REDUCING
HOUSING
INEQUALITIES

National report on the regulatory system of environmental and energy policies: Spain

An extract from Deliverable 3.2, *'National reports on the regulatory system of environmental and energy policies'*, of the ReHousIn project

August 2025

FOREWORD

This report is an extract from Deliverable 3.2, National report on the regulatory system of environmental and energy policies', of the ReHousIn project, which examines the economic mechanisms, norms, and institutional and contextual factors that shape the Environmental and Energy Policies (EEPs) in nine European countries.

The full version of the deliverable is available here.

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The ReHousIn project aims to spark innovative policy solutions towards inclusionary and quality housing. To achieve this, it investigates the complex relationship between green transition initiatives and housing inequalities in European urban and rural contexts, and develops innovative policy recommendations for better and context-sensitive integration between environmentally sustainable interventions and socially inclusive housing.

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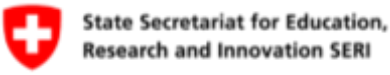

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NATIONAL REPORT ON THE REGULATORY SYSTEM OF EEPs IN SPAIN

1 Executive summary

Spain's retrofitting initiatives have been heavily influenced by EU regulations, particularly the Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED). The introduction of the Technical Building Code (CTE) and Climate Change and Energy Transition Law (2021) set minimum energy performance standards, while programs such as PREE (Programa de Rehabilitación Energética de Edificios) and tax incentives have provided financial support for energy renovations. However, disparities persist in regional implementation, and there is evidence that retrofitting can contribute to gentrification, making housing less affordable for lower-income residents.

Spain's adoption of NBS has evolved through a combination of national legislative frameworks, municipal initiatives, and EU funding. Key regulatory drivers include Law 33/2015 on Natural Heritage and Biodiversity and the National Strategy for Green Infrastructure, Connectivity, and Ecological Restoration (ENIVCRE). Funding is primarily sourced from EU mechanisms such as the European Regional Development Fund (ERDF), Next Generation EU, and LIFE program. Cities like Barcelona and Vitoria-Gasteiz have implemented ambitious greening initiatives, improving biodiversity, reducing the urban heat island effect, and enhancing stormwater management. However, green gentrification has been a growing concern, as these projects often lead to increased property values and displacement of lower-income residents.

Densification policies in Spain have been framed by the Urban Planning Law (2000), the Climate Change and Energy Transition Law (2019), and the Strategic Urban Agenda 2030. These efforts aim to curb urban sprawl, optimize land use, and improve public transit accessibility through transit-oriented developments (TODs) and compact city models. Financial incentives such as tax reductions, public-private partnerships (PPPs), and EU structural funds have been leveraged to promote high-density development. While densification has revitalized urban centers and improved environmental sustainability, challenges include rising property values, socio-economic displacement, and regulatory barriers at regional and municipal levels.

Spain employs a **multilevel governance** framework, with national ministries setting policy objectives, regional governments adapting strategies to local needs, and municipalities implementing projects. However, **fragmentation in governance, bureaucratic inefficiencies, and uneven regional capacities** have led to inconsistent policy implementation. In addition, while EU funding has been critical for these initiatives, its **distribution has been uneven**, favoring wealthier regions and well-funded municipalities.

Spain has made notable strides in environmental and energy policy through retrofitting, NBS, and densification policies. However, the **social consequences** of these initiatives, particularly regarding affordability and displacement, require further attention. To enhance policy effectiveness and equity, Spain must improve governance coordination, expand financial

support mechanisms for vulnerable populations, and ensure that sustainability efforts do not exacerbate socio-economic inequalities.

2 Introduction and methodology

As environmental and energy transitions accelerate under mounting ecological and geopolitical pressure, the question is no longer if transformation will happen – but how, for whom, and at what cost. Spain, like other EU member states, faces binding obligations to decarbonize its building stock, expand green urban infrastructure, and contain urban sprawl. This report aims to trace how climate and environmental policies – often designed at EU or national levels – take shape within the specific institutional, territorial, and housing context of Spain. It looks at how policies travel, adapt, and collide with existing systems of tenure, governance, and inequality.

The report draws on a structured document analysis of Spanish and European energy and environmental policy frameworks, focusing on how these intersect with housing systems. The research approach centers on identifying and interpreting the institutional logics, policy tools, and governance arrangements shaping three core domains – energy retrofitting, nature-based solutions (NBS), and urban densification.

The analysis draws on official documents across multiple levels, including EU directives (e.g., EPBD, EED), national frameworks (e.g., NECP 2021–2030, Climate Change and Energy Transition Law, CTE and Royal Decrees), and municipal strategies (e.g., Barcelona's Nature Plan, Valencia's Smart City strategy). These were complemented by implementation guidelines (such as PREE criteria and IDAE reports), as well as selected academic literature and civil society publications.

To supplement the document analysis, the research also incorporated qualitative data from 10 semi-structured expert interviews (see table 1) and one multi-stakeholder policy lab (see table 2). Interviews were conducted with professionals from public administration, housing agencies, NGOs, and research institutions, each lasting approximately one hour. Interviews were recorded, transcribed, and analyzed using an open coding process to identify emerging themes aligned with the five framing dimensions. The policy lab brought together actors from government, academia, and civil society to discuss barriers and enablers to climate-oriented housing policy, and provided insights into the dynamics of implementation, collaboration, and contestation at the urban level.

The analysis followed a qualitative thematic approach (Clarke & Braun, 2014; Bowen 2006) guided by five framing dimensions – the policy cycle, implementation mechanisms, market dynamics, multilevel governance, and socio-spatial impacts. Documents were read and annotated to identify how institutional actors, tools, and funding aligned with these dimensions, drawing on principles of document analysis and interpretive policy research (Yanow, 2000). timelines were constructed to trace the institutionalization of policies and their transposition from EU to national and local levels. Descriptive quantitative data (e.g., energy savings targets, investment levels, housing stock characteristics) were used to support interpretation, but no formal modelling was undertaken. The document-based approach allows for a detailed

mapping of institutional developments and policy instruments. However, the analysis is limited by the uneven availability of disaggregated socio-economic data, particularly at the regional and local levels.

This mixed-method approach enabled a grounded understanding of institutional developments, while also bringing in the perspectives of stakeholders involved in policy design and implementation. However, the analysis remains limited by the small number of interviews and regional scope of the policy lab, which may not capture the diversity of experiences across Spain. Findings are therefore interpretive and exploratory, but enriched by direct insights into institutional dynamics, coordination challenges, and on-the-ground realities.

Institution Represented	Date and place	Time and duration of interview
Ecodes - Fundación Ecología y Desarrollo	7th March 2025,	16h00, 1 hour 45 minutes
Instituto de Investigación Tecnológica, Universidad Pontificia Comillas	26th March, 2025	12h00, 1 hour
Alianza contra la Pobreza Energética	2nd April, 2025	16h30, 1 hour
Ecoserveis	16 April 2025,	12h30, 1 hour
Generalitat de Catalunya, Departament de Drets Socials i inclusió, Programa de suport a l'abordatge integral de la pobresa energética	16th April, 2025	10h00, 1 hour
Institute for Human Rights and Business	16th April, 2025	17h00, 1 hour
Incasól - Institut Català del Sòl	11th April, 2025	12h00, 1 hour
Ajuntament de Barcelona	11th April, 2025	10h00, 1 hour
Plan Estratégico Metropolitano de Barcelona	25 May, 2025	13h00, 1 hour
Diputació Barcelona	4th June, 2025	10h00, 1 hour

Table ES1. Information of interviewees for semi-structured interviews.

Institution Represented
NASUVINSA, empresa pública de suelo industrial, vivienda y cohesión territorial del Gobierno de Navarra
Instituto Municipal de la Vivienda y Rehabilitación de Barcelona
Institute for Human Rights and Business
Plan Estratégico Metropolitano de Barcelona (PEMB)
Celobert (cooperative)
Hidra, Institut de Recerca Urbana de Barcelona
Incasól - Institut Català del Sòl

asesor del Ministerio de Vivienda y Agenda Urbana (MIVAU)

Table ES2. Institutions represented in policy lab.

3 General governance system

Spain is a high-income country with a GDP of approximately €1.5 trillion, making it the fourth-largest economy in the European Union. The country has a population of around 47 million, with major urban centers such as Madrid, Barcelona, Valencia, and Seville experiencing rapid growth and housing pressures. Spain's housing market is characterized by high rates of homeownership (around 75%) but significant affordability challenges, particularly in urban areas where rental prices have surged due to demand-driven gentrification and short-term rental markets.

The Spanish governance system is a decentralized parliamentary democracy, where power is distributed across national, regional (autonomous communities), and local levels. The national government, led by the Prime Minister, is responsible for setting overarching policy objectives, particularly in energy efficiency, urban planning, and environmental sustainability. Spain's 17 autonomous communities have significant regulatory control over housing, urban development, and environmental policy, allowing for regionally tailored approaches to retrofitting, NBS, and densification. However, disparities in financial capacity between regions have led to unequal implementation of sustainability initiatives.

At the municipal level, city governments play a critical role in implementing housing retrofitting programs, green infrastructure projects, and urban density strategies. However, bureaucratic inefficiencies, governance fragmentation, and limited financial resources in some municipalities have hindered policy effectiveness. EU funding mechanisms, including the European Regional Development Fund (ERDF) and NextGenerationEU, have played a crucial role in supporting urban sustainability projects but have also been criticized for favoring wealthier, better-connected cities over smaller, economically weaker regions.

Governance Level	Housing Policy	Retrofitting	Densification	Nature-Based Solutions (NBS)
EU	Sets broad principles on housing rights (via social policy), provides funding (e.g., NextGenEU), but housing policy largely national.	Defines binding energy performance directives (EPBD, EED), co-finances retrofitting (e.g., ERDF, RRF).	Provides urban planning frameworks through cohesion policy; promotes compact cities via Green Deal.	Drives NBS via biodiversity strategies, Urban Greening Plans, and funding mechanisms (e.g., Horizon Europe).
National (Spain)	Defines legal housing frameworks (Ley de Vivienda), finances programs (e.g., Plan Estatal de Vivienda), sets rental subsidies.	Implements EU directives through Royal Decrees, manages PREE & NextGenEU funding, sets technical standards (CTE).	Coordinates national planning strategy (e.g., Urban Agenda), enables tax and zoning tools, guides TOD.	Sets national climate goals (e.g., NECP, PNACC), funds NBS through urban regeneration programs.
Regional (Autonomous Communities)	Manage housing stock, co-design housing programs with central gov,	Adapt national frameworks to local context, administer retrofitting grants	Coordinate regional land-use planning, apply zoning incentives, support	Support green space design in urban plans, align with biodiversity

	administer subsidies.	(PREE), engage technical staff.	TOD via regional mobility strategies.	strategies, fund local green infrastructure.
Local (Municipalities)	Implement and manage public housing, issue building permits, enforce housing standards, collaborate with CSOs.	Coordinate applications for retrofitting, provide technical assistance to residents, run municipal schemes.	Issue local zoning plans, develop urban redevelopment projects, coordinate PPPs.	Design and maintain parks, green roofs, street trees; engage community in co-design; pilot Superblocks.

Table ES3. Governance competencies summary table (Spain)

4 Housing retrofitting

This section outlines the evolution of Spain's housing retrofitting policy, driven largely by EU directives such as the EPBD and EED. It traces a clear policy timeline and examines the layered implementation process, including financial instruments like PREE and tax incentives, regulatory mechanisms such as the Technical Building Code (CTE), and support tools like one-stop shops. The section also explores the role of multilevel governance and public-private partnerships in driving retrofitting, while acknowledging uneven market engagement and regional disparities. While the overall ambition has increased, especially since the NECP 2021–2030 and the post-COVID recovery plan, implementation remains uneven across regions and housing tenures. Wealthier autonomous communities and municipalities with stronger technical and institutional capacity have benefited more from funding and program access, while others face barriers to uptake. Retrofitting policies in Spain reflect both an expanding environmental agenda and persistent socio-territorial inequalities in how support is delivered and who receives it.

4.1 The policy cycle: emergence of the issue and policy decisions

Spain's approach to building energy efficiency and retrofitting has evolved through a series of national policies and the transposition of European Union (EU) directives. Below is a timeline, followed by a table, highlighting key milestones, actors, documents, and the influence of EU interventions on Spain's policy development in this area.

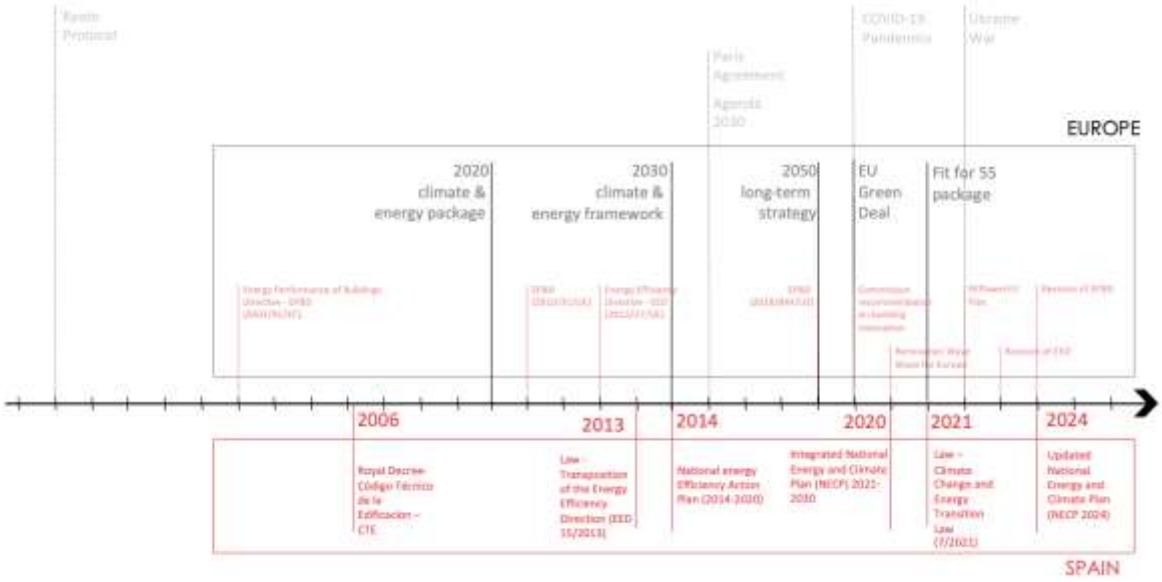

Figure ES1: timeline illustrating key policies and regulations in Spain (bottom part) and EU (upper part) affecting housing retrofitting (in red)

YEAR	MILESTONE / EVENT	ACTORS	KEY DOCUMENTS	EU INFLUENCE
2002	***Adoption of the Energy Performance of Buildings Directive (EPBD) 2002/91/EC***	EU	EPBD 2002/91/ec	Initiated EU-wide standards for building energy performance
2006	***Implementation of the Technical Building Code (Código Técnico de la Edificación - CTE)***	Spanish Government	Royal decree 314/2006	Transposed EPBD 2002/91/EC into national law, setting energy efficiency standards for new and renovated buildings.
2010	***Recast of the EPBD (Directive 2010/31/EU)***	EU	EPBD 2010/31/EU	Strengthened requirements for nearly zero-energy buildings and cost-optimal levels.
2013	***Transposition of the Energy Efficiency Directive (EED) 2012/27/EU***	Spanish government	Law 15/2013	Established measures to achieve energy savings across sectors, including buildings.
2014	***Submission of the National Energy Efficiency Action Plan 2014-2020***	Spanish government	National Energy Efficiency Action Plan 2014-2020	Outlined strategies to meet EU energy efficiency targets, focusing on building renovations.
2018	***Amendment of the EPBD (Directive 2018/844/EU)***	EU	EPBD 2018/844/EU	Emphasized long-term renovation strategies and smart

				technologies in buildings.
2020	***Approval of the Integrated National Energy and Climate Plan (NECP) 2021-2030***	Spanish government	NECP 2021-2030	Set national targets for energy efficiency and building renovations in line with EU goals.
2021	***Enactment of the Climate Change and Energy Transition Law***	Spanish Government	Law 7/2021	Aimed for carbon neutrality by 2050, with specific measures for building energy efficiency.
2023	***Publication of the revised Energy Efficiency Directive (Directive (EU) 2023/1791)***	EU	EED 2023/1791	Raised the EU's energy efficiency target, requiring member states to achieve an additional 11.7% reduction in energy consumption by 2030.
2024	***Spain's updated National Energy and Climate Plan***	Spanish Government	Updated NECP 2024	Increased targets for green hydrogen production and energy storage, reflecting ongoing commitment to EU energy efficiency objectives.

Table ES4. Table summarizing EU regulations transposed at national level (retrofit)

While national legislation defines the core regulatory framework, many implementation responsibilities—especially for grant programs like PREE—are delegated to Spain's autonomous communities. This decentralization has led to notable regional variation in uptake, administrative capacity, and retrofit outcomes (Agencia de l'Habitatge de Catalunya, n.d.; Ajuntament de Barcelona, n.d.).

The adoption of the Energy Performance of Buildings Directive (EPBD) 2002/91/EC by the European Union in 2002 marked a significant milestone in the drive to improve the energy performance of buildings across Europe. The directive required Member States to set minimum energy performance standards for new and existing buildings, laying the groundwork for future legislation aimed at reducing the carbon footprint of buildings and aligning with broader EU sustainability goals (European Parliament, 2000). In Spain, the EU's EPBD influenced the development of national legislation, notably through Royal Decree 314/2006, which set energy performance standards for buildings. This was Spain's direct response to EU-level pressures, marking the beginning of a strategic shift towards energy efficiency in buildings. The EU influence was strong, ensuring that energy-saving measures were integrated across Member States, creating a common framework for energy performance standards. A prime example of the directive's impact was seen in Spain's early energy efficiency renovations in public

buildings, where energy assessments and retrofitting measures were implemented to comply with the new regulations, improving insulation, heating, and cooling systems.

In 2006, Spain's government implemented the Technical Building Code (CTE), a national initiative heavily influenced by the EU's EPBD. This code set energy efficiency standards for new buildings and major renovations, ensuring that energy conservation measures were incorporated into the design, construction, and operation of buildings (BOE, 2021). The Spanish government adapted the EU framework to suit national needs, introducing detailed requirements for building insulation, heating, ventilation, and air conditioning systems. The CTE influenced various urban projects across Spain, particularly in Madrid and Barcelona, where new housing projects adhered to these energy performance standards, ensuring more sustainable development in line with EU guidelines (Ajuntament de Barcelona, n.d.).

The recast of the EPBD (Directive 2010/31/EU) in 2010 introduced stronger measures, including nearly zero-energy buildings (nZEB) and cost-optimal levels for energy efficiency in buildings. It required Member States to ensure that new buildings were nearly zero-energy by 2020, a directive that placed additional pressure on Spain to enhance its energy efficiency standards for both new constructions and renovations (European Parliament, 2020). Spain transposed these strengthened requirements into national legislation, particularly through updates to the CTE, further improving energy efficiency and the integration of renewable energy systems. This recast of the directive not only reinforced the EU's commitment to a greener future but also accelerated Spain's efforts toward achieving carbon neutrality.

In 2013, the Energy Efficiency Directive (EED) 2012/27/EU was transposed into Spanish law through Law 15/2013. The directive aimed to reduce energy consumption across all sectors by 20% by 2020, with a specific focus on improving energy efficiency in buildings. Spain's national energy efficiency action plan was shaped by this directive, outlining a clear strategy for retrofitting existing buildings and improving energy performance standards for new constructions. The EED influenced Spain's building sector by encouraging long-term energy savings, through measures such as the adoption of more energy-efficient heating systems, better insulation, and more sustainable energy sources. This included urban projects in Madrid and Seville, where old buildings were renovated to meet energy-saving requirements set out in the law. These measures applied not only to residential buildings but also to commercial and industrial sectors, ensuring widespread improvements in energy efficiency across various types of infrastructure.

In 2014, Spain submitted its National Energy Efficiency Action Plan (NEEAP) 2014-2020, detailing strategies to meet the EU's energy efficiency targets. This plan focused on reducing energy consumption in buildings, especially in the residential and public sectors, through targeted renovation programs and the introduction of new energy performance standards. The plan incorporated the guidelines provided by the EED, which influenced Spain's national policies on energy-saving measures in buildings. It also provided incentives for private sector retrofitting initiatives, helping Spain meet its ambitious energy-saving goals.

In 2020, Spain approved its Integrated National Energy and Climate Plan (NECP), aligning with the EU's Green Deal and the broader European climate and energy strategy. The NECP 2021-2030 set ambitious energy efficiency targets for Spain, including a 39% reduction in

energy consumption by 2030. This plan aimed to ensure that Spain's building sector was aligned with the EU's climate and energy goals by promoting energy-efficient renovations and integrating renewable energy systems into the building stock. The Spanish government's adoption of the NECP was a direct response to EU climate strategies and reinforced Spain's commitment to sustainability. Cities like Seville implemented renovation projects in line with the NECP, ensuring that both public and private buildings met the new energy efficiency standards.

The Climate Change and Energy Transition Law enacted by the Spanish government in 2021 reinforced these objectives, aiming for carbon neutrality by 2050. This law included specific measures for improving energy efficiency in buildings, especially in the context of renovations and the integration of renewable energy. It was heavily influenced by EU policies, such as the Green Deal and previous directives, particularly the EPBD and the EED. This law not only reflected Spain's commitment to the EU's energy and climate goals but also set national objectives for reducing the carbon footprint of the building sector. Real-world applications of the law were seen in Madrid, where public housing was retrofitted with renewable energy sources, energy-efficient technologies, and enhanced insulation to reduce carbon emissions and meet national and EU climate targets.

The revised Energy Efficiency Directive (EED 2023/1791) published by the EU in 2023 raised the energy efficiency target, requiring Member States to achieve an additional 11.7% reduction in energy consumption by 2030. While Spain is still adapting its policies to align with this revised directive, it signals the continued evolution of EU energy efficiency goals, pushing Spain to update its strategies and regulations to meet these more ambitious targets. As part of Spain's ongoing commitment to EU climate strategies, it will likely enhance its renovation efforts and energy performance standards to ensure compliance with the revised EED.

While retrofit policy in Spain is primarily structured around national frameworks such as PREE, it includes limited dedicated provisions for the public or social housing sector. Public housing represents a small portion of Spain's overall housing stock – having risen from only 2.5% to 3.4% according to the Minister for Housing and Urban Agenda, Isabel Rodriguez (La Moncloa, 2025) – and most retrofit incentives target privately owned dwellings or homeowners associations. Some regional and municipal actors – such as INCASOL in Catalonia or EMVS in Madrid – do implemented retrofit programs in public housing, but these efforts are not uniformly distributed and often depend on regional capacity, local priorities, and EU funding opportunities.

4.2 The implementation process

Spain's implementation of building energy efficiency policies has involved a multifaceted approach, incorporating legislative measures, financial incentives, and supportive programs. This process has been characterized by various tools, implementation structures, timelines, beneficiaries, territorial considerations, deadlines, and assessment mechanisms. Furthermore, this journey has encountered frictions, experiments, controversies, and conflicts as the country navigates its path toward a more sustainable building sector.

Regulatory tools

A central legislative tool driving Spain's building retrofit strategy is the **Climate Change and Energy Transition Law (Law 7/2021)**. This law establishes ambitious targets for carbon neutrality by 2050 and emphasizes the critical role of improving energy efficiency in the building sector. In practice, the law requires substantial investments in energy-saving measures and promotes the use of renewable energy sources within the built environment. The Spanish government has increasingly sought to align national laws with broader European Union goals, ensuring that energy retrofits are not just an internal policy focus but part of Spain's broader contribution to the EU Green Deal.

The Technical Building Code (CTE), established in 2006 and updated periodically, sets minimum energy performance standards for new and renovated buildings. This code enforces stringent guidelines on improving energy efficiency through insulation, heating systems, and the integration of renewable energy technologies. Over the years, these regulations have driven the construction of energy-efficient buildings and encouraged the retrofit of existing structures, aligning Spain's built environment with EU standards.

The Integrated National Energy and Climate Plan (NECP) 2021-2030 provides a decade-long roadmap for Spain's energy efficiency goals, including detailed strategies for building energy retrofitting. Regular assessment mechanisms are employed to monitor progress toward energy efficiency targets. These assessments include data collection and performance reviews to gauge the success of energy retrofitting projects and identify areas where further efforts are needed. Such reviews, primarily conducted by national bodies such as the Ministry for the Ecological Transition and Demographic Challenge (MITECO), the Spanish Office for Climate Change (OECC), the Institute for Energy Diversification and Saving (IDEA), and the National Statistics Institute (INE), have been particularly useful in adjusting policies to address emerging challenges and ensuring that Spain remains on track to meet its carbon neutrality targets.

Spain has also introduced extensive training and certification programs to ensure that professionals in the building sector are equipped with the skills necessary for implementing energy-efficient renovations. These programs focus on the latest energy-saving technologies, construction techniques, and the regulatory requirements set forth in the CTE and the Climate Change and Energy Transition Law. By certifying energy performance and ensuring that building professionals adhere to these standards, Spain is creating a skilled workforce capable of driving the energy efficiency agenda. One example of this is the growing demand for BREEAM and LEED certified professionals, who are increasingly sought after to ensure that retrofitting projects meet both energy and environmental standards.

Tool / Regulation	Type	Level	Objective
EPBD 2002/91/EC	EU Directive	EU	Establish minimum energy performance standards

Royal Decree 314/2006 (CTE)	National Code	National	Set national building energy standards
EPBD 2010/31/EU (Recast)	EU Directive	EU	Mandate nearly zero-energy buildings (nZEB)
Law 15/2013	National Law	National	Transposition of Energy Efficiency Directive (EED)
NECP 2021–2030	National Strategy	National	Align energy/climate actions with EU Green Deal
Law 7/2021	National Law	National	Establish long-term decarbonization goals
EED 2023/1791	EU Directive	EU	Raise efficiency target (11.7%) by 2030
Updated NECP 2024	National Strategy	National	Expand on renovation/digital energy management targets

Table ES5. Key Regulatory Tools

Financial tools

For instance, the **PREE (Programa de Rehabilitación Energética de Edificios) program**, which offers subsidies for energy renovation projects, has been instrumental in advancing retrofits across Spain. Co-funded by both national and EU funds, the program specifically targets residential and commercial buildings, providing financial incentives for property owners to undertake energy-efficient renovations. This initiative is particularly significant in areas with aging housing stocks, such as Barcelona and Madrid, where retrofitting efforts aim to reduce energy consumption while improving the overall comfort and sustainability of buildings. The PREE program reflects Spain's commitment to EU policies, demonstrating a clear alignment with the EU's objectives of achieving carbon neutrality and reducing energy consumption in the building sector.

Alongside direct financial support, **tax incentives** also play a critical role in encouraging building owners to invest in energy efficiency improvements. These tax deductions incentivize both private and public sector actors to undertake energy-saving renovations, further driving the energy retrofit agenda. In cities like Madrid, where the real estate market is dynamic, developers are encouraged to retrofit existing buildings to meet contemporary energy performance standards, leveraging tax benefits that lower renovation costs. These incentives help make energy-efficient retrofitting more attractive, particularly in an urban market

characterized by rising property values and limited space for new construction. However, critics point out that these tax incentives may disproportionately benefit wealthier property owners and developers, exacerbating inequalities if low-income communities lack the necessary capital to take advantage of these incentives.

Regional initiatives, particularly those driven by autonomous communities, further enhance the scope and impact of retrofitting efforts. In regions like Asturias, regional governments have established their own **subsidy programs** tailored to local needs, targeting energy efficiency improvements in both residential and commercial buildings. These regional initiatives are vital in addressing specific local challenges, such as housing inequalities and regional climate goals, while supporting national energy efficiency targets. Moreover, the decentralization of such programs allows for more effective and localized implementation, ensuring that subsidies reach areas where energy poverty and housing inequalities are most pressing.

EU funding mechanisms, such as the **European Regional Development Fund (ERDF) and NextGenerationEU**, have played a crucial role in supporting Spain's retrofitting initiatives, co-financing renovation projects and providing additional financial stability. These EU funds have been pivotal in assisting municipalities and regional governments to undertake large-scale energy retrofitting efforts, further reinforcing Spain's alignment with EU goals. However, critics argue that the distribution of these funds has not always been equitable, with wealthier regions often receiving a larger share, leaving poorer areas with fewer resources to invest in energy-efficient building renovations (Venner et al., 2024). As one respondent notes, who works as a regional implementation consultant, "muchos tecnicos de ayuntamientos pequenos ni se enteran de cuando salen las convocatorias," highlighting a procedural failure of communication between levels of government leading to a gap in knowledge-sharing and coordination.

Program / Tool	Type	Year Created	Funding Size	Level	Target / Purpose
PREE	National subsidy (EU-funded)	2020	€300M per call	National (via regions)	Retrofit 1.2M dwellings by 2030; building envelope and thermal systems
PREE 5000	National / EU-funded	2021	€50M	Small municipalities (<5,000 residents)	≥75% cost coverage for rural renovations; support in depopulated areas
NextGenEU – Component 2 (PRTR Housing)	EU Recovery Mechanism	2021	€6.8B (housing/urban)	National → regional	Renovate 1.2–1.4M dwellings; improve energy efficiency and comfort

DUS 5000	National / EU-funded	2021	€75M	Local	Support sustainable urban regeneration in small municipalities
IRPF Tax Deduction	National tax incentive	2021	Variable (individual-based)	National	20–60% deduction for retrofit works achieving target energy savings

Table ES6. Key Financial Tools

Support and information tools

To ensure the retrofitting process is as efficient as possible, Spain has established **one-stop shops**—dedicated centers where property owners can access **guidance, technical assistance, and information about available financial support**. These hubs aim to streamline the complex process of retrofitting by offering a centralized service for advice and funding applications. These one-stop shops have been essential in simplifying the retrofit process, making it more accessible to property owners and speeding up the uptake of energy-efficient renovation (Biere-Arenas and Marmolejo-Duarte, 2023).

Spain has also introduced **extensive training and certification programs** to ensure that professionals in the building sector are equipped with the skills necessary for implementing energy-efficient renovations. These programs focus on the latest energy-saving technologies, construction techniques, and the regulatory requirements set forth in the **CTE and the Climate Change and Energy Transition Law**. By certifying energy performance and ensuring that building professionals adhere to these standards, Spain is creating a skilled workforce capable of driving the energy efficiency agenda.

Another significant challenge is **public awareness and engagement with retrofit programs**. Despite the existence of robust financial support schemes and incentive programs, participation in these initiatives has often been lower than expected. This issue is compounded by a lack of outreach and communication strategies to inform property owners about the potential benefits of retrofitting. To overcome this, the Spanish government has launched **public awareness campaigns and information services** aimed at engaging citizens and encouraging greater participation in energy-saving programs since 2017. Nonetheless, ensuring broad public participation remains a critical challenge for Spain's retrofit strategy, as many homeowners are still unfamiliar with the process or may perceive the investment as too costly.

Regular **assessment mechanisms** are employed to monitor progress toward energy efficiency targets. These assessments include **data collection and performance reviews** to gauge the success of energy retrofitting projects and identify areas where further efforts are needed. Such reviews, primarily conducted by national bodies such as the **Ministry for the Ecological Transition and Demographic Challenge (MITECO), the Spanish Office for Climate Change (OECC), the Institute for Energy Diversification and Saving (IDEA), and**

the National Statistics Institute (INE), have been particularly useful in adjusting policies to address emerging challenges and ensuring that Spain remains on track to meet its carbon neutrality targets.

Initiative / Platform	Level	Role	Target Group
Barcelona One-Stop Shop (Oficina de la Rehabilitació)	Municipal	Provide residents technical guidance and contractor access	Homeowners and homeowner associations
Municipal Technical Offices (various cities)	Municipal	Offer in-person assistance on subsidy access and eligibility	Citizens seeking retrofit support
National Housing Portal (Ministerio de Vivienda)	National	Centralized platform for policy info and funding opportunities	General public and applicants
Local Public Awareness Campaigns	Municipal / Regional	Disseminate info on energy retrofitting, rights, and support	Low-income and vulnerable residents

Table ES7. Support and Information Tools for energy retrofit

4.3 Size and role of the market

Spain's retrofitting market operates within a complex framework shaped by a blend of regulatory frameworks, financial mechanisms, and market-based interventions that collectively aim to enhance energy efficiency in buildings. This multi-faceted approach involves a combination of government-driven policies and private sector initiatives, providing a diverse array of tools and mechanisms to support the renovation of existing buildings and the promotion of energy-efficient technologies. Key elements of Spain's retrofitting market include **energy price regulation, financial support mechanisms, and market-based interventions** that encourage private sector participation and innovation.

In most cases, energy retrofitting works are delivered by **small and medium-sized enterprises (SMEs)**, typically local construction firms, installers, and energy service companies contracted by homeowners or building communities. The retrofit market remains **highly fragmented**, with uneven capacity across regions and no centralized delivery structure. This leads to variability in costs, timelines, and technical quality. While large firms occasionally lead public projects, **most renovation efforts rely on small-scale providers** working under time-limited aid schemes or local tender processes.

The Energy Service Companies (ESCOs) form a material part of the retrofit market in Spain, embedded within a broader €3 billion European ESCO sector generated through performance-based contracts. While Spain does not dominate this space, national assessments note a small but growing network of ESCOs providing retrofit services—particularly in the public sector and multi-unit buildings. However, data transparency on contract volume, firm capacity, and measurable energy outcomes remains limited (UNEP-DTU 2019).

In principle, ESCOs in Spain operate under the Energy Performance Contracting (EPC) model: they conduct energy audits, finance upgrades, and implement renovation works in exchange for a share of energy savings over time. This structure reduces upfront costs for clients while aligning incentives with long-term efficiency gains. Yet in practice, challenges remain—particularly the lack of standardised contract templates, barriers to third-party finance, and weak monitoring and verification systems (European Commission 2020).

A deeper structural barrier lies in Spain's **housing ownership model**, where a large share of the population lives in multi-unit buildings governed by **homeowners' associations (*comunidades de propietarios*)**. These associations require a majority or qualified vote to approve renovations, making retrofit decisions slow and politically difficult — especially in buildings with mixed tenure, elderly residents, or financial disparities among owners. This collective governance structure discourages timely action and **complicates the business case** for retrofit companies, who face uncertainty in project approvals and payment timelines.

Energy price regulation

Energy Price Setting and Obligation Schemes play a key role in shaping the economic environment for retrofitting efforts. Spain's electricity market underwent significant reforms aimed at decoupling gas prices from electricity prices, reducing the volatility of energy costs and facilitating the integration of renewable energy sources. This reform became particularly important in 2022 when Spain and Portugal secured approval from the European Commission to cap gas prices at €50/MWh for one year, mitigating the impact of fluctuating gas prices on electricity costs. This intervention helped stabilize the energy market, making it more predictable for both consumers and companies investing in energy efficiency measures, such as retrofitting.

Energy obligation schemes

Alongside these reforms, Spain has implemented Energy Obligation Schemes, which require energy companies to meet specific energy savings targets. These obligations compel energy providers to invest in or promote energy-saving measures among consumers, including retrofitting residential and commercial buildings. By requiring energy companies to take responsibility for reducing energy consumption, Spain aligns with EU directives that mandate energy savings across various sectors, including the building sector. This creates a financial incentive for companies to engage in retrofitting initiatives that reduce energy use and promote (urban) sustainability.

Market-based interventions

Market-based interventions complement Spain's regulatory framework and financial incentives. One such mechanism is the Energy Efficiency Certificates (EECs) system, which allows energy providers and other obligated parties to meet their energy-saving targets by purchasing certificates representing verified energy savings. This market-based solution offers flexibility in how energy savings are achieved, incentivizing investment in energy-efficient technologies, including those used in building retrofitting. The EEC system promotes transparency and accountability, encouraging businesses to engage in retrofitting projects that generate verifiable energy savings. This market-driven approach is seen as an effective tool for meeting Spain's ambitious energy efficiency targets, contributing to the overall reduction in energy consumption.

In addition, Public-Private Partnerships (PPPs) have been instrumental in financing and implementing large-scale retrofitting projects in Spain. These collaborations allow the public sector to leverage private sector expertise and capital, driving the renovation of large numbers of buildings while ensuring that energy efficiency targets are met. Spain has seen notable successes in PPPs, particularly in the urban regeneration and retrofitting of old residential areas in cities like Madrid and Barcelona. These partnerships enable municipalities to take on ambitious retrofitting projects while mitigating financial risks, ensuring that both energy savings and social objectives, such as affordable housing, are prioritized.

Public-private collaboration in retrofit delivery remains limited, though some **Autonomous Communities and municipalities** have developed platforms or programs that engage private actors. For example, **Barcelona's "One-Stop Shop" (Oficina de la Rehabilitació)** offers residents technical assistance and connects them with certified companies, acting as a bridge between public subsidies and market implementation. These types of intermediaries are more common in wealthier regions with greater administrative capacity. However, Spain still lacks a **national strategy to professionalize or coordinate the retrofit market**, and efforts remain uneven and pilot-based rather than systemic.

Despite the importance of market-based interventions, Spain's retrofitting market is still largely driven by government initiatives and regulatory frameworks. Programs like subsidies, tax incentives, and obligation schemes remain dominant, providing the essential financial support and legal framework needed to stimulate energy efficiency improvements. However, the growing role of ESCOs and the introduction of mechanisms like the EEC system indicate a shift towards greater market involvement in Spain's energy efficiency goals.

4.4 The multi-level governance process

Spain's approach to building energy retrofitting is shaped by a multilevel governance framework that involves coordination between national, regional, and local authorities, as well as a diverse range of stakeholders from both the public and private sectors. This collaborative structure is designed to enhance energy efficiency in buildings, promote sustainability, and address the interconnected issues of housing affordability and environmental performance.

At the national level, the Ministry for the Ecological Transition and the Demographic Challenge (MITECO) is the central body responsible for formulating Spain's national energy policies, including those related to building energy retrofitting. MITECO is tasked with the development of strategic plans, most notably the Integrated National Energy and Climate Plan (NECP) 2021-2030, which outlines clear energy efficiency targets and measures for achieving sustainability goals. The NECP plays a critical role in guiding Spain's energy transition by setting a long-term vision for reducing carbon emissions, improving energy performance in buildings, and integrating renewable energy sources.

Alongside MITECO, the Instituto para la Diversificación y Ahorro de la Energía (IDAE), an agency under the ministry, promotes energy efficiency and renewable energy. IDAE's role in supporting building retrofitting is multifaceted, encompassing the provision of technical assistance, funding programs, and public awareness campaigns. Through its financial programs, IDAE facilitates the implementation of retrofitting projects by **offering grants and low-interest loans to homeowners, businesses, and municipalities**. This technical and financial support is essential in making retrofitting projects more accessible, ensuring that energy efficiency measures are adopted at scale. The agency's role extends beyond funding by raising awareness of the benefits of retrofitting and encouraging the widespread adoption of energy-saving practices.

At the regional level, Spain's 17 autonomous communities exercise significant authority over housing and urban development. These regions adapt national policies to meet local needs and manage the allocation of funding for retrofitting programs. For example, Asturias has introduced specific subsidy programs to enhance building energy efficiency, reflecting the region's unique housing stock and climate conditions. Regional authorities also have the flexibility to design programs that address local priorities, such as improving the energy performance of public buildings or incentivizing the renovation of historical structures to meet modern energy efficiency standards. This level of autonomy ensures that retrofitting efforts are tailored to the particular challenges and opportunities of each region, which can vary greatly across Spain.

At the local level, municipalities are the key actors in the implementation of building retrofitting policies. Local governments are responsible for urban planning, issuing building permits, and enforcing energy efficiency regulations. They also play a crucial role in community engagement, ensuring that residents and local stakeholders are informed about available programs and encouraged to participate in retrofitting initiatives. Municipalities often collaborate with regional and national authorities to execute energy efficiency programs, ensuring that local projects align with broader strategic goals set at the national level. Additionally, local authorities often work with developers, energy service companies (ESCOs), and other private sector entities to facilitate retrofitting projects and ensure that building renovations comply with energy performance standards.

Effective coordination among these different levels of governance is critical to the success of Spain's energy retrofitting policies. However, challenges can arise due to overlapping responsibilities and varying regional capacities. For example, while national policies such as the NECP provide overarching frameworks, the regional and local governments often have to adjust these policies to their specific contexts, which can lead to variations in implementation.

These discrepancies can cause inconsistencies in how retrofitting projects are carried out, as local governments might prioritize different objectives or face difficulties in accessing the necessary funding or resources to meet energy efficiency targets.

Moreover, while energy retrofitting and housing affordability are inherently interconnected, policies aimed at improving building energy performance may inadvertently lead to trade-offs. For example, stringent energy efficiency requirements could drive up the cost of renovations, potentially making retrofitting projects unaffordable for low-income households. This situation is particularly evident in older buildings that require extensive renovations to meet modern energy standards. Balancing energy performance goals with affordability is a significant challenge for local governments, which must weigh the environmental benefits of energy-efficient retrofits against the potential economic strain they could place on residents.

The Energy Service Companies (ESCOs), which provide financing, design, and implementation services, are central to the market-based aspects of retrofitting. By offering performance-based contracts, ESCOs help reduce financial risks for property owners, making energy retrofitting more attractive. Similarly, housing associations and financial institutions facilitate community participation and offer the necessary capital for large-scale renovations, aiming for retrofitting projects to be accessible to homeowners and developers alike.

While autonomous communities in Spain have substantial regulatory autonomy over housing and urban development, they remain highly dependent on national funding and EU grants for large-scale retrofitting programs. This financial dependency can sometimes affect the priorities and implementation capacities of regional authorities. For example, regions that are less economically developed may face challenges in securing sufficient funding to carry out energy retrofitting projects at the scale required. At the same time, the allocation of financial resources from national and EU sources often comes with conditions, such as specific energy-saving targets or sustainability criteria, which must be met to qualify for funding. This dynamic can shape the kinds of retrofitting projects that are prioritized in different regions, depending on local financial capabilities and the availability of external funds.

While vertical coordination between EU, national, and subnational authorities forms the backbone of Spain's retrofit governance, horizontal governance relationships are increasingly critical to implementation. Public-private partnerships (PPPs), particularly in cities like Barcelona and Valencia, facilitate collaboration between municipal authorities, private firms (e.g. construction companies, ESCOs), and community-level actors such as homeowners' associations. These horizontal arrangements enable shared financing, bundled procurement, and localized technical assistance. Likewise, collaboration between civil society organizations and local governments—such as ECODES supporting outreach to vulnerable households—illustrates the growing role of civic actors in bridging policy and practice at the neighborhood scale.

Actor	Type	Role in Governance
European Commission (DG ENER, DG CLIMA)	Public - EU Level	Sets binding EU directives and funding frameworks for climate and energy policy

Spanish Ministry for the Ecological Transition (MITECO)	Public - National Level	Transposes EU policy into national law and oversees national energy strategy
IDAE (Institute for the Diversification and Saving of Energy)	Public Agency - National	Implements funding programs and technical support schemes (e.g. PREE, NECP)
Regional Governments (e.g., Catalonia, Madrid)	Public - Regional Level	Adapts and deploys national policies at the regional level; manages regional funds
Municipalities (e.g., Barcelona, Valencia)	Public - Local Level	Implements retrofit policies locally; often develops pilot programs and PPPs
ESCOs (Energy Service Companies)	Private Sector	Delivers energy retrofits through performance-based contracts (EPCs)
Construction Firms and Installers	Private Sector	Executes renovation works; key players in the retrofit supply chain
Financial Institutions (e.g., banks, energy credit programs)	Private Sector	Provide loans and co-financing mechanisms for energy renovations
Homeowners Associations (Comunidades de Propietarios)	Semi-public/Collective	Manage collective decision-making in multi-unit housing retrofits
NGOs and Civil Society (e.g., ECODES, Fundación Renovables)	Civil Society	Advocate for equitable energy access; monitor policy implementation

Table ES8. Multi-level Governance Actors (Retrofit)

Governance Level	Public Actors	Horizontal (Collaborative) Actors
EU	European Commission (DG ENER, DG CLIMA)	—

National	MITECO, IDAE	—
Regional	Autonomous Communities (e.g. Catalonia)	Regional energy agencies, technical consultants
Local	Municipalities (e.g. Barcelona, Valencia)	ESCOs, construction firms, homeowner associations, NGOs

Table ES9. Multilevel and Horizontal Governance of Retrofitting in Spain

4.5 Achievements, assessments, and challenges

Spain's building retrofitting initiatives have yielded notable achievements in enhancing energy efficiency and improving housing quality. However, these efforts have also introduced significant challenges, particularly concerning housing inequalities. While retrofitting policies have contributed to the country's broader sustainability and energy goals, they have also raised concerns about affordability, displacement, and unequal access to the benefits of energy-efficient housing. Below is a detailed analysis of the measured and potential impacts of retrofitting policies on housing inequalities.

Retrofitting has led to significant reductions in energy consumption and greenhouse gas emissions. For example, energy renovations in Spanish buildings have been shown to decrease energy consumption by as much as 52% (Serrano-Lanzarote et al. 2017), depending on the specific climate zone and the scope of the renovations. This reduction in energy use contributes not only to Spain’s climate goals but also helps residents lower their utility bills. For lower-income households, this can have a particularly beneficial effect, reducing the financial burden of high energy costs and improving their overall quality of life.

One of the most tangible benefits of retrofitting is the improvement in housing quality. Upgraded insulation, modernized heating systems, and improved ventilation significantly elevate living standards. These changes contribute to better indoor comfort, healthier living environments, and better overall health outcomes for residents. For example, energy-efficient renovations in public housing have resulted in more consistent indoor temperatures, reduced mold issues, and better air quality. These upgrades are especially beneficial for vulnerable populations, such as the elderly or those with respiratory conditions, by ensuring that their homes are healthier and more comfortable.

The retrofitting sector has also generated significant economic activity, particularly in construction and related industries. By investing in the renovation of existing buildings, the retrofitting market has created employment opportunities in areas like construction, manufacturing, and energy services. These job opportunities contribute to local economic growth and help reduce unemployment, particularly in areas where retrofitting projects are concentrated. For example, large-scale retrofitting programs in cities like Seville and Madrid

have contributed to job creation in the construction sector, supporting not only skilled labor but also the local economy through increased demand for materials and services.

However, one of the most pressing concerns related to energy-efficient renovations is the potential for gentrification and 'renovictions' (renovation-induced evictions). As buildings are retrofitted and energy efficiency is improved, property values can rise, leading to increased rents. In some cases, this results in the displacement of low-income residents who can no longer afford to live in these newly renovated areas (Bouzarovski et al. 2018). This process exacerbates housing inequalities, as wealthier residents are able to benefit from the improved infrastructure and amenities, while long-time residents are forced out due to rising costs. For instance, in neighborhoods in Madrid and Barcelona where retrofitting has taken place, rising rents have driven lower-income residents to seek housing in more peripheral and less developed areas, contributing to increased socio-economic segregation.

While subsidies and financial incentives for energy-efficient renovations exist, many low-income households struggle to access the necessary financing for retrofitting projects. Although there are programs in place to support renovations, these may not be sufficient to cover the full cost of retrofitting for those with limited financial resources. Additionally, the bureaucratic hurdles associated with accessing such funding can be prohibitive, leaving many low-income residents unable to participate in these programs. This issue limits the ability of disadvantaged communities to benefit from the energy savings and improved living conditions that retrofitting can provide, thereby reinforcing existing inequalities.

Spain's 17 autonomous communities have significant autonomy over the implementation of retrofitting programs, which has led to regional disparities in the availability and scope of these initiatives. While some regions, such as Catalonia and the Basque Country, have made significant progress in rolling out energy efficiency programs, other regions have lagged behind due to a combination of limited funding, political will, and regional priorities. These disparities in retrofitting efforts can lead to geographic inequalities, where some areas benefit from the environmental and economic advantages of retrofitting, while others remain stuck with outdated and inefficient housing.

As the demand for energy-efficient homes grows, there is a risk of creating housing shortages in urban areas. Retrofitted buildings, particularly those in desirable locations, can become scarce commodities as demand outstrips supply, further driving up prices. In high-demand cities like Madrid and Barcelona, this can lead to increased competition for energy-efficient housing, making it more difficult for low-income households to access these improved living spaces. Moreover, while retrofitting increases the quality of housing, the higher costs associated with energy-efficient homes can reduce affordability for vulnerable populations, particularly in the face of urban housing shortages.

All in all, while Spain’s retrofitting policies have led to significant progress in energy efficiency, housing quality, and economic stimulus, they also present challenges that must be addressed to avoid exacerbating housing inequalities. Issues such as gentrification, access to funding, regional disparities, and housing shortages highlight the need for more targeted measures to ensure equitable access to the benefits of retrofitting. Moving forward, policies must prioritize social equity by ensuring that the most vulnerable populations benefit from energy-efficient

housing, that funding mechanisms are accessible to low-income households, and that the risk of displacement due to rising rents is mitigated. Additionally, greater coordination across regions and levels of government is essential to ensure that the benefits of retrofitting are distributed more evenly across Spain. By addressing these challenges, Spain can continue to advance its energy efficiency goals while promoting a more inclusive and equitable urban development model.

Access to retrofitting programs in Spain remains uneven across both tenure and income lines. Most incentives — such as PREE — are directed at homeowners or homeowner associations, making it difficult for renters to benefit from improvements to their buildings, reflected initatives such as the Alianza por una rehabilitación de viviendas sin dejar a nadie atrás (the alliance for the rehabilitation of houses without leaving anyone behind) (Ecodes 2023). As the Ministerio de Vivienda y Agenda Urbana (MIVAU), covering the Efficiency Aid Program for Individual Dwellings within the Recovery Plan (PRTR), states, programs are geared towards homeowners wherein applicants must handle documentation, which can be a barrier for lower-income or elderly households (MIVAU 2024).

Additionally, low-income households often cannot afford the co-financing share required by most retrofit aid programs. Under the national **framework PREE**, subsidies cover only **35% to 45%** of eligible costs, depending on the type of intervention and the efficiency gains achieved. This means that households must contribute between **55% and 65% of the total investment**, often upfront and without guaranteed financing support. For families without access to credit or savings, these requirements represent a substantial barrier to participation in renovation schemes aimed at energy efficiency improvements (IDAE 2024).

Finally, regional differences in administrative capacity and technical readiness lead to unequal access to EU and national retrofit funds. While the overall funding framework is national, each **Comunidad Autónoma** is responsible for implementing its own programs, resulting in **uneven rates of fund absorption**. Wealthier and more administratively capable regions—such as **Catalonia and Madrid**—tend to absorb a larger share of resources, while less developed or rural areas face barriers in matching funds, processing applications, or launching technical assistance. This has created a fragmented retrofit landscape that reinforces existing territorial inequalities (European Commission 2023; IDAE 2023).

Impact area	Measured or potential	Description/evidence
Access by tenure	Measured	Retrofit programs primarily target owner-occupied and condominium housing, excluding renters who depend on landlord participation (MIVAU 2024; Interview with NGO representative).
Affordability of co-financing	Measured	Low-income households struggle with required personal investment (often >50% of total cost), limiting their ability to participate in national schemes such as PREE (IDAE 2023; Policy Lab 2025).

Territorial disparities	Measured	Uneven administrative capacity across regions results in unequal absorption of retrofit funds, disadvantaging rural and lower-income regions (EC 2023; Interview with regional authority).
Energy cost burden	Measured	Energy retrofits lower utility costs long-term, but upfront costs limit access to these savings for vulnerable populations (Interview with local energy agency).
Administrative barriers	Measured	Complex application processes create obstacles for elderly, non-digital users, and immigrants (MIVAU 2024; Field interviews).
Opportunities for neighborhood regeneration	Potential	If well-targeted, retrofitting can be combined with area-based regeneration, particularly in degraded or mono-functional urban neighborhoods (Policy Lab 2025).

Table ES10. Measured and Potential Impacts on Housing Equality (Retrofit)

5 Nature-Based Solutions

This section examines Spain's evolving approach to Nature-Based Solutions (NBS), shaped by a mix of EU policy influence, national legal frameworks, and municipal innovation. Although "NBS" is not a common term in Spanish law or planning, related concepts such as green infrastructure, ecological urbanism, and climate adaptation are increasingly embedded in urban policy. The analysis highlights key milestones, including the 2015 Natural Heritage and Biodiversity Law and the 2021 ENIVCRE strategy, and explores the diverse implementation landscape—from EU-funded LIFE projects to city-led green roof programs. Attention is given to governance structures, the role of NGOs and platforms like FEMP, and funding inequalities across regions. While NBS projects deliver clear environmental and social benefits, the section also flags risks of environmental gentrification and uneven access to green amenities.

5.1 The policy cycle: emergence of the issue and policy decisions

While the term "nature-based solutions" (NBS) has gained traction in EU-level discourse, it is rarely used explicitly in Spanish national or municipal policy. Instead, related terms such as "green infrastructure," "sustainable urban development," and "ecological restoration" are more common. In this section, NBS is used as an analytical lens to group and assess a diverse set of interventions that deliver environmental and social co-benefits through nature-based means. Spain's approach to nature-based solutions (NBS) has evolved through a series of national policies and the transposition of European Union (EU) directives. Below is a timeline highlighting key milestones, actors, documents, and the influence of EU interventions on Spain's policy development in this area.

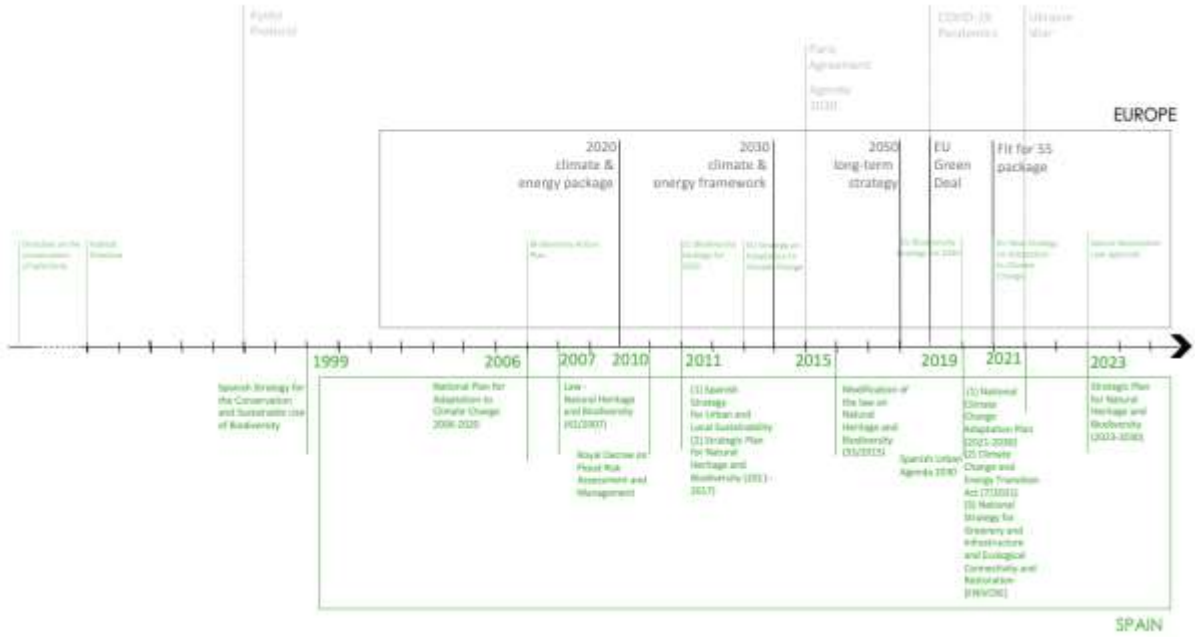

Figure ES2. Timeline illustrating key policies and regulations in Spain (bottom) and EU (upper) affecting Nature-based Solutions (in green).

YEAR	MILESTONE/EVENT	ACTORS	KEY DOCUMENT (short name if possible)	RELEVANCE TO NBS
1992	Habitat Directive	EU	92/43/EEC	Introduces Natura 2000, supporting habitat preservation crucial for NBS development.
1992	Spain ratifies the UN Convention on Biological Diversity	Spanish Government		Aligns Spain with global biodiversity goals, integrating NBS as a biodiversity strategy.
1999	The Spanish Strategy for the Conservation and Sustainable Use of Biodiversity	Spanish Government		Outlines national biodiversity conservation, indirectly promoting NBS applications.
2006	Biodiversity Action Plan	EU		EU-level biodiversity plan encouraging member states to adopt NBS for ecosystem services.
2006	National Plan for Adaptation to Climate Change 2006-2020	Spanish Government		Emphasizes adaptation measures like NBS to address climate impacts.
2007	Law on Natural Heritage and Biodiversity	Spanish Government	Law 42/2007	Framework law integrating NBS as tools for biodiversity and natural heritage conservation.

2010	Royal Decree on flood risk assessment and management	Spanish Government		Encourages use of NBS like wetlands and floodplains for managing flood risks.
2011	EU Biodiversity Strategy for 2020	EU		Promotes NBS to halt biodiversity loss and improve ecosystem services.
2011	Spanish Strategy for Urban and Local Sustainability	Spanish Government		Includes NBS as part of urban sustainability efforts, particularly in green urban planning.
2011	Strategic Plan for Natural Heritage and Biodiversity 2011-2017	Spanish Government		Incorporates NBS into strategies for conserving biodiversity and enhancing ecological networks.
2015	Modification of the law on Natural Heritage and Biodiversity	Spanish Government	Law 33/2015	Updates legal framework, strengthening NBS relevance in biodiversity protection.
2016	Climate Change Adaptation Strategy for the Spanish Coast	Spanish Government		Highlights NBS such as dunes and wetlands for coastal resilience.
2019	Spanish Urban Agenda 2030	Spanish Government		Advocates for green urban infrastructure and NBS to enhance urban sustainability.
2020	EU Biodiversity Strategy for 2030	EU		Prioritizes NBS as central to restoring ecosystems and increasing biodiversity.
2020	Government's Declaration on the climate and environmental emergency	Spanish Government		Commits to integrating NBS to address climate challenges and enhance resilience.
2021	National Climate Change Adaptation Plan 2021-2030	Spanish Government		Expands on NBS as a tool for addressing climate risks and promoting resilience.
2021	Spain's Climate Change and Energy Transition Act 7/2021	Spanish Government	Act 7/2021	Establishes binding targets for emissions and highlights NBS as part of climate solutions.
2021	National Strategy for Greenery Infrastructure and Ecological Connectivity and Restoration (ENIVCRE)	Spanish Government		Defines strategic goals for implementing NBS to improve ecological connectivity and restore degraded ecosystems.
2021	Recovery Plan, Transformation and Resilience	Spanish Government		A key instrument for the development of European funds under the Next Generation EU recovery plan.
2022	Strategic Health and Environment Plan 2026	Spanish Government		Focuses on integrating health and environmental considerations, including NBS to improve urban

				resilience and public health outcomes.
2023	Strategic Plan for Natural Heritage and Biodiversity 2023-2030	Spanish Government		Sets comprehensive goals for conserving biodiversity and enhancing natural heritage, explicitly incorporating NBS for ecological restoration and connectivity.
2024	Nature Restoration Law approval	EU	(EU) 2024/1991	Establishes legally binding targets for ecosystem restoration across the EU, promoting widespread adoption of NBS to address climate and biodiversity crises.

Table ES11. Table summarizing EU regulations transposed at national level (NbS)

The EU has been a driver in shaping Spain's policies related to the development of NBS, guiding and influencing national strategies and frameworks. NBS and related terms like green infrastructure (GI) pop up in many of the national environmental policies. They are more frequently explicitly mentioned in guidance documents and non-binding strategies, as compared to binding laws and regulations (Davis et al., 2018). However, an exception is the Spanish Law 33/2015 on Natural Heritage and Biodiversity (Ley del Patrimonio Natural y de la Biodiversidad), which requires mandatory GI strategies both on the national level and for the autonomous regions of Spain (Jefatura del Estado (Gobierno de España), 2015). The National Strategy for Greenery Infrastructure and Ecological Connectivity and Restoration (ENIVCRE) came into force in 2021, significantly impacting regional GI deployment, although many regions had already developed their own strategies beforehand.

After Law 33/2015 mandated the development of GI strategies at both the national and autonomous community levels, the National Strategy for Green Infrastructure, Ecological Connectivity, and Restoration (ENIVCRE) came into force in 2021, requiring regions to develop their own strategies within a maximum period of three years, based on the national strategy. Some autonomous communities developed their own GI strategies before 2021, such as Madrid, Valencia and Catalonia.

In terms of assessment, the implementation of the strategy is divided into work programs. Annual monitoring and reporting are conducted on the current work program, along with triennial evaluation reports for each Work Program until 2050. Additionally, a review of the national strategy is carried out in 2023, as well as mid-term evaluations in 2030 and 2040, and a final evaluation report in 2050 (Ministerio para la Transición Ecológica y el Reto Demográfico, 2021).

The economic downturn following the 2008 financial crisis negatively affected municipalities willingness to invest into NBS (Dorst et al., 2022). This highlights the importance of EU funds for Spain to implement NBS.

A study from 2021 highlights that urban NBS development cases in Spain were marked by relatively limited experience with citizen engagement, although notable differences were observed between cities and city districts. One explanation was the low level of environmental awareness among the public, which often leads to unrealistic expectations regarding the functions and benefits of green spaces (Dorst et al., 2022). Another aspect of low public engagement or participation in such programs or interventions, might be connected to how new green or blue spaces tied to biodiversity, environmental regeneration, health promotion or nature conservation, might be erasing past uses and the identity of places. In other words, the social and cultural aspects of places deemed as suitable for the implementation of NBS might not be considered early on in the process of implementation, with consequences on how residents and social groups engage in such projects.

5.2 The implementation process

Spain's implementation of NBS policies has involved a multifaceted approach, with a balanced distribution between legislative measures, financial incentives, and supportive programs. In terms of legislation, the country has implemented environmental and spatial planning regulations to promote NBS, while financial tools have included public procurement of land. Additionally, inter-municipal exchange platforms and educational programs supported the mainstreaming of the protection and creation of NBS (Van Der Jagt et al., 2023). This process has been characterized by various tools, timelines, beneficiaries, territorial considerations, deadlines, and assessment mechanisms, while also not free of socio-political frictions, experiments, controversies, and conflicts. Below is an overview of these aspect of policy implementation around NBS.

Legislative measures

By transposing EU directives, Spain has enacted national laws to strengthen the role of NBS in regional and urban planning. Law 33/2015, which amended Law 42/2007, incorporated the concept of GI into the Spanish legal system (FEMP, 2019). Law 33/2015 on Natural Heritage and Biodiversity (Ley del Patrimonio Natural y de la Biodiversidad) establishes the foundational legal framework for the conservation, sustainable use, enhancement, and restoration of natural heritage and biodiversity. This law includes tools to promote knowledge and planning of natural heritage and biodiversity, such as the State Strategy for Green Infrastructure, Ecological Connectivity, and Restoration, which requires the autonomous regions of Spain to develop NBS strategies and integrate NBS initiatives within their competencies (Sekulova et al., 2020).

Financial Support Mechanisms

A 2021 report highlights the absence of a dedicated national budget for NBS in Spain (Dorst et al., 2022). Instead, NBS development relies primarily on local and EU funding sources. Spain has benefited significantly from EU programs including the LIFE and Horizon program and European Regional Development Funds. These programs include specific allocations for NBS, biodiversity conservation, and climate adaptation measures (Fundacion Biodiversidad, 2025b).

Programs like the award of grants by the Biodiversity Foundation (Fundación Biodiversidad)1 were established for projects that contribute to implementing the National Climate Change Adaptation Plan 2021-2030. In the new financing period of 2021-2027, the Biodiversity Foundation (Fundación Biodiversidad) plays at national level, the role of an intermediate body for the European Regional Development Fund (ERDF) with the aim of contributing to the National Strategy for Green Infrastructure, Connectivity and Ecological Restoration (IVCRE), the National Plan for Adaptation to Climate Change, and other important policies to be materialized with transformative interventions in the territory. Its mission includes enacting interventions related to knowledge generation around biodiversity, the promotion of bioeconomy, protecting the marine environment and fomenting sustainability and NBS in urban environments (Fundacion Biodiversidad, 2025c).

The foundation is managing two calls for grants directed to municipalities for the renaturalization and resilience of cities within the framework of the Recovery, Transformation and Resilience Plan, financed by the European Union – Next Generation EU. A total of 120 million euros will be allocated in the coming years (Fundacion Biodiversidad, 2025b). The grant was distributed between different projects initiated by municipalities with over 50 000 inhabitants across Spain (Fundacion Biodiversidad, 2025a). Another call for grants focuses on the restoration of river ecosystems and flood risk reduction in Spanish urban environments, with a commitment to include NBS, amounting to 75 million euros (Fundacion Biodiversidad, 2025c).

In some cases, cities were more innovative and proactive in implementing NBS independently of policies and incentives at the national level, which in turn might have led to regional disparities along lines of city size and available budget (Dorst et al., 2022). Many city governments have launched their own subsidy programs to promote NBS. For instance, the Municipality of Barcelona started a program in 2017 to support the establishment of new green roofs in the city. In the second call of the program the competition's ten winning projects received a 75% subsidy on the cost, with a limit of €100,000 per roof. The selected projects included features such as self-sufficient urban allotments, rainwater collection, installations for renewable energy generation, a composting area for organic waste, and the inclusion of relaxation and leisure areas (Ajuntament de Barcelona, 2020).

Supportive Programs and Structures

The first inter-municipal exchange platform promoting NBS in Spain has been the **"Local Government Network + Biodiversity"**, established in 2006. It represents a federation operating under the guidance of the Spanish Federation of Municipalities and Provinces (FEMP), with the aim of adopting and influencing policies, as well as co-developing knowledge related to biodiversity, ecological connectivity, and the restoration of nature in (peri-)urban areas. FEMP has a membership of around 300 municipalities (Red Biodiversidad, 2025; Van Der Jagt et al., 2023). In 2019 the federation developed the **"Guide of Municipal Green**

[1] The Biodiversity Foundation (Fundación Biodiversidad) is a public foundation founded in 1998, operates under MITECO (Ministry for Ecological Transition and the Demographic Challenge), with the mission to contribute to reversing biodiversity loss. The foundation is responsible for distributing related EU and national grants and provides financial support.0

Infrastructure" handbook in collaboration with the Association of Green Infrastructure Management Companies (ASEJA) and the Spanish Association of Public Parks and Gardens (AEPJP) (FEMP, 2019). The federation was also a key contributor to the development of the ,"National Strategy for Green Infrastructure, Connectivity and Ecological Restoration" (Red Biodiversidad, 2025; Van Der Jagt et al., 2023).

In 2019 the **Nature-Based Solutions Working Group (GT-SbN)** was established, co-financed by MITECO (Ministry for the Ecological Transition and the Demographic Challenge) and coordinated by the Conama Foundation (a Spanish, independent, non-profit foundation that promotes open dialogue to foster sustainable development in Spain and Latin America) and the IUCN (International Union for Conservation of Nature) Mediterranean Cooperation Centre. Originating from a session at the 14th National Environmental Congress in 2018, this multidisciplinary group includes professionals from various fields, such as research, governance, and the private sector. The working group aims to promote awareness of the importance and benefits of NBS, foster a network for exchanging knowledge and information on NBS and identify replicable examples of NBS with measurable impacts to encourage their wider adoption. The GT-SbN has also launched an online platform, the **Observatory of NBS in Spain**, which provides tools, bibliographic resources, success stories, and a catalog of innovative projects to support professionals in the field (Fundacion Conama, n.d.; Sekulova et al., 2020).

Although nature-based solutions in Spain are often deployed through municipal urban planning strategies, their design and implementation generally do not explicitly differentiate by tenure (e.g., owner-occupied vs. rental vs. social housing). Publicly led initiatives, such as green corridors, urban gardens, or superblocks, may span across diverse tenure contexts, but tenure is rarely a formal criterion in site selection or investment planning.

Interviews and the policy lab suggested that tenure can indirectly shape the outcomes of NbS. For example, green infrastructure introduced in neighborhoods with high levels of rental housing or socio-economic vulnerability—such as Sant Martí in Barcelona—has sometimes been associated with gentrification pressures. As one planner in Barcelona noted: "Even if the greening is public, the value goes up and that pushes people out—we've seen that in Poblenou and Sant Martí." In contrast, public or cooperative housing projects have more capacity to retain residents and manage public space equitably, enabling a more stable integration of NbS without displacement. One housing official emphasized: "We could do more green interventions in social housing, but it requires coordination. Right now it's mostly happening around market-led regeneration."

While there are isolated examples of NbS in social housing contexts (e.g., roof gardens or shaded courtyards), a systematic tenure-sensitive approach remains absent from most NbS planning in Spain.

ELEMENT	DESCRIPTION
Legislative measures	Law 33/2015 on Natural Heritage and Biodiversity (Ley del Patrimonio Natural y de la Biodiversidad)
Financial Support	Award of grants by the Biodiversity Foundation (distribution of ERDF), EU programs (Horizon, Life, Next Generation EU), local subsidy programs

Supportive programs	Local Government Network +Biodiversity, “Guide of Municipal Green Infrastructure” handbook, Nature-Based Solutions Working Group (GT-SbN), “Observatory of NBS in Spain” online platform
Time horizon	The ENIVCRE requires regions to develop their strategies within three years from approval based on the national strategy
Assessment mechanisms	Annual monitoring reporting and triennial evaluate reports of the ENIVCRE
Challenges and controversies	Financial constraints post-2008 crisis, Lack of public environmental awareness and public engagement

Table ES12. Implementation Process (NbS)

5.3 Size and role of the market

The market for urban NBS development in Spain is expanding, driven by a combination of regulatory frameworks, urban resilience strategies, and the demand for sustainable urban planning. While precise market size figures are not readily available, the role of NBS is gaining prominence.

Although there is an absence of a dedicated national budget for NBS in Spain, large cities like Barcelona and Madrid have been leaders in funding GI projects, integrating them into broader urban development and climate plans (Dorst et al., 2022). For instance, Barcelona's ,,Nature Plan" and Madrid's ,,Madrid+Natural" framework have allocated significant municipal resources to expand urban greenery (Ajuntament de Barcelona, 2021; Ayuntamiento de Madrid, 2019). Large public investments in NBS were made in the city of Vitoria-Gasteiz, which was awarded the title of European Green Capital in 2012, partly due to its green belt project (Ayuntamiento de Vitoria-Gasteiz, 2022). Similarly, the city of Valencia received the same award in 2024 for its commitment to restoring natural ecosystems, improving air quality, and providing well-distributed urban green spaces within walking distance for residents (European Commission, 2024).

There is an increasing role for private investments, particularly in real estate developments that incorporate green roofs, green walls, and sustainable urban drainage systems (SUDS) to enhance property value and meet regulatory requirements. Although a study from 2021 highlights the perceived low market demand for NBS further dampened private sector interests; even NBS mainstreaming was not thought to be feasible without private sector contributions because of limited public sector capacity. The limited role of the private sector is explained with the profit- and result- oriented mindset of real estate developments and the perception of NBS as technically risky regarding costs and reputation. The study also highlights that urban NBS are competing with commercial building development in peri-urban areas (Dorst et al., 2022).

Spain significantly relies on EU funding mechanisms to carry out NBS, including the LIFE program, Horizon, the European Regional Development Funds and the Next Generation EU funds that support NBS projects as part of broader goals for sustainable and climate-resilient urban planning (Fundacion Biodiversidad, 2025b).

5.4 The multi-level governance process

Spain's approach to fostering NBS is characterized by a multilevel governance framework involving national, regional, and local authorities, as well as various stakeholders from the public and private sectors. NBS policies in Spain follow a top-down flow, starting at the EU level, where directives and strategies provide overarching frameworks. These are then transposed into national legislation, as laws and policies such as the ENIVCRE. From there, responsibilities and frameworks are passed down to the autonomous communities, which are required to develop their own strategies in alignment with national guidelines. Finally, on the local level provinces, metropolitan areas and municipalities implement these policies through tailored projects and initiatives, ensuring that the broader goals of the EU and national strategies are adapted to local contexts and needs.

At the level of central government, The Ministry for the Ecological Transition and the Demographic Challenge (MITECO) is the primary body responsible for formulating national environmental policies, including those related to NBS. It develops strategic plans, such as the “Spanish Strategy for the Conservation and Sustainable Use of Biological Diversity” and the ENIVCRE. Fundanción Biodiversidad is an agency under MITECO, which promotes the conservation, restoration, and sustainable use of biodiversity through funding programs, building alliances and public awareness campaigns.

Spain's 17 autonomous communities have significant authority over urban development. They adapt national policies to regional contexts, manage funding allocations, and implement regional programs to promote NBS. From 2021 every Autonomous Community is required to develop their own GI strategy, however some of them have already developed such a strategy, like Catalonia with the Catalonia Green Infrastructure Program (PIVC) 2017-2021 (Generalitat de Catalunya, 2017).

Provincial Governments (Deputacio) play a coordination role between autonomous communities and municipalities. They provide technical and financial support to smaller municipalities that may lack resources to independently implement NBS. Deputations facilitate regional-level collaboration and ensure that urban greening efforts align with broader regional goals.

Metropolitan areas, which encompass multiple municipalities, coordinate urban development strategies across municipal boundaries. They ensure that NBS initiatives are integrated into broader metropolitan-scale planning. For example, the Metropolitan Area of Barcelona develops the Metropolitan Urban Master Plan in which (re)naturalization plays an important role (AMB, 2025).

Local municipal governments are responsible for urban planning and building permits. They play a crucial role in implementing NBS projects, enforcing building codes, and facilitating community engagement. For example, the city of Barcelona set a goal to develop 10,67 ha of green areas every year, partly by reclaiming public spaces in dense urban neighbourhoods (Ajuntament de Barcelona, 2021). The city Vitoria-Gasteiz, one of the leading cities in Spain in urban greening, created its GI strategy in 2012 and implemented several NBS projects over time (Climate ADAPT, 2018).

The "Local Government Network + Biodiversity" intermunicipal exchange platform was established in 2006 under the guidance of the Spanish Federation of Municipalities and Provinces (FEMP) and developed the “Guide of Municipal Green Infrastructure” handbook and contributed to the development of the ENIVCRE. The Association of Green Infrastructure Management Companies (ASEJA) and the Spanish Association of Public Parks and Gardens (AEPJP) are Spanish organizations working towards the promotion of NBS (FEMP, 2019). The Conama Foundation, a Spanish NGO that promotes sustainable development in Spain and Latin America, and the IUCN Mediterranean Cooperation Centre are two key non-governmental actors engaged in policy work, advocating for NBS, and coordinating the NBS Working Group (GT-SbN) (Fundacion Conama, n.d.; Sekulova et al., 2020).

A scientific paper from 2021 studying the barriers working against NBS in Spain points out that the main barriers, related to underlying structural conditions in Spain, were for example the limited communication between parties in government and certain lack of flexibility by departmental organizations linked to bureaucracy. The uncertainty and lack of capacity was underlined within local governments to take the lead in sustainability innovations. Although the research highlighted that in many cases the city level was more innovative than the state that time (Dorst et al., 2022). Another study stressed that the national government was seen as lagging behind in providing policy-based support for NBS, especially when compared to certain cities (Van Der Jagt et al., 2023). This changed in 2021 when the ENIVCRE came into force.

ACTOR	TYPE	LEVEL	ROLE	IMPACT
Minister (MITECO)	Public	National	Develops national environmental policies and strategic plans.	Sets overarching goals and frameworks for NBS.
Biodiversity Foundation	Public	National	Distribution of public funds from the national to the local level.	Implementation of NBS.
Autonomous Communities	Public	Regional	Adapt and implement national policies; manage regional programs.	Ensure policies are tailored to regional contexts.
Provincial Government (Deputacio)	Public	Regional	Facilitate cooperation between municipalities and manage regional-level services.	Bridge regional and local efforts for consistent NBS implementation.
Metropolitan Areas	Public	Regional/ Local	Coordinate urban development strategies across municipalities.	Integrate NBS into broader metropolitan strategies, ensuring regional cohesion.
Municipalities	Public	Local	Oversee urban planning, building permits, and local initiatives. NBS in urban areas are mainly initiated by the local municipalities.	Directly engage with communities and enforce regulations.
Conama	NGO	National	Conama is a Spanish,	Initiator of the GT-SbN, the national

			independent, non-profit foundation that promotes open dialogue to foster sustainable development in Spain and Latin America.	Nature-based Solutions Working Group
Non-governmental and Civil Society Organizations	Non-profit	National/Regional/Local	NGOs and networks such as the Local Government Network +Biodiversity, the Association of Green Infrastructure Management Companies (ASEJA) and the Spanish Association of Parks and Public Gardens (AEPJP) advocate for NBS practices and community initiatives.	Raise awareness and influence policy development.
Private real-estate developers	Private	National/Regional/Local	Invest in green amenities within real estate developments.	Drive market-based NBS projects.

Table ES13. Key Actors and their Roles (NbS)

5.5 Achievements, assessments, and challenges

Spain's policy initiatives regarding NBS have contributed to a shift over the last decade, scaling up the implementation of NBS from pilot phase to more broad application on the local level (IUCN, 2019). However, these efforts have also introduced challenges, particularly concerning housing inequalities. Below is an analysis of the measured and potential impacts of NBS on housing inequalities, accompanied by a summary table.

The implementation of NBS in Spanish cities led to the mitigation of urban heat island effect by cooling the environment through shading and evaporation. In recent years, the city of Barcelona implemented a Climate Shelter Program aimed at enhancing climate adaptation. As part of this initiative, NBS like greening, creating chade, green roofs and green walls were developed in many schoolyards (Ajuntament de Barcelona, 2025). NBS projects demonstrated a positive effect on the transition to sustainable stormwater management (SUDS) through reducing surface-runoff and the increase of biodiversity by providing habitats for various urban species, for example in Vitoria-Gasteiz (Climate ADAPT, 2018). NBS in Spain also positively affected the improvement of urban air quality and protected coastal areas. For instance, hybrid dunes in the Barcelona Metropolitan Area protected urban areas from coastal erosion and extreme events (OPERAs, n.d.). However, irrigation and maintenance of green areas are costly in the dry Mediterranean climate.

New green spaces contribute to the improvement of physical and mental health by encouraging active lifestyles, they reduce stress and improve well being by providing access to nature. Urban gardens play an important role in creating spaces for community interaction, fostering stronger social ties and resilience (Camerin & Longato, 2024). For example the city of Barcelona in 2012 started an environmental stewardship program which allows citizens to participate in the creation and maintenance of urban green areas (Ajuntament de Barcelona, n.d.).

The construction and maintenance of new urban green areas requires increasing public investment and employing more workforce which generates employment opportunities and stimulates economic activity (Barseghyan et al., 2023). It also (re)creates areas previously considered degraded or of low aesthetic and recreational value, indirectly boosting the local economy.

However, urban greening can drive up property values and rents, potentially displacing low-income residents. Environmental gentrification is already evident in major cities like Barcelona, which pursue ambitious urban greening policies while facing significant pressure in the property market and a shortage of affordable housing. This process exacerbates housing inequalities by making neighborhoods increasingly unaffordable and/or unwelcoming for long-term residents, either by causing displacement due to increasing rental prices, or by slowly changing the social and business fabric of neighborhoods (Anguelovski et al., 2018).

A 2021 report highlights the absence of a dedicated national budget for NBS in Spain. Instead, NBS development relies primarily on local and EU funding sources (Dorst et al., 2022). Variations in regional policies and funding availability can result in unequal implementation of NBS implementation, with some areas advancing more rapidly than others, for example the municipalities of Vitoria-Gasteiz and Barcelona. At city level, also, low budgets for NBS implementation might mean that more high-income, white and politically powerful neighborhoods are prioritized over others that are more marginalized and ethnically diverse.

Spain’s progress in integrating NBS reflects a dynamic interplay between EU directives, national frameworks, and local innovation. At the national level, the enactment of Law 33/2015 marked a significant milestone, requiring the development of national and regional GI strategies. However, many municipalities had already begun developing GI strategies and implementing NBS well before the national GI strategy was introduced in 2021. Despite the absence of a dedicated national budget for NBS, cities such as Barcelona, Madrid, Vitoria-Gasteiz, and Valencia have led urban greening efforts through substantial municipal investments and innovative projects. Spain has heavily relied on EU funds, programs like LIFE, Horizon, ERDF, and Next Generation EU provided crucial financial support to advance these initiatives. The multi-level governance of NBS faces notable challenges, including limited stakeholder communication, bureaucratic inefficiencies, and capacity gaps at the local level. However, innovative cities have often taken the lead, setting ambitious goals and implementing strategies despite these structural barriers. NBS initiatives have yielded many benefits, including urban heat mitigation, enhanced biodiversity, improved air quality, and contributions to climate resilience. Socially, these projects have fostered community engagement, reduced

stress, and promoted public health. However, the implementation of NBS has also highlighted challenges, particularly concerning housing inequalities. Green gentrification has emerged as a pressing issue in larger cities, where urban greening efforts often increase property values.

Impact area	Measured or potential	Description/evidence
Access to green infrastructure	Measured	Low-income and marginalized communities often lack equitable access to new NbS (e.g., green corridors, urban gardens) which are concentrated in central, high-visibility zones (Eggimann 2022; Interview with CSO).
Green gentrification	Measured	NbS projects in central areas (e.g., Barcelona Superblocks) have increased surrounding housing costs and displaced vulnerable groups (Anguelovski et al., 2023).
Uneven implementation	Measured	Municipal capacity affects NbS rollout; large cities implement more extensive projects than small towns or peri-urban areas (Barcelona, Vitoria-Gasteiz vs. rural municipalities).
Disconnection from housing strategy	Measured	NbS often introduced through environmental planning with little integration with housing affordability policies (Interview with urban planner).
Potential for participatory governance	Potential	Community-led greening initiatives offer avenues for more inclusive outcomes, particularly in smaller-scale interventions (Policy Lab notes).
Co-benefits for health and climate	Potential	Well-targeted NbS improve microclimates, reduce urban heat islands, and support mental health—benefits that could reduce inequality if equitably distributed (Ghosh et al. 2024).

Table ES14. Table Measured and Potential Impacts on Housing Equality (NbS)

6 Densification

This section explores how urban densification has been regulated in Spain over the past two decades, particularly in the context of climate transition, housing access, and spatial planning reform. While densification is not always an explicit goal, it is often advanced through instruments such as zoning updates, infill incentives, and urban regeneration programs. Spanish cities operate within a multi-tiered legal and planning framework, with regional governments defining land use regimes and municipalities translating them into local development plans. The analysis examines how different actors deploy densification logics,

the territorial asymmetries in implementation, and the emerging tensions between environmental efficiency and social equity.

6.1 The policy cycle: emergence of the issue and policy decisions

Densification policies in Spain have evolved as part of a broader strategy to address urban sprawl, improve housing availability, and promote sustainable land use. The drive toward compact urban development has been influenced by European Union (EU) frameworks, national urban development goals, and the need to mitigate environmental degradation caused by dispersed urbanization. Spain's approach integrates legislation, planning instruments, and financial measures that prioritize efficiency in land use and infrastructure.

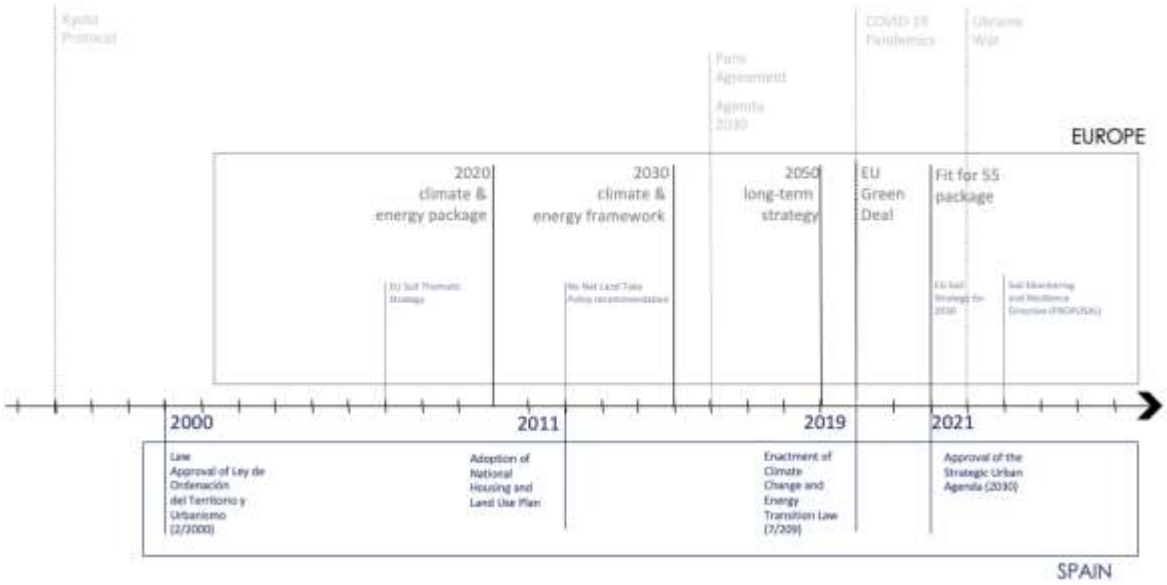

Figure ES3. Timeline illustrating key policies and regulations in Spain (bottom) and EU (upper) affecting urban densification (in blue)

YEAR	MILESTONE / EVENT	ACTORS	KEY DOCUMENTS	EU INFLUENCE
2002	***Adoption of the Energy Performance of Buildings Directive (EPBD) 2002/91/EC***	EU	EPBD 2002/91/ec	Initiated EU-wide standards for building energy performance
2006	***Implementation of the Technical Building Code (Código Técnico de la Edificación - CTE)***	Spanish Government	Royal decree 314/2006	Transposed EPBD 2002/91/EC into national law, setting energy efficiency standards for new and renovated buildings.
2010	***Recast of the EPBD (Directive 2010/31/EU)***	EU	EPBD 2010/31/EU	Strengthened requirements for nearly zero-energy buildings and cost-optimal levels.

2013	***Transposition of the Energy Efficiency Directive (EED) 2012/27/EU***	Spanish government	Law 15/2013	Established measures to achieve energy savings across sectors, including buildings.
2014	***Submission of the National Energy Efficiency Action Plan 2014-2020***	Spanish government	National Energy Efficiency Action Plan 2014-2020	Outlined strategies to meet EU energy efficiency targets, focusing on building renovations.
2018	***Amendment of the EPBD (Directive 2018/844/EU)***	EU	EPBD 2018/844/EU	Emphasized long-term renovation strategies and smart technologies in buildings.
2020	***Approval of the Integrated National Energy and Climate Plan (NECP) 2021-2030***	Spanish government	NECP 2021-2030	Set national targets for energy efficiency and building renovations in line with EU goals.
2021	***Enactment of the Climate Change and Energy Transition Law***	Spanish Government	Law 7/2021	Aimed for carbon neutrality by 2050, with specific measures for building energy efficiency.
2023	***Publication of the revised Energy Efficiency Directive (Directive (EU) 2023/1791)***	EU	EED 2023/1791	Raised the EU's energy efficiency target, requiring member states to achieve an additional 11.7% reduction in energy consumption by 2030.
2024	***Spain's updated National Energy and Climate Plan***	Spanish Government	Updated NECP 2024	Increased targets for green hydrogen production and energy storage, reflecting ongoing commitment to EU energy efficiency objectives.

Table ES15. Table summarizing EU regulations transposed at national level (Densification)

The evolution of densification strategies in Spain reflects a gradual alignment with sustainable urban planning principles and broader European Union (EU) frameworks. Each milestone represents a critical step in shaping the country's approach to land use, urban development, and climate resilience.

Before the year 2000, several key laws and regulations shaped urban development and densification in Spain. The ***Ley del Suelo*** **(Land Law) of 1956** was one of the first comprehensive land-use laws in the country. It established a framework for urban development and land classification, introducing the concept of zoning and defining land categories such as urban, developable, and non-developable. Though the law indirectly supported densification by encouraging the development of urban land within city boundaries and restricting development in non-urban areas, its enforcement was inconsistent, and urban sprawl continued to occur unchecked.

In 1975, the ***Ley General de Ordenación Urbana*** **(General Urban Planning Law)** replaced the 1956 law. This new legislation provided a more structured approach to urban planning, focusing on the preparation of municipal urban plans (known as Plan General de Ordenación

Urbana, or PGOU) to guide development. The PGOU frameworks introduced by this law often included provisions to increase housing density in urban centers, especially in cities experiencing rapid population growth. Cities like Madrid and Barcelona began preparing urban plans that incorporated compact city principles, helping to manage their expanding populations.

Throughout the 20th century, **various *Plan Nacional de Vivienda* (National Housing Plans)** were introduced to address housing shortages and improve living conditions across Spain. These plans often focused on the construction of social housing in urban areas, contributing to rising population density in cities such as Valencia, Seville, and Bilbao. These housing developments typically consisted of multi-story apartment blocks built within existing urban boundaries.

In 1992, the *Ley del Suelo* was revised to yet again curb urban sprawl. This revision prioritized urban renewal and redevelopment over the expansion of urban peripheries and introduced stricter requirements for municipalities to justify land-use changes. By promoting urban renewal and infill development, the 1992 law implicitly encouraged densification and set the stage for future policies that would explicitly prioritize compact urban development.

During the 1980s and 1990s, the first decades of democracy following the death of the dictator Francisco Franco (1975), many Spanish cities adopted their own urban development plans, often shaped by national laws and regional policies. For example, Barcelona's urban plan following the 1992 Olympics emphasized the redevelopment of industrial zones into residential and mixed-use areas, laying the groundwork for modern densification efforts – albeit leading to expulsions and urban cleansing of working-class communities while marking the end of barraquismo[2] in the city. Similarly, in Madrid, urban renewal projects in districts such as Lavapiés aimed to increase population density while preserving the ´historical fabric´ of the city.

The foundation for densification efforts in Spain was laid **in 2000 with the Urban Planning Law (*Ley de Ordenación del Territorio y Urbanismo*)**, which introduced several core principles of land use planning in Spain. These principles emphasized compact urban growth, prioritizing infill development over expansion into greenfield areas, and promoting mixed-use developments to integrate residential, commercial, and public spaces within neighborhoods. The law also stressed the conservation of natural resources and the reduction of environmental impacts by limiting urban sprawl and optimizing infrastructure.

For example, Valencia embraced these principles through the revitalization of the Cabanyal-Canyamelar district. This project involved transforming an underutilized area into a vibrant mixed-use neighborhood with improved housing, public spaces, and tourism facilities. While the initiative successfully enhanced urban density and economic activity, it also drew criticism

[2] The historical phenomenon of informal housing settlements, characterized by makeshift shacks or huts (known as *barracas* or *chabolas*) built by people who lacked access to formal housing. These settlements often emerged on the outskirts of cities, especially during periods of rapid urbanization in the 20th century.

for gentrification and the displacement of long-time residents, reflecting the challenges of balancing densification with social equity.

In 2007, the EU further strengthened these ideas with the adoption of the **Leipzig Charter on Sustainable European Cities**. This document emphasized the importance of compact urban development, mixed-use neighborhoods, and the integration of sustainable transport systems. These principles were implemented, for example, in Zaragoza as part of the city's preparation for Expo 2008. The transformation of the Ebro River area focused on creating high-density housing, public spaces, and integrated transportation infrastructure. The project successfully enhanced urban connectivity and increased population density in previously underutilized areas. However, some parts of the development struggled with long-term occupancy after the Expo, highlighting the importance of sustained economic activity to support densification efforts.

Building on these foundations, Spain introduced the **National Housing and Land Use Plan in 2011**. This plan promoted urban regeneration, the reuse of underutilized land, and the development of high-density housing to address growing population demands. Bilbao's Zorrotzaurre redevelopment exemplified this approach by transforming a semi-abandoned industrial peninsula into a thriving mixed-use urban area. The project prioritized affordable housing, commercial spaces, and sustainable infrastructure, creating a model for urban regeneration in Spain. This initiative significantly increased the availability of housing and public amenities, although some challenges related to environmental remediation and funding complexities emerged during the process (Radovanović and Perović 2024).

The launch of the **EU Urban Agenda in 2016** marked another pivotal moment, emphasizing sustainable urbanization and compact city models as central pillars of European urban planning strategies. Madrid aligned its planning efforts with this agenda by implementing transit-oriented development (TOD) initiatives, focusing on areas around major transport hubs like Chamartín. The city's TOD projects encouraged high-density, mixed-use developments that improved public transit accessibility and reduced reliance on private vehicles. These efforts supported Madrid's goals of reducing carbon emissions and enhancing urban mobility. However, rising property values near these hubs raised concerns about affordability for lower-income residents, underscoring the need for equitable housing policies within densification efforts.

In **2019, the Climate Change and Energy Transition Law** linked densification with climate resilience by promoting urban models that reduce greenhouse gas emissions through efficient land use and infrastructure. The city of Seville applied these principles by creating green urban corridors that connected dense urban neighborhoods with parks and natural areas. These corridors incorporated bicycle lanes, pedestrian pathways, and public transit stops, reducing car dependency and improving overall urban livability. While the initiative was widely appreciated for enhancing environmental quality and promoting active mobility, some residents expressed concerns about the need for more extensive public transit options to support growing populations.

The **Strategic Urban Agenda 2030**, approved in 2021 at National level, reinforced compact city models and smart growth strategies, integrating environmental, economic, and social

objectives into densification efforts. Barcelona's Superblock program became a flagship initiative under this agenda, with cities around the world aiming to replicate the initiative as to integrate green space within densification projects (Eggimann 2022). Superblocks consolidate traffic into perimeter streets, creating pedestrian-friendly internal areas with green spaces and community-oriented facilities. This approach significantly reduced air pollution, improved public health, and enhanced the quality of life for residents. However, it faced resistance from some car users and local businesses who relied on vehicle access, highlighting the challenge of balancing diverse urban priorities. Furthermore, Barcelona's Superblocks may contribute to green gentrification as the transformation of urban spaces into pedestrian-friendly, green environments can increase property values, attracting wealthier residents while displacing lower-income and historically marginalized communities, thereby reinforcing social inequalities (Anguelovski et al. 2023).

Finally, the **revision of the EU Territorial Agenda in 2023** strengthened the focus on urban density for sustainability. Valencia integrated these principles through its Valencia Smart City initiative, which emphasized energy-efficient buildings, smart grids, and IoT-based urban management in high-density zones. These projects improved energy efficiency, reduced waste, and showcased Valencia as a leader in smart urban growth – playing a role in the city being awarded the title the 2024 European Green Capital. However, the substantial investment required for such advanced technologies has posed challenges for scalability and equitable access for all residents (Mahmoud and Wael 2019).

Densification policies are increasingly tied to broader environmental and energy goals, as reflected in national climate planning. The Integrated National Energy and Climate Plan (NECP 2021–2030) explicitly promotes compact urban form and transit-oriented development as tools to reduce emissions from transport and buildings. The Climate Change and Energy Transition Law requires urban plans to integrate climate adaptation and mitigation criteria, further aligning densification with energy and greening policies. Moreover, densification is linked to energy retrofitting strategies (e.g., through the PREE program) by targeting dense areas for energy-efficient redevelopment, and to NbS initiatives like green corridors and superblocks, which often support both climate goals and higher density use of space.

This progression illustrates how Spain's densification strategies have been shaped by a combination of national priorities and EU directives. Each milestone not only pushed forward the country's approach to urban planning but also laid the groundwork for future initiatives, creating a cohesive and adaptive national policy framework which continues to impact localized (re)development projects throughout the country´s 17 autonomous communities.

6.2 The implementation process

Spain's densification policies are implemented through a mix of legislative tools, financial programs, and planning instruments. The implementation process reflects a multi-pronged approach to addressing urban challenges while promoting sustainability and economic growth. An overview of these elements is provided below.

Urban Planning Legislation and Climate Integration

The Urban Planning Law of 2000 was the first foundational legislation establishing legal frameworks to encourage compact city development, urban renewal, and efficient land use. The law guided local governments to combat urban sprawl by prioritizing infill development and repurposing existing urban spaces. For instance, Valencia's El Carmen neighborhood revitalization utilized these principles by transforming an aging urban district into a high-density, mixed-use area with ´modern´ amenities. This project preserved the historic character of the neighborhood while introducing efficient land-use practices, fostering economic growth, and increasing housing availability. However, the focus on economic revitalization often led to gentrification, displacing low-income residents and reducing the social diversity that made the neighborhood unique, through an influx of tourists and the touristification of the area (El Español, 2024)

The Climate Change and Energy Transition law of 2019 connected urban densification to Spain's climate goals by emphasizing compact urban models to reduce greenhouse gas emissions. It highlighted the integration of renewable energy systems, green roofs, and energy-efficient infrastructure in high-density areas. For example, in Vitoria-Gasteiz, green infrastructure initiatives were incorporated into urban densification projects, including the development of urban gardens and green roofs on residential buildings. These measures not only reduced energy consumption but also enhanced urban livability and resilience to climate change.

National Subsidies and Urban Regeneration Programs

Subsidies, coming from both the national government and local government sources, for urban regeneration, such as those found in programs such as the Plan Estatal de Vivienda (State Housing Plan), offer financial incentives to developers for undertaking infill development and repurposing unused urban spaces. In Bilbao, subsidies from the national government, the Basque Regional Government and the Bilbao City Council, were instrumental in transforming the Zorrotzaurre peninsula, where abandoned industrial areas were redeveloped into a vibrant urban quarter. The subsidies reduced financial barriers, enabling the development of affordable housing and public spaces while attracting private investment. However, these efforts have often prioritized economic growth over social equity, with affordability initiatives failing to meet the needs of the lowest-income households, exacerbating housing inequality in regenerated areas (Bilbai Hiria, 2024).

EU Co-Financing and Structural Funds

Structural and cohesion funds from EU, such as those from the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund, and NextGenerationEU funds, have also significantly supported Spain's urban densification initiatives. These funds have co-financed major projects in metropolitan areas across Spain, facing housing shortages – including Madrid, Barcelona, Valencia, Seville, Bilbao, Malaga, Zaragoza, Alicante, Castellón, Vigo, Santander, Oviedo, Murcia, and Palma de Mallorca. The Barcelona Superblock program, a celebrated and globally recognized initiative, benefited from EU funding to reconfigure traffic patterns, expand pedestrian zones, and increase urban

density without compromising sustainability. This initiative demonstrated the potential of EU funds to create transformative urban projects with long-term benefits.

Task Incentives and Fiscal Tools

Tax reductions have also been implemented to encourage developers to focus on high-density housing projects and retrofitting existing urban infrastructure. In Madrid, developers received tax benefits — including reductions in the Impuesto sobre Construcciones, Instalaciones y Obras (ICIO) — for projects located near major public transport hubs, which helped promote compact, transit-oriented development. These fiscal tools were designed to reduce upfront development costs and improve the financial viability of high-density, sustainable housing.

Some municipalities have also introduced property tax (IBI) reductions for renovated buildings that meet energy performance or urban integration criteria. This has proven especially effective in medium-sized cities like Zaragoza and Valencia, where local governments actively promote the reuse of existing urban land rather than expansion into peripheral areas. While these tax policies help catalyze urban regeneration and densification, critics argue that their application often lacks social targeting, risking the promotion of market-rate development that are unaffordable for low- and middle-income households (Bouzarovski et al., 2018).

Local Plans and Zoning Reforms

Localized densification plans within cities have guided urban development in cities like Barcelona and Madrid, prioritizing transit-oriented development (TOD), mixed-use neighborhoods, and efficient public spaces. The Madrid Nuevo Norte project exemplifies this, integrating residential, commercial, and transit infrastructure within a compact area. By aligning urban growth with public transit, the project aimed to minimize reliance on private vehicles and promote sustainable mobility. However, critics highlight that the prioritization of high-end commercial spaces and luxury housing often marginalizes low-income populations, who are unable to access these benefits.

Incentivized zoning reforms have encouraged higher-density housing near transit corridors and employment hubs. For example, Seville introduced zoning incentives to facilitate residential development near its metro lines, increasing population density while reducing urban sprawl. These reforms simplified approval processes, making it easier for developers to invest in high-density projects. Still, these zoning changes frequently favor upscale developments, further displacing economically vulnerable groups who cannot afford the new housing stock.

Element	Description
Legislative measures	Climate Change and Energy Transition Law (2021), Technical Building Code (2006, updated periodically)
Financial Support	

	Subsidies (e.g., PREE), tax incentives, regional programs (e.g., Asturias' energy efficiency subsidies)
Supportive programs	One-stop shops, training and certification programs
Time horizon	NECP 2021-2030 outlines a 10-year strategy with interim targets
Assessment mechanisms	Regular monitoring and reporting to evaluate progress and adjust strategies as needed
Challenges and controversies	Financial constraints post-2008 crisis, regulatory changes causing uncertainty, low public awareness and engagement

Table ES16. Implementation Process (Densification)

6.3 Size and role of the market

The densification market in Spain is influenced by various policy frameworks, financial mechanisms, and private sector participation. These elements interact in complex ways to shape urban development trends, particularly in high-density cities. Understanding how each component functions requires a deep dive into the legislative, economic, and social factors driving the urban densification process, as well as the role of public and private actors in these developments.

Vertical Housing and Private Development

Private developers have historically played a critical role in shaping the densification landscape in Spain, particularly in urban centers such as Madrid, Barcelona, Valencia, and Bilbao. These cities have experienced substantial population growth, urban migration, and increased demand for affordable housing, which has driven the need for high-density housing solutions. As Spain's cities have become more populated, urban planning policies have encouraged the construction of vertical housing—such as apartment buildings and mixed-use developments—in the heart of urban areas.

There have been several key legislative influences in this regard. The Ley General de Ordenación Urbana (1975) and its subsequent revisions, like the Ley del Suelo (1992), set the stage for high-density housing in Spain by introducing zoning laws and urban renewal initiatives that enabled developers to build more densely in cities. These laws allowed for more flexible land-use practices, enabling the vertical growth of urban spaces. The Ley de Vivienda (2022), which reaffirms the government’s commitment to affordable housing, provides new incentives for the construction of high-density, low-cost housing by private developers.

Public-Private Partnerships (PPPs)

Public-Private Partnerships (PPPs) are instrumental in urban densification efforts in Spain, particularly when it comes to mixed-use developments and affordable housing projects. These partnerships allow municipalities to leverage private sector capital and expertise while fulfilling

public objectives like increasing housing stock, urban regeneration, and improving infrastructure.

Several key legislative moments have influenced the importance of PPPs in urban densification efforts in Spain. In 2017, the Ley de Contratos del Sector Público provided the legal framework for PPPs, enabling municipalities to engage private developers in projects that support urban densification and revitalization. Private developers play a crucial role in these projects, often providing the capital, expertise, and efficiency needed to deliver high-density housing and mixed-use developments, particularly in city centers and underdeveloped areas. The National Housing and Land Use Plan (2011) and Strategic Urban Agenda 2030 (2021) further encourage collaboration between public and private sectors by offering various incentives, such as tax breaks, density bonuses, and fast-tracked permits for projects that meet specific sustainability and affordability criteria. These plans create more transparent pathways for joint ventures, incentivizing developers to prioritize urban regeneration and sustainable growth, and to incorporate green infrastructure, affordable housing, and mixed-use spaces in their projects.

In Valencia, a notable example of a PPP-driven project is the regeneration of the Old Turia Riverbed, where public land has been revitalized with private investment to create mixed-use spaces, residential areas, and recreational zones. Similarly, Madrid's operation "Madrid Río" transformed the Manzanares River area into a green space while incorporating affordable housing, thanks to a successful public-private collaboration.

Market Instruments: Tax Bonuses, Density Incentives, and Land Readjustment

Several market interventions are designed to facilitate urban densification and encourage private sector involvement. These include tax incentives, density bonuses, land readjustment schemes, and innovative financing models, such as green bonds, that promote sustainable development.

Tax incentives and density bonuses are increasingly common in urban centers, particularly for developers who meet sustainability and affordability criteria. For instance, the Madrid City Council offers density bonuses in exchange for including a certain percentage of affordable housing in development projects. Similarly, Barcelona has incentivized the construction of energy-efficient buildings and increasing density by offering tax rebates and expedited permitting processes.

In densely populated urban areas, land availability is often scarce. **Land readjustment schemes**, which allow for the consolidation of fragmented plots, enable more efficient development. These schemes function as a **market mechanism** because they rely on **private landowners and developers** to drive urban transformation, with the government acting as a **regulator rather than a direct investor**. Instead of expropriating land, municipalities facilitate **land pooling**, allowing private owners to consolidate their plots for redevelopment. This process **raises property values**, enabling landowners and developers to profit while financing infrastructure improvements, making it a **self-sustaining model**. By shifting costs to the private sector and letting the market dictate redevelopment, land readjustment promotes **densification without heavy state intervention,** aligning public planning goals with market-

driven urban renewal. These schemes are particularly prevalent in Barcelona, where urbanization policies prioritize land consolidation to create denser, mixed-use neighborhoods that balance residential, commercial, and green spaces.

Green Financing and Investment Tools

In recent years, financial institutions in Spain have been increasingly focusing on sustainable urban development through mechanisms like green bonds and other forms of green financing. This aligns with Spain's push for more sustainable cities and the EU's Green Deal. In particular, banks and financial institutions have begun offering specialized loans for energy-efficient buildings and low-carbon infrastructure, which has made high-density development more viable for developers committed to sustainability.

6.4 The multi-level governance process

Spain's densification efforts involve coordination across national, regional, and local levels, with each tier of government playing a crucial role in ensuring that policies are effectively implemented. Effective governance is essential to harmonize diverse policy objectives and ensure that densification meets both national goals and local needs.

At the national level, the Ministry of Transport, Mobility, and Urban Agenda (MITMA) plays a leading role in developing strategic frameworks such as the Urban Agenda 2030. MITMA is also responsible for overseeing the allocation of national and EU funds to densification projects, ensuring that resources are distributed efficiently to achieve the country's urban development goals. In particular, the National Housing and Land Use Plan (2011) outlines clear priorities for sustainable urban development, offering financial incentives for projects that align with densification and urban regeneration efforts. Moreover, MITMA's policies emphasize the importance of compact, sustainable cities, helping to guide local and regional efforts to reduce urban sprawl and enhance environmental sustainability.

The National Housing Observatory, a key governmental body, monitors housing trends across Spain. This body collects data, conducts research, and provides valuable insights that inform densification policies and address emerging challenges. By tracking housing demand, supply, and affordability, the Observatory plays an instrumental role in shaping policies that respond to shifting urban dynamics.

At the regional level, autonomous communities are granted significant regulatory autonomy, allowing them to adapt national policies to suit local contexts. This flexibility enables each region to address specific needs and challenges unique to its urban environments. For example, Catalonia has introduced regional legislation to promote transit-oriented development (TOD), encouraging high-density housing near public transportation hubs to reduce car dependency and improve urban mobility. Similarly, Andalusia has focused on revitalizing historic urban cores, combining preservation with densification efforts to breathe new life into older neighborhoods while addressing housing shortages.

Municipalities are the key actors in implementing zoning, urban planning, and permitting processes. They are responsible for the ground-level application of densification policies, often

working in collaboration with both regional and national authorities to align local projects with broader strategic goals. Local governments also engage directly with communities to ensure public support for densification initiatives. In some cases, municipalities offer incentives to developers to ensure that projects meet local housing needs, such as including affordable units in new developments.

Private developers play a crucial role in these projects, delivering high-density housing that aligns with local zoning and urban planning policies. By providing capital and expertise, private developers help municipalities meet their densification goals. The National Housing and Land Use Plan (2011) and the Strategic Urban Agenda 2030 (2021) have offered developers a framework of incentives to prioritize sustainable and affordable projects, such as tax breaks, density bonuses, and green building certifications.

Actor	Type	Scale	Domain	Role	Policy Effect
Ministry of Transport, Mobility and Urban Agenda	Public	Central/National	Political	Sets national strategy for urban planning and densification	Frames densification priorities, allocates funding
Ministry for the Ecological Transition (MITECO)	Public	Central/National	Technical/Political	Aligns urban form with climate targets (energy, mobility, land use)	Encourages sustainable, low-carbon urban models
National Housing Observatory	Public	Central/National	Technical	Provides data and analysis to support housing policy development	Informs evidence-based planning and densification monitoring
Autonomous Communities (e.g., Catalonia)	Public	Regional	Political/Technical	Tailor national frameworks, coordinate zoning and subsidies (e.g., TOD projects)	Localize densification tools to specific challenges
INCASÒL (Catalonia)	Public	Regional	Technical	Facilitates land readjustment and urban redevelopment	Unlocks land for densification, especially in brownfield sites
Municipalities / Local Governments	Public	Local	Political	Implement planning regulations, issue permits, and engage communities	Control the pace and location of densification
EU Institutions / Funding (e.g., ERDF, NextGenEU)	Public (Supranational)	EU	Political/Technical	Fund urban regeneration, promote green densification	Provide incentives for compact, sustainable development

				through strategic agendas	
ICO (Instituto de Crédito Oficial)	Public	National	Technical	Provides affordable public financing to urban development and densification projects	Lowers financial barriers for socially oriented densification
Private Developers	Private	Local/National	Technical	Design and build high-density housing and mixed-use projects	Shape built environment, often guided by market logic
Banks / Real Estate Funds	Private	National/EU	Technical	Provide investment capital, especially for large redevelopment projects	Influence what types of projects get built and where
Civil Society Organizations / Housing NGOs	Civil Society	Local/National	Political	Advocate for affordable, inclusive urban development; monitor exclusionary trends	Pressure for equity, transparency, and anti-displacement safeguards
Community Associations / Neighborhood Groups	Civil Society	Local	Political	Represent resident concerns, especially in areas targeted for densification	Enable participatory planning, resist unwanted gentrification or displacement

Table ES17. Key Actors and their Roles (Densification)

6.5 Achievements, assessments, and challenges

The compact city model has helped curb urban sprawl, preserving green spaces and aligning with EU sustainability goals. Cities like Madrid and Barcelona have prioritized infill development, converting underutilized areas into high-density, mixed-use neighborhoods that minimize outward expansion. Transit-Oriented Developments (TODs), particularly in Madrid and Valencia, have improved accessibility, reduced car dependency, and contributed to EU mobility targets.

Economically, densification has revitalized local economies, attracting businesses and boosting property values. Cities like Bilbao and Seville have seen increased tourism and service industry growth, alongside infrastructure upgrades. However, higher-density developments often drive up property values and rents, reducing affordability for lower-income residents. Gentrification in Barcelona and Madrid has underscored the need for policies like the **Ley de Vivienda** (2022) to protect vulnerable populations from displacement.

Infrastructure strain remains a challenge. Rapid densification can overwhelm public services, causing congestion and service bottlenecks. Valencia, for example, has expanded housing availability but faces growing pressure on waste management and transportation. Strategic planning and investment are crucial to maintaining livability.

Densification has not been evenly implemented, deepening regional disparities. While Barcelona and Madrid lead in urban transformation, rural and peripheral areas like Castilla-La Mancha struggle to keep pace, leading to unequal access to housing and services. Key Performance Indicators (KPIs), utilized by governments, such as population density, housing affordability, and land-use efficiency help monitor these efforts.

Periodic policy reviews, like those assessing Barcelona's Superblock program, aim to refine strategies, yet wealthier districts tend to receive more resources, perpetuating inequality. Public opposition to densification, often driven by concerns over overcrowding and gentrification, highlights the need for inclusive, participatory planning. However, marginalized groups often lack meaningful involvement in decision-making processes.

Regulatory hurdles, including bureaucratic delays and conflicting local policies, further slow densification efforts. High land costs in cities like Madrid and Barcelona deter private investment in central areas, sometimes pushing development to peri-urban zones, inadvertently encouraging sprawl.

From an environmental justice perspective, densification supports sustainability by reducing per capita carbon emissions and enhancing public transit. However, if not carefully managed, it can exacerbate social inequities. In Madrid, the rise of luxury developments in areas like Malasaña and Lavapiés has displaced lower-income residents, highlighting the need for a balanced approach that integrates affordability with sustainable urban growth.

Impact area	**Measured or potential**	**Description/evidence**
Socio-spatial exclusion	Measured	High-density redevelopment displaces low-income residents in city centers (e.g., Madrid Río, Barcelona Superilla) (Anguelovski et al., 2023).
Affordability pressures	Measured	Rising land values in densified areas make inclusion of affordable housing difficult without regulation (Zorrotzaurre, Bilbao; Policy Lab 2025).
Limited inclusion of social housing	Measured	Densification programs often lack binding quotas for affordable units (Strategic Urban Agenda 2030).
Inequitable TOD development	Potential	Transit-oriented projects risk prioritizing market-value housing without enforceable inclusionary zoning (Interview with academic planner).

Displacement through upgrading	Measured	Combined infrastructure and densification projects indirectly displace existing low-income communities (Bouzarovski et al., 2018).
Opportunity for vertical equity	Potential	Emerging regional practices (e.g., Catalonia's INCASÒL) integrate safeguards and land readjustment for more inclusive outcomes.

Table ES18. Measured and Potential Impacts on Housing Equality (Densification)

7 Summary and discussion of results

Spain has successfully implemented **energy retrofitting programs**, improving the sustainability and efficiency of its building stock. The **PREE program** and **tax incentives** have encouraged energy-efficient renovations, particularly in aging urban areas. However, **regional disparities in implementation** persist, with wealthier regions benefiting more from subsidies than economically disadvantaged areas. Furthermore, **gentrification concerns** have emerged as retrofitting often leads to higher property values, pushing lower-income residents out of renovated areas.

Spain has made significant strides in implementing **urban greening projects**, with cities like **Barcelona, Valencia, and Vitoria-Gasteiz** leading the way. Benefits include **improved air quality, climate adaptation, and biodiversity conservation**. However, the **lack of a dedicated national budget for NBS** means that funding remains heavily dependent on **EU grants and local government initiatives**. Additionally, the phenomenon of **green gentrification** has raised concerns, as improved green spaces tend to increase property values and attract wealthier demographics, potentially displacing long-term residents.

Densification has been a **key strategy** in Spain's urban sustainability agenda, with policies aimed at **curbing urban sprawl and integrating public transit with high-density developments**. Projects such as **Madrid Nuevo Norte and Barcelona's Superblock initiative** have reshaped urban landscapes, reducing car dependency and improving environmental sustainability. However, densification has also led to **rising housing costs**, making affordability a significant challenge. **Regulatory inefficiencies and fragmented governance** have further slowed the implementation of high-density developments, particularly in economically weaker regions.

Spain's environmental and energy policies are shaped by overlapping economic, normative, institutional, and contextual factors at both national and local levels. Spain's highly decentralized governance system plays a central role: while national frameworks (e.g., NECP, Climate Law) establish broad objectives and legal parameters, implementation is largely delegated to autonomous communities and municipalities. This often leads to uneven uptake, administrative capacity, and funding absorption, particularly between wealthier and less-resourced regions. Economically, the structure of incentives—co-financing requirements, tax rebates, density bonuses—favors actors with access to capital, contributing to unequal participation in retrofit and densification schemes. Normatively, the strong focus on sustainability and urban innovation in public discourse often coexists with conflicting market

logics, where private developers prioritize profitability over affordability or equity. Institutionally, EEPs are fragmented across different ministries and levels of government, creating coordination gaps, while local authorities often rely on EU or national funds to act. Finally, contextual factors such as the ageing housing stock, high rates of homeownership, and growing social inequality directly shape how policies are received, contested, and adapted on the ground.

One important avenue for mitigating displacement risks associated with green infrastructure and urban renewal is the expansion of social and other forms of decommodified housing. While Spain's social housing stock is currently limited, particularly in rental form, there is growing recognition among experts and policymakers that ensuring affordability and tenure security must accompany green urban transitions. Interviews with housing professionals and public officials emphasized that retrofitting and urban regeneration, when driven primarily by market actors, tend to favor middle- and upper-income groups. Embedding affordability conditions into green redevelopment programs, dedicating a share of upgraded housing stock to public or cooperative housing, and expanding public land banking (as seen with INCASÒL in Catalonia) are potential tools to counteract exclusionary effects. Strengthening non-market housing mechanisms could thus serve as a structural safeguard against the unintended consequences of EEPs, particularly in gentrifying neighborhoods undergoing green and dense redevelopment.

While Spain has made substantial progress in **retrofitting, NBS implementation, and densification**, **socio-economic inequalities have not been adequately addressed** in policy design. Future policy efforts should:

1. **Expand financial accessibility for low-income households to participate in energy retrofitting programs.**
   Current retrofit programs, such as PREE, often require high upfront co-financing and complex application processes, which create barriers for vulnerable groups. Policy revisions should include simplified procedures, targeted subsidies, and zero-interest financing mechanisms to ensure equitable access and prevent the exclusion of those most in need of energy efficiency improvements.

2. **Mitigate displacement risks associated with green infrastructure and urban renewal projects.**
   Green interventions can inadvertently trigger rent increases and gentrification in upgraded neighborhoods. Urban sustainability policies must incorporate displacement risk assessments, tenant protections, and participatory planning approaches to ensure long-term residents are not pushed out as a result of environmental improvements.

3. **Integrate affordability protections into green renewal policies.**
   Social housing and decommodified housing instruments should be used to anchor affordability within areas undergoing energy retrofits, greening, or densification. Mandating affordable housing quotas and supporting cooperative and public housing models can help align environmental objectives with long-term social equity goals.

4. **Improve governance coordination across national, regional, and municipal levels.**

Spain's multilevel governance system leads to fragmented implementation and uneven access to funding and technical resources. Stronger coordination mechanisms, standardized frameworks, and shared learning platforms are needed to reduce administrative gaps and support consistent policy uptake across regions and cities.

5. **Prioritize affordability in densification efforts to ensure that urban sustainability does not** come at the cost of social equity. Urban compactness strategies must be tied to clear affordability objectives, especially in high-demand areas. Densification policies should require affordable housing components, incentivize mixed-income development, and monitor socio-spatial impacts to avoid exacerbating existing inequalities.

By refining these approaches, Spain may able to reach their sustainability goals in a more just manner.

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NATIONAL REPORT ON THE REGULATORY SYTEM OF EEPs IN SWITZERLAND

1 Executive Summary

This report aims at providing an analysis of Switzerland's environmental and energy policies, with a focus on energy renovations of residential housing, densification and nature-based solutions (NBS). It is primarily based on an in-depth review of policies and regulations, which are analysed through a multi-level governance lens. In addition, interviews were conducted with state ministry representatives, with experts from national and cantonal organisations, the private sector, and academia. The report also includes some preliminary reflections on their implications on housing inequality.

Chapter 1 provides a general introduction. It is followed by chapter 2, which focuses on Switzerland, a small and wealthy country with a population of only about nine million. Historically, the favourable economic situation and employment opportunities have attracted large numbers of migrants, leading to a steady population growth. The country is governed under a federal system at three levels: the Confederation, the 26 cantons and the 2,172 municipalities. Being characterised by a direct democracy, Switzerland provides extensive opportunities for political participation. Over the last decades there have been dozens of popular initiatives and referenda related to housing, energy and the environment, clearly reflecting the importance of these topics in public debates.

Switzerland is a country of tenants with the lowest homeownership rate in Europe. Only 35.9% of dwellings are owner-occupied. High housing prices and the liberal rental housing market that contribute to making investments in the rental sector profitable are among the reason given for this situation. Apartment buildings constitute the majority of the rental housing stock. They are primarily owned by private individuals, private companies and pension funds. Public- and non-profit cooperative housing play an important role in some cities, but a relatively marginal one at national level.

Chapter 3 focuses on Switzerland's energy policy with particular focus on energy retrofitting of residential buildings. The Swiss government's commitment to the 1992 Climate Change Convention, the Kyoto Protocol and the Paris Agreement resulted in the passing of the CO2 Act in 2000. This Act mandated a 10% reduction in CO2 emissions by 2010. It also includes a provision for a CO2 levy on fossil fuels used for heating, lighting, or electricity generation that was introduced in 2008. In 2010 Switzerland launched the Buildings Programme, which provides financial incentives for energy-efficient renovations. The programme is being implemented and is co-financed by the cantons. Concerns that energy refurbishments are contributing to the loss of affordable housing have started to emerge as costs related to property improvements—such as energy refurbishments—can be passed on to tenants in the form of rent increases.

Chapter 4 focuses on nature-based solutions (NBS). Until recently Switzerland did not use the term NBS and related policies are integrated in those focusing on biodiversity conservation,

climate change adaptation, and river restoration. In 2012 the Federal Council released the first part of its Climate Change Adaptation Strategy, which proposes enhancing green infrastructure, promoting open spaces, preventing soil sealing, and using green and shaded areas to mitigate heatwave impacts and river restoration. The 2014 Action Plan emphasized the importance of spatial planning in adapting urban areas to increasing heat stress. Municipalities, supported by cantons and federal offices, were tasked with implementing climate change adaptation and mitigation measures, with limited funding coming from the federal government. As a result, only few cities are currently programmatically implementing NBS, while smaller towns often lack a clear strategy.

Chapter 5 focuses on densification, which has been a key policy goal in Switzerland since the 2014 revision of the Spatial Planning Act, when densification became legally binding. However, the implementation of densification objectives has been rather slow as the principle of subsidiarity grants significant authority to local governments. In fact, a significant portion of new housing continues to be built on undeveloped land, particularly in rural and peri-urban areas. This trend is gradually shifting, especially in cities and tourist regions, where the combination of restrictive building zones and low interest rates has sparked a construction boom and driven up land prices. One of the key challenges of densification is its impact on housing affordability. In fact, between 2000 and 2021, the price of single-family houses increased by 80%, while rents rose by 30%. Currently, no policies specifically address the social impacts of densification. Most strategies focus on spatial issues, while socioeconomic consequences like displacement and unequal housing conditions are largely overlooked.

2 Introduction and methodology

This report aims at providing a qualitative analysis of Switzerland's environmental and energy policies, with some preliminary reflections on their implications on housing inequality. The report is based on an in-depth review of policies and regulations and eight interviews, which are analysed through a multi-level governance lens. Switzerland is not part of the EU but shares the same climate goals. The strategies towards these goals, however, are defined by national and cantonal policies, with cantons and municipalities enjoying a high degree of autonomy. Switzerland is characterised by a direct democracy; its citizens can and do exercise a strong influence on environmental and energy policies through popular initiatives or referenda. While there is an overall consensus on climate goals, the strategies towards attaining them are constantly being challenged as reflected by numerous popular initiatives, often followed by federal government's counter proposals.

The report focuses on three specific domains that are expected to play a key role in the adaptation and mitigation of climate change: energy renovations of residential buildings, densification, and nature-based solutions (NBS).

Energy efficient retrofitting includes the building envelop and the engineering system, including the replacement of windows and heating systems. In Switzerland, these measures are strongly incentivized and subsidized through the Buildings Programme (*Gebäudeprogramm*).

Densification emerged as a concept at a global level in response to the environmental debates of the 1960s and 1970s (Burgess, 2000). Advocacy for 'compact cities' aimed at transforming

urban settlements to enhance their environmental sustainability by reducing land consumption, limit commuting, and slow down urban sprawl. In Switzerland, a small and mountainous country characterised by the scarcity of buildable land and the desire for a high degree of self-sufficiency in food production, a parsimonious land use has been the main concern of spatial planning for several decades. But only since 2014 densification has become a legally binding objective for the whole country.

NBS is a term increasingly used in policy and academic circles to refer to actions that are inspired by, supported by, or copied from nature with the aim to increase urban sustainability and to improve the resilience for humans and biodiversity (European Commission: Directorate-General for Research and Innovation, 2015). NBS often aim to address climate change mitigation and/or adaptation and to combat biodiversity loss. This implies the protection, restoration, and/or management of natural and semi-natural ecosystems, management of productive land and coastal areas, and the creation of new “green” or “blue” infrastructures. In Switzerland, the concept of NBS appeared in policy documents only recently, but public concerns, political debates, popular initiatives, and local-level projects that may be labelled as NBS are not new. However, national level policies to promote NBS are rather weak with initiatives depending entirely on municipal governance. Moreover, while public debates, political concerns, and scientific literature over the negative impact of energy refurbishments and densification on an equitable and affordable access to housing in Switzerland are not new, so far links between NBS and housing inequality trends have not been explored and debated yet.

This report is based on the review of secondary data, such as information, data, thematic studies, and evaluation reports available on the website of relevant governmental agencies (e.g. those of the Federal Office of Housing, the Federal Office of Spatial Development, the Federal Office of Energy) and those related to specific programmes such SwissEnergy (*EnergieSchweiz*) and the Buildings Programme. In addition, interviews with experts from the public and private sector and academia provided insights into legislation, multi-level governance processes and the implementation of regulations. To this aim, we spoke with representatives of the SFOE, the SFOSD, the FOEN, the EnDK, EspaceSuisse, ETH SPUR, Grünstadt Schweiz and LemonConsult (see appendix). Moreover, the subjects were discussed at a PolicyLab attended by 28 participants, resulting in the provision of additional information (see appendix). Longitudinal Information on popular initiatives, direct and indirect counter-proposal and legal frameworks related to environmental and energy policies could be found on the official website of the Federal Council. As will be discussed in the following chapters, Switzerland is a federal state with its 26 cantons and 2’172 municipalities, which enjoy a high degree of autonomy, with considerable implications on the specific modalities and progress in the implementation of environmental and energy policies. These are affected by several factors, such as context specific concerns and interests, the economic situation and the overall political orientation.

The report aims at providing an overview of national policies and the system through which they are being implemented. However, it was beyond its scope to analyse the specific environmental and energy policies of each canton and municipality. Finally, the report is also based on a review of scientific literature, in particular related the impact of environmental and energy policies on housing inequality. Such literature remains relatively limited and focuses

primarily on the impact of densification in and around Switzerland's main cities (Zurich, Basel and Geneva), with only limited studies on other regions and cities. Publications on the impact of energy refurbishments on housing equity, with few exceptions, is almost exclusively limited to some research projects commissioned by Federal Office of Housing, while we could not find any scientific publication focusing on NBS and its interlinkage with sustainable and inclusive housing in Switzerland.

3 Switzerland: main socio-economic characteristics and governance system

3.1 Switzerland's socioeconomic profile

Switzerland is a small country with a size of only 41,285 km^2 and a population of approximately 9 million people. With the Alps occupying two thirds of its territory, but housing only 10% of the population, the country is facing a considerable pressure on its scarce land resources (EDA, 2024). Indeed, about 2/3 of Switzerland's population live in the Swiss Plateau region, which covers only 30% of its surface. 84.8% of the country's inhabitants live in areas classified as urban (BFS, 2024d).

With an annual GDP per capita of USD 92'000 in 2022 Switzerland ranks as one of the top 10 economies worldwide. Approximately 74% of Swiss GDP is generated by the services sector, 25% by industry and less than 1% by the agricultural sector (FDFA, 2024a).

Switzerland has one of the lowest unemployment rates in Europe (2.0% in 2023; Staatssekretariat für Wirtschaft SECO, 2024) and is actually experiencing a labour shortage in many sectors (Jaberg, 2024; O'Sullivan, 2024). The monthly median gross salary for full-time employees in 2020 amounted to CHF 6'665. However, there is a significant discrepancy between the salaries of lower- and higher paid jobs. In fact, the lowest-paid 10% of employees earned less than CHF 4,382 gross per month, compared with over CHF 11,996 gross per month for the highest-paid 10% (FDFA, 2024b).

The country's favourable economic situation and employment opportunities have historically attracted large numbers of migrants, in particular from surrounding European countries. As a result, Switzerland has seen a steady population growth in the last three decades, from close to seven million inhabitants in 1990 to slightly over nine million in 2024 (BFS, 2024e). 40% of Switzerland's permanent resident population have a migration background, defined by the Federal Statistical Office (FSO) as "all foreign nationals and naturalized Swiss citizens, except for those born in Switzerland and whose parents were both born in Switzerland (3^{rd} generation), as well as Swiss citizens at birth whose parents were both born abroad" (FSO, 2024).

Switzerland is not exempt of poverty; in 2022, 8.2% of the Swiss population i.e. approximately 702'000 people were affected by income poverty. Most severely affected were people living alone, single-parents with minor children, persons with no post-compulsory education, foreign nationals from Eastern Europe or non-European countries, and those living in households with no employed person. However, in 2022, also 3.8% of all employed persons in Switzerland

were affected by poverty, corresponding to 144’000 persons. Employed persons particularly affected by poverty are those who worked for only part of the year, self-employed persons, persons with a temporary contract and persons employed in small businesses (FSO, 2023).

On average, Swiss households spend 13.8% of their gross income on housing and electricity, 7.7% on transport, 6.3% on food and non-alcoholic beverages and 6.6% on compulsory health insurance (BFS, 2024c).

3.2 Switzerland’s governance system

Switzerland is governed under a federal system at three levels: the Confederation, the 26 cantons and the 2,172 municipalities. The country is governed by the Federal Council, a seven-member collegial body whose decisions are made by consensus. Accordingly, left, right, and centrist parties all share executive power. Members of the Federal Council are traditionally drawn from the ranks of the four parties with the largest share of popular votes: the (right conservative) Swiss People’s Party (SVP), the Social Democratic Party (SP), the Centre (an alliance of the Christian Democratic People's Party (CVP) and the Conservative Democratic Party (BDP)) and The Liberals (FDP). There are also parties, such as for example the Green Party and the Green Liberal Party, which are not represented on the Federal Council but have representatives in the Swiss Parliament (FDFA, n.d.). Federal councillors are elected by the national parliament, the Federal Assembly.

Each federal councillor (sometimes also referred to as minister) is assigned a department, which is further divided into several federal offices. Particularly relevant to our project is the Federal Department of the Environment, Transport, Energy and Communication (DETEC), which includes, among others, the Swiss Federal Office of Energy (SFOE) and the Federal Office for the Environment (FOEN). Equally relevant to our project is the Federal Office for Housing (FOH), under the Federal Department of Economic Affairs, Education and Research (EAER).

The Federal Assembly consists of an upper and a lower chamber. The National Council (200 members) is the lower house and represents the people. The Council of States (46 members) is the upper house and represents the cantons. Delegates from eleven different parties set forward their views in the current parliament. Switzerland has several more political parties, but some are only active at the regional level. Members of the parliament (both chambers) are elected every four years.

3.3 Switzerland’s direct democracy and its impact on housing, energy and environmental policies

Since becoming a federal state in 1848, Switzerland has been characterised by a direct democracy providing expanded opportunities for democratic participation. Along the usual voting rights accorded in democracies, the Swiss people also have the right to launch and vote on referenda and popular initiatives. Popular initiatives allow citizens to propose changes to the Swiss Federal Constitution. If an initiative gathers enough support, it is put to a nationwide vote. To launch a popular initiative, citizens must collect at least 100,000 valid signatures from

eligible voters within 18 months. Once the required signatures are collected and verified, the initiative is examined by the Federal Assembly, which may either accept the proposal, reject it, or put forward a counter-proposal. If the initiative proceeds to a nationwide vote, it requires a double majority to pass: the majority of voters across the whole country (the popular majority) and a majority of the cantons (the cantonal majority). Each canton, regardless of its population, has one vote, so even small cantons have an equal say in the final decision. If both conditions are met, the initiative becomes law.

A counter-proposal is an alternative proposal that either modifies the original initiative or offers a different solution to the issue at hand. A counter-proposal can be presented alongside the original initiative in a nationwide vote, giving the public the option to choose between the initiative, the counter-proposal, or reject both. If the counter-proposal is accepted but the original initiative is rejected, the counter-proposal may still become law if it also receives majority support from the voters and the cantons.

Referenda are another critical component of Switzerland's system of direct democracy. Through a referendum, citizens can challenge laws or legal provisions that have already been passed by Parliament. This allows people to stop or amend legislation they disagree with. To call for a referendum, 50,000 valid signatures must be collected within 100 days after the law is passed. If enough signatures are gathered, a national vote is held, and the citizens decide whether the law should stand or be repealed. Like the popular initiative, a referendum also requires a double majority: the majority of voters and the majority of the cantons must approve the decision for it to be valid. The voting system in Switzerland ensures that both the majority of the population and the majority of cantons are involved in decision-making. This dual majority aims at protecting the interests of both larger urban areas and smaller rural regions.

Overall, Switzerland's system of direct democracy empowers citizens to influence the country's laws, ensuring that government decisions reflect the will of the people. Whether it is through a popular initiative to amend the constitution, a referendum to challenge a law, or a counter-proposal to offer an alternative solution, these mechanisms give Swiss citizens a substantial role in shaping their nation's future.

Over the last few decades issues related to housing, energy and the environment have been subject to several popular initiatives, clearly reflecting the importance of these topics in public debates. For example, in 2015, the popular initiative "More Affordable Housing" (*Mehr bezahlbare Wohnungen*) was launched. It aimed at making housing more affordable by promoting the construction of affordable housing, improving tenants' rights and limiting speculative practices in the housing market by introducing a right of first refusal for public authorities. The initiative was supported by the Swiss tenants' association and several progressive political groups. However, it was rejected by the majority of voters in a popular vote held in 2020.

Also launched in 2015, the popular initiative "Stopping urban sprawl - for sustainable settlement development" (*Zersiedlung stoppen – für eine nachhaltige Siedlungsentwicklung (Zersiedlungsinitiative)*) raised concerns about the environmental consequences of urban sprawl and demanded to further limit building zones. Due to the recent revision of the Spatial Planning Act (SPA, *Raumplanungsgesetz,* revised in 2014), the issue was not considered

urgent enough to convince a majority of the voters and was accordingly rejected in 2019. The partial revision of the SPA in 2014 proposed by the Federal Council had itself been triggered by the popular initiative “Space for Human and Nature” *(Raum für Mensch und Natur (Landschaftsinitiative)*) in 2013. The original motion sought to freeze the spreading of building zones, aiming to curb urban sprawl.

In 2003, the popular initiative “Yes to fair rents” (*Ja zu fairen Mieten*) aimed to tighten the regulation and contestability of rents and to improve tenants' rights. It was rejected by the electorate.

The years before the 2000s saw a number of initiatives raising demands on stricter rent control, more affordable housing, land use regulations, and measures against speculation in the housing market. For example, in 1986, the Swiss population called for an improvement of the tenant’s rights with a popular initiative titled “For the legal protection of tenants” (*Für den Mieterschutz*), causing a counter-proposal by the federation, which was accepted in 1987. It was followed by the “Urban-rural Initiative against land speculation” (*Stadt-Land-Initiative gegen die Bodenspekulation*) in 1988, which addressed rising land prices, but was rejected by the voting majority.

Switzerland is a liberal-conservative country. Accordingly, progressive initiatives are typically rejected by voters. However, in some cases led to accepted counter-proposals by the government, thus nevertheless leading to some policy changes. However, because of Switzerland's system of subsidiarity, in which the responsibility for implementing federal spatial planning decisions lies with cantons and municipalities, many initiatives address issues at the local level. Housing initiatives, targets for a minimum proportion of affordable housing, and land conservation initiatives, have attempted to secure affordable housing in many municipalities. Likewise, active spatial policies are also implemented locally.

Over the years, Switzerland has also seen a significant number of popular initiatives related to a wide range of environmental issues, including climate change, conservation of natural resources, biodiversity, and pollution control. For example, the recently withdrawn “Glacier Initiative” (*Für ein gesundes Klima (Gletscherinitiative)*) sought to achieve net-zero carbon emissions in Switzerland by 2050, aligning the country’s policies with the goals of the Paris Agreement. The Federal Council decided on an indirect counter-proposal for a new climate law (*Klimagesetz*), which was accepted by almost 60% of the population in a referendum in 2023. This law sets a net-zero carbon target for 2050 and mobilises subsidies for climate-neutral energy sources.

The popular initiative “For a sustainable and resource-efficient economy” (*Für eine nachhaltige und ressourceneffiziente Wirtschaft (Grüne Wirtschaft)*) focused on sustainable production, waste reduction, and the efficient use of resources and aimed at a better regulation of the economy on these issues. It proposed new measures to integrate environmental sustainability into economic decision-making, but was rejected by the voters in 2012.

As shown, also the initiatives aiming at a stronger climate protection, are generally rejected by the Swiss voters but have triggered fierce public debates around these topics and in some instances nevertheless had an influence on related policies, in particular in cases where public support for the cause was strong.

An overview of all popular initiative held in Switzerland between 1893 and today is provided online by the Swiss Federal Chancellery.

3.4 Switzerland's housing system

Switzerland is a country of tenants with the lowest homeownership rates in Europe. Currently only 35.9% of dwellings are owner-occupied (Bundesamt für Statistik, 2024b). Several reasons explain this low rate of homeownership such as the very high prices of residential real estate (Bourassa & Hoesli, 2010), a relatively liberal rental housing market with a relatively weak protection of tenants (Debrunner, Kolocek, et al., 2024). These factors contribute to making investments in the rental sector profitable, even though rents can only be increased in case of a proven increase of operation and maintenance costs or interest rates (Bourassa et al., 2010, p. 270). This leads to higher investments in the construction and maintenance of rental units than in other countries, with the result that these have a quality comparable to owner-occupied housing (BWO, 2005). Furthermore, as pointed out by Bourassa et al. (2010, p. 269), income tax rules in Switzerland are not particularly favourable to home ownership due to the imputed rent system. However, the tax value of a property for wealth taxation purposes is generally significantly below its market value.

Another factor that may have contributed to the low share of homeownership is related to the fact that a legal framework for condominium ownership was introduced in Switzerland only in 1965. As a result, in urban areas characterised by a relatively old multifamily housing stock, homeownership rates remain very low (BWO, 2005).

There are significant differences in the homeownership rates between urban and rural areas. In several predominantly rural cantons more than 50% of the households own their dwelling, but the highly urbanised cantons of Geneva and Basel-City, for example, have homeownership rates of only 18.9% and 15.5% respectively. In the city of Zurich, over 90% of the households do not own the dwelling in which they reside (BFS, 2024a).

Currently, Switzerland counts close to 1.8 million residential buildings and 4.8 million dwellings (Bundesamt für Statistik, 2024c). Each year between 30'000 and 50'000 new dwellings are being built to meet the demand of a growing population and a shrinking average household size. On average each dwelling is inhabited by approximately 1.9 persons. While the per capita consumption of space in 1980 was 34 m^2 in 1980, it increased to an average of 46.5 m^2 in 2023 (BFS, 2024b).

About 18.7% of Switzerland's dwellings were built before 1919, 42.1% between 1913 and 1980 and 39% in the past 44 years, i.e. after 1980. Detached single family privately-owned houses prevail in sub-urban and rural areas. At national level, 23% of Switzerland's inhabitants live in this housing typology and another 11.2% in semi-detached or terraced houses. The majority of the rental housing stock in cities consists of apartment buildings. 37% of the country's inhabitants live in apartments buildings with less than 10 dwellings, and 25% in larger ones. Apartment buildings are primarily owned by private individuals and to a lower degree by private companies and pension funds. Public rental housing and non-profit housing owned either by cooperatives or by public and private foundations constitute a significant category of owners in some cities but play a relatively marginal role at national level. Public housing is generally subsidized and targeting socioeconomically disadvantaged households, while housing

cooperatives are committed towards non-profit and non-commodifiable housing for their members, regardless of their socioeconomic status.

Whereas most European countries define housing costs as burden when they exceed 30% of the gross income, in Switzerland a housing costs are considered a burden for lower income people when they exceed 25% of their disposable income. On average, households in Switzerland spend an average of 20% of their disposable income on housing, but for large share of lower-income people, single parents, and foreign-born households they often exceed 30% of their disposable income[3].

	Housing	**Housing Retrofitting**	**NBS**	**Densification**
National level	*Responsible for the promotion of adequate and affordable housing for all* Federal Office for Housing (FOH) - Financial tools for non-profit sector - Federal tenancy law	*Responsible for reduction of Co2 emissions and decarbonisation* Swiss Federal Office of Energy (SFOE) - Financial tools - Support and initiative for Innovation - Objectives for energy efficiency and decarbonisation	*Responsible for the protection of ecologically valuable landscapes and strategies in climate adaption and biodiversity* Federal Office for the Environment (FOEN) - Financial tools for pilot-projects - Objectives for biodiversity and climate adaptation	*Responsible for sustainable land use and the differentiation of building- and non-building zones* Federal Office for Spatial Development (SFOSD) - Laws - Objectives sustainable land take - Technical guidelines
Cantonal level	*Responsible for the regulations, implementation and subsidy schemes* - Cantonal tenancy law - Cantonal housing policy[4]: e.g. Subsidy programmes, promotion and consultancy, rent control)	*Responsible for the regulations, implementation and subsidy schemes* - Cantonal regulations and objectives - Cantonal financial tools[5]: e.g. Subsidy programmes, promotion and consultancy	*Responsible for the implementation of national policy* - Cantonal objectives - Structure planning - Ecological compensation	*Responsible for the implementation of national policy* - Cantonal spatial planning (regulation of building zones) - Building law (PBG)

[3] For details see Widmer, Hannah et al. 2024. National report on housing inequality: Switzerland ReHouIn Deliverable D2.1.

[4] Housing is a cantonal competence, however only 9 out of 26 cantons have local instruments for housing promotion. These tasks and policies can therefore be considered voluntary. The same goes for municipal housing policy.

[5] The cantons can decide whether to promote energy retrofitting. However, they need a cantonal subsidy programme to access federal contributions. Also, municipal programmes are voluntary

Municipal level	*Responsible for the implementation of cantonal policy and additional local policy* - Local housing policy: local regulations, local subsidy programmes, promotion and protection of affordable housing (e.g. non-profit housing, quotas for non profit housing, special land use plans, utilisation planning)	*Responsible for the implementation of cantonal policy* - Local energy policy: local regulations, local subsidy programmes, construction permits	*Responsible for the implementation of cantonal policy and additional local policy* - Municipal utilisation plan - Local subsidy programmes[6]	*Responsible for the implementation of cantonal policy* - Municipal utilisation plan - Municipal zoning- and building regulation (BZO) - Re-zoning and compensation - Adaption of infrastructure

Table CH1. The organisation of competences for ecological transitions and housing policies at different governance levels.

4 Housing retrofitting

4.1 The policy cycle: emergence of the issue and policy decisions

The public promotion of housing retrofitting in Switzerland has a long history dating back to the 1973 oil crisis to which the Swiss Federal Council and the parliament responded by comprehensively reorganising the country's energy policy. For the first time the issue was raised that houses should be better insulated and not excessively heated. The oil crisis, compounded by the first public discussions triggered by the publication of 'Limits to Growth' by the Club of Rome (Meadows et al., 1972), led to a gradual rethinking on the way energy was used. It further enhanced awareness on the dependence on imported energy sources (Gisler, 2022).

Perhaps the most important measure taken by the Federal Council in 1974 was to set up the 'Federal Commission for an Overall Energy Concept'. This commission was tasked with identifying the direction of Switzerland's energy policy and investigating whether it might be necessary to extend federal competences in this domain. The report presented by the commission in 1978 formulated three goals for a future energy policy: an adequate and secure energy supply, the guarantee of economically optimal energy prices, and the protection of people and their environment. It further recommended that the federal government should incorporate an energy article into the Constitution with the aim of creating the foundations for a more active federal energy policy. After prolonged debates, Article 89 (Energy Article/*Energieartikel*) was finally added to the Swiss Constitution in 1990. It stipulates that, within the framework of their responsibilities, the federal government and the cantons must

[6] Municipalities have the discretion to implement support for NBS measures. However, such programs remain voluntary at the municipal level.

establish the necessary prerequisites for securing an adequate, comprehensive, safe, economic, and ecological energy supply, and ensure an efficient and parsimonious energy use. The article also states that measures related to the energy use of buildings are mainly the responsibility of the cantons, even though the national government is strongly involved in the promotion of energy refurbishments. The next sub-section will therefore trace the development of energy efficiency policies at the federal level, and in the subsequent sub-section, we focus on the Buildings Programme (*Gebäudeprogramm*), i.e. on the most important instrument through which Switzerland is promoting energy refurbishments of its housing stock.

Switzerland's energy efficiency policies

Following the addition of the Energy Article to the Swiss Constitution in 1990, the Federal Council launched Switzerland's first energy policy in 1991. The programme "Energy 2000" (*Energie 2000*) aimed to promote a rational use of energy and renewable energies through voluntary measures. This programme was followed by the SwissEnergy (*EnergieSchweiz*) programme in 2001, which specifically focuses on energy efficiency of buildings. Up to date SwissEnergy remains Switzerland's central platform for information on energy efficiency, renewable energies and refurbishment (BFE, 2024b).

After the Energy Article passed, the Federal Assembly also began working on the Energy Act (*Energiegesetz*). Related debates were heated and continued for years, with the result that the Energy Act only came into force in 1999 (Zünd, 2019). The Act is legally binding and requires cantons to regulate energy use and renewable energy sources, for both new and existing buildings (Bundesversammlung, 1998).

Switzerland's energy policy does not only reflect awareness of energy being a scarce resource but also its commitment towards the Climate Change Convention which was approved at the 1992 Earth Summit in Rio de Janeiro and came into force on 21 March 1994 (United Nations, 1992). However, it soon became clear that the provisions of the Convention were insufficient and as a response, the Kyoto Protocol was passed in 1997. In the Protocol, the participating industrialised countries committed to reduce their greenhouse gas emissions between 2008 and 2012 by an average of 5.2% in comparison to 1990. Switzerland made the same formal commitment as the European Union to reduce greenhouse gas emissions by an average of 8% between 2008 and 2012 (BAFU, 2023c).

In response to its commitments made to the Kyoto Protocol, the Swiss government passed the CO2 Act (*CO2-Gesetz*), which came into effect in 2000 and is legally binding. The law mandates a 10% reduction in CO2 emissions by 2010, relative to the 1990 levels (BAFU, 2000). It also includes a provision for a CO2 levy on fossil fuels used for heating, lighting, or electricity generation (excluding gasoline and diesel), to be introduced after 2004, should other reduction measures fail to meet the targets. The CO2 levy was ultimately introduced in 2008 and has been increased several times due to the shortfall in achieving the reduction goals (BAFU, 2020).

In 2010, the launch of the Buildings Programme (*Gebäudeprogramm*) marked a significant step in Switzerland's energy and climate policies by offering financial incentives for energy-efficient renovations. This federal-cantonal partnership, partially financed through the CO2

levy, aims to reduce heating energy consumption and to improve insulation standards across the country (BFE, 2023)[7].

Following the nuclear catastrophe of Fukushima, the Federal Council introduced the Energy Strategy 2050 (*Energiestrategie 2050*), a long-term vision focused on phasing out nuclear power and increasing renewable sources, such as solar and wind energy. Retrofitting buildings became a key component of the strategy to curb energy consumption and emissions within the housing sector. As part of the new Energy Strategy 2050, the Energy Perspectives 2050 were developed as political guidelines and the revision of the Energy Act (see below) was advanced (BFE, 2013, 2018).

On the international front, the 2015 Paris climate conference led to an agreement for the post-2020 era that committed all states to reducing their greenhouse gas emissions and largely eliminated the previous distinction between industrialised and developing countries. Switzerland ratified the Paris Agreement in October 2017, thereby committing to halve its emissions to 1990 levels by 2030, partially through international emissions reductions.

In 2016, the 1999 Energy Act dating was revised. The updated law, which came into force in 2018, sets clear targets for expanding electricity generation from renewable sources. It also includes an interim target of reducing per capita energy consumption by 43% by 2035. (Federal Assembly, 2018). With this revision, the Federal Assembly also decided to extend the Buildings Programme (Eidgenössisches Departement für Umwelt, Verkehr, Energie und Kommunikation UVEK, n.d.).

In 2021, Switzerland enacted its “Long-Term Climate Strategy 2050” (*Langfristige Klimastrategie* 2050), a comprehensive and binding roadmap to achieve net-zero greenhouse gas emissions by 2050 (FOEN, 2023). A major focus of this strategy is the buildings sector, aiming at reducing greenhouse gas emissions from the existing building stock to zero by 2050. This will require a swift change in energy refurbishment practices, as many existing oil and gas heating systems continue to be replaced with new fossil-based systems, undermining the long-term goals of the Climate Strategy (Federal Council, 2021).

The Energy Perspectives 2050+ (*Energieperspektiven 2050+*), adopted in 2021, outlines Switzerland's long-term energy policy and serves as basis for decision making. The report presents two main scenarios: ZERO and BAU (business as usual), with the ZERO scenario further divided into several subvariants. All ZERO scenarios aim to achieve net-zero greenhouse gas emissions by 2050, in line with Switzerland's climate goals, while ensuring a secure and stable energy supply. The overarching strategy calls for a reduction in energy consumption across all sectors, along with the replacement of carbon-intensive energy sources with renewable alternatives. The strategy highlights significant reductions in energy consumption for space heating despite an increase in the energy reference area for housing. The goal is that 95% of Switzerland’s households will be heated with heat pumps or district heating by 2050 (BFE, 2021).

A proposed revision of the CO2 Act sought to establish more ambitious climate targets, including stricter regulations for buildings. This included additional taxes on fossil fuel heating

[7] Further details on the Buildings Programme are provided in Section 0.

systems, the creation of a climate fund, and further incentives for renewable energy retrofitting. However, the revision was rejected in a popular vote in June 2021, largely due to concerns about increased costs for households and businesses. This vote marked a setback for Switzerland's climate policy, in particular in the relation to the effort to accelerate retrofitting in the building sector (BAFU, 2021).

In 2019, a popular initiative "For a healthy climate (Glacier Initiative)" (*Für ein gesundes Klima - Gletscher-Initiative)* called for a ban on the use of fossil fuel by 2050. In response, the Federal Assembly and the Federal Council developed an indirect counterproposal, the "Climate and Innovation Act" (*Klima- und Innovationsgesetz*) which was passed in 2023 and came into force in January 2025. This Act legally enshrines Switzerland's commitment to reaching net-zero greenhouse gas emissions by 2050. In the buildings sector, it sets a target for an 82% reduction of emissions by 2040, with a complete decarbonization by 2050. The Act also introduces a Stimulus Programme (*Impulsprogramm*) that complements the Buildings Programme with additional subsidies. The specific measures and subsidies to support this transition are outlined in the Climate Protection Ordinance (*Klimaschutzverordnung*) and in the Energy Ordinance (*Energieverordnung*) which are both legally binding (BFE, 2023; Bundesversammlung, 2022).

The Swiss Engineers and Architects Association (*SIA*) set a new building standard called Climate Path (*Klimapfad, SIA 390/1*) in 2025 to limit CO2 emissions in the building sector. As a holistic consideration of construction, operation and induced mobility over the entire life cycle of buildings, it allows to evaluate and compare new developments and retrofits. The SIA's standards are highly influential in the construction industry, and the association plays an important role in political decision-making (Ménard, 2025).

In addition to national policies and initiatives, certifications with national and international labels have a growing impact on energy efficient refurbishments. Especially for international investors, green labels are important cachets to persist with a portfolio in an EU wide market. In Switzerland, the most important certification for sustainability is the Sustainable Building Standard Switzerland SNBS (*Standard Nachhaltiges Bauen Schweiz) which was originally developed for new buildings but is increasingly applied also to refurbishments.* The SNBS covers social, economic, and ecological sustainability. Labels are voluntary instruments that can also be applied only partially. They entail benefits like increased density (Representative of Lemon Consult AG, personal communication, May 7, 2025).

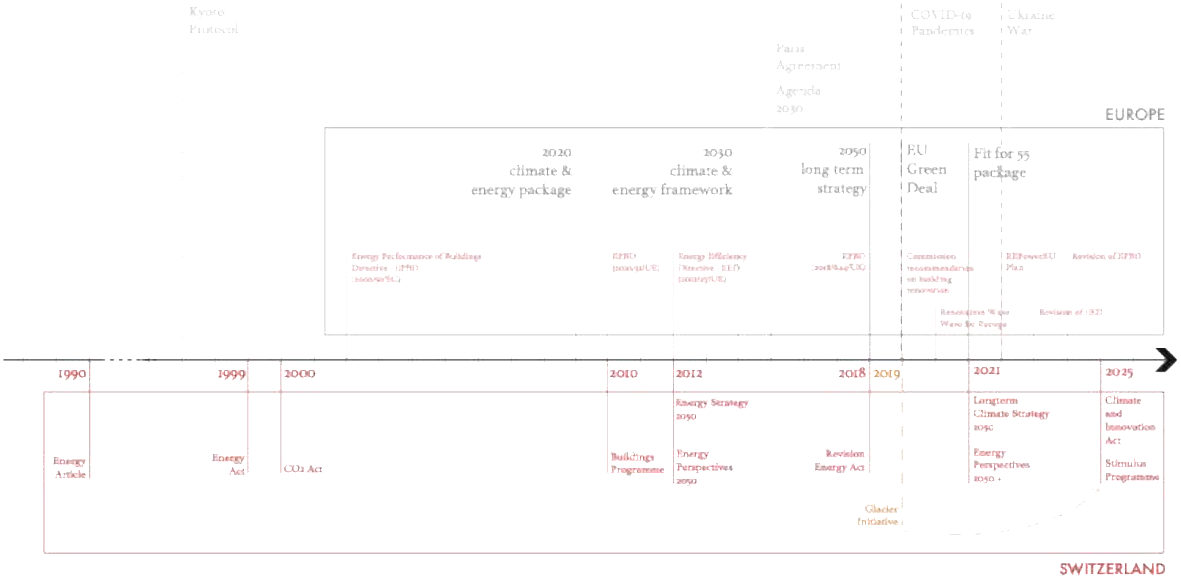

Figure CH1. Timeline of policies, initiatives and strategies regarding energy refurbishments in Switzerland

The Buildings Programme

In Switzerland, buildings are responsible for over 40% of energy consumption and around a third of the CO2 emissions. It is estimated that currently more than one million houses have little or no insulation and are therefore in urgent need of energy-efficient refurbishment. In addition, more than 60% of all residential buildings are still heated with fossil fuels or conventional electricity (Bundesamt für Statistik, 2024a). According to official estimates, in a significant portion of buildings better insulation can reduce heating requirements by more than half. Furthermore, by switching from fossil-fuelled heating to renewable energies, CO2 emissions during operation can be reduced to almost zero (EnDK & Bundesamt für Energie BFE, 2024).

The Buildings Programme was launched in 2010 with the aim to reduce the energy consumption of the building stock and to cut CO2 emissions. It provides financial subsidies to the owners of any type of building for energy refurbishments (e.g. replacement of windows, replacement of the heating system, and insulation of walls and roofs). The current Buildings Programme builds upon a previous building programme that was implemented until 2009 with public support by the Stiftung Klimarappen (Interface Politikstudien Forschung Beratung & Ernst Basler + Partner AG, 2010). With the revision of the Energy Act 2018, the Federal Assembly decided to continue the Buildings Programme (Eidgenössisches Departement für Umwelt, Verkehr, Energie und Kommunikation UVEK, n.d.).

The federal subsidies provided through the Buildings Programme only apply if the respective canton also has a financing program for energy refurbishments. Details of the subsidy schemes' implementation are explained in section 3.2. As previously mentioned, the Buildings

Programme is complemented by the Stimulus Programme that was introduced under the Climate and Innovation Act. This temporary subsidy programme is designed to address areas where existing subsidies are insufficient and will run for ten years. It primarily aims at fostering the replacement of fossil fuel heating in multi-family buildings and electric heating systems with renewable alternatives. In total, a credit of 2 billion CHF were allocated to the Stimulus Programme (Das Gebäudeprogramm, 2024b).

4.2 The implementation process

As mentioned in the previous sections, housing retrofitting in Switzerland is primarily taking place with the support of the Buildings Programme, which is a joint initiative of the confederation and the cantons. Funding is provided through a partial earmarking of the CO2 levy at the federal level, as well as contributions from the cantons. Since 2010, one third of the revenue from the CO2 levy has been invested in measures to reduce CO2 emissions from buildings. This funding is capped at CHF 450 million per year and is distributed to the cantons as an overall federal contribution. To receive this contribution, a canton must have a programme in place that promotes energy-efficient building renovations, including improvements to building envelopes and building technology, as well as the replacement of electric and oil heating systems.

The federal contribution is divided into two components: a basic contribution per inhabitant and a supplementary contribution. The basic contribution can account for up to 30% of the available funds. The supplementary contribution is limited to twice the amount the canton has approved for its own programme. The funds provided by both the Confederation and the cantons support a variety of energy-related measures, including the insulation of roofs and façades, the utilisation of waste heat and the use of renewable energies (BFE, 2024c). According to a representative of the BFE, the buildings programme primarily aims to promote energy efficiency and, secondarily, decarbonisation, as related measures create greater deadweight effects (Representative of SFOE, personal communication, May 8, 2025).

While cantons are free to determine which measures to support and under what conditions, the Conference of the Cantonal Energy Directors (*Konferenz der Kantonalen Energiedirektoren*, EnDK) has developed the “Harmonised Promotion Model of the Cantons” (*Harmonisiertes Fördermodell der Kantone*, HFM), which offers a standardized framework for developing cantonal subsidy schemes. Nevertheless, each canton is entitled to customise its programme based on regional needs and available financial resources. The first version of the HFM of 2003 was revised in 2007, 2009 and again in 2015 to reflect new policies, developments and evaluations of the Buildings Programme (BFE & EnFK, 2016). In some cantons, regulatory tools have been introduced, like the forbidding of the replacement of obsolete heating systems with fossil fuel heating systems (Zurich, Basel Stadt, Geneva, Neuenburg).

Additionally, the cantons have jointly developed the “Cantons’ Model Regulations in the Energy Sector” (*Mustervorschriften der Kantone im Energiebereich*, MuKEn) which set guidelines for energy use for both new and existing buildings. These regulations have been periodically updated since 1992, with the most recent version dating from 2014. Also the MuKEn can be adapted by the cantons to their specific needs and incorporated accordingly into their canton-

specific legislation (Konferenz Kantonaler Energiedirektoren, 2018). However, according to EnDK, the requirements of most of the 26 cantonal energy laws are practically identical, which explains why the Swiss building stock is relatively homogeneous in terms of energy efficiency. (Representative of EnDK, personal communication, May 8, 2025).

An evaluation of the Buildings Programme for the phase from 2010 to 2014 revealed that its impact was below expectations, suggesting that meeting targets in the buildings sector will be challenging. Data collected by the BFE suggests that funds are actively used by larger, more affluent real estate owners (Representative of SFOE, personal communication, May 8, 2025). Some cantons reduced their budgets, which affected the federal contributions, while in others, demand for subsidies was lower than anticipated (Bundesrat, 2016). However, since 2016, the federal funding for the Buildings Programme has increased significantly, from slightly over CHF 150 million to CHF 425 million in 2022, hinting at a growing momentum for energy refurbishments. Indeed, energy renewal rates between 2011 and 2020 were around 40% to 50% higher than in the previous decade (BFE, 2024a). However, even though representatives of several administrative levels emphasize the importance of the Buildings Programme to attain climate goals, a drastic reduction of its funding is currently under discussion (Representative of EnDK, personal communication, May 8, 2025), (Representative of SFOE, personal communication, May 8, 2025).

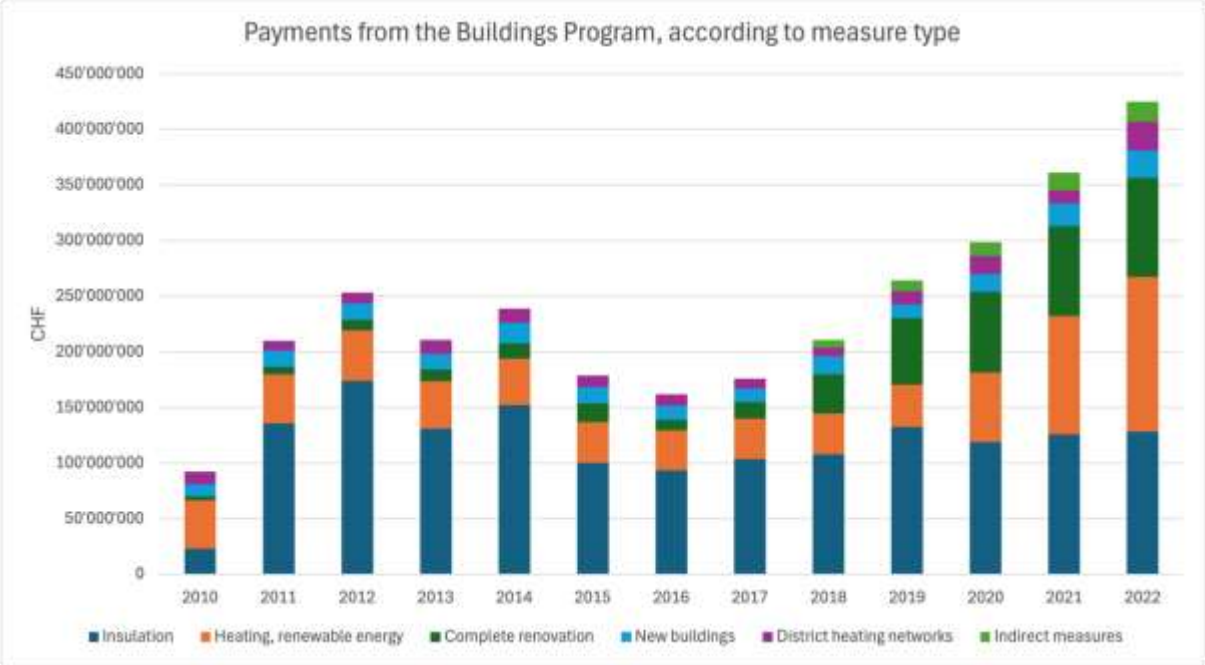

Figure CH2. Federal payments for the Buildings Programme by measure type, in CHF. Source: MURE Database (2023).

4.3 Size and role of the market

The energy refurbishments benefit from significant public support; over 3.6 billion francs in subsidies have been disbursed under the Buildings Programme between 2010 and 2023 (Das

Gebäudeprogramm, 2024a). Subsidy payments in 2023 alone totalled CHF 528 million. Private market actors (specialized consultants and the building industry) play a key role in the implementation of energy refurbishments. The building sector also supports SwissEnergy financially and has a strong lobby for maintaining the Buildings Programme (Representative of SFOE, personal communication, May 8, 2025). Indeed, according to a recent official publication, so far the Building Programme had an employment effect of 3025 man-years (EnDK & Bundesamt für Energie BFE, 2024). Accordingly, it may be said that the Buildings Programme has been quite successful in the creation of green jobs, in line with the objectives of the European Green Deal.

However, apart from incentives and funding, there are also market-related factors that affect real estate owners' decision-making about energy retrofitting. For example, the currently unpredictable energy prices strongly building owners' attitudes towards refurbishments. Fluctuating energy pricing undermine a reliable planning of renewable energy systems, leading to a slowdown of retrofitting (Representative of EnDK, personal communication, May 8, 2025).

As subsidies only cover a fraction of the refurbishment costs, homeowners typically rely on private financing mechanisms such as mortgages or construction loans for retrofitting projects. Banks set a credit limit based on available equity, generally applying an 80/20 equity-to-loan ratio (hausinfo, 2024). Financing depends on the potential to increase the value of a property or to achieve energy savings. The public sector plays a crucial role through subsidies in supporting retrofitting projects that align with sustainability goals, but that are not immediately economically viable because, for example, the initial investment is high, or not all external costs are calculated correctly. Ideally, these public funds enhance market-based financing, incentivizing homeowners to pursue energy-efficient renovations (BFE, 2024b).

4.4 The multilevel governance process

Switzerland's direct democracy and federal system plays an important role in the climate debate, as shown once again when the revision of the CO2 Act was rejected by the majority of the voters in 2021. The governance of housing retrofitting policies is based on a multilevel system. The cantons are primarily responsible for reducing the energy consumption in buildings and hence for the implementation of the Buildings Programme and are also in charge of processing and approving the funding applications.

As mentioned earlier and illustrated in Figure 3, the funds for the Buildings Programme come from federal as well as cantonal sources: a share of the CO2 levy (federal contribution) and cantonal contributions. Cantonal contributions range from CHF 130 to 200 million annually, while federal contributions from the CO2 levy total up to CHF 450 million annually, with an average of CHF 400 million (BFE, 2023). The federal support consists of a basic contribution and a supplementary contribution which can be twice as high as the funds approved by the respective canton. This structure incentivizes cantons to allocate higher budgets, as larger cantonal contributions result in higher federal funding. Additional cantonal funding programs beyond the Buildings Programme are also possible (BFE, 2024c).

As argued by an energy expert, there is a fundamental social equity problem with the programme as it provides public funding in the form of subsidies to private landlords that enhance the value of their property, which in turn enable them to increase rents. However,

social problems that such refurbishments may cause, such as evictions and unaffordable rents for the most vulnerable people have to be absorbed by the state (Representative of SFOE, personal communication, May 8, 2025). Furthermore, the Buildings Programme does not include any social criteria in defining subsidy entitlements, thus externalising its eventual negative social impacts.

Additional subsidy programmes, complementing the federal and cantonal programmes, can also be put in place at the municipal level. Predominantly larger municipalities and cities have launched their own subsidy programmes for energy refurbishments. For example, the city of Zurich provides additional subsidies for the replacement of heating systems, photovoltaic systems, and building renovations (Stadt Zürich, 2024a). But also smaller municipalities such as for example Amriswil in the canton of Thurgau with a population of 14,300 in 2023 (Kanton Thurgau, 2024) have their own local funding for EEP programmes. In addition to building renovations, they support for example battery storage, charging infrastructure, cargo bikes, bike trailers, and greening of roofs and facades (Stadt Amriswil, 2024). The online platform Energy Franc (*Energiefranken*), supported by the Electricity Provider of the Canton of Zurich (*Elektrizitätswerke des Kantons Zürich*, EKZ), provides a comprehensive overview of subsidy schemes at different levels of government.

Besides federal, cantonal, and municipal offices for energy, other important actors in the energy refurbishment sector are the “Conference of the Cantonal Energy Directors” (EnDK – Konferenz der Kantonalen Energiedirektoren), which assembles the cantons in in the energy and climate sector at government level, the specialist level Conference of Energy Agencies (EnFK – Energiefachstelle Konferenz), and the “Conference of Heads of Environmental Protection” (*KVU – Konferenz der Umweltämter*). These bodies jointly develop and coordinate the cantons’ energy and climate policy activities, such as for example the HFM and the MuKEn (EnDK & Bundesamt für Energie BFE, 2024). They are important because, as was mentioned, energy policy, building policy and the specifications for energy standards in the construction industry are cantonal competences.

In most cantons, strategies, concepts, guidelines or planning reports on the canton's energy and climate policy with concrete objectives and action plans – including rules on which measures are subsidised by the Buildings Programme – have been developed only in recent years, based on the MuKEn. Targets are defined based on the objectives of federal legislations in the energy and CO2 domain, among others. Despite extensive guidelines, a study commissioned by WWF Schweiz found that the implementation of energy and climate policies in the building sector varies significantly across cantons. While the canton of Basel-City has adopted exemplary policies (fulfilling 4 out of 5 points), 11 cantons only fulfil 2 out of 5 points, while none of the cantons is implemented a policy fully in line with the Paris Agreement (EBP Schweiz AG, 2019).

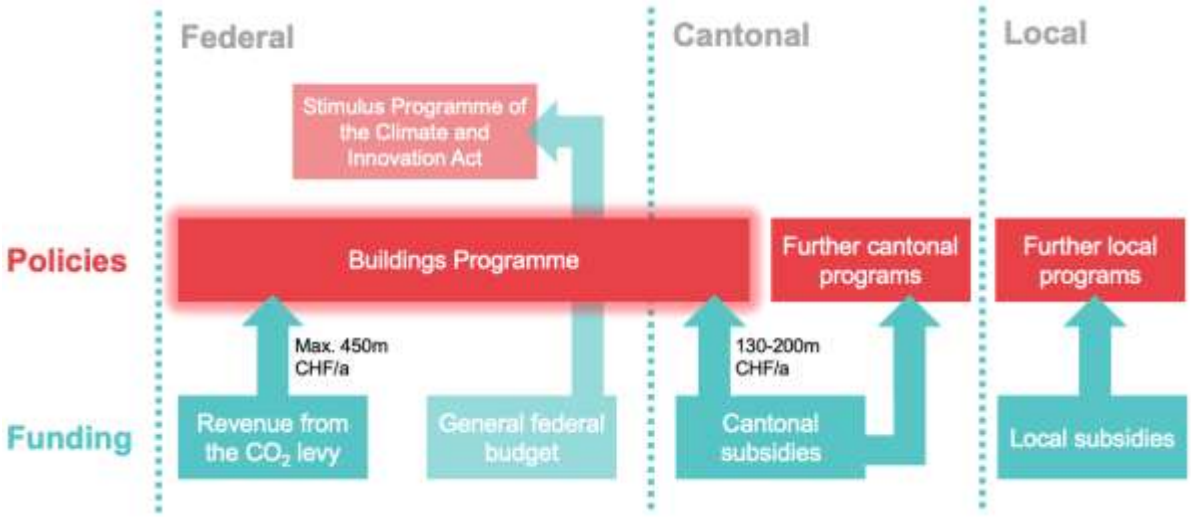

Figure CH3. Multilevel governance process of the Buildings Programme. Source: authors' own

Sector	Level of governance	Name	Role	Date of appearence
Public	National	Federal Office of Energy (SFOE)	Implementation of federal energy policies	1907
Public	National	Federal Office for the Environment (FOEN)	Implementation of federal climate policies	1971
Public	Cantonal	Cantonal offices of energy	Implementing their canton's energy policies	late 1970s-early 1980s, depending on Canton
Public	National	Conference of Heads of Environmental Protection (KVU – *Konferenz der Umweltämter*).	Promotion of sustainable development, including energy efficiency initiatives. Coordination of environmental policies across cantons; fostering collaborations between cantons and other stakeholders.	1976
Public	National	Conference of the Cantonal Energy Directors (EnDK – *Konferenz der Kantonalen Energiedirektoren*), EnDK	Development of common guidelines for cantonal energy policies and frameworks for regulating energy use in existing and new-built buildings	1988
Public	National	Conference of Energy Agencies (EnFK –	Connect energy experts across the country, provide support to energy offices, ensure that local and	1997

		Energiefachstelle Konferenz	regional energy initiatives align with national goals.	
Public	Cantonal	EKZ (Energieversorgung Zürich/Energy supply Zurich)	Provides consulting services to optimise energy use, including energy refurbishments and offers financial incentives for renovations. Collaborates with other actors to foster large-scale energy refurbishments, including residential buildings. Overall responsibility for the Platform “Energie Franken”	1997
Private		Faktor Journalisten AG	Collaborations with energy companies, NGOs, government agencies, and other stakeholders in communication on energy transition, environmental protection, climate change, and sustainable development. Responsible for data collection on available subsidies by commune for Energie Franken	2001
NGO	National	Stiftung Klimarappen	Was responsible for the implementation of the energy refurbishment programme that preceded the Buildings Programme	2008
Public	National	Energiehub Gebäude	**Platform for building owners**, planners, and energy consultants to access information and resources about energy efficiency measures for buildings. It helps stakeholders identify, plan, and implement strategies that reduce energy consumption in buildings, optimize heating, cooling, and lighting systems, and ensure better insulation and overall energy performance.	2014
Public	Municipal	Municipal offices of energy	Implementing local energy policies	Depending on municipality
Private	National/local	Consulting firms and networks of certified consultants on energy efficiency (e.g.	Advisory services to improve energy efficiency in homes and businesses. Support for energy-efficient renovations,	

		SuisseEnergie, Energieberater Schweiz, Enco AG, Green Tech AG, Minergie, Swiss Energy and Environmental Engineering (ESE)	including insulation, heating systems, and renewable energy solutions	
Private	National/local	Building industry, building technology companies (e.g Losinger Marazzi, HRS Real Estate AG, Baumer Group, Züblin Schweiz AG, Walo Bertschinger AG	Implementation of energy refurbishments, including thermal insulation, windows, and renewable energy installation	

Table CH2. Actors involved in the policy cycle of energy retrofitting

4.5 Assessments, achievements, and challenges

As mentioned in Section 3.2, the volume of federal contributions to the Buildings Programme is the main aspect that is being monitored and regularly published, for example in its Annual Reports. However, it may be argued that the real impact of the programme should rather be assessed in terms of the reduction in energy consumption and CO2 emissions. Since its inception in 2010, the programme has resulted in a decrease of 3.8 billion kilowatt-hours (kWh) in energy consumption and a reduction of 1,064,000 tons in CO2 emissions (Das Gebäudeprogramm, 2024a). In its latest evaluation, the Buildings Programme was deemed effective, as the savings per Swiss Franc exceeded initial expectations (Bundesrat, 2016).

Nevertheless, several concerns and critiques have been raised regarding the programme, its funding structure, along with equity considerations. Concerns have also been raised with regard to its potential **deadweight effect** as property owners receive subsidies even if they would have undertaken energy refurbishment also without them. An evaluation from 2023 estimated that the deadweight effect accounts for approximately 47% (BFE & EFK, 2024). These numbers, however, were only based on cantonal and national experts' estimates (Representative of SFOE, personal communication, May 8, 2025) (Representative of EnDK, personal communication, May 8, 2025). Furthermore, an evaluation commissioned by the Stiftung Klimarappen confirms that households with higher gross incomes have disproportionately benefitted from the programme (Interface Politikstudien Forschung Beratung & Ernst Basler + Partner AG, 2010), suggesting that it could exacerbate social inequality. As an energy expert stated, there is a basic social problem with the funding: although it benefits from public funding, the subsidies are provided to private landlords. However, inequalities such as energy poverty and social problems caused by increasing housing affordability problems are absorbed by the state (Representative of SFOE, personal communication, May 8, 2025).

There is increasing concerns that energy refurbishments are substantively contributing to the loss of affordable housing with severe consequences on lower income people (e.g. Suppa et

al., 2019). In Switzerland, costs related to property improvements—such as energy refurbishments—can be passed on to tenants in the form of rent increases, provided these improvements increase the property's value (Burkhalter, 2014). Under current regulations, which date back to 1977, 50–70% of the investment in extensive renovations can be considered "value-enhancing" and subject to rent increases, minus the subsidies received. This rule was originally intended to incentivize landlords to renovate (King et al., 2019). However, the relatively weak tenant protections (Debrunner, Kolocek, et al., 2024) make **renovictions**—forced evictions due to renovations—a more appealing option for landlords. This enables them to carry out extensive renovations and subsequently charge significantly higher rents. A case study covering ten instances revealed that, even when accounting for lower utility costs, tenants experience an increase in financial burden following energy refurbishments, particularly when rental contracts are terminated (B,S,S & Basler & Hofmann AG, 2014).

To date, subsidies for retrofitting have been offered based exclusively on technical criteria, without any social equity consideration (Debrunner & Hartmann, 2020). The impacts of these policies are multifaceted, especially concerning housing quality and affordability, affecting in particular lower-income tenants in urban areas and agglomerations. **Renovictions** became a widely diffused practice in the 2010s and have remained high, particularly in urban centres (Vogel, 2019). In Zurich, for example, 30% of all housing renovations between 2021 and 2022 entailed renovictions, affecting over 1,000 individuals annually (Stadt Zürich, 2024d). Research with focus on the canton of Zurich indicates that renovations and replacement constructions contribute to the displacement of lower-income and vulnerable tenants, with new tenants in renovated or rebuilt buildings earning, on average, 3,000 Swiss Francs more than those they replace (Kaufmann et al., 2023). Nationwide data on renovictions remains difficult to obtain (Vogel, 2019)

While energy refurbishments themselves do not necessarily entail comprehensive renovations (BWO, 2016), the subsidies granted under the Buildings Programme make such renovations financially more attractive. This, in turn, increases the likelihood of renovictions and rent increases, potentially accelerating gentrification in certain areas.

In recent years, the federal government has explored ways to modify the subsidy structure to better align with housing policy objectives. A study commissioned by the Federal Office of Housing (BWO, 2016) outlines various options and their anticipated effects on energy policy, housing affordability, government spending, and enforcement (BWO, 2016). One recommendation is to link subsidies to additional criteria, such as vacancy rates, in order to prevent the deadweight effect in high-demand areas where renovations (and energy refurbishments) would be profitable even without subsidies. Another proposal is to make the obtainment of subsidies contingent on landlords' agreement not to evict tenants or to comply with rent control regulations. A stronger alignment of energy and housing policies could also entail amendments to tenancy laws, such as reducing the percentage of renovation costs that can be passed on to tenants through rent increases or enhance eviction protections.

While such measures could mitigate the risk of renovictions and excessive rent increases, they have been criticized for potentially reducing incentives to renovate, undermining Switzerland's energy policy goals. Furthermore, they are often seen as an infringement on property rights

(BWO, 2016), or are regarded as costly and difficult to enforce. Up to date, none of these measures have been adopted at national level. However, some cantons, for example Geneva and Basel Stadt, have introduced stricter rent controls and tenant protections to address the risks of renovictions, gentrification, and rising rents. For instance, under Basel's new housing protection laws, landlords must seek approval from a committee before raising rents following a renovation. These measures aim at reducing gentrification and renoviction risks, but have also been criticised for slowing down renovations, which harms smaller enterprises in the building sector (Hauser, 2023), (Künzle & Kenan, 2024).

Nevertheless, retrofitting also has the potential to reduce housing inequality. If rent increases resulting from energy refurbishments are controlled and do not outweigh the savings on utility costs, retrofitting could alleviate **energy poverty**, particularly for low-income households. Over time, the financial relief from reduced energy consumption could directly ease the burden on families in need.

Policy / Programme	Measured impacts on housing inequalities	Potential impacts on housing inequalities
Buildings Programme	-	**Inefficient Funding**: In 2023, 47% of recipients report they would have retrofitted without subsidies. **Unequal Benefits**: Only property owners and the building industry directly benefit from the Buildings Programme. Eligibility for subsidies exclusively based on technical criteria; socioeconomic factors are not considered **Negative Social Impacts**: Energy retrofits often trigger full renovations, leading to evictions, higher rents, displacement and gentrification
Stimulus Programme	-	**Inefficient Funding**: The Stimulus Programme focuses on measures, which would often be retrofitted without funding (e.g. decarbonisation of heating systems)
Swiss tenancy law: landlords can transfer 50–70% of renovation costs to tenants	Rent increases typically exceed energy cost savings (BWO, 2016) Cost transfers are often not controlled (only if tenants insist)	**Incentivized Rent Hikes**: Tenancy law encourages combining energy retrofits with value-adding renovations, allowing greater rent increases.

		Reduced Affordability: Retrofitted homes often become unaffordable for low-income tenants.

Table CH3. Summary table of measured and potential impacts of retrofitting policies on housing inequalities.

5 Nature-Based Solutions

5.1 The policy cycle: emergence of the issue and policy decisions

Currently, Switzerland lacks policies explicitly promoting nature-based solutions (NBS), as this concept is not yet used at national level. However, NBS are closely related and in some cases reflected into policies on biodiversity, climate change adaptation, and river restoration. Public awareness on climate change and environmental protection are playing an important role in advancing NBS in Switzerland. As a result, the number of policies instruments aiming at promoting NBS have grown rapidly over the past decade, a sharp contrast to the slower developments before 2010. The Swiss Spatial Planning Act only contained a planning principle stating that residential areas should include 'a lot of green and trees', which, although vague, was still legally useful wording. Furthermore, the Swiss Nature and Heritage Conservation Act (Natur- und Heimatschutzgesetz, NHG) assigned all cantons with “ecological compensation”[8] in intensively utilised areas in 1988 (SR 451 - Art.18 B2, 1966). However, already in 1996, WWF Switzerland (*WWF Schweiz*) criticized spatial planning practices that led to excessive land sealing without adequate compensation in the form of land or river restoration (Bernath et al., 2024). This triggered public debates on the need of actions that today we would refer to as NBS. The first popular initiative that promoted NBS (without using this term) was launched by the Swiss Fishing Federation (*Schweizerischer Fischerei-Verband, SFV*) in 2005. Named "Living Water (River Restoration Initiative)" (*Lebendiges Wasser (Renaturierungs-Initiative)*) it primarily aimed to address the extinction or near-extinction of native fish species by calling for an amendment to the Swiss constitution. It advocated for river restorations and the establishment of cantonal funds to protect biodiversity and improve aquatic habitats. The initiative prompted the Swiss Parliament to draft an indirect counterproposal in 2010, which addressed many of the initiative’s goals, but gave more weight to the interests of the water energy industry. It proposed alternative financing mechanisms for river restoration and to incorporate these issues into amendments to the Water Protection Act (*Gewässerschutzgesetz*) rather than to the constitution. The initiative was eventually withdrawn, and in 2011, while the Water Protection Act amendments were enacted.

Nevertheless, these amendments have faced opposition, particularly from the right-wing party SVP, the Swiss Farmers’ Union, the electricity industry, and power plant operators, which objected to cantons’ requirement to designate watercourse areas that cannot be used for

[8] Collective term for measures that serve to preserve and promote habitats and their connectivity in intensively utilised or densely populated landscapes. According to the FOEN, ecological compensation measures mainly promote native biodiversity in resident areas.

intensive agriculture or construction. At the same time, the slow pace of river restorations has also drawn criticism in relation to the increasing number of floods and landslides caused by climate change. As a result, river restorations are increasingly advocated as a key NBS for the management of climate change-induced floods (Bernath et al., 2024).

At national level, the Federal Council began developing a Climate Change Adaptation Strategy (*Strategie Anpassung an den Klimawandel*) in relation to the 2011 revision of the CO2 Act (*CO2-Gesetz*), which requires the Federal Council to coordinate climate adaptation measures. In 2012, the Federal Council released the first part of this strategy, titled *"Objectives, Challenges, and Fields of Action"* (Schweizerische Eidgenossenschaft, 2012). While not explicitly mentioning NBS, it identified heatwaves and floods as growing natural hazards due to climate change and proposed mitigation strategies that align with NBS principles. Key measures included creating and enhancing green infrastructure, promoting open spaces, preventing soil sealing, and using green and shaded areas to mitigate heatwave impacts. River restoration was also highlighted as a measure for flood protection.

In 2014, the Federal Council published the Action Plan for the Period 2014-2019 as part of the Climate Change Adaptation Strategy (Schweizerische Eidgenossenschaft, 2014). This plan, while again not directly referring to NBS, emphasized the importance of spatial planning in adapting urban areas to increasing heat stress. It called on cantons and municipalities to take responsibility for urban climate adaptation, with the federal government providing guidelines and support, but it is not legally binding. A notable example is the guide “Heat in Cities: Principles for Climate-Adapted Urban Development**”** (BAFU, 2018), which offers best practices for urban planning.

Building upon the previous one, the Federal council published a second Action Plan in 2020 (Schweizerische Eidgenossenschaft, 2020). One of its main foci is the enhancement of urban green spaces and watercourse areas. It further aims to raise awareness about the ecosystem services provided by green and blue infrastructure. Municipalities, supported by cantons and federal offices, are encouraged to adopt these measures. As of 2020, the federal government funded 81 pilot projects addressing climate change adaptation and mitigation at municipal and regional levels.

While climate change adaptation is the main concern of the projects promoted by the Action Plans, initiatives that may be labelled as NBS are also being promoted with the aim of protecting biodiversity.

For example, already back in 2009, the Federal Council mandated the Federal Office for the Environment (FOEN) to develop a strategy on biodiversity, which was presented to Parliament in 2011. The strategy primarily entailed securing ecological infrastructure and providing and enhancing ecological spaces in urban areas. It gained support from the Social Democratic Party (SP) and the Christian Democratic People’s Party (CVP), but was criticised for its lack of concrete action, particularly from the Green Party (Grüne Schweiz), the Liberals (FDP), and the Swiss People’s Party (SVP), who feared excessive regulation and costs (Flückiger, Porcellana, Gerber, et al., 2024). Nevertheless, it was adopted in 2012, and a participatory process was launched to develop an Biodiversity Action Plan, which was finally adopted in 2017 for the period 2017-2023 (Bundesrat, 2017). Although the Action Plan does not use the

term NBS, it aimed to create a nationwide ecological infrastructure, integrating settlements into ecological networks. This infrastructure was expected to have additional benefits such as improving air quality, regulating microclimates, and reducing noise.

Despite criticism regarding delays, the lack of funding, and the non-binding nature of the plan, the Action Plan was extended into 2024 and the development of a second Action Plan (2025-2030) underway. However, in September 2024, three environmental organizations—Pro Natura, WWF, and BirdLife Schweiz—issued a joint statement criticizing the draft of the Action Plan for its insufficient funding and effectiveness (Pro Natura et al., 2024).

The second Action Plan, published in November 2024, reiterates the importance of promoting biodiversity in urban areas through the creation and enhancement of green spaces, integration into ecological networks, and land and river restoration. For the first time, the plan explicitly uses the term NBS (*naturbasierte Lösungen)* for one of the 15 measures under the FOEN's responsibility mentioned in the Action Plan (Bundesrat, 2024). This measure outlines plans for the Confederation to oversee NBS projects and support at least 30 regional and municipal NBS projects by 2030. Municipalities remain key players in the implementation of NBS. Following a recent revision of the CO2 Act, which came into force in January 2025, the federal government has launched the *adapt+* funding programme to promote measures to adapt to climate change, including NBS. Starting in August 2025, the program is planned to run until 2030 with an annual budget depending on submitted projects, mainly by cantons, regions, municipalities and organisations. This year, around 1.5 million has been allocated for the funding programme (BAFU, 2025).

Stronger commitments towards the biodiversity conservation were also sought by the popular initiative titled "For the Future of Our Nature and Landscape" (Biodiversity Initiative) (*Für die Zukunft unserer Natur und Landschaft (Biodiversitätsinitiative)*) of 2019, which was launched by environmental organizations, including, among others, the Swiss Fishing Federation. The initiative demanded increased funding for biodiversity, more protected areas, and greater responsibility for cantons in preserving landscapes. Critics argued that the initiative would negatively impact agriculture, energy production, and tourism and incur significant costs for both the Confederation and the cantons (Flückiger, Porcellana, & Ziehli, 2024). With these arguments they succeeded persuading 63% of the voters who rejected the initiative by popular vote in September 2024.

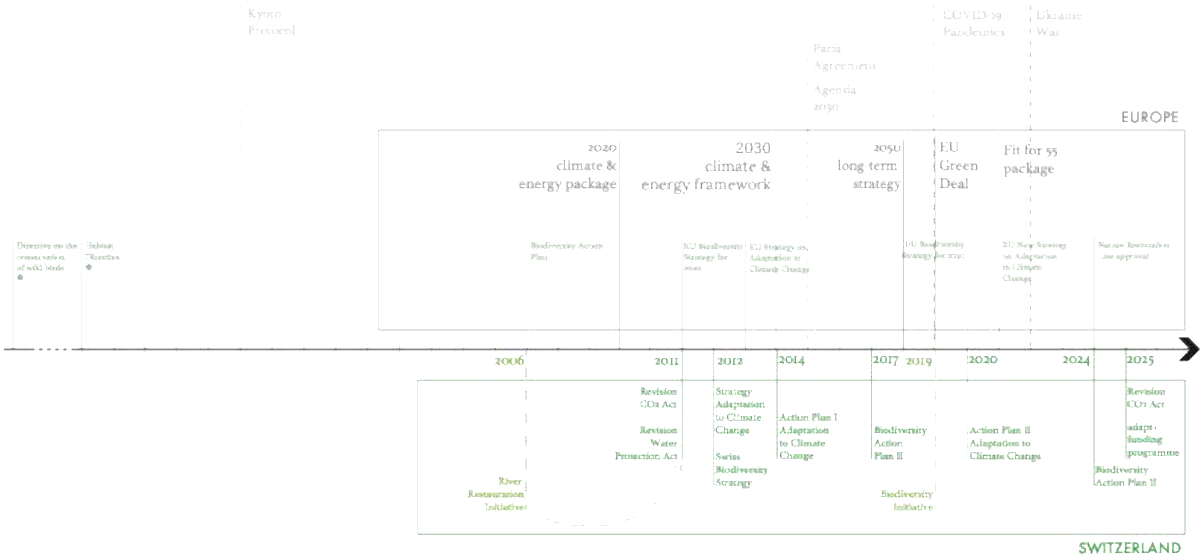

Figure CH4. Timeline of policies, initiatives and strategies affecting NBS goals in Switzerland

5.2 The implementation process

The implementation of NBS policies at cantonal or municipal level is not explicitly regulated or defined at the national level. While national strategies on biodiversity and climate change adaptation recognize cantons and municipalities as key partners in implementing related measures, they do not provide clear guidance on how this implementation should unfold at lower levels of governance. As a result, so far none of Switzerland's 26 cantons developed a strategy specifically focused on NBS. Since 2008, the Federal Office for the Environment (FOEN) started supporting the cantons with project-specific financial contributions for a period of up to 4 years through environmental sector programme agreements *(Programm-vereinbarungen im Umweltbereich*) (BAFU, 2008). However, it is the responsibility of the cantons to include measures for landscape politics and ecological compensation in their legislation. By early 2022, only 17 out of the 26 cantons adopted strategies for climate change adaptation, while in the remaining cantons, such strategies were still under preparation (BAFU, 2023a). Notably, the Climate Strategy of the Canton of Thurgau, published in December 2022, is the only one to explicitly mention NBS (*naturbasierte Ansätze*). This is likely related to the term's recent emergence, as NBS were introduced into national policies only in 2022 (Bundesrat, 2022). Cantons pursue different strategies. For example, Basel Stadt uses an added-value levy (*Mehrwertabgabe*), which has to be paid when a building permit is issued, to fund public green spaces. Even though the majority of the cantons are still without an operational strategy, it is argued that the need for climate adaptation is widely recognized at the cantonal level (BAFU, 2023a).

At the municipal level, there has been a notable increase in climate strategies and action plans since 2020. While early efforts focused on energy related issues, the first comprehensive

climate strategies began to appear in 2015. Since then, there has been a significant increase in the number of cities and towns developing climate-related policies (Schweizerischer Städteverband et al., 2024). However, currently, 97% of Swiss municipalities are addressing climate change to some extent, but only 31% adopted specific strategies or measures for climate adaptation. A recent study on the integration of climate change adaptation goals in Swiss municipalities concluded that local adaptation measures remain rare, largely depending on individual stakeholders' initiatives or the occurrence of extreme events (Braunschweiger & Pütz, 2021). Local governments have expressed frustration over the lack of clear directives on climate change adaptation at the cantonal and municipal levels, questioning whether direct national legislation would be politically feasible. Many municipalities have called for more guidance and stricter legal requirements from higher levels of government, particularly from cantons (Schweizerischer Städteverband et al., 2024). In response to this lack of support, the FOEN has issued model clauses for biodiversity and landscape quality in urban areas and the implementation of the ecological compensation, aimed at assisting cantons and municipalities (BAFU, 2023b, issued for the first time in 2022).

In the specific domain of heat adaptation in urban settings, a study focusing on Swiss cities' administrations' perspectives revealed that many local authorities would welcome greater support from both cantons and local legislative bodies (Fujara, 2022). A large majority of cities and towns recognize the increasing strain that heatwaves put on urban areas and deem it an urgent issue. However, only 17% of the cities (mainly large and medium-sized ones) have strategies dedicated specifically to heat adaptation. According to the FOEN, those are mainly cities with strong administrative structures under progressive political influence (Representative of FOEN, personal communication, April 17, 2025). These strategies include support tools or regulatory measures that aim to encourage the greening of private properties and climate adaptation of public spaces. About one-third of the cities lack a strategy altogether. The remaining municipalities have integrated heat adaptation into their broader climate strategies.

One of the earliest regulatory policies involving NBS at the municipal level is the requirement to green flat roofs on newly constructed buildings—sometimes extending this obligation to renovations. Zurich introduced this regulation in 1991, while Basel followed in 1999. The policies include guidelines on the height, mass and profile of the substratum, and on the species of plants. There are stricter demands for extensive roof greening in large projects, which have special building policies (Stadt Zürich, n.d.-b). Today, most municipalities in Switzerland have similar regulations requiring the greening of flat roofs (Wepf, 2016).

5.3 Size and role of the market

Rather than ushering the adoption of NBS, the market's lack of interest appears to hinder progress. This can be seen in the various examples where the implementation of nature-based measures was slowed down by other market interests.

One relevant market factor pertains to the obligation to green flat roofs. A recent study of Zurich's flat-roof greening initiative found that, in the 1990s, the percentage of green roofs increased from under 20% to over 25%. However, since the 2000s, this percentage has

steadily declined, with only slightly more than 10% of newly constructed flat roofs being green between 2011 and 2015 (Kübler, 2024). This decline is attributed to increasing competition for roof space, as many building owners use the upper floors for terraces or penthouse apartments, which add value to the property but reduce available space for greening.

Another example is the sponge city concept (*Schwammstadtkonzept)*, an urban planning principle that aims at rainwater retention instead of drainage, which is currently being tested in several pilot projects. As a NBS, it aims to improve urban climate and is even supported by some municipalities (e.g. Zurich) through incentives for unsealing private land. However, it is technically challenging to implement in existing residential areas and economically unattractive, as it tends to hinder rather than encourage construction. According to a FOEN representative, the lack of market appeal is one of the reasons why NBS do not have a strong lobby and are not prioritized politically (Representative of FOEN, personal communication, April 17, 2025).

Furthermore, the challenge with NBS for real estate investors lies in their limited measurability and quantifiability, which makes it difficult to incorporate their value into property pricing (Interview CM). If the costs of such investments cannot be recovered through higher rents, profit-oriented landlords have little incentives to adopt these 'soft factors', as stated by a real estate investor to FOEN: "For these (factors) to be considered serious criteria for developing a property portfolio, they must be more measurable" (Representative of FOEN, personal communication, April 17, 2025).

NBS Measure	Policy / Example
Greening of flat roofs	Mandatory in Zurich since 1991 and currently mandatory in most municipalities
Sponge City Principle	Pilot projects in several municipalities (Bern, Lucerne, Zurich…), Municipal subsidy programmes for unsealing private land
River Renaturation	Water Protection Act, National subsidy programme
Increase of Tree canopy area	Tree protection, Municipal subsidy programmes for heat reduction
Renaturation of large-scale infrastructure (grey to green)	Project-based public funding, e.g. Schwamendingen (Zurich): Enclosure of highway with park on top

Table CH4. Examples for NBS measures in Switzerland.

5.4 The multilevel governance process

Sections 4.1 and 4.2 have highlighted that the development of NBS-related policies are relatively recent that gained momentum only over the past decade. While environmental organizations, particularly in the area of biodiversity, have exerted significant pressure, movements like Fridays for Future, which started in Switzerland in December 2018, have contributed to increasing the pace of policy development related to climate change mitigation

and adaptation (Schweizerischer Städteverband et al., 2024). However, resources allocated at the national level remain limited (as criticised regarding the Actions Plans for biodiversity; Pro Natura et al., 2024), with implementation largely expected to occur at the municipal level. This means that the success of these initiatives depends primarily on local stakeholders—whether government officials, administrators, local parliamentarians, or civil society organisations (Braunschweiger & Pütz, 2021).

As a result, some cities are leading the way with innovative strategies and implementations, while smaller towns often lack a clear strategy altogether (Schweizerischer Städteverband et al., 2024). This disparity may also reflect political orientation, as progressive parties tend to support NBS and related strategies, whereas liberal-conservative parties often oppose them, citing concerns about high costs and negative impacts on sectors such as agriculture, energy, and tourism.

Municipalities can implement NBS on public land, for example by greening municipal buildings, planting trees along roads, or undertaking river restorations. However, expanding the presence of green roofs and facades mainly depends on the willingness of private property owners. To this aim, many cities offer incentives, such as subsidies and free consultations, and have incorporated the greening of flat roofs into building regulations (Wepf, 2016).

A notable example of a municipal program promoting both heat reduction and biodiversity is the *Stadtgrün* initiative by the City of Zurich, which began in 2024 and will run until 2035. The programme consists of four sub-programmes targeting different stakeholders: the first supports green measures in public spaces and streets; the second offers advice and subsidies to private property owners; the third promotes green measures on municipal properties; and the fourth funds research and pilot projects on heat reduction (Stadt Zürich, 2024b). The program has a total budget of 130 million Swiss Francs, with 28.2 million allocated to the second sub-programme for private property owners between 2024 and 2029 (Stadt Zürich, 2024c).

At the national level, the *Grünstadt Schweiz* (Green City Switzerland) label promotes urban greenery and sustainable management of green spaces. This label, founded and managed by the Association of Swiss Departments for Green Spaces since 2017 *(Verband Schweizerischer Stadtgärtnereien und Gartenbauämter*, VSSG) and partially funded by the FOEN, is awarded to cities committed to urban greening. Up to date, 20 cities have received the *Grünstadt* label, with 7 more in the certification process.

Sector	Level of governance	Name	Role/Responsibilities	Date of appearence
Public	National	Federal Office for the Environment (FOEN)	Elaboration of NBS strategies and action plans at national level	1971
Public	Cantonal	Cantonal offices for the environment	Elaboration of NBS strategies and action plans at cantonal level and implementation with cantonal boundaries	depending on Canton
Public	Cantonal	Cantonal offices for the spatial development/construction	Regulation of greening obligations and compensation areas through planning and building regulations	depending on Canton
Public	Municipal	Municipal offices for the environment	Elaboration of NBS strategies and action plans and their implementing at local level	depending on municipality
Public	Municipal	Municipal offices for the spatial development/construction	Regulation of greening obligations and compensation areas through planning and building regulations	depending on municipality
Non-governmental organisation	National	WWF Schweiz	Promotion of biodiversity through NBS	1961
Non-governmental organisation	National	BirdLife	Promotion of biodiversity through NBS	1922
Non-governmental organisation	National	Pro Natura	Promotion of biodiversity through NBS	1909
Non-governmental organisation	National	Swiss Fishing Federation	Promotion of biodiversity through NBS	1883
Non-governmental organisation	National	Swiss Farmers' Union	Opposition to NBS entailing transition from intensive land cultivation to extensive uses	1897
Non-governmental organisation	National	+ others		
Non-governmental organization	National	Grünstadt Schweiz (under the responsibility of the Association of Swiss Departments for Green Spaces (Verband Schweizerischer Stadtgärtnereien und Gartenbauämter VSSG, partially funded by the FOEN)	Certification of cities with formal commitment to urban greenery	2012
Private	Municipal	Private landowners	Implementation of NBS (greening of roofs/facades, de-sealing)	

Table CH5. Actors involved in the policy cycle of NBS.

5.5 Assessments, achievements and challenges

Given the lack of a policy specifically defining and promoting Nature-Based Solutions (NBS), there has been no targeted evaluation or research focusing on their implementation or overall impacts. According to FOEN and SFOE representatives, the national agenda focuses on climate adaptation strategies with measurable goals, such as achieving net zero by 2050 (Representative of FOEN, personal communication, April 17, 2025) (Representative of SFOE, personal communication, May 8, 2025). The focus on climate adaption rather than biodiversity measures was also reflected in the popular vote in 2024, when the Biodiversity Initiative was rejected. Switzerland's politicies are influenced by the powerful farmers' lobby that favours biodiversity measures concentrated in urban and residential areas. *As a result, no federal subsidy programme has been established.* In rural areas, biodiversity measures are rare and are usually implemented and subsidised by the cantonal authorities, since small municipalities often lack the resources and expertise to implement such complex concepts.

The varying degrees of progress in the greening of municipalities of different sizes are also reflected in the Greencity certification (Representative of Grünstadt Schweiz, personal communication, April 15, 2025). **Nature-based solutions (NBS) are not only complex and costly to implement, but their adoption is also hindered by political tensions—particularly between national strategic goals and the resistance from conservative governments**. To date, there has been no mandatory ecological planning at a municipal level, meaning that local legislation and subsidy programmes are highly diverse (Martinoli et al., 2025).

One notable aspect of the Swiss situation is the absence of public or academic discourse around issues of distributive justice related to green spaces and greening subsidies. There is little debate regarding the impact of creating or upgrading green spaces on property values and housing costs, nor is there significant discussion about where and for whom green spaces are developed. **The implementation of NBS varies significantly depending on whether the land is privately or publicly owned, particularly in terms of the stakeholders involved, funding mechanisms, and resulting impacts. In public spaces, green interventions tend to influence rent and property prices only after several years, making it difficult to establish a direct correlation. Moreover, Swiss tenancy law has yet to clarify whether NBS can be legally considered value-enhancing measures that would allow rent increases. As a result, further research is needed to understand whether and how NBS affect housing affordability.** Additionally, the unequal effects of subsidies for greening private roofs, facades, or gardens—particularly on homeowners versus tenants—have not been addressed by public debates and research yet.

Policy / Programme	Measured impacts on housing inequalities	Potential impacts on housing inequalities
Municipal Subsidies for NBS (e.g. Stadtgrün ZH)	-	**Unequal Access**: Only Property owners benefit from subsidies.

		Green Gentrification: Large-scale greening projects can lead to rent increases and displace existing residents.
Certifications by Grünstadt Schweiz	-	Green Gentrification through location improvement
Green Building Policies (e.g. Greening of flat roofs)	-	Higher rents because increasing construction costs can be passed on to tenants

Table CH6. Summary table of measured and potential impacts of NBS policies on housing inequalities.

6 Densification

6.1 The policy cycle: emergence of the issue and policy decisions

Given Switzerland's scarcity of buildable land (see section 2.1), it is not surprising that land use regulations, directly or indirectly aiming at densification, already began emerging after the 1960s construction boom, focusing initially on controlling pressure on agricultural land and later on landscape protection and biodiversity conservation, as stipulated by the Federal Constitution (Art. 2 CSC). Areas like natural monuments and historic pathways are regulated by the Federal Act on the Protection of Nature and Cultural Heritage (*Bundesgesetz über den Natur- und Heimatschutz, NHG*), which was passed in 1966.

In 1979, a national vote led to the incorporation of spatial planning principles into the Federal Constitution. The first Spatial Planning Act (SPA; *Raumplanungsgesetz, RPG*) introduced dynamic structural and use planning by assigning spatial responsibilities and effective tasks to the regions and municipalities. It aimed at distinguishing building and non-building areas, without initially emphasizing densification. The Swiss Federal Office for Spatial Development (*Bundesamt für Raumentwicklung*, *ARE/* SFOSD), created in 2000, coordinates sustainable development, balancing compact settlement, landscape protection, and land use across the 26 cantons.

Despite these regulations, urban sprawl continued into the 2000s. With the spatial development report (*Raumentwicklungsbericht*), the SFOSD published a self-critical assessment which found that spatial development in Switzerland is unsustainable and asked for a holistic spatial development concept and a revision of the SPA (Represenative of SFOSD, personal communication, May 20, 2025). This prompted the 2008 Landscape Initiative (*Landschaftsinitiative*) which called for a 20-year freeze on building zones and the promotion of inner-city development by the federal government and the cantons (ARE, 2024b). In response, the Federal Council proposed a thorough revision of the SPA, introducing densification as a legally binding policy and restricting land hoarding. The revision was approved by a large majority of voters in 2013. The SPA I, which came into force in 2014, can

be seen as a turning point in Swiss spatial planning, with significant requirements for densification and land conservation through the strict regulation of building zones.

In parallel, the non-binding Swiss Spatial Concept (*Raumkonzept Schweiz*), launched in 2012, seeks to harmonise the objectives of the cantons and municipalities. It aims to guide development with a focus on sustainable urban planning, mobility and regional diversity. The Swiss Biodiversity Strategy, adopted in 2012, stresses integrating biodiversity into spatial planning and promoting biodiversity within settlement areas (Bundesrat, 2012). Additionally, the Second Home Law (*Zweitwohnungsgesetz, ZWG*), which was approved by Swiss voters in the same year, limits the construction of vacation residences to preserve land, protect the character of existing settlements and increase use density.

Despite these efforts, settlement areas expanded by 31% between 1985 and 2018, consuming large amounts of agricultural land (BFS, 2021). In response, the Green Party launched a popular initiative against urban sprawl (*Zersiedlungsinitiative*), demanded further limitations on building zones and emphasized small-scale settlement (ARE, n.d.). It was rejected by the Swiss voters in 2019. The second landscape initiative, which followed shortly afterwards, again called for measures against urban sprawl, the protection of building-free zones and the prevention of the conversion of agricultural buildings (ARE, 2024b). This prompted the Federal Council to counter-propose the second revision of the SPA, which focuses on regulating construction outside designated zones. It was approved by the Swiss parliament in 2023 and will soon be implemented.

In 2020, the Landscape Concept Switzerland (*Landschaftskonzept Schweiz*, LKS) was adopted to ensure the cultural quality in landscape development. Furthermore, the Swiss Soil Strategy (*Bodenstrategie Schweiz*) was introduced to limit construction activities and to protect land as a non-renewable resource. In line with the EU Soil Strategy 2030 aiming at ceasing land consumption by 2050 both are legally binding (BAFU, 2024). These recent initiatives highlight the growing urgency of densification and land preservation in Switzerland, marking a shift towards a more concrete implementation of these goals. Today the share of undeveloped building zones in Switzerland as a whole is 10 to 16%, with the largest part being urban areas at 46%, while peri-urban and rural areas have similar ratios at 29% and 25% respectively (ARE, 2022).

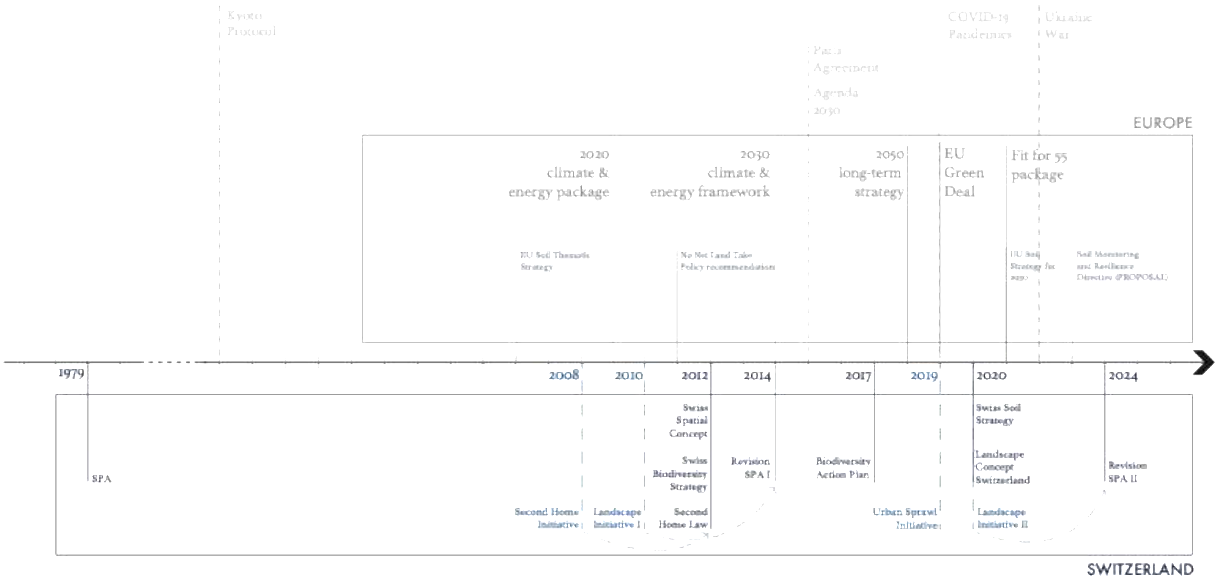

Figure CH4. Timeline of policies, initiatives and strategies affecting densification goals in Switzerland.

6.2 The implementation process

Due to Switzerland's federalist structure the implementation of densification objectives has been rather slow, with meaningful influence on local planning becoming visible only a decade after the introduction of the first revision of the SPA in 2014. In fact, the principle of subsidiarity grants significant authority in spatial planning and thus in the implementation of densification goals to local governments.

While the federal government sets legal frameworks, broad concepts and strategies (*Konzepte und Sachpläne*), such as the SPA and the Spatial Planning Concept, the cantons are required to align their regional structure plans (*Richtpläne*) with these national directives. These plans, typically spanning 20-25 years, focus on land use in urban areas, landscapes, transport, and infrastructure (ARE, 2024c). Cantons must allocate building land based on demographic forecasts, adjust building zones to protect agricultural land, and ensure that any increase or decrease in land value due to new zoning is compensated. Specifically, 20% of the added value from new building rights must be deducted (Art. 5 SPA). Zoning was only possible until all cantonal structure plans had been approved by the federal government, which is why there is an absolute freeze on building zones from 2019.

Municipalities play a key role in guiding and executing local densification efforts through utilization plans (*Nutzungspläne*). These plans often integrate various planning instruments, such as planning zones, which serve as a precursor to relocating and rezoning building land. Densification strategies target a range of sites, including brownfields, greenfields, underutilized building zones, gaps between structures, and urban wastelands in easily accessible locations.

Priority is given to fully utilizing these resources before implementing rezoning measures, which may involve transforming or replacing the existing housing stock (ARE, 2019).

Beyond issuing building permits, municipalities are now tasked with ensuring the realization of dense, high-quality settlements. In many cantons, municipalities must concretize structure plans by developing settlement concepts and establishing minimum density requirements for building zones. These new responsibilities require expertise in development and process management. Utilization plans must strategically address the impacts of densification on living quality, ensuring they are both practical and compelling.

Some municipalities have taken proactive steps to institutionalize densification as a planning objective. For instance, the city of Zurich adopted densification as a legally binding planning goal in 2016 to promote sustainable urban renewal. To this aim, the City Council introduced innovative planning tools, such as designated densification zones (*Verdichtungszonen*), which offer developers economic incentives like density bonuses (Zürich Amt für Städtebau, 2013).

The process of adapting local legislation to the national densification policy is not as advancing in municipalities at the same pace: while large cities have administrative power and political influence, smaller municipalities often lack the resources and expertise to implement federal policies. As a result, in 2024 only 43% of the municipalities completed their structure plan adaptation (UVEK & ARE, 2024). According to the head of EspaceSuisse, no general regional differences in the implementation of SPA I can be identified (Representative of EspaceSuisse, personal communication, March 24, 2025). Whereas larger cities feature complex urban fabrics and limited building land reserves, smaller towns often lack the political backing and strategic housing policies needed to implement densification projects. According to a representative of EspaceSuisse, the severity of the housing crisis in larger cities can be attributed to a slowdown in building activity due to the new conditions under the revised SPA, and by the heated housing markets driven by international investors.

Swiss citizens by and large support the SPA I, but local acceptance of densification projects can be challenging, particularly in existing neighbourhoods due to the NIMBY (Not In My Backyard) effect. For projects to gain public approval, they must demonstrate clear social and ecological benefits that enhance the quality of the affected neighbourhood (UVEK & ARE, 2024). Without such benefits, Swiss voters have the power and are likely to block essential planning tools for densification, such as special land-use plans (*Sondernutzungsplan*).

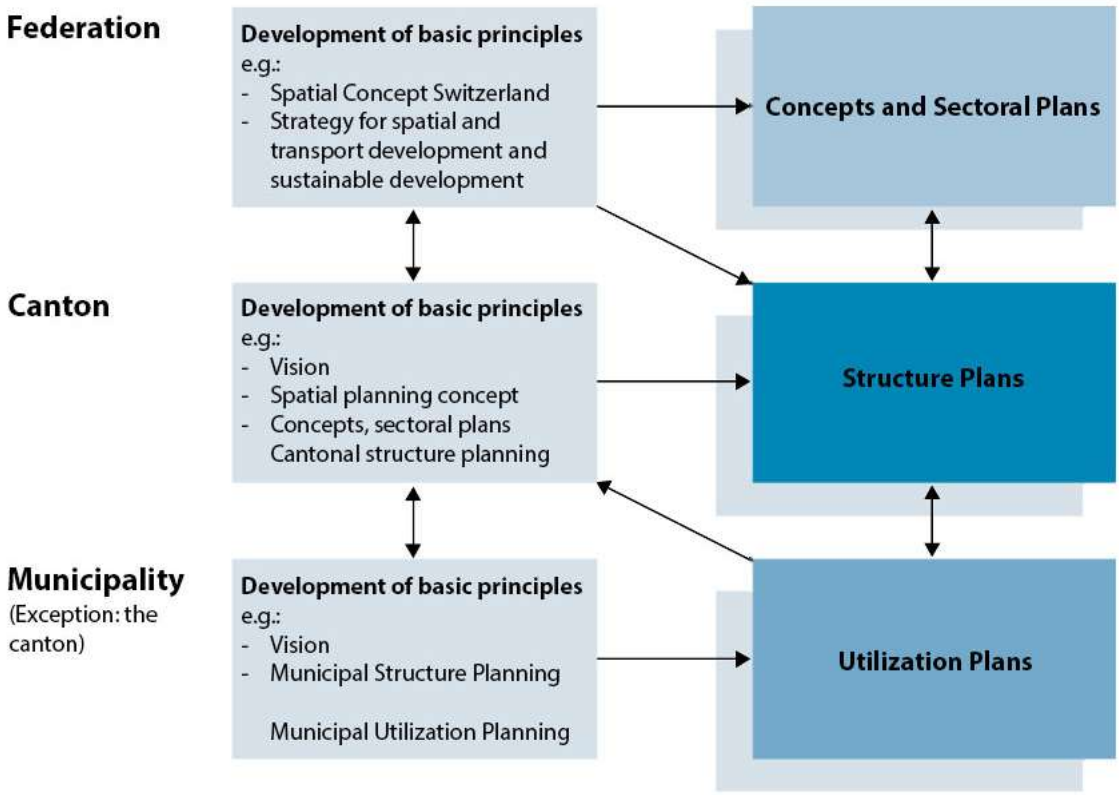

Figure CH6. Spatial planning instruments according to the Federal Law on Spatial Planning (source: SFOSD, 2012; own translation*)*.

Form	Level of governance	Name	Aim	Date of appearance
Law	National	Nature and Cultural Heritage Protection Act (NHG)	Secures the protection and conservation of biodiversity, heritage landscapes, sites of local character, historical sites, natural and cultural monuments.	1966
Inventory	National	Federal Inventory of Heritage Sites of national importance (ISOS)	Inventory of townscapes and settlements with significant cultural value that should be protected (ca. 1250 objects).	1970
Inventory	National	Federal inventory of landscapes and natural monuments (BLN)	Inventory of the most valuable landscapes and natural monuments of Switzerland (162 objects).	1977

Inventory	National	Federal inventory of historic pathways and transport routes (IVS)	Inventory of valuable historic transport routes of Switzerland (3'750 km).	1883
Law	National	Spatial Planning Act (SPA)	Aims to ensure sustainable land use by coordinating urban development, environmental protection, and infrastructure planning. It seeks to balance development needs with the preservation of natural resources and quality of life across the country.	1979
Initiative	National	Second Home Initiative	Aimed at limiting the share of vacation homes per municipality and was accepted by the majority of Swiss voters in 2012 (see below)	2007
Initiative	National	Landscape initiative (*Landschaftsinitiative - Raum für Mensch und Natur)* (withdrawn)	Aimed to introduce densification as a legally binding policy objective. It proposed that building zones should cover no more than the demand for the next 15 years, and that oversized building zones should be reduced or moved to other locations.	2008 - 2013
Strategy	National	Spatial Concept Switzerland	Outlines the country's long-term spatial planning strategy, focusing on balanced regional development, sustainable land use, and the efficient integration of transportation, housing, and environmental conservation.	2012
Law	National	Second Home Law	Bans the construction of new vacation apartments and the use of over 20% of existing apartments per municipality as second homes with the aim of preserving the character of existing settlements and increase their density of use.	2012
Strategy	National	Swiss Biodiversity Strategy	Promotes biodiversity within settlement areas to ensure that they contribute to the networking of habitats, to the preservation of settlement-specific species, and provide	2012

			people opportunities to experience nature in their living environments and local recreational areas.	
Law Revision	National	SPA I (1. revision of the SPA)	Compared to the previous version, the revised law introduced stricter controls on building zones, emphasized the protection of open spaces, and focused on directing urban development to already built-up areas, aiming to ensure more efficient and environmentally conscious land use.	2014
Action Plan	National	Biodiversity Action Plan	Conserve biodiversity by serving as an interface between the Confederation's biodiversity policy and other policy areas, including agriculture, spatial planning, transport, and economic development.	2017
Initiative	National	Initiative against urban sprawl (*Zersiedlungsinitiative)* (rejected)	Launched by the Young Green Party. It demanded a total freeze of the building zones in Switzerland and that new building zones could only be created if an area of at least the same size had been removed as a building zone elsewhere.	2019
Strategy	National	Landscape Concept Switzerland	With the aim of preserving and enhancing diverse landscapes it defines the framework for their coherent and quality-based development. It encompasses 14 landscape quality objectives that provide a framework to support landscape-related stakeholders at the federal, cantonal, and municipal levels with the aim of integrating landscape protection into spatial planning processes, fostering ecological, social, and economic cohesion across the country	2020
Strategy	National	Swiss Land Strategy	In the framework of the 2050 climate net zero goal it aims at ensuring that no more land	2020

			shall be consumed in Switzerland beyond 2050	
Initiative	National	2. Landscape initiative (2. *Landschaftsinitiative)* (withdrawn)	Called for stricter measures to prevent urban sprawl, the protection of landscapes from construction and the prevention of conversion of agricultural buildings	2020
Law Revision	National	SPA II (2. revision of the SPA)	Was developed by the Parliamentary Committee for the Environment, Spatial Planning and Energy (UREK) as a counterproposal to the "Landscape initiative" of 2020 and was unanimously approved by the Parliament in 2023. Its aim is to stabilise the number of buildings and the sealed area outside the building zone.	2023

Table CH7. Policies, initiatives and strategies influencing spatial planning and densification.

6.3 Size and role of the market

The combination of restrictive building zones and low interest rates in Switzerland has sparked a construction boom and driven up land prices, especially in urban areas (BFS, 2021). This trend is primarily fuelled by two factors: a dwindling land supply and increasing demand are causing the housing market to heat up. Additionally, rezoning in certain areas triggered urban renewals and refurbishments of the building stock. Rezoning often entails enhancing accessibility, infrastructure, and the overall quality of neighbourhoods, making these areas more attractive to both residents and businesses. Large-scale rezoning projects, such as those involving entire districts, trigger construction, create jobs, and stimulate local economies. Such economic productivity reinforces densification trends and attracts investors seeking to capitalize on anticipated appreciation, further intensifying demand and development in these urban areas.

For example, the city of Zurich, after years of population decline due to suburbanization, is experiencing a renewed population growth since the late 1990s, partly driven by the influx of highly skilled, high-income migrants, primarily from other European countries (Stadt Zürich, n.d.-a). The redevelopment of former industrial zones entailed large projects that gave a strong boost to the building industry.

Switzerland already has one of Europe's most expensive real estate markets, with Zurich, Geneva, and Basel leading the way. Its robust economy has supported consistent demographic and economic growth. According to a 2023 study by the Federal Office of Housing (BWO, 2023), spatial planning plays a crucial role in shaping housing costs by determining how flexibly the housing supply can respond to shifting demand: Property values

rise most sharply in areas where available building land is scarce. Wüest Partner (2024) further report that the ongoing shortage of rental housing is both caused by rents and transaction prices for owner-occupied properties.

While this increased demand makes urban property highly attractive to investors, it also opens the door to speculation, pushing up land prices and rents. The disparity in rental prices in Zurich, for example, ranges from CHF 15/m² to CHF 55/m² (Lutz et al., 2023). High property values are attracting investors and fuel speculation, which might lead to volatility. According to an expert, investments are primarily driven by the financial sector, as the Swiss property market is regarded as a safe haven for capital (Represenative of SFOSD, personal communication, May 20, 2025). Within the high price segments, public-private partnerships (PPP) are increasingly being adopted to finance large-scale urban redevelopment projects designed to support densification (discussed further below).

From an economic standpoint, Swiss spatial planning in urban areas presents both opportunities and challenges. Rising land values make urban development an attractive target for investments and speculation. These may align with the national densification goals and give a boost to the economy. However, densification often triggers socioeconomic changes, particularly in terms of housing affordability. Although densification may increase the housing supply, it generally entails higher rents due to rising land prices and the renovation of buildings to higher standards. Consequently, market-driven densification often favours higher-income residents, increasing building density without necessarily improving occupancy density. Moreover, higher rents diminish disposable income, reducing purchasing power for many residents.

A similar problem has emerged in tourist areas, where municipalities are experiencing a housing crisis fuelled by the prevalence of second homes and capital investments in underutilized properties. As stated a representative of SFOSD, “There is no shortage of housing in these regions but too little that is affordable for the local population” (Represenative of SFOSD, personal communication, May 20, 2025). Furthermore, rural cantons depending on tourism, such as for example Valais, are not in favour of densification, as could be seen in the popular vote in 2013 (Figure CH5). The focus on growth in cities can lead to opposite developments In rural areas: limited land reserves and a growing rural exodus can leave some remote areas behind by further concentrating development and resources in urban centres (Zufferey, 2020).

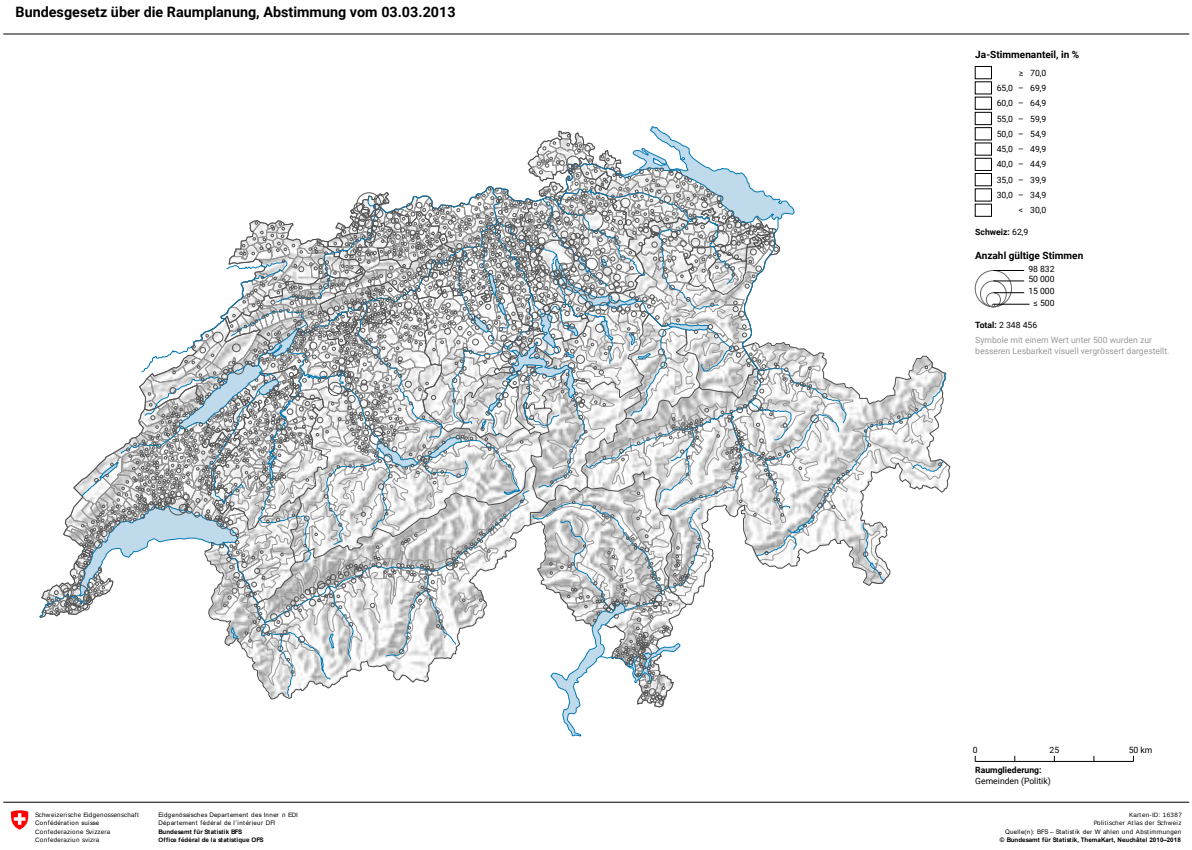

Figure CH5. Distribution of votes on the SPA revision in 2013. Source: BFS – Statistik der Wahlen und Abstimmungen © Bundesamt für Statistik, ThemaKart, Neuchâtel 2010–2020.

6.4 The multilevel governance process

The Swiss Spatial Planning Act (SPA I) aims to coordinate spatial activities across different government levels to promote denser construction. However, implementation varies locally, influenced by cantonal structure plans, planning culture, financial capacity, municipal strategy, and political orientation. Experts view Switzerland's federal structure as a barrier to an effective densification, as regions—despite playing a key role in local spatial development and having the potential to support smaller municipalities—lack formal planning authority (Representative of ETHZ SPUR, personal communication, June 4, 2025).

A report by the SFOSD on factors constraining densification (ARE, 2019) shows that these often result from conflicts between different administrative levels as well as tensions with private individuals. Building codes and land use regulations might hinder the national densification aims, as they regulate distances in between buildings or the usage of strategically important areas (ARE, 2019). Furthermore, regulations of townscape images and landscape heritage can be in conflict with the objectives of the SPA. Besides the legislation of land use planning and cantonal townscape preservation, information and recommendations by the

applicable federal heritage protection inventories[9] have to be considered as well. For each case, a holistic coordination process is required to reach an overarching spatial concept. As a basic planning tool, ISOS is often used to challenge building projects and can constitute a major obstacle to densification. However, it is argued that if applied in line with the SPA it could help to increase public acceptance and the spatial quality of urban developments (ARE, 2016).

Private land hoarding in development zones is common in densifying areas. Accordingly, cantons are required to implement land mobilization measures, by introducing time limits for development. Direct democracy in Switzerland allows citizens to influence legislation, making it crucial to anticipate objections. To mitigate these risks, the SFOSD suggests the adoption of participatory planning processes and an early involvement of all stakeholders as a means to avoid conflicts (ARE, 2019). Municipalities also use tools like special land use plans (*Sondernutzungsplan*) to prevent objections and integrate dense settlements effectively (EspaceSuisse, 2020). Cantons have also introduced instruments to address land ownership issues and achieve densification goals (ARE, 2019).

Regarding horizontal governance, there is broad support for stopping urban sprawl across various political perspectives. The debate over preserving (agricultural) land and natural heritage often engages conservative groups, linking land use to national identity and tourism. Meanwhile, climate-conscious movements advocate densification for social and ecological reasons. Right-wing (*SVP*), liberal (*FDP, GLP*), and conservative (*CVP*) parties tend to be more sceptical of densification, while the Green Party (*Grüne*) and the Social Democrats (*SP*) are generally in favour (M. Gerber et al., 2024).

63% of households in Swiss cities live in apartments owned by the private sector, including firms, banks, insurance companies, and pension funds (Debrunner & Hartmann, 2020). To align private profit motives with public densification goals, municipalities offer incentives like densification bonuses. However, competition in the building market means private actors retain significant power, with public-private partnerships (PPPs) facilitating collaboration between municipalities and investors. Depending on local regulations, these dynamics may lead to high profit margins with significant social costs, as observed in Zurich, or lead to more modest returns and a comparatively stable housing market, as in the case of Geneva (Representative of SFOSD, personal communication, May 20, 2025).

[9] The three inventories Federal Inventory of Landscapes and Natural Monuments (*Bundesinventar der Landschaften und Naturdenkmäler von nationaler Bedeutung, BLN*), Inventory of Swiss Cultural Heritage Sites (*Bundesinventar der schützenswerten Ortsbilder der Schweiz von nationaler Bedeutung, ISOS*), and Inventory of Historic Pathways and Transport Routes (*Bundesinventar der historischen Verkehrswege der Schweiz, IVS*) are part of the NHG and aim at the preservation of cultural and natural monuments in spatial planning.

Sector	Level of governance	Name	Role	Date of appearence
Nation-wide association	National	VLP Espace Suisse	Swiss association for Spatial Planning Works for the federation in questions of spatial planning as educator, consulting	1943
Public	national	Federal Department of the Environment, Transport Energy and Communications, DETEC (*UVEK*)	Responsible for infrastructure and environment, hence spatial planning issues.	1848
public	national	Federal Office for the Environment, FOEN (*BAFU*)	Ensures sustainable use of natural resources such as soil, water, air, tranquillity and forests	1971
public	national	Swiss Federal Office for Spatial Development (*ARE*)	Federal authority responsible for spatial planning, mobility policy and sustainable development.	2000
public	cantonal	Cantonal Offices for Spatial Development	Prepare regional structure plans, allocate and adjust building land and define a land use development strategy in the areas of settlement, landscape, transport and infrastructure for a medium planning interval of 20-25 years.	
public	municipal	Offices for Urban Development	Concretise the structure plan through utilisation plans, targeting areas for certain use and density goals, issuing building permits, integrating the public	
NGO	nationwide association	Swiss Heritage Protection	Independent organisation for the preservation of cultural building heritage	1905
NGO	nationwide association	ProNatura	Independent nature preservation organisation in Switzerland, e.g. protecting nature reserves, launching initiatives	1909
NGO	nationwide association	BirdLife	Independent nature preservation organisation in Switzerland, e.g. protecting	1922

			nature reserves, launching initiatives	
private	nationwide association	Different political parties	Parties are involved in the proposal of initiatives representing public opinions and if accepted changing the law	-
private	different	Private landowners Private investors		-

Table CH8. Actors involved in the policy cycle of densification

6.5 Assessments, achievements and challenges

Urban densification has been a key policy goal in Switzerland since the 2014 revision of the Spatial Planning Act. Yet, despite this legal framework, a study by the Swiss Federal Office for Spatial Development (ARE, 2024a) shows that a significant portion of new housing continues to be built on undeveloped land, particularly in rural and peri-urban areas. However, this trend is gradually shifting, especially in cities and tourist regions. From 2018 to 2022, 59% of new dwellings were built on existing sites, often through redevelopment of already built areas (ARE, 2024a). This shift is reflected in the stable building zones from 2017 to 2022, with demographic growth contributing to a reduction in land consumption per capita—from 309 m² in 2012 to 282 m² in 2022. Today, 95% of the Swiss population lives within building zones, of which 10-16% remains unbuilt and available for future development (ARE, 2022). However, according to a researcher, densification in Switzerland is not contributing to sustainable development at the moment: “De facto, more is being built in the form of more building volume, more concrete in the end.” (Representative of ETHZ SPUR, personal communication, June 4, 2025).

With the second revision of the Swiss Spatial Planning Act, densification became legally mandatory and a key priority of Swiss policies (UVEK, 2024). Platforms like densipedia.ch and EspaceSuisse were established to support its implementation. Harmonizing structural conditions across cantons is also a key focus, which sometimes requires complete overhauls of cantonal building laws. By 2022, all 26 cantonal structure plans were accepted by the Federal Council, with municipalities now tasked with land-use planning and the finalization of building zones. However, so far only 43% of municipalities have adapted their land-use plans to meet cantonal structure requirements (UVEK & ARE, 2024). Urban municipalities are generally ahead of their rural counterparts in adopting SPA I, likely due to greater housing demands, more planning resources, and lower public resistance. Nevertheless, for densification to succeed, municipalities must develop new competences to maintain both urban quality and public support. Limited resources often lead municipalities to rely on external experts, which can slow down knowledge transfer and hinder locally adapted solutions. Particularly in rural areas with a high proportion of residential properties, changes to land use plans - such as the rezoning of land – is often causing strong political resistance (UVEK & ARE, 2024).

One of the central challenges of densification is its impact on housing affordability. Critics have argued that the 2014 SPA revision has contributed to rising housing costs, and in some urban areas to gentrification and displacement (Debrunner, 2024). Indeed, between 2000 and 2021, the price of single-family houses increased by 80%, while rents rose by 30%. The mechanisms of Swiss spatial planning, according to an employee of the SFOSD, allow the market to react immediately, depending on the capacity of local regulation to stabilize: “Ultimately, it is always a question of who benefits from regulation and who from non-regulation” (Represenative of SFOSD, personal communication, May 20, 2025). Land rezoning plays a crucial role in facilitating or restricting development and thus the possibility to adapt to the housing shortage. However, densification only alleviates the housing shortage in places where occupancy rates are already exhausted. In general, therefore, the impact of densification depends on the context (BWO, 2023).

Public acceptance remains a crucial factor in the success of densification, as pointed out by multiple studies (J.-D. Gerber & Debrunner, 2022; Herdt & Jonkman, 2023; Sudau & Grêt-Regamey, 2024; Wicki et al., 2022). A media analysis from 2010 to 2019 on gentrification found that public opinion is pivotal to the success of densification projects. While support for densification at the national level has grown to 57.5%, local support remains much lower, at just 11.9% (Wicki et al., 2022). Emotional responses tied to concerns over place identity and personal autonomy often cause resistance, especially in communities close to proposed densification projects (Herdt & Jonkman, 2023). Despite general agreement on the need for more housing, NIMBYism often obstructs local efforts. Researchers suggest that Switzerland’s direct democratic tools, if used for site-specific solutions and public participation, could improve the quality and equity of densification (Herdt & Jonkman, 2023). Collaborative efforts between the public and the private sector are seen as essential for achieving socially sustainable densification (Perić et al., 2023).

Critics have also pointed out that private actors, particularly corporate property owners, are the main beneficiaries of densification, often prioritizing financial gains over social justice (Debrunner, 2024). Large-scale projects are typically driven by private entities such as banks, insurance companies, and pension funds. Switzerland’s strong property protection laws, which favour property owners, further contribute to rising property values and an imbalance of decision-making power, leaving tenants at a disadvantage (Debrunner, Jonkman, et al., 2024; J.-D. Gerber et al., 2017). This unequal distribution of the benefits of densification has led to growing public resentment. Comparative studies suggest that granting municipalities greater authority to intervene in property rights could lead to more equitable and effective densification outcomes (Götze & Jehling, 2023). A representative of SFOSD criticized the insufficient consideration of the connection between spatial development and real estate market: “I believe the purpose of (spatial) regulation should be (…) to ensure excessive profit opportunities are not offered at the expense of communities or individuals” (Represenative of SFOSD, personal communication, May 20, 2025).

Different densification strategies—such as brownfield developments, transit-oriented developments (TODs), and rezoning—have varied effects on local demographics. For example, it was found that in Zurich, densification efforts have largely been driven by new construction (being 6.5 times more common than refurbishments), leading to the displacement of lower-income residents (Kaufmann et al., 2023). Lutz et al. (2024) also noted that while

TODs increase population density, they tend to displace low-income households near transportation hubs, exacerbating inequality and contributing to gentrification. Similarly, Verheji et al. (2023) explored the challenges of ensuring public access to green spaces in privately managed densification projects.

Currently, no policies specifically address the social impacts of densification: most strategies focus on spatial issues, while socio-economic consequences like displacement and unequal housing conditions are largely overlooked. An expert highlights the construction-oriented focus of current legislation, noting: “If we want to make consistent contributions towards sustainability with the SPA, we must promote use density and mixed uses.” (Represenative of SFOSD, personal communication, May 20, 2025). Most densification projects are driven by private developers who view housing primarily as an investment, rather than a social good (Perić et al., 2023).

Policy / Programme	Measured impacts on housing inequalities	Potential impacts on housing inequalities
SPA I	Displacement of vulnerable groups: In zones with scarcity of buildable land, densification often replaces older, affordable housing with new developments. (Debrunner, 2024) In TOD (transit oriented developments), displacement of lower-income residents has been proved (Lutz et al., 2024)	**Rising Costs**: Reduced building zones and land speculation drive up land prices and urban rents. **Ignored Tenant Needs**: Federal policies prioritize inner development and investor interests over tenant protections. **Uneven Capacity**: Small and large municipalities share densification responsibilities but differ in capacity, leading to slower housing delivery and reduced quality.
Second Home Initiative		Rising housing prices, disappearance of affordable housing for local population in tourist areas

Table CH9. Summary table of measured and potential impacts of densification policies on housing inequalities.

7 Summary and discussion of results

7.1 Summary of changes in EEPs

Also in Switzerland, international policies such as the Kyoto Protocol and Paris Agreement triggered ambitious national climate goals in the early 2000s. With national support, several local governments—especially larger cities—enhanced these goals by launching their own complementary programmes.

As mentioned in Chapter 1, over the last two decades, Switzerland has seen a continuous evolution of environmental and energy policies. Popular initiatives and social movements have played an important role in shaping EEPs, with public opinion capable of both accelerating and impeding political momentum. Although most initiatives aimed at more progressive regulation or stronger climate protection were rejected, they sparked lively public debates and sometimes prompted revisions to legislation.

The Swiss political system not only influences how decisions are made but also leads to considerable variation in regulations across the country. *The subsidiarity principle gives equal responsibility to all municipalities, regardless of capacity, leading to uneven implementation.* Depending on available financial and professional resources, national policies are therefore not implemented uniformly across all municipalities. *Direct democracy can lead to diluted measures in order to gain majority support.* This can lead to approaches deviating from their original objectives or being redirected to serve different agendas. For example, the relatively weak tenant protection law triggers **renovictions as they** enable landlords to carry out extensive renovations and subsequently charge higher rents.

Lobbies are an important part of political decision-making in Switzerland. For EEPs **the conservative farmers' lobby and the liberal building sector have exerted considerable influence, while the homeowners' association (*Hauseigentümerverband* HEV) plays a key role in shaping housing policies, in particular the tenancy law**. Several representatives from federal organisations agreed that parliamentary decision-making is largely driven by market interests rather than environmental concerns. The real estate sector is fuelling density goals, primarily aiming for higher building density. *The building sector defends the Buildings Programme and promotes densification developments*. Thus, while both energy refurbishments and densification are supported by influential lobbies, NBS lack political support, as the market shows little interest in non-profitable measures provided by nature. Furthermore, the farmer's lobby opposes federal subsidies, as it has no interest in more regulations for agriculture. All experts we in on NBS we could interview explained that biodiversity objectives are of secondary importance to parliament, meaning that funds are preferably channelled into energy savings and decarbonisation. Market interests partly explain the political focus on measurable change and technical responses in the climate debate. Regarding an international real estate market, climate adaptation measures are becoming increasingly important to obtain sustainability certifications that enhance property value.

Switzerland’s national policies reflect a strong political focus on energy efficiency, driven by climate goals and energy strategies. The Buildings Programme, with a total budget of CHF 528 million in 2023, has significantly expanded over the past decade making an important contribution to energy savings. National support to energy refurbishments further incentivised cantons to pursue active energy policies and required municipalities to establish structure plans and schemes. However, as stated by the representatives of different federal organisations, there have been considerable budget reductions in all departments. The political orientation of department heads, this can lead to a reduction in funding (Representative of SFOE, personal communication, May 8, 2025).

The term *nature-based solutions* (NBS) has only recently entered public discourse in Switzerland and still lacks a dedicated federal funding scheme—likely due to limited market

interest. To date, municipalities have remained the central actors in regulating, implementing, and promoting NBS, meaning that their success depends entirely on local political will and available resources.

With the enactment of the SPA I revision, densification became a legally binding and central planning objective nationwide. In combination with increased land and real estate speculation, the reduction of designated building zones has been identified as a contributing factor to rising housing costs. **As the implementation of the SPA at the local level has hardly started, these challenges are expected to intensify.**

7.2 Relations and trade-offs between EEPs and housing policies

Both energy retrofitting and densification have entered Swiss legislation in the early 2000s and have led to significant impacts on social sustainability overall and the housing sector specifically. **However, NBS are only now beginning to be considered in relation to housing affordability—and so far, only in large-scale greening projects. By outlining the general challenges and effects of EEPs on housing affordability, their broader social impacts become evident.**

The subsidy structure for energy retrofitting in Switzerland (Buildings Programme) is being criticised due to a significant deadweight effect—nearly half of the funds go to projects that would have occurred anyway. Wealthier households disproportionately benefit from these subsidies, raising concerns about social equity. The programme lacks social criteria, focusing solely on technical aspects, which may unintentionally exacerbate inequalities.

Energy retrofitting often leads to rent increases, as landlords can pass on 50–70% of renovation costs to tenants, minus subsidies. This has contributed to a rise in rents and renovictions, especially in urban areas, displacing lower-income tenants and accelerating gentrification. In Zurich, for example, 30% of renovations involved tenant displacement, with new tenants earning significantly more than those replaced. Proposed reforms to align energy and housing policy - such as tying subsidies to tenant protections - have not been implemented at the national level due to concerns over cost, enforceability, and property rights. If well-regulated, retrofitting could mitigate energy poverty, but current retrofitting policies and incentives risk worsening housing affordability for vulnerable populations.

To date, NBS in Switzerland face limited national support, as federal priorities lean towards climate adaptation over biodiversity. Implementation is largely left to cantonal and local levels, where smaller municipalities often lack the capacity to manage complex NBS projects. As a result, progress is uneven and highly localized. The unequal distribution of greening subsidies - favouring homeowners over tenants - remains largely unexamined. There is little public or academic debate on how NBS affect housing costs or who benefits from green space investments. While green interventions in public areas may raise property values, the delay in effect makes it hard to measure their impact on rents. Swiss tenancy law does not clearly define whether NBS qualify as value-enhancing improvements that could justify rent increases.

Following the second revision of the SPA in 2014, when densification became legally binding, reducing land consumption has become a central goal of Swiss spatial planning policy. Due to the Swiss federal structure, the state of implementation varies widely between municipalities. Critics argue that densification primarily benefits private investors, such as banks and pension funds, while tenancy needs are bypassed. Switzerland's strong property rights further reinforce this imbalance, limiting tenant influence and fuelling public discontent. While direct democratic tools could enhance participation and equity, they are not yet systematically used in densification processes.

Multiple studies found that densification leads to rising housing costs, gentrification, and displacement, particularly in urban areas. The effects of densification on the local context, by factors such as vacancy rates and municipal governments' regulatory capacity. Land rezoning plays a key role in shaping development potential, but its benefits are unevenly distributed. **Currently, national policies prioritize hard densification, often at the expense of ecological and social considerations that could be addressed through more inclusive soft densification strategies.**

The combination of EEPs – **as for example densification targets and the promotion of energy retrofitting** – appears to generate severe social impacts that are require a strong political will to be mitigated. As was mentioned, they trigger large scale demolitions of older but affordable housing. The **Swiss tenancy law limits the right to increase rents following minor upgrades and within ongoing rental contracts, indirectly promoting more extensive renovations or full the full replacement of older buildings, which allow tenant evictions** Such demolitions are not only problematic from a social perspective; as highlighted by some scholars, **current energy policies do not consider the ecological impact of demolition** (Representative of ETHZ SPUR, personal communication, June 4, 2025)..

The growing number of popular initiatives addressing regulations of housing and affordability underscores the increasing tensions between EEPs and social sustainability. Switzerland's complex administrative and political structure leads to significant variation in regulatory approaches across cantons. **Moreover, strong lobbying interests often shape political decisions, frequently sidelining social concerns. Yet, these concerns must be meaningfully integrated into both the development of EEPs and housing policy.**

8 Glossary

Abbreviation (ENG / GER)	German	English
SFOE / BFE	Bundesamt für Energie	Federal Office of Energy
SFOSD / ARE	Bundesamt für Raumentwicklung	Swiss Federal Office for Spatial Development
FSO / BFS	Bundesamt für Statistik	Federal Statistical Office
FOEN / BAFU	Bundesamt für Umwelt	Federal Office for the Environment
FOH / BWO	Bundesamt für Wohnungswesen	Federal Office for Housing
NHG	Bundesgesetz über den Natur- und Heimatschutz	Federal Act on the Protection of Nature and Cultural Heritage Protection
IVS	Bundesinventar der historischen Verkehrswege der Schweiz	Inventory of Historic Pathways and Transport Routes
BLN	Bundesinventar der Landschaften und Naturdenkmäler von nationaler Bedeutung	Federal Inventory of Landscapes and Natural Monuments
ISOS	Bundesinventar der schützenswerten Ortsbilder der Schweiz von nationaler Bedeutung	Inventory of Swiss Cultural Heritage Sites
BDP	Bürgerlich-Demokratische Partei	Conservative Democratic Party
CVP	Christlichdemokratische Volkspartei	Christian Democratic People's Party
	CO2-Gesetz	CO2 Act
	Die Mitte	Centre
EAER / WBF	Eidgenössische Departement für Wirtschaft, Bildung und Forschung	Federal Department of Economic Affairs, Education and Research
DETEC / UVEK	Eidgenössisches Departement frü Umwelt, Verkehr, Energie und Kommunikation	Federal Department of the Environment, Transport, Energy and Communication
EKZ	Elektrizitätswerke des Kantons Zürich	Electricity Provider of the Canton of Zurich
	Energie 2000	Energy 2000
	Energieartikel	Energy Article
	Energiefranken	Energy Franc
	Energiegesetz	Energy Act
	Energieperspektiven 2050	Energy Perspectives 2050

	Energieperspektiven 2050+	Energy Perspectives 2050+
	EnergieSchweiz	SwissEnergy
	Energiestrategie 2050	Energy Strategy 2050
	Energieverordnung	Energy Ordinance
FDP	FDP.Die Liberalen	The Liberals
	Gebäudeprogramm	Buildings Programme
	Gewässerschutzgesetz	Water Protection Act
	Grüne Schweiz	Green Party
GLP	Grünliberale Partei	The Green Liberal Party
	Grünstadt Schweiz	Green City Switzerland
HFM	Harmonisiertes Fördermodell der Kantone	Harmonised Promotion Model of the Cantons
	Junge Grüne Schweiz	Young Green Party
KIV	Klimaschutzverordnung	Climate Protection Ordinance
	Klimastrategie Kanton Thurgau	Climate Strategy of the Canton of Thurgau
EnDK	Konferenz der Kantonalen Energiedirektoren	Conference of the Cantonal Energy Directors
	Langfristige Klimastrategie 2050	Long-Term Climate Strategy 2050
MuKEn	Mustervorschriften der Kantone im Energiebereich	Model Regulations of the Cantons in the Energy Sector
	Nutzungsplan	Utilization Plan
SPA / RPG	Raumplanungsgesetz	Spatial Planning Act
	Richtplan	Structure Plan
	Sachpläne und Konzepte	Concepts and Strategies
	Schweizer Bauernverband	Swiss Farmers' Union
SVP	Schweizerische Volkspartei	Swiss People's Party
SFV	Schweizerischer Fischerei-Verband	Swiss Fishing Federation
	Sondernutzungsplan	Special Land Use Plan
SP	Sozialdemokratische Partei	Social Democratic Party
	Stimulus Programme	Stimulus Programme

	Strategie Anpassung an den Klimawandel	Climate Change Adaptation Strategy
	Strategie Biodiversität Schweiz	Swiss Biodiversity Strategy
	Umwelt Schweiz 2022	Swiss Environmental Report 2022
VSSG	Verband Schweizerischer Stadtgärtnereien und Gartenbauämter	Association of Swiss Departments for Green Spaces
ZWG	Zweitwohnungsgesetz	Second Home Law

Table NO 11. Glossary of Swiss names and acronyms

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10 Annex

Institution	Focus	Name	Place and date	Duration
SFOSD	Densification	Matthias Howald	20.05.2025, online	81 min
SFOE	Energy retrofitting and Buildings Programme	Andrea Streit	08.05.2025, Zurich	85 min
FOH	Housing policy and debate	Martin Tschirren	10.07.2025, online	74 min
EspaceSuisse	Densification	Damian Jerjen	24.03.2025, online	60 min
EnDK	Energy retrofitting, multilevel governance	Olivier Brenner	08.05.2025, online	55 min
ETHZ SPUR	Densification	Gabriela Debrunner	04.06.2025, online	60 min
FOEN	Nature-based solutions	Claudia Moll	17.04.2025, Zurich	62 min
Grünstadt Schweiz	Nature-based solutions, densification	Antonio Diblasi	15.04.2025, online	45 min
Lemon Consult	Energy retrofitting, labels	Mark Frey	07.05.2025, Zurich	45 min

Table CH12. List of Interviews.

PolicyLab	How can ecological sustainability and access to affordable housing be combined?
Date	03.04.2025
Location	Bahnhofplatz 2, 9001 St.Gallen, “Historischer Saal” (in person event)
Number and types of participants	28 participants representing the following organisations: - Federal Office of Housing - Federal Office of Energy - Federal Office of Spatial Planning - Cantonal Office for Spatial Development Zurich - Cantonal Office for Spatial Development Thurgau - Cantonal Office for Housing Subsidy (SG, TG, AI) - Building Directorate St.Gallen - Office for Environment and Energy St.Gallen - Office for Urban Planning St.Gallen - Office for Urban green areas St.Gallen

	- Office for Urban green areas Amriswil - Tenants' Association Zurich - Swiss Homeowners Associations - Association of Housing cooperatives Switzerland - Association of Housing cooperatives Zurich - Association of Housing cooperatives Eastern Switzerland - Housing cooperative ABZ - Housing cooperative St.Gallen - Axa Winterthur (private developer) - Intep (Sustainability consulting and applied research) - Wincasa (private developer) - Pensimo (private developer) - ETH SPUR (Institute for Spatial Planning and Urban Politics) - Fachhochschule OST (Institute for Social Work and Space) - ZHAW (Institute for Social Work) - EAWAG (Swiss Federal institute of Aquatic Science & Technology)

Table CH13. Details PolicyLab.

NATIONAL REPORT ON THE REGULATORY SYSTEM OF EEPs – THE UNITED KINGDOM

1 Executive summary

This report details the legislative and governance frameworks for retrofitting, Nature-based solutions (NBS), and densification in the UK. The key message is that the UK central government uses legislative and public funding mechanisms primarily to catalyse and enable market delivery of its retrofit, NBS and densification strategies. This centres on the belief that markets can and should deliver where public needs are identified, if government can set the right context for markets to flourish. But where private markets are relied on to provide the capital required for service delivery, these will also need to be commercially viable, with trade-offs for equity and public benefit.

Chapter 4 outlines the legislative and governance frameworks for retrofitting. The main challenge here is that domestic energy improvements are not being rolled out at the pace required to meet the UK's climate obligations. It seems likely that this is because the UK government has prioritised small scale demand-side incentives intended to catalyse productivity in the supply-side. However, the retrofitting sector is likely to require significant levels of public investment to become a fully functional industry. One impact is that while government focusses on small scale demand-side schemes, the cost of retrofit installation remains extremely high. Meanwhile, funding schemes reproduce underlying housing inequalities: houses with disrepair, damp or mould are excluded, narrow eligibility excludes other households in need, and market-led schemes prioritise cost-efficiency over quality.

Chapter 5 outlines the legislative and governance frameworks for NBS. Biodiversity requirements for all development and regeneration became effective from 2024, meaning that both small and major new development must ensure a minimum of 10% biodiversity net gain, ideally on site, in order to secure planning permission. Delivery of NBS through housing development means NBS are likely to be delivered in line with the private sector values of the UK real estate sector, viewing nature as asset for the enhancement of real estate value. Additional costs may also lead developers to question viability and reduce affordable housing delivery. At the same time, local authorities are required to develop Local Nature Recovery Strategies, to set the framework for developers to make their proposals for NBS delivery. Local authorities must negotiate with the private sector over the specific nature of NBS provision, in conditions of reduced capacity. This may lead to developers pursuing a limited range of NBS and further inequalities being entrenched due to the uneven capacities of local authorities.

Chapter 6 outlines the legislative and governance frameworks for densification. On the face of it, housing densification in the UK can be considered part of the central government's low-carbon strategy. However, looking at the history of densification in the UK shows it has deeper

roots, and emerged very separately to the green agenda. Within the mechanisms for housing delivery that have been established as part of the UK housing (and planing) system, regeneration and densification are processes through which housing provision – and the land underlying housing provision – have become privatised and re-commodified. Provision of social housing on these sites relies on cross-subsidy from private tenure owner occupied or rental homes, which has been found to result in a net decline in social homes. This form of urban development can radically increase housing inequalities in the affected areas.

2 Introduction and Methodology

This report details the legislative and governance frameworks for retrofitting, NBS and densification in the UK. As noted above, the UK is made up of four countries: England, Scotland, Wales and Northern Ireland, with some competencies of the UK government applying only to England. While the administrative and legislative frameworks for green initiatives like retrofitting, NBS and densification are complex and often involve overlap between the UK government and the devolved administrations, these are broadly areas in which UK national strategy applies to the English territory. Each of the devolved administrations have separate frameworks and institutions for these initiatives, and an analysis of each one would require that four separate national frameworks were detailed in turn. Since the local case studies for this project are located in England, we have focussed on the English case. Nevertheless the 'West Lothian Question' (detailed above) means the governance frameworks for England are often determined by the UK central government. Therefore when unpacking governance mechanisms at the national-scale, we usually refer to UK level policy frameworks. Desk-based policy analysis at this level was conducted through analysis of central government strategy, legislative and consultation documents, sourced from the websites of central government departments such as the Department for Energy Security and Net-Zero, the Department for Environment, Food and Rural Affairs, and the Ministry of Housing, Communities and Local Government.

A few governance competencies are completely devolved to England, for example Homes England is 'the housing and regeneration agency' for England, and provides the finance for social and affordable housing in England. (In the devolved administrations this role is occupied by the Scottish Housing Regulator, the Northern Ireland Housing Executive, and the Welsh Government). In cases like this, we refer to English level policy frameworks throughout this report.

All areas in England are provided local services by at least (usually) one local authority. Regional authorities are not common throughout the UK, but the GLA is a significant example of this tier of government, setting out the spatial development strategy for London and providing additional support to the Greater London Boroughs. Desk-based policy analysis at this local and regional level was conducted through analysis of local authority and GLA strategy, legislative and consultation documents, sourced from the websites of various local authorities and the GLA. This policy analysis was supplemented by 5 interviews (see Table 1 below) and a 'Policy Lab' workshop, with attendees from national, regional and local government as well as housing providers, development companies and NGOs. The purpose of these workshops was to present our hypotheses about the impacts of retrofit, NBS and

densification implementation in England on housing affordability and access, and to seek on-the-ground expertise about how these initiatives work in practice.

Institution type	Role	Date of interview
Local authority arms length management organisation	Sustainability Associate	28/5/2025
Local authority climate team	Climate Action Officer	28/5/2025
Housing association	Senior Repairs & Maintenance Surveyor (responsible for affordable housing retrofit programme)	18/06/2025
Housing association	Project Director for new housing development	8/7/2025
Local authority planning team	Development Management Planning Officer	16/07/2025

Table UK1. Competences of ecological transitions and housing policies as organized at different governance levels

The report also draws on academic and grey literature, particularly for a deeper understanding of how the markets for retrofitting, NBS and densification work in the UK, and for assessing their constraints and likely impacts for housing inequalities. One limitation of the review of this literature is that it has been non-systematic; relying largely on the authors' professional judgement for selection of studies and reports, rather than defining a methodology for the selection of literature. The limitations of this approach were mitigated by the authors by consulting key academic informants prior to review (one leading academic working in each of the three areas of retrofitting, NBS and densification) to guide the review process and ensure a broad range of literature has been consulted.

3 General Governance System

The UK Office For National Statistics (ONS) have estimated the UK population at mid-year 2023 to be 68,265,200. This can be divided into the population of England (57,690,30), Scotland (5,490,100), Wales (3,164,400) and Northern Ireland (1,920,400).

The United Kingdom (UK) is made up of four countries: England, Scotland, Wales and Northern Ireland (NI). The UK has its own legislature (UK Parliament) and executive (UK Government). The 'devolved administrations' (Scotland, Wales and NI) also have their own legislatures (Scottish Parliament, National Assembly for Wales, and National Ireland Assembly), and their own executives (Scottish Government, Welsh Government, and Northern Ireland Executive).

There is no separate legislature or executive for England. This creates a political issue around what gets called the West Lothian Question or the English Question, concerning whether members of Parliament (MPs) from the devolved administrations (who sit in the UK Parliament) should be able to vote on matters that affect only England, while these same matters are reserved for the devolved administrations to vote on separately, without being impacted by

votes from MP's representing other parts of the UK. Devolution also means that there can be different political parties in power in each of the four countries of the UK. These different parties are then able to set a different political agenda for that administration, supported by the Civil Service (which supports the Scottish Government, the Welsh Government and the UK Government; the Northern Ireland Executive is supported by a separate Northern Ireland Civil Service).

This governance architecture means that the administrative and legislative frameworks for specific policy areas can be quite complex, with not only multi-level governance to consider (central, regional and local tiers of government and the governance ecosystems surrounding them) but also separate-yet-overlapping central administrations with distinct political landscapes. When it comes to analysing specific policy spheres at the national level, it is worth bearing in mind that the powers of UK legislation do not always apply equally to all four countries within the UK, particularly in policy areas which are devolved to Scotland, Wales or NI. Some areas of the UK government's work apply largely to England, meaning for example that some statistics produced by the UK government are for England only.

The following powers are devolved to the devolved administrations: local government (including planning); agriculture, forestry and fisheries; transport; health and social care; education and training; justice and policing; sports and the arts, some taxation, and some social security elements. The following powers are reserved to the UK administration: defence; foreign affairs; immigration; trade policy; constitution; and most aspects of broadcasting. Energy policy is not a devolved power, but the devolved administrations can have a significant impact on those aspects of energy policy that are manifested through the built environment, due to devolved planning powers.

Sub-national government in the UK is divided into three levels: civil parishes, local authorities and regional authorities. Not all areas have all three levels of government. Civil parishes exist mostly in rural areas, with locally elected parish councils being responsible for the maintenance of public spaces and facilities.

At least one local authority provides local services to all areas in the UK: these are either single-tier areas, where one single borough council or unitary authority provides services relating to planning and housing as well as education, transport, and waste management; or two-tier areas where local authority services are divided between a district council and a county council.

Regional authorities are not common throughout the UK, but are used to provide additional services to some larger areas, for example the Greater London Authority (GLA) which is supported by the Mayoral Assembly, and which creates and maintains London-wide strategies such as the London Plan. Other areas (such as Greater Manchester) have created combined authorities which do not replace the local authorities in question but which have additional powers, including the ability to receive separate funding and to directly elect a combined authority mayor, for joint strategic functions.

	Housing	Housing retrofitting	NBS	Densification
National level	Sets national policies and laws for the entire country (Department for Housing, Communities and Local Government, DHCLG). E.g. setting affordable rent levels.	Sets national policies and laws for the entire country (Department for Energy Security and Net-Zero, DESNZ) E.g. setting minimum EPC standards.	Sets national policies and laws for the entire country (Department for Environment, Food and Rural Affairs, DEFRA) E.g. Biodiversity Net-Gain legislation.	Sets national policies and laws for the entire country (Department for Housing, Communities and Local Government, DHCLG) E.g. creation of the National Planning Policy Framework (NPPF), and Estate Regeneration National Strategy.
Regional authorities	Provide some additional services and funds within some larger areas (e.g. Greater Manchester and Greater London Authority (GLA)), often implemented through the local authorities in these areas.	The GLA provides some additional services and funds to help local authorities in London make the best use of nationally available funds.	Provide some additional services and guidance (e.g. GLA: Urban Greening for Biodiversity Net Gain: A Design Guide).	Providing funds for non-profit sector to purchase land for densification. In the case of London, creation of the London Plan, setting strategic planning priorities for London, e.g. Opportunity Areas.
Local authorities	Responsible for providing public housing services. Including (but not limited to): planning for housing development, negotiation of planning gain for public housing delivery through Section 106 agreements with private developers, maintaining housing registers for public housing allocation.	Responsible for providing public services. Including (but not limited to): coordinating retrofit of all local authority owned housing, application to centrally coordinated funds for public housing retrofit.	Responsible for providing public services. Including (but not limited to): drafting local strategies including Green and Blue Infrastructure Strategies or Local Nature Recovery Strategies, for the coordination of NBS delivery by private developers in the borough.	Responsible for providing public services. Including (but not limited to): planning for housing developement, working in partnership with private and non-profit sector fort he delivery of housing.

Table UK2. Competences of ecological transitions and housing policies as organized at different governance levels

4 Housing retrofitting

4.1 The policy cycle: emergence of the issue and policy decisions

Emergence of the issue in national policymaking

The main driver of retrofitting policy in the UK is the legally binding climate obligations made by the UK as part of the Paris Agreement and subsequent commitments. The UK's Nationally Determined Contribution (NDC) towards these efforts is a commitment to reducing greenhouse gas emmissions by at least 68% by 2030 (compared with 1990 levels), and to reach net zero by 2050.

Of the nearly 28 million residential dwellings in the UK, over 65% were constructed before the 1970s (Camarasa et al 2018). The construction of new dwellings has declined steadily since then, meaning that the building stock in the UK is some of the oldest, and least energy efficient, in Europe. Within the UK, homes account for the second largest sector (after transport) in terms of energy use (18% of carbon emissions), requiring significant retrofit measures. The UK Climate Change Committee (UK CCC) has stated that in order to achieve the UK's climate obligations, the rate of residential retrofits must increase to 500,000 each year by 2025, and to one million per year by 2030 (Paillet 2024).

However, the UK is significantly 'off track' with regard to retrofit, according to the UK CCC, who in their recent Progress Report to Parliament (UK CCC 2024) stated that energy efficiency measure installations in homes „are moving in the wrong direction compared to the scale-up that is required. They fell in 2023 and were already significantly off track in 2022".

1995: Home Energy Conservation Act (HECA)

Local authorities were required to produce a strategy for the improvement of residential energy efficiency in their area by 30% in the next 10-15 years, including consideration of the private as well as public housing stock in their areas (Preece et al 2023).

2008: Climate Change Act

The UK's 2008 Climate Change Act set out domestic targets for carbon emissions reduction, standing separately to EU law on carbon emmissions. The Act set targets to reduce emissions to 35% below 1990 levels across all sectors by 2020, and 80% below 1990 levels by 2050. As part of the act, the independent UK CCC was established, to set the UK's carbon emissions reductions budgets (five year targets) and to design the strategies that would allow these budgets to be met. The UK CCC also makes an evaluation of all national policies in the UK to assess whether these are aligned with current budgets and to suggest amendments. As part of this role, the UK CCC maintains a position on retrofit activity within the UK, for example stating that residential retrofits would need to increase to a rate of 500,000 per year by 2025, and one million per year by 2030, to meet the UK's net zero target (RICS 2024).

2010: Retrofitting emerges as a policy priority, with announcement of the 2012 Green Deal

In September 2010, the government made a statement in advance of launching its 'Green Deal', which would 'radically overhaul the energy efficiency of homes and small businesses'. This included the suggestion that retrofitting measures could catalyse £7 billion of Green Deal private sector investment per year and create up to a quarter of a million jobs by 2030 (DECC 2010 A).

In December 2010 the Department for Energy and Climate Change published a summary of the government's proposals (DECC 2010 B) to allow landlords, tenants and homeowners to pay for retrofit measures (listed in total) through savings in their energy bills.

2011: Energy Act

This Act set out the legislation that underpinned the Green Deal, one of several publicly funded schemes providing funding for the retrofit of the UK's hosuing, outlined in the section on implementation below. The legislation also required all landlords to make energy efficiency improvements to their properties as requested by their tenants by 2016, and to improve the least efficient properties to a minimum of energy efficiency rating of E before rental, by 2018 (Camarasa et al 2018).

2012: Energy Efficiency Strategy: The Energy Efficiency Opportunity in the UK

In 2012, the UK Government launched its Energy Efficiency Strategy (updated in 2013). It frames energy efficiency measures as a driver of economic growth. This document provides the strategic context for the Green Deal and the Energy Company Obligation (ECO) scheme, both outlined below.

2017: UK CCC Report to Parliament

In 2017, the UK CCC outlined the extent of retrofits required for the UK to meet its energy efficiency targets, in a report to parliament (UK CCC 2017): all (practicable) lofts (8.4 million) would need to be insulated by 2022; all (practicable) cavity walls (6.2 million) would need to be insulated by 2030; 2 million solid walls would need to be insulated by 2030; 2.5 million heat pumps would need to be installed by 2030, and around 3 million homes would need to be connected to low-carbon heat networks (UK CCC 2017)

2017: The UK's Clean Growth Strategy

This strategy set out energy and carbon emission reduction policies. Key policies and proposals for improving the energy efficiency of homes included retrofitting as many homes as possible across the UK to have an Energy Performance Certificate (EPC) band C by 2035 (Camarasa et al 2018) using, for example, investment to support the Energy Company Obligation (ECO) Scheme.

2021: UK Net Zero Strategy: Build Back Greener

The 2021 'Long-Term Low-Emission Development Strategy' outlines the governments proposals for supporting retrofit in the private rented sector, owner occupied homes, and social rented housing (HM Government 2021), including strengthening Minimum Energy Efficiency Standards to EPC band C by 2028 in the PRS, and providing £800 million additional funding

to the Social Housing Decarbonisation Fund (SHDF) over 2022/23 to 2024/25. The setting of minimum EPC standards in effect legislates for compulsory retrofitting of homes to reach the required energy performance standards.

2024: UK CCC Progress Report to Parliament

In its 2024 Progress Report to Parliament, the UK CCC (2024) identified the UK as being significantly off track, in relation to other European countries, in terms of annual heat pump installations in homes (which would require , a considerable scale-up' to meet targets), and in terms of other energy efficiency measure installations in homes, which „are moving in the wrong direction compared to the scale-up that is required. They fell in 2023 and were already significantly off track in 2022".

2025: New Labour government's Warm Homes Plan

The concrete measures to be implemented by the new government are not certain, although the Labour government's 2024 election manifesto September 2024 Warm Homes Plan press release indicated that the government would look into

The Warm homes plan strengthens existing Minimum Energy Efficiency Standards from EPC band E to EPC band C in the private rented and social rented sector, This will apply to new tenancies by 2028, and all tenancies by 2030. This places the responsibility on landlords, including private landlords, corporate landlords, local authorities and other social housing providers to retrofit all rental properties. The strategy also replaces the existing Home Upgrade Grant (HUG) scheme with the Warm Homes: Local Grant, and has rebranded the Social Housing Decarbonisation Fund (SHDF) as the Warm Homes: Social Housing Fund. There is a suggestion that the eligibility for application to the Warm Homes: Local Grant scheme would now be area based, rather than individually means tested, helping to retrofit the UK's residential dwellings at greater scale than means tested schemes.

Position of the country with EU's policies on retrofitting

During the 1990s, the rise of climate policies globally but also driven by EU regulation, helped to kick-start the creation of residential energy efficiency schemes (see section X below).

More recently, the 2009 EU Renewable Energy Directive (EC 2009) set a target to decarbonise end-use sectors such as transport, heating and cooling and industry, by increasing the share of renewable energy to 20% in 2020, with the highest shares expected to be reached in the power sector, and an aspiration to achieve 45% by 2030. As a member of the EU in 2009, the UK Renewable Energy Strategy was published in 2009, and the EU legislation transposed into UK law, through The Promotion of the Use of Energy from Renewable Sources Regulations, and the 2011 Renewable Transport Fuel Obligations (Amendment) Order. The Renewable Energy Directive was renewed in 2023 after the UK left the EU, meaning this has not been transposed into UK law.

The 2009 EU Ecodesign Directive established a framework for the setting of ecodesign requirements for 28 specific energy-related products which, in relation to retrofit, include boilers, windows, and insulation materials. This legislation was aimed at building into these

products, at the design stage, obligations to reduce energy consumption, thereby aiding the EU's overall energy efficiency targets. While the UK's transposition of EU ecodesign requirements stayed the same immediately after exit from the EU, The 2019 Ecodesign for Energy-RElated Products and Energy Information (Amendment) (EU Exit) Regulations ensured that ecodesign requirements already in force or scheduled to apply before the point of exit would continue to apply to products placed on the UK market before or following exit, until the legislation was replaced.

The 2012 EU Energy Efficiency Directive set out the EU's ambitions to encourage the uptake of energy efficiency measures within the EU, setting an energy efficiency tarted of saving 20% of the Union's primary energy consumption by 2020 compared to 2007 baseline projections, and of making further energy efficiency improvements after 2020 (EC 2012). This document established a framework for the implementation of proposals that had been introduced in the 2011 Energy Efficiency Plan, and was transposded into UK law through various regulations, such as the 2014 Energy Efficiency (Building Renovation and Reporting) Regulations 2014, requiring the Secretary of State for Energy and Climate Change to fulfill certain reporting requirements, including the submission of a longtern renovation strategy to the EC, submission of reports on meeting energy efficiency targets, submission of a National Energy Efficiency Action Plan every three yeats, and, crucially for understanding the current retrofit in the UK, to link financial support for energy efficiency of buildings to targeted or achieved energy savings. As with the Renewable Energy Directive, the Energy Efficiency Directive was renewed in 2023, with the UK no longer aligned with EU policy.

The policy transition away from alignment with EU law was managed during the UK's ‚EU exit', through statutory instrumments such as the Renewable Energy, Energy Efficiency and Motor Fuel Emissions (Miscellaneous Amendments) (EU Exit) Regulations (UK Department for Business, Energy and Industrial Strategy 2021). This set out amendments to the EU-derived legislation, ensuring that it would continue to operate effectively until replaced. For example, these amendments removed references to EU law and EU institutions, and removed obligations to submit energy efficiency plans and reports to the Commission after 2020. They did not, however, change the substantive nature of the legislation.

The 2024 EU Directive on Energy Performance of Buildings contributes to overall energy and climate goals by setting out a strategy for the building stock specifically, and sets out the aim to achieve a fully decarbonised building stock by 2050. Since this legislation was passed after the UK's exit from the EU, it has not been transposed into UK law.

All EU regulations were transposed into UK law, until the transposition deadlines for EU regulations stretched beyond the date that the UK left the EU (January 2020). This is illustrated in the table below.

EU Package / framework	Relevant Directives	Relevant UK Transposition
2001: EU Sustainable Development Strategy (updated in 2005)	2002 EU Energy Performance of Buildings Directive (EPBD)	Introduced **Energy Performance Certificates (EPCs)** for homes and buildings. Also led to the introduction of **Display Energy Certificates** and **air conditioning inspections**. This directive was later **recast in 2010** (Directive 2010/31/EU), and those updates were also transposed into UK law before Brexit.
2009: EU 2020 Climate and Energy Package	2009 EU Renewable Energy Directive (EC 2009)	*The Promotion of the Use of Energy from Renewable Sources Regulations*
	2009 EU Ecodesign Directive	*The 2019 Ecodesign for Energy-Related Products and Energy Information (Amendment) (EU Exit) Regulations* (These ensured that ecodesign requirements remained in force after Brexit.)
	2012 EU Energy Efficiency Directive (EC 2012)	*The Energy Efficiency (Building Renovation and Reporting) Regulations 2014*
2014 EU 2030 Climate and Energy Framework 2018: EU 2050 Long-Term Strategy "A Clean Planet for All" 2018: EU Clean Energy for All Europeans Package.	2018 Renewable Energy Directive	No. Transposition deadlines after the UK left the EU. As a result, **these were not transposed into UK law**. The UK had already transposed earlier versions of related directives (from the 2009 and 2012 packages) and set its own legally binding climate targets via the **Climate Change Act 2008** and subsequent **carbon budgets**, which aligned with or exceeded EU ambition.
	2018 Renewable Energy Directive	
2019: EU Green Deal	2023 Renewable Energy Directive	No. Following Brexit, the UK is no longer bound by EU legislation. The UK has independently committed to achieving net-zero greenhouse gas emissions by 2050, as enshrined in the Climate Change Act 2008 (2050 Target Amendment) Order 2019.
	2023 Energy Efficiency Directive	
	2024 Directive on Energy Performance of Buildings	

Table UK3. Transposition of EU regulations to the UK national level

4.2 The implementation process

Laws and regulations

Energy performance standards for rented homes are used to compell landlords to made energy efficiency upgrades to their rental properties in order to be licenced to put them on the market for rent. The Energy Act of 2011 required landlords to make energy efficiency improvements requested by their tenants, and to improve the energy efficiency rating of their properties to Energy Performance Certificate (EPC) band 'E' before rental. This could be improved by the new 2024 government's Warm Homes Plan, which aims to consult on proposals for both private and social rented properties to be brought up to EPC band C by 2030 (currently, social rented homes have no minimum energy efficiency standard at all). Owner occupiers do not require an EPC until they sell their home or place it on the market for private rent.

While new building standards are not strictly relevant to retrofitting, they dovetail with retrofitting in terms of the UK's efforts to make the overall building stock more energy efficient. National buildings standards were first intoduced in the Building Regulations of 1965, functional performance standards introduced in the Building Act of 1984, and revisions to these standards made in 2010, 2013 and 2016. Currently, Energy Performance Certificates are required for the construction and/or sale of a building, using a Standard Assessment Procedure (SAP) methodology to determine the energy efficiency of the property (it's SAP rating) based on factors such as construction materials, heating and vantilation, and insulation and glazing. After consultation running 2019-202, the Future Homes Standard (later the Future Homes and Building Standard) proposed new standards for energy efficiency of new homes, meaning homes would need to be built with low carbon heating solutions such as heat pumps. The previous government intended this legislation to come into effect in 2025, and the new Labour government have stressed commitm,ent to energy efficiency standards, but the exact outcome seems unclear at this point.

Financial support

Schemes providing public funding to support the retrofit of the UK's hosuing stock are the backbone of the retrofitting strategy. These are not simply intended to increase the number of homes with retrofit measures, and are not sufficient to achieve retrofit at scale; they are also intended to catalyse innovation in retrofit supply chains and boost productivity and capacity in the construction industry, to kick-start genuine market delivery of retrofit. However, this has had limited results. These schemes fall into four categories and are outlined in turn below:

A. Supplier obligation schemes: programmes requiring energy suppliers to offer retrofit efficiency improvements to customers most in need.
B. Pay as you Save (PAYS): programmes allowing consumers to apply for loans to cover the cost of retrofitting their own properties, repaid through savings to energy bills.
C. Publicly funded schemes for owner occupiers and the PRS.
D. Publicly funded schemes for social housing providers.

Supplier obligation schemes

As Rosenow (2012) explains, the premise of supplier obligation schemes is that: „central government imposes an energy savings target on large energy suppliers (gas and electricity) that has to be achieved at the customer end“. Energy suppliers usually charge a levy to all their customers, spreading the cost of any measures they provide, usually to more fuel-poor customers or living in those properties most in need of upgrading (e.g. EPC rating of D or lower).

These schemes are not only intended to increase the number of homes with retrofit measures; they are also intended to help build up the supply-side of the retrofit market (numbers of contractors and technological development), by encouraging demand. However, by spreading the cost of installations, this artificially lowers consumers‘ expectations around the cost of retrofit. Measures are often provided at very low or no cost, and consumers more broadly are left unwilling to pay for these measures at market cost. While many of these schemes have been successful in terms of retrofitting the expected numbers of homes, this has not encouraged the demand for retrofit more broadly; therefore neither has it boosted the supply side of the market beyond that needed to meet the specific obligations of each scheme.

Date	Scheme	Supplier obligation scheme details
1994-2002	**Energy Efficiency Standards of Performance (EESOP)**	From 2000, all licensed energy suppliers with at least 50,000 domestic customers were required to delivery energy efficiency measures to domestic households (Preece et al 2023). Suppliers asked to focus on the ‚disadvantaged‘ (Grubb et al 2015). EESoP ran from 1994 to 1998; EESoP 2 ran from 1998 to 2000; EESoP 3,ran from 1998 2000 to 2002 (Rosenow 2012). Jointly developed/managed by Ofgem (initially the Office of Electricity Regulation (OFFER) and the Energy Saving Trust. Funded through a levy of £1 per customer bill year, rising to £1.20 in 2002 (Preece et al 2023). The most common measure delivered was insulation, given its cost efficiency and ability to save customers money. Around 3 million households benefited from EESoP1, with savings of around £120 over the lifetime of the measures (Preece et al 2023).
2002-2008	**Energy Efficiency Commitment (EEC)**	In 2002, the EESoP scheme was renamed the Energy Efficiency Commitment (EEC). EEC 1 ran from 2002 to 2005; EEC 2 from 2005 to 2008 (Rosenow 2012). Funded through a levy on household bills, with the measures securing a household saving of £9 for every £1 spent by energy suppliers (Preece et al 2023). Preece et al (2023) express doubts about whether this scheme had any ‚pump-priming‘ potential within the retrofit market: suppliers had to offer insulation at a considerable discount to encourage uptake, and without these financial incentives, it seemed doubtful to some that consumers would continue making energy efficient choices (Preece et al 2023).

2008-2012	**Carbon Emissions Reduction Target (CERT) Program**	In 2008, EEC was renamed the Carbon Emissions Reduction Target (CERT). This was the largest supplier obligation programme thus far, creating an estimated energy saving of more than £2bn annually (Grubb et al 2015). Funded by a customer levy, estimated at £24 per year for each fuel (Preece et al 2023). As with previous supplier obligation schemes, there are doubts as to whether these interventions were economically sustainable without financial support, or had the capacity to kick-start market-based activity in the absence of financial mechanisms based in legislation. Insulation was often offered free or cash incentives provided to incentivise those in priority groups; (Preece et al 2023) note concerns amonst stakeholders that this left a legacy of customer expecation that such measures should be provided free or at a very low cost.
2009-2012	**Community Energy Saving Programme (CESP)**	CERT was complemented by the CESP area-based scheme which focussed supplier obligation-based provision of retrofit measures on the most deprivated areas, in order to focus efforts on vulnerable households and communities. Preece et al (2023) note that area-based schemes can bring significant benefits in terms of take-up and cost-effective delivery, with local authorities taking on a central role in building awareness of the scheme.
2012-ongoing	**ECO scheme**	Launched on 1st January 2013, replaceing previous supplier obligation schemes. Suppliers could install improvements directly themselves, through contracted installers, or through a brokerage platform (Preece et al 2023). The ECO scheme and its subsequent itterations (ECO 1-3) lead to 1.4 million homes being improved between 2013-2016, with the most common measures being cavity wall insulation. Preece et al (2023) note that the scheme has failed to develop a market for solid wall insulation, partly because of the focus on these cheaper measures.
2022-2024	**ECO4**	At an estimated cost of £4 billion over 4 years, the scheme specifically aims to support households on the lowest incomes, with eligibility determined by receipt of means tested benefits (Preece et al 2023). ECO4 ‚Flex' is a parallel programme which is also designed to target households on low incomes, but not in receipt of benefits (Preece et al 2023).
2023-2026	**The Great British Insulation Scheme (previously ECO+)**	Running in parallel to the other ECO supplier obligation schemes, this programme is intended to be taken up by customers who do not currently benefit from any other government support to upgrade their homes, but are living in the least energy efficient homes (EPC band G-D), either in receipt of certain state benefits, or in lower Council Tax bands (Preece et al 2023). Rather than a ‚whole house' approach, the scheme offers single insulation measures.

Table UK4. Supplier obligation schemes.

Pay as you Save schemes (PAYS)

The PAYS mechanism was developed specifically for the launch of the ‚Green Deal' in 2012, under the premise that households should pay for their own home energy efficiency retrofits, rather than all energy consumers contributing through levies, as with supplier obligation schemes (Preece 2023). This mechanism allows individual households to finance the installation of retrofit measures by applying for a ‚Green Deal Loan', which would then be repaid on the basis of money saved on energy bills (Camarasa et al 2018). The Green Deal was also intended to incentivise private rental tenants to take on the costs of retrofit, as they would benefit from reduced energy bills, rather than landlords (who had been targeted by supplier obligation schemes) who were slow to apply for schemes that did not benefit them directly (Rosenow and Eyre 2016).

Ultimately the PAYS mechanism of the Green Deal failed to incentivise a critical mass of consumers. While savings on energy bills were, in principle, great enough to cover the costs of the loans required to pay for retrofit measures at the market rate, the scheme has been criticised as having a poor understanding of consumer behaviour. Consumers are not always economically ‚rational' actors, and the fact that their costs would be covered was not enough to incentivise the time and effort required for retrofit uptake (Rosenow and Eyre 2016). While in 2011 the Department for Energy and Climate Change (DECC) estimated the Green Deal would result in 14 million domestic retrofits (Rosenow and Eyre 2016), take up was in fact 'dismal' (Grubb et al 2015), with only 6,000 homes being retrofitted each year, and a total of 15,000 at its completion). The Green Deal Loan Programme was discontinued in 2015 (Camarasa et al 2018).

Date	Scheme	PAYS scheme details
2012-2015	**Green Deal**	The scheme cost government £240m, but was assessed by the National Audit Office as failing to generate additional energy savings, and not value for money. Preece et al (2023 cite 'lasting damage to the retrofit sector due to loss of momentum'. The scheme failed to incentivise uptake and retrofit measures fell dramatically (loft insulation by 90%, cavity wall insulation by 62%, and solid wall insulation by 57%, in 2015 compared to 2012).

Table UK5. PAYS schemes.

Publicly funded schemes for owner occupiers and the PRS

As with supplier obligation schemes, publicly funded schemes are not simply intended to fund retrofit measures, but rather as a demand-side incentive to 'set the right conditions' for the retrofit supply chain to grow, encouraging the construction sector to increase activity to meet demand. As with supplier obligation schemes, these demand-side measures have failed to boost productivity and innovation at scale in the retrofit market. While many schemes have been successful in and of themselves in increasing retrofit installations to the tune of the funding provided, they have not aided any great shift in the numbers of retrofits required to meet the UK's carbon reduction targets by 2050.

Date	Scheme	Scheme details
1991-2000	**Home Energy Efficiency Scheme**	A scheme for improving the energy efficiency of private tenure households in receipt of certain benefits, through provision of insulation and central heating grants (Preece et al 2023). Around £75m was spent in grants annually to low-income families and pensioners (Preece et al 2023).
2000-2013	**Warm front**	Replacing the Home Energy Efficiency Scheme, this scheme was intended to benefit private tenure households in receipt of certain benefits, and suffering from fuel poverty (Preece et al 2023). The scheme was overseen by the Department for Energy and Climate Change (DECC). Public expenditure was around £3.4bn, and afforded 2.3m households assistance between 2000-2013 (Preece et al 2023).
2014-2022	**Domestic Renewable Heat Incentive (DRHI)**	Incentives were offered to owner occupiers, landlords with properties in the PRS, and social housing providers (all households), to promote the use of renewable heat sources in domestic properties. Households that installed a renewable heating system would then apply to the scheme to receive quarterly payments as an additional incentive. The total funding offered by the scheme was £1.5 billion, with the scheme supporting 110,830 low-carbon heating system installations (Preece et al 2023).
2020-2021	**Green Homes Grant**	The scheme allowed home owners and landlords in the PRS to apply for vouchers towards the cost of installing energy efficiency measures, including low-carbon heating systems. While £1.5 billion was allocated to this scheme, only £314 million was issued. This underperformance lead to the scheme being withdrawn. 47,500 homes received assistance, rather than the proposed 600,000 (Preece et al 2023).
2020-2023	**Green Homes Grant (local authority scheme)**	This scheme extended the support to home owners and landlords in the PRS, for energy efficiency measures to be installed in low income homes, delivering funding via local authorities. Around 70,000 measures were installed before the end of 2023 (Preece et al 2023).
2022-2025	**Home Upgrade Grant (HUG)**	Local authorities could apply for funding to coordinate the delivery of energy efficiency measures in the homes of owner occupiers and for landlords in the PRS, intended to improve EPC ratings to a band C, and with a total of £950 million provided until 2025 (Preece et al 2023).
2022-2025	**Boiler Upgrade Scheme (BUS)**	Installers of heat pums and biomas boilers could apply on behalf of consumers (owner occupiers and landlords in the PRS) for capital grant, contributing to the costs of installation. Consumers would receive between £5-6,000 off the costs of installation, but could only apply for this funding through MSC certified contracters, with the value of the grant taken off the final installation bill. 21,438 measures had been installed up to 2023 (Preece et al 2023).

Table UK6. Public funding for owner occupiers and the PRS.

Publicly funded schemes for social housing

The SHDF makes central government grant available to bidders (local authorities and housing associations) for retrofitting their social housing stock. As with all schemes listed in this section, the scheme is not only intended to increase the number of retrofit installations to the tune of the funding provided; it is also intended to develop the supply-side of the retrofit sector: „creating the conditions for growth in the retrofit supply chain capacity and capabilities, boosting productivity and innovation in the construction sector“ (Great Yarmouth 2024). Applications can be made by individual registered providers of social housing (local authorities or housing associations), or consortia of providers working together, and require that a minimum of 100 social homes at EPC band D-G will be improved.

The funding available through the SHDF is not nearly enough to retrofit the social housing stock at scale. Housing providers are asked to bid against each other for funding to retrofit relatively small proportions of their housing stock, with some applicants receiving no funding at all (although the Warm Homes: Social Housing Fund has claimed that all applications meeting minimum requirements should receive some funding). The task of retrofitting all social housing would require either large-scale central government grant, or a way for local authorities to recoup the high cost of installations, which is impossible in straightforward accounting terms since retrofits secure no financial gains for landlords. The scale of social housing retrofit roll-out through the SHDF is indicative of the UK government's approach to retrofit throughout its schemes, which is to boost the supply-side of the market through small demand-side props, in an effort to kick-start the UK retrofit market in earnest, something which is yet to be seen.

Date	Scheme	Scheme details
2019-ongoing	Social Housing Decarbonisation Fund (SHDF) (now Warm Homes: Social Housing Fund)	A total of £3.8 billion over 10 years is proposed by the Government; as of 2023 just over £1billion had been committed (Preece et al 2023) 2020: Social Housing Decarbonisation Fund Demonstrator (£61 million) 2021: Wave 1 (£179 million offered to 69 projects) 2022: Wave 2.1 (£778 million offered to 107 projects, with £1.1billion additional match funding from applicants) 2023: Wave 2.2 (£75 million offered to 42 projects, with £139 million additional match funding from applicants)

Table UK7. Public funding for social housing

Other public interventions

There are some local-authority and Greater London Authority (GLA) led schemes which provide assistance, funding, or good practice guides for retrofit. Some examples are provided below:

Scheme	Details
Cambridge council's Action on Energy	Provides funding and information.
Cambridge City Council Net-zero retrofit pilot	Pilot project is underway on Ross Street and Coldham's Grove to retrofit 50 council homes in line with the very latest in sustainable design.
Southend-on-Sea City Council's retrofit eco home	Serves as an educational resource, showcasing effective technologies and practical applications for South Essex Homes residents and partners.
GLA Social Housing Retrofit Accelerator	Provides help to London Boroughs with applications to the SHDF
GLA's Net Zero Accelerators	Provides support and enabling services (examples of innovation, knowledge transfer, data and delivery)
GLA Mayor's Warmer Homes Programme (launched 2018)	Provided £14.5m funding towards heating and insulation improvements to homes in or at risk of fuel poverty improving 4,505 homes by April 2023; provided £2,600,000 additional funding the financial year 2023-24.
GLA Warmer Homes Advice Service (launched 2018)	Providing support to over 21,500 households by March 2023; continued for 2023-24.
London Community Energy Fund (LCEF)	Provides support to get community energy projects up and running faster (schools, places of worship, leisure centres and other community buildings).
GLA "London Power" The Mayor's Energy Company	A public-private partnership between the GLA and Octopus Energy, founded by the Mayor of London. Supplying Energy to those living in London.

Table UK8. Current Local and regional government schemes

4.3 Size and role of the market

Major characteristics of the market framework of retrofitting

The UK CCC has stated that in order to achieve the UK's climate obligations, the rate of residential retrofits must increase to 500,000 each year by 2025, and to one million per year by 2030. This number therefore represents to the UK government it's demand-side targets for installations in the retrofit 'market' (whether these are financed and coordinated through public or private mechanisms).

It is clear there is a significant shortfall in the numbers of retrofitted homes, when compared with these targets (Camarasa et al 2018, UK CCC 2024) (the extent of actual numbers of retrofits is difficult to establish, not least because 'retrofit' encompasses various measures, with some homes benefitting from insulation, but not low-carbon heat pumps or biomas boilers, and many homes that are not retrofitted to net zero standard).

The challenge the UK government has seized on, in trying to upscale the number of retrofits across the UK, is incentivising greater uptake on this demand-side of the market, hoping that this will catalise innovation in the construction industry to meet demand more widely. Other

than the Green Deal, which was completely unsuccessful, all schemes listed above involve coordinating either public grant or private finance for small-scale retrofit roll-out projects, in an attempt to boost market-based provision at a far greater scale.

However, research exists which suggests that retrofit installations simply cost too much for sustainable market demand to emerge without the kinds of financial assistance these schemes provide for consumers (Preece et al 2023, Ellison 2024). Eco Experts recently found that while UK consumers have a high-degree of awareness of low-carbon technology, the huge cost of retrofit installations is preventing widespread adoption. Retrofit measures like solar, battery and heat pump installation can cost between £20,000 and £30,000, with additional costs for double-glazing, cavity wall, solid wall, and loft insulation. This significantly limits the size of the demand-side of the market ('effective demand'). Outside of a government scheme, uptake is likely to be limited to those significant income or capital resources.

This means the 'pump-priming' approach of the UK government, when setting the framework for a retrofit market, is likely to be unsuccessful.

It is worth also considering the supply-side of the market, to understand this problem. Part of the problem of high costs in the retrofitting market is the undersupply of skilled contractors and installers, and the fragmented nature of the construction industry more broadly. A shortfall of skilled coonstruction professionals (Springford 2023, BCIS 2024, Colemans 2024) is compounded by the need for an increase of labour to meet the rerofitting goals outlined by the UK CCC. There is a retrofitting "skill crisis" (Ashden, n.d.) with the Construction Leadership Council (PwC 2022) estimating that the UK will need 500,000 new professionals within construction and retrofit. Currently, only 1,000 trained retrofit co-ordinators are able to oversee the management and design of retrofit measures where 50,000 are needed; 3,000 heating engineers are trained to install heat pumps, where 60,000 are needed (Ashden, n.d.).

As with the organisation of the energy industry, most engineers and installers are self-employed, single-director companies, who are then subcontracted by larger firms, connecting them to consumers. Some installers work independently, connecting to consumers through installer-lead cooperatives. These self-employed installers are likely to have transitioned from previous positions as electricians, gas engeneers, or other roles in the construction industry; a transition that can imply significant risk to those individuals' incomes. These factors combine to create incredibly high costs on the supply-side of the retrofit market.

In short, the construction industry will likely need significant levels of public investment, and improved coordination to address the high costs of retrofits. The UK government's approach thus far is to use (demand-side) market-based mechanisms where there isn't yet a sustainable and well-coordinated (supply-side) market. Camarasa et al (2018) also suggest that the complexity and inconsistent funding of government programmes have caused uncertainty and and an inability to plan in the sector, causing firms to go out of business. From the perspective of supply-side stakeholders, these authors suggest that the UK government should instead provide extensive professional education, tailored policies, and standardisation of refurbishment solutions. This sector is likely to require significant input from government if it is to become a fully functional industry.

This would stand on top of further subsidies and tax incentives to encourage innovation on the supply-side, and uptake on the demand-side. Add to this the fact that energy consumers have been shown not to respond to 'rational' economic incentives (Rosenow and Eyre 2016). This all stands counter to the "the traditional 'neoclassical' assumption … that if energy efficiency saves money, markets would deliver it" (Grubb et al 2015).

How dominant are purely market-based interventions in the retrofitting market?

As noted above, supply-chains are relatively fragmented and effective demand relatively low in the retrofit market, meaning purely market-based mechanisms are a small segment of the market. This notwithstanding, some purely market-based interventions exist. These also rely on market intermediaries (see institutional section below) to connect installers and customers.

Some private business models are emerging that leverage the value uplift that retrofiting affords private home ownership, in order to cover retrofit costs. For example, residential developers are able to buy up homes with poor energy standards, renovate and then sell those homes on at higher prices. Nevertheless, since private developers and corporate landlords in the UK are largely involved in building new buildings (rather than buying and retrofitting older properties), they have a relatively minor involvement with market-based interventions in the retrofitting market.

4.4 The multilevel governance process

The most direct relationship between central and local government is in the cooridnation of the SHDF. Applicants must co-fund at least 50% of installation costs. There have been controversies around the multilevel governance and coodination of this scheme, since some successful applicants were unable to deliver their retrofit plans at the scale initially epected, or match the funding due to budget constraints, and had to return their allocated funds (this meant that much of the funding allocated through Wave 2 of the scheme was ‚recycled' from Wave 1, rather than being new funding in earnest (Riding 2024a). The inability of some local authorities to deliver on their SHDF proposals has been reframed by some as the central government ‚responsibility dumping' its climate obligation strategy to the local level, asking local authorities with stretched resources and capacity to apply to a competitive fund in order to implement central government targets, without support in terms of design, monitoring or accountability. Some councils, such as Islington, have managed to secure this support by engaging consultands, for example to investigate how best to get their social housing stock to net zero by 2030 (Evans et al 2023). Nevertheless, uneven capacity and levels of in-house expertise will mean that local authority actions are likely to be uneven with greater success in better resourced areas.

Many local authorities have developed their own climate strategies, for example Islington's *Vision 2030: Building a Net Zero Carbon Islington by 2030* (London borough of Islington, 2020a). In this plan, local authority priorities include retrofitting all domestic buildings (not only social homes) to an average level of EPC B (2020–2030). Local authorities clearly need to consider the private housing stock within their climate plans, but addressing this in a strategic

way is likely to be difficult. Additionally, and as the Islington plan points out, ‚Our housing retrofit programme alone demands funding which we can't raise':

„*The council will need the government to make significant and ongoing funding available in order to deliver our ambition for Islington. For instance, the cost of retrofitting the council's housing stock to become both energy efficient and zero carbon is in excess of what the council can afford within existing resources. This also applies to private housing and social housing provided by other organisations. Funding needs to be made available on a consistent, ongoing basis, with reasonable time given for applications to be processed and funds spent; this will enable the development of high quality proposals, provide stability and security for the delivery industry and reduce costs.*" (London borough of Islington, 2020a)

Vision 2030 also includes a plan to seek funding for skills development programmes in fields like retrofitting, for local residents. But cooridnation of these actions requires input from hier tiers of government. The role currently played by local authorities therefore seems to highlight a gap in directives and support from central government.

At local authority level, housing officers and the regeneration team often sit separately from teams concerned with retrofits, which might exist as part of the property maintenance team. This could create a disconnect between the departments responsible for retrofit and regeneration, where synnergies might allow for better coordination of retrofit policy.

Central Government have been accused of 'flip-flopping' and creating an uncertain environment for retrofit professionals. For example, a recently proposed ban on installing new gas boilers (intended to encourage the predictable uptake of heat pumps, and certainty for industry) has been withdrawn in early 2025 (Horton 2025).

In the UK case, the Greater London Authority (GLA) is an important case of intermediate regional government. The role of the GLA is to support the London Boroughs through additional funds and technical support, but cannot diverge greatly from the national context due to the market conditions leading to high retrofit costs. The GLA's support is detailed in table 5. Some of these schemes, including the GLA's Net Zero Accelerators which offers advice, training knowledge sharing and finance advice to London-based organisations including local authorities and social housing providers, was launched using £950,000 funding for a ‚Retrofit London' programme', to create a suite of programmes for advice provision and technical support. The GLA successfully bid for £12,006,000 from the Home Upgrade Grant 2 scheme (from DESNZ) for use in London in 2023-24 and 2024-25. The GLA can therefore best be understood as significant enabler of local authorities within the governance and funding frameworks set by central government. Beyond the £14.5 Warmer Homes Programme for homes in or at risk of fuel poverty, the GLA has not been able to offer significant public funding towards retrofit rollout.

Key actors and institutions

Institution type	Name	role
Local and regional governments	Local authorities (numerous)	Design local climate strategies, considering the entire building stock within the local area. Implement the SHDF, as well as other public measures locally. Apply for funding from central government for skills-upgrading and retrofit roll out measures and demonstrator projects. Provide support to energy suppliers in delivery of supplier obligation schemes.
	GLA	Provides some funding for retrofit rollout (£14.5 Warmer Homes Programme for homes in or at risk of fuel poverty), also provides programmes offering advice and technical support to local authorities and social housing providers.
Central Government	Department for Energy and Climate Change (2010-2016) Department of Business, Energy and Industrial Strategy (2016-2023) Department for Energy Security and Net-Zero (2023-present)	Design of UK policy strategy relating to retrofit; coordinates retrofit schemes of the UK government.
	UK Parliament Energy Security and Net Zero Committee	This committee scrutinises the policy, spending and administration of the Department for Energy Security and Net Zero and its public bodies, including Ofgem and the Committee on Climate change. Builds evidence bases, e.g. through enquiries such as the 'Heating our homes' (UK Parliament 2023), which looked into issues of energy efficiency (including insulation), heat pumps and other technologies, as well as infrastructure problems surrounding delivering warm homes and the need to ensure that there is a skilled workforce when needed. Holds one-off sessions and events e.g. 'Retrofitting our homes for a net zero future', (UK Parliament 2024)
	UK CCC (arms length / independent organisation)	The UK CCC set the budgets and design strategies to achieve the UK's climate obligations. Evaluates central government policies and identifies where shortfalls in policy need to be addressed (Camarasa et al 2018), for example holding the government to account on the rate of retrofit nationwide.
Energy Suppliers	Various	Implement supplier obligation schemes. Suppliers can coordinate the roll-out of retrofit measures for customers in a number of ways: by contacting installers directly; by subsidising ‚do it yourself' measures; by liaising with other

		managing agents (e.g. local authorities and supermarkets who then sucontact individual installers); or by creating their own insulation businesses to deliver retrofit measures themselves (e.g. British Gas). Energy suppliers are able to offer retrofit assistance to individuals who do not qualify for the ECO scheme (or alternatives) outlined above. This could be through the provision of funding, or by helping self-funding households with information and links to professionals.
Financial	Green Finance Institute	Financial intermediaries such as the Green Finance Institute exist to analyse barriers to investment, develop financial instrumments and channel public, private and philanthropic investment into 'real economy outcomes', targeting commercial returns. Their 'Coalition for the Energy Efficiency of Buildings' advocates for measures such as area-based financing, and a new National Investment Bank „to co-create new investable asset classes and channel both public and private capital towards defined net-zero outcomes" (GFI n.d.).
	Banks	Some banks offer preferential rates for the purchase of well-retrofitted homes, or cash incentives (e.g. a £20,000 5-year interest-free loan for green upgrades is available from Nationwide (Nationwide, 2024)). These measures are relatively recent and small scale.
	Equity release council	Retrofit mortgage: A mortgage that provides funding to enhance the energy efficiency and reduce the carbon footprint of a residential property. The Equity Release Council (ERC 2024) has unveiled new guidance for member firms to consider when launching retrofit lifetime mortgages
Interest groups	The UK Green Building Council (UKGBC)	The UKGBC is an interest group concerned with the sustainability of the built environment. They produce recommendations to government, with some level of influence.

Table UK9. Key institutions involved in the policy cycle for retrofitting

Acellerators and other market-based institutions and initiatives

A proliferation of small-scale organisations exist to help catalise the retrofit market, for example RetrofitWorks, an installer-led cooperative who link consumers with installers, or People Powered Retrofit, an organisation providing consumers and installers with advice and support to plan, procure and deliver retrofit projects. These organisations are unlikely to have an impact on the structure of the industry, but aid coordination within the segment of the market currently supported by effective demand.

Name	Purpose
Free Energy Grants	Consumer / household advice and liaison
RetrofitWorks	Links individual consumers with installers. Installer-led coop
People Powered Retrofit	Provides consumers and installers with advice and support to plan, procure and deliver retrofit projects.
Cosy Homes Oxfordshire	Provides individual consumers with information e.g. to make a "draft retrofit plan"
OpenEcoHomes in Cambridge	An initiative to support home owners by visiting other homes, with support from Cambridge City Council and local businesses.
Nesta's visit a heat pump service	Delivering a service to help people learn about heat pumps in real-world settings.

Table UK10. Current Market-based institutions involved in retrofitting

4.5 Achievements, assessments, and challenges

The main challenge highlighted above is that retrofits are not being rolled out at the pace required in order to meet the UK's climate obligations. It seems likely that this is because the UK government has used a 'pump priming' approach to its retrofit policy, using small scale demand-side incentives to catalise innovation in the construction industry and boost productivity in the supply-side of the market. Meanwhile supply-side blockages are not properly addressed, and subsidy for the currently prohibitive cost of retrofit insterventions is not forthcoming at scale. Policy

One impact of this on inequalities is that while government focusses its efforts on small scale demand-side schemes, the cost of retrofit installation for the population more broadly remains extremely high. Houses continue to be constructed, renovated and improved without consistent policies or standards, kicking the cost of retrofit down the road. Since only those with considerable disposable income will be able to afford retrofit measures without assistance, and to benefit from reduced energy bills, middle- and low-income earners, particularly those who do not qualify for assistance elsewhere, will face a choice between the relatively high cost of installation or more energy inneficient homes and higher energy bills.

There is some indication that good-quality retrofits can increase house values. Camarasa et al (2018) observes that house prices can vary by 5-10% based on their Energy Performance Certificate (EPC) rating, and cites a Department of Business, Energy and Industrial Strategy (BEIS) 2013 report estimating that retrofits could increase property values by an average of 14%. This means that those who have been able to afford retrofit installation could benefit further from house price rises, locking certain groups out of these homes. This effect is likely to be marginal, however. Retrofit is more likely to drive house prices rises for already affluent households who can afford comprehensive, architect-led retrofits with high-quality materials and installation, but the number of these self-funded 'whole house' retrofits remains very low. Grant schemes, which tend to fund less holistic retrofits, have a more limited effect.

In terms of spatial inequalities, the UK's approach to retrofit has so far been geographically fragmented, with retrofit uptake (beyond funding for social housing retrofits) depending on

individual's own inclinations to follow up on the availble government schemes or fund their own projects. However, the new 2024 government have indicated that the eligibility for application to the Warm Homes: Local Grant scheme will now be partially area-based, rather than individually means tested, helping to achieve greater scale. This could open an avenue for whole streets or local areas to benefit from retrofit improvements and, if house prices are affected, to lock certain groups out of these areas. Nevertheless, the deployment of area-based schemes remains extremely limited, and house price effects are not yet proven for the less holistic retrofits available through such schemes.

A further potential spatial inequality could be created by 'retrofit mortgages' allowing individuals to access equity in their homes to fund retrofit projects. Since property values vary across the UK, regional differences could be created between individual's capacity to retrofit their homes. Those living in London, where house values are highest, may be able to access adequate finance, whereas those living elsewhere (particularly in the North) where house values are lower may find that retrofit installation and certification could exceed the level of equity they can access from their homes. However, green mortgages remain a nascent market and mainly function as loyalty schemes for lenders to retain existing borrowers. The interest rate and total borrowing cost of green mortgages are not the lowest on the market, so the incentive for homeowners to switch mortgage providers for a green mortgage is relatively weak.

Therefore, retrofit policy and roll-out could (but cannot yet be shown to) produce inequalities through the mechanism of house prices or affordability. Nevertheless, and as supported by our Policy Lab workshops (see Table 11 below), the way that publicly funded retrofit schemes are designed in the UK can reproduce inequalities relating to housing quality. Publicly funded retrofit schemes such as supplier obligation schemes often exclude housing with disrepair, damp, and mould, locking out households living in the worst conditions and those most in need. Market-led support schemes also prioritise cost efficiency over quality and appropriateness, and have led to damp and mould being worsened through poor ventilation. The bottom line is that these schemes are not extensive enough to contribute the quantity or quality of retrofits required within the UK.

With regard to social housing, since local authorities and housing associations must match-fund their funds from the SHDF, there is the potential for rising rents within the social housing sector. For example, in a recent rent review meeting held at Blackpool council, members of the local authority cabinet discussed the need to ensure the Housing Revenue Account (a ring-fenced financial account used by local authorities in the UK to manage all income and expenditure related to their landlord functions for council-owned or social housing) would remain financially secure, "alongside measures to decarbonize our stock":

„*In terms of climate change the 2024/25 capital programme includes an additional £500,000 to enable all remaining properties to achieve a minimum energy efficiency level of SAP C. There is currently no significant external funding to support this work, and decarbonisation of the whole stock is estimated to cost in the region of £80-90 million on the best available information*." (Blackpool Council 2024)

The report concludes with a recommendation "That rents for all Housing Revenue account properties are increased by 7.7% in 2024/25 to maintain the health and future viability of the

Housing Revenue Account in line with official guidance". While rent reviews are not uncommon and may not be cuased solely by spending on the council's SHDF programme, the clear link between energy efficiency measures and rents in social homes illustrated in this report suggests this question is worth investigating.

The previous points are summarised in the table below, with further insights drawn from Policy Lab workshop #1, held in London.

Hypothesis: impacts on housing inequalities	**Further insights, drawn from Policy Lab workshop #1 (WP7)**
Potential for rising rents within the social housing sector	Although this may be offset by lower energy bills.
The cost of private retrofit installation for the broader population remains extremely high	The costs of retrofit including more complex insulation measures, heat pumps, ventilation, and solar panels – and 'whole house' approaches which combine these measures – remain prohibitively expensive for most of the population, despite the universal heat pump subsidy and targeted grants for retrofit. Despite government subsidies and grants, retrofit remains financially inaccessible to most households, with middle-income households ineligible for most support but unable to self-fund improvements.
Good-quality retrofits can increase house values, and could lock certain groups out of retrofitted homes	This effect is likely to be marginal. There is limited evidence that retrofit grant schemes are driving house prices rises. This is truer for affluent households who can afford comprehensive, architect-led retrofits with high-quality materials and installation. The number of self-funded 'whole house' retrofits remains very low. Grant schemes, which tend to fund less holistic retrofits, have a more limited effect.
Area-based schemes (where whole streets or local areas can benefit from retrofit improvements) could lock certain groups out of these areas, if house prices are affected.	Potentially. Area-based schemes tend to take a more comprehensive approach and improving multiple properties may magnify the effect on house prices. However, the deployment of area-based schemes remains extremely limited. The upcoming national Warm Homes: Local Grant scheme, which introduces area-based eligibility criteria, should provide more insight into the effects of area-based schemes on house prices.
Those living in London, where house values are highest, may be more able to access retrofit mortgages.	However, green mortgages remain a nascent market and mainly function as loyalty schemes for lenders to retain existing borrowers. The interest rate and total borrowing cost of green mortgages are not the lowest on the market, so the incentive for homeowners to switch mortgage providers for a green mortgage is relatively weak.

Supplier Obligation Schemes can lead to low-quality retrofits	Energy supplier obligation schemes for lower-income households often result in retrofits which are partial, poorly installed, and driven by cost-efficiency rather than quality, while affluent homeowners can procure comprehensive architect-led retrofits.
Those living in poor-quality housing are excluded by current retrofit policy	Current retrofit policies systematically exclude properties with the most severe housing deficiencies (disrepair, damp, mould), leaving households in the poorest housing conditions without effective support.
While retrofit policy is not yet reproducing housing market inequalities at scale (e.g. inequalities relating to affordability or house prices), it is reproducing inequalities in housing provision (e.g. inequalities relating to access to certain types of housing, or locking individuals into certain tenures, types or qualities of housing, including those with poor energy standards).	Retrofit policies exclude housing with disrepair, damp, and mould, locking households living in the worst conditions out of support schemes. The narrow and complex eligibility requirements of retrofit support schemes exclude many households in need. The universal support scheme (for heat pumps) only covers half the cost of installation, so more affluent households benefit disproportionately. Market-led support schemes prioritise cost efficiency over quality and appropriateness – with sometimes hazardous consequences – and provide little agency for households over the measures installed.

Table 11 . Summary table

5 Nature-Based Solutions

5.1 The policy cycle: emergence of the issue and policy decisions

Emergence of the issue in national policymaking

2018: 25 Year Environment Plan

The Policy paper *A Green Future: Our 25 Year Plan to Improve the Environment* (DEFRA 2018) sets out the British agenda for environmental protection and improvement post-Brexit. This was the foundation for UK legislation departing from EU legislation, and set the framework for the UK environmental legislation that would follow. This includes the biodiversity net-gain legislation detailed below, which would become the UK's flagship NBS policy. This would require developers contribute a minimum 10% biodiversity net-gain for each new development, and ask local authorities to negotiate the location and type of NBS. The text points to early,

as-yet-undeveloped thinking around this, for example on p79: “As we build more homes, preserving and creating green spaces in towns is more important than ever. Local authorities and developers need to take account of all the benefits when deciding how much land to allocate as green space“.

2021: Environment Act

The UK 2021 Environment Act is the current legislative basis for all nature recovery and biodiversity net gain in the UK. The act establishes the twin mechanisms of biodiversity net gain law, and the production of local nature recovery strategies by local authorities, which are the central pillars of NBS policy in the UK.

Biodiversity net gain law outlines the responsibility of the private sector to deliver on NBS, stating that all planning permission granted under the Town and Country Planning Act 1990 will be subject to a condition for biodiversity net gain that must be met before the development commences. Before any construction, developers must measure the existing biodiversity values of each site, and present a plan to show how at least 10% gain in biodiversity value will be achieved.

Local nature recovery strategies are, in part, the mechanism by which the public sector can engage with private sector delivery of NBS. The 2021 Act states that all local authorities must have a nature recovery strategy in place. Much like local development plans, local nature recovery strategies are plans designed by the local authority, setting out their vision for the area. This includes the context, specific requirements and biodiversity conditions that must be acknowledged by the private sector when applying for planning permission for new development.

2023: Environmental Improvement Plan

The 2023 Environmental Iomprovement Plan is a scheduled update of the 2018 25 Year Environment Plan: “Where the 25YEP set out the framework and vision, this document sets out the plan to deliver”. The ‘apex goal’ of the policy is ‘improving nature’, which is achieved through various initiatives. Landscape Recovery Projects, and a ‚Nature Recovery Network‘ of new protected areas, are likely to be rural and/or remote. In terms of urban nature, the plan reinforces the commitment to implement the 2021 Environment act: „including rolling out Local Nature Recovery Strategies to identify areas to create and restore habitat, and Biodiversity Net Gain to enhance the built environment”. The plan also proposes an updated Green Finance Strategy, setting out “a goal to raise at least £500 million per year of private finance into nature’s recovery by 2027 and more than £1 billion by 2030”.

Position of the country with EU’s policies on NBS

From the 1970s onwards, the UK’s environmental protection policy clearly benefitted from the UK’s membership of the EU. Environmental groups, often margianalised at the national level in Britain, worked in alliance with the EU Commission to expand the EU’s competence in biodiversity policy, and thereby ‘outflank’ the UK government to ensure environmental protections were in place (Fairbass and Jordan, 2021)

Since leaving the EU, the UK has been 'ahead' of the EU in approving legislation that enforces nature recovery and biodiversity net gain, passing the Environment Act in 2021, several years before the EU parliament approved the 2024 Nature Recovery Directive.

This may have been because the UK faced a crisis after leaving the EU, at which point EU legislation would remain in place until it was replaced at the UK level. Given the profound uncertainty created by the UK's internal politics post-referendum, there was a concern that environmental safeguards would fail with only the undermined legacy EU law underpinning environmental protection. This placed an imperative on the UK to pass legislation including for the protection of the environment.

2024 Nature Restoration Directive

The EU's Nature Restoration Directive was approved by the European Parliament in February 2024. The overall aim is to contribute to achieving the EU's climate mitigation and climate adaptation objectives, through recovering biodiversity in a long-term and sustained way, partly using NBS strategies.

In some senses, the definition of NBS in the UK and the EU are similar. Nature-based solutions are defined in this text as

> „solutions that are inspired and supported by nature, that are cost-effective, and that simultaneously provide environmental, social and economic benefits and help build resilience. Such solutions bring more, and more diverse, nature and natural features and processes into cities, landscapes and seascapes, through locally adapted, resource-efficient and systemic interventions. Nature-based solutions need to therefore benefit biodiversity and support the delivery of a range of ecosystem services." (EU 2024: 10).

As well as rural-based NBS, such as restoring wetlands and peatlands and promoting sustainably managed forests and farmland, the directive exemplifies NBS with initiatives such as developing urban green spaces and installing green roofs and green walls in the design of buildings (EU 2024: 11, 28).

While in the UK context there is an emphasis on ‚biodiversity', in the EU context, there is an emphasis on ‚ecosystems'. A central target of the directive is to ensure that, by 2030, at least 30% of degraded ecosystems are under effective restoration' (EU 2024: 3), including urban ecosystems. This is determined as Member States having put in place restoration measures that are necessary to improve to good condition at least 30 % of all habitat types considered to be not in good condition (EU 2024: 63). The directive stresses the need for ‚increasing urban green space' as a major aspect of improving the health of urban ecosystems.

With their different emphases on 'biodiversity' and 'ecosystems', it is relatively complex to determine the UK's natural protection legislation compares to the EU agenda and approach. When drilling down into the implementation, there are some differences between the approach of the EU 2024 directive and the UK 2021 Act, particularly with regard to biodiversity restoration and/or gain in urban areas. Article 8 of the 2024 EU directive (*Restoration of urban ecosystems, p78*) states that Member States shall ensure that there is *no net loss* in the total

national area of urban green space and of urban tree canopy. There is no such stipulation in the UK, but the requirement for a 10% biodiversity *net gain* to be made under any new development means UK legislation could be seen as stronger in enforcing the restoration of nature in urban environments.

The EU 2025 directive supplements this with a requirement that from 2031 onwards, Member States shall achieve an *increasing trend* in the total national area of urban green space, (including through the integration of urban green space into buildings and infrastructure), although the exact increase is not stipulated at this point.

As well as legislation for the protection and improvement of nature, both the EU 2025 directive and the UK 2021 Act include plans to improve plan making. At the EU level, this will be implemented through the creation of national restoration plans, to be reviewed by 2032 and 2042. This target (Target 1 of the directive) 'ensure[s] that all areas are under participatory, integrated and biodiversity inclusive spatial planning and/or effective management processes' (EU 2024: 3). This is equivalent to the creation of local nature recovery strategies under the 2021 Act in the UK, albeit at the national, rather than local level.

How the EU and UK approaches compare is not straightforward, not least since gains in *biodiversity* and increases in *green spaces* or in *habitat types* are not straightforwardly comparable. Some feel that the UK's biodiversity clauses are more stringent than those impelemented in the EU. On the other hand, Gravey and Jordan (2023) characterise British environmental policy-making after Brexit as a new form of governance, 'disengaged' from the EU environmental rule book, and testing new forms of implementation (e.g. 'more top-down'). They argue that without a better understanding of the causal mechanisms through which this new form of governance shapes outcomes, "the outcomes may not become clear for many years."

All EU regulations were transposed into UK law, until the transposition deadlines for EU regulations stretched beyond the date that the UK left the EU (January 2020). This is illustrated in the table below.

EU Package / framework	Relevant Directives	Relevant UK Transposition / equivalent
1992 EU commitments to international Convention on Biological Diversity (CBD).		2004 UK Biodiversity Action Plan (UK BAP) formed part of the UK's national obligations towards EU commitments
2006 EU Biodiversity Action Plan	Habitats Directive (92/43/EEC) Nitrates Directive (91/676/EEC) Birds Directive (2009/147/EC, originally 79/409/EEC)	All specific directives were transposed into UK law. The Action Plan itself is not transposable law, but objectives informed creation of subsequent UK biodiversity policy frameworks and updates, ensuring coordination with

	Water Framework Directive (2000/60/EC) Environmental Impact Assessment Directive (85/337/EEC, amended by 2014/52/EU)	EU and global biodiversity objectives.
2011 EU Biodiversity Strategy to 2020	Did not introduce new directives but built on and strengthened earlier biodiversity policies	The Strategy itself is not transposable legislation, but objectives informed informed creation of the 2012 UK Post-2010 Biodiversity Framework
2013 EU Strategy on Adaptation to Climate Change	Did not introduce new directives but built on and strengthened earlier biodiversity policies	The Strategy itself is not transposable legislation, but informed the 2013 UK government's National Adaptation Programme (NAP) for 2013–2018
2020 EU Biodiversity Strategy for 2030	Did not introduce new directives but built on and strengthened earlier biodiversity policies	Not transposed into UK law, since it was adopted after the UK left the EU The equivalent UK legislation is the 2025 UK National Biodiversity Strategy and Action Plan (NBSAP) for 2030
2021 EU Strategy on Adaptation to Climate Change	Did not introduce new directives but led to the creation of new commitments including the Nature Restoration Law (2024/1991), a regulation aiming to restore at least 20% of the EU's land and sea areas by 2030, with binding restoration targets for specific habitats and species.	Not transposed into UK law, since it was adopted after the UK left the EU. The equivalent UK legislation is the Environment Act 2021.
2019: EU Green Deal	2024 EU Nature Restoration Directive	Not transposed into UK law, since it was adopted after the UK left the EU The equivalent UK legislation is the Environment Act 2021.

Table 12. Transposition of EU regulations to the UK national level

5.2 The implementation process

As noted by the UK House of Lords Inquiry into Nature-based solutions for climate change, The UK government's focus for NBS has been „mostly on large-scale land sparing approaches, such as large-scale tree planting and peatland restoration" (UK Parliament 2021). The funding mechanisms associated with these kinds of interventions, largely focussing on landscapes like farmland, grassland and woodland, without residential development, are unlikely to have an impact on housing inequalities beyond the fact that the UK has focused most NBS funding streams towards areas without housing.

NBS strategy in areas with housing development receive very little government funding, but are guided by two legislative frameworks. Firstly, the 2024 Biodiversity net-gain legislation requires all new housing development (of every tenure) to provide a 10% net-gain in on-site biodiversity (delivered through NBS provision). This means that NBS are provided through all new housing development, and are the responsibility of private, public and non-profit housing providers and developers. Secondly, all local authorities are required under the Environment Act 2021 to draw up Local Nature Recovery Strategies, which will guide the provision of NBS by housing providers in local areas, according to Biodiversity net-gain law.

Biodiversity net gain

Biodiversity requirements for all development and regeneration became effective from 12th February 2024, meaning that the majority of major new planning development will require an element of NBS. From 2nd April 2024, small developments were also asked to delivery on biodiversity requirements. The law states that developers must ensure a minimum 10% net gain in biodiversity (based on a pre-development assessment of the land they are developing), in order to secure planning permission.

One goal of this legislation is to deliver positive outcomes for nature, and ‚leave the environment in a better state than it was found (The Environment Agency, 2024). A further goal is to encounrage developers to chose areas for redevelopment that are already lacking in biodiversity, since a net-gain requirement of +10% is far harder to achieve in biodiversity hotspots. The goal is thus also to guide development into areas with the least nature value, keeping new housing away from green spaces.

While biodiversity net-gain is site-based and therefore incremental, it is mandated by the 2021 Environment Act, and therefore is a powerful tool for enforcing the delivery of NBS in the UK, providing clarity to developers about their obligations, and grounding NBS delivery in local authorities' local nature recovery strategies.

Local nature recovery strategies

There is currently no comprehensive landscape planning instrumment in England and Wales (although there is for Scotland). This means there currently exists no high-level coordination as to conservation efforts, landscape management or NBS at the national scale. Local nature recovery strategies may go some way to plugging this gap, since they should be drafted by every local authority, and will eventually cover the whole of England. Nevertheless, while preparation and delivery will be supported by central government, these strategies are locally-

led, and must be designed and implemented by the local authorities themselves (although the Greater London Authority (GLA) is presently drafting a London-wide nature recovery strategy and will subsequently provide guidance to all London Boroughs).

The purpose of these plans is to identify local priorities and map out proposals for specific actions to provide environmental benefits in each area. For example, key elements to be included in the strategies, as set out in the central government guidance (DEFRA 2023) are a statement of biodiversity priorities and a local habitat map, as well as mapping "opportunities for the use of NBS for wider environmental issues like flooding, climate change mitigation and adaptation, or poor water quality" (UKGBC 2023 A). These plans will therefore set the local vision and framework against which developers will need to make their proposals for NBS delivery, as part of the binding new biodiversity net gain requirements.

The mitigation hierarchy

Biodiversity net gain is underpinned by the 'mitigation herarchy, as set out in the National Planning Policy Framework (NPPF) (UKGBC 2023 B).

This provides a sequence of four approaches to addressing potential damage to biodiversity from development. 'Avoidance' of damage is the approach that should be prioritised in all planning applications, before 'minimisation' and 'mitigation' measures are considered, and finally 'compensation' or offsetting of any damage.

Before development can take place, developers must provide evidence within a Biodiversity Net Gain Plan, outlining evidence of the steps taken to avoid and/or minimise adverse impacts to biodiversity. Proposals must provide strong rationale and evidence for forgoing avoidance and mitigation measures (on-site NBS, delivered as part of new development), in order to justify offsetting or compensating for any damage off-site (off-site NBS, delivered elsewhere, and usually in rural locations). The rationale for offsetting or compensating for damage to biodiversity, rather than avoiding, minimising and mitigating it, cannot include considerations of financial cost (UKGBC 2023 B).

Off-site NBS delivery as part of developers biodiversity net gain obligations will also be directed by local authorities' Local Nature Recovery Strategies. Where NBS for biodiversity net gain cannot be achieved on-site after consulting the mitigation hierarchy, off-site opportunities should be identified, giving priority to local enhancements (UKGBC 2023 B). Compensation or offsetting through NBS delivery outside of the local area will be given a 'multipier' of 0.5, meaning that developers will need to contribute greater biodiversity value off-site, than those who deliver on-side NBS in new developments.

Financial support

There exist several grant schemes for NBS that are open to applicants. These tend to have a rural focus, concentrating on landscapes and habitats such as farmland, grassland and woodland. Since there is no housing development permissable on farmland, grassland or woodland, and these kinds of landscapes tend to be large stretches of natural environment without residential developments, these funds are not relevant to this study's focus on housing and housing inequalities.

Name	Institution	Details	Urban or rural focus
Nature-based Solutions for Climate programme : Habitat creation grant	Natural England, Environment Agency, Forestry Commission, Board of Trustees of the Royal Botanic Gardens Kew, Department for Environment, Food & Rural Affairs, Department for Business, Energy & Industrial Strategy and Department for Energy Security and Net Zero	Offers one-off grants to partnership-led pilot projects. Projects must achieve habitat creation and restoration at a landscape scale - an area of at least 500 hectares in size. Date: 2022	Rural farmland, grassland and woodland
Nature-based Solutions for Climate Change at the Landscape Scale	Natural England with the Environment Agency, the Forestry Commission and Royal Botanic Gardens Kew at Wakehurst, Kew's wild botanic garden in Sussex.	2021: £12.5m pilot programme to test approaches for creating and restoring species rich habitats 2022: one-off grannt offering a small number of projects a share of £5m funding to pilot these approaches. The habitats prioritised for this research programme include those found within a mixed land-use system typical of the English countryside. This includes grassland, scrub, hedgerows and woodland though other habitats may still be eligible for funding.	Rural farmland, grassland and woodland
Environmental Land Management schemes	Department for Environment, Food and Rural Affairs (DEFRA)	The SFI (Sustainable Farming Incentive) will pay Farmers are paid to adopt and maintain sustainable farming practices that can protect and enhance the natural environment alongside food production, and also support farm productivity CSHT (Countryside Stewardship Higher Tier) provides financial incentives for farmers to look after and improve the environment. The Higher Tier agreements will be bespoke, developed with the input of Natural England or Forestry Commission advice. Landscape Recovery will pay landowners or managers who want to take a more radical and large-scale approach to producing environmental and climate outcomes through land use change and habitat and ecosystem restoration.	Rural farmland, grassland and woodland

Nature for Climate Fund		Provides £750 million up to 2025 of public funding for tree planting and peatland restoration. This will be the main source of funding for tree planting and for peatland restoration until 2025, when it will be replaced by ELMs. The policy is set out in the England Trees and Peat Action Plan 2021-24	Rural farmland, grassland and woodland
Natural Environment Investment Readiness Fund		This offers grants of £10,000–£100,000 to support environmental projects in England. These projects would support research that enables a market-based approach to restoring nature. It will be replaced by the £30 million Big Nature Impact Fund.	Rural farmland, grassland and woodland

Table UK13. Grant schemes for NBS.

Other public interventions

Several public-private partnership initiatives and other public interventions have been geared towards the use of NBS in the UK; again, these tend to have a remote rural focus, and are therefore not pertinent to this study.

Name	Institutions	Details	Urban or rural focus
Nature Returns Programme	Natural England in partnership with the Environment Agency, Forestry Commission, RBG Kew at Wakehurst and six Local Partnership Projects. Co-sponsored by Defra and DESNZ	£17m programme to build the evidence for nature-based solutions to climate change and biodiversity loss. Six local partnership projects have been established to pilot nature-based solutions for climate change, through the creation of habitats. These are located across England from Plymouth to Northumberland. 628 ha of species rich habitats and 9 km of hedgerow have been created at these local partnership sites. The habitats have been selected as those with the potential contribute to the uptake and storage of carbon but for which the evidence base is poor, including biodiverse grasslands, wetland mosaics, scrub, semi-natural woodland and hedgerows.	Rural farmland, grassland and woodland
UK Inter-Agency Group	Membership of the IACCG includes: Natural England,	The Inter-Agency Climate Change Group (IACCG) will showcase 12 projects on Nature-based Solutions from across the UK at its stand at the	Rural farmland, grassland

	Natural Resources Wales, NatureScot, Northern Ireland Environment Agency, Joint Nature Conservation Committee (JNCC), Environment Agency, Scottish Forestry, Scottish Environment Protection Agency (SEPA), Forestry Commission, Forestry England.	UN Climate Change Conference in Glasgow. To showcases some of the very best examples of projects on Nature-based Solutions from across the four countries of the UK	and woodland
The Nature Recovery Network	DEFRA	The Nature Recovery Network is a growing national network of wildlife-rich places, stretching from our cities to countryside, mountains to coast. It is supported by green and blue spaces that buffer and connect these wildlife-rich sites.	Rural farmland, grassland and woodland

Table UK14. Other public interventions for NBS

EU funded projects

Name	Details of the project	UK case	Case specifics
CLEVER Cities	A European-funded project that trialled working with local citizens to 'co-design' the regeneration of urban areas to make them greener and healthier. London was chosen as one of three lead cities along with Hamburg and Milan.	The London project was a partnership between the Mayor of London, Peabody, Groundwork London and Social Finance.	CLEVER Cities Thamesmead: The project used 'nature-based solutions' to address local urban challenges in Thamesmead, South East London. This meant using landscape, planting and nature to help regenerate an area to provide environmental, social and economic benefits. It included traditional features like parks and green spaces, as well as 'urban greening' like rain gardens and street trees.

Table UK15. EU funded projects for NBS

5.3 Size and role of the market

Major characteristics of the market framework of NBS

The UK government are encouraging private investment in environmental iprovement, through their 'green finance strategy (HM Government 2023 A).

To encourage 'a step-change in levels of investment', the Green Finance Strategy represents the governments efforts to '[equip] the market with the information and tools necessary to drive

the transition'. This includes publishing a 'nature markets framework' explaining that markets will be developed to attract investment into natural capital. This framework explains that the introduction of compliance markets in England for biodiversity net gain will allow developers to ‚buy units from habitat creation projects to meet their obligations to mitigate the environmental impacts of development and contribute to the recovery of nature'.

This market is central to developers' ability to compensate for, or offset, NBS provision as part of their biodiversity requirements. Where developers do not provide NBS on site, they will be able to tap into the market for off-site NBS provision, by investing in land and NBS in other areas.

This growing market for biodiversity offsetting is, in some quarters, seen to be contributing to the financialisation of land, since landowners may start to view their land as a source of new income. Some view the market as relatively uncoordinated, since there is as yet no coordinated system of landscape planning across England. Without a comprehensive landscape plan, offsetting investments may be made according to market principles (i.e. developers may make their investment decisions according to the simplest and most straightforward options available, and landowners may participate in this market by selecting the highest bidder able to capture those investments, rather than offsetting investments being coordinated according to carefully designed parameters about where biodiversity compensation might achieve its best results in terms of social and biodiversity value).

How dominant are purely market-based interventions?

The UK government has placed great stock in protecting and restoring nature through market mechanisms. The UK's flagship NBS policy, the biodiversity net-gain requirement, is one that works through setting the right framework for market provision, rather than a state-led provision of NBS or the protection of nature. Very much like S106 (of the Planning and Compulsory Purchase Act 2004 – the UK's flagship affordable housing delivery policy whereby a proportion of all newly developed housing provided by private developers must be 'affordable', rather than affordable housing being provided on its own terms, directly through the public sector and separate from housebuilding by private developers) the biodiversity net-gain policy is dependent on the work of private developers, requiring the provision of NBS to be incorporated as a condition of operating within this market, rather than NBS provisions being made on its own terms, in the basis of the public interest, through public sector actions.

The requirement that local authorities develop local nature recovery strategies should go some way to correcting the lack of a comprehensive landscape planning instrumment in England and Wales. While this instrument does not provide a strategic landscape plan to align NBS provision across the country, these plans should provide the public sector with some level of control, determining how the provision of NBS in local areas (through policies such as biodiversity net-gain) can be more aligned with their own local plans and policies. At the same time, without the benefit of an overarching national strategic plan for NBS, this could place a lot of responsibility at the door of local authorities, not least corraling and negotiating with the private sector over the specific nature of NBS provision. Local authorities may well need to establish their own frameworks for monitoring, assessments and indicators, both in order to design comprehensive plans and requirements for NBS provision that is fitting to the specific

needs of their local area and population, and in order to enforce those plans and monitor their results as actioned by the private sector. This could require developing a new layer of expertise at a time when many local authorities are underfunded and facing resource and capacity constraints. We may find that there is uneven capacity across different local authorities depending on the pre-existing inequalities and capacity constraints within different areas. Some local authorities may be more willing, or able, to finance external consultants for the development of their own policy frameworks for plan making. Others may be more willing, or able, to work with private developers in ways that ensure the public interest is best served by NBS provision through private development. It may be interesting to investigate, at the interview stage, whether the different capacity constraints of local aurthorities in different parts of the country could have implications for how NBS is rolled out in practice, through interactions with the developers engaged in these processes. A further question is how different local authorities are able to modify and mediate the specific ways that NBS provision within privately coordinated housebuilding might impact housing access and affordability for local populations.

5.4 The multilevel governance process

The House of Lords Science and Technology Committee holds the government to account on its policies relating to science and technology, principally through undertaking enquiries, such as the 2021 inquiry into Nature-based solutions for climate change (UK Parliament 2021). This process allows interest groups to feed into the policy making process, by calling for written and oral evidence from national and local experts. The Inquiry then uses this evidence to interrogate the government's policies for NBS, including the Local Nature Recovery Strategies.

Evidence to this enquiry was provided by the following interest groups:

Interest group name
Scottish Forestry
IUCN UK Peatland Programme
UK Centre for Ecology and Hydrology
Nature Programmes, Green Finance Institute
Finance Earth
Country Land and Business Association (CLA)
Science and Nature, National Trust
Scotland's Rural College (SRUC)
Climate Change, Natural England
Forest Services, Forestry Commission
Environment Agency
National Farmers Union (NFU)
Marine Management Organisation (MMO)
Royal Society for the Protection of Birds (RSPB)
Nature and Climate Change, NatureScot
Scottish Forestry
Blue Marine Foundation
Bright Blue
British Ecological Society (BES)
Climate Solutions Exchange
UK Centre for Ecology and Hydrology
Food, Farming and Countryside Commission
Finance Earth

Forest Canopy Foundation
Game and Wildlife Conservation Trust
Landscape Decisions Programme Network
MyOcean Resources Limited
National Association for Areas of Outstanding Natural Beauty (NAAONB)
Soil Association
Society for Applied Microbiology (SfAM)
Sustainable Soils Alliance
Wilder Carbon Ltd
Wildfowl and Wetlands Trust
The Wildlife Trusts
WWF

Table UK16. Interest groups providing evidence to the 2021 Parliamentary inquiry into Nature-based solutions for climate change

This inquiry identified challenges relating to the implementation of Local Nature Recovery Strategies (UK Parliament 2021), and a response from the UK Government (DEFRA 2021), as follows:

Recommendations made by Parliament	Government response
We recommend that the Government follows the recommendations from the Committee on Climate Change in setting targets for nature-based solutions. Where it does not do so, it should provide an evidence-based explanation as to why not, and how it can still reach net zero. It should define terms in its pledges where definitions are contested; this applies particularly to the term "protected".	We are introducing legally binding long-term environmental targets under the Environment Act, which will drive action by successive governments to protect and enhance our natural world. These targets will cover nature-based solutions, including creating or restoring in excess of 500,000 hectares of a range of wildlife-rich habitat outside protected sites by 2042, compared to 2022 levels and increasing woodland cover from 14.5% to 17.5% of total land area in England by 2050.
We recommend that the Government establishes ambitious skills and training programmes for land managers, authorities developing Local Nature Recovery Strategies and public delivery bodies. Training in surveying, monitoring and verifying, carbon accountancy, forestry, ecology, and planning and carrying out naturebased solutions needs to be expanded urgently. The Department for Education and the Department for Business Energy and Industrial Strategy must allocate some of their funding to this effort to make schemes accessible to land managers and provide sufficient skilled personnel to meet targets	• To ensure that responsible authorities are ready for Local Nature Recovery Strategy rollout, we will provide materials, resources, and specialist advice from Defra ALBs. • Natural England is scoping the potential to create an Environmental School of Excellence both to develop in-house capability, standards and professionalisation, and to support the wider sector to deliver local nature-based solutions
We recommend that the Government provides additional support as a matter of urgency for land managers, in the form of a dedicated advisory service, to help them engage with Environmental Land Management Schemes. The advisory service should be delivered in collaboration with public delivery bodies and should help land managers through the application process. It should help farms to identify the most	We want the environmental land management schemes to be user friendly, and easy to access and engage with, so that advice can focus on where it will really add value. The Future Farming Resilience Fund has been developed to provide free business support to farmers and land managers during the agricultural transition. ALB advisers will also provide free support to

appropriate actions to take, the support they need and can expect, and the likely environmental impact of their actions.	encourage good engagement and ensure high quality agreements. We are exploring through our tests and trials and detailed policy design work the likely need for advice in these schemes, how best it could be delivered, and who is best placed to provide it.
We recommend that the Government develops an overall land use strategy. This should outline how nature-based solutions will contribute to net zero emissions, how they will be integrated with other policies and how trade-offs in land use will be managed. The Government needs to describe how the UK's land can deliver the multiple services demanded of it without offshoring emissions. The Government should work with large landowners, including land and marine managers such as the Ministry of Defence and the Crown Estate, to achieve its objectives.	Meeting our climate targets will require careful consideration about the way we use our land, considering tree planting, peatland restoration and biomass production. We are also exploring other demands on land to meet governments commitments on biodiversity and nature recovery, climate adaptation, housing and infrastructure, and food security. Defra is currently conducting spatially explicit analysis bringing together social, physical, economic, and ecological evidence to assess the level and type of changes indicated by government commitments. This analysis will help to support multifunctional land uses and inform our approach to managing trade-offs. This approach and the need for a land use strategy will be kept under review as the work progresses this year.

Table UK17. Recommendations presented by the 2021 Parliamentary inquiry into Nature-based solutions for climate change, and response from government

With regard to the built environment (rather than remote rural areas) NBS policy in the UK amounts to the biodiversity net gain requirements placed on developers, and the requirement for all councils to have a Local Nature Recovery Strategy in place, providing a strategy for developers' biodiversity net gain contributions.

Thus, the UK's NBS policy is effectively a national framework, coordinated by local authorities, and delivered by the market. This requires that local authorities develop or acquire skills in measuring the performance of different NBS, in prioritising interventions, in how NBS benefit different groups of people differently, in creating and using indicators, and in understanding and communicating the various and multiple benefits of different NBS to developers and to the public. Developing these skills requires capacity at a time when local authorities are under resourced and lack in-house expertise, and there is a risk that this type of multi-level policy coordination could amount to 'responsibility dumping' by the national government onto local authorities, without clear guidance and additional resources. The House of Lords Inquiry into Nature-based solutions for climate change recognised the need for "ambitious skills and training programmes for […] authorities developing Local Nature Recovery Strategies" (UK Parliament 2021), to which the government have responded that they are providing "materials, resources, and specialist advice from Defra ALBs" (DEFRA 2021). Some feel that local authorities have more questions than answers, indicating a fragmentation of policy between the national and the local level.

Nevertheless, in advance of the Local Nature Recovery Strategies which local authorities are mandated to have in place in 2024, there already exist many local authority framewroks, strategies and initiatives for NBS, including town hall and community plans, both in place and

under construction (see e.g. Massini et al 2021 for the London Borough of Hackney, or London Borough of Islington 2020b). Thus while some feel the NBS policy is poorly coordinated at the UK scale, the reality is that some areas have plans and policies in place that have allowed them to hit the ground running with the new requirements. The degree to which this varies across the UK may depend on resourcing, local politics, and the mix of professionals working at each authority. This also opens a space for consultancies to assist local authorities with developing metrics for NBS and biodiversity measurement, with designing monitoring frameworks, with measuring and mapping benefits, and assessing the potential for scaling up, for example.

Additionally, local authorities are supported by Natural England, a non-departmental public body designed to advise the government on the natural environment in England. Natural England provide authorities with access to evidence and technical information notes, as well as launching the Responsible Authority Network, a 'forum for enhancing capability and capacity within and acorss [authorities] to assist in preparing high-quality LNRSs', and recruiting Nature Recovery leads to support plan delivery, as outlined in their letter to chief planners (Natural Engalnd 2024).

Authorities may also be supported by a tier of regional government where one exists (e.g. the GLA in the case of London). The GLA have developed various initiatives, including a policy inventory to create a more wholistic understanding of NBS and green infrastructure and the London green infrastructure framework (currently under construction), as well as pre-existing grameworks such as the London Environment Srategy and the All London Green Grid (ALGG), a policy framework to promote the design and delivery of green infrastructure across London.

Key actors and institutions

Institution type	Name	role
Local and regional governments	Numerous	Local authorities are responsible for designing and implementing the new Local Nature Recovery Strategies, often supported by a range of consultants.
Central Government	Department for the Environment, Food and Rural Affairs (DEFRA)	DEFRA are responsible for all biodiversity legislation, and mandating the requirement for Local Nature Recovery Strategies. They are also the department responsible for sponsoring Natural England, the Environment Agency, and the Joint Nature Conservation Committee.
	Natural England (non-departmental public body)	Natural England provides advice to central government, and supports local authorities. It is responsible for ensuring that England's natural environment, including its land, flora and fauna, freshwater and marine environments, geology and soils, are protected and improved.
	The Environment Agency (non-departmental public body)	The Environment Agency is concerned with ‚creating better places for people and wildlife'. The development of biodiversity net gain policy and guidance has been a collaborative effort

		between DEFRA, Natural England, the Forestry Commission and the Environment Agency.
	Joint Nature Conservation Committee (JNCC) (non-departmental public body)	JNCC is the public body that advises the UK Government and devolved administrations on UK-wide and international nature conservation. The Committee monitors biodiversity, evaluates options and provide advice to ensure that the natural environment is protected in an effective way.
	UK Inter-Agency Climate Change Group (IACCG)	The UK Inter-Agency Climate Change Group (IACCG) brings together representatives from the UK environmental agencies. Membership of the IACCG includes: • Natural England • Natural Resources Wales • NatureScot • Northern Ireland Environment Agency • Joint Nature Conservation Committee (JNCC) • Environment Agency • Scottish Forestry • Scottish Environment Protection Agency (SEPA) • Forestry Commission • Forestry England
Experts, interest groups and NGOs		There exists a myriad ecosystem of of NGOs, often working with local authorities. These are almost countless but some examples are given here: • Parks for London works with landowners and managers to protect and improve London's green infrastructure. • The Nature-based Solutions Initiative are an interdisciplinary team based at the University of Oxford seeking to shape policy and practice on nature-based solutions, producing case studies, guidelines, research, reports and other resources. • Thames21 is the voice for London's waterways, working with communities to improve rivers and canals for people and wildlife. They have a programme on urban wetlands, and champion the use of natural flood management and sustainable urban drainage systems, which are sub-categories of NBS.

Table UK18. Key institutions involved in the policy cycle for NBS

5.5 Achievements, assessments, and challenges

Nature is viewed as an asset in the UK real estate sector, and as something that enhances real estate value (Juntti and Ozsezer-Kurnuc 2023). A significant category of impact for NBS

is the value of residential properties, and therefore the potential for green gentrification in neighbourhoods benefitting from NBS interventions.

Where developers design their Biodiversity Net Gain Plans with enhancing property values in mind, they may pursue a limited range of NBS, which may not provide the greatest natural or social value in newly developed areas. There currently exist no metrics of social value for NBS (Juntti et al 2025), making it difficult for authorities to negotiate these benefits for local residents. In particular, solutions may be chosen which deliver limited community value, or which benefit certain priviledged groups and types of use, over others (Juntti et al 2025). Choices around location may also channel economic, social and environmental benefits into the most expensive and desirable areas of mixed-tenure developments, stratifying communities and entrenching inequalities.

Additionally, BNG requirements increase the delivery and maintenance costs associated with new housing development. Against the backdrop of polycrises increasing the costs of construction, and stagnating house values, developers may seek to offset costs by negotiating down their planning gain contributions (for social homes) through viability assessment negotiations with local authorities. For registered providers of social homes who cannot make such viability negotiations, this makes the delivery of affordable housing schemes more challenging. This could produce an unequal playing field between different kinds of housing providers, in terms of their ability to negotiate rising costs.

The uneven nature of local authorities‘ capacity to design and deliver Local Nature Recovery Strategies may also be significant. This is the tool through which authorities can corrale natural and social value from private developers‘ biodiversity net gain contributions, according to the public interest. Where local authorities are well placed to seek the support of consultancies and design effective strategies, they may be able to lessen the extent of green gentrification. That being said, authorities depend on the finance made available from private development for their provision of social housing and other community goods. This feature of the UK housing system may disincentivise authorities from negotiating with developers over the type and location of NBS delivery, so that communities benefit from the biodiversity value that is protected by law.

The previous points are summarised in the table below, with further insights drawn from Policy Lab workshop #1, held in London.

Hypothesis: impacts on housing inequalities	**Further insights, drawn from Policy Lab workshop #1 (WP7)**
Coordinating biodiversity net-gain (BNG) contributions for new development (a legal	BNG requirements increase their delivery and maintenance costs, and means getting a deliverable affordable housing scheme to work is harder.

requirement in the UK) both on- and off-site is a recent addition to affordable housing providers' costs – with the potential to affect affordable housing delivery.	In some urban areas BNG contributions for new development will be particularly expensive, where the urban area is dense or doesn't have the infrastructure required for NBS (e.g. filtration, soil, space). The new BNG regulations have increased the number and range of consultancies that housing providers (both social housing providers and private developers) need to pay, which also raises the costs associated with housing development. Additionally, on sites developed by private developers, rising costs associated with BNG contributions could lead to reduced numbers of social homes in new developments, as private developers and housebuilders seek to offset costs by negotiating down their planning gain contributions (for social homes) through viability assessment negotiations with local authorities.
Where developers design their BNG Plans with enhancing property values in mind, they may pursue a limited range of nature-based solutions (NBS), which may not provide the greatest natural or social value in newly developed areas.	Additionally, bigger private developers may be able to reduce their BNG contributions on account of rising costs. Since affordable housing providers are more regulated than private developers, they are less able to circumvent their BNG requirements. This could produce an unequal playing field between different kinds of housing providers, in terms of their ability to negotiate rising costs.
Choices around location may also channel economic, social and environmental benefits into the most expensive and desirable areas of mixed-tenure developments, entrenching inequalities.	Biodiversity-rich sites may be less likely to be allocated for social homes, because they will be unviable for social housing providers.
The different capacity constraints of local aurthorities could have implications for how NBS are rolled out in practice, through interactions with the developers engaged in these processes.	Local authorities have inconsistent capacities, and also are given responsibility for how Local Nature Recovery Strategies and BNG contributions should be coordinated in practice, leading to inconsistencies, complexities and additional costs for housing providers. A multi-level governance 'disconnect' was noted between central government and local authorities. While central government has established BNG requirements for new development and some guidance, it falls to local authorities to say how this should work in practice. This disconnect often manifests in the use of external consultancies to manage the

	relationship between central and local government. This can result in inconsistencies in the approaches of different local authorities, which also exacerbates the complexity, and additional costs, faced by housing providers (both private developers and social housing providers) working across multiple authorities.
Potential for green gentrification in areas identified for large-scale redevelopment	Regeneration projects which leverage nature to improve social value, quality of life, inward investment, tourism, or reputation could lead to green gentrification, particularly if these require the demolition and removal of existing homes to make space for nature-based solutions and nature-focused landscape architecture. Funding from Homes England for the construction of new social housing will be crucial to mitigating inequalities.

Table UK19. Summary table

6 Densification

6.1 The policy cycle: emergence of the issue and policy decisions

Emergence of the issue in national policymaking

On the face of it, housing densification in the UK can be considered part of the central government's low-carbon strategy. Densification has come to be understood as a way to encourage less carbon intensive lifestyles, reducing car dependency and domestic emissions (Quinio and Rodrigues 2021). Threads of the green agenda can be found in the UK Government's discussions around denser, mixed-use or 'walkable' neighbourhoods. For example, the UK Environmental Improvement Plan 2023 included the commitment „that everyone should live within 15 minutes walk of a green or blue space." (HM Government 2023 C). This is resonant of the '15 minute city' concept, which aims to tackle both the climate crisis and urban sprawl through the creation of dense, mixed-use urban neighbourhoods (Moreno 2016: The 15-Minute City: A Solution to Saving Our Time and Our Planet).

In recent years, the UK government's rhetoric around inner-city densification and new urban extensions has also been framed in these terms. Policies like the relaxation of planning rules to allow for the conversion of industrial sites and retail spaces into homes in city centres have been framed as part of a plan to create denser, 'walkable', livable communities. In July 2023, then Secretary of State for Levelling up, Michael Gove, said that government would be ""unequivocally, unapologetically and intensively concentrating our biggest efforts [to increase housing numbers] in the hearts of our cities". (BBC 2023). This went hand in hand with the recommendation that "local planning authorities are not expected to review the Green Belt to

deliver housing" (Michael Gove, quoted in CPRE 2022), and represented discourses around prioritising nature and environmental concerns.

However, looking at the history of densification in the UK shows it has deeper roots, and emerged very separately to the green agenda. Neither is there a significant EU dimention to densification in the UK; densification policy within the UK has its own very distinct hstorical context. The foundation to UK densification strategy is found in the 1955 Green Belt Circular (Circular 42/55) of the Ministry of Housing and Local Government, prior to the UK joining the EU. This policy outlines five key purposes, amongst which are to check the unrestricted sprawl of built-up areas, and to assist in urban regeneration by encouraging the recycling of brownfield urban land. While this does not reference densification directly, the policy of recycling inner-city brownfield land and restricting urban sprawl is in effect, in a context of rising populations, a policy for urban densification, prioritised in UK planning policy from the 1950s onwards. This policy guided densification in the UK until the early 2000s, when the pressure for increased housing developement in the UK became particularly acute, and lead the New Labour government to strengthen urban intensification policy through strateges like the Sustainable Communities Plan (see below). Thus, densification has been consistently prioritised in the UK and sits largely outside the influence of EU intervention, as well as sitting outside of sustainability concerns.

Many of the areas currently being densified in the capital were demarkated in the 2004 London Plan as Opportunity Areas (OAs), which defines London's key locations with potential for substantial provision of new jobs and homes (OAs typically have capacity for at least 2,500 homes or 5,000 jobs). These were part of the Central London Growth Corridor, steering densification through large-scale development and regeneration in areas already supported by key transport infrastructures or linked to potential public transport improvements (new London Underground lines, stations or multi-modal nodes). OAs have been unlocking large pieces of (publicly-owned) land through the regeneration of large social housing estates, active industrial estates with low density, and inactive brownfields. There are similar to programmes in other large and middle-sized de-industrialised cities in England, that have followed the London OA model, we focus here on the London model as illustrative of this paradigm. Despite the substantial increase in housing provision by the private sector and non-proft sector, this mode of densification has driven a loss or transfer of social housing stock, processes of residential displacement into peripheral areas, and gentrification.

By analysing and understanding the actual underlying rationales behind densification in the UK, as well as the mechanisms and policy processes that have been used to achive it, this calls into question the strategic relationship between densification and the net-zero agenda. Instead, we suggest that densification is more closely linked to the politics of land and the residualisation of social rented housing in the UK. Within the mechanisms for housing delivery that have been established as part of the UK housing (and planing) system, regeneration and densification are processes through which housing provision – and the land underlying housing provision – have become privatised, and the land and housing system is further re-commodified. This form of urban development has been prioritised in the revitalisation of cities and, notwthstanding current discourses around walkability, sustainability and inclusivity, they can radically increase housing inequalities in the affected areas.

In the UK we can distinguish between ‚hard' densification (large-scale (re)development projects concentrated on large pieces of land, usually kick-started through legislative catalysts such as Growth Corridors and Opportunity Areas, and often focused on regenerating pre-existing social housing estates, brownfield and active industrial sites), and 'soft' densification, sometimes called "English-style densification" (Touati 2015) (small-scale development scattered throughout the city or rural areas, such as infil sites, garden ‚grabbing', rural exception sites, windfall sites, conversion of single-family houses into apartments, and small-scale redevelopments using permitted development rights).

1930s-1990s: Metropolitan green belt policy as the foundation for urban densification

Densification is an important aspect of the UK's green belt policy (as set out in the National Planning Policy Framework), which was established in 1955 and designed to encourage development within settlement boundaries, in order to limit urban sprawl. Ecological sensitivity grew in the 1970s - 1990s, with this policy being championed for reasons of environmental protection, and densification of inner-city areas established as an ideal

2003: Sustainable, 'mixed' communities

The Sustainable Communities Plan was intended to guide redevelopment across England. The plan prioritised urban intensification across England and idenfied key Housing Growth Areas for concerted densification: The Thames Gateway, The London–Stansted–Cambridge–Peterborough Corridor, Milton Keynes–South Midlands, and Ashford (Kent). Notably, none of these areas are in the Midlands proper or North of the country.

Additionally, under this plan, the creation of 'Mixed communities' became a goal throughout the country, by which all new developement should be mixed tenure, „reflecting an integrated and egalitarian society in which people of all social classes and incomes share the same space, services and facilities, creating conditions in which mutual understanding and/or shared norms can potentially develop." (Tunstall and Lupton 2010).

However, sites for mixed-tenure development and regeneration were identified using the indices of deprivation, to focus redevelopment in deprived neighbourhoods. Thus, the policy effectively concentrated redevelopment in areas of high social housing density, ultimately reducing the numbers of affordable homes available to the local community. The underlying rationale of ‚mixed communities' has been called into question. Lupton and Tunstall (2008) argue that the policy of ‚regenerating disadvantaged neighbourhoods by reconstructing them as mixed communities' is based on „a neoliberal analysis of the problems of low-income neighbourhoods, in which structural problems are individualised and spatialised, and disadvantaged neighbourhoods, particularly those with majority social housing tenure, are discursively repositioned as irredeemably problematic."

2004: First London Plan under Mayor Ken Livingston: local authorities to identify areas for densification

The first London Plan, developed under mayor Ken Livingstone, stipulated that the London boroughs should survey their local areas for key parcels of land that could be made available, and where density could be increased, to meet massive local housing needs targets. These

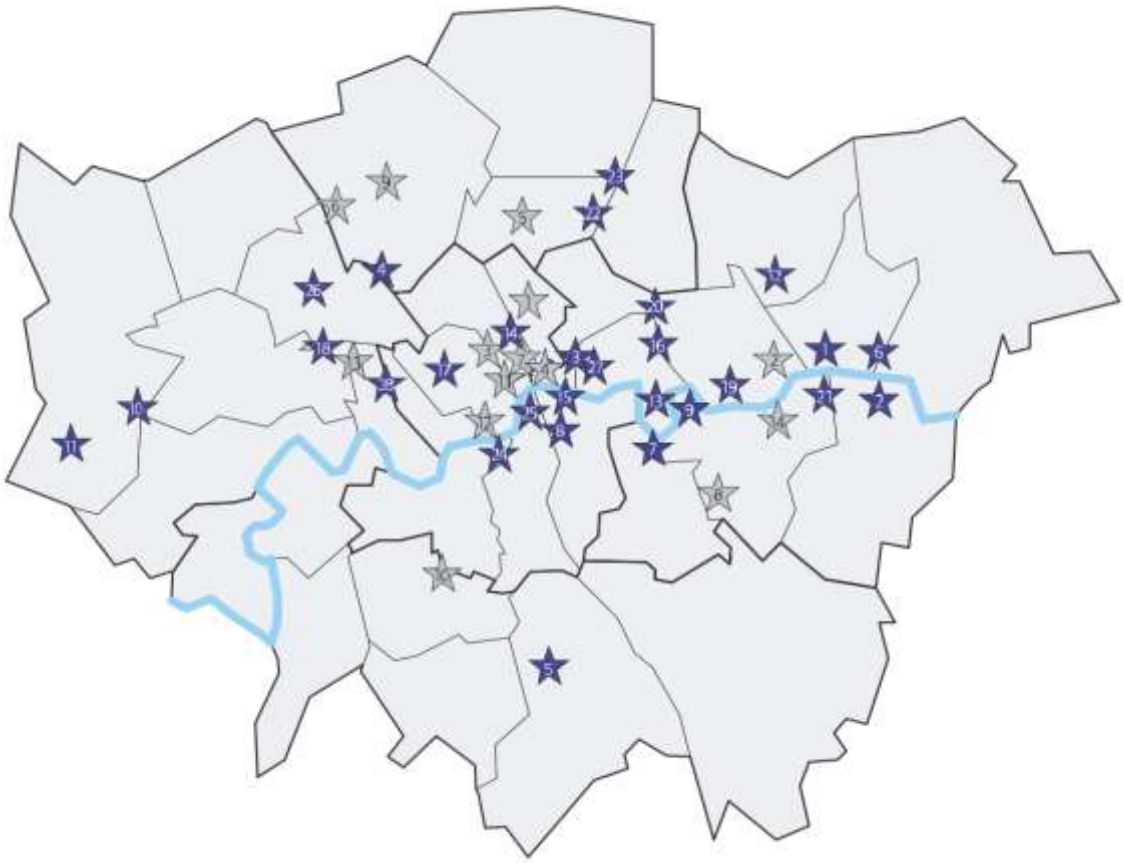
areas were to be identified in relation to their local infrastructure capacity to serve a higher density of homes. They therefore needed good connection to transport hubs, which would make them more ‘sustainable’.

While the key method of densification was to draw private investment into these areas, the plan aimed to protect the provision of social and affordable housing through the substantial sums of Section 106 (S106) money that denser development could deliver (New London Architecture 2024). S106 (of the Planning and Compulsory Purchase Act 2004) stipulates that a proportion of all newly developed housing provided by private developers must be ‘affordable’, and the plan contained an ambitious strategic target that developers should provide 50% affordable homes (70 per cent social housing and 30 per cent intermediate housing). However, by linking social housing delivery to the proportion of private housing delivered, Section 106 means that social housing is not provided on its own terms, instead being linked to the profit requirement of the private sector. This has opened the proportion of affordable housing delivery open to negotiation within specific planning applications. At the time, there was debate about whether such high affordable housing targets would act as a disincentive for developers, or whether the opportunity to build at higher densities would draw developers into the housing programme (Blackler 2002).

Emergence of Opportunity Areas

The first London Plan contained the objective to accommodate London’s growth within its boundaries, partly by allowing several ‚Opportunity Areas‘ to intensify (or densify) in order to accommodate the growing housing need and growth in jobs (see also Chapter 3, Part B). Opportunity Areas became a baseline for a new wave of regeneration and densification across London. The Plan states: “*Opportunity Areas have been identified on the basis that they are capable of accommodating substantial new jobs or homes and their potential should be maximised. Typically, each can accommodate at least 5,000 jobs or 2,500 homes or a mix of the two, together with appropriate provision of other uses such as local shops, leisure facilities and schools. These areas generally include major brownfield sites with capacity for new development and places with potential for significant increases in density*.“

map 2A.1 Opportunity Areas and Areas for Intensification



★ Opportunity Areas

1. Barking Reach
2. Belvedere/ Erith
3. Bishopsgate/ South Shoreditch
4. Cricklewood Brent Cross
5. Croydon Town Centre
6. London Riverside
7. Deptford Creek/ Greenwich Riverside
8. Elephant & Castle
9. Greenwich Peninsula
10. Hayes/West Drayton/Southall
11. Heathrow/Feltham/Bedfont Lakes
12. Ilford
13. Isle of Dogs
14. King's Cross
15. London Bridge
16. Lower Lee Valley
17. Paddington
18. Park Royal
19. Royal Docks
20. Stratford
21. Thamesmead
22. Tottenham Hale
23. Upper Lee Valley
24. Vauxhall/Nine Elms /Battersea
25. Waterloo
26. Wembley
27. Whitechapel/Aldgate
28. White City

Source: https://www.london.gov.uk/sites/default/files/the_london_plan_2004.pdf

London boroughs are required to prepare Opportunity Area Planning Frameworks (OAPFs), which set the frameworks for planning applications for private development on these sites. These set out „how [local authorities] will encourage and deliver the growth potential of OAs and support development that create job opportunities and housing choice for Londoners“ Mayor of London n.d.). In the most recent London Plan (Mayor of London 2021), Opportunity Areas are intended to support regeneration and the creation of mixed communities.

2011: London Plan under mayor Boris Johnson

London Mayor Boris Johnson abolished affordable housing targets, and while his Housing Strategy urges that schemes „must … provide an uplift in affordable housing where viable“, in reality this created conditions where no additional social housing would be built in areas where social housing already existed, as the strategy effectively ensured only that “any affordable homes that are demolished as part of estate regeneration schemes are replaced on a like-for-like basis“ (Mayor of London 2018). During this time many redevelopment projects delivered affordable housing proportions in the low teens (New London Architecture 2024). This also occurred during a time of austerity, which meant local authorities increasingly lacked resources and capacity, something used to justify the authorities' increasing inability to negotiate for higher proportions of social housing with private developers, due to the S106 mechanism which reduced their leverage. This plan therefore altered the mechanisms of densification to weaken value capture as a mechanism for the production of social housing.

2012: creation of the National Planning Policy Framework (NPPF)

The NPPF simplified the previously disparate and single-issue planning policy guidance notes and statements into a single national planning strategy that supported urban intensification, use of brownfield land for development, and high-density development near public transport. This national-level policy document set the framework for local urban densification strategies such as London's onoing Opportunity Areas and subsequent Housing Zones.

2014: Housing Zones

This programme was launched by the Mayor of London Boris Johnson, and Chancellor of the Exchequer George Osborne, creating 20 Zones in London in which homes could be delivered at greater density on brownfield land. £400 million of funding was made available, for local authorities to submit applications to designate an area of ‚majority brownfield land' as a Housing Zone, usually including „a bid for investment finance from private sector development partners to enable housing schemes to be unlocked or accelerated“. Each bid for Housing Zone designation was required to include „either (a) … a bid for investment funding from one or a number of private sector partners or (b) confirm that the local authority only wishes to apply for Housing Zone designation and provide a development proposition that will be delivered without government investment.“ (DCLG 2014). Under this scheme, Housing Associations including Peabody have successfully partnered with local authorities to bid for GLA Housing Zone status in several areas.

2016: Estate Regeneration National Strategy

The estate regeneration strategy extended the logic of 2003's 'mixed communities' to encourage the redevelopment of housing estates – usually areas of social housing density – across England. The policy provided 'a detailed framework' for how local authorities can support estate regeneration in their areas, from adopting a ‚place-based approach' to planning, to ensuring good design principles are adopted by developers on site, to meeting affordable housing needs on site, in order to deliver ‚mixed and inclusive communities'.

The estate regeneration funding prospectus enables areas to bid for a share of £140m of loan funding, £30m of enabling grant, and £2m of capacity building funding. This financial support from government is directly targeted at de-risking the early stages of regeneration schemes and providing support to areas for such activities as community engagement, feasibility studies, scoping of proposals and masterplanning. There is also support available for preconstruction activities such demolition and moving residents.

2021: London Plan under mayor Sadiq Kahn

In Sadiq Kahn's 2021 London Plan, the affordable housing target for new development was restored to 50%, with all affordable housing to be delivered on site, unless in exceptional circumstances.

The Mayor also outlined plans to put funding in place to ‚unlock' housing development and build on the Housing Zone programme. For example, the Plan outlines how in the Opportunity Area of thamesmead, „Housing Zone status and investment by Peabody in estate renewal in the area will improve the quality of the environment and bring new housing opportunities." (Mayor of London 2021). This followed a descision in 2020 to allocate £83.7 million of GLA affordable housing grant to the Peabody Trust for the acquisition of a large brownfield site in Barking and Daggenham. Thus, strategic planning for London at this time was geared towards funding private and non-profit sector partners to deliver housing, including against affordable housing targets, in specific areas designated for densification.

2023: UK Long term plan for housing commits to 'a new era of regeneration, inner-city densification and housing delivery across England'

These plans for a „programme of urban regeneration and a new inner city renaissance" stretch beyond London: „Densification, done the right way, will transform the opportunities available to people across the country" (Gove 2023). The plans included:

- Launching a consultation on new Permitted Development Rights, [which] would make it easier to convert larger department stores, space above shops and office space.
- Establishing a new "super-squad" team of leading planners and other experts charged with working across the planning system to unblock major housing developments, underpinned by £13.5 million in funding.

This strategy went hand in hand with a statement from the Secretary of State for Levelling Up, Housing & Communities, Michael Gove, confirming that „local planning authorities are not expected to review the Green Belt to deliver housing". (Gove 2022). Ultimately this meant that densification would be the primary strategy for housing delivery across the country, with stong guards in place against greenfield development.

6.2 The implementation process

The UK system of planning for housing

The legislative frameworks used to catylise densification are outlined in section 5.1., namely, Sustainable, 'mixed' communities, growth corridoors, Opportunity Areas, Housing Zones, and Estate Regeneration (National Strategy).

Analysis of this implementation process can be extended by looking at the UK planning system, which determines the role (and relative power) of central and local government, as well as the non-profit sector (and we return to the relationships between them in section 5.3 below). This section explains how through certain planning mechanisms, the role of local government has been weakened in densification processes, as well as how the role of housing associations and power of private sector developers has grown, with impliications for housing affordability.

The introduction of S106 in 1990 as the primary policy for the production and provision of affordable housing (see section 5.1) has weakened the role of setting statutory affordable hosuing targets for new development, since these can be negotiated down according to the viability of development for private developers. S106 agreements are negotiated and agreed during the planning process, therefore remove regulatory control over planning gain.

Several further mechanisms within the UK housing and planning system have limited the ability of local authorities to steer densification agendas or provide social housing within densification projects, including:

Local authority Housing Revenue Accounts (HRAs), a system of ring-fencing council revenue on housing (from social rents and Right-to-Buy sales) for spending on housing delivery, were introduced in the 1989 Local Government and Housing Act. With the pool of local authority housing shrinking with the RTB, this prevented local authorities from cross-subsidising housing delivery from other sources of revenue, effectively limiting local authority finance for housing. HRA 'borrowing caps' (a cap on how much local authorities can borrow against their housing assets to fund new developments) were also centrally defined, further limiting local authority finance for housing until they were abolished in 2018. This also limited local authority budgets for the maintenance and management of their housing stock, residualising this stock and meaning that authorities have become reliant on non-profit housing providers (mostly housing associations) for the production and provision of social housing and delivery of affordable housing targets. During the 1980s and 1990s, much of the social housing stock owned by local authorities was transferred to the non-profit sector.

As well as using the funds available in the HRA, since 2004, local authorities have been "free to finance capital projects by borrowing, provided they can afford to service their debts out of their revenues" (UK Debt Management Office n.d.). This has been part of a shift requiring local authorities to self-finance a greater proportion of their services, with reduced government grant, and has weakened local authority financial sustainability.

Local authorities have also been encouraged to dispose of public land, through policies such as the "Right to Regenerate", which "will enable public to require councils and public sector to

sell unused land and assets" unless councils can demonstrate a clear plan for future use, for conversion into homes by the private sector (MHCLG 2021). This undermines the ability of councils to protect public land for the provision of affordable homes in the future.

The UK planning system thus renders local authorities as enablers of densification by the private sector, rather than active shapers of the densification agenda. Authorities have needed to sell assets as a source of revenue and to attract private investment for residential growth, and social / affordable housing provision where possible. This emphasis on private sector housing provision and limiting of local authority involvement means that the densification agenda has created the foundations for new forms of 'affordable' housing provision by the private and non-profit sector which ultimately undermine genuine affordability (e.g. intermediate housing as a form of social housing not tied to local incomes but determined according to 80% of local private rents, or Shared Ownership programmes promoting home ownership as a share of the affordable housing offer of new densification projects).

Regeneration policy and strategy

'Soft' densification is encouraged in UK regulatory frameworks, nevertheless it is 'hard' densification (large-scale regeneration projects, including inner-city estate regeneration, growth corridoors, OAs, and urban extension projects into the surrounding countryside in smaller cities) that have a more significant impact on housing inequalities. This form of densification can be considered an exercise by government to stimulate private sector market activity within urban development. They are also indicative of a dis-alignment between central and national governments, through which the central government has prioritised expansion of the private housing sector (owner occupation and private rent) at the expense of social and affordable housing provision.

Growth corridors and OAs have created a legaslative framework for the implementation of hard-densification through the regeneration of social housing estates, brownfield and active industrial areas, with local authorities acting as enablers of private sector development to 'unlock' densification. Once initiated, these programmes can span 20-25 years (some have not yet been started), creating new housing markets and a huge increase in land value, usually near current or future public transport hubs at prime locations of central and inner London (1st gerenation regeneration, see below for details), and more recently in the outer london boroughs supported by the extension of the London underground Elisabeth line and other public transport routes (2nd generation regeneration). These 1st and 2nd generations of regeneration are intended to support a strategy of growth in the real estate market, by attracting large amounts of inward investment underwritten by the sale of public land and poor regulation of speculative activity. Rather than pursuing public benefit on its own terms, these schemes illustrate an approach by which "the lines between the state and developer become blurred as the state becomes increasingly reliant on land value capture to achieve broader public benefit" Ferm (2023: 265).

- **1st generation regeneration** projects link to the 2003 'Mix-community' policy outlined in section 5.1. This targeted central and inner-city boroughs, and was effectively the demolition of social housing estates (often moving social tenants further afield) to be replaced with denser mixed-tenure neighbourhoods, increasing

owner occupation and private rent in the area. These schemes often relied on non-profit housing providers for new social housing production, if any, and required that local authorities sell public land to developers as part of public-private partnerships, as outlined above.

- **2nd generation regeneration** replaced the governance mechanism of public-privare partnerships used in the 1st wave (e.g. London Borough of Southwark partnering with Lendlease landowner-developer) with non-profit-private joint ventures (e.g. Peabody housing association partnering with Lendlease landowner-developer). The increasing role given to non-profit sector housing providers in the 1st wave was scaled up in last decade, meaning that large housing associations are now the leading actor in coordinating regeneration projects, rather than local authorities. This new role for the non-profit sector is sometimes supported by central or regional government finance (e.g. Peabody were allocated £83.7 million of affordable housing grant from the London Mayor's affordable housing programme, for the acquisition of the former Ford Stamping Plant site in Daggenham, for regeneration inlcuding 50% open market tenures and 50% affordable tenures including Shared Ownership). Non-profit housing providers will also acquire land and housing from local authorities and other housing associations before establishing a joint-venture with larger private developers (e.g. Lendlease, a transnational real estate company). There is also a potential for financialisation of these sites if, for example, non-profit organisations issue bonds to finance the regeneration. This reflects a further weakening of the role of local authorities, which no longer lead or coordinate densification projects, but rather are left as enablers of the private and non-profit sector.
- **3rd generation regeneration** shows some positive signs of a paradigm shift towards an increased role of regional government (particularly the Greater London Authority), and direct provision of social housing by some local authorities. This is exemplified by the Regent Estate in Sommerstown, London, where the existing social housing stock has been retained and infilled with new affordable housing stock. Since the removal of the HRA borrowing cap in 2018, increasing numbers of local authorities have created public companies, often called "local housing companies", for direct delivery of new social housing stock (Marrs 2019). This new direction in densification has shown promising results and may be a response to increasing recognition of the need for new social and affordable housing, as well as grassroots contestation of 1st wave regeneration.

The Current Mayor of London, Saddiq Kahn, has made efforts to increase local authority housing provision within densification projects through various initiatives, including the Council-led Hosuing Network (peer-to-peer support and good practice sharing), the Housing Development Academy (providing development management courses to council teams) and underpinned by funding from the GLA Affordable Homes Programme (2021-26). In 2022 Kahn introduced a £4 million programme called Land for Council Homes Revenue Fund, intended to scale up local affordable housing delivery programmes by local authorities.

6.3 Size and role of the market

Soft-densification programmes are small construction interventions, supported by the national construction industry.

Hard-densification, catalysing development at a greater pace, fuelled the construction boom of the 2000s, with a large new market from private investors, large scale developers, and international institutions. Densification was harnessed by central government as a way to pursue inward investment by these institutions, as well as attracting house purchase by international buyers through the expansion of owner occupation, particularly in London (with many homes sitting empty). Thus, estate regeneration has been a way to release land in prime locations, with value captured disproportionally by the private sector.

There has been an increased role of the non-profit sector within such schemes, as detailed above in section 6.2.

The global financial crisis of 2008 only temporarily slowed the construction boom in areas marked for densification, but lead to a reorganisation of its governance, particularly through a renewed emphasis on Build-to-Rent models of private rental delivery (see Deliverable 4.1), paving the way for 'financialisation 2.0', in which risk-averse investors sought the more secure returns that could be achieved from private rental revenue streams. Unconventional monetary policy (e.g. Quantitative Easing) used post-2008 supported a 'rush-to-assets' and maintained the value of private property, and a continued prioritisation of regeneration as mechanism for drawing private investment into the housing market, urban development and the construction industry have maintained a development boom throughout this period.

Increasing pressure for new housing starts has lead to changes in permitted development rights allowing office-to-residential conversions to be completed without planning permission (Madeddu and Clifford 2022) and for industrial areas with low density industries to be released for housing development (Ferm and Jones 2017).

As noted above in section 5.2, the 3rd wave of regeneration represents a recent counter-trend in this market organisation, with the GLA supporting local authority housing delivery and the creation of some innovative programmes allowing local authorities to deliver housing through mechanisms not limited to planning gain (direct delivery, rather than through S106 agreements). However, these have been relatively small in size, and are restricted by local authority capacity and power relative to central government.

The size of the 'market' for densification is difficult to quantify in the UK case. While international investment from Real Estate Investment Trusts (REITS) and other financial institutions surged following the 2008 financial crisis, as Ryan Collins has observed, "Detailed data on non-bank private and institutional investment into the housing market in the UK is limited. This is an area where more transparency, disclosures and research is needed." (Ryan Collins 2024: 24). Institutional investment into residential assets rose consistently from almost 4Bn in 2012 to almost £10Bn in 2021, with £5.5bn of capital invested into UK residential assets coming from overseas (Knight Frank 2022). This market research also suggests that the proportion of institutional capital invested in residential property (over other forms of property including commercial) continues to rise (ibid). The UK has a consistent history of leveraging

deregulation, planning policy and public funds towards ushering private investment into real estate (See Deliverable 4.2, also Stirling et al 2022). Post crisis, during a low-interest-rate environment which constrained individual (and thereby institutional) investment into owner occupied housing, the government became interested in increasing investment into the private rental sector, commissioning the Montague Report (Montague 2012) which identified barriers to long-term institutional investment in purpose-built rental homes. Many of its proposals were adopted, for example the creation of a government supported Built-to-Rent development fund. Thus, while the pre-crisis market revolved around owner occupation, post-crisis this market was maintained by policies ushering investment into the PRS. While these shifts do not indicate the size of this market, they are an indication of broad policy support for and ongoing success of institutional investment into the UK real estate market, post 2008.

6.4 The multilevel governance process

Here it is worth drawing attention again to the tension that exists between central and local levels of government, which have very different priorities when it comes to housing delivery.

As we have described, densification has been enacted by all levels of government (but pursued particularly at the national level as a means of drawing private investment into the housing market and urban development) since 1990s.

Until the 2008 GFC, we would argue that local and national frameworks converged, with national densification strategies and the strategies of the GLA / Mayor of London following similar paths. These have ultimately intensified the residualisation of social housing and created a bigger role for the non-profit and private sector in the governance of densification, as detailed above in sections 5.1, 5.2, and 5.3.

Post-2008 we see a divergence in the direction of travel between the national level and the regional tier in London (the GLA). Successive London Plans (a competence of the GLA: see Section 5.1) have been used as a test-bed for new governance frameworks, including the removal of affordable housing targets by Mayor Boris Johnson (replacing social housing ‚like-for-like), the creation of Housing Zones in 2014, and then under Mayor Sadiq Kahn, the reintroduction of affordable housing targets at the local level, alongside innovative programmes to support direct delivery by the London Boroughs. While local authorities have been increasingly weakened through changes in the planning and housing system, this implies a role for regional tiers of government like the GLA, in protecting housing affordability.

While densification has predominantly been used to recommodify the housing system (through demolition of social housing, reduction of statutory affordable housing requirements and the privatisation of land), it is clear that the national and regional tiers of government can travel in different directions, each with implications for how the local level can operate through densification projects, and with potential for decommodification therein. Nevertheless, beyond the creation of the London Plan and use of affordable housing grant from the GLA's affordable housing programme, the GLA does not have direct competences on densification, and thus plays a largely supporting role to the London Boroughs.

Given the UKs emphasis on regeneration in London as the maim mechanism of densification policy (through OAs and other mechanisms), London itself might also be considered something of a test-bed for national strategy. The London Plan has been the site of experimentation (e.g. removal and reintroduction of affordable housing targets within densification frameworks), which are then in national strategies such as the 2016 Estate Regeneration National Strategy. This line of enquiry requires furthere analysis, however.

It therefore remains something of an open question the extent to which there is space for the continued development of alternative approaches and tools for densification that might foster the decommoification of land and housing, at the regional, and/or local level.

Key actors and institutions

Institution type	Name	role
Central Government	Office of the Deputy Prime Minister (ODPM 2001 – 2006)	Ministerial department responsible for housing, communities and local government. Design of UK policy strategy relating to densification, e.g. Estate Regeneration National Strategy (2016). Produces the The National Planning Policy Framework (NPPF), and the The Planning and Compulsory Purchase Act 2004, which sets the framework allowing S106 agreements to be negotiated between local planning authorities and ‚persons interested in land', determining contributions, arrangements and restrictions as planning agreements or planning obligations.
	Department for Communities and Local Government (DCLG 2006 – 2018)	
	Ministry of Housing, Communities and Local Government (MHCLG 2018 – 2021)	
	Department for Levelling Up, Housing and Communities (DLUHC 2021 – 2024)	
	Ministry of Housing, Communities and Local Government (MHCLG 2024 –)	
Local and regional governments	GLA	The Mayor of London leads the GLA and is responsible for the strategic governance of Greater London. Sets out the spatial development strategy for London to be followed by local authorities in the London Plan, including strategic initiatives such as Opportunity Areas and Housing Zones. Provides affordable housing grant from the Mayor's affordable housing grant, e.g. providing £83.7million of funding to Peabody housing association for the acquisition of the former Ford Stampint Plant site in Dagenham for mixed tenure housing delivery (50% ‚affordable' tenures inclusing for owner occupation).
	Local authorities (numerous)	Coorinate planning strategies, permissions and land reslease e.g.: prepare local housing needs assessments and design local development plans, bringing land forward for development; form development agreements with private developers over the transfer of public land

		(including single-tenure social housing estates) for densification; negotiate S106 agreements with developers, including for the provision of social and affordable housing; partner with non-profit and for-profit housing providers and developers e.g. to submit applications to designate areas of majority brownfield land as Housing Zones. Would previously partner with construction companies and private developers to coordinate delivery of densification projects (1st generation densification); currently play a more enabling role, with non-profit housing providers performing this coordinating role (2nd generation densification).
Non-profit sector developers and housing providers	e.g. Peabody housing association	Currently the main actor cordinating densification projects. For example: Peabody as formed a strategic partnership with the GLA for the delivery of regeneration and densification projects, to deliver housing (including up to 7,000 ‚affordable' tenure homes in e.g. Thamesmead, Daggenham Green, and the former Holloway Prison in Islington. Peabody works in partnership with private construction companies (e.g. The Hill Group) to deliver masterplanning and housing at these sites. As the owner of densification sites (e.g. having purchased the site at Daggenham Green in partnership with Dagenham Dock Ltd), Peabody acs as the client coordinating development and acquiring services reated to sustainability, social value advice, town planning, architectural design, masterplanning, landscape design, public realm design, structural engineering, civil engineering, access and inclusivity consultancy, sales and capital markets consultancy.
Private sector construction companies, developers and housing providers	e.g. The Hill Group, British Land (a UK 'developer and asset manager') or Lendlease (an Australian multinational construction and real estate company)	With local authorities playing an enabling role to ensure land release for densification projects, private developers provide the capital required for design, construction, and delivery of new housing. These actors therefore ensure such schemes are ‚commercially viable'. Often work in partnership with local authorities or non-profit housing providers in the interest of public benefit (e.g. provision of affordable housing), nevertheless there are trade-offs due to these companies' profit requirements, and planning structures (e.g. S106, affordable housing targets, local authority capacity) which have weakened the leverage of the public interest.

Table UK20. Key institutions involved in the policy cycle for densification

6.5 Achievements, assessments, and challenge

UK densification strategy has encouraged the gentrification of areas designated for regeneration through the residualisation of the social housing stock and extension of owner occupation and private rental tenures.

More significantly, densification has been used to recommodify the land and housing supply system, progressively weakening the role and power of public institutions in these processes, and transferring land, responsibility and revenue streams to the private sector, including to large international organisations. This opens the door for the financialisation of land for densification and the management of these projects, with huge implications for residential inequalities, not least curbing the redistributative role that local authority direct delivery can play in housing provision.

In place of central government finance, the hard regeneration projects detailed above have depended on bringing forward the value inherent in public land (including single tenure social housing estates) and transfering this to the private sector. This means that provision of affordable housing under this densification agenda relies on cross-subsidising social provision with the provision of private tenure owner occupied or rental homes (as negotiated under S106 agreements between local authorities and the developers who take ownership of densification projects). The National Housing Federation suggests that cross-subsidy models of housing delivery result in a net decline in social housing on all estate regeneration projects, alongside an increase in private tenure housing (Riding 2024b). This is supported by Penney (2024) Who illustrates the extent of social housing loss using examples from the Heygate and Aylesbury Estate Regeneration programmes in the London Borough of Southwark: „*On these two estates, 3,971 homes, including 3,435 council homes, will have been demolished by 2035. In their place, a total of 6,979 homes (1.76x density) have been built or planned: 1,897 (27%) will be social homes, 1,017 (15%) will be intermediate homes, and 4,065 (58%) will be market homes. This represents a net loss of 1,538 truly affordable homes. Additionally, the replacement social rented homes are being provided with less secure Assured Tenancies and with £107.51 higher average per week social housing costs*“.

Constraints

The transfer of public land to private ownership, encouraged under the regeneration agenda, constrains direct delivery of social housing by local authorities. This has an impact for any future programmes to expand the decommodified housing stock, as land price cannot be controlled or constrained, meaning it will cost far more to deliver public services (including housing provision) on private land. As an additional concern, since industrial areas have also been targeted for release to private housing developers, there is a risk that many SMEs will be relocated, undermining ‘blue-collar’ employment opportunities and substituting these for predominantly owner occupier and private rental tenure housing.

Opportunities

We have pointed to various innovative programmes of the GLA intended to support local authority housing delivery. This includes the Council-led Hosuing Network, the Housing Development Academy, and the £4 million Land for Council Homes Revenue Fund. The

removal of the HRA borrowing cap in 2018 increased local authority access to finance, and some local authorities have created 'local housing companies' for direct delivery. While these initiatives are unlikely to reach scale while local authorities are not sufficiently supported by central government grant, they at least offer opportunities for more direct delivery, and indicate the significance of the local level for reducing housing inequalities in the face of the densification agenda.

The previous points are summarised in the table below, with further insights drawn from Policy Lab workshop #1, held in London.

Hypothesis: impacts on housing inequalities	**Further insights, drawn from Policy Lab workshop #1 (WP7)**
Densification encourages the gentrification of areas designated for regeneration	Not necessarily. Yes, in relation to first-generation densification, based on public-private partnerships, but local authorities are learning from past mistakes. Public sector participants do not regard densification/regeneration as a driver of gentrification in the latest regeneration programmes. Some see the process as 'good gentrification' when the concentration of deprivation of the estate and surrounding area is very high, or when the existing estate is not demolished (as in most recent regeneration programmes).
Densification as implemented in the UK transfers the value inherent in public land (including social housing estates) to the private sector.	Yes, particularly in 1st generation regeneration (public-private partnerships) with the selling of public land to private developers and demolition of council estates. But in the last decade this transfer to the private sector is not so direct, with a change in the governance of regeneration to non-profit-private joint venture (2nd generation), and more GLA funds/loans for acquisition of land (to local authorities and non-profit hosuing providers), and changing approach to demolition of council estates.
Densification limits the possibility of direct delivery of housing by local authorities.	Yes, due to how the planning system and housing supply system is organised. However, there are signs of growing direct delivery from local authorities in recent years, with introduction of council-owned regeneration companies and housing companies.
Social housing delivery relies on cross-subsidy from private tenure production (Section 106) and results in a net decline in social homes.	Yes. Section 106 is an issue: housing provision by the private sector does not ensure reaching affordable housing targets or good quality homes, so local authorities need vehicles to build better / build themselves (like council-owned regeneration companies)
Opportunities: various innovative programmes of the GLA intended to	Yes. More recently there are signs of a paradigm shift (towards direct delivery), stopping the decline of social housing delivery.

support local authority housing delivery.	
Opportunities: removal of the Housing Revenue Account (HRA) borrowing cap in 2018 increased local authority access to finance, some have created 'local housing companies' for direct delivery.	Yes, there are signs of a shift towards new vehicles for local authority direct provision (see above), but it may be too early to see the benefit of lifting the borrowing cap, as local authorities still have difficulty in borrowing due to the high rise in interest rates (and high cost of construction).
The impact of crises: rising construction costs (alongside stagnant house price rises) means housing developers engaged in densification have increasingly narrow profit margins. This falling viability can compell developers to reduce Section 106 contibutions, affordable housing delivery and other 'negotiable' aspects (including net-zero construction targets) where possible.	Higher cost of regeneration (particularly green regeneration) for private, public and non-profit sector, due to raised interest rates, rising construction costs, and Brexit. Brexit in particular made procurement for construction more challenging. Housing associations also struggle with the increased costs of production and raised interest rates. The non-profit sector is changing: housing associations are getting larger by merging, but some are having financial difficulties.
Where we need to improve: coordination	Holistic thinking about budgets at national level for more long-term funding. The planning system is precedent-led, and things are reviewed because of objections, ratgher than being set against criteria, measurements or data.

Table UK21. Summary table

7 Summary and discussion of results

7.1 Summary of changes in EEP

In the UK, retrofitting, urban greening, and densification are replicating many of the residential inequalities that are already produced by the UK housing system. This is because of a broader contextual historical shift in UK governance structures, that has occured over several decades. The governance structures determining how these environmental initiatives are rolled out, are underpinned by the same logic that governs the existing housing system: a preference by UK policymakers to catalyse economic activity through the commodification of public goods.

The underlying macroeconomic conditions of this policy preference have deep roots. From the 1960s onwards, attempts have been made to reduce government intervention in the economy, to liberate the supply side (production and provision) of public goods [10] from state control, alongside tax reductions implemented with the aim of increasing personal consumption and the declining productivity of British industry. These shifts were turbo-charged during the Thatcher era, and increase as Britain shifts increasingly towards a services dominated economy.

This means that while national policy for EEPs is set by national government, these policies are designed so that responsibility for implementation falls to private, public and non-profit housing providers. In this context, public and non-profit institutions are usually left to rely on the private sector to fund implementation. Some funding, guidance and support is available from the national level, but this is usually not sufficient to extend retrofiting, NBS delivery or densification at scale. Rather, national-level funds and support are usually intended as a ‚pump-priming' exercise, to stimulate activity at lower scales of governance and market operation. Ultimately, this means that the costs of implementing EEPs are usually shouldered by the private sector, and therefore ‚shunted-on' from housing providers to end users, ultimately increasing housing inequalities.

7.2 Relations and trade-offs between EEPs and housing policies

In the UK, environmental debate and the green policy initiatives—such as retrofitting, NBS , and densification—have developed largely in isolation from the housing affordability debate. The housing affordability debate predates the decarbonisation and sustainability debate, and the links between these areas are not part of the current political agenda. Their nexus also remains underexplored in academic circles due to disciplinary silos, although some synergies are gathering momentum.

[10] We define public goods as goods and services the provision of which benefits all members of society, being non-excludable and non-rival. This includes the availability of affordable housing and the creation of a sustainable and net-zero economy, both of which provide benefit at a societal level that individuals cannot be excluded from. These specific public goods cannot be reduced to (for example) individually owned homes or individually owned green space, but extend to the benefit felt by society at large in their wider provision and availability.

Our view however, and as stated above, the governance structures determining how these three green initiatives are rolled out, are underpinned by the same logic that governs the existing housing system: a preference by UK policymakers to catalyse economic activity through the commodification of public goods. These EEPs are public goods that are manifested through the built environment, and as such their design follows the same logic as the UK housing system, and replicates many of the mechanisms whereby housing inequalities are created.

This policy preference for private provision of public goods, the historical context of which is outlined above, has seen shift from state intervention and investment in the supply side (largely but not limited to central government subsidy) to the demand side (largely but not limited to tax restructuring). This has created decades' worth of housing, fiscal and welfare policy intervention intended to lubricate the flow of private (rather than public) investment into housing, and now into green initiatives. Direct state investment into supply (which was a norm during the postwar de-commodification of the UK housing system) has been replaced by attempts to stimulate privately funded supply by boosting. This logic has been applied both to housing and to green initiatives.

We would add that this is not primarily an issue of environmental policy or governance, but of how the governance of public goods provision works in the UK. By outsourcing the provision of public goods to the private sector, the costs of both housing production and of green interventions will rise, with costs ultimately re-couped from end-users, thereby increasing residential inequalities. These three green initiatives are therefore replicating and amplifying the residential inequalities that are already produced by the UK housing system.

In retrofitting, homeowners and landlords (whether private, public, or non-profit) have struggled to retrofit their properties and are unlikely to do so by 2035–2050 due to prohibitive costs. Similarly, the provision of NBS remains scarce, often off-site, and of poor quality, while densification continues to drive up housing prices, making the delivery of affordable housing increasingly untenable.

Just as the UK housing debate (since 2004 – see Deliverable 4.2) has framed the housing affordability crisis as a supply-side (market failure) problem, the climate and environmental discourse is now expected to follow suit—framing shortfalls in the provision of retrofits, NBS, and densification of housing as a supply-side problem, rather than a problem of state funding, coordination and provision. This narrative risks justifying further demand-side subsidies and deregulation of planning and the housing system to stimulate market-led production of green goods, rather than addressing the complex implications of green interventions for housing affordability and regional or urban inequalities.

Thus, although the housing affordability and environmental debates remain largely disconnected, the systems themselves are deeply intertwined—following similar narratives, governance structures, and policy patterns, albeit with a time lag.

More importantly, the idea that decarbonisation may hinder housing affordability—and in fact make housing less affordable—is largely absent from the UK's national debate. In international academic circles, the the green-housing affordability nexus has gained traction through the concept of 'green gentrification' (Anguelovski et al 2022) (environmental initiatives triggering neighbourhood changes which drive green gentrification and diplacement). Green gentrification may occur in certain areas (particularly those that are already quite gentrified

such as Woodbury down – see WP2 for more details). However, our hypothesis is that green gentrification is far from being the main mechanism whereby EEPs reinforce housing inequalities in the UK context.

Green initiatives in the UK are impacting housing affordability more fundamentally through the housing provision/production system itself. As the cost of production for green initiatives such as NBS and retrofitting continues to rise, and with minimal direct state intervention and only limited demand-side subsidies, the financial burden of the UK's low-carbon policies is increasingly falling on housing providers rather than the national government. Private developers, non-profit organisations, and local authorities are being tasked with both funding and implementing decarbonisation efforts. Consequently, a portion of these costs is either passed on to tenants and prospective buyers, further exacerbating housing affordability challenges, or re-couped through negotiable aspects of development such as Section 106 contributions and affordable housing unit delivery. As housing providers are increasingly required to deliver green initiatives—whether on-site or off-site—the production and retrofitting of affordable housing is being constrained. Small and medium-sized private and non-profit providers are already struggling to operate under these conditions. At the same time, policies aimed at expanding low-carbon technologies are not improving housing affordability. In fact, green policy instruments and subsidies often raise development costs, indirectly limiting the supply of affordable housing and reinforcing the commodification of the housing system.

Due to the UK's exit from the EU, the scale of public investment in the UK green agenda is significantly smaller than for other EU countries, which benefit from substantial EU subsidies. One issue here is not only the size of these funds, but also how they are distributed. In the UK, the limited availability of grants (for example, local authorities must bid competitively for limited funds to retrofit their social housing stock, meaning many apply for but are left without grant funding) constrains the capacity to support ‚green and affordable' housing initiatives effectively.

The UK's environmental agenda is missing a critical opportunity to support the production of affordable housing. Current green policies lack mechanisms to foster the de-commodification of housing, which would mitigate the affordability crisis.This would require, for instance, direct state intervention in the provision of these three green initiatives. Furthermore, green programmes and subsidies to housing providers are not accompanied by regulatory safeguards to prevent rent increases or speculative practices. Nor do they include fiscal tools and land value capture mechanisms that would allow the state to reclaim a portion of the increased land value resulting from public investment (e.g., through improved environmental quality). This gap is rooted in the UK's weakly regulated private rental sector, and in the negotiable nature of planning gain (like Section 106 agreements), which are designed to allow the private sector to retain much of the uplift in value as an incentive to deliver public goods.

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