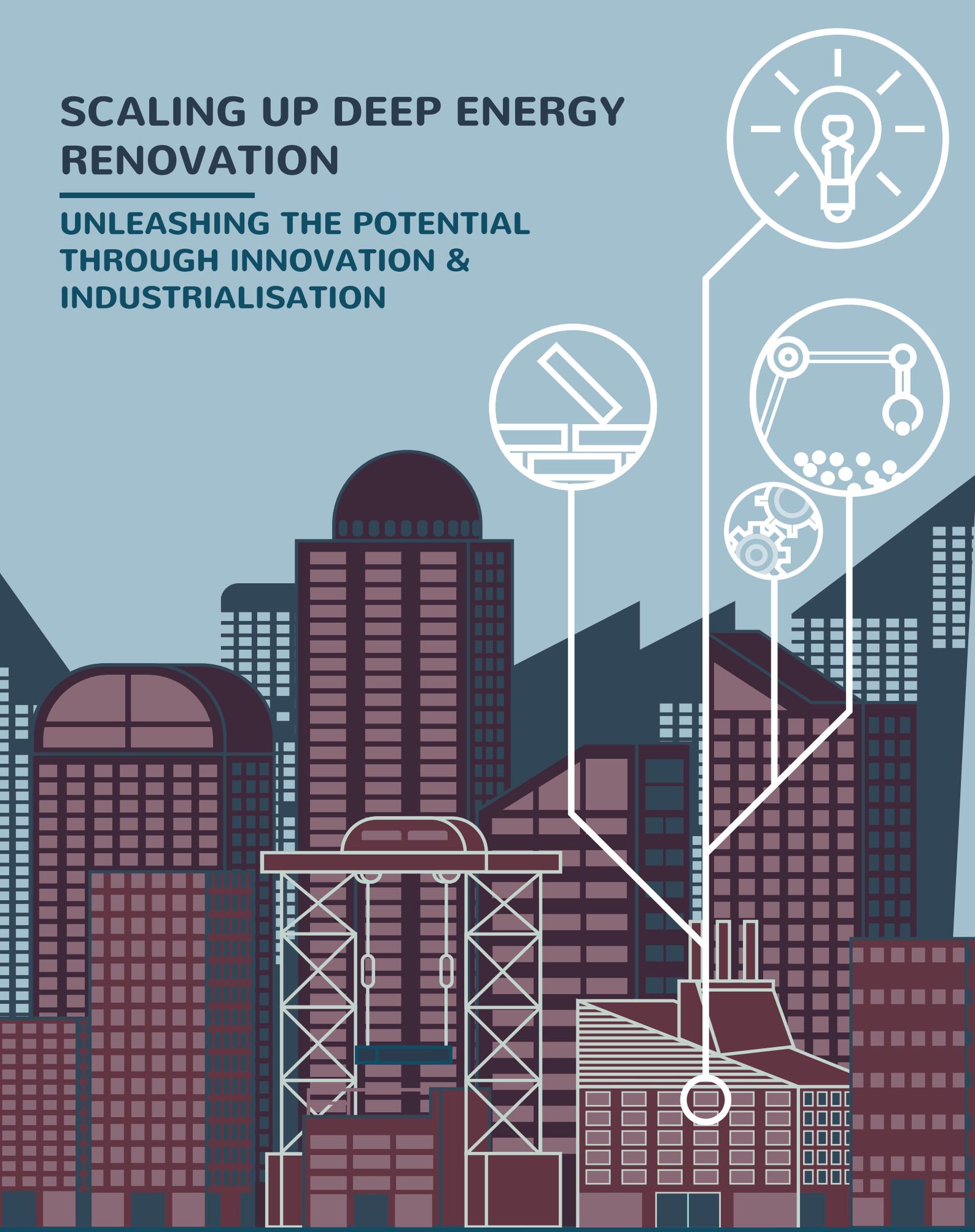


# SCALING UP DEEP ENERGY RENOVATION

UNLEASHING THE POTENTIAL  
THROUGH INNOVATION &  
INDUSTRIALISATION



# SCALING UP DEEP ENERGY RENOVATIONS

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## UNLEASHING THE POTENTIAL THROUGH INNOVATION & INDUSTRIALISATION

### **About i24c**

The Industrial Innovation for Competitiveness (i24c) initiative is a European platform established by the European Climate Foundation and dedicated to developing and promoting an industrial strategy that secures European industry's competitive advantage through innovation. It aims to strengthen understanding and confidence in how, through a systemic focus on innovation, Europe's industries can successfully compete and drive prosperity in the dynamic transition to the new economy, shaped by global technological, social and ecological mega-trends. i24c develops evidence to inform the critical debate on these issues in Europe and works to co-create effective and socially fair solutions with a wide range of partners.

[www.i2-4c.eu](http://www.i2-4c.eu)

### **About BPIE**

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.

[www.bpie.eu](http://www.bpie.eu)

This report was prepared in partnership with the team of:

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Special thanks to all the experts that contributed to the project and reviewed the report. They are listed in Annex 1.

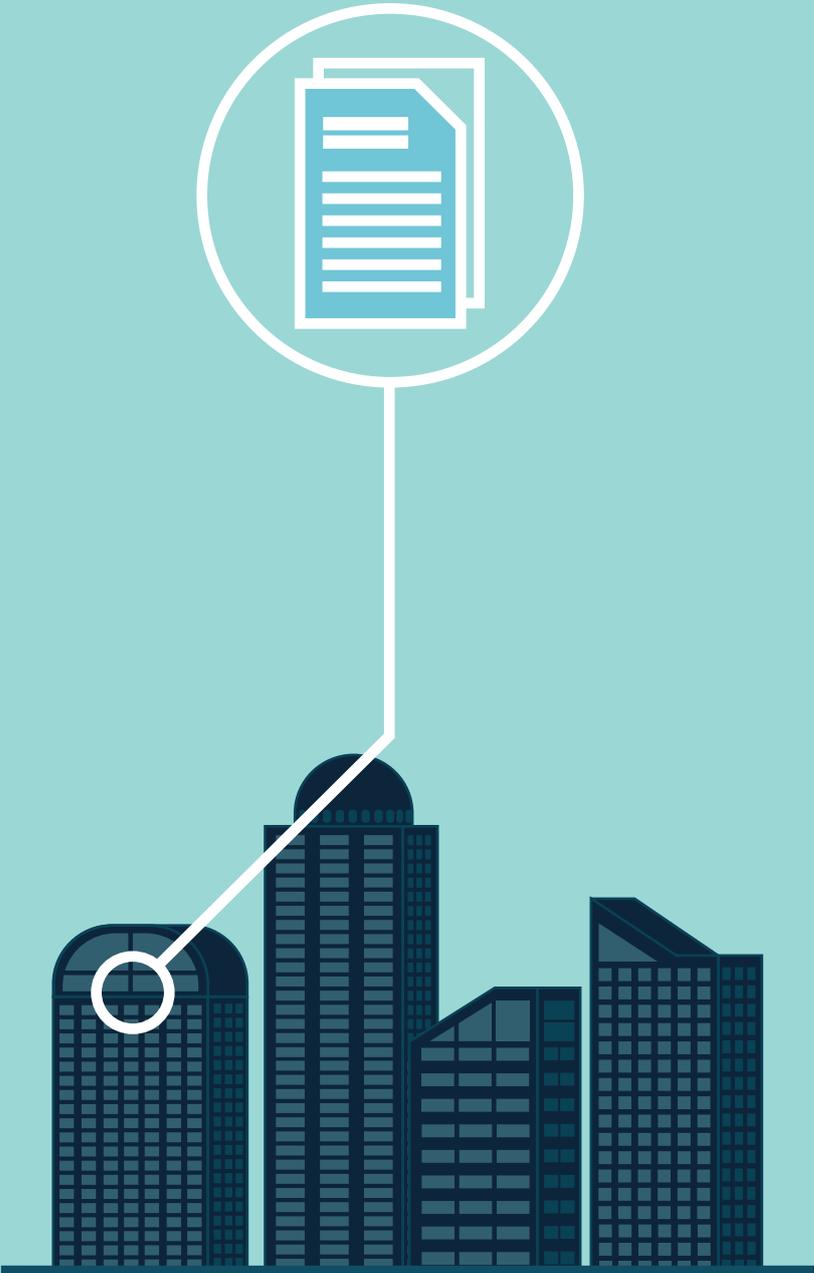
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# EXECUTIVE SUMMARY



## EXECUTIVE SUMMARY

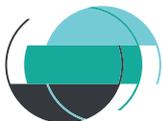
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The European construction industry, like many others, is confronted by an economy that is undergoing a highly significant change, shaped by megatrends such as greater urbanisation, disruptive new technologies and digitalisation, globalised value chains and sustainability. At the same time, the European economy faces the profound challenge of meeting the ambitious climate mitigation goal set out in the Paris Agreement of keeping average global warming to well below 2°C. A key question for this industry is how to ensure that, married to these other megatrends, can be treated as an opportunity for economic success and global leadership as much as an environmental challenge. Accelerating the pace of deep energy renovation in the construction value chain - extensive building improvement work that substantially increases energy efficiency and reduces energy consumption by 75% or more - has a vital role to play in ensuring economic success and can help achieve these other public policy goals. This report seeks to explore how it can be best done.

Frontrunner projects in Europe have demonstrated that innovation in all aspects of the process – products, services, business models and policy – offers great opportunities to reduce the cost and increase the pace of deep energy renovation, while boosting economic growth, creating jobs and reducing emissions. The Dutch Energiesprong project, for example, reduced the cost of a net zero energy renovation of a terraced house from €130,000 for the first pilot project in 2010 to €65,000, thanks to economy of scale, 3D-technologies and pre-fabricated materials. On-site work takes only a week, limiting the burden for inhabitants, while increasing their comfort and improving the look of the house. This state-of-the-art renovation programme is embedded in a holistic approach that involves all relevant actors and takes into account regulations, sales channels, energy performance guarantees, marketing, increases in property value, and finance. This approach enables deep energy renovation to be scaled up through an industrialised production process.

While the Energiesprong project is considered best practice, other European examples highlight key factors (called components in this report) that accelerate the rate of deep energy renovations, such as the KfW Energy-Efficient Refurbishment programme (Germany), Energies Posit'if (France) and Project Zero (Denmark). Some of these programmes achieve a certain level of industrialisation by aggregating and streamlining replicable processes, instruments or products. They owe their success to moving from a product-centred approach to an industrialised, service-oriented approach that uses innovative technologies, business models and/or finance models (such as selling products and services within an integrated framework), ultimately reducing the cost of energy renovations.

The Energiesprong project and other early examples show that seven main components are critical to scaling up and increasing the rate and depth of energy renovation. Only by interconnecting these components and key actors it will be possible to create a viable path forward.



### **Legislation**

includes all policy measures that promote deep energy renovation across all political levels (local, national and European).

### **Business model**

covers the full value proposition that the renovation model offers, for example a one-stop-shop service.

### **Value chain ecosystem and leadership**

focuses on how all relevant actors of a renovation programme – including those outside the sector – can collaborate to increase the rate and depth of renovation.

### **Marketing and awareness raising**

aims to engage the broader public to persuade homeowners and other building owners to undertake renovations.

### **Financing model**

covers the different types of funding and investment products that can be used to fund deep energy renovation.

### **Technical solutions and products**

encompasses new products and systems that lower costs and speed up innovation rates, some of which are based on more industrialisation of the production and deployment process.

### **Aggregation of demand**

responds to fragmented building ownership in Europe by grouping demand to make deep energy renovation more feasible technically and economically.

To increase the rate and depth of building renovation in Europe, policy reform is needed that affects all of these components – whether to create the right incentives, provide the needed framework conditions or remove barriers to change. This report puts forward policy recommendations at EU, national and local levels, based on the advice of experts representing the full value chain of the building sector.

These key policy recommendations should be seen as starting points to unlock each component's potential. In this transformation, the role of the private sector should not be underestimated – for instance, by providing consumer-tailored services or by developing new low- or zero-carbon technologies and products.

A more widespread and industrialised approach to deep energy renovation presents both opportunities and challenges to the renovation market and actors in the value chain. Further dialogue is needed with key experts to reach a deeper understanding of the implications and the needed changes.



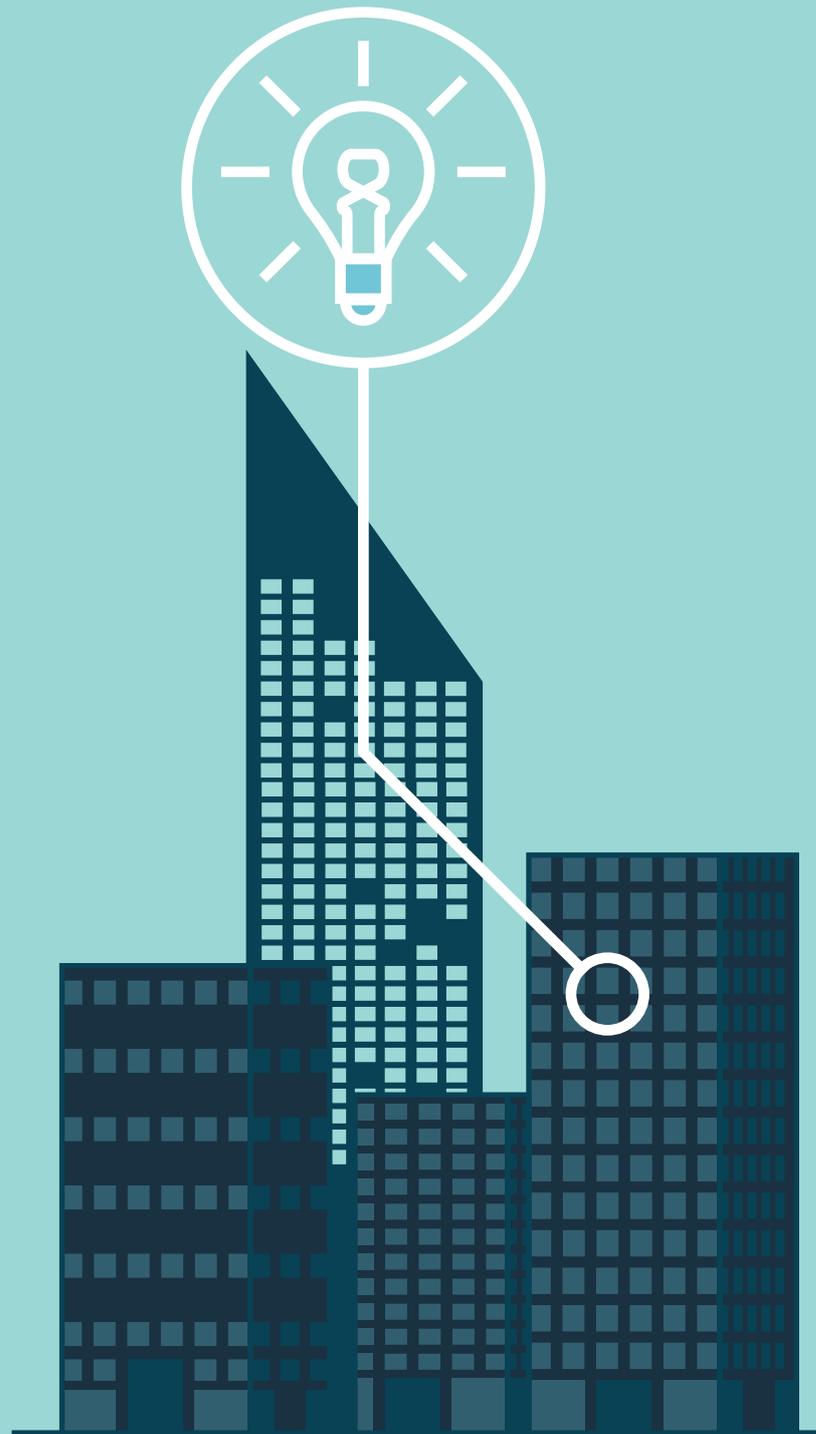
**Table 1: Overview of the components, key success factors and recommendations.**

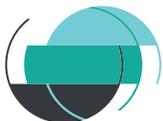
COMPONENTS	KEY SUCCESS FACTORS	POLICY RECOMMENDATIONS
<b>LEGISLATION</b>	<ul style="list-style-type: none"> <li>• Rules and incentives enable deep energy renovation through legislation.</li> <li>• Dialogue and collaboration across all levels of governance</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <p>Establish a harmonised energy renovation target at EU-level.</p>
<b>BUSINESS MODEL</b>	<ul style="list-style-type: none"> <li>• Start from the final energy target when creating a renovation service.</li> <li>• Create a facilitator role.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <p>Establish a dynamic legislative framework.</p>
<b>VALUE CHAIN ECOSYSTEM AND ITS LEADERSHIP</b>	<ul style="list-style-type: none"> <li>• Open up the value chain for innovators.</li> <li>• Empower local authorities in (pilot) projects.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <p>Empower the frontrunners.</p>
<b>MARKETING AND AWARENESS-RAISING</b>	<ul style="list-style-type: none"> <li>• Switch from a product-centred to an end-user-centred focus.</li> <li>• Build market confidence for industrialised renovation.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">NATIONAL</div> <div style="border: 1px solid black; padding: 5px;">LOCAL</div> <p>Steer funding from investment to guiding.</p>
<b>FINANCING MODELS</b>	<ul style="list-style-type: none"> <li>• Create new financing products with a long-term perspective.</li> <li>• De-risk deep energy renovation.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <p>Allow for innovative financing and provide further risk coverage.</p>
<b>TECHNICAL SOLUTIONS AND PRODUCTS</b>	<ul style="list-style-type: none"> <li>• Develop renovation solutions integrating the buildings interaction with the energy system.</li> <li>• Design integrated solutions with the end-use in mind.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <p>Encourage renovation programmes to adopt a systems approach.</p>
<b>AGGREGATION OF DEMAND</b>	<ul style="list-style-type: none"> <li>• Aggregate demand to provide sufficient scale.</li> <li>• Drive market transformation through deep energy renovation of public and commercial buildings.</li> </ul>	<div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">EU</div> <div style="border: 1px solid black; padding: 5px;">NATIONAL</div> <div style="border: 1px solid black; padding: 5px;">LOCAL</div> <p>Public authorities to lead by example.</p>



# INTRODUCTION

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# INTRODUCTION

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## WHY FOCUS ON DEEP ENERGY RENOVATIONS?

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The building sector is a key partner in achieving the European Union's Energy Union ambitions and the climate mitigation goals set out in the Paris Agreement. Deep energy renovation not only has significant potential to contribute to these goals but also constitutes an essential economic opportunity. The European Union's 28 member countries represent a renovation market with an estimated turnover of €109 billion, which generated 882,900 jobs in 2015. This market could increase by almost 50% if the European Union adopts a 40% energy savings target for 2030, creating more than 1 million additional jobs.<sup>1</sup>

To achieve Europe's 2020 energy efficiency targets, €60-100 billion needs to be invested annually in buildings in the European Union.<sup>2</sup> However, current investments are less than half of what is required to achieve and five times lower than what is necessary to deliver 2050 decarbonisation targets for buildings.<sup>3</sup> Current renovation rates, stagnating at around 1%, need to be tripled, and renovation needs to deepen to capture its full cost-effective savings potential and reach Europe's overall climate and energy targets.

Given that current policies and industry initiatives are insufficient to increase the rate and depth of renovation, a breakthrough is needed that can stimulate and foster this market – and unleash its full potential – through innovative technologies, processes and delivery models.

## THE OBJECTIVE OF THE PROJECT

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i24c (Industrial Innovation for Competitiveness) and the European Climate Foundation initiated this project to reach a broader understanding of the opportunities and challenges presented by the industrialisation of deep energy renovations. By industrialisation, we mean aggregating and streamlining replicable processes (such as aggregating demand for renovation), instruments (such as financial models) or products (such as pre-fabricated materials or modular buildings). This includes combining measures to reach renovation solutions tailored for specific building typologies.

<sup>1</sup>OPENEXP (2016) Energy Transition of the EU Building Stock [http://openexp.eu/sites/default/files/publication/files/Reports/energy\\_transition\\_of\\_the\\_eu\\_building\\_stock\\_full\\_report.pdf](http://openexp.eu/sites/default/files/publication/files/Reports/energy_transition_of_the_eu_building_stock_full_report.pdf)

<sup>2</sup>COM (2012) Consultation Paper: "Financial Support for Energy Efficiency in Buildings"; and EURIMA. (2012). Financing Mechanisms for Europe's Buildings Renovation. Retrieved from: <http://www.climatestrategy.es/index.php?id=27>

<sup>3</sup><http://bpie.eu/publication/eefig-final-report/>

## METHODOLOGY

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Fostering deep energy renovation through industrialisation is a complex topic that requires collaborative thinking by all parties throughout the value chain and by outsiders. It also requires a holistic and systemic approach. To obtain as many valuable insights as possible, this project was structured around two workshops with experts representing industry, financing sector, building owners, research and local governments (Annex I). This enabled a diverse and profound debate.

**The first workshop** aimed to synthesise European experts' visions and jointly identify the **key components** necessary to foster and scale up innovative ecosystems for deep renovation.

**The second workshop** focused on the key factors that would enable large-scale deep energy renovation. Starting from two cases in an ideal 2050 situation (single family housing in Western Europe, and commercial and public buildings), participants traced back (or "backcasted") their evolution to today's situation to identify enabling measures, or key success factors. They focused in particular on the business models and actors that would enable this transformation.

Following this process, **policy recommendations** were formulated on three levels (local, national and European) to pave the way for the unleashing of large-scale deep renovation in the European Union. The assessment using specific case studies aimed not to be all-inclusive but to create more practical, real-life boundary conditions to develop potential solutions. The policy recommendations proposed here cover a wide range of possible actions but are not exhaustive.<sup>4</sup>

In this two-phase approach, experts considered the following questions:

### **Phase 1 – The components<sup>5</sup> to foster industrialisation:**

- What are the **essential components needed to foster scaling and industrialisation** in deep energy renovations and scale up the renovation rate?
- Which of these components should be **prioritised first**?
- How are these components **systemic and linked**?
- Who are the **key actors** instrumental for each component? Are there players from **outside the current value chain** that might help speed up innovation? Should new partnerships be envisaged?
- How can **industrial players** be involved? What are the possible consequences – positive and negative – for the sector at large?

<sup>4</sup>The full list of recommendations composed by the expert team can be found in Annex IV.

<sup>5</sup>Components are to be understood as the systemic elements – or ingredients – that build up a model or initiative that fosters industrialised retrofits.



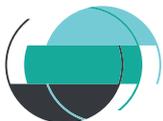
## **Phase 2 – Solution frameworks and recommendations:**

- What would a fully industrialised deep energy renovation look like in an **ideal future scenario**? What steps need to be taken to fulfil it?
- How would the **different components** take shape in this ideal scenario?
- What are today's **challenges and opportunities** in reaching that ideal scenario?
- What **policy recommendations** could be made at **different levels** (EU, national, local) to speed up this transition?

# KEY COMPONENTS OF WIDESPREAD DEEP ENERGY RENOVATION IN EUROPE

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# KEY COMPONENTS OF WIDESPREAD DEEP ENERGY RENOVATION IN EUROPE

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The building sector is a key contributor to Europe's economic growth and employment. In 2011, it was responsible for 7% of GDP and employed over 11 million people, making it the largest contributor to EU employment.<sup>6</sup> This impact could increase significantly with a fully deployed European energy renovation market.

Despite the many challenges involved, an increasing number of companies and governments are searching for solutions to increase the rate and depth of energy renovation. Some valuable projects initiated throughout the Value Chain of the Building Sector (VCBS) are already achieving higher rates of deeper renovations. These frontrunner projects owe their success to moving from a product-centred approach to an industrialised, service-oriented approach with innovative technologies, business models and/or finance models (selling products and services within an integrated framework), that reduces the total cost of energy renovations.

Examples such as Energiesprong (Netherlands), KfW (Germany), Energies Posit'if (France) and Project Zero (Denmark) show that key elements recur in all deep energy renovation programmes, such as available financing, new services like an aggregator or a facilitator, and innovation in materials and technologies. The most important enablers of these key elements can be grouped into seven main categories:

1. The **legislation** component includes all policy measures that touch upon the deep energy renovation process across all political levels, from local to EU level. It includes not only financial legislation and legislation specific to construction, but also indirectly related legislation such as regulations on accessibility, housing, inheritance and mortgage loans. It also includes broader policy instruments and initiatives that could enable innovation and industrialisation in the building sector.
2. The **business model** component includes all aspects related to key partners, value propositions, target customers and revenue model. It considers the full value proposition the renovation model might offer, the best market entry point and whether partners from outside the current value chain are needed.
3. The **value chain ecosystem and leadership** component focuses on all the actors that belong to the deep renovation process and the corresponding value chains, such as policy-makers, contractors, designers, energy service companies, financiers, facilitators and end-users. It focuses on the whole system, including the players outside the current construction value chain, and looks at how these actors can be empowered to speed up the rate and depth of renovation.

<sup>6</sup>European Commission – Joint Research Centre, "Energy Renovation: The Trump Card for the New Start for Europe," 2015

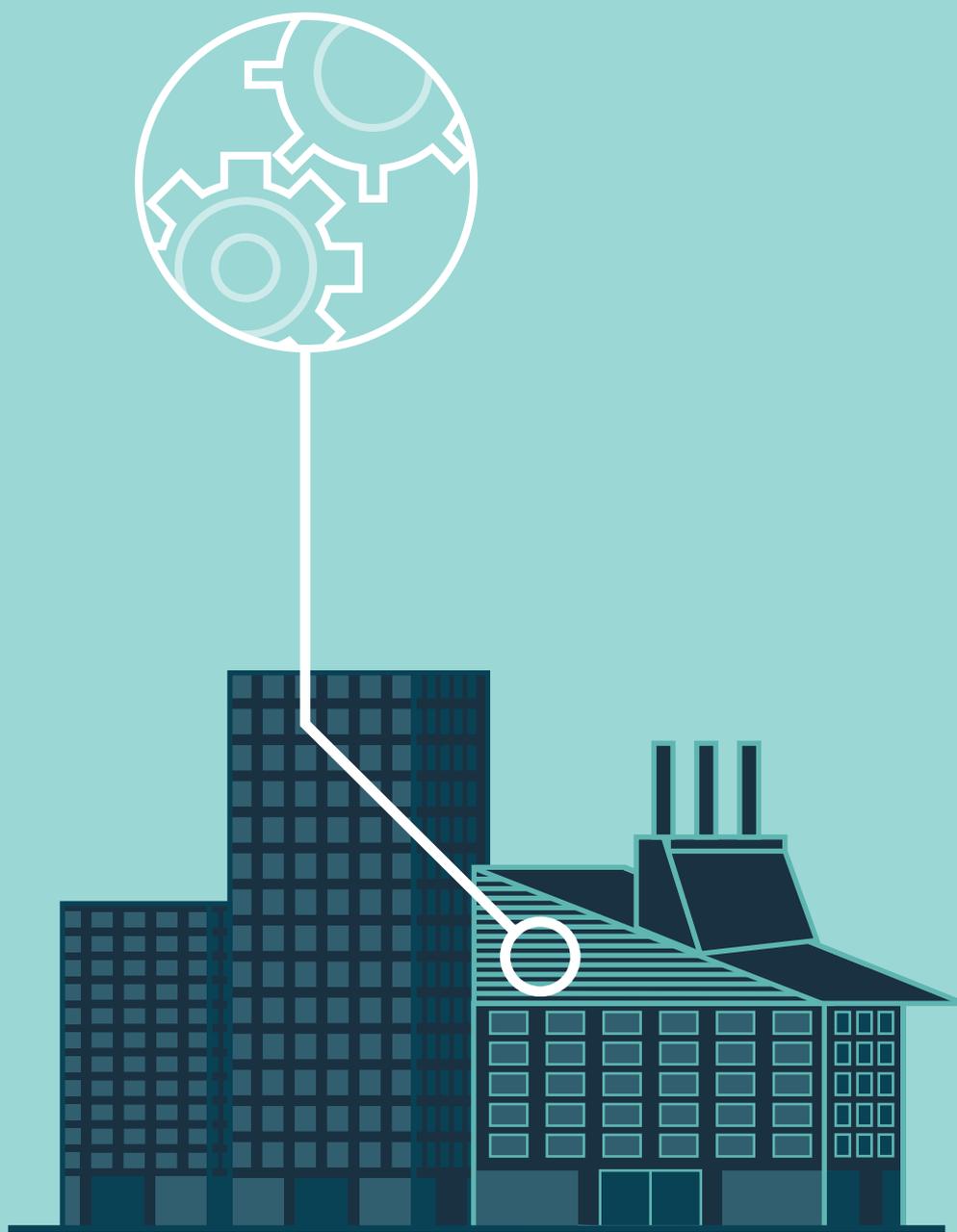
4. The **marketing and awareness-raising** component tackles the challenge of engaging the broader public. It considers how renovation programmes attract the interest of consumers, partners, government, investors and others, and asks which unique selling points would persuade them to participate. Energy savings may be an attractive selling point for some, but the incentives are likely to be much broader, including factors such as aesthetics and comfort.
5. The **financing model** component explores the different types of funding and investment products that can be used to finance deep energy renovation. It focuses on innovative business models that offer more flexibility to end-users and investors, but also allows for a transition from a focus on initial investment, or capital expenditure (CAPEX), to a long-term mind-set that focuses on operating expenses (OPEX).
6. The **technical solutions and products** component looks at the product and system innovations for deep energy renovation solutions, and how innovative industrialisation of the production and deployment process can lower the cost and increase the rate of renovation. It includes technical innovations from other sectors, such as information technology (IT), that might be adapted to the construction process.
7. The **aggregation of demand** component tackles the problem of fragmented building ownership in Europe. It explores different ways of scaling up demand to make deep energy renovation more feasible technically and economically. Depending on local market conditions, this role can be covered by private, non-profit or governmental actors, or a combination of these.

These components are crucial as governments or companies seek to develop viable renovation programmes that are replicable and scalable. Deep energy renovations require a systemic approach because of the interdependence of their phases – from design to execution to maintenance – and the interaction of external and internal actors. The components used in a renovation programme do not always display clear boundaries and must be linked and leveraged to unlock scaling and acceleration of deep energy renovation.

# SCALING UP AND INDUSTRIALISING DEEP ENERGY RENOVATION

## KEY SUCCESS FACTORS AND POLICY RECOMMENDATIONS

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# SCALING UP AND INDUSTRIALISING DEEP ENERGY RENOVATION - KEY SUCCESS FACTORS AND POLICY RECOMMENDATIONS

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Pioneer projects have shown that the rate of deep energy renovation can be accelerated. However, this requires governments to provide a more enabling environment and often changing legislation. There is also a key role to be played by the private sector and by other non-governmental actors both within and outside of the construction value chain, notably in establishing business models and developing new products and services.

The role of governments can be very broad when it comes to fostering deep energy renovation and its industrialisation. It can include creating dynamic legislation and frameworks; stimulating research and development (R&D) and pilot cases through incentive programmes; creating a clear and aligned vision; revisiting the rules of public procurement; and setting up a platform and taking a facilitator role.

For each of the seven **components** described above, **key success factors** and **policy recommendations** are presented, at EU, national and local levels.

## 1. LEGISLATION

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### **Key success factor 1 – Rules and incentives enable deep energy renovation through legislation**

There is an **urgent need for legislation that both drives (push) deep renovation and opens market opportunities (pull), and promotes it** through “hard” measures such as mandatory building performance levels and “soft” measures such as support programmes. **Policy makers can have a strong enabling role** in shaping the energy renovation market when regulating, driving product phase-out (for example, inefficient boilers), managing public procurement, funding and initiating programme delivery units, and setting up public-private partnerships (PPPs).

A further issue is the **difference in the implementation speed and level within Europe**. Some member states are frontrunners and transpose regulation before it becomes a European obligation, or implement it more strictly than required (eg, Denmark on building performance regulation). Other member states transpose only the strict minimum within national legislation, lack control and compliance measures, and undertake limited assessment of implementation<sup>7</sup>.

<sup>7</sup>For example, only 50% of the Member States monitor the compliance of new buildings with energy performance requirements. (QUALICHeCK project - <http://qualicheck-platform.eu>)



## EXAMPLE 1: Phasing out the least performing buildings

There is no stronger signal to the market than a renovation obligation and phasing out the least-performing buildings offers economic, social and environmental gains. Obligations should provide building owners with sufficient preparation time, however, and be supported by financial incentives, at least for the most vulnerable groups).

**France** has mandated renovation for private residential buildings whose primary energy consumption exceeds 330 kWh/m<sup>2</sup>. This affects buildings with the lowest Energy Performance Certificate (EPC) ratings, of F or G. These buildings will have to be renovated before 2025. This measure will drive the transformation of the existing building stock, and kick-start the ambition of bringing the entire building stock to low energy consumption levels (“Bâtiment Basse Consommation”) by 2050, which is also part of the French law.<sup>8</sup>

In the **United Kingdom**, there will be a requirement (from 2018) for any properties rented out in the private rented sector to have a minimum EPC rating of E. This measure is creating a strong incentive for building owners to improve the energy performance of the least-performing buildings.<sup>9</sup>

### Key success factor 2 – Dialogue and collaboration across all levels of governance

**Dialogue and collaboration within and across all levels of governance is crucial to support the framework and incentive structures** that will enable the scaling up and industrialisation of deep energy renovation, and the necessary innovation in products, business models and policy. EU, national, regional and local government levels have different roles, yet they all carry a responsibility and an opportunity to foster ecosystems for deep energy renovations:

- EU: Setting out a clear, long-term vision, devising standards, setting targets, establishing guidelines, providing financing;
- National: Establishing requirements and guidelines, providing financing;
- Local (or regional): Creating platforms for aggregation of the housing/building stock, facilitation and collaboration (e.g. the CITYinvest project, in which 24 pilot projects are analysed and compared).

<sup>8</sup>[https://unfccc.int/files/national\\_reports/biennial\\_reports\\_and\\_iar/submitted\\_biennial\\_reports/application/pdf/french\\_biannual\\_report.pdf\\_-\\_adobe\\_acrobat\\_pro.pdf](https://unfccc.int/files/national_reports/biennial_reports_and_iar/submitted_biennial_reports/application/pdf/french_biannual_report.pdf_-_adobe_acrobat_pro.pdf)

<sup>9</sup><http://www.rla.org.uk/landlord/guides/minimum-energy-efficiency-standards.shtml>

## EXAMPLE 2: Fostering innovation through cross-governmental support: Living Lab Housing Renovation in Flanders, Belgium

The Living Lab Housing Renovation programme is financed by the Flemish Innovation Agency, with a total budget of €6 million, and was set up as result of a cross-governmental dialogue among ministries and administrations of innovation, energy, (social) housing and financing, and local authorities. The main objective is to initiate innovative, scalable and replicable renovation concepts that make deep energy renovation affordable.

The Living Lab programme plans research, development and demonstration activities in eight pilot cases, representing the most common housing typologies in Flanders. Local governments, social housing corporations, research institutes and private actors from the construction value chain are involved.

In addition to the pilot cases, a knowledge platform is being developed, responsible for the central coordination and monitoring of projects, quality control and knowledge management.

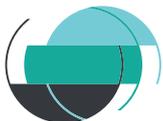
<http://www.iwt.be/subsidies/proeftuinbouw>

<http://www.kennisplatform-renovatie.be/>

### Policy recommendation – Foresee a harmonised energy renovation target at EU-level

**EU** **Establish a long-term deep energy renovation target and make public funding conditional on performance achieved.** This target should set a clear energy performance ambition level, provide insight on the timing to achieve this level, and harmonised to a certain degree across member states. Mandatory requirements on measures such as renovation speed, quantity or energy performance should be aligned with this target. Since each member state proceeds at a different pace and has different conditions, it should be up to individual countries to define how to achieve the harmonised target.

**NATIONAL** Incentive programmes could then make public funding conditional on the level of energy performance achieved. This would require developing a unified performance measurement standard that could also be used by financial institutions (eg, to assess the risk of renovation investments) and by governments to assess which projects are eligible for public funding.



## 2. BUSINESS MODEL

### Key success factor 3 – Start from the final energy target when creating a renovation service

**When designing an optimal and innovative solution framework, it is necessary to start from the goal**, such as net zero energy renovation in the case of the Dutch Energiesprong project. This avoids the current unsatisfactory situation whereby the energy performance levels reached depend on building professionals' competences and habits.

To enter a market successfully with a new solution, **an appropriate entry point is needed**. For example, social housing corporations were the primary entry point for Energiesprong since they provided the scale that was needed to make the solution feasible, while limiting the number of actors involved in the early stages.

The entry point of new products and services will vary depending on the local context and on the building or client type the model is targeting; for example, they could be based on the construction period of the building/housing stock. The EU renovation market is extremely diverse nationally and even locally. To scale up a new solution, it is therefore crucial to explore and map the context it is embedded in, taking into account factors such as the financial situation of consumers, the legal context, ownership and building characteristics. The entry point should be selected that offers the best prospects for future market expansion.

### Key success factor 4 – Create a facilitator role

In every new market, **a facilitator or an initiator plays a key role in initiating a project and helping create the conditions to make it work**. This role can be played by the local government (see next section), the private sector (eg, large housing corporations), local NGOs or a combination of these. Choosing the right facilitator will strongly depend on the local market conditions.

### EXAMPLE 3: Create a facilitator role - Energiesprong in the Netherlands

The Energiesprong project, supported by the Dutch government, aims to implement a net zero energy concept for the existing social housing stock. The aim is to refurbish 111,000 rental houses to zero net energy by 2020, to be paid for by energy cost savings over a 30-year period. The project also aims to develop state-of-the-art renovation methods to be scaled up to industrialised production levels using prefabricated building elements and replacing all major energy-consuming appliances. The project has created a large market for easy-to-install, customised building shells.



Energiesprong has positioned itself as an independent actor, driving and coordinating other stakeholders to jointly develop all aspects of their market solution. This approach is now gaining traction in the United Kingdom and France.

<http://www.energiesprong.eu/>

### Policy recommendation – Establish a dynamic legislative framework

**EU** **CREATE A DYNAMIC LEGISLATIVE FRAMEWORK THAT ALLOWS FOR THE DEVELOPMENT OF NEW PRODUCTS, SOLUTIONS AND BUSINESS MODELS AND CAN BE FLEXIBLY ADAPTED AS THE MARKET EVOLVES.** The policy framework should not define one approach to achieving the target or benchmark for energy renovation performance levels, but create dynamic legislation that enables innovation in business models (such as new aggregated services that improve quality and lower costs). It should be able to adapt to market evolutions and to successful outcomes of pilot projects, and allow for the creation of integrators or facilitators (see Examples 4 and 6). Guidance on new financing schemes could be included in such a framework, as well as clear rules on how new players – including from other industries – can enter the market.

**NATIONAL**

## 3. VALUE CHAIN ECOSYSTEM AND ITS LEADERSHIP

### Key success factor 5 – Open up the value chain for innovators

**Inviting innovators from within or outside of the construction value chain to join ecosystems can help speed up the diffusion and change necessary to scale up and accelerate deep energy renovation.** Innovators from other sectors (such as the car industry or IT) can bring new ideas and share what they have learnt. The insights and technologies they bring can trigger a surge in the innovation process. The IT sector, for example, has a large role to play in enabling innovation in the production process and collaboration within the ecosystem of the construction sector, through tools such as Building Integrated Management Systems, 3D scanning, Computer Numeric Control and user interfaces. The important leadership role of inviting outside innovators into ecosystems can be taken on by different stakeholders, including government, third parties and construction companies.

### Key success factor 6 – Empower local authorities in (pilot) projects

When developing pilot projects in Europe, it is crucial to empower and enable local authorities since they often act as catalysts in mobilising the value chain. Many local authorities have already set higher ambitions on climate mitigation and decarbonisation than the European Union requires and are developing incentive or rollout programmes to push for the accomplishment of these goals. Some programmes are starting in bigger cities, but initiatives such as the Covenant of Mayors demonstrate that many small and medium-sized local authorities have carbon neutral ambitions.<sup>10</sup> A strong collaboration between industry actors and local governments can speed up the development of innovative projects, especially when the city (or region) takes on the role of a facilitator to align industry actors, the market and end-users, and includes them in an ecosystem approach.

<sup>10</sup> Of the more than 6,800 signatories of the Covenant of Mayors initiative, 5,400 are municipalities with fewer 50,000 inhabitants.



### EXAMPLE 4: Involving a facilitator - Project Zero in Denmark

The small Danish town of Sønderborg has implemented a comprehensive, forward-looking strategy that aims to make the area zero carbon by 2029.

The project is based on the belief that education is vital at all levels. Energy consultant courses were organised for municipal service workers and efforts were made to educate the area's tradesmen and unskilled workers in energy renovation techniques. As part of their activities, 1,200 homeowners have received free energy advice.

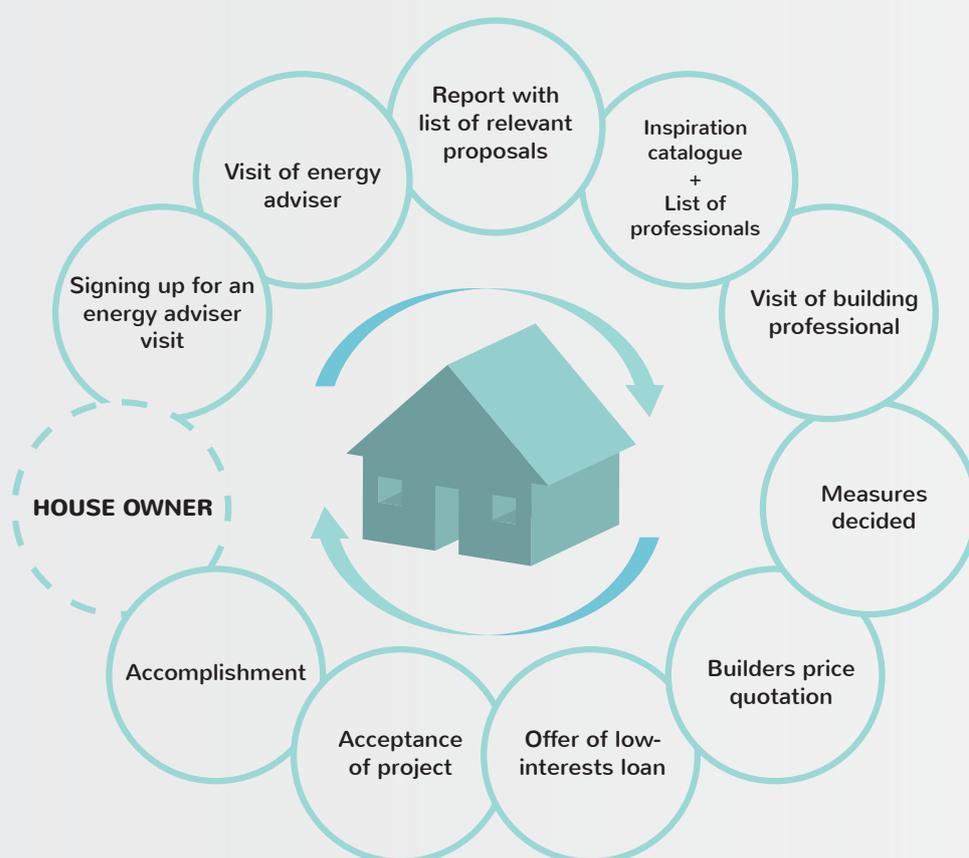


Image source - Request2Action

This campaign drove up interest and demand for contractors who could implement energy renovations. Moreover, financial support was secured by working with the banks in the area – and with building professionals – to understand cash flow in energy renovations and competitive loans for house-owners. This project embodies well the added value of a facilitator.

<http://brightgreenbusiness.com/>

## EXAMPLE 5: Public leadership delivering deep renovation

OSER (Regional Energy Services Operator) is a public energy services company (ESCO) created for its public shareholders in the Rhône-Alpes region in France. This public ESCO was developed as a solution to the perceived weak demand for deep energy renovation and the absence of comprehensive renovation solutions on the market. The initiators believed the public authorities had to play a leadership role in the roll-out of deep energy renovation projects, in order to boost the demand for deep energy renovation in the region.

The ambition of the programme is to invest €78 million in energy renovation and to reach the French low energy consumption standard BBC (Bâtiment Basse Consommation) of 80kWh/m<sup>2</sup>/year for every building. The renovation programme is expected to reduce energy consumption by 40% to 75%, boost the regional economy and create jobs in the construction sector.<sup>11</sup>

### Policy recommendation - Empower the front runners

**EU NATIONAL** **Empowering cities, regions or private initiatives to go beyond the set goals and lead by example can help increase and accelerate the rate and depth of energy renovation.** Across Europe, projects are emerging that are testing the industrialisation of deep energy renovation. These projects could inspire other actors to take up a frontrunner role as well. With a European-wide dissemination platform and a more adaptive regulatory framework, Europe could empower these potential frontrunners even further. A more dynamic policy framework for pilot cases would ease the local legislative barriers (such as urban, energy performance or privacy legislation) that many pilots encounter. Providing the pilot cases with the freedom to draw outside the lines of strict regulations could improve their outcomes and pave the way for more innovation. Regardless of whether they are private, public or PPP initiatives, they would all benefit from widespread sharing of best practices and more dynamic legislative frameworks.

## 4. MARKETING AND AWARENESS RAISING

### Key success factor 7 – Switch from a product-centred to an end-user-centred focus

**Understanding the perspectives and experiences of building users** is key to creating demand for deep renovations. Building users' expectations and wishes are often not in line with or are not initiated by the CO<sub>2</sub> or energy-saving benefits that such renovations bring. For example, in a survey presented in the study Healthy Homes Barometer 2016, 14,000 Europeans from 14 countries were asked to define the reason for renovating their homes. "Reducing energy costs" scored high, but so did "improving overall wellbeing at home". In the Dutch Energiesprong project, what building occupants liked most about their renovated

<sup>11</sup>[http://cityinvest.eu/sites/default/files/library-documents/Model%20SPL%20OSER\\_Regional%20Energy%20Services%20Company\\_final.pdf](http://cityinvest.eu/sites/default/files/library-documents/Model%20SPL%20OSER_Regional%20Energy%20Services%20Company_final.pdf) ces%20Company\_final.pdf



net zero energy homes was the deeper windowsills, the new kitchen and the fact that the house no longer looked like public housing. User expectations and habits are also evolving in commercial buildings, as offices become flexible workspaces through practices such as “hot-desking” and retailers respond to the popularity of online shopping by focusing more than ever on the consumer’s entertainment and experience. Building users involvement in the project/programme conception is therefore critical to ensure its successful uptake.

### EXAMPLE 6: The Uber model – a digital platform connecting demand and supply

Uber sells itself as a reliable, user-friendly and economical option to other means of transportation. It provides a service that is easily accessible and transparent. From a logistical point of view, it runs smoothly and it allows additional services such as matching people heading in the same direction and turn multiple rides into one.

The same strategy that makes Uber such an attractive service could be applied to a platform connecting demand for and supply of deep energy renovation. A third party – private or governmental body – could set up a user-driven platform like Airbnb or Uber where end-users could launch requests for renovation and “integrators” make proposals to meet demand. The platform could include a peer-to-peer review and even third-party quality control of the integrators to boost customer trust. The role of the integrator company is similar to the role that architects and general contractors play in new build today.

### Key success factor 8 – Build market confidence for industrialised renovation

**Branding and quality assurance are key ways to build market confidence.** Today the majority of renovations are carried out in a staged manner, combining several smaller local contractors. Industrialised deep energy renovations – where one contractor provides a turnkey renovation using mainly prefabricated modules – are still fairly a new terrain within the construction sector. In the newly built segment, this turnkey approach is more common and integrated. To encourage a much broader adoption of this approach in renovation as well, it is crucial to build consumer trust. This can be done through branding combined with quality assurance frameworks for products, systems and companies. Homeowners and occupants are more inclined to work with a company or institution that is operating within a quality framework.

Governments can increase market confidence by acting as an objective third party or as a facilitator setting up the appropriate quality framework. For example, in the Flemish region of Belgium a quality framework was set up as part of a subsidy programme for cavity wall insulation. As a result, installations increased annually by 15% and customer satisfaction grew to 96%. Half of the homeowners indicated that without the quality framework, they would not have undertaken the cavity wall insulation.

### EXAMPLE 7: Increasing the competences of building professionals in near zero energy building (nZEB) design and construction

By creating an Open Training Platform and Qualification Scheme for professionals in the building sector, the European PROF/TRAC project intends to overcome competence-related barriers to deep energy market transformation. Such barriers include limited knowledge and skills in energy-efficient building design and nZEB principles, lack of collaboration between the different disciplines and professionals, lack of harmonised certification and qualification schemes, and lack of skills-mapping and qualifications for the specific subject and target groups.

The PROF/TRAC platform targets technical experts, architects and managers involved in nZEB design and construction. The developed European qualification scheme will be part of a life-long learning process for continuous development and training of professionals.  
[www.profrac.eu](http://www.profrac.eu)

#### Policy recommendation – Steer funding from investment to guiding

**EU** **Use public funding to guide building owners through the renovation process.** Public funding is traditionally used to lower the upfront investment when executing energy renovation measures. While this is a proven incentive, it does not always generate the most rational solution or most holistic approach. An interesting alternative or complementary approach is to provide guidance to building owners through tailored advice. An energy advisor could provide objective and easy-to-understand information and personalised support to building owners on what a rational approach for their energy renovation might be. Project Zero in Sonderborg, Denmark, has shown that this approach motivates a far larger share of owners to choose an energy renovation than in cases when they only had a financial incentive. These advisors can also support the tendering process and provide contacts of qualified suppliers and building professionals.



## 5. FINANCING MODELS

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### Key success factor 9 – Create new financing products with a long-term perspective

**Financial institutions should market new financing products tailored for deep energy renovations.** The emphasis on classical mortgages for real estate loans makes it difficult for a majority of the population to obtain the finance they need to engage in a deep energy renovation. More flexible financial products could speed up the renovation rate and shift renovations from the current staged approach to a fully deep renovation. These could be similar to the financing products that the automotive sector provides, such as leasing contracts or low-interest short-term loans. Third-party investment under an ESCO format or linking a mortgage to the property and not to the owner are also examples of potential solutions.

### EXAMPLE 8: Driving new financing for energy efficiency investments

The European Energy Efficiency Financial Institutions Group (EEFIG) has published a report that provides key recommendations to policy makers and market participants in the building sector, industry, and small and medium-sized enterprises (SMEs), in order to trigger more investments in energy efficiency.<sup>12</sup> The recommended actions include – but are not limited to – market, economic and financial actions such as enforcing existing buildings regulations, developing standards, exerting concerted and consistent regulatory pressure to improve the energy efficiency of buildings, and leveraging private sector finance through optimal use of European Structural and Investment Funds and Member States funds.

The formation of EEFIG was the first time that such a broad group had been brought together. It includes financial experts, policymakers and industry-specific energy efficiency experts. A common vocabulary and a systemic approach was developed by comprehensively defining and prioritising the drivers for supply and demand for investment.

In continuation of the EEFIG 2015 findings, the EEFIG de-risking project is now addressing the fundamentals of energy efficiency investments in the buildings and corporate sectors by developing a common, accepted and standardised underwriting and investment framework for investing in energy efficiency.

<http://www.eefig.eu/>

<sup>12</sup>The report “Energy Efficiency – The First Fuel for the EU Economy” covers buildings, industry and SMEs, with a total contribution of more than 120 active participants, representing finance, policy makers, the building sector, industry, SMEs and energy efficiency market actors.

## EXAMPLE 9: Fostering innovative market solutions through segment-specific guiding

The Finanzforum Energieeffizienz in Gebäuden (EFFIN) initiative focuses on the financial aspects of increasing the energy efficiency of buildings in Germany. The project, led by DENEFF (the German Industry Initiative for Energy Efficiency), provides practical advice for establishing or expanding innovative business models and financing offers for energy-efficient building renovation.

The innovative aspect of this project is how it has analysed and segmented the market by needs and convened stakeholders to develop new products based on this information. The segment-specific guides are aimed at helping four groups of stakeholders with the development of innovative approaches and the implementation of market-related solutions. These four groups are stakeholders in the areas of owner-occupied homes, rented housing, commercial and public authority property.

The involvement of over 70 companies – from the financial services, property and energy advice sectors, as well as providers of energy efficiency solutions and energy suppliers – guarantees the practical feasibility of the solutions developed.<sup>13</sup>

[www.finanzforum-energieeffizienz.de](http://www.finanzforum-energieeffizienz.de)

### Key success factor 10 – De-risk deep energy renovations

#### **Frameworks should be further developed to cover and reduce the financial risk.**

When it comes to funding energy-saving measures, one of the most important barriers for financial institutions is the lack of an official and uniform model that ensures a payback through lower energy costs. There are a number of currently uncovered (perceptions of) risks in the OPEX approach for financial loans. For example, a measurement and verification protocol – often foreseen by an ESCO in the framework of a guarantee on the expected energy savings under a so-called Energy Performance Contract – is complex for conventional financing institutions and therefore perceived as risky. Risk-mitigation models – supported by financial actors or governments – could offer an alternative.

At the European level, energy efficiency de-risking is targeted by the European Fund for Strategic Investments (EFSI), which was launched jointly by the EIB Group and the European Commission to help overcome the current investment gap in the EU by mobilising private financing for strategic investments.<sup>14</sup> An example of an EIB-supported project (with approximately €400 million financed by the EIB) is the innovative approach by French regions of “tiers financement”, established to provide technical and financial assistance to homeowners and homeowner associations for energy-efficient renovations. The project, involving public and public-private entities as well as commercial banks, aims to provide long-term funding to final beneficiaries and reduce project financing risk.<sup>15</sup>

<sup>13</sup><http://www.finanzforum-energieeffizienz.de/praxishandbuecher-tools/ueberblick.html>

<sup>14</sup><http://www.eib.org/efsi/>

<sup>15</sup><http://www.eib.org/projects/pipeline/2015/20150188?lang=fr>



### Policy recommendation – Allow for innovative financing and provide further risk coverage

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**Create a framework to foster innovative financing models** that can reduce risk while developing products adapted to the individual needs and capabilities of building owners and users. To encourage financial institutions to take a longer-term approach, instead of only taking into account the upfront investment in assessing risk, governments need to create a framework that enables these kinds of models. For example, the cost of living could be taken into account when assessing the risk of a loan applicant. Currently, the development of more flexible and innovative financing products is often blocked by financing legislation; due to the banking crisis, for example, the requirements for mortgage loans were tightened, which prevents homeowners from borrowing more for energy-efficient renovations.

It is also important to address the EU and national accounting rules under which Energy Performance Contracts and energy efficient investments are considered by default as gross capital expenditure. As a result of this interpretation, the levels of public debt increase with the energy renovation expenditures, ultimately acting as a barrier for public authorities in several member states that would like to increase energy efficiency in the public space.

National legislation has been adapted in some member states to allow more flexible financing mechanisms favouring deep energy renovations. In the Netherlands, for example, in the context of the Energiesprong project, rental prices are allowed to increase for homes that have undergone net zero energy renovations. The United Kingdom's Green Deal allows loans to be connected to the property rather than the owner.

## 6. TECHNICAL SOLUTIONS AND PRODUCTS

### Key success factor 11 – Develop renovation solutions integrating the buildings interaction with the energy system

In the buildings sector, new construction methods as well as energy monitoring and optimisation tools and other technologies such as batteries, PVs or smart charging for electric vehicles, are being deployed. These could drastically reduce the energy needs of both new and existing buildings, and even enable buildings to become net energy producers.

When enabling the transition towards deep energy renovation, policy makers should take into account the **full interaction of buildings in the energy system**. This means considering all the products and services that enable not only reduced energy consumption and renewable production, but also smart and flexible consumption. Examples of these technologies and systems – some of them not yet mainstream – are energy storage, smart control systems, electric vehicle charging points and demand-side flexibility. This would allow for an approach that tackles the whole energy system and buildings' interaction with the grid, and enables a deep energy renovation to transform a traditional building directly into a future-proofed smart energy building. Such full system approaches require cross-sector partnerships, as they integrate technologies from the construction, automotive and energy industries, demonstrating again that the ecosystem of deep energy renovation is much broader than the construction value chain.

## EXAMPLE 10: Solar battery programme, Upper Austria<sup>16</sup>

The region of Upper Austria wanted to kick-start market development of solar batteries and support product and service innovation. A solar battery programme was implemented in September 2014. By mid-2016, more than 400 systems had been installed and over 800 home-owners were participating in the programme.

Within this programme, households with an existing solar photovoltaic (PV) system apply for a subsidy and install a storage battery with the objective of increasing the share of solar electricity used on-site. The financial support helps to lower householders' investment costs. To encourage system and operation quality – which is especially important in early markets – a guarantee of seven years had to be given by the company installing the battery system.

The average installed capacity is about 7 kWh. The subsidy decreased from €800 per kWh in September 2014 to €400 per kWh in 2015. A monitoring programme is assessing the system performance and solar coverage for each participant.

### Key success factor 12 – Design integrated solutions with the end-use in mind

**When developing a new service or product, it is critical to take into account the requirements of the projected end-use,** such as comfort level, work performance, flexible use of space, or entertainment possibilities. Thinking about what the target market could look like in the short and longer term and for what the buildings will be used when designing a product or service is critical. The end-user's behaviour will probably change and the purpose of the target building typology may evolve. These are important questions to ask, especially for commercial and office buildings, since there is a clear and rapid shift happening concerning when and where people work and where companies set up their offices.

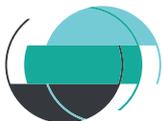
To design and develop these future-oriented integrated solutions, a holistic approach including multiple actors is often appropriate, embedded in an ecosystem approach (see section 3).

### Policy recommendation – Encourage renovation programmes to adopt a systems approach

**EU** **Establish renovation programmes that encourage integrated system solutions rather than individual measures.** Current policy and funding approaches often favour single measures or staged renovations leading to a lock-in effect, rather than pushing for a more holistic renovation. Creating renovation programmes that push for an overall approach, and that consider how the building plays a role within the energy system, can encourage the development of more systemic product and service solutions. The clustering of different buildings could be encouraged by defining subsidy conditions to show that deep energy renovation is best tackled on a larger scale and with a full, systemic approach. An interesting case is the building renovation roadmap being implemented in the German region of Baden-Württemberg, for which financial support is linked to an individual building renovation plan. The roadmap lays out a stepwise, holistic renovation over a longer period, tailored to the owner's preferences and possibilities.<sup>17</sup>

<sup>16</sup>The German KfW Energy-Efficient Refurbishment financing programme has similar support measures - [https://www.kfw.de/PDF/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1\\_Gesch%C3%A4ftsberichte/Gesch%C3%A4ftsbericht-2015-2.pdf](https://www.kfw.de/PDF/Download-Center/Finanzpublikationen/PDF-Dokumente-Berichte-etc./1_Gesch%C3%A4ftsberichte/Gesch%C3%A4ftsbericht-2015-2.pdf)

<sup>17</sup>Similar initiatives are being developed and implemented in France (P2E by The Shift Project) and Belgium, Flanders (RenovatiePact).



## 7. AGGREGATION OF DEMAND

### Key success factor 13 – Aggregate demand to provide sufficient scale

**Aggregating the demand for renovation from several individual building owners can increase market prospects for those involved in selling or supplying new products and services.** The aggregator could be a government body, an independent third party or an actor in the construction value chain (an architect, a real estate company or a pension fund, for example). Aggregating demand is common in the energy industry, for example, for purchasing green power. On a smaller scale, the aggregation principle is common practice for apartment buildings. There are already some larger-scale examples in the renovation market, where several buildings or stakeholders have been aggregated to create a significant scale for energy renovation. Redundant legislative obstacles to these new business models should be revised in order to support this development.

### Key success factor 14 – Drive market transformation through deep energy renovation of public and commercial buildings

An increased rate of deep energy renovation of government and commercial buildings would provide a learning laboratory and kick-start the market for the whole sector. Governments at all levels (EU, national, cities) can encourage market transformation that favours deep energy renovations as they have a large volume of owned and rented property, a high amount of public spending and high visibility. According to Article 5 of the EU Energy Efficiency Directive, energy-efficient renovations of central government buildings should set the example for regional and local governments, as well as open up the market for the residential and commercial building stock.<sup>18</sup> In other regions of the world, commercial buildings have been an easier market segment than the residential sector in which to initiate the transition towards deep renovation, since commercial buildings have a higher turnover and more capacity for investment. Therefore, commercial buildings also have a high potential to take a leading role in encouraging deep renovation, whether or not they are governed by mandatory energy performance requirements.

### Policy recommendation – Public authorities to lead by example

EU	Public authorities should lead by example and plan an integrated energy management <sup>19</sup> approach in order to increase to net zero efficiency levels the energy performance of the building stock they own and occupy. This energy management approach should be designed to overcome the barrier of public buildings often being owned, used, maintained and financed by different departments. Renovation programmes have to be developed within a systemic approach, including innovative financing opportunities such as ESCO-related services <sup>20</sup> , aggregation of demand and innovative public procurement.
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LOCAL	

<sup>18</sup>Article 5 from the Energy Efficiency Directive stipulates that all Member States shall ensure that 3% of the total floor area of heated and/or cooled buildings owned and occupied by central government is renovated each year to meet at least the minimum energy performance targets. This regulation, however, allows for an alternative - less strict - approach and does not include a various range of public buildings such as those from regional or local governments.

<sup>19</sup>The process of monitoring, controlling, and conserving energy in a building.

<sup>20</sup>Experience shows that Public Buildings are particularly interesting for ESCO-related services since the Return on Investment (ROI) for energy saving measures in public buildings can be much longer than for commercial buildings.

# CONCLUSION





## CONCLUSION

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Current policies and building sector initiatives are insufficient to achieve the necessary rate and depth of deep energy renovation. A breakthrough in renovation technologies, processes and the renovation market is required. This calls for solutions that stimulate the market and enable it to reach its full potential. Frontrunner renovation programmes have shown that such a scaling up is possible, especially if a systemic approach is undertaken that includes aggregating demand, considering end-users first, implementing dynamic legislation and providing innovative financing.

As governments and multi-national bodies around the world consider their response to the challenges of climate change, energy security and affordable energy, solution frameworks that develop replicable deep renovation programmes are of paramount importance.

The key success factors and policy recommendations in this report can serve as inspiration and motivation for policy makers at European, national and local levels to foster a systemic approach to deep energy renovation. Such an approach can significantly reduce the timespan and costs of renovation and create economies of scale that make industrialisation possible, as shown in pilot cases such as Energiesprong (Netherlands). While the policy recommendations in this document are directed at the different levels of government, the private sector also has a key role to play in implementing the key success factors identified, notably in business model setting and the development of new products.

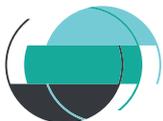
The role of governments can be very broad when it comes to driving deep energy renovation and its industrialisation. It can vary from creating dynamic legislation and frameworks to stimulating R&D and pilot cases through incentive programmes, defining energy performance targets for existing buildings, revisiting the rules of public procurement or setting up a platform and taking up a facilitator role. What is crucial is that policies are aligned around a clear vision.

The European Union has named 2016 the year of delivery for a better Energy Union, which has to significantly accelerate the transition toward an energy-efficient and sustainable built environment. With the EU Energy Efficiency Package being released late 2016, the policy recommendations made here gain even more relevance.

# ANNEX

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## ANNEX I – PARTICIPANT LIST WORKSHOPS 1 AND 2

NAME	ORGANISATION
Niels Schreuder	AGC Glass Europe
Theo van Es	Apeldoorn (NL)
Judit Kimpian	Architects' Council of Europe (ACE-CAE)
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Paul Cartuyvels	Bouygues construction
Cosmina Marian	BPIE
Maarten De Groote	BPIE
Marianne Lefever	Reshape innovation
Oliver Rapf	BPIE
Elise Steyaert	CITYinvest - Climate Alliance
Lieven Vanstraelen	CITYinvest - Energinvest
Stephan Kolb	Danfoss
Susann Bollman	DENEFF
Patty Fong	ECF
Ron Van Erck	Energiesprong
Jasper van den Munckhof	Energiesprong
Jan te Bos	EURIMA
Adrian Joyce	EuroACE
Henning Ellermann	Germany Trade & Invest

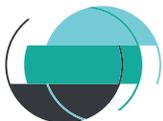
<b>Tatiana Bosteels</b>	<b>Hermes</b>
<b>Julien Dijol</b>	<b>Housing Europe (or ask for best practice)</b>
<b>Julia Reinaud</b>	<b>I24C/ECF</b>
<b>Dominik Bach</b>	<b>KfW</b>
<b>Cédric de Meeûs</b>	<b>Lafarge</b>
<b>Yamina Saheb</b>	<b>Openexp</b>
<b>Peter Graham</b>	<b>PAN Solutions</b>
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<b>Signe Krag</b>	<b>Project Zero – Sonderborg</b>
<b>Céline Carré</b>	<b>Saint-Gobain</b>
<b>Geert Houvenaghel</b>	<b>Siniat</b>



# ANNEX II – LIST OF COMPONENTS

CATEGORY	COMPONENT
MARKETING AND AWARENESS RAISING	Social process of people inspiring each other
	Customer focus to create demand
	Create confidence in a scalable market
	Tenant involvement
	Make it simple for people: a bundled offer based on quality guarantee
	Capacity building and awareness raising
	Trusted/credible brand (effective marketing and performance guarantee)
	Responding to customer/owner expectations
FINANCING MODELS	Reduced risks for banking loans by grouping investors, EIB loans, energy services
	Focused financed products
	Loans connected to the house instead of homeowners
	Wider promotion (EU level) of KfW's progressive lending policy to encourage deeper and multi-element renovation
	Make it simple for people: a bundled offer based on quality guarantee
COST IMPACT	Clear cost-based approach
	Price – the industrial retrofit has to be and can be 5% less expensive
	Lower the cost of deep renovation by reshaping the business model, from material producer to solution sets
SOLUTIONS & PRODUCTS	Energy system that covers remaining needs
	Integrated renovation solutions besides the integrated business model (central production, prefabrication)
	Impact on the grid? Costs?
	Develop products, looking at broad set of technology solutions
QUALITY PERFORMANCE GUARANTEES	Lower the risk perception by showing track record
	Energy performance guarantees
	Quality assurance linked to value creation (e.g. guarantee X energy savings versus added value (market price) and quality (comfort))

<b>BUSINESS MODEL</b>	Risk management strategy
	Full chain approach, meaning if one block is lacking, all fall
	Value chain offer (multi-actor and open innovation)
	Integrated offer
	Smart selection of market segment to start with
	A business model that starts conception at product level instead of project level
	Innovation (and its integration in business models)
	Appropriate business models, including asset value
	Think backwards from goal – there are many possible paths
	Don't see or position industrialisation as objective, but as a means
<b>ACCOUNTING</b>	Off-balance debt deconsolidated
	Adapt the EU system of accounts treatment of EE investments for public EPC programmes (Eurostat rate, CAPEX/OPEX)
<b>VALUE CHAIN ECOSYSTEM AND ITS LEADERSHIP</b>	Knowledgeable project facilitators (public and private)
	Dialogue between all actors
	Put an actor on the market, plus coordinate and drive change for all relevant stakeholders
	Bring in the construction sector, made up of individual craftsmen and SME at 95%
	Collaboration and improved organisation between supply-side actors (e.g. architects, contractors)
Green ambassadors and energy coaches	
<b>LEGISLATION</b>	Use carrots and sticks
	Common nZEB or net ZEB definition and standards (EU/MS) for levels of ambition, plus a definition of deep renovation
	Fiscal incentives for customers
	Regulatory demand-pull
	EU level regulation and strategies (with local flexibility)
	Seem all successful schemes have had clear "government support" Loans – grants
<b>AGGREGATION OF DEMAND</b>	A significant scale of deep energy renovations
	Demand aggregation
	Initial markets
	Ambitions (time, scale). Long-term perspective. Upscaling
	Aggregation of market actors
	Scale typology of buildings
<b>FACILITATION</b>	Switch from architecture to design
	Enable local authorities by adapting technical assistance (such as ELENA) to promote new ways of building
	Coordinated assessment and delivery system (convenience)
	One-stop shopping for all components of the construction value chain, include finance, verification, BL-T warranty



## ANNEX III – LIST OF SUCCESS FACTORS AND INSIGHTS

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### **Other takeaways from the discussion on the Business Model Component:**

- An independent organisation is needed to manage the scheme.
- Start with the right building segment (ownership, construction period, financing model).
- For industry: an integrated product solution, with performance guarantees is important.
- Consider Public Service Obligation (PPP) to initiate the renovation market.
- Include IT in its broadest aspects.
- Measurements and verification can be enablers for banks to support financing of the scheme or the home owners.
- Break down the model by building typology.
- Importance of a legal framework to support large-scale scheme roll-outs.
- Also include non-residential buildings in the implementation of the model.

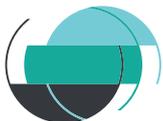
### **Other takeaways from the discussion on the Legislation Component:**

- In some countries (FR, NL, UK), legislation was or is being developed to give the tenant the possibility to finance energy saving measures with the gained energy savings.
- In the UK and NL, there is legislation (on the way) to link the mortgage to the property, and not to the owner.
- In DE, legislation made it possible for social housing organisations to coordinate and manage energy services for their tenants.
- UK and BE-FL have set up energy performance requirements for the rental market.
- With staged renovation, there is a risk for lock-in effects, but it is difficult to have holistic renovation for all existing buildings.
- Is it realistic to demand/provide a 30 years guarantee, does it create an extra barrier, or does it stimulate a higher and deeper renovation rate?
- Where should the focus lie for legislation? Should it be on building level or on the larger system of deep renovation? And how to deal with the difference between designed energy efficiency and real operational efficiency? There is often quite a difference between both, but does a better understanding of this leads to a higher rate and deeper renovation? Could this risk be covered by legislation and how?
- Develop a building passport supporting staged deep renovation overcoming lock-in effects.

### **Other takeaways from the discussion on the Value Chain Ecosystem and its Leadership Component:**

- Importance of leadership within the ecosystem, a role which can be taken on by different stakeholders (e.g., government, third party, construction company).
- In the value chain there are still partners missing today such as grid companies; IT

- companies; clients; non-construction sector players (i.e., outsiders that have experience to share).
- Collaboration for what purpose:
    - Project level – planning phase / operational phase
    - Programme design & market transformation
    - Within the different segments of the value chain and also across the entire value chain.



## ANNEX IV – LIST OF POLICY RECOMMENDATIONS

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### EU LEVEL

- Set long-term target (2050) for the building stock to reach a nZEB performance level
- Expand/revise public procurement rules to allow “integrators” to emerge
- Change public accounting rules
- Require implementation of national renovation strategies
- Allow network owners not to connect everyone to the natural gas network on demand when a decision has been made for a gas transition in that area
- Support existing tools which work well such as technical assistance; drive standardisation (measurement)
- ERDF funding conditional on performance guarantee
- Make subsidies conditional on the level of achieved performance (at EU and MS level)
- Use public funding only to finance zero energy renovation (EU and MS)
- Set the ambition, not the instruments to reach it
- Support best practice sharing (including on public procurement; rules not only based on costs)
- Support innovative solutions
- Review the regulatory framework to allow taking into account non-monetary benefits
- Mandatory renovation requirements or average energy decrease in buildings (+ mandatory GHG target)
- Energy market rules that value flexibility
- Harmonise nZEB definition standards for all MS
- Follow through on the Building Classification Scheme rating buildings: all new buildings must be A+ (++); all renovation projects > 25% of the value of the house need to meet strict energy targets (ex. Increase the energy class of the building by 2, e.g. from D to B)
- Remove the thresholds included in the current legislation

### NATIONAL LEVEL

- Create the enabler (e.g. energy efficiency expert) & demonstrate the benefit of works, thus also supporting implementation on the ground
- Favour holistic approaches and not individual solutions (e.g. look at several blocks of flats rather than just at a single building)
- Take into account transport in a system approach

- Incentivise higher goods when carrying out retrofits
- Shift from “investment” subsidy/grant to “facilitating” grant (subsidy on “how to” & “know how”)
- Define a law and communicate about the evolution of a regulation in order to lead anticipations of supply and demand
- Create a Task Force that coordinates outcomes
- Public decisions in order to lead the initial phase of take-off/ dissemination (include a “in-house” agency dealing with public buildings)
- Allocate budget for a market development team, but select wisely the members and give them freedom to act
- Remove split incentives (landlords to recuperate energy savings / private home owners to attach financing to property)
- Provide a subsidy to advance in energy class
- Have a positive list of certified suppliers and components
- Allow cities/regions to go beyond national targets (empower leaders)
- Allow financial schemes that connect loans to houses
- Review inheritance laws of houses & the age structure of the owners to give houses to an age range, when more renovations happen, e.g. 25-40 years when starting a family
- Innovative financing for pilot projects
- Regulatory signals to phase out worst performant buildings (like in the UK and FR)
- Use public subsidies or Art. 7 obligations (EED) to support information services and visit SFH owners
- Performance guarantee standards
- Skill development
- Staged deep renovation, mandatory when buying a house, not selling or provide opportunities (e.g. short stage before 2020 when EPCs below a certain level, linked with incentives)
- System performance guarantee certification of worker skills and energy advisers (by a government or independent body)
- Policy conjunction of:
  - Facilitated uptake of integrative business a la Sonderborg (e.g. demand and mobilisation)
  - Roadmap for target nZEB trajectory in order for MS to mobilise financial support a la KfW (motivate private capital)
  - Reduce fragmentation across MS for regulation/implementation in order to facilitate the emergence of pre-configured systems and approaches => facilitating adequate supply side and cost reductions for a better return on investment.



## LOCAL LEVEL

- Promote networks of professionals, training, public conferences and meetings
- Create a Centre of Information/Meeting Point where individual owners can meet advisors; where professionals can get data & information on the market and products as well as contacts of other professionals
- Introduce an easy new/good branding scheme/certificate "5-10-15". In 5 years we will save 10% and produce 15% of our energy consumption (at national level as well)
- All cities must have climate targets and a roadmap to fulfil this
- Streamline planning permits by rubberstamping certain voluntary industry standards for retrofits (regional level)
- Give a good example and transform all public buildings into nZEBs
- Pay for the education and operation of energy coaches that help home owners to express their demands and the use of the platform
- Organise visits to demonstration projects for mayors and CEOs to lead by example + local showcases + PPPs to trigger demand and inspire a community involvement







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