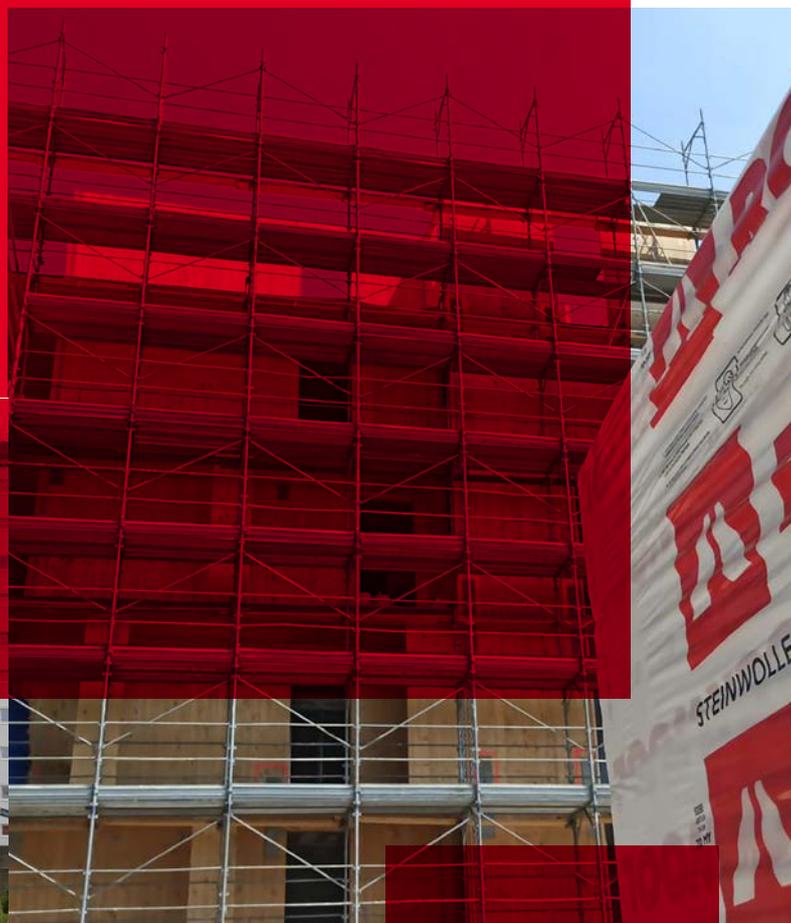


Why renovation makes economic sense

From pricing a typical renovation to exploring available grants, we break down the costs – and savings – involved in renovation.



ROCKWOOL®

Renovation – the business case study

The reasons to renovate are many and far-reaching – from leaving a legacy for future generations and improving our health, to mitigating climate change and regenerating our economy.

Renovation is hitting the headlines once again, as the EU is promoting energy efficiency renovations for Europe's building stock as one of the best ways to help our economies recover after COVID-19. The ambitious goal is to achieve the greatest economic benefit and the greenest climate impact in the shortest possible timeframe. All while simultaneously improving our health and comfort – what's not to like?

Whether you're a homeowner or a professional, there's a lot to gain from this report:

Tap in to EU incentives

Learn more about the subsidies available from the EU – and find out why now is the perfect time to renovate.

Make energy efficiency renovations work for you

Get an overview of the actions you can take to make the biggest difference to your home.

Save big!

Explore the savings to be made through renovation – as well as the initial costs involved.

Get inspired

Learn about the Italian superbonus scheme – and discover how an energy efficiency renovation transformed the lives of residents living in a UK social housing scheme.



EU incentives to renovate

In May 2020, the Commission proposed a long-term EU budget boosted by Next Generation EU¹. Promoted as a temporary emergency recovery plan, the goal of Next Generation EU is to help repair the economic and social damage created by COVID-19 and prepare for a better future. Two months later, the EU leaders agreed on a record-high €1.82 trillion long-term budget, deciding – for the first time ever – to borrow capital market funds to finance the recovery².

The size of the Next Generation budget remained significant in the final plan – the Commission initially proposed a €560 billion recovery facility, with €310 billion in grants and the rest in loans and the European Council increased it to €672.5 billion, with €360 billion in grants and €312.5 billion in loans.

Just Transition Fund³ – a surprising cutback?

As one of the key funds behind the Just Transition Mechanism (JTM), it was a surprise to many in July when the European Council reduced it to €10 billion compared to the Commission's proposed €40 billion. It seems like a severe cutback – but it should be remembered that when the JTF was first suggested in autumn 2019, it was expected to have a budget of €7.5 billion.

The JTM is a tool to ensure that the transition towards a climate-neutral economy occurs in a fair way. This involves using at least €100 billion to help those relying on the fossil fuel value chain through the transition. To benefit from the funding, the Member States need to identify the eligible territories and commit to match each euro with money from the European Regional Development Fund and the European Social Fund Plus, to mobilise even more investments. The JTF will primarily provide grants to regions, supporting workers to develop new skills and to help start-ups to create new opportunities. It will also support investments in the clean energy transition, for example in energy efficiency.

¹ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_940

² <https://www.consilium.europa.eu/media/45109/210720-euco-final-conclusions-en.pdf>

³ https://ec.europa.eu/regional_policy/en/newsroom/news/2020/01/14-01-2020-financing-the-green-transition-the-european-green-deal-investment-plan-and-just-transition-mechanism

€550

**billion must be spent
on climate action**

30 percent of the total budget needs to be spent on climate-related investments, which includes renovation – and this is an increase from the Commission’s May proposal of 25 percent. The result is that almost €550 billion in total must be spent on climate action, and it is this funding that schemes from different countries are tapping in to.

Think about it: renovating to help local economies recover makes sense. Compared to other EU industries, construction is labour-intensive and locally-based. Around 95 percent of construction companies employ ten or fewer people, and craftsmen generate two-thirds of their revenue locally, within a 50-km radius of their business⁴. So your home improvement project boosts an industry in need – and instantly supports craftsmen in the local community.

Why renovate?

As buildings are Europe’s single largest energy consumer, accounting for close to 40 percent of total primary energy demand and greenhouse gas emissions, it’s good news that insulation can help reduce a building’s heating needs by up to 70 percent⁵. Living in an energy efficient building has many benefits: lower energy costs, greater comfort at home, a more valuable property, and less emissions. We spend roughly 90 percent of our lives indoors. It’s our right to live, learn, work and recover in buildings that are comfortable and safe.



⁴ Source: European Commission (2016)

⁵ Sources: EU Commission (2016): Heating and cooling strategy

Renovating a multi-unit house

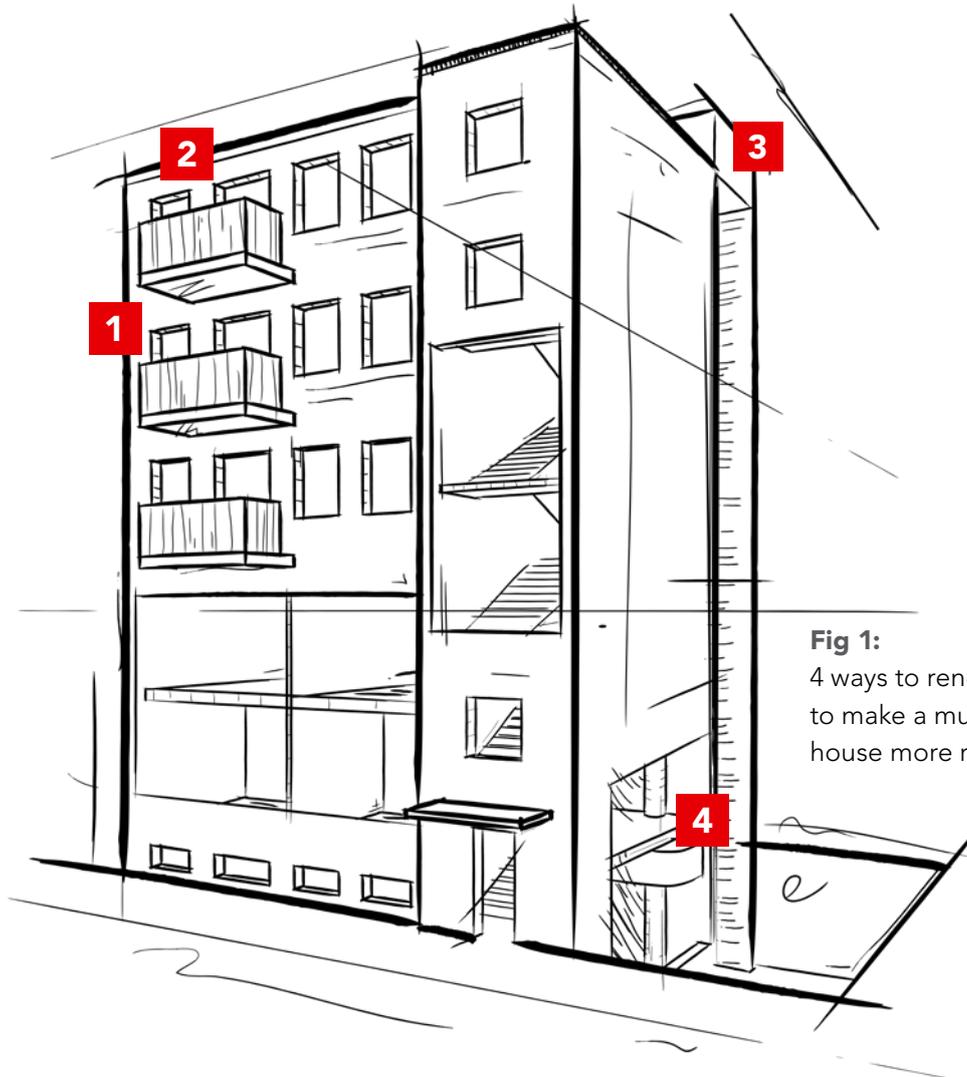


Fig 1:
4 ways to renovate
to make a multi-unit
house more resilient

1 Façade

External wall insulation systems with render or cladding materials improve thermal performance, fire safety, and building acoustics, without using valuable space from the interior.

2 Roof

Most energy loss occurs through the roof. Stone wool insulation keeps this loss to a minimum, and also improves summer comfort by keeping warm, external air out and keeping cool air in.

3 Flexible systems

It's possible to integrate insulation products below solar and photovoltaic systems to help minimise the heat loss, improve efficiency energy and increase safety through added fire protection.

4 Above cellar/carpark considerations

When built above a cellar or carpark, insulating the lower surface – or intrados – of the ground floor can reduce the use of energy and ensure a pleasant floor temperature.

Renovating a single family home

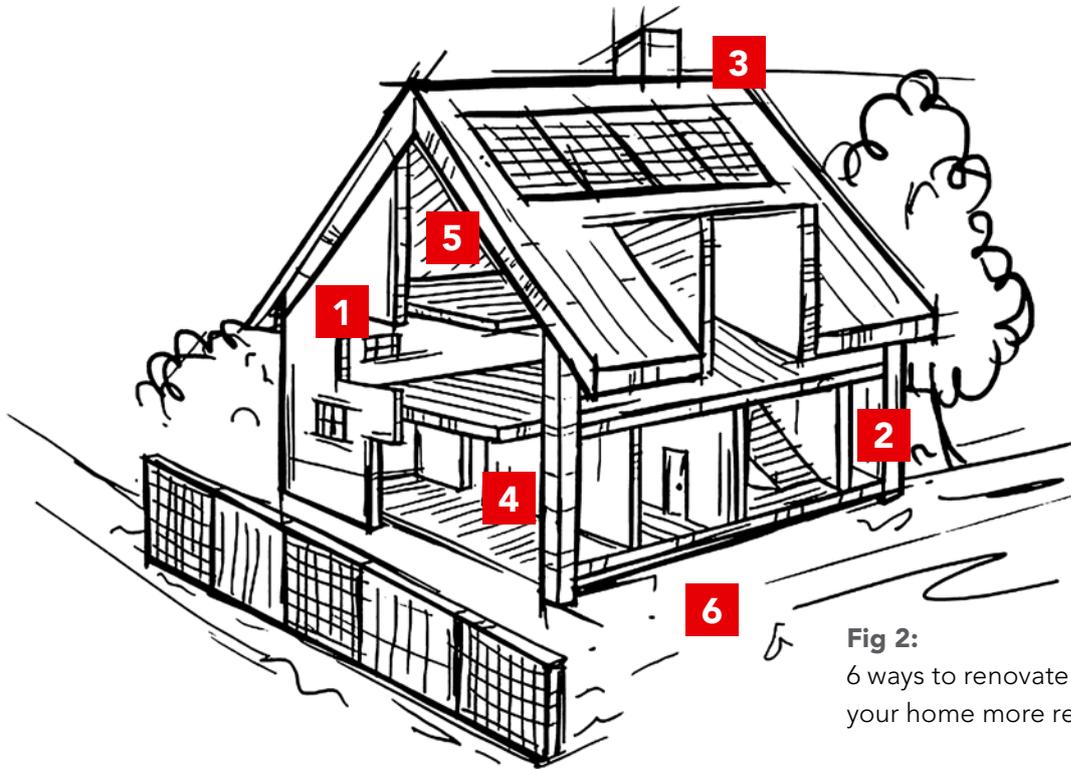


Fig 2:
6 ways to renovate to make your home more resilient

1 Façade

External wall insulation systems with render or cladding materials improve thermal performance, fire safety, and building acoustics, without using valuable space from the interior.

2 Exterior walls

If you want to maintain the existing appearance of the building, e.g. bricks or old stone walls, but you want to keep the house warm in winter or cool in summer, reduce energy usage and limit unwanted noise, it's also possible to insulate from the inside.

3 Pitched roof

A large part of a building's energy loss is through the roof. So it's the first place you should seek to insulate to maximise the energy efficiency of your home and reduce your reliance on the grid. A well-insulated roof can significantly cut heat loss, meaning your house will stay warm for longer, even in the face of a heating outage. By using a fire-resilient material such as stone wool to insulate your roof, the fire safety of your home also improves greatly.

4 Interior walls

The insulation of interior walls, floors, and ceilings can improve comfort and reduce unwanted noise in the home. In the case of fire, it contains fires to the room in which they started, both keeping residents safe and limiting damages to your home.

5 Loft

Warm summers can make a poorly insulated loft unbearably hot – and cold winters make it expensive to heat. The high density of stone wool makes it an efficient material for creating a comfortable indoor climate all year round, reducing noise and helping you save money on your energy bill.

6 Basement

Insulation of the basement can reduce energy use, ensure a comfortable temperature and protect from damp. Should your basement get flooded, stone wool will not retain water after draining, limiting the potential for mould.

Saving money through renovation

Many of the renovation incentives promote energy efficiency solutions, as it is these that offer the greatest benefits to the homeowners and to society at large. Using stone wool to improve thermal insulation helps reduce energy costs, increase the fire resilience of structures, and limit noise pollution from internal and external sources – and makes your home more resilient while dealing with chronic stresses or acute shocks. It helps save natural resources and reduce the burden on public infrastructure, like electricity and district heating systems.

1 Energy savings

Improved insulation reduces your energy bills, makes your house safer, and helps save on maintenance costs. In the EU, 64 percent of energy bills go towards heating⁶. Using modern insulation, such as stone wool, can help reduce your heating costs by as much as 70 percent. Starting a renovation project can help save a lot of money in the long-term as, for the average home in the United Kingdom, this equates to a yearly saving of £400.

2 A great investment

Investing in energy efficiency renovations ultimately reduces energy use, making it a very tempting investment. A €10,000 investment in renovation yields energy savings of €1,8 - €5,6 per m²/year, and this goes directly to the homeowners, depending on the depth of renovation. Based on a renovation of medium depth, the internal rate of return (IRR) over 30 years is 5-6%⁷ – and this is enticing for both homeowners and institutional investors. On average, investment in building renovation delivers more than two-fold return in energy cost savings over the lifetime of the investment.

The investment case of renovation depending on the renovation depth and government's repayment bonus				
	Energy cost savings per 10.000€ investment (€/m ²)	IRR (with 0% repayment bonus)	IRR (with 10% repayment bonus)	IRR (with 20% repayment bonus)
Deep	5,6	~6%	~7%	~9%
Medium	4,2	~3%	~5%	~6%
Light	1,8	~-2%	~-2%	~-1%

Fig 3: Investment in renovation provides a 5-6 percent IRR for the household⁸

⁶ https://ec.europa.eu/eurostat/statistics-explained/index.php/Energy_consumption_in_households

⁷ The renovation depth logic is based on primary energy savings, considering 3-30% as light renovation, 30-60% as medium renovation and >60% as deep renovation. The yearly energy savings discounted for 30 years, assuming an average energy price of €0.15. Source: European commission (2019)

⁸ Source: European commission (2019)

Relation between house price and energy label (compared to G level)



Source: Copenhagen Economics (2015)

Fig 4: The relationship between house prices and their energy label

3 Increasing the value of your property

Many homeowners wonder if investment in an energy renovation project translates into a higher sales price. In many countries, the energy efficiency of buildings is rated on a label scale, easily letting potential buyers know what energy expenses to expect in a particular house. Copenhagen Economics analysed to what degree better energy efficiency ratings impact the house price, and found that for each step-wise increase on the energy label scale, the house price increases by EUR 5,600-8,100 for an average house of 100 m². This result is based on an extensive econometric analysis using more than 365,000 observations on house sales in Denmark. The energy label rates houses from A to G, with A being the highest standard and G being the lowest standard. This result proved robust to different modelling choices, and the estimation takes into account the houses different qualities and location.

4 Better health, less medical expenses

COVID-19 has turned our focus firmly to health – and it's of little surprise that a comfortable living environment is essential for both human health and childhood development. With many forced to spend extended periods of time at home, it's clear that your home should be comfortable enough to support you and your family. Considering factors like temperature, noise, and humidity can help you find the necessary solutions to improve comfort within your house. Noise pollution and higher humidity in homes can lead to adverse health effects. Specifically, noise pollution can increase the risk of heart problems, aggravate stress, reduce focus and mental performance in children and teenagers, and cause loss of sleep. Reducing the effects of noise pollution requires acoustic insulation that helps absorb noise from external sources and the indoor environment. According to the European Environmental Agency (EEA), roughly 10,000 premature deaths occur every year due to the adverse health effects of noise pollution⁹. A humid indoor environment also causes issues, providing the ideal conditions for mould to grow and spread, which can lead to asthma and other respiratory problems¹⁰.

⁹ <https://www.eea.europa.eu/themes/human/noise/noise-2>

¹⁰ <https://www.rockwoolgroup.com/our-thinking/indoor-comfort-health-and-safety/indoor-climate/indoor-humidity/>

How much does a typical renovation cost?

Considering the cost savings discussed above, a typical renovation probably does not cost as much as you first would believe. The example below breaks down the costs involved in a deep renovation of a 150 m² house.

Example house of 150 m²

	Assumptions	Cost (€)
Painting	3-5 €/m ² x 500m ²	2,000
Roof²	Trusses with braising	3,000
Windows	~500 € x 10 windows	5,000
Doors	1,000 € x 2 doors	2,000
Insulation	50-100 €/m ² x 125 m ²	9,000
Installation	55% of material cost and installation	26,000
Project management	15% markup	7,000
Permit		1,000
Total cost		55,000
		~370€/m ²



1. EU27 average personnel cost per construction worker and architect/civil engineer

2. EU27 average personnel cost per wholesale

Note: 2017 figures extrapolated to 2019 with inflation rates

Source: Eurostat (2017); homebuilding; BCG analysis



Classifying the depth of your renovation

In 2011, the BPIE created the following definitions of renovation levels, and estimated the share of market within each level and the approximate cost involved.

Minor renovations – accounting for 85 percent of the market. These smaller renovations implement one or two measures, e.g. a new boiler, resulting in a reduction in energy consumption of between 0 percent and 30 percent. The average cost of such minor renovations is €60/m².

Moderate renovations – accounting for 10 percent. These renovations involve three to five improvements, such as the installation of modern insulation within the home and a new boiler, resulting in energy reductions in the range of 30 percent - 60 percent. The average cost is €140/m².

Extensive renovations – accounting for 5 percent. These larger renovations are viewed as a package of measures that work together to reduce energy consumption by 60 percent – 90 percent. The average cost is €330/m².

Almost Zero-Energy Building renovations – accounting for a tiny percentage of the market. These renovations involve the replacement or upgrade of all elements that influence energy use, coupled with the installation of renewable energy technologies to reduce energy consumption and carbon emission levels to close to zero. The average cost is €580/m².

By reviewing the market share each level represents, it's clear to see that there are many opportunities to improve energy efficiency when renovating buildings – opportunities that are not yet made use of.



Looking to Italy for inspiration: 110 percent grant for renovation

In Italy, the 110 percent 'superbonus' was announced on May 26, 2020. The scheme is Italy's way to encourage families to upgrade their own living conditions – and in turn, make use of the EU incentives. To qualify for this exceptional bonus, the renovation must improve the energy efficiency of the building – securing a jump of at least two energy classes – and increase the building's resilience to earthquakes.

The scheme in Italy aims to:

1. Increase the energy efficiency of buildings
2. Make buildings more resilient to earthquakes
3. Install more solar-powered systems

To make it crystal clear, ROCKWOOL Italy shared some real results from energy efficiency simulations based on a variety of buildings that represented typical residential scenarios.

The multi-unit building case

The simulations took place in a total of 12 buildings, with each building originally rated as energy class F or G. The buildings hosted between six to 84 apartments. In each case, the simulation took into account:

1. The condition of the building before the renovation
2. The renovation that took place, such as envelope insulation, replacement of windows or the replacement of the heating system
3. The average results obtained, both the energy saving and energy rating jump

Characteristics of the buildings before renovation:

- **Insulation:** non-insulated brick walls (thermal transmittance between 1.5 and 0.8 W / m²K), non-insulated floors and roofs
- **Doors and windows:** medium level windows (thermal transmittance U_w between 3.5 and 3 W / m²K)
- **Systems:** central heating and hot water



Renovation	Results
Insulation of the building envelope	
<ul style="list-style-type: none">■ 1 wall thermal transmittance: $U = 0.18 \text{ W / m}^2\text{K}$■ Thermal transmittance cover: $U = 0.16 \text{ W / m}^2\text{K}$■ Optimisation of thermal bridges■ Renovation area: > 40%	<ul style="list-style-type: none">■ Energy savings: 57%■ Average energy class jump: 2.1
Insulation and windows upgrades	
<ul style="list-style-type: none">■ Thermal transmittance of windows: $U_w = 1.3 \text{ W / m}^2\text{K} + \text{Solar factor } g_{gl} = 0.6$	<ul style="list-style-type: none">■ Energy savings: 66%■ Average energy class jump: 3.1
Insulation, windows and heating/cooling system	
<ul style="list-style-type: none">■ Condensing boiler	<ul style="list-style-type: none">■ Energy saving: 74%■ Average energy class jump: 4

The data is sourced from the study carried out by ANIT (National Association for Thermal and Acoustic Insulation).

The single-family home case

The simulations focused on single-family bungalows with attics and without underfloor heating, rated in energy classes G and F. In each case, the simulation took into account:

1. The condition of the building before the renovation
2. The renovations carried out
3. The average results, both the energy saving and energy rating jump

Characteristics of the single-family homes before renovation:

- **Insulation:** 35cm non-insulated brick walls (thermal transmittance $U = 0.87 \text{ W / m}^2\text{K}$), non-insulated masonry floors (thermal transmittance $U = 1.32 \text{ W / m}^2\text{K}$)
- **Windows and doors:** double-glazed windows (thermal transmittance $U_w = 3.12 \text{ W / m}^2\text{K}$)
- **Systems:** heating and hot water production by gas generator, with traditional combined / optional boiler split for cooling.

51%

energy savings by insulating the building envelope

Renovation	Results
Insulation of the building envelope	
<ul style="list-style-type: none">■ 1 wall thermal transmittance: $U = 0.22 \text{ W / m}^2\text{K}$■ Attic thermal transmittance: $U = 0.22 \text{ W / m}^2\text{K}$■ Optimisation of thermal bridges■ Renovation area: > 37%	<ul style="list-style-type: none">■ Energy savings: 51%■ Average energy class jump: 2
Insulation and heating systems	
<ul style="list-style-type: none">■ Condensing boiler	<ul style="list-style-type: none">■ Energy savings: 69.3%■ Average energy class jump: 3
Insulation, heat pump and solar panels	
<ul style="list-style-type: none">■ Heat pump■ Photovoltaic system	<ul style="list-style-type: none">■ Average energy class jump: >4

The data is sourced from the study carried out by ANIT (National Association for Thermal and Acoustic Insulation).

The results are impressive – but perhaps most noteworthy is the fact that insulating the building envelope alone has such a significant impact. In both the multi-unit and single homes cases, the buildings jumped two energy classes – and a better energy class means an instant increase in the value of the space. With energy savings of 57 percent for the multi-unit building and 51 percent for the single-family home, it's not difficult to understand that a one-time expense is repaid through instant and substantial energy savings.

Case study:

Wilmcote House – Portsmouth, UK

An energy innovation to help fight fuel poverty

Energy renovation aims to make comfortable living affordable for social housing residents

Portsmouth's 100-home Wilmcote House development was built at a time when energy performance was less of a priority than it is today. Constructed in 1968 from prefabricated concrete panels that had just 25mm of insulation, it also featured electric heating that makes it very costly for residents to stay warm indoors. As a result, many residents are unable to afford to heat their homes adequately. This is a serious issue in Europe, where 10.8 percent of the population cannot afford to keep their homes warm. Countries with the most energy poverty have higher winter mortality rates, in both warm and cold climates. In Europe, over 80 million people live in damp homes, which can cause respiratory illnesses.

At Wilmcote House, although residents liked their flats and their location, poor energy performance was a major issue. It led to high heating bills and mould, damp and condensation which can adversely affect health. Recognising that poor insulation was the main problem, the City Council embarked on a major energy efficiency upgrade aimed at meeting

the EnerPHit standard, which for renovations is the equivalent of the Passive House low-energy building standard. The aim was to reduce heating demand by 90 percent and extend the building's life by 30 years.

"Most of the residents are suffering from serious fuel poverty," says James Traynor of ECD Architects. "This insulation will make an appreciable difference to this issue. Significantly reducing heat loss through the thermal envelope by insulating the building wall alongside other works will help the project meet the EnerPHit standards."

The "deep retrofit" project involved different insulation measures, with ROCKWOOL REDArt® providing external wall insulation, Rockpanel® used for cladding and a selection of our fire protection products included for fire safety. The result will not only help take residents out of fuel poverty – it will also make Wilmcote House a more pleasant place to live. As James Traynor of lead designers ECD Architects says: "The project will improve conditions within all properties, making them feel much warmer and substantially reducing fuel bills."





The time for renovation in Europe is NOW!

Considering the current EU subsidies available, coupled with the fact that renovation is the most effective way to upgrade our living conditions and meet our climate goals, it's the right time to act and start future proofing our homes.

Within the EU, 35 percent of the buildings are over 50 years old¹¹. This indicates that the renovation potential of buildings in the EU is vast – up to 110 million buildings could be in need of renovation¹².

In short, renovation is an excellent way to improve our homes, to build a more resilient and healthier society, all while achieving climate goals and

boosting the local economy. Renovating with stone wool from ROCKWOOL brings even more benefits: greater fire resilience, soundproofing, resistance to damp, and it is more durable and completely recyclable. ROCKWOOL insulation is the sustainable way to make an impact on the challenges of climate change, urbanisation, improving people's health and quality of life, and resource scarcity.

¹¹ <https://ec.europa.eu/energy/en/topics/energy-efficiency/buildings>

¹² Loebel, O., 2016. Opportunities and Challenges in Existing Buildings, the Renovate Europe Campaign, Advancements for Metal Buildings Congress, Ljubljana 22nd October 2016.

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