

# Putting renovation on the agenda

Global perspectives on the value of renovation



In cooperation with:

Copenhagen  
Economics



# Foreword

The global challenge to accelerate the transition to a better, more inclusive, sustainable economy has never been more important. Cities, with their high concentration of people, economic activity and infrastructure, offer a unique opportunity to tackle climate change.

Today, 3.9 billion people live in cities and, according to the United Nations World Urbanization Prospects, the urban population is expected to grow by another 2.5 billion by 2050. However, these densely populated and built up areas are not realising their full potential to drive sustainable development and prosperity.

Across the planet more than 28% of greenhouse gas emissions derive from energy use in buildings. This number is destined to increase by 50% by 2050 if no actions are taken. Reaching the Paris climate goals requires urgent action to avoid further lock in to inefficient and climate vulnerable buildings and homes. This will require upscaled investment in the renovation of the existing building stock.

Retrofitting and improving the energy efficiency of buildings is not only the most significant and cost-effective investment cities can make to reduce their impact on the climate, it is also the backbone of a future prosperous society. We spend roughly 90% of our lives indoors, making this a matter of people's right to live, learn, work, and recover in buildings that are comfortable and in which they feel safe.

Investing in more energy efficient buildings is a win-win-win decision - it is one of the rare areas where the multiple-benefits far outweigh the investments. In this brief, we have highlighted the many reasons why the world should accelerate actions to improve our buildings. Governments and cities have a key role to play as they have the power and strength to make changes happen.

The purpose of this report is to provide valuable insights for future choices. At ROCKWOOL, we've been applying the 7 strengths of stone to the world's biggest challenges for decades. Our expertise is perfectly suited to tackle many of today's biggest sustainability and development challenges from energy consumption and noise pollution, to fire resilience, water scarcity and flooding. Our range of products answer the diverse needs of the renovation challenge.

By wisely renovating our buildings we can help shape a better tomorrow for our families, our cities and the world.

**Mirella Vitale**  
SENIOR VICE PRESIDENT, ROCKWOOL GROUP





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# Executive summary

Renovating buildings is one of the least expensive ways to address climate change, and an area where the potential energy savings are among the largest. Energy renovation has a strong business case.

Many of the measures are so cheap that over their lifetime, the cost savings on energy usage surpass the investment costs. In times of economic downturn, building renovation can be a positive economic boost as it contributes to economic growth and employment.

Buildings affect many important aspects of human existence. We spend roughly 90% of our lives indoors so the quality of the buildings contributes significantly to our health, our wellbeing and our productivity - at work and at home. On a bigger scale, renovating buildings can also alleviate energy poverty and the associated health impacts from living in low quality buildings. Today, 15% of people in developed countries are subject to energy poverty.

The quality and appearance of buildings also has a significant socio-economic impact. Improving the quality of buildings improves the quality of cities, which leads to greater social mobility, diminished crime and a better quality of life for residents. Furthermore, building renovation projects provide new local jobs as well as opportunities for residents to engage more actively in their communities.

Today, there are a wide range of technical solutions available and extensive experience in global projects to learn from. The crucial question is: How do we scale global renovation activities to match the urgency of our fight against climate change without compromising on quality?

Regarding climate change, 70% of cities are already dealing with its effects; and cities along with governments are the key players in leading the transformation of the building stock. Indeed, the individual and collective choices made by cities when addressing the issue of climate change set the agenda for communities and governments everywhere. In this process, it is important for policy makers to:

- Take significant and effective action by massive capacity building (information, training, education, facilitation), removing undesirable regulatory barriers, and improving access to financing;
- Ensure a long-term commitment regarding ambitions and policies and;
- Lead by example – large scale public ownership provides room for achieving economies of scale and testing new business models.



# 1

# Building renovation delivers significant value across several dimensions

Buildings are affected by several global mega trends, which demand our action to reduce energy consumption. This report highlights how renovating buildings to make them more energy efficient, more

resilient to climate change, and with a better indoor environment has a very wide range of benefits for individuals and for society (see Figure 1).

**FIGURE 1**  
**Building renovation delivers significant value across several dimensions**

<b>1</b> Economic	Combatting climate change
	Increasing resilience
	Reducing energy bills
	Supporting employment
<b>2</b> Health and productivity	Improving indoor comfort, well-being and productivity
	Lowering outdoor air pollution
<b>3</b> Social	Creating attractive cities with social responsibility
	Alleviating energy poverty

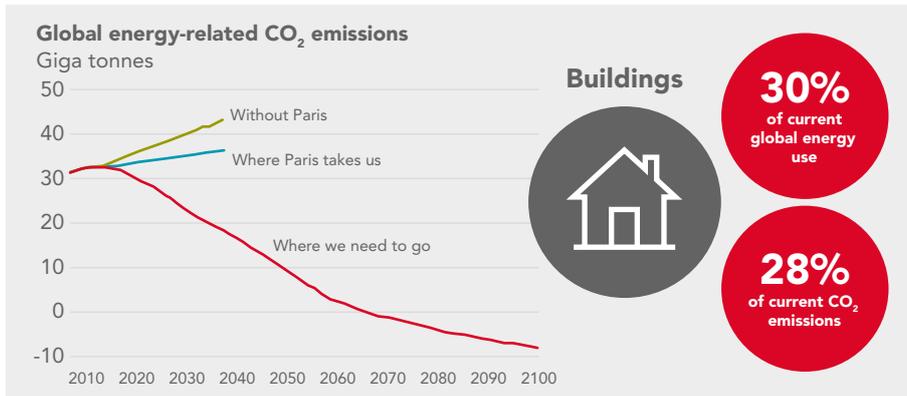
## 1.1 A solid business case

### Renovation is among the cheapest solutions to fight climate change

Reaching the well-below 2 degrees target decided by the Paris agreement calls for a massive change as fast as possible. Global energy-related CO<sub>2</sub> emissions are increasing as the larger and wealthier populations continuously demand more energy to live decent lives. From today to 2100, the world population is predicted to grow to 10 billion and the average income

per capita will quadruple. All of this will increase the global primary energy usage from 13 to 33 billion tonnes of oil equivalents.<sup>1</sup> This calls for a rapid transition towards renewable energy and a much faster implementation of already proven viable energy efficiency measures. Currently, the national actions the world's countries have committed to in the Paris agreement are not sufficient to reach the target (see Figure 2).

Figure 2  
Climate change demands our action now



**Note:** "Without Paris" is IEA's Current Policies Scenario, "Where Paris takes us" is IEA's New Policies Scenario and "Where we need to go" is an average of a range of scenarios in the AR5 database that is consistent with the 2 degree target.  
**Source:** UN and IEA (2017), IEA (2017) and Copenhagen Economics (2017).

Energy efficiency in buildings is a very cost-effective way to reduce CO<sub>2</sub> emissions and should therefore be at the forefront of nations' climate strategies. A large body of evidence shows that energy efficiency is very cost effective and that the monetised co-benefits of energy efficiency in buildings can even be higher than the required investments. The International Renewable Energy Agency shows that the average abatement cost of reducing CO<sub>2</sub> emissions through energy efficiency is less than half that of doing so through renewable energy – even with the impressive

rate of improvement in the cost of renewables seen in recent years.<sup>2</sup> In buildings, there is a very large, economically viable energy efficiency potential that remains untapped. The International Energy Agency estimates that currently only 20% of this potential is exploited.<sup>3</sup>

The renovation of existing buildings is crucial to combat climate change. Today, energy used in buildings accounts for 30% of final energy demand and 28% of CO<sub>2</sub> emissions.<sup>4</sup> The global building floor area is expected to double by 2050.<sup>5</sup> Buildings have very long lifespans.

<sup>1</sup> Based on median values of baseline scenarios in the AR5 database (PBL Netherlands Environmental Assessment Agency). / <sup>2</sup> IRENA (2017). / <sup>3</sup> IEA (2012).  
<sup>4</sup> UN and IEA (2017). As a point of comparison, industry accounts for 37% of global final energy demand and transport accounts for 28%. / <sup>5</sup> UN and IEA (2017).

Estimates suggest that more than half of existing buildings (globally) are expected to still be in use by 2050 (75-90% in OECD countries), highlighting the importance of ensuring high quality renovations to a greater extent.<sup>6</sup> The speed at which existing buildings are renovated to consume less energy is a decisive factor. To limit the global temperature increase to “well-below 2 degrees”, the entire existing building stock must be renovated by 2050 to become low-energy buildings.<sup>7</sup> The EU Commission, in their heating and cooling strategy, estimate that proper insulation can reduce heating needs by up to 70%.<sup>8</sup>

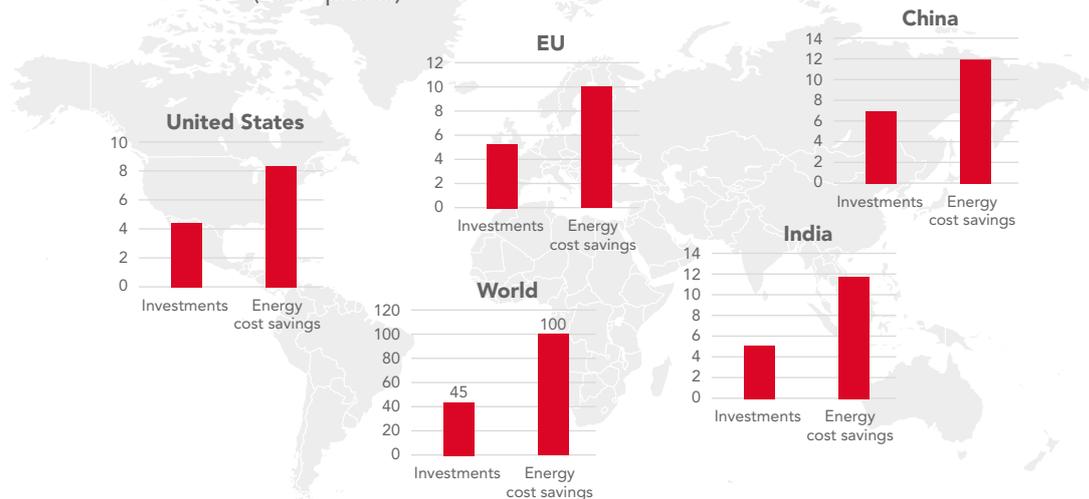
**Renovation increases cities’ resilience to climate change**

Rising global temperatures mean more frequent and more extreme weather events – from extreme warmth to extreme cold, to wildfires, heavy rain and flooding. As more and more people work and live in dense city areas, critical infrastructure faces

an increasing risk of damage. If an earthquake or a fire strikes in a densely populated city, the consequences can be very serious. Currently, 70% of cities are dealing with the effects of climate change,<sup>9</sup> and it is estimated that more than 80% of the predicted total costs of adapting to climate change will be related to cities.<sup>10</sup> This calls for careful urban planning to prevent social breakdown, physical collapse or economic deprivation.

Renovating buildings can make them more resilient to climate change. Resilient cities mean that the infrastructure and buildings are well-conceived, well-constructed and safeguarded against known hazards such as fire, flooding and earthquakes. Designing for resilience to prevent extreme events from seriously impacting the urban communities requires a holistic building design that takes into account risk levels for general safety, including fire safety, as well as energy efficiency.

**Figure 3**  
**Renovating buildings is an attractive long-term business case**  
 Trillion USD (2005 prices)



**Note:** Investments and energy cost savings are cumulative from today to 2050 (discounted). The result is based on a scenario in which the annual rate of renovations of the building stock increases from 1.4% to 3% by 2020 and remains constant hereafter. It is assumed that renovations will result in at least 70% improvement of the energy performance of a building, and that technology learning decreases investment costs over time.  
**Source:** Global Building Performance Network (2015). Results for the “Deep efficiency scenario”.

6 IEA (2013). / 7 IEA (2017). / 8 EU Commission (2016a). / 9 C40 website <https://www.c40.org/ending-climate-change-begins-in-the-city>. / 10 World bank (2011).

More resilient buildings mean less damage from fire, for example. The costs of such damages do not only entail the physical damage to buildings, but also the extensive costs to society when e.g. children have to be relocated because of school fires.<sup>11</sup> With a more resilient city, communities will recover more easily from extreme weather events.

**Renovation costs can be paid back through lower energy bills**

Energy renovations reduce energy bills at a low cost. In fact, if an energy upgrade takes place as part of a general renovation cycle and involves an upgrade of the building envelope (delivering large energy reductions), the resulting savings from lower energy bills will often pay back the investment costs over a certain period. A study from the Global Building Performance Network, an

organisation whose mission is to provide policy expertise on energy use in buildings, has identified energy renovation investments with a cost of approximately \$45 trillion globally, and with the potential of delivering energy savings worth about \$100 trillion (see Figure 3), meaning that for roughly every dollar invested one gets more than two dollars back during the lifetime of the investment.

The potential of energy renovation is not just a 'desktop-hypothesis' – it has been demonstrated numerous times in practice. A case study for a renovation project of a residential apartment complex in the United Kingdom shows that energy bills were reduced by up to 90% and the overall renovation investment had a positive net present value after 19 years (see Box 1).

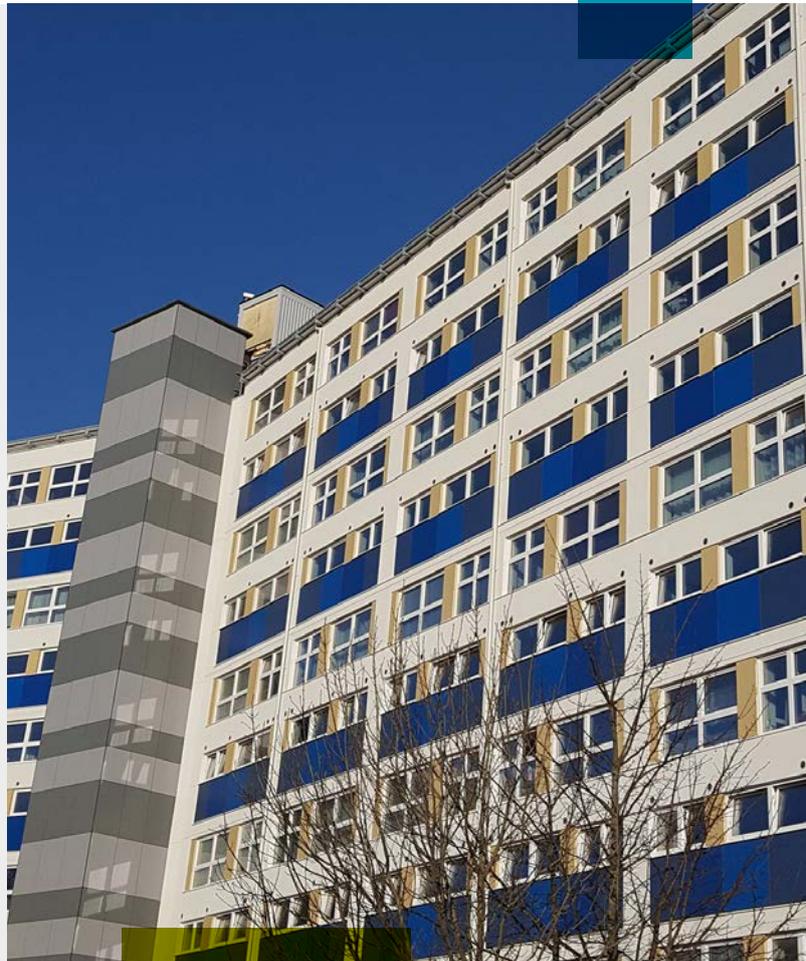
**BOX 1**

**Energy renovation of Wilmcote House in the United Kingdom reduced energy bills by up to 90%**

Wilmcote House is a large residential apartment complex in Somerstown, Portsmouth in the United Kingdom. Before its renovation, many residents were unable to heat their apartments. The buildings were deteriorating, and maintenance costs were rising. The owners were left with the choice of either demolishing and rebuilding or conducting a deep renovation. They chose to renovate as it proved to be more cost-effective. In fact, the investment is expected to have a positive net present value after 19 years. After 30 years, the investment is expected to have a net present value of £413,203.

The objectives of the renovation project were to reduce energy bills for the residents, improve thermal comfort, enhance the building's aesthetics, reduce maintenance costs and positively impact the community's perception of the building. The renovation delivered on all objectives. Energy bills were reduced by up to 90% and residents reported improved thermal comfort and improved overall living conditions. Moreover, the renovation had a positive impact on the residents' engagement with the community as they felt involved in the process.

Source: ECD Architects (2018).



The property value of a renovated building will also be higher. The outlook of lower energy bills, the higher general quality of the building and lower expected future maintenance costs affect the property value, as people are willing

to pay more for the building. When buildings are rated based on their energy performance, such as in the EU, information about the lower annual energy bills helps raise the price for an energy renovated building (see Box 2).

## BOX 2

### High score energy label impact on house price

One of the barriers holding back energy renovations is the uncertainty of whether the obtained energy savings from an energy renovation project will translate into a higher sales price. If not, the owner may not be able to recoup the investment when the house is sold. 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. A central question is therefore: To what extent do better energy efficiency ratings impact the house price?

Copenhagen Economics has analysed this question 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 m<sup>2</sup> (see figure below). 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 houses' different qualities, location, owner's characteristics etc.

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



Source: Copenhagen Economics (2015).

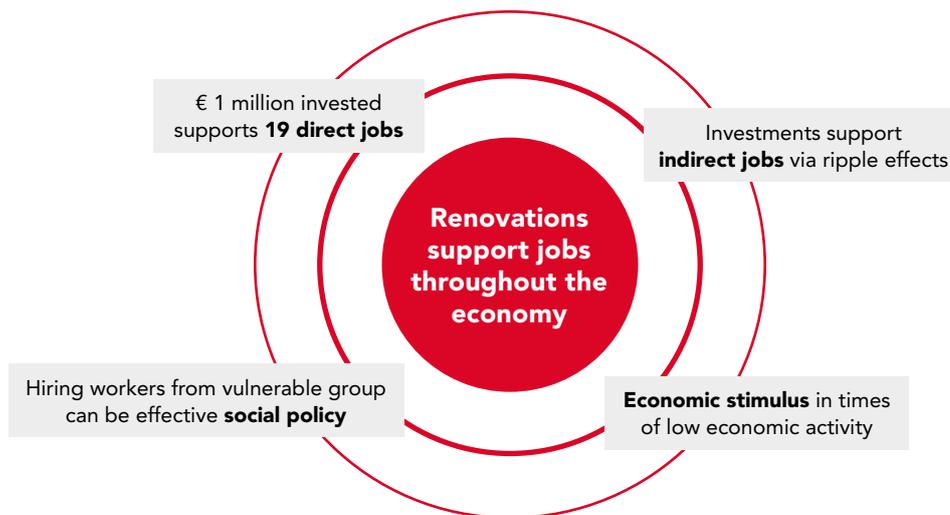
### Renovation supports economic growth and employment

Increasing renovation rates can be an effective way to stimulate economic growth and employment. Studies from Europe estimate that for every €1 million invested in renovating buildings, approximately 19 jobs will be directly created in the construction sector, although estimates vary depending on country and sector-specific conditions.<sup>12</sup> This means that a large-scale renovation project of €100 million can be expected to support around 1,900 jobs in the construction sector. Scaling this up on a regional level shows the large economic impact of increasing

renovation. The impact assessment of the EU Energy Performance of Buildings Directive shows that annual economic activity in the construction sector would increase by €8-12 billion if renovation rates are increased by 1.0%-point to 1.6% for residential and 1.7% for non-residential buildings towards 2030.<sup>13</sup>

As renovation companies rely on input and material from subcontractors, the investments in renovations will have ripple effects throughout the economy (see Figure 4). Such economic stimulus will, as any other type of fiscal stimulus, be most valuable when activated during an economic downturn.

Figure 4  
**Investments in renovations support employment throughout the economy**



Source: Euroace (2012) for job figures.

Renovation initiatives can successfully be combined with other initiatives to bring marginalised groups into the labour market. We see a growing number of examples where renovation initiatives have been combined with local governments' efforts to engage marginalised groups by hiring the unemployed youth to help with large renovation projects in their local

communities. This has proven to be an effective stepping stone for the people involved as they gained valuable job training and experience. A study in Denmark shows that 14 large renovation projects in the social housing sector created 110 jobs, 70 educational internships, 80 wage-subsidised jobs and 180 company internships for local citizens.<sup>14</sup>

## 1.2 Improved health, well-being and productivity

### Renovation improves indoor comfort, health and productivity

We spend nearly 90% of our time indoors and yet we dedicate very few resources to building quality.

There are multiple characteristics of buildings that affect the health, well-being and productivity of the people who live, work, learn, recover or play inside them. These characteristics can generally be divided into three groups:

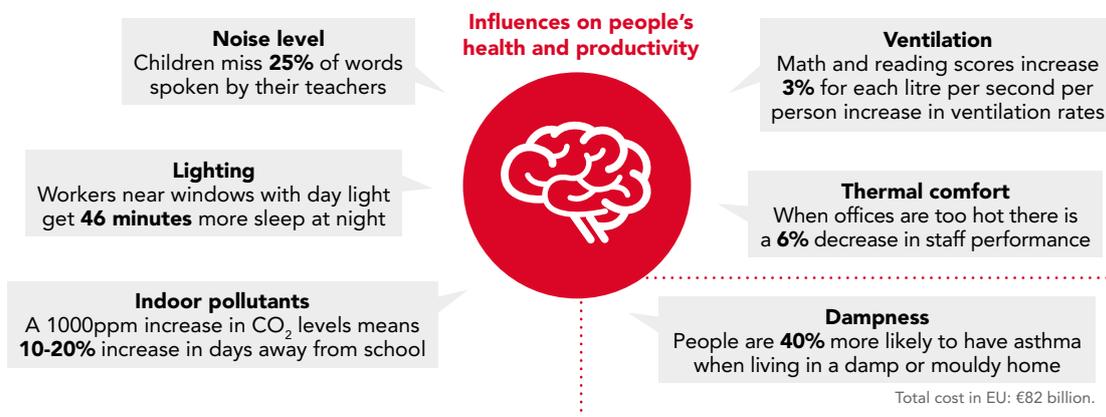
- Thermal comfort;
- Humidity and dampness; and
- Other productivity-related aspects such as lighting, ventilation, indoor pollutants, and noise.

Thermal comfort relates to the problem of too cold or too warm temperatures and the occurrence of draughts. Humidity and dampness can - in combination with cold surfaces - lead to mould, which lead to asthma and respiratory diseases.

These two groups lead to both health and medical costs, diminished quality of life, diminished life expectancy and lower productivity. The last group of characteristics contains other aspects of a building which affect the productivity and well-being of those inside it. Many people currently live in buildings with these issues. One out of six Europeans say that they live in a building with moisture issues, a lack of daylight, inadequate heating during the winter and overheating during the summer.<sup>15</sup>

How and to what extent these aspects adversely impact people's health is becoming increasingly clear. People living in damp homes are 40% more likely to have asthma.<sup>16</sup> When offices are too warm, staff performance decreases by 6%.<sup>17</sup> Increasing ventilation can increase math and reading scores in schools; and reducing the amount of indoor pollutants reduces the amount of days away from school (see Figure 5).

Figure 5  
The indoor environment in buildings affect the people inside it



Source: Noise level: Acoustic society (2018) // Indoor pollutants and ventilation: World Green Building Council (2017) // Thermal comfort and lighting: World Green Building Council (2016) // Dampness: Fraunhofer (2016b) and European Respiratory Society (2013).

The cost that society pays because of these impacts is becoming increasingly apparent. The total annual cost for European societies attributable to asthma and chronic obstructive pulmonary disease is estimated to be €82 billion, which is just one element of the total cost of unhealthy buildings.<sup>18</sup>

**Renovation reduces outdoor air pollution**

Energy consumption in buildings is a significant source of local air pollution. Air pollution has serious health impacts for people living in cities (e.g. heart and lung diseases), is costly to society and affects the local environment through e.g. lower agricultural yield and acidification. Combustion of fossil fuels and biomass for heat production and

electricity emits local air pollutants such as sulphur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>) and fine particulate matter (PM<sub>2.5</sub>). Local air pollution does not only stay local; it travels long distances.

Local air pollution is a rising concern in many countries and is a key contributor to illness and premature deaths. In fact, more than 80% of people living in cities are subjected to outdoor air quality that is worse than what is recommended by the World Health Organisation (WHO). Air pollution ranks as the fourth-largest overall risk factor for human health worldwide.<sup>19</sup> On a global level, the number of premature deaths caused by outdoor air pollution every year is estimated to be 4.2 million (see Figure 6).

**Figure 6**  
**Air pollution is a worldwide concern with real consequences for people**

**In total: 4.2 million**



Source: WHO

Reduced demand for energy when renovating buildings lowers the impact of air pollution, and its effects on society. Increasing insulation in buildings in the EU alone could lead to an annual gain of

70,000 life years and over 7,000 cases of persistent chronic bronchitis avoided. The economic value of all the improvements of mortality and morbidity amounts to € 6.64 billion per year.<sup>20</sup>

<sup>18</sup> European Respiratory Society (2013). / <sup>19</sup> IEA (2016).

<sup>20</sup> Eurima (2015). This is based on a scenario from 2005 to 2020 with an annual renovation rate of 2% assuming ambitious insulation levels in new and renovated buildings.

## 1.3 The socio-economic impact of attractive cities

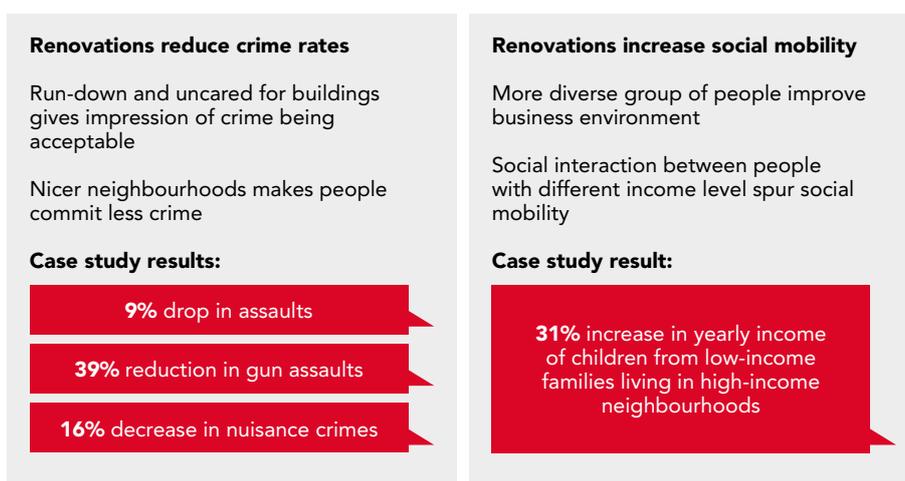
### Renovating vulnerable neighbourhoods can reduce crime rates and improve quality of life

Renovating certain areas of cities to increase the attractiveness of neighbourhoods can result in high socio-economic benefits. Areas with run-down and abandoned buildings are likely to have more assaults and gun violence - making citizens feel less safe. This is known as the "broken-window" theory, which says that a neighbourhood in a poor state is perceived to be uncared for and as a result, crime in that neighbourhood is more likely to go unchallenged. Although this is an area where the effects have undergone less investigation, there are indications that renovating neighbourhoods can reduce crime rates. In one study in the United

States, improving the general quality of buildings in a neighbourhood through renovations reduced assaults by 9%, gun assaults by 39% and nuisance crimes by 16%.<sup>21</sup>

Increasing the attractiveness of neighbourhoods can also attract a more diverse group of people to live in the area, which has a range of benefits. When a neighbourhood is attractive enough to middle and high-income groups, it increases social mobility through the interaction between children from families of different backgrounds in schools. In fact, children from low-income families living in higher-income neighbourhoods are more likely to attend college, and will as a result earn 31% more as adults (see Figure 7).

Figure 7  
**Renovating city neighbourhoods can act as social policy**



Source: Copenhagen Economics based on Kondo et al (2015) and Chetty et al (2016).

Diversity improves the local business environment as businesses have access to both low and high skilled labour. From a city's perspective, improving the quality of living conditions for all residents

and the ability to attract new citizens through attractive neighbourhoods brought about by a modernised and attractive building stock will also contribute to the tax income of the city.

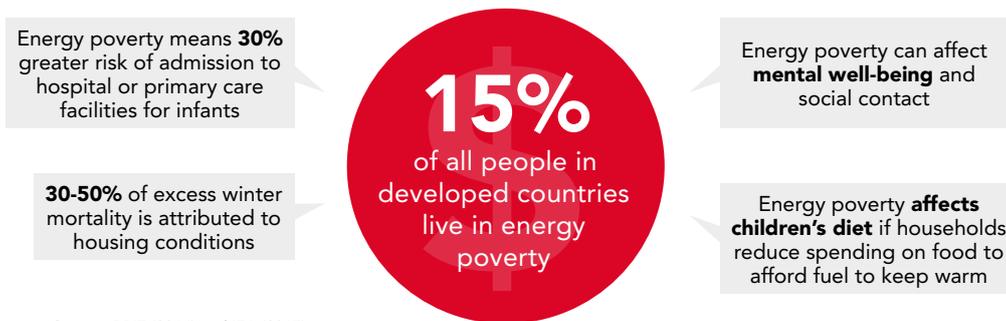
### Renovation can alleviate energy poverty

Energy poverty refers to people's ability to afford energy to keep their home at a proper temperature. It is most often rooted in the combination of low incomes and energy-inefficient dwellings. Energy poverty causes people to live in a poor indoor environment, which again contributes to a range of health issues.

Energy poverty is a large problem in many countries. An estimated 15% of people that live in

developed countries live in energy poverty.<sup>22</sup> In the European Union, around 8% of the population are unable to heat their homes adequately.<sup>23</sup> Children and elderly are especially vulnerable. Cold surfaces, lack of ventilation or the presence of draughts may lead to mould growth and associated respiratory health problems and excess winter deaths (see Figure 8). In the United States, asthma induced by dampness and mould in homes is estimated to cost USD 3.5 billion per year.<sup>24</sup>

Figure 8  
Energy poverty is widespread and has a severe human impact



Source: BPIE (2014) and IEA (2017).

A well-designed building renovation can deliver real cost savings and counteract energy poverty and the associated social problems. Reducing the energy demand of the building itself makes it cheaper to keep a healthy temperature and makes the building more affordable to live in, which will reduce the problem of energy poverty.<sup>25</sup> If targeted properly, renovation programmes can deliver significant public savings through reduced medical treatments, constituting a significant part of the renovation investment. Some research examples include:

- A study on the Northern Ireland's Warm Homes scheme to improve the energy efficiency of houses for elderly and disabled show that for every €1 spent in this scheme, 42 cents was recouped by the National Health Service because of the improved health of the residents.<sup>26</sup>
- In the United Kingdom, the program 'Boilers on Prescription' has resulted in a 60% drop in medical appointments for people receiving a high efficiency boiler.<sup>27</sup>
- In the state of Vermont in the United States, a review of the weatherization program (a social program providing thermal renovations for low-income households) shows that health and safety improvements added an additional \$1,044 in average project cost, while returning health and safety benefits worth \$2,372, including \$1,421 due to fewer illnesses.<sup>28</sup>

22 A (2017). / 23 Eurostat, EU-SILC survey. / 24 Mudarri and Fisk (2007).  
25 EU Parliament (2015). / 26 Liddell (2013). / 27 GenToo (2016). / 28 Allen (2016).





# 2

# Recommendations for actions

Today, there are wide-ranging technical solutions available and extensive experience in global projects to learn from. The next step is to focus on scaling up renovation activities in line with the urgency of combatting climate change.

National governments and local municipalities alike have a number of buttons they can push. Indeed, the individual and collective choices made by cities addressing the issue of climate change could set the agenda for communities and governments everywhere.

In this process, it is important for policy makers to:

- Take significant and effective action by massive capacity building (information, training, education, facilitation), removing undesirable regulatory barriers, and improving access to financing;
- Ensure long-term commitment regarding ambitions and policies and;
- Lead by example – large-scale public ownership provides room for achieving economies of scale and testing new business models (see figure 9).

Figure 9  
Suggestions for actions

<b>1</b> Take action	<b>National action</b>	<ul style="list-style-type: none"> <li>• Remove undesirable regulatory barriers (fossil fuel subsidies, municipal budget rules, rent regulation) and introduce massive capacity building (create facilitators, information, training, education)</li> <li>• Improve information about energy savings and health benefits</li> <li>• Improve access to financing (regulation and infrastructure, e.g. mortgages, green bonds)</li> </ul>
	<b>Local action</b>	<ul style="list-style-type: none"> <li>• Local support/subsidy programmes</li> <li>• Establish local facilitators and knowledge centers</li> <li>• Explore new business models with early involvement of relevant stakeholders</li> <li>• Integrate renovation in overall city planning and social policy</li> </ul>
<b>2</b> Ensure long-term commitment	<b>Credible and transparent planning</b>	<ul style="list-style-type: none"> <li>• Design credible and transparent long-term plans and ambitions for renovations at both national and local levels. Adopt policies and measures needed to meet ambitions</li> </ul>
<b>3</b> Lead by example	<b>Renovate public buildings and share success stories</b>	<ul style="list-style-type: none"> <li>• Public buildings make up a significant share of total energy consumption</li> <li>• Public ownership provides room for achieving economies of scale and testing of new business models</li> </ul>

Source: Copenhagen Economics.

## 2.1 Take action

**Remove undesirable regulatory barriers to renovation.** A number of common national and local policies such as fossil fuel subsidies and rent control deter investments in energy efficient renovation. Fossil fuel subsidies keep the price of energy artificially low for consumers, thereby reducing the potential economic savings of improved energy efficiency. By removing subsidies for heating, governments will improve public budgets and increase incentives to renovate buildings. Furthermore, subsidies and savings in the health system should be allocated to the renovation of dilapidated/run-down buildings that affect vulnerable groups. Another key barrier is rent control, which limits landlords from increasing the rent following a renovation, even though the energy bill of the tenant is reduced. This reduces the incentive for landlords to carry out renovations aimed at lowering energy consumption including potentially more attractive long-term energy efficient renovations.

**Make market participants aware of the value of energy renovations.** In a survey conducted by the United Nations' Economic Commission for Europe, the surveyed stakeholders indicated that low awareness about the benefits of energy renovation is in fact a key impediment to the investment in and financing of energy efficient projects.<sup>29</sup> By providing market participants with information about the real value of energy renovations, governments at both the national and the local level can be instrumental in realising the benefits outlined in the previous chapter.

**Improve access to funding of renovation projects by improving financial infrastructure and regulation.** Renovation will increase the value of the building, but in many countries it is not possible to issue a mortgage with collateral based on the expected increase in property value.<sup>30</sup> Consequently, there is limited experience and competence within the financial sector in terms of assessing risks and opportunities in building renovation, thereby making it costlier to achieve funding. There are examples of projects that work to design, for example, standardised lending applications based on objective building information, which financial institutions can use in their risk assessment and which lower transaction costs and the risk premium.<sup>31</sup> When designing financing schemes and incentives, it is important to link attractive conditions to the level of energy improvements, such as in the German KfW scheme.<sup>32</sup>

Another financial option for the public sector to consider is to explore the possibilities with companies such as **Energy Service Companies (ESCO)**. An ESCO is a private contractor that can identify and implement energy saving measures in a building. Many ESCO's have been offering guaranteed energy savings to their clients and compensating the owners if the energy savings are not realised. Such contracts will reduce the level of risk perceived by building owners like local municipalities. Standardised contracts and long contract periods of up to 20+ years are key issues to get in place to ensure ESCO companies can include an upgrade of the building envelope in their projects.

<sup>29</sup> UN Economic Commission for Europe (2017). / <sup>30</sup> See e.g. Copenhagen Economics (2018) / <sup>31</sup> See for example the Danish Bedre Bolig initiative.  
<sup>32</sup> <https://www.kfw.de/inlandsfoerderung/Privatpersonen/Bestandsimmobilie/>

Local governments can **enact support programmes at the local level.**

Examples of such support programmes are tax incentives, renovation subsidies, project development assistance, and provision of low-interest loans for energy efficiency projects.

**Integrate energy renovation in the overall city planning.** Energy

renovation can contribute to other urban planning objectives such as climate adaptation and be an important tool in social policy. Furthermore, it may be economically advantageous to implement an energy renovation in conjunction with other projects for climate adaptations, for example drainage systems to handle heavy rainfall or improved fire resilience in cities.

## 2.2 Ensure long-term commitment

**Adopt credible and transparent long-term strategies** with policies and measures for renovation of the building stock to engage stakeholders – at both national and municipal level. Institutional investors, banks, business, developers, and housing companies are looking for low-risk investments and making long-term decisions on investments in innovation and new business models.

By formulating credible long-term ambitions, governments and local municipalities can help minimise risk for stakeholders and encourage further investments and innovation.

This long-term strategy should include a clear path for upgrading the building stock. The credibility of these plans can be increased by adopting appropriate long-term measures, such as those outlined above.

The long-term plans may be supplemented by indicative targets for the short and medium term. In doing so, governments provide stakeholders with additional information about the direction of the market and can underscore the credibility of their long-term plans by achieving targets in the short and medium term.

## 2.3 Lead by example

Governments at both the national and municipal levels should lead by example and act by **renovating public buildings.** Public buildings account for a significant share of total energy consumption. Because of the large number of buildings in public ownership, economies of scale can be achieved and new business models tested. The

experiences and knowledge gained through these projects should be shared across political entities to facilitate implementation of best practices that will aid in a successful scale-up of renovations. **Further, by renovating public buildings, governments demonstrate their long-term commitment to tackling climate change.**



# 3

# References

**Acoustic Society (2018)** Classroom acoustics 1

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