



**BUILDINGS
PERFORMANCE INSTITUTE
EUROPE**

COVID-19 RECOVERY: INVESTMENT OPPORTUNITIES IN DEEP RENOVATION IN EUROPE

As Europe is discussing the scale of an unparalleled recovery programme to mitigate the damage of the Covid-19 pandemic, it has become clear that renovation of the European building stock would create a triple benefit. It would lead to an increase in economic activity, retaining and creating employment; it would support the achievement of Europe's climate and energy targets, and it would provide Europeans with better and healthier buildings. The scale of the investment opportunity is enormous, and while large figures for the economic recovery are currently featuring high in the political debate, the question remains what investment is needed to deeply renovate Europe's buildings.

The total amount to trigger a significant scaling up of the renovation rate and depth is adding up to €90 billion per year, allocated to support mostly deep renovation, advisory services for owners/investors and technical assistance in member states, as well as innovation in serial renovation solutions. This funding would support an annual investment in mostly deep renovation of €243 billion in EU-27.

A significant push for serial renovation is necessary to increase speed and depth of renovation while ensuring a sufficient availability of a skilled workforce. Industrial/serial renovation delivers cost-effective net-zero renovation at high quality by making use of prefabricated building modules, innovative financing and business models, and digitalisation across the value chain.

All figures presented in this paper are related to either medium or deep renovation so that renovation efforts are aligned to the requirements of the Paris Agreement. We are assuming that renovations of some building types will only lead to a medium energy saving due to architectural and/or technical constraints. This makes the decarbonisation of heating energy even more important; however, this investment opportunity is not the topic of this paper. Further, we are not making any assumptions whether renovation measures are implemented in a comprehensive way at a single point in time or whether they are realized in a stepwise approach. Our approach assumes a linear investment over time, meaning that the same amount will be invested in each of the coming years. However, reality will likely be different; we consider our approach sufficient to define which share of the European recovery package should be allocated to building renovation in the current decision-making process.

Renovation activities will only see a significant increase if demand for renovations and supply of business offers from the construction industry match. An economic stimulus package should therefore address both. **Our suggestion to allocate a share of the recovery funds to renovation therefore has two pillars: One providing support to owners/investors, and a second providing support to stimulate and scale up serial renovation.**



PILLAR 1: INVESTMENT SUPPORT TO OWNERS/INVESTORS FOR DEEP RENOVATION

What is the investment opportunity for deep renovation in residential and non-residential buildings? Costs for renovation measures vary significantly depending on building type and location. There is no comprehensive European database for

renovation costs, and individual studies have provided different data sets. We have therefore developed a cost index to estimate the investment potential in different regions of the European Union.

DEVELOPING A COST INDEX FOR DEEP RENOVATION

The cost for renovations varies amongst countries and is uncertain, as the market is based on individual offers between supply and demand, although in some countries the pricing is regulated. In general, these offers are not accessible to other potential market participants, preventing transparency and therefore creating variation across prices. As a consequence, it is not possible to gather comparable renovation costs across Europe. To provide a transparent result and account for the different renovation cost in EU countries, a price index was created based on the material cost given in a recent study published by the European Commissionⁱ. The price index takes into account the price difference of building elements such as the windows, facade and roof insulation. The indices for the different building elements were aggregated by geometric mean. In a next step they were aggregated into the regions using the weighted average on the bases of the floor area renovated in the different countries. The resulting index is applied to the assumed renovation costⁱⁱ. Whilst this approach is simple and could be further developed, it is designed to increase transparency about the estimate of the deep renovation investment opportunity.

The table below shows the annual investment opportunity for region and building type, based on the surface area covered by the respective building type. It lists annual investments for medium and deep renovation as well as the total investment costs until 2050 to renovate all buildings, as well as per building category.

The total renovation investment opportunity in EU-27 is estimated at €243 billion per year until 2050. Of this amount, €179 billion/a is required for residential buildings, and €64 billion/a for non-residential buildings renovation.

Regional differences regarding costs can be significant. We have therefore clustered EU member states in regions with similar characteristics.



ⁱ See p 252 in: Ipsos Belgium and Navigant (2019) Comprehensive study of building energy renovation activities and the uptake of nearly zero-energy buildings in the EU Final report. Available at: https://ec.europa.eu/energy/sites/ener/files/documents/1_final_report.pdf

ⁱⁱ Buildings Performance Institute Europe (BPIE) and Kockat, J. (2020) Identification of levers and levels for the building stock - EU H2020 project: European Calculator. Available at: http://www.european-calculator.eu/wp-content/uploads/2020/04/EUCalc_D2.5_Lever-levels-buildings.pdf

How much investment is needed to renovate the European building stock?

	Floor area	Floor area renovated medium	Floor area renovated deep	Cost assumption for medium renovation	Cost assumption for deep renovation	Investment opportunity 2020-2050	Investment opportunity each year
EU-27							
	million m ²	million m ²	million m ²	EUR pro m ²	EUR pro m ²	bn EUR	bn EUR
total	26,196	5,894	13,753	290	405	7,282	243
residential	19,570	4,403	10,274	286	401	5,374	179
non-residential	6,626	1,491	3,479	300	420	1,907	64
West and Northwest							
total	14,523	3,268	7,625	350	490	4,882	163
residential	10,090	2,270	5,297	350	490	3,392	113
non-residential	4,433	997	2,327	350	490	1,490	50
Northeast and Central							
total	3,063	689	1,608	174	243	511	17
residential	1,986	447	1,043	174	243	331	11
non-residential	1,076	242	565	174	243	180	6
South							
total	7,568	1,703	3,973	240	336	1,742	58
residential	6,670	1,501	3,502	240	336	1,536	51
non-residential	898	202	472	240	336	207	7
Southeast							
total	1,042	234	547	146	205	146	5
residential	823	185	432	146	205	116	4
non-residential	218	49	115	146	205	31	1

While this table shows the total investment opportunity, we have to ask the question how much public funding support is needed to trigger these investments. Different financial instruments result in different leverage factors. A careful design of the instrument of choice has a significant impact on uptakeⁱⁱⁱ by its target group. However, a leverage factor of 3 to 4 is a reasonable assumption for the effectiveness of a well-designed financial instrument. Nevertheless, the current economic downturn may have a dampening effect on the leverage factor. In order to reflect the situation in different regions of Europe, we assume variations in leverage resulting in different funds needed to trigger investments in deep renovation.

For West and North West EU-27, we assume a leverage factor of three, i.e. 1 Euro of public funding triggers 3 Euro of investment. To achieve the full investment potential, 25% of the investment opportunity should be provided by public funds as direct grant and other forms of subsidy such as tax reliefs.

For the rest of EU-27, we assume a leverage factor of 1.5, i.e. 1 Euro of public funding triggers 1.5 Euro of investment. To achieve the full investment potential, 40% of the investment opportunity should be provided by public funds as direct grant and other forms of subsidy such as tax reliefs.

With these assumptions and allocated proportionally to the surface area of residential and non-residential buildings, the total support per year should be €41 billion for West and North West Europe (55% of floor space), €6.8 billion for Northeast and Central Europe (12% of floor space), € 23.2 billion for Southern

Europe (29% of floor space), and €2 billion for South East Europe (4% of floor space).

The total annual amount of direct financial support to owners and investors triggering a comprehensive renovation of buildings in Europe as allocated in the recovery programme would be €73 billion.

In addition, advisory services for appropriate renovation measures should be increased significantly, so that investment decisions avoid lock-in effects and contribute to a full decarbonisation of the building stock. This includes the establishment of one-stop shops, the roll out of the Building Renovation Passport and respective awareness campaigns. In a recent study for the European Commission^{iv}, BPIE estimated the required funding to support a broad uptake of Building Renovation Passport by member states at €1.3 billion/a.

Further, technical assistance for member states should be increased so that national authorities are enabled to establish measures and support programmes to deliver the renovation programmes. Existing programmes by the EIB have had a positive impact in member states and should be scaled up. It would be appropriate to spend at least €1/m² of floor space to be renovated for technical assistance in member states, requiring a total of €26 billion to cover the full European building stock. We recommend spending 50% of this funding in the first decade to kick-start the process. This means that an additional €1.3 billion/a in this decade is needed.



PILLAR 2: THE PROMOTION OF INDUSTRIAL RENOVATION AS AN IMPORTANT PILLAR OF A GREEN STIMULUS PACKAGE

Increasing deep renovation cannot be achieved with small scale individual renovation projects but needs to be supported by large scale and serial renovation projects which are executed on industrial scale. Industrialised renovation using prefabricated building components has been implemented in pilot and

research projects across Europe for over 7 years.^v Solutions like the Energiesprong business model demonstrate a promising way to accelerate deep building renovation to a net zero level and boost a much-needed innovation in the construction sector. The approach offers multiple benefits:

- ⇒ *Accelerate the decarbonisation of the built environment through the development of standardised solutions*
- ⇒ *Reduce time used on the construction site*
- ⇒ *Better quality renovations through long-term performance guarantee and monitoring*
- ⇒ *Alleviate shortage of skilled workers*
- ⇒ *Enable innovative business models and thus open up new business areas*
- ⇒ *Innovate the construction industry - test new technologies and bring them to market maturity*
- ⇒ *Make renovation projects more attractive than new construction activities*

ⁱⁱⁱ For a recent overview of European funding schemes for renovation see Economidou, M. et al (2019): Accelerating energy renovation investments in buildings, [JRC Science for Policy Report](#)

^{iv} European Commission (2019): [EPBD19a Feasibility study: Deliverable 6.2](#)

^v For an overview see BPIE (2019): [Innovation Briefing](#) - Deep Renovation Using Prefabricated Components.

High costs are the main barrier for the development of a mass market for serial renovation

Industrial renovation is characterised by the prefabrication of building modules (e.g. facades, energy modules), innovative process optimisation, and digitalised planning and monitoring. Though costs for the net zero renovation solution have dropped significantly after the first pilots in the Netherlands, rising construction costs in most countries slowed down the expected price falls of prefabricated components.

On average, industrial renovation projects achieve costs of ~ €1000/m² which is foreseen to fall to €500-550/m² in a mature market. Especially costs for the production of facades have not decreased as planned, as production capacities are still too small and lack highly industrial production capacities. Costs currently fall only due to process optimisation and decreasing costs for energy system modules (PV systems, heat pumps).

Typical building types for a large-scale industrialised renovation are terraced houses and small multi-family buildings built between 1950 – 1970 with a simple building structure. In EU-27,

around 1.3 billion m² of residential building space fall into this category. A deep and industrialised renovation of 75% of the floor space in these buildings would result in a market volume of €1,150 billion (i.e. € 1.15 trillion) calculating with an average of with an average of 900€/m² for a net zero renovation reflecting the latest cost estimations.

A European innovation fund could stimulate a cost decrease and the development of industrial scale renovation by providing funds to de-risk and encourage process and product innovations for the construction industry. Calculating with 30% support of the investment volume, such an innovation fund should have a budget of €69 billion to start a market of industrialised renovation and simultaneously boost a green recovery. At this stage, it is important to scale up production capacities to support the uptake of an industrial renovation market to deliver deep renovation at large industrial scale. We suggest maintaining this fund for a period of five years, requiring an amount of €13.8 billion/a.

An opportunity to strengthen circular building principles

The production of building components for serial renovation should integrate a lifecycle perspective and circularity. The launch of an industrialised mass-market is an opportunity to integrate circular economy principles into the renovation of existing buildings.

Conclusion

Stimulating deep energy renovation of Europe's buildings with the Recovery Package provides a unique opportunity to create a new economic dynamic while benefitting European citizens and the climate at the same time. An amount of €73 billion/a should be allocated in support of building renovation, with an additional amount of €2.6 billion/a for advisory services and technical assistance in member states.

Targeting the construction sector, an additional €13.8 billion/a should be provided in an innovation fund to scale up serial renovation of buildings on an industrial scale. In total, the recovery package to stimulate a wide-spread deep renovation of European buildings would come to a total of €90 billion per year.



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The Buildings Performance Institute Europe is a European not-for-profit think-tank with a focus on independent analysis and knowledge dissemination, supporting evidence-based policy making in the field of energy performance in buildings. It delivers policy analysis, policy advice and implementation support.

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