria for public procurement in the construction sector.