



Image 1. Illustration from FME ZEN

POLICY RECOMMENDATION PAPER

Speeding up the implementation of Zero-Emission Buildings and Neighbourhoods through targeted financial policies

Recommendations for national and regional policymakers in the EU

Authors

Alice Pittini, Housing Europe

Andreas Tuerk, Joanneum Research

Angela Greco, TNO

Ann Kristin Kvellheim, SINTEF Community

Inger Andresen, NTNU Norwegian University of Science and Technology

Jannika Aalto, Green Digital Finance Alliance

Niki Gaitani, NTNU Norwegian University of Science and Technology

Victoria Taranu, BPIE Buildings Performance Institute Europe

Authors listed alphabetically.

EXECUTIVE SUMMARY

The transition to zero emission and energy positive buildings, neighbourhoods and communities is key to unlocking the EU's climate and energy ambitions by transforming both new and existing buildings into drivers of decarbonisation. This ambition is also reflected in the recent recast of the Energy Performance of Buildings Directive (EPBD¹), which will be transposed to national legislation by the Member States by the end of May 2026.

Despite increasing maturity of the currently known enabling technologies, significant financial barriers hinder realising this potential at the necessary speed and scale. To address these challenges, several innovative demonstration projects have been developed across Europe as part of the EU's research and innovation funding programmes.

To that ambition, this paper puts forward 10 key policy recommendations for national and regional policy makers for overcoming financial barriers for building renovation and transforming existing buildings into zero emission or positive energy neighbourhoods by 2050. The recommendations are based on experiences and learnings from 8 research and innovations projects in Europe, including 33 demonstration sites around Europe. While the EPBD covers both new buildings and building renovation, these projects and following recommendations made, largely focus on building renovation and transforming existing buildings into zero-emission or positive energy neighbourhoods.

The paper also presents a stakeholder matrix of key built environment actors in building renovation towards zero emission or positive energy buildings and neighbourhoods by 2050. The matrix presents the drivers, barriers and needs of each group to broaden the understanding of what needs to be regulated and who needs to be incentivised.

¹ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202401275&pk_keyword=Energy&pk_content=Directive

INTRODUCTION

The recent recast of the Energy Performance of Buildings Directive (EPBD) has introduced the concept of zero-emission buildings and neighbourhoods as key to unlocking the EU's climate and energy ambitions. The goal from the EPBD is to have a decarbonised building stock by 2050. All new buildings should be zero-emission buildings by 2030, and existing buildings should be transformed into zero-emission buildings by 2050². We are now facing the challenge to transform one of the largest sources of emissions, buildings, into a powerful driver of decarbonisation. At the same time, the transformation provides the opportunity to significantly enhance residents' wellbeing and foster a stronger sense of community.

Many characteristics and the challenges for zero emission buildings and neighbourhoods and Positive Energy Buildings (PEB) and Positive Energy Districts (PED) are similar, and experiences from all such projects are presented in this paper. While most enabling technologies are increasingly mature, lack of finance remains a major barrier to realising this potential at the necessary speed and scale. Beyond that, the built environment is a complex network of stakeholders and mixed incentives that must align to accelerate the decarbonization of the EU's housing stock.

To address these challenges, several innovative demonstration projects have been developed across Europe as part of the EU's research and innovation funding programmes. These projects serve as both testing grounds and lighthouses to guide the broader adoption of net zero emission buildings and neighbourhoods.

The EPBD will be transposed to national legislation by the Member States by the end of May 2026. In order to realise its ambition, it is crucial that this be done in a strict and harmonised manner. This paper puts forward 10 key policy recommendations for national and regional policy actions needed to overcome the financial barriers that hinder developing and implementing similar initiatives. While the EPBD covers both new buildings and building renovation, the challenges and therefore recommendations of this paper focus on building renovation and transforming existing buildings into zero-emission buildings by 2050.

This policy recommendation paper is a result of a policy workshop held during the EU Sustainable Energy Week 2024. It represents the experiences and learnings from the following research and demonstration projects:

FME ZEN (Research Centre on Zero Emission Neighbourhoods in Smart Cities), ARV, syn.ikia, Cultural-E, EXCESS, SUPER-i, oPEN Lab and the Energy Efficient Mortgages Initiative (EEMI).

² 'zero-emission building' (ZEB) means a building with a very high energy performance, as determined in accordance with Annex I, requiring zero or a very low amount of energy, producing zero on-site carbon emissions from fossil fuels and producing zero or a very low amount of operational greenhouse gas emissions, in accordance with Article 11;

At least **10 % lower than** the total primary energy use of the **national threshold for NZEB** (as of end May 2024).

BUILT ENVIRONMENT ACTORS, THEIR NEEDS AND INTERESTS

Many stakeholders play a role in renovation projects towards zero emission building or neighbourhood. This is due to the complexity of the built environment as well as in the implemented zero emission / energy solutions. Understanding what drives each group as well as what keeps them from taking action is helpful in designing impactful and well targeted policy actions.

The different stakeholders can be categorised as:

1. National, regional and local policy makers
2. Society and NGOs
3. Construction and installation companies, professionals involved e.g. architects, engineers, planners
4. Tenants and building owners
5. Investors / banks / green funds
6. Technology providers
7. Utilities, DSO and TSO
8. Research and academia

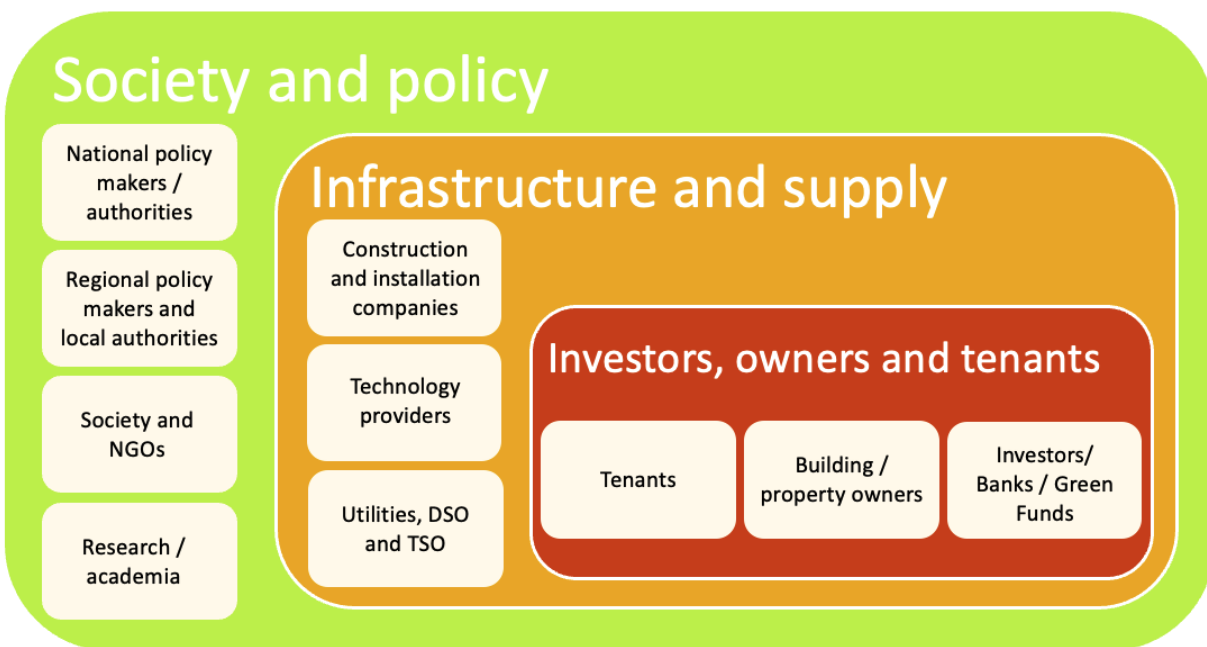


Figure 1: Built environment actors. Adapted from FME ZEN

There is some overlap between these categories. For example, a municipality will act as a local authority in translating the Planning and Building Act into practical use. Municipalities could also be in all roles mentioned under "owners" in the figure, and they could also have ownership interests in actors sorted under "infrastructure and supply" which means this is a complex picture. A citizen could also have several roles such as a building owner or an occupant/tenant in addition to citizen.

Financing is a highly relevant aspect to enabling net zero buildings and neighbourhoods. Therefore, investors and financiers are important stakeholders as they provide the necessary financial capital.

However, investors typically seek the shortest possible payback times and may not be interested in very innovative technologies that increase risk and may reduce profitability. An important new driver is the EU taxonomy that may incentivise investors to also include projects with higher environmental and social gains into their portfolio. Also, pension funds and other institutional investors that run real estate development departments may have a more long-term perspective on revenues.

In general, construction companies often are not very interested and incentivized in using new technologies, due to uncertainties about risks and the lack of knowledge and skills on how to implement them. However, there are a few frontrunners in the EU as noticeable exceptions gaining a competitive advantage by offering innovative and sustainable buildings. For companies driven by low CAPEX and smaller companies whose core business does not include innovative technologies, there may not yet exist key drivers for participating in zero emission building and neighbourhood deployment. Focused on a low CAPEX and core business (not including innovative energy supply technologies) they may not be yet key drivers for net zero building and neighbourhoods 'renovation.

Owners and operators of buildings such as real estate companies or housing associations are interested in a low OPEX, providing benefits to owners or tenants. They often, however, are risk-averse to new technologies and fear warranty issues and higher maintenance costs, due to lack of experience. They may seek affordability over sustainability. Installation companies can prove to be a barrier concerning the installation and commissioning of new technologies, due to a lack of skilled personnel, or concerns regarding liabilities.

A possible solution between short- and long-term interest could be an integrator that takes care of the construction and maintenance process as well as moving to a building-as-a-service approach. Energy suppliers may not be willing to supply innovative technologies in case the district already is supplied by them with a low carbon infrastructure, such as district heating. Importantly, zero emission neighbourhoods allow for a wider selection of renewable energy systems compared to nearly zero emission buildings.

Stakeholder matrix

	Interests	Needs
National policy makers/ authorities	Decarbonising the building stock, Compliance and implementation of EU regulation and policies	Good understanding of costs and benefits, as well as externalities and needed subsidies
Regional policy makers and local authorities	Decarbonising the building stock, Improving area's liveability	Knowledge and capacity building
Research/ academia	Developing innovative and higher-performance solutions, Value creation, Knowledge building: optimisation and M&V methodologies	Clear research questions and drivers, Research funding
Society and NGOs	Improving society and increasing wellbeing, Transitioning into a sustainable low carbon society	Policy support, Funding, Public support
Utilities, DSO and TSO	Demand for affordable renewable energy, Security of supply	Early involvement into district planning, No redundancy of infrastructure
Construction and installation companies, and professionals involved	Low CAPEX	Derisking, cheap finance, Skilled workforce, Predictable policy environment
Technology providers	Deliver affordable installations, Value creation	Liabilities cleared, Skilled workforce, Predictable policy environment
Investors / Banks / Green Funds	ROI, Low CAPEX	Derisking, Predictable policy environment
Building / property owners	Low OPEX, Maintaining or increasing property value	Derisking, Financing
Tenants	Increase in comfort, wellbeing and decrease in energy bills as well as decarbonizing the building stock (environmental concerns)	Agency and decision-making power, Affordable solutions, Information and education, Neutral and science-based information of the performance of available solutions for their buildings and neighbourhoods.

Table 1: Built environment stakeholder matrix and identification of interests and needs

POLICY RECOMMENDATIONS

This paper puts forward the following policy recommendations for national, regional and local authorities for transforming existing buildings into zero-emission buildings by 2050.

- 1. Design accessible subsidies**
- 2. Target public funds to low-income households**
- 3. Mix public funding with private investment to scale up renovation**
- 4. Develop financing, governance and regulatory schemes that enable collective actions**
- 5. Enable systemic, modular and dynamic solution funding**
- 6. Ensure regulatory and funding stability**
- 7. Reduce taxes on skilled labour**
- 8. Enhance policy coordination and alignment**
- 9. Harmonise energy sharing and prosumption regulation across the Member States**
- 10. Integrate circularity and other environmental KPIs into public procurement**

1. Design accessible subsidies

EPBD Article 17 states that “*Member States shall assess and, where appropriate, address barriers related to up-front costs of renovations.*” In line with this provision, national and regional financial subsidies should be designed to be more accessible, such as offering upfront payment options and point of sale discounts rather than relying solely on tax rebates. This approach addresses cash flow challenges and encourages broader participation, ultimately leading to greater uptake of subsidised solutions.

In addition to financial accessibility, the process of navigating available subsidies is often complex, making them difficult to locate, understand and utilise. To improve access, better coordination of existing schemes and simplified application procedures are crucial. This could be done, for instance, through the EU wide network of one-stop shops (OSS), as proposed in the revised EPBD. The OSSs can serve as a central entry point for technical and practical assistance and be integrated with various public and private financing options.

2. Target public funds to low-income households

Prioritise public funding for low-income groups and those who cannot pay to ensure equitable access to energy efficiency measures and decarbonisation initiatives. This provision is included in Art 17 of the EPBD:

“When designing financial support schemes for building renovation, Member States shall consider whether to use revenue-based parameters” and is crucial to guarantee the Commission’s promise of a fair energy transition that “leaves no one behind”. To ensure access to as well success and uptake of these measures and initiatives, national and regional subsidies should be designed in a way that prioritises low-income groups and households.

The national Social Climate Plans (SCPs) should include provisions and earmarked proportions for vulnerable groups. These plans are to be submitted to the Commission by 30 June 2025 and detail how the Member States plan to use the Social Climate Fund funding, as included in Art 17 of the EPBD,

generated from the extension of the ETS scheme to transport and buildings (up to €65 billion in EU funding over the 2026-2032, together with a 25% co-financing from the Member States³). Most of current schemes place a financial burden due to high upfront costs, which can be a barrier for low-income populations⁴. Expanding subsidies and loans will lower this barrier and stimulate wider participation in sustainability efforts.

3. Mix public funding with private investment to scale up renovation

Use public funds to catalyse private finance through mechanisms such as energy performance contracts with third party financing and blended finance instruments to scale up renovation. Greater focus on de-risking solutions is also needed. This includes public guarantees for private loans and mechanisms to support pioneering private companies that are developing new technologies and solutions crucial for achieving EPBD's ambitions, despite the high risk of failure. This is particularly important in a high-interest rate environment as a key measure to bring down the cost of borrowing.

There is also a need for EU or national mechanisms to derisk investments and increase investor confidence, as well as for innovative financial and insurance instruments and solutions. The role of Invest EU – co managed by the EIB and the national public banks – should be strengthened.

The Super-i project has developed cost-benefit analysis to assess the potential of different types of contracts/financial mechanisms to fund energy efficiency intervention in social housing. Costs and benefits are analysed for all the involved parties in the project pilot sites, namely social housing companies, ESCOs, tenants, private owners, financial institutions and civil society.

4. Develop financing, governance and regulatory schemes that enable collective actions

Financing, governance and regulatory schemes that target collective actions on a community or neighbourhood level are needed. The EPBD mentions non-financial barriers in this regard:

“Member States shall take appropriate regulatory measures to remove non-economic barriers to building renovation. With regard to buildings with more than one building unit, such measures may include removing unanimity requirements in co-ownership structures or allowing co-ownership structures to be direct recipients of financial support.”

Collaboration between local authorities and existing energy communities and other local and established community structures can catalyse action by streamlining communication and coordination as well as supporting community buy-in. Where such structures are not available or accessible, they can be co-created. However, the absence of a responsible entity for managing collective energy solutions at the neighbourhood level, combined with fragmented financial schemes, hinders the prioritization of energy-positive measures on a larger scale. Appointing bodies responsible for coordination can catalyse more effective energy transitions⁵. There are examples of creating designated energy managers or entities responsible for coordinating and managing neighbourhood-level energy solutions. The Energy Manager in the syn.ikia demonstration project in Barcelona, Spain is a potential model to replicate. The

³ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698777/EPRS_BRI\(2021\)698777_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/698777/EPRS_BRI(2021)698777_EN.pdf)

⁴ Kerstens, A., & Greco, A. (2023). From buildings to communities: Exploring the role of financial schemes for sustainable plus energy neighborhoods. *Energies*, 16(14), 5453.

⁵ Rubio Agulló, C., Qian, Q. K., & Greco, A. Orchestrating the Heat Transition: Collective Stakeholder Decision-Making in Dutch Low-Carbon Heating Projects. <https://doi.org/10.2139/ssrn.4884151>

role of ESCOs could also potentially be enhanced by providing targeted incentives, as seen in Spain, where they help bring energy efficiency solutions to the market. These companies can serve as key actors in coordinating collective actions for sustainability transitions.

Energy performance contracting is a mechanism to finance energy efficiency measures and renewable energy installations through an energy service company instead of requiring upfront payments from homeowners – a significant and well-known barrier to renovations. Energy performance contracts on a neighbourhood level, connected to municipal planning and regulations are a model that could unlock renovation on a neighbourhood level, with the support of enabling governance schemes.

Another aspect would be changing voting procedures within homeowners' associations, where sometimes a few critical voices can influence everyone and therefore the outcome. In the oPEN Lab project, this barrier was overcome in Tartu by individual instead of collective voting. In another demonstration case in Spain, the ARV project is developing a public-private-partnership, where large-scale renovation of multi-family buildings is enabled through a combination of capacity and consensus building, administrative support and access to financing options.

5. Enable systemic, modular and dynamic solution funding

Policy makers should design funding schemes to support systemic solutions and technology packages instead of single measures only. Funding for serial or modular, scalable renovation is not available in most Member States, but only for individual technologies. Where they are available, they contribute to the realisation of demonstration projects. This is the case for instance in Estonia, where the oPEN Lab demonstration site in Tartu will benefit from such subsidies.

Some technologies, which may not be cost-effective in themselves, may be key enablers for implementation. This is the case in Austria and the EXCESS project, where photovoltaic thermal (PVT) solar panels were installed. PVT solar panels are a type of solar panel that generates both electricity and heat. They are more expensive than conventional solar panels, but in combination with geothermal heat pumps require less deep drilling and save costs. Another example is prefabricated multifunctional facades with solar PV generation, heating/cooling while providing insulation. Similarly, in Utrecht, industrial prefabricated and modular component renovation approach integrating construction, energy and climate installations is being demonstrated in the ARV project.

Packages of individual renovation solutions to achieve more ambitious renovation should also be incentivised. To that end, the Cultural-E project developed solution packages and provided tools for performance calculation⁶. Successful experiences of financing can be found in Flanders, and in Germany with KfW (a German state-owned investment and development bank), where the level of grant and the total amount of loan is relative to the energy performance achieved.

6. Ensure regulatory and funding stability

Ensuring a steady and predictable regulatory and subsidy environment that enables long-term investment in line with EPBD's long-term vision of transforming existing buildings into zero-emission buildings by 2050 and mitigates volatility, economic and election cycle changes is essential for a successful transformation of the building sector.

⁶ <https://zenodo.org/records/8273531>

On an EU level, many funding schemes for financing net zero emission buildings and neighbourhoods, such as the EU's Recovery Fund, are temporary measures. For example, the NextGenerationEU funding package has been crucial in financing renovation activities and projects across the continent but cut-off dates for funding availability are confusing and disruptive. In order to reach the climate and energy goals in the built environment, the Member States and the EU must guarantee long term stability and continuity of funding.

7. Reduce taxes on skilled labour

Reduce taxes on skilled labour and increase them on emissions and harmful industries, such as fossil fuels. The construction sector in the EU faces a persistent labour shortage ⁷ resulting in delays in multiple renovation and construction projects. The high cost of labour, coupled with the lack of skilled workers capable of implementing novel and complex solutions, exacerbates this issue and means that often underskilled labour is used. Lowering taxes on skilled labour can lead to more competitive salaries, thereby making the sector more attractive to potential employees and helping to address the workforce shortage.

It should be noted that this can have a big impact on the budget deficit or availability of public funding. Therefore, any revisions in national taxation policies should be balanced with the assessment of favourable taxation and other subsidies for harmful industries, such as fossil fuels.

8. Enhance policy coordination and alignment

National governments should ensure coordination and policy dialogue between the National Building Renovation Plans (NBRP) and the Social Climate Plans (SCPs), as well as other synergetic policies, to ensure ambition and implementation can be achieved. According to the EBPD, the Member States should submit their NBRPs by the end of 2026. These plans should put forward concrete policies that, in line with the SCPs, provide safeguards to vulnerable populations and ensure just transition.

Beyond energy policy, revising national educational policies and vocational and workforce retraining priorities is essential. This should be coordinated to support employment and job creation to address the labour shortage in the construction sector.

9. Harmonise energy sharing and prosumption regulation across the Member States

Complementary to the ambitions of the EPBD, all Member States should have in place legislation and regulatory frameworks that enable and incentivise shared energy production and prosumption, and this should be harmonised across the EU. Regulation on energy sharing varies widely across the different EU countries and in some countries, comprehensive and permissive legislative frameworks for prosumption and jointly acting renewable self-consumers do not yet exist. Furthermore, issues such as legal establishment, spatial limits, and technical requirements create challenges and confusion.

For instance, the RED III⁸ directive states that Renewable Energy Communities (RECs) should be primarily value-driven rather than focusing on financial profits. Its implementation varies across the Member

⁷ https://www.ela.europa.eu/sites/default/files/2024-05/EURES-Shortages_Report-V8.pdf

⁸ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ:L_202302413

States, with some countries, such as Austria, opting for a strict interpretation of a non-profit nature of energy communities, while others, such as Greece, allow profit to a certain extent and under certain conditions. Further guidance should be provided to MS on the level of possible profits allowed, which could boost investments and business model innovation on a pan-European level and the generation of widely applicable blueprints for new business models.

10. Integrate circularity and other environmental KPIs into public procurement

Mandate the inclusion of circularity and environmental KPIs in public procurement processes on city and regional levels not just for new buildings, but also renovations.

While the concept of net zero emissions is relatively new, the discussions in the last year have centred on positive energy buildings and districts. Embodied emissions or practices of material and building component reuse have been largely neglected. This has resulted in low or non-existent demand for circular solutions and their cost competitiveness. In an industry where cost is the primary driver, circular construction and renovation are not yet able to compete with more established, linear methods.

EPBD article 7 states that life cycle Global Warming Potential (GWP) of all new buildings as of 2030 should be calculated and disclosed through EPC, and limit values set by Member States based on common methodology. Provisions for building renovation are not mentioned. To that point, circularity aspects need to be integrated in regional mandates as a key component of net zero buildings and neighbourhoods where renovation plays a role in delivering outcomes. Leveraging the volume of public procurement can drive sustainable innovation in the construction sector by sending clear demand signals and ensuring market stability. Without this, embodied emissions from renovation risk offsetting some of the gains from successful implementation of the EPBD.

About this report

This policy recommendation paper is a result of a policy workshop held during the EU Sustainable Energy Week 2024. We thank the following research and demonstration projects and partners for sharing their experiences and learnings.

FME ZEN⁹

FME ZEN is the Research Centre on Zero Emission Neighbourhoods in Smart Cities in Norway. It works to create solutions for the zero emission buildings and neighbourhoods of the future.

ARV¹⁰

ARV is a H2020 EU-funded project aiming at creating climate positive circular communities in Europe and increasing the building renovation rate in the continent.

syn.ikia¹¹

syn.ikia is an Horizon2020 EU-funded project with a mission to increase the share of sustainable neighbourhoods with surplus renewable energy, resilient and affordable living places and communities in different contexts, climates and markets in Europe.

Cultural-E¹²

Cultural-E is an EU-funded project, which aims to define modular and replicable solutions for Plus Energy Buildings, accounting for climate and cultural differences, while engaging all key players involved in the building life cycle.

EXCESS¹³

The Horizon2020 EU-funded EXCESS project will develop new low-cost PEB solutions for the European housing market. It will improve materials, technologies and integrated technological systems.

SUPER-i¹⁴

SUPER-i is a Horizon2020 EU funded project whose objective is to support the funding of energy efficient refurbishment of social housing stocks across Europe while increasing the share of renewable energy in the final energy consumption.

oPEN Lab¹⁵

oPEN Lab is an EU-funded project leading the transition to Positive Energy Neighbourhoods (PENs) in Tartu (Estonia), Pamplona (Spain) and Genk (Belgium).

Energy Efficient Mortgages Initiative (EEMI)¹⁶

The EU Horizon 2020 funded Energy Efficient Mortgages Initiative (EEMI) has been the catalyst for the growth of a new, integrated, multi-stakeholder energy efficient mortgage ecosystem since its inception in 2015. The EEMI seeks to introduce a greener, more sustainability focused means of buying, renovating and living in homes.

⁹ <https://fmezen.com/>

¹⁰ <https://greendeal-arv.eu/>

¹¹ <https://www.synikia.eu/>

¹² <https://www.cultural-e.eu/>

¹³ <https://positive-energy-buildings.eu/>

¹⁴ <https://super-i-supershine.eu/super-i/about/>

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¹⁶ <https://energyefficientmortgages.eu/>

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