Review of Financing Schemes Relevant for Sustainable Space Cooling at the EU and National Levels

Cool LIFE

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Authors	Giulia Conforto (e-think)
Contributing Partners	IEECP, EURAC, ABUD, MINES, TUW
Reviewers	Jean-Sébastien Broc (IEECP), Dario Bottino (EURAC), Francesca Conselvan (e-think)
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List of Acronyms

CDD	Cooling Degree Days
DHC	District Heating and Cooling

EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
EU	European Union
FEC	Final Energy Consumption
GDP	Gross Domestic Product
GFA	Gross Floor Area
HDD	Heating Degree Days
H&C	Heating and Cooling
LTRS	Long-Term Renovation Strategy
NECP	National Energy and Climate Plan
NEEAP	National Energy Efficiency Action Plan
PPS	Power Purchasing Standard
RES	Renewable Energy Sources
RRP	Recovery and Resilience Plan

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Keywords List

- Financing Schemes
- Space Cooling
- Energy Efficiency
- Public Expenditure
- Private Finance
- Heating
- Correlation
- Indicators

Disclaimer

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Executive summary

Space cooling is one of the five primary end-uses considered in evaluating a building's energy performance. The energy consumption in buildings for cooling is often much smaller than the one for heating, but with global warming, cooling needs are progressively growing. Cooling demand puts significant stress on electricity systems in warmer countries, such as Italy and Spain, where they are the major contributors to summer peak loads. Yet, cooling needs are mostly overlooked, and ensuring summer comfort is increasingly important due to warmer and prolonged summers but also for the escalating health risks associated with growingly frequent and intense heat waves.

Building renovation rates are increasing, showing a notable reduction in greenhouse gas emissions from buildings (31% in the EU between 2005 and 2021). However, the pace remains inadequate for meeting the 2030 and 2050 targets. Investments in the EU amount to barely half of the estimated renovation needs to be on track with targets for buildings and providing summer comfort remains mostly overshadowed by reducing heating needs.

Even with the proliferation of financing options in recent years, access to finance remains a significant hurdle to the decarbonization of buildings, heating, and cooling.

This study seeks to provide some clarity by conducting a thorough mapping of funding schemes supporting energy efficiency and renewable energy for space cooling, either specifically or as part of an objective of global energy performance of buildings, across the EU-27. We gathered data on over 500 private and public schemes at the European and national levels, including some local programs. Beyond space cooling, we covered related focus areas such as building efficiency, heating and cooling efficiency, renewable energy in heating and cooling, and district heating and cooling. As many programs do not disclose their budgets, the bottom-up aggregated data on budget resulted too inconsistent to be used. To compensate, we incorporated data from an external source on public expenditure in energy and energy efficiency in buildings and industry at the country level. We then analysed the dataset for correlations with selected social, energy, economic, and financial indicators.

Our primary finding indicates that financing options are many and dispersed, varying across countries in terms of the number of programs, scope, issuer, and the type of support offered. This makes it difficult to measure what the actual public and private finance support is, and what importance is given to space cooling in it. Concerning the instruments used, traditional instruments such as grants, green loans, green mortgages, and tax rebates dominate the financing landscape. We observed a correlation between the magnitude of public expenditure on energy efficiency in buildings and industry, the number of financing schemes, population size, and total final energy consumption in buildings. Surprisingly, climate conditions, including heating and cooling requirements, do not seem to influence public expenditure or the number of schemes aimed at reducing energy demand and emissions while improving indoor comfort levels. Examining outliers revealed that country-specific dynamics significantly shape the availability of public and private financing for building decarbonization.

Where Cooling Degree Days are significantly high, cooling needs do not translate to equally high cooling demand. Mentioning “heating and cooling” jointly is mainstreamed in financing schemes at the European level, but much less at the national level. Even when cooling could fall in the scope of schemes, these are mostly perceived as aimed at reducing heating demand and increasing winter comfort. Financing instruments for the energy transition in buildings target overall efficiency and all-year-round comfort, mainly addressing heating, and rarely addressing

cooling and summer comfort which remain a secondary objective. Despite cooling is broadly mentioned together with heating in policies and incentives at the European level, it seems to be much more overlooked at the national level. The review of financing schemes confirms the background analysis: as the main end-use in buildings, in terms of energy consumption, remains space heating, so the priorities of the financing schemes, where space cooling and summer comfort may be either hidden, neglected or a secondary objective.

The Expert interviews indicated that cooling is still mostly seen as a luxury or a nice-to-have addition, rather than a need, like heating. Yet space cooling is a growing need in terms of health, especially for vulnerable people, and productivity of business and commercial spaces, such as offices, shops and malls, if not essential to some services, such as data centres (where it can be considered process cooling).

As no similar comprehensive database has been found to date, this mapping can be considered the first EU-27 repository of financing options for sustainable space cooling, addressing a critical gap in the literature. However, information on schemes is fragmented, dispersed, difficult to access, and prone to rapid obsolescence, presenting yet another obstacle to finance in terms of information accessibility. To enhance awareness among potential beneficiaries of financing instruments regarding their financing options and facilitate their access to these resources, the mapping will be accessible through the CoolLIFE Tool and Knowledge Hub. Potential beneficiaries might include primarily:

- Policy officers from ministries, experts from national energy agencies or other implementing bodies, could benchmark with other countries.
- Experts from financing institutions, who could be interested in the overview of these markets, especially when they are not yet active in financing EE in buildings and would consider developing offers in this field.
- Energy advisors, for example from local energy agencies, who could identify private schemes they were not aware of.
- ESCOs and other companies developing offers for investments in EE in buildings, who could be interested in identifying financing opportunities, especially in countries they are not active yet.

Recognizing the rapid obsolescence that this mapping is exposed to, this report provides also in Annex all the relevant sources, such as EU databases and publications, national strategic documents, other main web portals and keywords to allow interested readers to replicate a similar mapping exercise, should they need it, once the mapping provided thought the CoolLIFE Tools and Knowledge Hub will have become outdated.

1. Introduction

Decarbonizing the building sector is recognized as imperative to achieve carbon neutrality, but progress remains inadequate. Emissions from buildings in the EU decreased by 31% between 2005 and 2021 (EEA, 2023), yet the current trajectory falls short of meeting the EU's 2030 and 2050 targets. Significant acceleration (about 7.5 the pace registered between 2015 and 2021 ('Buildings | ECNO', 2023)) in energy renovations is essential to achieve the targeted 60% decrease in building emissions by 2030 compared to 2015 and full decarbonization by 2050, (Jong et al., 2022).

The main end-use in buildings, in terms of energy consumption, is space heating. Space cooling remains a topic significantly less prominent than space heating. On average in Europe space heating needs are 20 times higher than space cooling ones: 2858 Heating Degree Days (**HDD**) compared to 140 Cooling Degree Days (**CDD**) (Eurostat, 2022a). In terms of energy consumption, this difference is even broader: with space cooling accounting barely for 0.5% of energy consumption in households, compared to 64.4% for space heating, with the only exception of Malta and Cyprus. Moreover, 99% of space cooling is already electrified: space cooling is therefore not a direct challenge for decarbonising energy consumption in buildings. Nevertheless, energy consumption for space cooling was estimated to amount to about 106 TWh in 2016 in the EU[1] (Pezzutto et al., 2021), with a strong increasing trend. It should be noted that there is likely significant uncertainty about the actual energy consumption related to space cooling. Energy consumption for space cooling is indeed difficult to separate from other electricity consumption in data on overall electricity consumption. Cooling demand puts significant stress on electricity systems in warmer countries, such as Italy and Spain, where they are the major contributors to summer peak loads

More generally, quantifying the economic profitability of cooling projects should not be limited to considering the related energy costs. The primary objective of cooling projects can indeed be related to ensuring thermal comfort during summertime (summer comfort), possibly with other objectives in non-residential buildings such as ensuring basic conditions for the activity (e.g. for the health sector or data centres), meeting customers' expectations (tourism sector), increasing attractiveness and sales in commercial spaces (such as malls and shops), increasing productivity of employees (e.g. in offices), and reducing overall hazard and healthcare expenses due to the risks associated with growingly frequent and intense heat waves.

Space cooling (or air conditioning) is one of the five end-uses considered to assess the energy performance of a building, as set in the Energy Performance of Buildings Directive (**EBPD**). However, Because of the disparity between heating and cooling mentioned above, energy efficiency standards, Energy Performance Certificates (**EPCs**), and measures on building envelopes and H&C systems mostly focus on reducing the demand for heating rather than for both H&C and very rarely they are specifically meant for cooling. Addressing "Heating and Cooling" together is mainstreamed in EU policy (Pezzutto et al., 2024), but at the national level, the financing schemes directly addressing Cooling are much less than those addressing heating or Heating and Cooling (**H&C**).

[1] Including the United Kingdom at that time.

Surging demand for cooling led to power outages in southern Europe during peak demand periods, highlighting the urgent need for effective solutions[2]. In urban areas, where populations are increasingly vulnerable to extreme heat events, the risks are compounded, with an estimated 62,000 excess heat-related deaths in Europe in 2022 alone (Ballester et al., 2023). Heatwaves would cause about 90% of fatalities related to climate-related extreme events (Quefelec, 2023). Despite these challenges, space cooling is still widely disregarded in strategic spatial planning and building regulations across many countries. It is most often a secondary issue in energy planning, as found for example when screening National Energy and Climate Plans or comprehensive assessments for heating and cooling (Pezzutto et al., 2024). For instance, the provision of cooling in Denmark is treated as a commercial activity, while the provision of heat is treated as a public service (Energy Cities, 2023). As a first step, the new Energy Efficiency Directive mentions both, heating, and cooling. To address this disparity and promote more resilient built environments, it is essential also to integrate cooling considerations into local spatial planning and urban design initiatives, to optimize spatial layouts, enhance efficiency, and foster sustainability, which is however beyond the scope of this mapping of financing instruments.

Upgrading H&C systems to more efficient and less carbon-intensive solutions is just part of the challenge; the other part is building design or retrofit. New constructions are covered by building regulations aimed at minimizing energy needs (cf. nearly Zero Energy Buildings). Further incentive schemes may promote new buildings going beyond the requirements of building regulations. The EPBD also requires Member States to set minimum requirements for building renovations, in case of major renovation or minimum energy performance requirements per building component. So far, few Member States put in place regulations that compel the initiation of renovations and the upgrade of H&C systems, occasionally for public buildings and offices (e.g., in the Netherlands) or private-rented dwellings (e.g., in France). Unlike new construction, building renovation is mostly addressed with incentive schemes that aim at boosting the renovation rates, either listing eligible action types or requiring renovation projects to achieve at least a certain energy class or minimum energy savings gains. The decision to switch to more efficient H&C devices and to initiate renovations of existing buildings by private individuals or asset managers remains voluntary and is motivated by various factors: lower energy bills, increased property value, available capital and incentives, etc. (Pérez-Navarro et al., 2023). Several EU policies aim to stimulate investments in building energy efficiency to raise the yearly renovation rate towards 3% (Economidou et al., 2020; BPIE, 2022): the Renovation Wave, the EPBD Recast, and the EED Recast.

Access to finance and economic profitability remain significant barriers to decarbonizing H&C and improving buildings' energy performance. High initial costs, lengthy payback periods, a lack of financial incentives, and regulatory hurdles render especially building renovation burdensome for households and less appealing than other investments for investors (Liao et al., 2023; D'Oca et al., 2018; EMBuild, 2017; Ntouros et al., 2022; Cummins et al., 2023). A multitude of public incentives attempt to make renovations more attractive and funding for climate action is increasing, with a 9% growth across the EU in 2022 (I4CE, 2024), but it remains inadequate, meeting only half of the estimated investment needs.

When starting our review, we found that information on funding schemes is fragmented, dispersed across multiple sources, and subject to frequent changes. Multiple programs with slightly different focuses often overlap in terms of beneficiaries and measures, making it challenging for beneficiaries to have a comprehensive understanding of available financing options. To have a clear picture of the currently available options to meet an increasing demand for space cooling while advancing the energy transition, we conducted a comprehensive mapping of currently

[2] Italy and Spain mention the issue of summer peak loads in their draft update of National Energy and Climate Plans. (EU Commission, 2019)

available funding schemes, both public and private, at the EU and national levels for each EU-27 Member State, with relevant regional and local insights where applicable. Considering the background described above, it was essential to broaden the scope beyond schemes that would be specifically focused on space cooling. The scope of our review therefore covers also financing schemes that cover both, heating and cooling systems, and/or that deal with buildings' overall energy performance. We included as well in the scope financing schemes dealing with improving the energy performance of the building envelope.

The resulting database comprises 556 schemes with various data and parameters. In attempting to discern the factors influencing the extent and granularity of funding schemes, a preliminary assessment of this dataset reveals relevant trends and correlations between public expenditure in building efficiency, the number of schemes, and a range of social, economic, energy, climate, and financial indicators. The findings of this assessment are complemented by a series of expert interviews discussing what could help address cooling more systematically, ease access to financing and close the investment gap to meet the growing demand for space cooling in the frame of a low-carbon energy system.

2. Methodology

This study employed a comprehensive approach to create the first detailed mapping of financial instruments supporting sustainable space cooling across the EU-27. We focused on financing schemes relevant to cooling or for energy efficiency of building envelopes since insulation and other efficiency measures are likely to reduce cooling demand and increase summer comfort. More schemes relevant to H&C and District Heating and Cooling (**DHC**) were identified, but when they are focused on space heating, we assumed that they would not affect cooling demand, summer comfort and emissions from space cooling, and therefore they were excluded from this analysis.

An extensive literature review was conducted to gather existing knowledge and reviews on financing schemes for H&C and building decarbonization, to establish a foundational base of policies and initiatives at the EU level (EEFIG, 2022; DG Energy et al., 2022; Conforto and Hummel, 2022; OECD, 2021; EIB, 2020; Economidou et al., 2019; TPA Group, 2018).

Data on existing mapping and datasets of national financing schemes were collected from various sources through desk research, including documents such as National Energy and Climate Plans (**NECPs**), National Energy Efficiency Action Plans (**NEEAPs**), Long-Term Renovation Strategies (**LTRSs**), Recovery and Resilience Plans (**RRPs**), Comprehensive Assessments and existing databases of policy measures or collections of case studies (ODYSSEE-MURE, n.d.; EBRD, n.d.; fi-compass, n.d.; EU COR, n.d.; IEA, n.d.; EEA, n.d.; OECD, n.d.; EIB, n.d.). A list of national agencies promoting climate action and disbursing funding was compiled. These included National Energy Agencies, National Energy Efficiency Funds, Environment, Innovation and Development Agencies, and Ministries (Energy, Environment, and Economics).

Structured desk research scanned the gathered sources and compiled a long list of schemes, supplemented by research for each country using a set of keywords translated into each national language (in Annexe). The shortlisting process retained only currently active schemes, resulting in two tables: one for public and one for private schemes, containing detailed information such as name, country, level, promoted action type(s), target sector(s), type of instrument, start and end year, links to relevant sources, and a brief description. Target sectors distinguish whether the schemes deal with investments in **residential** and/or **non-residential** premises.

Focus sectors include:

- **Cooling**: when the scope of the scheme covers cooling systems, sun shading, ventilation, or other type of investment with a direct link with space cooling (e.g. green roofs).
- **Building Envelope Efficiency**: when the scope of the scheme covers the improvement of the building envelope and/or the improvement of the overall energy performance of the buildings (e.g. requirements in terms of minimum energy class or minimum energy savings gain).
- **H&C Efficiency**: when the scope of the scheme covers the replacement of heating and/or cooling systems with higher efficiency ones.
- **Renewable Energy in H&C**: when the scope of the scheme covers the installation of heating and/or cooling systems running with renewable energy (including heat pumps).
- **DHC**: when the scope of the scheme covers the development, extension, or improvement of district heating and/or cooling networks, and/or the connection of buildings to them.

Instruments for public schemes were clustered into the following types:

- **Advisory Service, Technical Assistance**: support provided by experts, offering guidance, advice, and recommendations on technical matters, such as technology implementation, process optimization, problem-solving, or training.

- **Energy efficiency obligations**: obligations set on energy companies (suppliers or distributors) to achieve energy savings targets or to provide customers with energy services or funding for energy efficiency actions. These obligation schemes include the white certificate schemes (when energy savings can be traded).
- **Equity financing**: investment in the shares of ownership in a company.
- **Grant/Subsidy**: financial contribution, often without repayment, to support specific activities, projects, or sectors, provided against a selection process (grant), or in every case conditions apply (subsidy).
- **Guarantee**: promise to assume responsibility for another party's debt or performance obligation in the event of default, assuring lenders or investors.
- **Loan/Soft Loan**: borrowing money with the agreement to repay the principal amount plus interest, with more favourable terms, such as lower interest rates or longer repayment periods in the case of soft loans.
- **Tax incentives**: benefits or reductions in tax liabilities to encourage certain behaviours or investments.

The **types of instruments for private schemes** include:
- **Advisory Service, Technical Assistance**: see above.
- **Equity Financing**: see above.
- **Grants/Subsidy**: see above.
- **Green Bonds**: fixed-income financial instruments where the proceeds are exclusively used to fund environmentally friendly projects or initiatives, such as renewable energy or sustainable infrastructure.
- **Green Leasing**: leasing agreements between landlords and tenants that incorporate environmentally sustainable practices or features into the design, construction, or operation of leased properties.
- **Green Loan**: a type of loan specifically designated for financing projects or activities that have positive environmental impacts, such as energy efficiency improvements or pollution reduction initiatives.
- **Green Mortgage**: a home loan product that offers incentives, discounts, or favourable terms to borrowers who purchase energy-efficient homes or make eco-friendly improvements to their properties.
- **Guarantees**: see above.
- **On-bill financing**: a financing mechanism where the costs of energy efficiency upgrades or renewable energy installations are repaid through the utility bills of the property, typically structured to ensure that the energy savings offset the repayment costs.

Schemes classified according to these criteria were also distinguished when the description covered **explicitly** the focus sectors or **implicitly** (i.e. the description did not mention the eligible type(s) of action, or the link with the criteria is indirect). All discussions and analyses presented in this paper pertain exclusively to the criteria explicitly addressed. However, for the sake of comprehensiveness, the information provided in the CoolLIFE Tool and Knowledge Hub will include all schemes identified, mentioning if their coverage of the criteria was explicit (with a “Y”) or implicit (with a “(Y)”).

To reinforce the reliability, the mapping underwent a thorough review by the CoolLIFE project partners. Each partner received an export of the mapping, with relevant sources specific to their assigned countries. Partners meticulously reviewed the collected schemes for any inaccuracies and conducted additional scans to identify any schemes that may have been overlooked. Subsequent updates were verified and seamlessly integrated into the mapping. This iterative process served to refine and validate the assembled information.

The assessment then identified significant trends and correlations. A primary challenge arose from the erratic disclosure of budget allocations for public schemes and its complete absence for private schemes. Consequently, as an indicator of the scale of investment in each country, aggregate data on public energy spending at the national level and its allocation towards building and industry efficiency were utilized (IEA, 2024).

The dataset was complemented with additional indicators: public energy spending for energy and building and industry efficiency, total and per capita (IEA, 2024), population (Eurostat, 2022c), Gross Domastic Product (**GDP**) per capita in Purchasing Power Standards (**PPS**) (Eurostat, 2023a), HDD and CDD (Eurostat, 2022a), total Final Energy Consumption (**FEC**) in buildings (EURAC, 2023) converted to GWh, total Gross Floor Area (**GFA**) (EURAC, 2023), building energy intensity per m2 and capita (own calculations), electricity and gas prices (Eurostat, 2022b), the share of DHC in FEC (Bursich, 2020), inflation (own calculation from Harmonized Index of Consumer Prices (Eurostat, 2024)), cost of borrowing (ECB, 2024), interest rates (CEIC Data, 2024), sovereign yield (MTS Markets, 2024) and public deficit (Eurostat, 2023b). We tried to consider the current political majority in the parliament or government but abandoned it, as current schemes can be inherited from previous governments. All indicators were taken for the most recently available year, as summarized in Figure 1, which is an element that might affect correlations.

A correlation matrix was adopted to assess any correlations between public expenditure, the number of schemes, and additional indicators. Outliers with exceptionally high or low numbers of schemes were identified, and further factors were investigated to explain these observations.

A selected series of H&C experts were contacted and interviewed or asked to fill out a survey. The questions and aggregated answers complement the main findings of the mapping and the assessment, to offer valuable insights for further analysis and decision-making.

Source	Indicator (Reference Year)
CEICDATA	Interest Rate (2024)
ECB	Cost of borrowing (2023)
EURAC for EU BSO	Building FEC (GWh converted from Mtoe) (2021); Total GFA (m2) (2021);
Eurostat	Population (2021); GDP/capita (in PPS) (2021); HDD (2023); CDD (2023); Electricity Prices (2022); Gas Prices (2022); Inflation (2023); Public Deficit (2022) (2022)
IEA	Public Energy Spending (bn €) (2024); Public Energy Spending in Building and Industry Efficiency (bn €) (2024)
IREES-Bursich for EU Commission	DHC in FEC (%) (2018)
MTS Markets	Sovereiegn Yied (2024)
Own Calculation	Energy Spending (€/capita) (2024); Energy Spending in Building and Industry Efficiency (€/capita) (2024); Financing Schemes - Total (2024); Financing Schemes - Public (2024); Financing Schemes - Private (2024); Building Energy Intensity (MWh/cap) (2021); Building Energy Intensity (kWh/m2) (2021)

Figure 1: Overview of sources of additional indicators used for the correlation matrix.

3. Results & Findings

3.1. Overall Mapping Highlights

The mapping identified a total of 556 funding schemes relevant to Space Cooling across the EU-27: 350 public schemes and 206 private ones. A higher prevalence of public schemes compared to private ones indicates a policy effort to mitigate the barrier of high initial costs and extended payback periods. This prevalence is also consistent with the common perception, especially among investors and credit institutions, that energy efficiency projects are less appealing than other investments (e.g. compared to renewable energy projects) and entail high transaction costs due to their often-modest scale and diversity (i.e. less standardised). Notably, only a few countries exhibited more private than public schemes, primarily Italy, Sweden, Denmark and Slovakia. This phenomenon is likely attributed not to more mature markets but rather to a highly fragmented banking sector, where numerous credit institutions offer similar products. For instance, Italy ranks fourth in Europe for the number of banks and credit institutes (EBF, 2023).

Regarding the types of instruments offered, as shown in **Error! Reference source not found.**, public schemes p rominently feature grants (51%), loans (14%), or a combination of both (8%), along with tax incentives (8%). In contrast, private schemes mainly consist of green loans (57%) and green mortgages (22%), with a smaller offering of green bonds (7%), which are primarily geared towards investment rather than project finance.

Public Schemes

Types of instrument	Count	%
Grant/Subsidy	172	51%
Loan/Soft Loan	54	14%
Tax Incentives	30	8%
Grant/Subsidy, Loan/Soft Loan	30	8%
Multiple (Grant/Subsidy, Tax rebate, Debt, Equity, Guarantee, TA)	17	4%
Energy efficiency obligations	15	4%
Other public scheme	11	3%
Advisory Service, Technical Assistance	9	2%
Guarantee	7	2%
Equity financing	5	1%
Grand Total	**350**	**100%**

Private Schemes

Types of instrument	Count	%
Green Loan	122	57%
Green Mortgage	47	22%
Green Bonds	14	7%
Equity financing	5	2%
Grants/ subsidy	4	2%
On-bill financing	4	2%
Green Leasing	3	1%
Advisory Service, Technical Assistance	3	1%
Green Loan, Advisory Service	2	1%
Guarantees	2	1%
Grand Total	**206**	**100%**

All Schemes

Sector	Count	%
Building Eff	457	82%
H&C Eff	468	84%
H&C RES	426	77%
DHC	186	33%
Cooling	297	53%
Residential	397	71%
Non-Res	272	49%
Grand Total	**556**	

Figure 2: Types of instruments in public and private schemes. Sectors coverage among all schemes.

Despite previous literature identifying various innovative instruments[3] (Conforto and Hummel, 2022; Bertoldi et al., 2021), the strong preference for traditional instruments highlighted in this mapping suggests a predilection of both

[3] Traditional instruments are intended in these studies as instruments developed historically, such as loans, equity and bonds. Innovative instruments offer new approaches to addressing funding gaps, promoting social or

public administrations and private financiers for well-known instruments that are easier to implement, administer, and communicate, as beneficiaries are more familiar with. This raises questions about the scalability of innovative financing approaches and their ability to attract private capital. Figure 3 reports the complete range of types of instruments previously documented in the literature (Conforto and Hummel, 2022), with the instruments most frequently found in the mapping, in darker shades.

<table>
<tr><th></th><th colspan="2">Traditional</th><th colspan="2">Innovative</th></tr>
<tr><td rowspan="2">Non-repayable</td><td colspan="2">Grants, Prizes and Subsidies</td><td colspan="2" rowspan="2">Energy-Efficiency Feed-in-Tariff</td></tr>
<tr><td colspan="2">Tax Incentives</td></tr>
<tr><td rowspan="4">Debt</td><td colspan="2" rowspan="2">Loans</td><td>Green/Soft Loans</td><td>Energy Efficient Mortgages</td></tr>
<tr><td>Green Bonds, Community Municipal Investment Bonds, Social Bonds</td><td>On-Bill Financing (OBF) Loans, Tariffs</td></tr>
<tr><td colspan="2" rowspan="2">Credit Enhancement (guarantees, securities, insurances, additional collateral, etc.)</td><td rowspan="2">Energy Performance Contracting (EPC) and Agreements (EPA)</td><td>Energy Service Agreement (ESA)</td></tr>
<tr><td>Green/Energy Revolving Funds</td></tr>
<tr><td colspan="2"></td><td>Green Leasing, PACE</td><td>Crowdfunding</td></tr>
<tr><td>Equity</td><td colspan="2">Third-Party Funding</td><td colspan="2">Energy Communities/Cooperatives</td></tr>
<tr><td rowspan="2">Other</td><td rowspan="2">Technical Assistance (TA), Project Development Assistance (PDA)</td><td>Advisory Services</td><td colspan="2">Energy Efficiency Quota Obligations</td></tr>
<tr><td>Capacity Building</td><td colspan="2">One-stop shops (OSS)</td></tr>
</table>

Figure 3: Financial Instruments for energy efficiency in buildings, building renovation, H&C, DHC

Exploring thematic areas, as shown in **Error! Reference source not found.** and **Error! Reference source not fo und.**, most schemes address energy efficiency in H&C (84%), overall envelope building efficiency (82%), and the use of renewable energy sources (RES) in H&C (77%). Fewer schemes specifically target cooling (53%) and district networks (33%). This result about cooling is in line with the background analysis reminding us that the priority field of action for energy efficiency in buildings remains space heating. The share of schemes specifically targeting cooling can be considered high in our mapping, which is related to the focus of the search (looking primarily for schemes relevant to space cooling). The low share of schemes dealing with district networks could be because the share of DHC varies significantly among Member States and because the target group (network operators, municipalities) is much less broad than building owners.

Residential dwellings (71%) are more frequently addressed than non-residential premises (49%). This is in line with the respective shares of residential and non-residential buildings in the building stock.

A **focus on cooling** shows that cooling is somehow more often addressed jointly with heating (“heating and cooling") in EU policy, although not always. Cooling is extensively addressed in financing schemes at the EU level and in countries with a high number of schemes, suggesting a more targeted approach. However, it is

environmental goals, and increasing access to capital for underserved communities or projects. They may leverage technology, alternative risk-sharing mechanisms, or non-traditional sources of funding to achieve their objectives. They are generally more recent developments, although in some cases they may have been invented already since a few decades but have not yet acquired the same diffusion of traditional instruments.

inconsistently supported in countries with high cooling needs, such as Malta (2 schemes) and Spain (6), but more inclusively in Cyprus (7) and Portugal (16), despite these countries having fewer schemes.

Public Schemes

	Schemes	Building Eff	H&C Eff	H&C RES	DHC	Cooling	Residential	Non-Res.
Grand Total	**350**	**274**	**302**	**269**	**147**	**207**	**225**	**208**
Country		**78%**	**86%**	**77%**	**42%**	**59%**	**64%**	**59%**
Germany	40	27	36	30	8	19	23	24
France	30	26	29	30	16	30	19	13
Poland	24	13	24	22	14	14	17	9
Belgium	23	22	21	14	7	7	11	15
EU	23	19	21	21	21	21	22	22
Austria	21	7	13	8	13	9	6	18
Netherlands	17	17	15	15	11	14	14	12
Slovenia	13	13	8	8	4	8	11	4
Bulgaria	12	9	9	7	1	4	7	9
Ireland	12	10	10	10	1	3	9	6
Luxembourg	10	8	10	10	5	6	7	4
Italy	10	8	9	6	5	5	6	4
Spain	10	6	8	8	3	4	7	9
Portugal	9	9	8	8	0	9	7	4
Hungary	9	9	9	8	4	8	4	6
Latvia	9	9	8	9	4	6	7	6
Czechia	9	8	9	5	3	5	3	6
Denmark	9	4	8	6	3	3	5	3
Croatia	8	7	8	6	2	8	5	5
Finland	8	6	7	7	4	5	5	5
Cyprus	6	6	5	5	4	5	4	5
Slovakia	6	5	6	6	4	5	4	4
Malta	6	4	1	1	1	1	4	4
Estonia	6	5	2	2	1		6	1
Sweden	6	5	4	5	1		4	1
Greece	5	4	5	5	1	4	2	4
Romania	5	5	5	3	2		4	4
Lithuania	4	3	4	4	4	4	2	1

Private Schemes

	Schemes	Building Eff	H&C Eff	H&C RES	DHC	Cooling	Residential	Non-Res.
Grand Total	**206**	**183**	**166**	**157**	**39**	**90**	**172**	**64**
Country		**89%**	**81%**	**76%**	**19%**	**44%**	**83%**	**31%**
Italy	18	17	18	18	1	6	17	3
France	16	14	16	16	3	16	16	3
Sweden	13	11	10	10	7	2	11	2
Austria	12	9	9	9	8	8	7	9
Poland	12	11	12	8	1	1	10	2
Denmark	11	10	10	10	1	3	10	2
Slovakia	11	11	7	7	1	3	10	3
Netherlands	10	9	5	5		5	9	2
Luxembourg	9	7	7	7	1	5	7	4
Belgium	9	8	7	6	2	2	6	4
Germany	8	7	8	8	7	8	6	7
Finland	8	6	4	4			6	5
Portugal	7	7	7	6	2	7	6	3
Ireland	7	7	3	3			7	
Cyprus	6	6	5	4	1	2	4	1
Estonia	6	6	5	5	1	2	5	1
Hungary	5	5	5	5	1	5	5	3
Czechia	5	5	5	5		3	4	1
Spain	5	5	4	4		2	3	3
Latvia	5	4	5	5	1	2	5	1
Malta	5	4	4	2		1	5	1
Croatia	4	3	3	3		2	2	2
Lithuania	4	4	3	3		1	4	
Bulgaria	3	2	2	2	1	2	2	1
Greece	3	3					3	
EU	2					2		
Slovenia	1	1	1	1			1	
Romania	1	1	1	1			1	1

Figure 4: Overview of the number of active public and private schemes by Country and target sector.

In terms of private offerings, which primarily comprise green loans (57%) and green mortgages (22%), they predominantly address building efficiency (89%), H&C efficiency (81%), RES in H&C (76%), and residential dwellings (83%). Coverage significantly drops for non-residential premises (31%) and DHC (19%). About non-residential premises, this can be explained again by the respective shares of residential and non-residential

buildings in the building stock (more customers for residential buildings, hence more schemes). Other possible explanations could include:

- Banks and financing institutions might not necessarily see the need to offer financing solutions specific to energy efficiency investments for companies (compared to offers already available for any type of investment).
- Specific offers for residential buildings are sometimes related to public policies (e.g. soft loans where the lower interest rate is funded by the State). Which might be less frequent for schemes for non-residential buildings.
- The green value of buildings with higher energy performance might be better acknowledged for residential buildings (cf. green mortgages for residential buildings that are often related to requirements in terms of energy class).

About DHC, this suggests that these often require individual negotiation and may involve public-private partnerships due to their large scale.

At the country level, the study found an average of 22 schemes per country: 14 public and 8 private ones. Top outliers include Germany (50), France (47), Poland (42), Austria (40), and Belgium (35), while bottom outliers include Romania (8), Greece (8), Lithuania (8), Cyprus (12), Malta (13), Estonia (13), and Croatia (13). These differences can be partly explained by the size difference (e.g. Germany, France and Poland on the one hand; Cyprus and Malta on the other hand). As mentioned earlier, the number of private schemes may be influenced by the structure of the banking sector (cf. high number of schemes in Italy that has a high number of banks). It may also be influenced by the implementation of market-based instruments, such as white certificate schemes. However, such schemes tend to focus on sectors where energy savings can be achieved at the least cost (e.g. industry) unless provisions make actions in buildings also attractive (case of France, where public incentives can be cumulated with white certificates).

Concerning public expenditure in building and industry efficiency, Italy stands out, followed by Germany, France, Spain, Austria, Sweden, Ireland, and Poland. However, the Italian value may be inflated by the costly "Superbonus" scheme, which is further discussed in the country focus.

3.2. Correlation with Socioeconomic, Climate, Energy and Financial indicators

The study gathered several indicators that could potentially influence the public and private offerings of financing schemes for building decarbonization, as depicted in Figure 1 and Figure 5. A correlation matrix was applied to this dataset, as illustrated in Figure 6. Notably, a strong correlation was observed between public expenditure on energy and building efficiency and several factors including population (0.92-0.87), total FEC in buildings (0.96-0.87), GFA (0.94-0.89), and the number of financing schemes (0.72-0.66). However, no significant correlation was evident between public expenditure in building efficiency and financial indicators.

The correlation with the population is particularly robust for top outliers like Italy, Germany, France, Spain, and Poland, but weakens for bottom outliers where countries with smaller populations do not necessarily exhibit the lowest expenditure.

In Italy and Spain, public expenditure on building efficiency is concentrated in a smaller number of larger schemes, whereas Austria and Belgium disperse modest values of public expenditure across a high number of schemes, attributed to the federal organization of the country, where schemes are predominantly found at the regional level, resulting in an increased total number of schemes.

Country	Energy Sp. (bn €)	Energy Sp. Build. & Ind. Eff (bn €)	Energy Sp. (€/capita)	Energy Sp. Build. & Ind. Eff (€/capita)	Financing Schemes - Total	Financing Schemes - Public	Financing Schemes - Private	Population	GDP/cap (PPS)	HDD	CDD
EU	990.5	151.0	2,209	337	25	23	2	448,387,872	100	2,858	140
Germany	311.9	30.3	3,697	359	48	40	8	84,358,845	117	2,736	34
France	137.8	26.2	2,024	384	46	30	16	68,070,697	100	2,036	117
Poland	37.6	5.3	1,023	144	36	24	12	36,753,736	79	3,200	41
Austria	27.6	8.4	3,032	928	33	21	12	9,104,772	124	3,229	29
Belgium	10.5	1.8	889	155	32	23	9	11,754,004	120	2,377	28
Netherlands	42.8	1.0	2,405	55	27	17	10	17,811,291	130	2,396	18
Italy	161.8	41.4	2,750	704	28	10	18	58,850,717	97	1,735	375
Spain	82.2	11.0	1,711	229	15	10	5	48,059,777	86	1,478	384
Sweden	11.6	5.6	1,106	532	19	6	13	10,521,556	119	4,919	2
Luxembourg	1.0		1,490	-	19	10	9	660,809	256	2,671	30
Denmark	12.9	1.7	2,177	283	20	9	11	5,932,654	136	3,019	3
Ireland	30.8	5.6	5,939	1,081	19	12	7	5,194,336	235	2,549	0
Slovakia	1.8	1.0	337	180	17	6	11	5,428,792	71	3,043	68
Finland	16.0	3.0	2,884	545	16	8	8	5,563,970	110	5,277	2
Czechia	25.6	0.9	2,366	83	14	9	5	10,827,529	90	3,083	27
Portugal	10.6	1.6	1,009	152	16	9	7	10,467,366	79	968	287
Slovenia	1.6	0.1	761	63	14	13	1	2,116,792	90	2,644	81
Bulgaria	1.4		221	-	15	12	3	6,447,710	62	2,307	202
Hungary	5.3	0.7	549	74	14	9	5	9,597,085	76	2,550	164
Latvia	1.1	0.4	596	189	14	9	5	1,883,008	73	4,026	14
Croatia	29.6	1.0	7,676	269	12	8	4	3,850,894	73	2,115	210
Estonia	2.2	0.2	1,630	148	12	6	6	1,365,884	85	4,118	16
Malta	0.5		950	-	11	6	5	542,051	104	544	842
Cyprus	0.6		640	-	12	6	6	920,701	94	696	698
Romania	7.2	0.06	378	3	6	5	1	19,051,562	76	2,751	146
Greece	13.8	2.94	1,332	282	8	5	3	10,394,055	67	1,538	372
Lithuania	4.4	0.79	1,555	277	8	4	4	2,857,279	89	3,773	19
Total	**990.5**	**151.0**	**2,209**	**337**	**556**	**350**	**206**	**448,387,872**	**1**	**2,858**	**140**

Country	Building FEC (GWh)	Total Gross Floor Area (m2)	Build. En. Intensity (MWh/ capita)	Build. En. Intensity (kWh/m2)	Electricity Prices	Gas Prices	DHC in FEC (%)	Inflation	Cost of borrowing	Interest Rate	Soverei egn Yied	Public Deficit (2022)
EU	4,295,555	32,407,086,861	9.6	132.5	0.29	0.06	6%	6.4%	4.1%	3.3%	3.2%	-1.0%
Germany	986,478	6,778,247,840	11.7	145.5	0.41	0.05	6%	6.1%	4.1%	2.2%	2.9%	-3.5%
Italy	685,985	4,857,889,366	10.1	141.2	0.23	0.05	2%	5.7%	4.1%	2.7%	2.9%	-3.5%
France	333,567	1,732,315,106	9.1	192.6	0.18	0.04	13%	10.9%		5.2%	4.3%	-2.9%
Spain	109,223	759,515,049	12.0	143.8	0.27	0.06	10%	7.7%	3.8%	2.7%	3.2%	0.1%
Netherlands	142,849	1,009,376,184	12.2	141.5	0.44	0.09	0%	2.3%	3.9%	2.7%	3.3%	2.4%
Poland	179,333	1,126,647,786	10.1	159.2	0.48	0.08	2%	4.1%	4.1%	2.5%	3.7%	-3.2%
Ireland	549,094	4,642,068,603	9.3	118.3	0.38	0.08	1%	0.06	4.9%	3.8%	2.5%	3.3%
Croatia	280,447	4,065,651,173	5.8	69.0	0.18	0.06	0%	3.4%	4.2%	3.2%	2.8%	-0.8%
Austria	130,136	788,575,499	12.4	165.0	0.27	0.13	19%	5.9%		2.2%	2.3%	-2.5%
Czechia	11,564	44,830,896	17.5	258.0	0.20	0.08	5%	0.03	4.1%	2.6%	3.4%	-2.4%
Finland	71,045	571,197,133	12.0	124.4	0.38	0.13	30%	3.3%		2.3%	2.8%	-4.8%
Greece	58,245	201,170,034	11.2	289.5	0.25	0.06	0%	5.2%	4.2%	2.6%	2.8%	1.7%
Denmark	44,811	241,263,156	8.3	185.7	0.19	0.03	17%	0.11	4.1%	3.4%	3.9%	-8.0%
Sweden	93,762	724,498,529	16.9	129.4	0.24		14%	0.04	4.7%	2.8%	3.5%	-4.6%
Portugal	117,872	575,448,159	10.9	204.8	0.32	#N/A	9%	#N/A		3.9%	2.5%	-0.3%
Belgium	60,194	934,780,458	5.8	64.4	0.21	0.06	0%	5.3%	4.5%	3.0%	6.4%	-6.3%
Romania	17,542	107,601,143	8.3	163.0	0.19	0.05	6%	0.07	3.9%	3.1%	3.6%	-5.7%
Hungary	40,178	483,619,499	6.2	83.1	0.11	0.08	8%	0.09		3.9%	3.8%	-0.7%
Lithuania	92,815	472,868,919	9.7	196.3	0.12	0.02	5%	17.0%		6.0%	5.4%	-3.7%
Estonia	19,372	96,150,612	10.3	201.5	0.31	0.07	21%	9.1%	7.2%	3.4%	2.6%	-0.1%
Slovakia	35,296	266,680,627	9.2	132.4	0.13	0.03	4%	8.4%	4.0%	3.3%	6.2%	-6.2%
Slovenia	16,419	125,901,602	12.0	130.4	0.22	0.08	24%	9.1%	7.5%	3.3%	3.0%	-3.0%
Bulgaria	2,611	18,647,303	4.8	140.0	0.13		6%	0.06	2.4%	3.4%	3.1%	-0.3%
Latvia	6,996	132,322,399	7.6	52.9	0.37		6%	3.9%	5.0%	3.3%	3.5%	-2.0%
Luxembourg	114,459	567,928,845	6.0	201.5	0.42	0.06	5%	9.7%		6.1%	3.3%	-4.7%
Cyprus	71,889	953,594,457	6.9	75.4	0.23	0.08	0%	4.2%	4.3%	3.3%	2.4%	1.1%
Malta	23,371	128,296,485	8.2	182.2	0.28	0.06	20%	8.7%	6.5%	2.9%	3.0%	-3.6%
Total	**4,295,555**	**32,407,086,861**	**9.6**	**132.5**	**0.29**	**0.06**	**6.0%**	**6.4%**	**4.1%**	**3.3%**	**3.2%**	**-1.0%**

Figure 5: Socio, economic, energy, climate, and financial indicators.

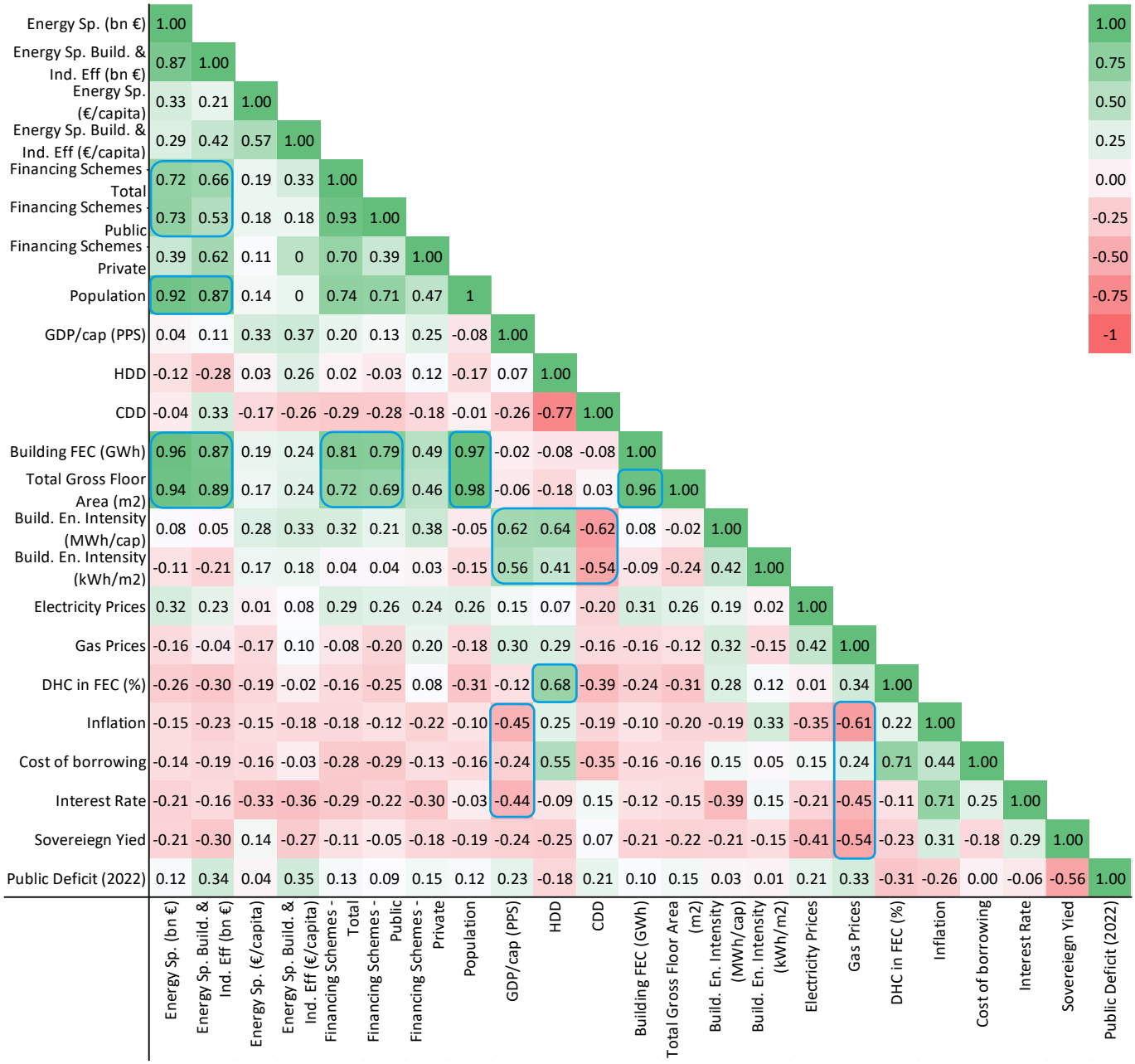

Figure 6: Correlation Matrix from the Data Table shown in Figure 4

GDP per capita in PPS did not exhibit any correlation with public expenditure for energy and building efficiency. While top outliers tend to be slightly wealthier than average, they do not necessarily possess the highest level of wealth, with Poland even among the lowest-income countries. However, GDP per capita in PPS moderately correlates with the energy intensity of buildings per capita (0.62) and HDD (0.64), indicating that wealthier countries tend to have less energy poverty and higher indoor comfort, resulting in higher final energy consumption, especially in colder climates.

HDD and CDD did not correlate with public expenditure for building efficiency. Countries with the highest heating needs did not necessarily exhibit the highest public expenditure, showing only a moderate correlation with the

energy intensity in buildings (0.64), primarily due to colder climates. Conversely, for cooling, high CDD values did not translate into high consumption, suggesting that summer comfort is still largely unmet, and cooling is a topic still neglected or inadequately addressed. However, there could be other explanations: building design in warmer countries could have already included summer comfort (cf. white colours of the buildings), uncertainties in the data on energy consumption related to space cooling can affect these considerations (as difficult to separate from other electricity consumption), especially because summer comfort may be handled with fans that have a low electricity consumption, cultural differences regarding the tolerance to higher temperature.

It must be noted that there might be bias in the correlations as the data may not be complete (we cannot guarantee completeness at 100%) and the year of the data does not always match between the data on schemes and the other variables. The review of the schemes is based on the description of the schemes. The data collection did not collect data about explanatory factors (e.g. equipment rate for air conditioning systems or fans).

While a strong correlation (0.87) was observed between public expenditure in building efficiency and total FEC in buildings, population, and gross floor area, no correlation was found with energy intensity per capita (toe/capita) or per surface (kWh/m2). Additionally, electricity and gas prices showed no correlation with public expenditure in building efficiency.

The share of DHC in FEC exhibited a strong correlation with HDD. Countries with small or non-existent district networks had the lowest number of schemes addressing this technology. Conversely, several schemes addressed DHC in countries where this technology is prevalent, but the share of DHC in FEC was not yet the highest. This suggests that the priority given to DHC systems at the EU level has not yet been fully embraced in countries new to this technology or where conditions for DHC are unfavourable (e.g. due to low heat density).

The financial indicators analysed did not display any significant correlation between the amount of public spending for building and industry efficiency. In terms of temporal dimension, most schemes commenced in the past five years, with fewer ongoing schemes found to have started further in the past. This is understandable as evolving needs, political priorities, and market conditions prompt the initiation, merging, or discontinuation of schemes over time.

3.3. Country Focus: Significant Outliers

Outliers enrich the narrative by providing unique insights, thus this section delves into the specific circumstances influencing the provision of funding instruments in selected outliers.

Austria stands out with one of the highest public energy expenditures in building and industry efficiency per capita in the EU, despite having the lowest proportion of schemes targeting energy efficiency in buildings. This situation is partly attributed to the prioritization of H&C systems over building envelopes, driven by a significant renovation wave in 2009. Additionally, the decentralized nature of implementation, where regions (Länder) oversee national schemes, contributes to a limited proliferation of financing schemes.

In contrast, **Spain** exhibits moderate public expenditure in building efficiency, considering its large population and gross floor area. Notably, there are relatively few schemes addressing Building Efficiency and Cooling independently. This aligns with previous analyses by Odyssee-Mure (Rousselot and Morgan-Price, 2021), which highlighted Spain's sluggish renovation rate and lower depth of renovations compared to other EU countries. Like Austria, Spain's regional governments (Autonomous Communities) play a significant role in building renovation, albeit primarily as implementers of national renovation schemes (previously PAREER and now PREE).

Conversely, in **Belgium**, energy efficiency policies fall under regional competencies, resulting in a proliferation of regional schemes and minimal nationwide schemes documented in this study.

Italy demonstrates the highest public expenditure in building and industry efficiency, largely attributed to the "Superbonus" program. This initiative, offering a 110% tax rebate for energy-efficient building renovations, sparked controversy due to its significant cost (approximately 100 billion € so far (ENEA, 2023)) relative to the modest energy efficiency gains achieved (Alpino et al., 2022). Introduced in 2020 to stimulate the economy and construction sector, the scheme drew criticism for its regressive nature, primarily benefiting property owners rather than the poorest segments of the population. Moreover, the incentive structure, set at 110%, led to inflated renovation prices and fueled debate over its efficacy and fairness. The MICAT project (Berger, 2024) conducted further analysis of the multiple impacts of this scheme. The Superbonus has been revised several times since 2022 to reduce its expenses (Romano, 2023), and from 2024, it is limited to the renovation of condominiums with an incentive rate of 70%(Gavi, 2024).

4. Experts Interviews

A series of expert interviews tried to identify elements that can hinder or facilitate access to finance for space cooling projects, as well as desirable elements that finance providers look for when reviewing credit or investment requests. This chapter presents the insights gathered from experts representing various stakeholder groups regarding the financing of sustainable space cooling projects.

Link to Survey: https://forms.gle/kDJbRtdYzNhcjmVn9

LIST OF QUESTIONS

Info: name, role, organization name, stakeholder category

Securing funding for a space cooling project:

1. *How easy was it for you to secure financing for your space cooling project(s)?*
2. *At what development phase of your project did you start looking for funding?*
3. *What information was needed/requested by the credit institute/investor when seeking financing?*
4. *Was there an asymmetry in the information available and the information required?*
5. *When applying for funding, were credit institutions able to fully assess the profitability and risks associated with the project? Were project developers able to fully communicate them?*

Barriers and Drivers to Financing Space Cooling:

6. *What do you think are the major drivers and barriers to securing financing for space cooling projects? Do they change over time? E.g. after many successful projects, due to market changes or other exogenous factors?*
7. *What makes, in your opinion, a space cooling project profitable and low risk?*
8. *What do think would help facilitate access to financing for space cooling projects? E.g. a database of successful projects, estimates on average financial indicators, a template to provide all necessary information about geothermal projects when applying for funding, support to assess geothermal projects in credit institutions, technical expertise in banks to assess space cooling projects or a centralized service e.g. provided by the national energy agency.*
9. *What else do you think is needed to accelerate the decarbonization of space cooling in Europe?*
10. *What do you think makes a financing scheme for building efficiency relevant to summer comfort?*

RESPONDENTS

The interviews conducted for this study involved a total of thirteen experts, each offering unique insights based on their professional backgrounds and experiences. The results from the interviews are not meant to be representative but to provide qualitative insights complementing the mapping of financing schemes. The distribution of respondents across different stakeholder categories is as follows:

- Research and Academia: 4
- Association/Lobby: 2
- H&C Planning/Consulting: 2

- Public Administration: 1
- Bank/Investor: 1
- Development/Energy Agency: 1
- Consumers Organization: 1
- Engineering Industry: 1

FINANCING A SPACE COOLING PROJECT

1. Ease of Securing Financing: Responses varied, with some indicating that it's sometimes very difficult due to split incentives, lack of public incentives, and perception of cooling as a luxury. However, cooling needs are increasing, especially for vulnerable populations and critical buildings. Others found it moderately easy but noted that funding schemes specifically for cooling are scarce.

2. Development Phase for Seeking Funding: Funding was sought at the outset of project development.

3. Information Required by Credit Institutions/Investors: The typical information required includes proof of planned measures, global warming potential of refrigerants, energy efficiency potential, energy labels, and technical information on proposed measures.

4. Asymmetry in Information: Responses were mixed, with some indicating a lack of awareness and others noting discrepancies between required and available data, especially concerning cooling sector KPIs.

5. Assessment of Profitability and Risks: Some respondents mentioned difficulties in financial institutions in assessing the benefits and risks of sustainable cooling projects, particularly due to limited awareness in financial institutions, and insufficient knowledge about cooling systems' installation and maintenance.

BARRIERS AND DRIVERS TO FINANCING SPACE COOLING

6. Major Drivers and Barriers:

Major Drivers include:

a) Climate change adaptation and sustainability goals, emphasise the increasing necessity for cooling.
b) Education and awareness efforts highlight the benefits and importance of cooling.
c) Market conditions improving due to successful projects and legislative targets for renewable cooling.
d) Legal requirements for energy efficiency and recognition of wider productivity and health benefits.

Major Barriers include:

a) Perception of cooling as a nice-to-have rather than a necessity leads to insufficient integration of cooling solutions.
b) Lack of awareness among policymakers and biases in certain regions where cooling is seen as a luxury.
c) Challenges in demonstrating clear economic returns due to difficulties in quantifying co-benefits like health and comfort.
d) Absence of cooling metrics in energy performance assessments and public incentives not tailored for cooling needs.
e) Lack of regulation and mandatory actions hindering progress in implementing cooling solutions.

f) Financial constraints, including the small size and heterogeneous nature of financing requests and high initial costs.
g) Insufficient data about cooling consumption and demand, hindering financing efforts.

Over time, factors influencing financing may evolve. As technologies become more affordable and regulations become stricter, barriers related to lack of information and low-income building owners could diminish. Successful projects can pave the way for improved access to funding sources. Ultimately, addressing these drivers and barriers will be essential for accelerating the adoption of financing for space cooling projects.

7. Profitability and Low-Risk Factors:
Several factors contribute to the profitability and risk management of a space cooling project:

a) **Targeted Approach**: Targeting relevant building types that are prone to overheating and extensively used in the summer can ensure that projects that meet specific demand needs are financially successful.
b) **Project design**:
    - **Involving experts in the design phase**, especially for innovative cooling methods such as Helsinki's free cooling based on lake waters, can enhance project efficiency and effectiveness.
    - Considering **integrated approaches** jointly addressing space heating and space cooling can improve project profitability, as the same project/investment can then contribute to multiple purposes (see also next point).
c) **Considering a broader set of solutions:**
    - **Cooperation with manufacturers and solution providers**: Partnering with high-rated technology suppliers and aligning with international commitments like the Kigali Amendment to reduce HFC23 emissions can enhance project credibility and attractiveness to investors.
    - **District Cooling**: Implementing district cooling solutions, particularly in urban areas, can offer more profitable and efficient alternatives compared to individual solutions.
d) **Valuing the possible multiple impacts** of space cooling projects:
    - **Efficiency and Flexibility**: Prioritizing efficiency considerations and promoting solutions that provide clean baseload capacity and flexibility can enhance project viability.
    - **Comfort**: Recognizing that space cooling projects primarily address comfort, ensuring that the project delivers value in terms of summer comfort for occupants is essential.
    - **Wider Impacts**: Understanding and quantifying indirect impacts, such as health improvements or increased customer retention in commercial buildings, contributes to project profitability assessment.
    - **Government Perspective**: Providing space cooling can reduce costs compared to healthcare services for vulnerable people, and buildings without cooling lose value, quantifiable for real estate developers and managers.
e) **Incentive design**: Addressing issues such as subsidies that may disadvantage certain cooling solutions, can improve project feasibility.
f) **Broader view of the cooling needs**: Comprehensive Assessments for heating and cooling, required by the Energy Efficiency Directive, that consider not only seasonal cooling but also potential uses for ventilation and refrigeration (data centres, cool rooms), would ensure using correct load curves and giving a thorough understanding of demand and requirements.

8. Facilitating Access to Financing:
Several measures were proposed:

a) **Awareness Building**:

- **Increase awareness among credit institutions** about the benefits and potential of financing space cooling projects, sharing best practices to build confidence in investment opportunities.
- **Address Perception Barrier**: Educate stakeholders about the necessity of cooling to overcome the perception that it is a luxury rather than a need.

b) **Improve investment information and application process**:
- **Transparent Information**: Provide transparent and easily accessible information on investment requirements, business models, and payback periods of successful projects to motivate and facilitate investment.
- **Benchmarking Financial Indicators**: Estimate average financial indicators to assess the profitability of cooling projects, with economic and energy savings per technology, aiding credit institutions in evaluating investment opportunities.
- **Funding Application Templates**: Develop templates for cooling project funding applications to streamline the application process and ensure all necessary information is provided.

c) **Technical Tools**: Provide technical tools such as integrating cooling into EPCs, better from third parties, to assist credit institutes in project evaluation and decision-making.

d) **Promote holistic approaches**:
- **Service-based Approach**: Sell cooling as a service rather than a commodity to highlight its cost-effectiveness independently from consumption variability.
- **Energy Efficiency Integration**: Integrate space cooling projects into broader energy efficiency initiatives to prevent overinvestment and ensure comprehensive project evaluation, e.g. in minimum energy performance standards both for new constructions and building retrofit.

e) **Open-access data:** Produce and disseminate open-access datasets on emissions, comfort, and energy use of space cooling to quantify how future-proof are properties and increase accordingly creditworthiness of property owners.

9. Accelerating Decarbonization: Accelerating the decarbonization of space cooling in Europe requires a multifaceted approach:

a) **Policy Mandates**: Implementing top-down mandates to include cooling as a requirement in energy performance certificates and acknowledging the unmet demand for cooling.

b) **Electricity Decarbonization and increased use of renewable energy sources**: Prioritizing the decarbonization of the electricity sector, considering that space cooling primarily relies on electricity. Emphasizing energy efficiency measures to reduce cooling demand is also crucial. And encouraging the greater utilization of renewable energy sources for space cooling when relevant (e.g. from geothermal energy).

c) **Capacity Building**: Providing training and capacity building to political and technical personnel to enhance their understanding of cooling-related challenges and solutions.

d) **Collective Solutions**: Addressing cooling challenges collectively through initiatives such as creating green spaces and implementing shading strategies, rather than focusing solely on individual air conditioning units.

e) **Clear Targets**: Establishing clear cooling targets at both EU and national levels, distinct from heating targets, and integrating them into a comprehensive cooling strategy with a roadmap for implementing renewable cooling solutions.

f) **Standards and Regulations**: Developing and enforcing standards for cooling devices to ensure their compliance with decarbonization goals, eco-design and F-gas regulation, similar to Fleet Emissions Portfolio Standards.

g) **Promoting efficiency**: district cooling networks and digitized cooling systems to adapt to occupancy and outside temperature variations.

10. Relevance of Financing Schemes to Summer Comfort:

To make a financing scheme for building efficiency relevant to summer comfort, respondents highlighted several key factors:

a) **Air conditioning:** Directly addressing the need for cooling systems in buildings.
b) **Building efficiency improvements:** Prioritizing measures like insulation and windows.
c) **Versatile insulation:** Ensuring insulation strategies not only focus on heat loss but also prevent heat gains through shading, ventilation, and materials with long phase-shifting times.
d) **Assessment of overall comfort:** Evaluating energy efficiency based on indicators of comfort in both winter and summer seasons.
e) **Better comfort data:** Utilizing improved data on comfort levels to inform financing decisions.
f) **Ventilation systems:** Recognizing the importance of ventilation, especially in conjunction with the energy class of the house.
g) **Realistic cooling profiles:** Considering realistic cooling needs in building design and policy formulation, acknowledging the increase in cooling demand during summer months.
h) **Controls and automation:** Incorporating smart controls and building automation systems to enhance indoor air quality and summer comfort.
i) **Flexibility in solutions:** Favouring solutions that can provide both heating and cooling constantly and flexibly, such as those based on geothermal energy.
j) **Targeting relevant building uses:** Directing financing towards building uses that are predominantly used in the summer, ensuring maximum impact on summer comfort.

5. Discussion

This in-depth analysis offers a comprehensive examination of various aspects concerning the distribution and characteristics of financial mechanisms aimed at facilitating sustainable space cooling, and more broadly building decarbonization, throughout the European Union (**EU**). Nonetheless, certain aspects warrant further discussion.

To begin with, it is imperative to recognize the inherent limitations of such mapping exercise. While endeavours were made to ensure thoroughness, the completeness of the mapping cannot be guaranteed, given the constantly evolving nature of funding initiatives, resulting in rapid obsolescence.

The lack of a historical overview of expired schemes presents challenges in contextualizing the present situation relative to the past. For example, without historical data, it becomes arduous to assess trends such as spikes in public funding, especially in response to events like the COVID-19 pandemic (cf. Recovery and Resilience Plans, soon ending) or impending elections.

Another significant constraint lies in the difficulty of precisely comparing total funding availability due to the lack of specific information on funds allocated to individual programs. The opacity of budget data, not always available or difficult to find, not only complicates comparisons between public and private financing initiatives but also hinders assessments of their effectiveness. The same is true about the data on results and impacts of the schemes. Such information is rarely available directly next to the official description of the schemes (e.g. on their official webpages). Collecting data on budget, results and impacts thus implies a specific search for each scheme (without a guarantee of success). Compiling the descriptions of 556 schemes already required a lot of time and effort. Data on budgets was included when easily available. Gathering further data (on budget, results and impacts) on a systematic basis for 556 schemes would go beyond the resources available in CoolLIFE for this task.

Consequently, while the mapping identifies available schemes, it does not offer insights into their actual utilization. For instance, many schemes theoretically address both H&C, but their actual usage patterns remain unknown.

The disparity in public expenditure on building efficiency may serve as a proxy for the intensity of public support for the decarbonization of the building stock. However, it should be noted that the data available from the IEA also includes public expenditure for energy efficiency in industry, which may create a bias in the analysis. Moreover, the number of schemes does not directly reflect the intensity of support for decarbonization. Instead, it may mirror the strategy employed, such as umbrella schemes covering various actions or specific schemes targeting different aspects of building decarbonization or different segments of the building stock.

Apart from the evaluated indicators, several other factors, albeit harder to quantify, could influence the discrepancies across countries regarding both the size of public expenditure and the number of schemes aimed at sustainable cooling and building decarbonization. These factors may include the perceived importance and urgency of advancing the energy transition, the imperative to address energy poverty, political commitments, the status of market developments for sustainable space cooling solutions, the presence of major market players promoting solutions and lobbying for support schemes, and initiatives like electrification and decarbonization of cooling supply through renovations.

Countries with well-established private finance sectors may demonstrate higher levels of market maturity, with private investors being more inclined to view renewable energy and efficiency projects as profitable investments. Nonetheless, differences in interest rates across countries shape the financing landscape, with grants and loans reducing initial investments but failing to address interest rate differentials. Guarantees could potentially mitigate this issue by discounting rates or reducing the need for collateral.

Despite the proliferation of both public and private financing schemes, the renovation gap persists. This study highlights two primary assertions:

- Firstly, incentives alone, without a legal obligation to renovate buildings, may not suffice to close the renovation gap: in most countries, renovation rates are still lower than the target of the EU Renovation Wave, whereas financing schemes are available in all countries (and even sometimes many schemes). This questions the design and effectiveness of these schemes, but also that other (i.e. not related to financing) barriers might need to be overcome (e.g. availability of skilled professionals, availability of services/offers that can be attractive to building owners).
- Secondly, existing schemes necessitate enhanced clarity and visibility to effectively reach building owners and investors. A high number of schemes available in a country is indeed not necessarily a favourable condition, as building owners and investors may easily get lost among the various options. This is sometimes addressed with the development of one-stop-shops that can provide building owners with tailored information at once.

Looking forward, identifying, and addressing these challenges will be pivotal in enhancing financing incentives to propel building decarbonization forward.

In addition, issues interesting to investigate further include:

- Possible links between policies and the development of private schemes (for example, green loans with subsidised interest rates).
- Possible links between the development of private schemes and an increasing recognition of the green value of buildings by financing institutions (for example green mortgages).
- Whether the boost in existing or new schemes due to the Recovery and Resilience Plans resulted in market transformation effects or only short-term increases in the number of renovation or other energy efficiency projects.
- What eligibility criteria or requirements could help ensure that financing schemes for energy efficiency in buildings are also contributing to sustainable space cooling/summer comfort.

More specifically about financing sustainable space cooling, a preliminary step would be needed to clarify the scope of solutions for sustainable space cooling. A major risk is indeed that financing space cooling projects would be focused on air conditioning systems. Similarly to space heating, the approach for space cooling should start with minimizing the cooling needs, and whenever possible avoid the need for air conditioning systems (as set in the Austrian regulation for new buildings for example). However, unlike the case of space heating, the solutions to minimize cooling needs are less systematically considered, especially among the eligible action types in financing schemes for building renovation. For example, these schemes rarely include in their scope actions such as sun shading, enabling night ventilation or green façades.

Another good example is the use of fans, which can be a cost-effective solution for ensuring summer comfort if the weather conditions do not lead to too high indoor temperatures. This type of solution is rarely considered in financing schemes, possibly because it does not have a high upfront cost and might not need financing incentives. However, financing schemes could be used to promote this type of solution when relevant and directing users to efficient devices instead of the lowest price options.

More generally, the review of financing schemes raised the issue that it was difficult to identify whether a renovation scheme could be relevant to space cooling/summer comfort. As the EU and national policies for energy and climate are currently aimed at increasing very significantly the renovation rates, there is a major risk of missed opportunity or lock-in effect if the corresponding renovation schemes are focused on space heating only. Due to the lower energy cost that space cooling represents (compared to space heating), addressing space cooling separately would make the business case for sustainable solutions difficult. Whereas, if addressed jointly with space heating, this can be an opportunity to adapt slightly the renovation projects, with low extra cost, while delivering the conditions to ensure summer comfort sustainably.

The new definition of energy poverty included in the new EED (EU)2023/1791 stipulates clearly that “essential energy services” and “basic levels and decent standards of living and health” include cooling. This may contribute to making cooling needs or summer comfort more systematically considered.

Going beyond the building level and building renovation, the Energy Efficiency Directive already requires Member States to assess cooling needs and potentials for district cooling in the Comprehensive Assessments for heating and cooling (now Article 24 in the new Energy Efficiency Directive). So far, addressing cooling has been a weak point in most Comprehensive Assessments. The upcoming updates of Comprehensive Assessments, due by 30 June 2024 as part of the final update of the National Energy and Climate Plans, may improve this.

However, there would remain a gap in the linkage between mitigation measures and adaptation measures, when dealing with space cooling and summer comfort in buildings. As stressed earlier in this report, this link is essential due to the consequences of climate changes that will increase cooling needs, and even make the comfort issue may become a major health issue due to the increase in frequency and intensity of heat waves. A good illustration of this linkage issue is the phenomenon of urban heat islands that require to integration of cooling considerations into local spatial planning and urban design initiatives. While this is usually addressed from an adaptation perspective, this can be worsened by the development of the use of air conditioning (releasing hot air into the outdoor environment). Integrated approaches are thus essential.

Such approaches have not been found in this review, as the focus was on building efficiency and cooling systems. This may also be because schemes for building renovation are mostly meant for building owners, whereas adaptation solutions are mostly developed at the urban level, i.e. with the municipalities as key stakeholders.

6. Conclusions

Despite the existence of numerous initiatives, coordinated action from both European and national policymakers is essential to expedite the supply of a growing space cooling demand, while transitioning toward decarbonization. This entails the establishment of supportive policy and financial frameworks, encompassing legislative mandates, incentives for building refurbishment, promotion of renewable energy technologies, assistance for vulnerable households, and the phase-out of fossil fuels, especially in power generation. Moreover, investment in technical support, capacity enhancement, and workforce training programs is vital to facilitate the effective implementation of decarbonization endeavours.

Conducting a systematic mapping of financing initiatives for space cooling proved to be a significant resource-intensive task, given its inherently dynamic nature. Thus, it is evident that there is scope for improvement in enhancing the accessibility of information regarding available funding programs. Centralized platforms, such as national portals providing a comprehensive overview of available incentives along with relevant details and direct links to application pages, could greatly enhance the widespread and efficient utilization of resources provided through such initiatives.

In the quest to reduce the information barrier, the mapping dataset behind this study will serve as a foundational resource for the financing program components of the Tool and Knowledge Hub developed under the CoolLIFE project. Acknowledging the challenge of obsolescence, proactive measures have been taken to mitigate this risk. Through meticulous curation of sources and utilization of targeted keywords, users can verify the status of listed programs and identify emerging opportunities, ensuring the mapping remains up-to-date and pertinent. Integration into these platforms will empower stakeholders to access comprehensive information and leverage it to facilitate informed decision-making and formulate evidence-based strategies toward achieving Europe's net-zero aspirations.

This mapping of financing schemes also provides a starting point for further analysis of key issues to prepare recommendations for enhanced schemes to promote solutions for sustainable space cooling. Such issues include:

- Clarifying the scope of solutions and approaches for sustainable space cooling.
- Analysing how financing schemes can be designed or adapted, considering the differences in needs according to the segments of the building stock and the profiles of building owners or occupants.
- Defining criteria or requirements to ensure that renovation schemes are also relevant to space cooling/summer comfort.
- Considering multiple impacts (e.g. health, peak load, productivity) can be strategic reasons for motivating investments in solutions for sustainable space cooling, with a higher weight on decision-making than energy costs alone.
- Analysing the interactions and possible linkages between mitigation and adaptation measures, and how integrated approaches can be developed.

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8. Annexe: Main Resources used for the Mapping

8.1. EU Databases

- **COR Division of Powers**: https://portal.cor.europa.eu/divisionpowers/
- **EBRD Projects**: https://www.ebrd.com/project-finder
- **EIB Projects**: https://www.eib.org/en/projects/loans/
- **Fi-compass Country Data**: https://www.fi-compass.eu/country-data
- **IEA Policies**: https://www.iea.org/policies
- **Odyssee-Mure Database**: https://www.measures.odyssee-mure.eu/energy-efficiency-policies-database.html#/
- **OECD Library**: https://www.oecd-ilibrary.org/
- **OECD Affordable Housing Database**: https://www.oecd.org/housing/data/affordable-housing-database/
- **Recovery and Resilience Facility Projects**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility
- **NECPs**: https://commission.europa.eu/energy-climate-change-environment/implementation-eu-countries/energy-and-climate-governance-and-reporting/national-energy-and-climate-plans_en#national-energy-and-climate-plans-2021-2030
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages_en
- **LTRS**: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en#national-long-term-renovation-strategies-2020
- **NEEAPs**: https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/national-action-plans-and-annual-progress-reports_en
- **Building renovation national contacts**: https://energy.ec.europa.eu/topics/energy-efficiency/financing/building-renovations_en

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- DG Energy 2022. Overview of markets and regulatory frameworks under the revised Renewable Energy Directive https://energy.ec.europa.eu/publications/district-heating-and-cooling-european-union_en
- DG Energy, e-think , Fraunhofer ISI , TU Wien , Viegand Maagoe , Öko-Institut e.VRESHC, Renewable space heating under the revised Renewable Energy Directive, 2022, https://op.europa.eu/en/publication-detail/-/publication/16710ac3-eac0-11ec-a534-01aa75ed71a1/language-en
- IRENA Country profiles for the European Union: https://www.globalccsinstitute.com/archive/hub/publications/138188/renewable-energy-country-profiles-european-union.pdf

8.3. Main Sources at the Member State (MS) level

AUSTRIA

- **NECP**: https://energy.ec.europa.eu/system/files/2020-03/at_final_necp_main_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/austrias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/84846ac4-c2fa-43bf-baad-20952579e2b7_en?filename=at_2020_ltrs_en_0.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/5c8cee5b-9f8b-487f-8dc0-7693e44e29f4_en?filename=at_neeap_2017_en.pdf (2017)
  https://energy.ec.europa.eu/document/download/39e37a54-13d0-4f5a-9c21-226592f329ab_en?filename=at_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**:
  - Upper Austria: www.energiesparverband.at
  - Carinthia: www.neteb-kaernten.at
  - Lower Austria: www.enu.at
  - Burgenland: https://www.burgenland.at/themen/wohnen
  - Vorarlberg: https://www.energieinstitut.at/buerger/energieberatung
  - Tyrol: https://www.energie-tirol.at
  - Vienna: https://www.hauskunft-wien.at
  - Styria: https://www.wohnbau.steiermark.at
  - Salzburg: https://www.salzburg.gv.at
- **National Energy Efficiency Fund: Climate and Energy Fund** https://www.klimafonds.gv.at/
- **Austrian Energy Agency - Funding:** https://www.energyagency.at/fakten/foerderungen
- **Austrian Environmental Funding:** https://www.umweltfoerderung.at/

- **Austrian Federal Ministry for Digital and Economic Affairs:** http://www.bmwfw.gv.at/
- **Austrian Federal Government Portal:** www.oesterreich.gv.at
- **Austrian Government Services Portal - Help.gv.at:** https://www.help.gv.at/
- **Austrian Federal Economic Chamber (WKO) - Austrian Federal Economic Chamber:** https://www.wko.at/
- **Austrian Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (BMK):** https://www.bmk.gv.at/
- **Desk Research Keywords**: Österreich Finanzierung, Energiefonds, Effizienz, Förderprogramm, Heizung, Grün, Subventionen, Förderung, Unterstützung, Finanzierung, Gebäudesanierung, Dekarbonisierung, thermische Sanierung, Isolierung, erneuerbare Energien in Gebäuden, Heizung und Kühlung, Fernheizung und -kühlung, DHC, geothermisch, Überschusswärme, Abwärme

BELGIUM

Belgium - Brussels

- **NECP**: https://energy.ec.europa.eu/system/files/2020-03/at_final_necp_main_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/austrias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/84846ac4-c2fa-43bf-baad-20952579e2b7_en?filename=at_2020_ltrs_en_0.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/5c8cee5b-9f8b-487f-8dc0-7693e44e29f4_en?filename=at_neeap_2017_en.pdf (2017), https://energy.ec.europa.eu/document/download/39e37a54-13d0-4f5a-9c21-226592f329ab_en?filename=at_annual_report_eed_2020_tra.pdf (2020 Progress Report)
- **Building Renovation National Contacts**: Homegrade Brussels https://homegrade.brussels
- **Energy Watchers:** https://www.energywatchers.be
- **Brussels Environment:** https://environnement.brussels/
- **Renovation works in Brussels:** https://www.travaux-de-renovation.be/
- **Renolution Brussels:** https://renolution.brussels/
- **Brussels Regional Investment Company:** https://www.finance.brussels/produits
- **Desk Research Keywords**: Belgique, Bruxelles, financements, fonds d'énergie, efficacité, programme de financement, chauffage, vert, subventions, promotion, soutien, financement, rénovation de bâtiments, décarbonisation, rénovation thermique, isolation, énergies renouvelables dans les bâtiments, chauffage et refroidissement, chauffage urbain et refroidissement, DHC, géothermie, chaleur excédentaire, chaleur résiduelle

Belgium – Flanders

- **NECP:** https://energy.ec.europa.eu/system/files/2020-09/be_final_necp_partb_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/austrias-recovery-and-resilience-plan_en
- **LTRS:** https://energy.ec.europa.eu/document/download/921e2081-983c-4812-b416-4de8943df275_en?filename=beflanders_ltrs_2020_en.pdf (2020)
- **NEEAP:** https://energy.ec.europa.eu/document/download/5c8cee5b-9f8b-487f-8dc0-7693e44e29f4_en?filename=at_neeap_2017_en.pdf (2017),

https://energy.ec.europa.eu/document/download/39e37a54-13d0-4f5a-9c21-226592f329ab_en?filename=at_annual_report_eed_2020_tra.pdf (2021Progress Report)

- **Building Renovation National Contacts & Flemish Government - Building, Housing, and Energy:** https://www.vlaanderen.be/bouwen-wonen-en-energie
- **Flemish Environment Agency - Energy, Climate, and Environment:** https://omgeving.vlaanderen.be/energie-klimaat-en-milieu
- **Flemish Government:** https://www.vlaanderen.be/
- **Desk Research Keywords**: België, Vlaanderen, energie fonds, efficiëntie, financieringsprogramma, verwarming, groen, subsidies, promotie, ondersteuning, financiering, gebouwrenovatie, decarbonisatie, thermische renovatie, isolatie, hernieuwbare energie in gebouwen, verwarming en koeling, stadsverwarming en koeling, DHC, geothermisch, overtollige warmte, restwarmte

Belgium – Wallonia

- **NECP:** https://energy.ec.europa.eu/document/download/d472bcb4-3559-408b-b9e8-0b64debe8f29_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/austrias-recovery-and-resilience-plan_en
- **LTRS:** https://energy.ec.europa.eu/document/download/921e2081-983c-4812-b416-4de8943df275_en?filename=beflanders_ltrs_2020_en.pdf (2020)
- **NEEAP:** https://energy.ec.europa.eu/document/download/5c8cee5b-9f8b-487f-8dc0-7693e44e29f4_en?filename=at_neeap_2017_en.pdf (2017), https://energy.ec.europa.eu/document/download/39e37a54-13d0-4f5a-9c21-226592f329ab_en?filename=at_annual_report_eed_2020_tra.pdf (2021Progress Report)
- **Building Renovation National Contacts & National Energy Agency:** https://energie.wallonie.be/
- **Federal Public Service Economy, SMEs, Self-Employed and Energy - Belgium:** https://economie.fgov.be/fr/themes/energie/transition-energetique/
- **Walloon Region:** https://www.wallonie.be/
- **Housing information in Wallonia:** https://logement.wallonie.be/
- **Desk Research Keywords**: Belgique, Wallonie, financements, fonds d'énergie, efficacité, programme de financement, chauffage, vert, subventions, promotion, soutien, financement, rénovation de bâtiments, décarbonisation, rénovation thermique, isolation, énergies renouvelables dans les bâtiments, chauffage et refroidissement, chauffage urbain et refroidissement, DHC, géothermie, chaleur excédentaire, chaleur résiduelle

BULGARIA

- **NECP**: https://energy.ec.europa.eu/system/files/2020-06/bg_final_necp_main_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/bulgarias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/32cf5db2-d79b-48e0-bf75-25859526cb46_en?filename=bg_ltrs_2020_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/601608d9-831b-4657-b3d7-db00b2567dcf_en?filename=BG_NEEAP_2017_v2_en.pdf (2017) https://energy.ec.europa.eu/document/download/88367a6c-79cd-4a71-a2a7-

9e2dc755e4ea_en?filename=2020%20Annual%20Progress%20Report%20of%20Bulgaria%20on%20implementation%20of%20NEEAP%202014-2020.pdf (2020Progress Report)

- **Building renovation national contacts**: https://www.seea.government.bg/bg/za-domakinstvata
- **Energy Efficiency and Renewable Sources Fund**: https://www.bgeef.com/en/
- **ABEA (Association of Banks in Bulgaria):** https://new.abea-bg.org/?lng=EN
- **Bulgarian Ministry of Economy:** https://www.sme.government.bg/
- **Bulgarian Ministry of Energy:** https://www.me.government.bg/en
- **Ministry of Regional Development and Public Works of Bulgaria:** http://www.mrrb.government.bg/
- **United Nations Economic Commission for Europe (UNECE):** https://unece.org/DAM/energy/se/pdfs/eneff/FEEI/FEEI_Report_7_Nov_2018.pdf
- **Bulgarian EcoFund:** https://ecofund-bg.org/
- **National Guarantee Fund in Bulgaria:** https://www.ngf.bg/
- **Desk Research Keywords**: България,Енергиен фонд, ефективност, програма за финансиране, отопление, зелен, субсидии, насърчаване, подкрепа, финансиране, обновление на сгради, декарбонизация, топлозащитен ремонт, изолация, възобновяема енергия в сградите, отопление и охлаждане, отопление и охлаждане на район, DHC, геотермални, излишък на топлина, отпаднала топлина

CROATIA

- **NECP**: https://commission.europa.eu/publications/croatia-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/croatias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/b87dca97-b7c1-452e-ae65-fad83be5f80b_en?filename=hr_2020_ltrs_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/05fcf4cc-3361-4ba1-afb5-2aec8a376d8f_en?filename=hr_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/f73c663f-2a03-4c71-affb-b1f1b7cb4db5_en?filename=croatian_report_on_the_progress_achieved_towards_national_energy_efficiency_targets_for_2020.pdf (2020Progress Report)
- **Environmental Protection and Energy Efficiency Fund**: https://www.fzoeu.hr/en/home/
- **Hrvatska elektroprivreda (HEP), national electricity company:** https://www.hera.hr/en/html/index.html
- **Ministry of Environmental Protection and Energy**: https://www.mzoip.hr/
- **Government of Croatia**: https://gov.hr/
- **Croatian Bank for Reconstruction and Development**: https://www.hbor.hr/
- **Fund for Environmental Protection and Energy Efficiency**: https://www.fzoeu.hr/
- **Energy Institute Hrvoje Požar**: https://www.enu.hr/
- **Desk Research Keywords**: Hrvatska, energetski fond, učinkovitost, program financiranja, grijanje, zeleno, poticaji, promocija, podrška, financiranje, obnova zgrada, dekarbonizacija, termička obnova, izolacija, obnovljiva energija u zgradama, grijanje i hlađenje, daljinsko grijanje i hlađenje, DHC, geotermalno, višak topline, otpadna toplina

CYPRUS

- **NECP**: https://commission.europa.eu/publications/cyprus-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/cyprus-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/ef04806b-a8af-4421-943a-ec5ee6b2191c_en?filename=cyprus_2020_ltrs_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/177af34e-ea9f-407f-a9c3-c3b44fa82782_en?filename=cy_neeap_2017_en.pdf (2017)
  https://energy.ec.europa.eu/document/download/ced58d71-a5a7-4b44-8814-13d65447d9c0_en?filename=cy_annual_report_eed_2020.pdf (2020Progress Report)
- **Building renovation national contacts**: RES and Energy Conservation Fund (Cyprus) https://www.resecfund.org.cy/el/sxedia
- **Cyprus Energy Agency**: https://www.cea.org.cy/
- **Ministry of Energy, Commerce, and Industry of Cyprus**: http://www.mcit.gov.cy/mcit/energyse.nsf/index_gr/index_gr?opendocument
- **Funding Programmes Portal of Cyprus**: https://www.fundingprogrammesportal.gov.cy/
- **Ministry of Energy, Commerce, and Industry of Cyprus**: https://meci.gov.cy/
- **Cyprus Energy Regulatory Authority**: https://www.oeb.org.cy/
- **Desk Research Keywords**: Κύπρος, Ταμείο ενέργειας, αποτελεσματικότητα, πρόγραμμα χρηματοδότησης, θέρμανση, πράσινο, επιδοτήσεις, προώθηση, υποστήριξη, χρηματοδότηση, ανακαίνιση κτιρίων, αποδαρμονοποίηση, θερμική ανακαίνιση, μόνωση, ανανεώσιμη ενέργεια σε κτίρια, θέρμανση και ψύξη, αστική θέρμανση και ψύξη, DHC, γεωθερμική, περίσσεια θερμότητα, θερμότητα απορριπτόμενη

CZECHIA

- **NECP**: https://commission.europa.eu/publications/czech-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/czechias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/0bcf9658-374d-41f1-a827-2e5f6f1651d3_en?filename=cz_2020_ltrs_official_translation_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/af260a22-7edd-42af-ab3b-40b530ddde16_en?filename=ener-2017-00343-00-00-en-tra-00.pdf (2017)
  https://energy.ec.europa.eu/document/download/570ab9e2-3d51-46ec-8c33-1e6060313cad_en?filename=cz_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: State Support for Energy Efficiency https://zkrotimeenergie.cz/statni-podpora/
- **Czech State Environmental Fund - Modernisation Fund**: https://www.sfzp.cz/en/about-the-modernisation-fund/
- **Czech Energy Regulatory Office of the Czech Republic**: http://www.eru.cz/en
- **Czech National Bank**: https://www.nrb.cz/
- **Czech State Environmental Fund**: https://www.sfzp.cz/
- **Czech Public Procurement Portal**: https://opzp.cz/
- **Ministry of Industry and Trade of the Czech Republic - Energy Efficiency**: https://www.mpo-efekt.cz/

- **Desk Research Keywords**: Česká republika, financování, energetický fond, účinnost, finanční program, vytápění, zelená, dotace, propagace, podpora, financování, rekonstrukce budov, decarbonizace, tepelná rekonstrukce, izolace, obnovitelná energie ve stavbách, vytápění a chlazení, městské vytápění a chlazení, DHC, geotermální, přebytečné teplo, odpadní teplo

DENMARK

- **NECP**: https://commission.europa.eu/publications/denmark-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/denmarks-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/efa5ef64-d3ca-40a3-9686-2dacdf76aeed_en?filename=dk_2020_ltrs_official_en_translation.zip
- **NEEAP**: https://energy.ec.europa.eu/document/download/d078709c-b0ba-4baf-906c-5cf6c00241eb_en?filename=dk_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/c1a9f18e-3bb2-4df8-b5bf-c205c9fceba1_en?filename=dk_annual_report_eed_2020.pdf (2020 Progress Report)
- **Building renovation national contacts**: https://sparenergi.dk/
- **Danish Green Financing Fund:** https://dgff.dk/
- **Danish Energy Agency - Grants and Support Schemes:** https://ens.dk/service/tilskuds-stoetteordninger
- **Danish Government:** https://www.regeringen.dk/
- **Danish Ministry of Finance:** https://fm.dk/
- **Danish Ministry of Transport:** https://www.trm.dk/
- **Danish Legal Information:** https://www.retsinformation.dk/
- **Desk Research Keywords**: Denamark, finansiering, energifond, effektivitet, finansieringsprogram, opvarmning, grøn, tilskud, fremme, støtte, finansiering, bygningsrenovering, decarbonisering, termisk renovering, isolering, vedvarende energi i bygninger, opvarmning og køling, fjernvarme og -køling, DHC, geotermisk, overskudsvarme, spildvarme

ESTONIA

- **NECP**: https://commission.europa.eu/publications/estonia-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/estonias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/8d683200-6b42-459c-9282-d582e0ea6153_en?filename=ee_2020_ltrs_official_translation_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/71a8cd78-fef5-4b32-bfaf-c12bd6e889ae_en?filename=ee_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/0ac918dc-53e9-4f88-ae3b-0a48020c4553_en?filename=ee_annual_report_eed_2020.pdf (2020Progress Report)
- **Building renovation national contacts**: Ministry of Economic Affairs and Communications of Estonia - Housing Renovation Wave: https://www.mkm.ee/ehitus-ja-elamumajandus/elamud-ja-hooned/renoveerimislaine
- **Estonian Ministry of the Environment**: https://kliimaministeerium.ee/en/climate-and-environment-protection/climate/modernisation-fund

- **KredEx Foundation**: https://kredex.ee/
- **Nordic Energy Research**: https://www.nordicenergy.org/
- **SmartCap (Estonia)**: https://smartcap.ee/
- **Nordic Investment Bank (NIB)**: https://www.nib.int/ (1 occurrence)
- **Environmental Investment Centre (Estonia)**: https://www.kik.ee/
- **Desk Research Keywords**: Eesti, rahastamine, energiafond, tõhusus, finantseerimisprogramm, küte, roheline, toetused, edendamine, tugi, finantseerimine, hoone renoveerimine, süsinikust vabanemine, soojusrenoveerimine, isolatsioon, taastuvenergia hoonetes, küte ja jahutus, kaugküte ja -jahutus, DHC, geotermiline, ülejääv soojus, jäätmesoojus

FINLAND

- **NECP**: https://commission.europa.eu/document/download/78c7f4bd-a3ca-4e83-8732-65f1e0d0baaa_en?filename=DRAFT%20NECP%20update_Finland.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/finlands-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/58721db6-4127-4a14-9d59-b6ea055a58db_en?filename=fi_2020_ltrs_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/5ca116c7-7971-48ea-98b6-cbcaab87020c_en?filename=fi_neeap_2017_en.pdf (2017)
  https://energy.ec.europa.eu/document/download/8517d638-d5f6-4894-8601-41c79821b314_en?filename=fi_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: Housing Finance and Development Centre of Finland (ARA): https://www.ara.fi/en-US/Housing_finance
- **Business Finland - Energy Aid for Finnish Customers**: https://www.businessfinland.fi/en/for-finnish-customers/services/funding/energy-aid
- **Finnish Energy Authority**: https://energiavirasto.fi/en/frontpage
- **Business Finland**: https://www.businessfinland.fi/
- **Finnish Ministry of Economic Affairs and Employment**: https://tem.fi/
- **Motiva Oy - Finnish Energy Efficiency**: https://www.motiva.fi/
- **Finnish Tax Administration**: https://www.vero.fi/
- **Desk Research Keywords**: Suomi, rahoitus, energiarahasto, tehokkuus, rahoitusohjelma, lämmitys, vihreä, tukia, edistäminen, tuki, rahoitus, rakennusten uudistaminen, hiilidioksidin vähentäminen, lämpöremontti, eristys, uusiutuva energia rakennuksissa, lämmitys ja jäähdytys, kaukolämpö ja -jäähdytys, DHC, geoterminen, ylimääräinen lämpö, hukkalämpö

FRANCE

- **NECP**: https://commission.europa.eu/publications/france-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/frances-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/aeb8a440-69a4-4a74-b2e0-29e1f3fd6084_en?filename=fr_ltrs_2020_en.pdf

- **NEEAP**: https://energy.ec.europa.eu/document/download/bc1592ef-b5f6-4743-818c-06fd9747644f_en?filename=fr_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/f22bd441-4c93-476d-9c21-29d870678eb9_en?filename=fr_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: France Renov - Government platform for renovation in France: https://france-renov.gouv.fr
- **French Ministry for the Ecological Transition - Green Fund**: https://www.ecologie.gouv.fr/fonds-vert
- **French Environment and Energy Management Agency (ADEME):** https://www.ademe.fr
- **French Ministry for the Ecological Transition:** https://www.ecologie.gouv.fr/
- **French Ministry of Economy, Finance, and Recovery:** https://www.economie.gouv.fr/
- **National Observatory of Energy Poverty (ONPE):** https://onpe.org/
- **Bpifrance - French Public Investment Bank**: https://www.bpifrance.fr/
- **French Public Service Portal**: https://www.service-public.fr/
- **Les Aides - Platform for French financial assistance**: https://les-aides.fr/
- **Desk Research Keywords**: Francais fonds d'énergie, efficacité, programme de financement, chauffage, vert, subventions, promotion, soutien, financement, rénovation de bâtiments, décarbonisation, rénovation thermique, isolation, énergies renouvelables dans les bâtiments, chauffage et refroidissement, chauffage urbain et refroidissement, DHC, géothermie, chaleur excédentaire, chaleur résiduelle

GERMANY

- **NECP**: https://commission.europa.eu/publications/germany-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/germanys-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/e81f8b45-cea3-4737-a2ef-d866b6631ed6_en?filename=de_2020_ltrs_official_en_translation.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/3a0ea42f-29cd-4279-962c-4cf4b054435e_en?filename=de_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/07f42cf0-7d8c-4bf3-8973-dc870107dffd_en?filename=de_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: Energiewechsel - German platform for the energy transition: https://www.energiewechsel.de/KAENEF/
- **German Federal Government**: https://www.bundesregierung.de/breg-de/aktuelles/ktf-sondervermoegen-2207614
- **German Energy Agency (dena)**: https://www.dena.de/startseite/
- **German Federal Ministry for Economic Affairs and Energy**: http://www.bmwi.de/EN/root.html
- **German Federal Ministry for Education and Research**: https://www.bmwk.de/
    - **Dossier on energy transition in the building sector**: https://www.bmwk.de/Redaktion/DE/Dossier/energiewende-im-gebaeudebereich
- **KfW German Development Bank**: https://www.kfw.de/
- **German Federal Office of Economics and Export Control (BAFA)**: https://www.bafa.de/
- **German Funding Database**: https://www.foerderdatenbank.de/FDB/DE/Foerderprogramme/foerderprogramme.html
- **Desk Research Keywords**: Deutschland Finanzierung, Energiefonds, Effizienz, Förderprogramm, Heizung, Grün, Subventionen, Förderung, Unterstützung, Finanzierung, Gebäudesanierung, Dekarbonisierung,

thermische Sanierung, Isolierung, erneuerbare Energien in Gebäuden, Heizung und Kühlung, Fernheizung und -kühlung, DHC, geothermisch, Überschusswärme, Abwärme

GREECE

- **NECP**: https://commission.europa.eu/publications/greece-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/greeces-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/154abea9-f01e-4151-8c19-b4e5036ed983_en?filename=el_2020_ltrs_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/22a0d07b-8339-4172-8164-326cc4f1d03a_en?filename=el_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/4cd36983-7396-405c-aaa1-a8453d33b567_en?filename=guiding_template_annual_reports_24_1.pdf (2020Progress Report)
- **Fi-Compass - Financial instruments for EU funds**: https://www.fi-compass.eu/financial-instruments/greece/erdf-energy-efficiency-fund-ii
- **Regulatory Authority for Energy (RAE) - Greece**: https://www.rae.gr/en
- **Ministry of Environment and Energy of Greece**: http://www.ypeka.gr/Default.aspx?tabid=37&locale=en-US&language=el-GR
- **Greek National Recovery and Resilience Plan**: https://exoikonomo2021.gov.gr
- **Hellenic Electricity Distribution Network Operator (HEDNO)**: https://hlektra.gov.gr/
- **Desk Research Keywords**: Ελλάδα, Ταμείο ενέργειας, αποτελεσματικότητα, πρόγραμμα χρηματοδότησης, θέρμανση, πράσινο, επιδοτήσεις, προώθηση, υποστήριξη, χρηματοδότηση, ανακαίνιση κτιρίων, αποδαρμονοποίηση, θερμική ανακαίνιση, μόνωση, ανανεώσιμη ενέργεια σε κτίρια, θέρμανση και ψύξη, αστική θέρμανση και ψύξη, DHC, γεωθερμική, περίσσεια θερμότητα, θερμότητα απορριπτόμενη

HUNGARY

- **NECP**: https://commission.europa.eu/publications/hungary-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/hungarys-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/45d3424e-4a6d-45ff-8c3b-e52cb1092b39_en?filename=hu_2020_ltrs_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/4af83a02-1a18-463b-ab5b-d9b60cf14ba1_en?filename=hu_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/1392dd75-9b0c-4996-a219-9cededd5e5c9_en?filename=hungary_annual_reports_24_1_eed_2020_fin_1.zip (2020Progress Report)
- **Building renovation national contacts**: Hungarian Energy and Public Utility Regulatory Authority (MEKH) - Advisory services: https://www.mmk.hu/tanacsadas
- **Hungarian Competition Authority (GVH) - Hungarian Energy Office**: https://www.gvh.hu/en/gvh/cooperation_agreements/hungarian_energy_office
- **Vali.hu - Hungarian tender and procurement platform**: https://vali.hu/
- **Pályázatok.org - Information on grants and funding opportunities in Hungary**: https://palyazatok.org/
- **Hungarian National Energy and Climate Plan**: https://www.enhat.mekh.hu/

- **Hitelnet.hu - Information on the Family Housing Support (CSOK) program in Hungary**: https://hitelnet.hu/csok/
- **Desk Research Keywords**: Magyarország, finanszírozás, energiaalap, hatékonyság, finanszírozási program, fűtés, zöld, támogatások, előmozdítás, támogatás, finanszírozás, épületfelújítás, széndioxidcsökkentés, hőtechnikai felújítás, hőszigetelés, megújuló energia az épületekben, fűtés és hűtés, távfűtés és -hűtés, DHC, geotermikus, felesleges hő, hulladékhő

IRELAND

- **NECP**: https://energy.ec.europa.eu/system/files/2020-08/ie_final_necp_main_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/irelands-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/5cf8a54b-ed5f-41c6-afc2-e2df796c5b4e_en?filename=ie_2020_ltrs.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/9c870c0b-4cdb-4cc6-b65b-73004d0029d5_en?filename=ie_neeap_2017.pdf (2017) https://energy.ec.europa.eu/document/download/083a447d-2796-40f6-8ff4-e19160dec023_en?filename=ie_annual_report_eed_2020.zip (2020Progress Report)
- **Building renovation national contacts**: Sustainable Energy Authority of Ireland (SEAI) https://www.seai.ie/
- **Global Ambition - Green Transition Fund**: https://globalambition.ie/green-transition-fund/
- **Department of the Environment, Climate and Communications (Irish government)**: https://www.gov.ie/en/organisation/department-of-the-environment-climate-and-communications/
- **Revenue Commissioners (Irish Tax and Customs Authority)**: https://www.revenue.ie/
- **Citizens Information - Information on public services in Ireland**: https://www.citizensinformation.ie/
- **Selectra - Energy price comparison platform**: https://www.selectra.ie/
- **An Post - Irish postal service**: https://www.anpost.com/
- **Desk Research Keywords**: Irish Funding, energy fund, efficiency, funding program, heating, green, subsidies, promotion, support, financing, building renovation, decarbonization, thermal renovation, insulation, renewable energy in buildings, heating and cooling, district heating and cooling, DHC, geothermal, excess heat, waste heat

ITALY

- **NECP**: https://commission.europa.eu/publications/italy-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/italys-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/49a04289-fd3e-4b4f-a398-644101813e6a_en?filename=2020_ltrs_italy_-_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/02b0fb3c-c2a8-424a-80a5-255117c1c9db_en?filename=it_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/d0809cb4-9f11-48d6-8a3a-175d2de274a7_en?filename=it_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: National portal on the energy performance of buildings https://pnpe2.enea.it

- **Ministry of Economic Development (Italy) - National Energy Efficiency Fund**: https://www.mase.gov.it/energia/efficienza-energetica/fondo-nazionale-efficienza-energetica
- **ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development**: https://www.enea.it/it/
- **ISPRA - Italian National Institute for Environmental Protection and Research**: http://www.isprambiente.gov.it/it/sistema-nazionale-protezione-ambiente
- **Ministry of Ecological Transition (Italy)**: http://www.minambiente.it/
- **Ministry of Economic Development (Italy)**: https://www.mise.gov.it/
- **GSE - Gestore dei Servizi Energetici (Italian Energy Services Operator)**: https://www.gse.it/
- **Confcommercio - Italian General Confederation of Enterprises, Professions and Self-Employment**: https://www.confcommercio.it/
- **Desk Research Keywords**: Italia, finanziamenti, fondo energetico, efficienza, programma di finanziamento, riscaldamento, verde, sovvenzioni, promozione, supporto, finanziamento, ristrutturazione edilizia, decarbonizzazione, ristrutturazione termica, isolamento, energia rinnovabile negli edifici, riscaldamento e raffreddamento, teleriscaldamento e -raffreddamento, DHC, geotermico, calore in eccesso, calore residuo

LATVIA

- **NECP**: https://energy.ec.europa.eu/system/files/2020-04/lv_final_necp_main_en_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/latvias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/61861e0c-f141-4fc1-9062-848a5ca31a88_en?filename=lv_2020_ltrs_official_translation_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/51ba8e7f-ee18-432b-a4c0-ff9fafb0c694_en?filename=lv_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/514d94e0-eca5-4617-b2f9-41848a76e83e_en?filename=lv_guiding_template_annual_reports_24_1_eed_2020_final.pdf (2020Progress Report)
- **Building renovation national contacts**: ALTUM - Latvian development finance institution https://www.altum.lv/
    - **ALTUM Services for Residents**: https://www.altum.lv/pakalpojumi/iedzivotajiem/privatmaju-energoefektivitate/
    - **ALTUM State Energy Efficiency Fund**: https://www.altum.lv/investoriem/valsts-energoefektivitates-fonds/
- **Ministry of Economics of the Republic of Latvia**: https://www.em.gov.lv/en/
- **Legal Information System of Latvia**: https://likumi.lv/about.php
- **F-Cubed - Project Labeef (Latvia-Belgium Energy Efficiency Fund)**: https://fcubed.eu/labeef/
- **Desk Research Keywords**: Latvija, finansējums, enerģijas fonds, efektivitāte, finansēšanas programma, sildīšana, zaļais, subsīdijas, veicināšana, atbalsts, finansēšana, ēku renovācija, dekarbonizācija, termiskā renovācija, izolācija, atjaunoj

LITHUANIA

- **NECP**: https://commission.europa.eu/publications/lithuania-draft-updated-necp-2021-2030_en (2019)

- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/lithuanias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/73b6debd-95d7-4754-abf5-7f77c45f7d4e_en?filename=lt_2020_ltrs_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/12ba57fc-0362-484f-a71a-3cd2e15019d2_en?filename=lt_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/1cd126a1-1249-41c2-aeef-6323f021ebdd_en?filename=0.eed_2019_ataskaitafinal_tranlsation_in_en.pdf (2020Progress Report)
- **Building renovation national contacts**: Public Procurement Office of Lithuania: www.apva.lt
- **Central Project Management Agency (CPVA) - Energy Efficiency Fund**: https://www.cpva.lt/en/energy-efficiency-fund/577
- **Energy Agency (ENA) - Lithuania**: https://www.ena.lt/about-us/
- **Ministry of Agriculture of the Republic of Lithuania**: https://am.lrv.lt/en/
- **Ministry of Energy of the Republic of Lithuania**: https://enmin.lrv.lt/en/
- **Nordic Energy Research**: https://www.nordicenergy.org/
- **Seimas of the Republic of Lithuania - E-Seimas**: https://e-seimas.lrs.lt/
- **INVEGA - Lithuanian Innovation and Business Promotion Agency**: https://invega.lt/en
- **Desk Research Keywords**: Lietuva, finansavimas, energijos fondas, efektyvumas, finansavimo programa, šildymas, žalia, subsidijos, skatinimas, parama, finansavimas, pastatų renovacija, dekarbonizacija, šiluminė renovacija, izoliacija, atsinaujinantys energijos šaltiniai pastatuose, šildymas ir aušinimas, vietinio šildymo ir aušinimo sistema, DHC, geoterminė, perteklinis šilumas, atliekų šiluma

LUXEMBOURG

- **NECP**: https://commission.europa.eu/publications/luxembourg-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/luxembourgs-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/fee986f3-614a-49aa-89c7-a56bc037b123_en?filename=lu_2020_ltrs_official_en_translation.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/86dd80a4-3cf5-498f-8db5-650e0b7ffe71_en?filename=lu_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/eeece3a6-756f-4151-b4f8-8c9f237cd30a_en?filename=neunter_monitoringbericht_luxemburgs_2021_gemass_art_24_abs_1_der_richtlinie_2012-27-eu_final.doc.pdf (2020Progress Report)
- **Building renovation national contacts**: Luxembourg Agency for Climate Change: www.klima-agence.lu
- **Luxembourg Agency for Climate Change - French version**: https://www.klima-agence.lu/fr/FCE
- **Luxembourg Energy Agency**: https://www.energieagence.lu/de/
- **Ministry of the Environment, Climate and Sustainable Development (Luxembourg)**: https://aev.gouvernement.lu/en.html
- **Ministry of the Economy of the Grand Duchy of Luxembourg**: https://mea.gouvernement.lu/en.html
- **Public Housing in Luxembourg**: https://logement.public.lu/
- **Guichet.lu - Luxembourg Public Services Portal**: https://guichet.public.lu/
- **Energy Efficiency Fund (Enoprimes) in Luxembourg**: https://www.enoprimes.lu/

- **Luxembourg Agency for Climate Change - Assistance programs for sustainable housing and mobility**: https://www.klima-agence.lu/fr/les-aides-pour-mon-projet/programmes-daides-pour-lhabitat-et-la-mobilite-durable
- **Desk Research Keywords**: Luxembourg fonds d'énergie, efficacité, programme de financement, chauffage, vert, subventions, promotion, soutien, financement, rénovation de bâtiments, décarbonisation, rénovation thermique, isolation, énergies renouvelables dans les bâtiments, chauffage et refroidissement, chauffage urbain et refroidissement, DHC, géothermie, chaleur excédentaire, chaleur résiduelle

MALTA

- **NECP**: https://commission.europa.eu/document/download/f30c8368-abf8-4272-9a97-93e41e221fcb_en?filename=MALTA_DRAFT%20UPDATED%20NECP%202021%202030.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/maltas-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/d2fbf9ea-ff9f-44eb-b7b0-260a67a2d325_en?filename=mt_2020_ltrs.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/d8f5a8e2-d4f0-4c9c-a77b-65613228c8e1_en?filename=mt_neeap_2017.pdf (2017) https://energy.ec.europa.eu/document/download/cd93176e-0743-4890-ab3d-addace668e26_en?filename=mt_annual_report_eed_2020.zip (2020Progress Report)
- **Building renovation national contacts**: Building and Construction Authority (Malta): https://bca.org.mt
- **Energy and Water Agency (Malta)**: https://energywateragency.gov.mt/
- **Malta Intelligent Energy Management Agency (MIEMA)**: http://www.miema.org/
- **Environment and Resources Authority (ERA) - Malta**: https://era.org.mt/
- **Department of Sustainable Development (Malta)**: https://sustainability.gov.mt/
- **Desk Research Keywords**: Maltese energy fund, efficiency, funding program, heating, green, subsidies, promotion, support, financing, building renovation, decarbonization, thermal renovation, insulation, renewable energy in buildings, heating and cooling, district heating and cooling, DHC, geothermal, excess heat, waste heat

NETHERLANDS

- **NECP**: https://commission.europa.eu/publications/netherlands-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/netherlands-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/c246db45-160e-4fd5-8f65-7811b5c9ccee_en?filename=nl_2020_ltrs_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/033a0da1-c992-4c8e-b25b-60afd20830b9_en?filename=nl_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/24c1dc34-7b3d-4da1-8bc7-4088e1c29b31_en?filename=nl_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: Verbeter je Huis (Improve your Home) - Netherlands: https://www.verbeterjehuis.nl
- **E3 Partners - Dutch Residential Energy Labeling System (DREF)**: https://www.e3partners.nl/dref/
- **Netherlands Emissions Authority (NEa)**: https://www.emissionsauthority.nl/about-the-nea

- **Netherlands Environmental Assessment Agency (PBL)**: https://www.pbl.nl/en
- **Ministry of Economic Affairs and Climate Policy (Netherlands)**: https://www.government.nl/ministries/ministry-of-economic-affairs-and-climate-policy
- **Netherlands Enterprise Agency (RVO)**: https://www.rvo.nl
- **Warmtefonds - National Fund for the Financing of Heating Transition**: https://www.warmtefonds.nl
- **Duurzaamthuis (Sustainable Home) - Netherlands**: https://www.duurzaamthuis.nl
- **Nationaal Energiebespaarfonds (National Energy Saving Fund) - SVN**: https://www.svn.nl
- **Desk Research Keywords**: Nederland financiering, energie fonds, efficiëntie, financieringsprogramma, verwarming, groen, subsidies, promotie, ondersteuning, financiering, gebouwrenovatie, decarbonisatie, thermische renovatie, isolatie, hernieuwbare energie in gebouwen, verwarming en koeling, stadsverwarming en koeling, DHC, geothermisch, overtollige warmte, restwarmte

POLAND

- **NECP**: https://energy.ec.europa.eu/system/files/2020-01/pl_final_necp_main_pl_0.pdf (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/polands-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/system/files/2022-06/PL%202020%20LTRS%20_%20EN%20version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/2a9a7899-dc84-4077-b682-5ea937d79ed6_en?filename=pl_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/27fcfde0-13c4-464f-8da7-452e5106fbbd_en?filename=pl_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: Clean Air Program (Poland) - Warm Apartment: https://czystepowietrze.gov.pl/cieple-mieszkanie/
- **Clean Air Program (Poland)**: https://czystepowietrze.gov.pl/
- **Energy Regulatory Office (URE) - Poland**: http://www.ure.gov.pl/en/
- **Ministry of Development, Labour and Technology (Poland)**: https://www.mos.gov.pl/en/ministry/
- **Ministry of Climate and Environment (Poland)**: https://www.gov.pl/web/klimat
- **Bank Gospodarstwa Krajowego (BGK) - Poland**: https://www.bgk.pl/
- **Tax Portal (Ministry of Finance) - Poland**: https://www.podatki.gov.pl/
- **Voivodeship Funds for Environmental Protection and Water Management (WFOŚiGW) - Poland**: https://wfosigw.pl/
- **Desk Research Keywords**: Polska, finansowanie, fundusz energetyczny, efektywność, program finansowania, ogrzewanie, zielony, dotacje, promocja, wsparcie, finansowanie, remont budynków, dekarbonizacja, termiczny remont, izolacja, odnawialne źródła energii w budynkach, ogrzewanie i chłodzenie, miejskie ogrzewanie i chłodzenie, DHC, geotermalne, nadmiar ciepła, ciepło odpadowe

PORTUGAL

- **NECP**: https://commission.europa.eu/publications/portugal-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/portugals-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/e6de7ed6-d8a0-4fe8-8fdb-26a7f2cbaf91_en?filename=2020_pt_ltrs_-_en_version.pdf

- **NEEAP**: https://energy.ec.europa.eu/document/download/3ad86ad6-85e9-43c9-804b-347da479c6a9_en?filename=pt_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/3e14e9a5-791c-4f96-b71d-9212817a1b21_en?filename=guiding_template_annual_reports_24_1_eed_2020.xlsb_.pdf (2020Progress Report)
- **Portuguese Environmental Fund**: https://www.fundoambiental.pt/
- **Portuguese Energy Agency (ADENE)**: https://www.adene.pt/adene-eng/
- **Portuguese Environment Agency (APA)**: https://apambiente.pt/en/apa/portuguese-environment-agency-apa
- **DECO Proteste - Consumer Protection Association (Portugal)**: https://www.deco.proteste.pt/
- **Directorate-General for Energy and Geology (DGEG) - Portugal**: https://www.dgeg.gov.pt/
- **Desk Research Keywords**: Portugal, financiamento, fundo de energia, eficiência, programa de financiamento, aquecimento, verde, subsídios, promoção, apoio, financiamento, renovação de edifícios, descarbonização, renovação térmica, isolamento, energia renovável em edifícios, aquecimento e arrefecimento, aquecimento e arrefecimento distrital, DHC, geotérmico, calor excessivo, calor residual

ROMANIA

- **NECP**: https://commission.europa.eu/publications/romania-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/romanias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/2c11f72a-47aa-4cd8-bc54-9fcdcfdebde1_en?filename=ro_2020_ltrs_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/75dcfb0f-a64f-476a-98e9-1ef93cb028d0_en?filename=ro_neeap_ro.pdf (2017) https://energy.ec.europa.eu/document/download/59bbaef4-27e6-492b-83be-703bb47a4848_en?filename=ro_annual_report_eed_2020_en.pdf (2020Progress Report)
- **European Union Opportunities - Modernization Fund (Romania)**: https://oportunitati-ue.gov.ro/program/fondul-pentru-modernizare/
- **Romanian Foundation for Energy Efficiency (FREE) - Funding of Projects**: https://free.org.ro/funding-of-project/
- **National Energy Regulatory Authority (ANRE) - Romania**: https://anre.ro/
- **Environmental Fund Administration (AFM) - Romania**: https://www.afm.ro/
- **Ministry of Environment, Waters, and Forests (Romania)**: http://www.mmediu.ro/messages/send
- **Ministry of Justice (Romania)**: https://just.ro/
- **Environmental Fund Administration (AFM) - Romania**: https://www.afm.ro/
- **Ministry of Energy (Romania) - Funding for the Energy Sector**: https://energie.gov.ro/finantari-sector-energetic/
- **Desk Research Keywords**: România, finanțare, fondul de energie, eficiență, program de finanțare, încălzire, verde, subvenții, promovare, susținere, finanțare, renovare clădiri, decarbonizare, renovare termică, izolație, energie regenerabilă în clădiri, încălzire și răcire, încălzire și răcire la nivel de cartier, DHC, geotermal, căldură în exces, căldură reziduală

SLOVAKIA

- **NECP**: https://commission.europa.eu/publications/slovakia-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/slovakias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/52d79c38-a80d-4766-8c51-8f041e1e0f93_en?filename=sk_2020_ltrs_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/b9721710-f20a-4a46-8671-f886a30a1fc1_en?filename=sk_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/f705b16d-ff1c-4807-90ff-f65917db3ad3_en?filename=sk_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Building renovation national contacts**: Slovak Innovation and Energy Agency (SIEA) - Free Consultancy: https://www.siea.sk/bezplatne-poradenstvo
- **International Energy Agency (IEA) - Information on Slovak Energy Efficiency and Renewable Energy Finance Facility (SlovSEFF III)**: https://www.iea.org/policies/795-the-slovak-energy-efficiency-and-renewable-energy-finance-facility-slovseff-iii
- **Slovak Innovation and Energy Agency (SIEA)**: https://www.siea.sk/en/
- **Slovak Environmental Agency (SAZP) - Slovak Environment Agency**: https://www.sazp.sk/en/slovak-environment-agency-sea.html
- **Ministry of Economy of the Slovak Republic**: https://www.economy.gov.sk/en/ministry
- **Government of the Slovak Republic**: https://www.gov.sk/
- **Slovak Innovation and Energy Agency (SIEA)**: https://www.siea.gov.sk/
- **Slovak Investment Holding (ASB)**: https://asb.sk/
- **Environmental Fund Slovakia (Envirofond)**: https://envirofond.sk/
- **Desk Research Keywords**: Slovensko, financovanie, energetický fond, efektívnosť, finančný program, vykurovanie, zelená, dotácie, podpora, podpora, financovanie, rekonštrukcia budov, decarbonizácia, tepelná rekonštrukcia, izolácia, obnoviteľná energia v budovách, kúrenie a chladenie, diaľkové vykurovanie a chladenie, DHC, geotermálna, nadbytočné teplo, odpadové teplo

SLOVENIA

- **NECP**: https://commission.europa.eu/publications/slovenia-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/slovenias-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/4bed459f-121c-4309-97d2-507495e94e0f_en?filename=sl_ltrs_2020_en.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/384da776-fd64-4647-95c1-15032695e322_en?filename=si_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/5b84c187-7643-48ef-b674-53b7509d9e3a_en?filename=guiding_template_annual_reports_24_1_eed_2020_slovenia_final.pdf (2021 Progress Report)
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- **Energy Agency of the Republic of Slovenia (AGER RS)**: https://www.agen-rs.si/web/en
- **Environmental Agency of the Republic of Slovenia (ARSO)**: http://www.arso.si/en/

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- **Central Alpine Environmental Commission (AlpES) - European Energy Efficiency Directive**: https://www.ca-eed.eu/
- **Slovenian Environmental Public Fund (Eko Sklad)**: https://ekosklad.si/
- **Desk Research Keywords**: Slovenija, financiranje, energetski sklad, učinkovitost, program financiranja, ogrevanje, zelena, subvencije, spodbujanje, podpora, financiranje, obnova stavb, decarbonizacija, toplotna prenova, izolacija, obnovljiva energija v stavbah, ogrevanje in hlajenje, daljinsko ogrevanje in hlajenje, DHC, geotermalna, odvečna toplota, odpadna toplota

SPAIN

- **NECP**: https://commission.europa.eu/publications/spain-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/spains-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/35ac6823-6ce8-47db-a796-6be8f9b81146_en?filename=es_2020_ltrs_en_version.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/5127ab96-7d4b-4b47-b968-2883f47582b3_en?filename=es_neeap_2017_en.pdf (2017) https://energy.ec.europa.eu/document/download/b36f7223-d6c6-46b2-961d-bfde094bf604_en?filename=ener-2020-00764-00-00-en-tra-00.zip (2020Progress Report)
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- **Institute for Diversification and Energy Saving (IDAE) - National Energy Efficiency Fund**: https://www.idae.es/en/support-and-funding/national-energy-efficiency-fund
- **EnerAgen - Spanish Network of Energy Agencies**: https://www.eneragen.org/
- **Ministry for the Ecological Transition and the Demographic Challenge (Spain)**: https://energia.gob.es/en-us/Paginas/index.aspx
- **Institute for Diversification and Energy Saving (IDAE) - Support and Financing**: https://www.idae.es/ayudas-y-financiacion_0
- **Ministry of Finance (Spain) - Call for Proposals**: https://www.pap.hacienda.gob.es/bdnstrans/GE/es/convocatorias
- **Institute for Diversification and Energy Saving (IDAE) - Catalog of Grants**: https://www.idae.es/ayudas-y-financiacion/catalogo-de-ayudas?
- **Instalaciones y Eficiencia Energética - Grants and Subsidies for Energy Efficiency in Autonomous Communities**: https://instalacionesyeficienciaenergetica.com/ayudas-y-subvenciones-eficiencia-comunidades-autonomas/
- **Desk Research Keywords**: España, financiación, fondo de energía, eficiencia, programa de financiamiento, calefacción, verde, subsidios, promoción, apoyo, financiamiento, renovación de edificios, descarbonización, renovación térmica, aislamiento, energía renovable en edificios, calefacción y refrigeración, calefacción y refrigeración distrital, DHC, geotérmico, calor excesivo, calor residual

SWEDEN

- **NECP**: https://commission.europa.eu/publications/sweden-draft-updated-necp-2021-2030_en (2019)
- **Recovery and Resilience Plan**: https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility/country-pages/swedens-recovery-and-resilience-plan_en
- **LTRS**: https://energy.ec.europa.eu/document/download/acc3e1f5-f0ef-457c-a4e7-f41ec7198deb_en?filename=se_2020_ltrs_official_translation.pdf
- **NEEAP**: https://energy.ec.europa.eu/document/download/2fea004a-11fe-47dd-92ef-4bb66cc56c9e_en?filename=se_neeap_2017_en.pdf (2017)
  https://energy.ec.europa.eu/document/download/d76ea992-2cbd-4e69-bf56-9a7fb174af16_en?filename=se_annual_report_eed_2020_tra.pdf (2020Progress Report)
- **Swedish Energy Agency**: https://www.energimyndigheten.se/en/
- **Swedish Environmental Protection Agency (Naturvårdsverket)**: https://www.naturvardsverket.se/en/
- **Government Offices of Sweden - Ministry of the Environment**: http://www.government.se/government-of-sweden/ministry-of-the-environment/
- **Parliament of Sweden (Riksdagen)**: https://www.riksdagen.se
- **Swedish Agency for Economic and Regional Growth (Tillväxtverket) - Project Bank**: https://projektbank.tillvaxtverket.se/
- **PayUp - Green Loans - Energy Loans**: https://www.payup.se/lana-pengar/grona-lan/energilan/
- **Desk Research Keywords**: Sverige, finansiering, energifond, effektivitet, finansieringsprogram, uppvärmning, grönt, bidrag, främjande, stöd, finansiering, byggnadsrenovering, avkolonisering, termisk renovering, isolering, förnybar energi i byggnader, uppvärmning och kylning, fjärrvärme och -kyla, DHC, geotermisk, överskottsvärme, spillvärme