MEDNICE
MED programme Network for an Innovative Cooperation in Energy Efficiency

# D. 4.4.1 Policy paper on financing Energy Efficiency in public buildings


Project co-financed by the European
Regional Development Fund

## Authors:

Andrea Bigano, Giulia Galluccio, Eugenio Sini (CMCC)


Task: 4.4.

Deliverable 4.4.1

## Document control

| Document version | Date | Modifications |
|---|---|---|
| V1 | 07/03/2019 | |
| V2 | 26/06/2019 | |

## Quality Assurance

| Reviewers | | Validation date |
|---|---|---|
| Responsible partner | IREC | |

## Consortium

| Partner No | Institution |
|---|---|
| LP1 | City of Nice |
| PP1 | Energy Cities |
| PP2 | Euro-Mediterranean University – EMUNI |
| PP3 | Catalonia Institute for Energy Research - IREC |
| PP4 | Euro-Mediterranean Center on Climate Change Foundation - CMCC |
| PP5 | Region of North Aegean – RNA |

## Disclaimer

This report considers the Modular Project deliverables available up to January 2019.

# TABLE OF CONTENTS

# 1 Introduction

Buildings are one of the main users of energy in the EU: they make up to 40% of overall current energy consumption of the EU and are responsible for 36% of $CO_2$ emissions in the EU[1] . While the overall relevance of buildings is clear, identifying clearly the share of it which *public* buildings are responsible for, is however far from straightforward[2].

According to a study by BPIE (2011)[3], public buildings account for about 10% of the building stock in Greece and 20% in France. Residential housing is by and large in the hands of private owners, with shares of public ownership below 5% in most Mediterranean countries (Spain and Greece reporting virtually zero public ownership in residential housing). Since households account for 68% of total energy use in buildings[4] this means that about 2-3% of energy use in buildings in Mediterranean countries is related to public housing. For the remaining 32% of energy consumption in buildings (due obviously to non-residential energy use), the building categories which are more often publicly owned, are not abundant and are not the major consumers of energy: schools and hospitals, for instance, account respectively for 12% and 10% of non-residential energy use in buildings in the EU, according to the BPIE study.

Thus, overall, public buildings in the EU have a non-negligible role as energy consumers, although not the major one, which is played by private residential consumers, followed by private commercial users. **Public buildings nevertheless play a very significant role in terms of policy relevance**. In particular, the revised EED Directive attributes to public buildings the task of setting the example, by setting strict energy efficiency improvement targets[5].

It is precisely this policy relevance of energy efficiency in public buildings, and the related exemplary role that public administration can play in fostering energy efficiency, that prompted the EU Interreg Med program to include energy efficiency in public buildings among its key thematic areas. Interreg Med is a major transnational cooperation activity of the EU, started in 2014, gathering together 13 Member States for seven years, with the common aim of fostering sustainable growth in the Mediterranean region. Energy

[1] Source: Eurostat https://ec.europa.eu/eurostat/web/environmental-data-centre-on-natural-resources/resource-efficiency-indicators/resource-efficiency-scoreboard/thematic-indicators/key-areas/improving-buildings

[2] Rademaekers et al. (2017) estimate that public buildings, whether owned or operated by a public administration, account for 12% of EU buildings stock; however, no source is provided for this figure

[3] The BPIE report Europe's Buildings under the Microscope (http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf ) gives some information at the EU member states level, warning however that data are incomplete for almost half EU countries. That report points out to a widespread heterogeneity across the EU as to buildings' ownership patterns, with the public share ranging from about 4% in Latvia to more than 90% in Estonia.

[4] Eurostat, 2009 data, cited in BPIE (2011)

[5] The next section provides the big picture of the policy and regulatory framework for energy efficiency in public buildings in the EU

efficiency is a primary ingredient of any sustainable policy, given the priority role of climate change mitigation and the effectiveness of energy efficiency in promoting it.

The ten modular projects in the EEB thematic area have generated in the past three years an impressive amount of output, by collecting tools, best practices and case studies relevant for energy efficiency in public buildings in the MED area. Four of these projects focused on the financial aspects of improving the energy efficiency in public buildings[6].

The present policy paper looks at how the modular projects' results fit in the current financial landscape and to what extent they resonate with the current European policy framework. The report will thus refrain from describing in depth the results of these projects[7]; we will instead recap here the main features of these projects, and we will provide only brief summaries of their results in order to allow the definition of their policy relevance.

The four projects in the EEB thematic area focusing on financing are ENERJ, NEW FINANCE, SISMA and STEPPING.

- **ENERJ** analyses and promotes new financial mechanisms such as Energy Performance Contracts (EPCs), green taxation, public-private partnership (PPP), which may enable the implementation of energy saving measures and policies in public/municipal buildings.
- **NEW FINANCE's** goal is to increase the confidence of public building owners and private investors, with the aim of helping overcome barriers in financing energy efficiency measures at local and regional level and thus accelerate new investments in public buildings.
- **SISMA**'s main aim is to foster the adoption of public/private innovative financial mechanisms to finance energy efficiency investments with a long payback period in municipal public buildings.
- Finally, **STEPPING** endeavours to increase the inclusion of EPCs within the planning process for public buildings in the MED area, and to increase the knowledge of MED institutions about designing, implementing and managing of energy efficiency plans for public buildings.

The present report opens by summarising the relevant policy backdrop against which financing EEB is expected to take place in the coming years in the EU. It will then illustrate in Section 3 the financial landscape in which the resources for making public buildings more efficient can be mobilised, looking at the main actors involved, the main pathways along which financing can take place, and the main issues and barriers known

[6] Their main results have been collected and illustrated in Deliverable 4.3.1, with particular reference to the technical lessons learnt and the barriers to energy efficiency financing highlighted by these projects and their stakeholders.
[7] The interested reader is referred to the Deliverable 4.3.1.

to pose potential and concrete threats to this process. Section 4 is where the contributions of the modular projects are reviewed in the light of the content of the two previous sections, looking at how they fit within the current EU approach to energy efficiency, within the EU energy and climate strategies and the current financial landscape. Policy implications beyond the EU approach, are explored in Section 5. Conclusions and policy recommendations close this report.

# 2 The current EU policy framework for energy efficiency. Long-term strategies and relevant European Directives

Highlights:

- Current EU targets for EE are set at 32.5% improvement compared to 1990 consumption levels. Long term strategy "a Clean Planet for All" envisages energy efficiency as one of the key levers for decarbonization of EU economy although it warns that full decarbonisation will require the use of all possible levers and substantial efforts to generate negative emissions.
- The Clean Planet for All strategy calls for a very prominent role of energy efficiency in buildings, in the light of the need of implement substantial energy efficiency upgrades and fuel switching in the long-lived European housing stock
- The EU legislation has specific provisions for public buildings: the Energy Efficiency Directive requires Member States to renovate 3% of the total area, and Article 6 requires that Member States must make sure that central governments purchase only products, services and buildings with high energy-efficiency performance. The Energy Performance of Buildings Directive requires all new public buildings built after 2018 to be nearly zero-energy buildings.
- In the framework of the Governance Regulation of the Energy Union, specific measures for public buildings are planned or implemented in several EU countries within the recently published National Energy and Climate Plans.

## 2.1 The EU vision for Energy efficiency policy

Concerns about climate change and other externalities associated with energy generation and use have prompted a transition towards renewables and a renewed emphasis on energy efficiency.

Perhaps the most effective way to understand the European approach to governing the energy sector is to notice that it has been developed as a series of answers to two key questions. The first one is: **what** do we want to achieve? The second one is: **how** do we want to meet our objectives?

As to the first question, a series of medium- and long-term targets have been specified for key energy and sustainability indicators.

The 2020 climate and energy package has been the main framework for EU climate policy over the last ten years. The package is meant to make sure that the EU will attain its energy and climate targets for 2020, i.e. reaching a 20 % improvement in energy efficiency, a 20 % cut in greenhouse gas (GHG) emissions from 1990 levels, and a 20 % share of renewable energy sources.

The year 2020 being around the corner and the targets mentioned above being at arm's reach[8], attention is shifting to the decades to come. In a medium-term perspective, the 2030 climate and energy framework builds on these targets with the goal to further reduce GHG emissions by 40 %, to increment the share of RES to at least 27 % and to further improve energy efficiency by 27 % by 2030, again with reference to 1990 levels. At the end of 2018, a recent revision of these targets based on a political agreement between the European Parliament, Commission and Council, further raised the stake to 32 % for RES and 32.5% for energy efficiency.

Also at the end of 2018, the long-term EU GHG reduction strategy 'A Clean Planet for All' was released. While avoiding explicit targets on RES and energy efficiency, the strategy provides a vision for a virtually decarbonised future by 2050 in the EU. The strategy draws on eight 'policy' scenarios, that is, eight possible pathways for EU GHG emissions that should ensure compatibility with the 'well beyond 2 °C' temperature stabilization target of the Paris Agreement.

The strategy highlights that substantial decarbonization can be achieved by means of several alternate pathways, each focusing on a class of specific key measures, but warns that none of them alone is sufficient to be in line with the Paris Agreement. The pathways put forward in the strategy focus in turn on:

- Increased and widespread energy efficiency improvement,
- shifting to an energy mix dominated by renewables,
- smart energy, transport and communications network infrastructures
- increasing and spreading energy efficiency across the economy
- the electrification and rationalization of transport,
- more investments in new carbon-neutral technologies and more circularity of production processes in the industrial sector, and a more modern and rational agricultural sector.

In order to bring the EU economy actually on a path in line with the 1.5 °C target, it would be necessary not only to pursue all the above options simultaneously but also to achieve negative emissions. This in turn would require combining some deployment of Carbon Capture Storage and Reuse with increasing bioenergy production and the use of agricultural and forestry sinks; it will also call for maximising the circularity of the whole economy and engaging EU citizen in committing to a more sustainable lifestyle.

[8] According to the EEA, as to August 2018, "The EU is on track to meet its 2020 climate and energy targets. Official data for 2015 show that GHG emissions have already decreased beyond the 20 % reduction target; the use of energy from renewable sources is steadily growing and getting closer to the 20 % target; energy consumption levels are currently considered on track, but are increasing slightly, which means that Member States need to make greater efforts to keep the EU on track towards its energy efficiency target." https://www.eea.europa.eu/themes/climate/trends-and-projections-in-europe/trends-and-projections-in-europe-2017/overall-progress-towards-the-european

From the point of view of the present report, it is worth noting that energy efficiency in buildings is indeed given a very prominent role in this strategy. The text of the strategy Communication ( EC, 2018) highlights that *"Given that most of the housing stock of 2050 exists already today, this will require higher renovation rates, fuel switching with a large majority of homes that will be using renewable heating (electricity, district heating, renewable gas or solar thermal), diffusion of the most efficient products and appliances, smart building/appliances management systems, and improved materials for insulation"*. The financial aspects of boosting energy efficiency in buildings are also seen as crucial: "*To achieve and sustain higher renovation rates, adequate financial instruments to overcome existing market failures, sufficient workforce with the right skills and affordability for all citizens are of central importance*". Again, this effort will require an "*integrated approach and consistency across all relevant policies will be necessary for the modernisation of the built environment and mobilisation of all actors. Consumer engagement, including through consumer associations, will be a key element in this process*".

As to the "how" side of the energy policy, the Energy Union Strategy, launched in February 2015, is the cornerstone of the current EU approach. It is built around five pillars: increasing energy security, a fully integrated internal energy market, energy efficiency, decarbonisation of the economy, and supporting research, innovation and competitiveness. The Energy Union Strategy considers energy efficiency as a resource in its own right and places it at the core of the EU energy policy. Energy efficiency improvement in the context of the Energy Union Strategy was initially envisaged to be deployed in the fields of residential energy use and transportation. However, it soon gained a more widespread and pervasive role, through the so-called Energy Efficiency First Principle. The Clean Energy for All Europeans Package (2016), also dubbed "Winter Package" makes the Energy Efficiency First Principle explicit as one of its three main goals. EEEP calls for energy efficiency consideration to be streamlined in every energy policy action and, importantly, in every energy financing initiative.

The Clean Planet for All Strategy (EC, 2018) pinpoints some promising policy options that have the potential to effectively enable reaching decarbonization in the EU by 2050. Not surprisingly, the suggested enabling framework includes among its key ingredients the deployment of the Energy Union Strategy. The roles of the innovation policies, local actions, the empowerment of EU citizens, the streamlining of sustainability into competition policy, are seen as key in this effort. However, it is again the role of financing (by means of the EU budget, coupled with private finance), that is expected to be the most crucial one. The Clean Planet for All Strategy highlights an important link between the Energy Union and the financial aspects of is enabling framework, in terms of providing clear and consistent signals to financial operators. It calls on the Governance of the Energy Union to use to this purpose the obligation for Member States to report their National Energy and Climate Plans "*which need to be consistent with long-term strategies as well as the estimate of the investment needs*". In the next section, among

the EU financial initiatives relevant for the energy efficiency financial landscape, the European Fund for Strategic Investment (EFSI), providing roughly 70 billion Euro for the implementation of the Energy Union, will be briefly discussed. The Clean Planet for All Strategy calls for an even larger role for sustainable investments in the future versions of EFI, and in particular that "least 40% of EFSI projects under the infrastructure and innovation window should contribute to the EU's commitments on climate action in line with the Paris Agreement's objectives…" (European Commission, 2018a). This implies an even more important role for energy efficiency investments within the EU energy financing programs.

## 2.2 Current EU policies for energy efficiency in public buildings

While the future of Energy Efficiency in buildings is posed to be a primary one within the EU energy and climate policy in the decades to come, in the present days EU regulatory framework energy efficiency in public buildings is by no means a topic of secondary consideration. It is currently ruled by two Directives, both revised in 2018 following the approaches put forward in the Clean Energy for All package: The Energy Efficiency Directive (EED), *first adopted in 2012*, and the Energy Performance of Buildings Directive (EPBD), first adopted in 2010.

The main provisions in EU policies concerning energy efficiency in public buildings stem from Article 5 and 6 of EED. The final revised version was formally adopted by Parliament and Council between November and December 2018. The revision affected important aspects of the Directive, such as the overall target raised to 32.5% energy efficiency improvement by 2030 (non-binding). However, it did not have significant consequences on the prescriptions addressing the role of public administration and its buildings. The Directive prescribes two main lines of actions for EU Member States' central administrations concerning the buildings they directly own and manage:

- Article 5 requires Member States to renovate 3% of the total area of "heated and/or cooled buildings owned and occupied by their central government", as from July 2015 for buildings with a "total useful area" of more than 250 m². Alternative means to achieve equivalent energy savings are allowed.
- According Article 6, Member States must make sure that central governments purchase only products, services and buildings with high energy-efficiency performance, if cost-effective to do so. In particular, when purchasing or renting buildings, public administrations must make sure that the buildings selected comply with the minimum energy performance standards prescribed by Article 4 of the current Energy Performance of Buildings Directive.

The EPBD has a specific provision for public buildings: while it requires all new buildings to be nearly zero-energy by the end of 2020, since last year (2018) all new public buildings must be nearly zero-energy buildings (N-ZEB). The Directive delegates to

Member States the precise definition of near-zero public buildings, something which has led to a certain heterogeneity across member states about the actual implementation of this provision. As to 2016, MED countries appear to be in line with this requirement, although the countries with the most detailed and quantitatively specified definitions do not belong to the MED area[9].

Besides these provisions, the 2010 text of the Energy Performance of Buildings Directive also prescribes that when a building is sold or rented, energy performance certificates must be provided, and included in advertisements for the sale or rental of buildings. Moreover, it requires EU countries to put in places inspection schemes for heating and air conditioning systems, or equivalent measures, and to draw up lists of national financial measures to improve the energy efficiency of buildings. The amended text adopted on 31 May 2018, the first of eight legislative acts within the Clean Energy for All Europeans, supplements these measures with requirements about long-term renovation strategies to decarbonise national building stocks by 2050 taking duly into account the financial aspects; the promotion of health and well-being of building users and of smart technologies in buildings - the latter to be complemented by the establishment of a rating scheme for smart-readiness in buildings; the facilitation of electromobility through the installation of charging stations for electric vehicles in buildings' car parks over a certain size; the obligation for Member States to report their national energy performance requirements and ensure their cross-national comparability.

In terms of financial measures, the new EPBD calls for Member States to establish a long-term strategy to mobilize investment in the renovation of the national stock of buildings, including public ones. To this purpose the new EPBD requires Member States to facilitate the aggregation of projects; to foster the reduction of the perceived risk of energy efficiency investments for private investors; to encourage the use of public funds to leverage extra private-sector investment or to tackle market failures; steering investments into an energy efficient public building stock; and to deploy transparent advisory tools, (in particular one-stop-shops for consumers and energy advisory services).

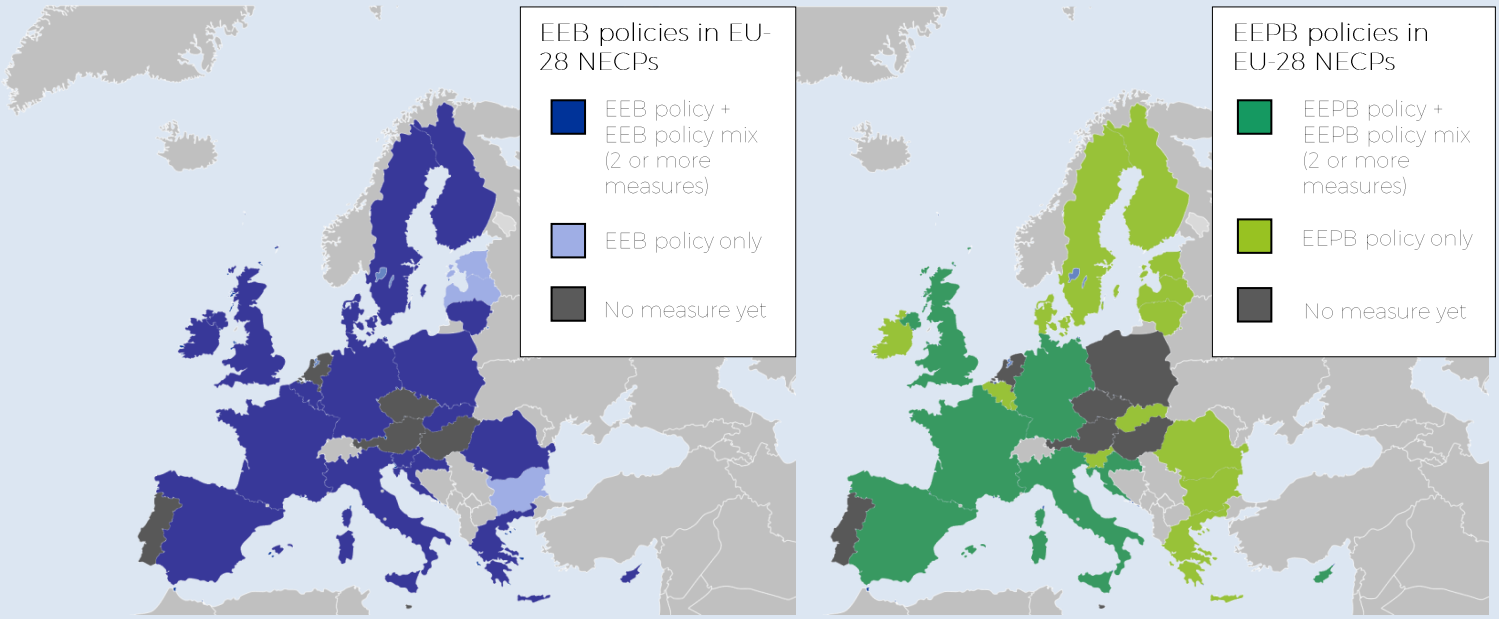
[9] Across the EU, five EU countries (Czech Republic, Hungary, Latvia, Portugal, Slovakia ) still completely lacked an official definition on n-ZEB and for three other countries (Austria, Belgium and Romania), there were gaps for some categories of buildings or in some subnational jurisdictions (D'Agostino et al., 2016).

## Energy Efficiency in Public Buildings and the National Climate and Energy Plans

The Governance of the Energy Union Regulation required EU member states to submit to the European Commission their draft national energy and climate plans by 31 December 2018 and the final plans by 31 December 2019. The submitted drafts are now available online[10], and it is interesting to gauge the relevance given to policy measures targeting energy efficiency in public buildings (and in buildings in general) within these draft plans. All plans follow a common template which includes specific indications to describe such actions: they are asked to report on

- *"The indicative milestones for 2030, 2040 and 2050, the domestically established measurable progress indicators, an evidence-based estimate of expected energy savings and wider benefits, and their contributions to the Union's energy efficiency targets as included in the roadmaps set out in the long-term renovation strategies for the national stock of residential and non-residential buildings, both public and private, in accordance with Article 2a of Directive 2010/31/EU";*
- *"Other planned policies, measures and programmes to achieve the indicative national energy efficiency contributions for 2030 as well as other objectives referred to in point 2.2 (for example measures to promote the exemplary role of public buildings and energy-efficient public procurement)"*

However, Member States had some leeway in applying such template in view of the fact that the submitted drafts are, by definition, provisional and further information can still be added in the final draft of the plan . Indeed, while virtually all member states reported on their broad energy efficiency targets and policies, and most had measures and targets for buildings in general, the degree of initiative varied considerably when it came to energy efficiency in public buildings. The following maps summarise the situation on NECPs' policies for energy efficiency in buildings in general and in public buildings in particular. The map on the left describes the situation of the policy for energy efficiency in buildings: the grey countries do not have policy on EEB, the light blue countries have EEB policies in place but the NECPs do not describe a consistent policy mix of at least two measures. The map on the right summerizes the same situation for energy efficiency




[10] https://ec.europa.eu/energy/en/topics/energy-strategy-and-energy-union/governance-energy-union/national-energy-climate-plans

in public buildings.

*Source: Authors' own elaboration on submitted draft NECPs*

The next paragraphs of this box provide a non-exhaustive list of interesting initiatives reported by Member States. It is worth noting that the majority of European countries reporting a rich set of actions in the field of public buildings are MED countries; however, four MED Member States so far did not put forward specific measures for energy efficiency in public buildings in the current drafts of their NECPs (Portugal, Greece, Malta and Slovenia).

Croatia has implemented support measures to foster a wide diffusion of nZEB buildings in the public sector, including a dialogue among all actors involved, the provision of guidelines and of media campaigns to promote nZEB standards. An energy renovation program for public buildings is also in place, which provide funds to facilitate he integration of contracting energy efficiency improvements with ESCOs, again with the aim of reaching nZEB standards. Measures such as the systematic implementation of energy management in public buildings, the energy renovation of public lighting, and the implementation of green procurement procedures aim to enhance the exemplary role of the public sector.

Cyprus is implementing a number of measures aimed at defining the regulatory setting for energy efficiency in buildings in general, mainly resulting from the transposition of the EU Directives. Some specific measures targeting public buildings are also in place, such as the training of about 700 Energy Saving Officer in the public sector, and an annual competition for schools to promote energy efficiency (part of a wider set of awareness raising initiatives). About 20 million Euro of EU structural and cohesion funds have been secured to support energy efficiency projects in public buildings, while 40 million Euro a revolving fund open also to public administrations has been established with the support of the EIB.

France is giving high priority to increasing energy efficiency and reducing carbon emissions in buildings in general, and implements fiscal measures, building codes, capacity building and awareness rising measures. For public buildings, a wide-scale renovation campaign is in place, aiming at mobilizing 4.8 billion Euros.

Germany is implementing a number of measures to foster energy efficiency in buildings, some of which are relevant also for public buildings and some are solely focused on the public sector's ones. The upcoming Energy for Buildings Act promotes the simplification of administrative procedures related to energy efficiency improvements, with simplified procedures to be applied starting with public buildings and then to be extended, by 2021, to all buildings. Energy consultation for public buildings managers are provided since 2016, advising on "where most energy is wasted in their buildings, which investments make economic sense, which areas of potential they have for savings, and how to avoid misguided investments". An analogous service is provided to residential building owners, whatever their juridical status. A measure exclusively targeting the public sector, is for instance, the specific funding program for energy contracts whose viability has been verified by means of a "contracting check" within an audit of the aforementioned energy consultation program; the idea is to increase both the feasibility of such contracts and the awareness[11] among local administrators about the opportunities such contracts offer. Another measure targeting public buildings concerns its exemplary role, which is given high

[11] Germany's NECP mentions other awareness raising initiatives targeted at the local level of government, fostering the dialogue on energy contracting among federal government and Lënder, or providing contracts models and guidelines, or promoting networking among local administrations.

priority within the German NECP. It requires that public buildings (both newly built and existing ones) must be at least 20% more efficient than what is “specified by the legislative minimum requirements on energy efficiency”. The federal Government envisages that this exemplary role will increasingly see the integration of renewable energy and energy efficiency solutions in public buildings. Finally, specific regulations are in place concerning the role of energy efficiency considerations in public procurement for construction services.

**Italy** has put in place a specific subsidy program (“Conto termico” i.e. “thermal account”) to support energy efficiency upgrades through specific contracts with ESCOs, open to both firms and public administrations. The Italian government plans to make this instrument increasingly focused on non-residential buildings, and to simplify the red tape linked to using this tool for EPCs. Moreover, a specific revolving fund to finance concessionary loans for energy efficiency programs has been launched, and it is expected to mobilize about 800 million Euro by 2020. Public administration can access this fund to cover up to 60% of eligible costs (80% for those strictly related to public buildings’ infrastructures).
Moreover, the Italian NECP mentions new "Guidelines for energy performance contracts EPC”. Their main purpose is the simplification of procedures of public procurement in the case of EPCs by listing EPC for buildings in a dedicated class of procurement contracts with lighter bureaucratic requirements. The new guidelines also introduce mandatory energy savings clauses in energy service contracts signed by the public administration.
Finally, since 2014 a specific program for energy upgrades in public administration buildings is in place (PREPAC): The program keeps an inventory of qualifying public buildings ( i.e. public administration buildings larger than 250 m2, excluding historical heritage, military ,or religious buildings) and keeps track of their surface area. Moe importantly, the program directly funds energy efficiency upgrades in public buildings: Between 2014 and 2017, the program funded 130 projects, providing financing for over 180 Million Euro. The program is still ongoing and foreseen to continue until 2030, with 3.2 Million m2 to be upgraded.

**Spain** plans to go beyond the 3% per year target by implementing energy efficiency upgrades in 300000 $m^2$ of public buildings per year, by putting in place a detailed schedule for renovations of public buildings and for their financing, underpinned by a web-based comprehensive assessment of the public building stock of the central government, by a capacity building program for energy managers of public buildings, and by the strong support to auto-production of energy and to the use of energy performance contracts in public buildings.

**The UK** has put in place an interest-free revolving loan scheme which, as of 2017, has already funded over 16000 projects aimed at the public sector and higher education buildings. The scheme is expected to provide 385 Million pounds by 2020 and to be kept in place at least until 2025. Moreover, the Emissions Reduction Pledge is a voluntary target for the public sector and higher education sector, of a 30% reduction in greenhouse gas emissions by 2020 compared to 2009-10, and open to more ambitious targets after 2020. Pursuant Article 18 of the 2012 EU Energy Efficiency Directive, Energy Performance Contracts are also being supported and harmonized through a model provided by the UK government, which includes guidance notes and best practices for the public sector and a list of registered energy service provider.

# 3 The financial landscape

Highlights:

- An *additional* flow of 177 billion Euro needs to be mobilized each year of the decade 2021-2030 in order to attain the goals of the Clean Energy for All package.
- Energy efficiency in buildings directly attracts noticeably fewer financial instruments from fewer institutions than other clean energy sectors.
- The financial instruments and financial institutions usually involved in energy efficiency improvements in buildings in general, are generally different from those likely to be accessed by the public administration.
- There are a number of substantial financial initiatives and programs stemming from EU institutions (EU Commission EIB, EBRD) in the form of grants or concessional loans that can be tapped for energy efficiency projects in public buildings.
- a clear and stable regulatory framework is ranked as one of the most crucial factors that can determine the success of investments for EEB, because the current regulatory situation is still far from optimal. Technological features of the investments are also relevant, along with internal e and external economic factors (which together the feasibility of recovering the investment within a reasonable time frame).

## 3.1 Energy Efficiency in the financial landscape for clean energy financing

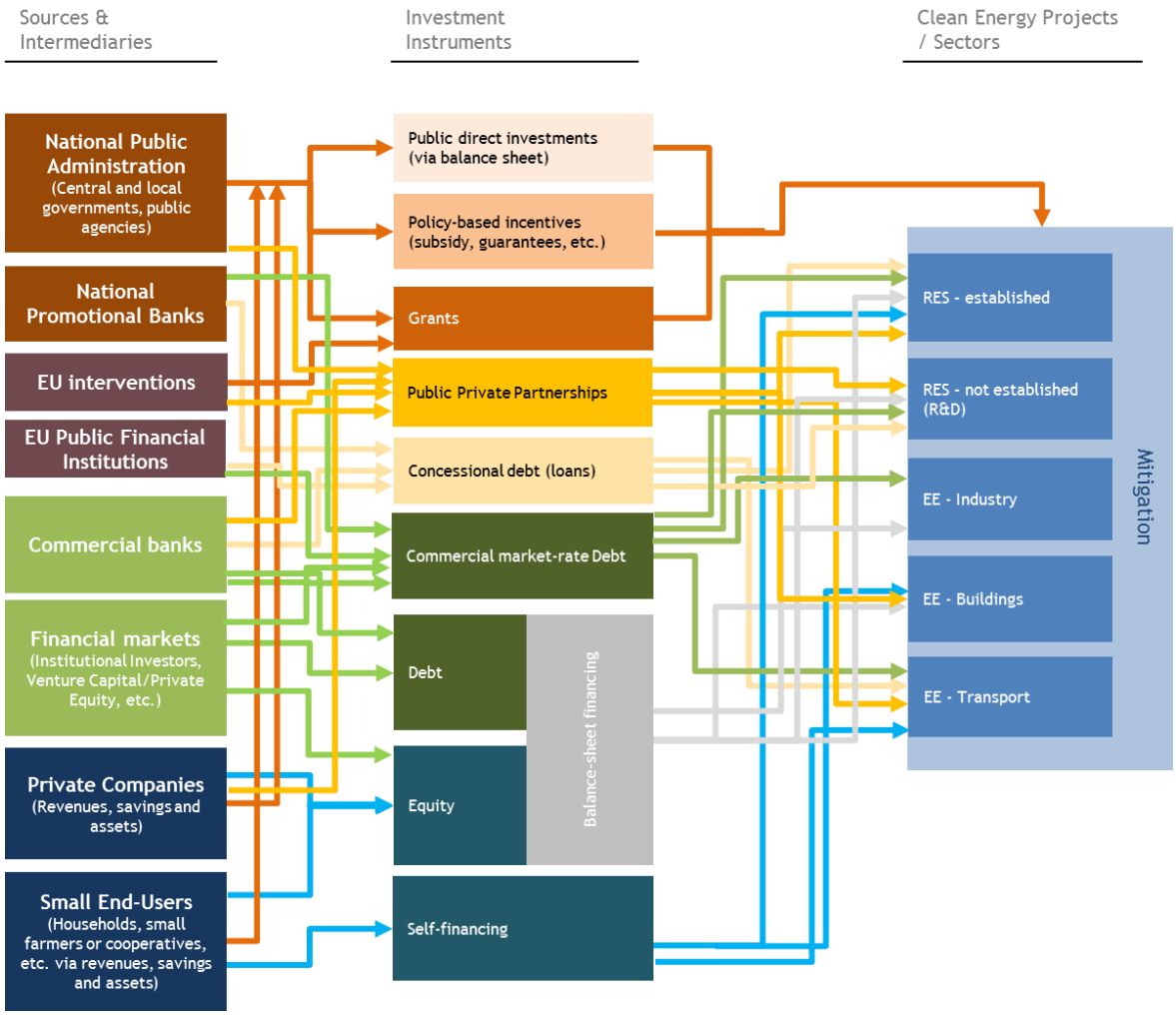
One of the top priorities for the whole European energy policy, in order to enable the energy transition to effectively take off, is to make sure that enough financial resources are mobilised and timely channelled to the right investment options. Recent estimates point to an *additional* annual flow of 177 billion Euro to be mobilized from public and private sources in the decade 2021-2030 in order to attain the goals of the Clean Energy for All package. These extra funds will have to complement the investments in clean energy already expected under the assumption of continuation of current conditions as captured in the EU REF2016 reference scenario (European Commission, 2016) which amount to 938 billion Euro per year for the same period. While certainly quite a substantial amount, this additional financial effort still falls within the range of manageable financial commitment. To put it in perspective, according to Eurostat, this is equivalent to tapping an extra 1.15% of the 2017 EU GDP (for sake of comparison, total R&D expenditures in 2016 in the EU were equivalent to 2.3% of GDP). Clearly, the financial needs mentioned above cover all clean energy investments, and thus the share to be covered by energy efficiency and in particular, energy efficiency in public buildings, is due to account for a fraction of that amount. The study by **Rademaekers et al. (2017)**, on which the present section is largely based[12], however points out that buildings, whether for energy efficiency or RES, will be the main recipient of this financial effort. Residential

[12] We therefore refrain from citing Rademaekers et al. (2017) in the rest of his subsection: unless otherwise indicated, it is implicitly assumed that the aforementioned study is the source of the findings described.

buildings will claim 87 billion Euro per year on the top of baseline investments, while tertiary sector buildings will claim 45 Billion Euro extra per year. In relative terms, this is equivalent to 49.1% and 25.4% respectively, of the total additional financial needs.

The general financial landscape has been summarised in the said study by means of Figure 3-1 below. The picture includes all possible instruments, sources of funding and sectors relevant for clean energy investments, along with the typical links among them. Our focus is mainly on a subset of these elements and links: namely, those directly related to energy efficiency in (public) buildings: it is nevertheless interesting to keep in mind the richness and complexity of the general landscape and to take notice of the various possible patterns of energy efficiency financing within this landscape. This could prove particularly useful if some financing schemes turn out to be monopolised by specific sectors /actors /technologies while they might have the potential to be usefully transferred to the case of EEB.

Figure 3-1 Financial Landscape for clean energy financing in the EU




Source: Rademaekers et al. (2017)

Figure 3-1 above highlights that energy efficiency in buildings attracts a number of funding instruments from a plurality of sources, but some are predominant. Of course, the picture is in a sense biased towards what happens in privately owned-residential buildings, but still some useful insights for public buildings can be distilled.

There are two striking facts about public buildings that transpire from examining this picture.

The first fact is that energy efficiency in buildings directly attracts noticeably fewer financial instruments from fewer institutions than other clean energy sectors. Only three arrowheads converge on the energy efficiency buildings rectangle on the right-hand side of the picture, while RES manage to attract up to five arrowheads.

The second one is that there appears to be some disconnect between the financial instruments and financial institutions likely to be tapped for energy efficiency improvements in buildings in general, and those likely to be accessed by the public administration. Tracing back the arrows pointing to buildings, we notice in fact that they are connected to

- self-financing
- Balance-sheet financing
- Public-private partnerships

Of these three instruments, the first one is usually understood as the first step of informal financing in the hands of individuals and households and amounts to using savings to pay for energy efficiency upgrades in the home, hardly a financial instrument applicable to public buildings, with the very marginal exception of tenants of public-owned social housing dwellings paying directly for such upgrades. Given the typically low-income bracket to which social housing tenants belong, this is most probably just a residual theoretical option rather than a significant source of funds for energy efficiency in public residential housing.

Balance-sheet financing is the equivalent of using own savings for firms and public and private institutions. Here the possibility is more concrete, although budget constraints (due for instance to the stability pact) and the no-profit nature of the majority of public institutions, prevents the generation of substantial resources for such purposes. However, its is entirely possible that public institutions able to generate income from the services they provide, such as hospitals and universities, will be able to invest some own resources in energy efficiency upgrades. Public-private partnerships are seen as “high potential in mitigating some of the investment risks that otherwise hinder private finance sources to invest in clean energy projects”; thus, they mainly envisage the public sector as source rather recipient of funding, which is mainly intended to support higher-risk private initiatives.

However, a more accurate reading of Figure 3-1supports the view that indirect and more general sources of funding more in line with the nature of public recipients can actually

be reaching public administrations needing financial support to improve energy efficiency in their buildings. For one thing, the figure includes a link between all clean energy sectors and international and national funding institutions through an orange connector that links sectors and such institutions through the financial instruments labelled "grants", "public direct investments" and "policy incentives".

At the national level, these funds come from other branches of national administration (the typical pattern involves transferring funds from the national government to all branches of central administration and from central to local administration under the budgetary laws periodically approved by the Parliament) or from National Promotional Banks. The latter are defined by the EC as "legal entities carrying out financial activities on a professional basis which are given a mandate by a Member State or a Member State entity, to carry out development or promotional activities". Their main role in clean energy financing is to complement private financing by sharing the risk and increase the confidence in promising but possibly commercially not fully mature projects. These banks operate by means of standard commercial debt or by means of concessional debt.

At the supra-national level, analogous roles are played by the EU institutions respectively by means of the various funding programs of the EU and by the financial activities of the European Investment Bank (EIB).

There is nevertheless the concrete possibility that a couple of relevant links between European and national promotional /financial institutions have been overlooked in Figure 3-1, perhaps because they are not among the most relevant ones within their respective sources /mechanism groups. Indeed, both EU banks and national promotional banks provide funds to energy efficiency investments, including those in buildings. These funds take the form of concessional debt, commercial debt or, in the case of EIB, project development assistance through the ELENA and JASPERS initiatives.

## 3.2 Relevant funding programs of the EIB and EU-level sources of funding

**EIB** has three specific programs for Energy Efficiency: Private Financing for Energy Efficiency, (PF4EE) running since 2014 in cooperation with LIFE with a budget of 75 million Euro, the much larger (265 million Euro) European Energy Efficiency Fund (EEEF)[13], run since 2011 in cooperation with the European Energy Programme for Recovery (EEPR) and finally the even more ambitious Smart Finance for Smart Buildings (SFSB) initiative.

The goal of SFSB initiative is to make investments in energy efficiency projects in (mainly residential) buildings, more appealing for private investors. Public funds provide a

[13] EEB projects financed under EEEF include for instance the energy efficiency upgrade of the Italian University Hospital S. Orsola-Malpighi in Bologna, completed in 2017 thanks to €31.8 million provided by the program, EPC contracts at the Jewish Berlin Museum, the Munich University of Applied Sciences and Universidad Politécnica de Madrid.

guarantee, which is leveraged to encourage private financing energy efficiency and RES in buildings. The idea is that this initiative is able to trigger three key enabling factors for boosting energy efficiency investments: an optimal use of public money, a clustering of small projects into more financial attractive aggregates and a lower risk for private financial operators considering investing in energy efficiency projects.

The SFSB initiative has indeed the potential for making a significant difference for financing energy efficiency improvements in the EU, as its ultimate aim is to unlock public and private funds for EUR 10 billion by 2020: if such goal is attained, SFBF will prove a key element of the EU financial landscape for energy efficiency investments in general. However, the focus of this initiative on residential buildings unfortunately tones down the relevance for public buildings.

EIB can provide funding to energy efficiency projects also through the European Fund for Strategic Investment (EFSI), whose very substantial resources (16 billion EU guarantee and €5 billion EIB capital contribution) cover however a wide range of sectors. In 2017, EFSI for instance lent 200 million Euro for a financial platform supporting energy efficiency upgrades in 25000 social housing units in France[14].

Other EU-level sources of funding are analysed in deliverable 4.3.1. We list them here for completeness, referring the reader to that deliverable for further details:

- Financial Instrument for the Environment (LIFE -Environment and Climate Action)
- Urban Innovation Actions
- Horizon 2020
- INTERREG EUROPE
- EIB Municipal Framework Loans.

Finally, other EU initiatives that is worth to mention are the Covenant of Mayors (CoM) and the Energy Efficiency Financial Institution Group (EEFIG). These initiaves do not provide direct funding, but they acilitate the implementation and the funding of energy efficiency investments. The CoM is playing an active role in this field by informing local administrations on this matter and by fostering capacity building for energy efficiency financing. Moreover, the CoM strives to eliminate bottlenecks between local other jurisdiction levels (higher or equivalent) or other unnecessary red tape complications. The EEFIG was established by the Directorate General for Energy together with the United Nations Environment Program Finance Initiative. Its goal is to coordinate the standardization in the global financial market for energy efficiency and its action goes beyond the European borders. Standardizing climate risk disclosure standards and project underwriting procedures at the global level can give an important contribution to make sure that financing energy efficiency improvements in public buildings will

[14] www.eib.org/en/projects/pipelines/pipeline/20160290

become a standard and smooth process, familiar to financial operators around the world, in the near future.

## 3.3 Key influencing factors for investment landscape

Rademaekers et al. (2017)[15] identify seven key factors that can determine the success of investments in clean energy. Their relevance varies across sectors and across sources of financing. These factors are

- Policy design, regulatory risk and public incentives uncertainties;
- Commercial necessities;
- Technology;
- Country's enabling framework to support clean energy transition;
- Governance and accountability factors;
- Macro-economic factors;
- Shortage of good investment projects and opportunities.

Among these factors, some are reportedly particularly important for energy efficiency in buildings. The presence of a clear and stable regulatory framework is ranked as one of the most crucial ones for EEB, because the current regulatory situation is still far from optimal. The Energy Efficiency First Principle can be thus seen as on opportunity to improve the regulatory framework towards a more effective consideration of energy efficiency and thus approximate the optimal configuration of EU policy and governance for EEB investment. Moreover, the regulatory framework should improve by doing away with perverse incentives and improving the predictability of the regulatory framework and of the cost of energy for the end-user, in the perspective of providing clear and consistent signals to investors, as we mentioned in the previous section as one of the key aspects of the enabling framework of the Clean Planet for All strategy. Regulatory stability is indeed particularly important to allow a sound planning of investments and hence ensure that enough financial resources are mobilised to support promising energy efficiency projects.

"Commercial Necessities", that is, the ability of the investment to help the beneficiary to remain competitive, is at first sight not a key feature for energy efficiency improvements in residential and public buildings, because in both cases the beneficiary is generally not driven by profitability considerations. Yet this can become a in issue because this situation reduces the appeal for commercial institutions to support with commercial loans energy efficiency upgrades in residential and public buildings. In a broader sense, the difficulty in perceiving a clear economic advantage from energy efficiency upgrades can hinder their uptake even in presence of a clear potential for the improvement of the energy performance of the building under scrutiny, a well-known phenomenon dubbed "energy efficiency gap" in the literature, whose possible causes (see Gerarden et al., 2017), include lack of information, asymmetric information (between the buyer and seller of a

[15] Again, we refrain from citing Rademaekers et al. (2017) in the rest of his subsection. The interested reader is referred to section 4.3 in that study, for a detailed discussion of these factors

home, for example), lack of liquidity, high discount rates, institutional disincentives, diverging incentives (among tenants and landlords), and others. Particularly in the case of public buildings, commercial intermediaries such as Energy Services Companies (ESCOs) can provide a way around in order to release funds. As we will note in the next section this may not be always enough, and further instruments may prove necessary in order to ensure the bankability of energy efficiency projects in public buildings.

The specific technological characteristics of energy efficiency upgrades are to a certain extent relevant for providers of funds, particularly in terms of granularity of the investment. Often energy efficiency upgrades in building are the result of a series of many small-scale investments, a feature that reduces the appeal for the larger fund providers.

The country's enabling environment is not perceived as a major hindrance factor, as far as energy efficiency upgrades in buildings are concerned. Governance and accountability factors matter as far as the institutions involved are supposed to mainstream sustainability considerations in their decisional process. While this is mainly not the case for residential buildings users, it is becoming increasingly a priority both for public buildings and for EU and national governmental funding sources, as highlighted in the previous section. The fact that the perceived policy relevance of these themes is increasing means certainly good news for the chances of promising energy efficiency-improving projects in public buildings to receive funding from EU and national funding sources.

Macroeconomic factors can have some relevance for energy efficiency investments in public buildings depending on the specific factor. The most relevant factor is the price of energy, whose perceived level and volatility can determine the economic rationale for engaging or not in energy efficiency upgrades (Hassett and Metcalf,1993): an outlook of steadily increasing energy prices translates into a prospect of expensive energy bills in the future, and hence encourages energy efficiency investments. On the other hand, decreasing or erratic energy prices makes them much less appealing. Market interest rates for loans vary considerably across the EU and can as well determine the feasibility of financing energy efficiency investments through commercial and concessional loans, as they are the basis on which the contractual conditions of the financial agreement are drawn. Another general economic factor that may be of some relevance is that Basel III[16] rules for banks stability lay down some ground rules about the level of risk and financial soundness of the investments that banks can support with their funding. Hence clean energy investments in general, given their typically short track records, can be found to be not safe enough in this perspective. Fortunately, the overall perspective is slowly changing towards making climate-proofing of investments an equally important prerequisite, with the recent advancements in terms of climate disclosure[17], brought forward by the European Commissions' Action Plan on Financing Sustainable Growth

[16] https://www.bis.org/bcbs/basel3.htm
[17] Task Force on Climate Disclosure, www.fsb-tcfd.org

published in March 2018 (European Commission, 2018b), which aims to further connect finance with sustainability. However, some contradictory pressures within the financial regulatory framework may still hinder in the short run clean energy investments, including those in energy efficiency in public buildings.

Shortage of good investment projects and opportunities can be a relevant impeding factor for energy efficiency in public buildings, almost by definition, particularly in terms of lack of sizeable energy efficiency projects. Energy efficiency projects are typically small, and involve a variety of actors and institutions, and this results in high transaction costs and fragmented markets. The natural way around this issue is aggregating small projects in large pools or portfolios, able to lower significantly transaction costs by means of standardization. This issue is particularly relevant for attracting funding from large-scale sources such as EU public financial institutions, commercial banks, and institutional investors.

# 4 Policy lessons from modular projects

Highlights:

The modular project in the EEB community have identified some policy relevant lessons. In particular:

- The implementation of EPC contracts requires multidisciplinary skills, and the knowledge of the technical, legal and procedural aspects of a EE project. This calls for the implementation of capacity building campaigns targeted to local administrations. One-stop shops for technical assistance service can also help closing the knowledge gaps
- Standardization of procedures is recommended
- A more accurate knowledge of the public building stock is necessary , including through comprehensive energy audits.
- EE projects in the MED area often do not achieve payback period and returns on investment that would ensure their bankability, due to specific characteristics of the typical EE upgrades needed in the MED area. Therefore , public funding is needed, and the amount of public support can be assessed by means of specific tools.
- The overall regulatory framework should also reflect the specificities of the MED area. This holds in particular for budget stability rules, that may hinder the uptake of EE renovation in public buildings due to the ensuing freeze on the financial assets of local administrations.
- More uniformity in the definition of N-ZEB buildings is also recommended.

This section builds on the policy-relevant results generated by the EEB modular projects providing interesting lessons about mobilizing financial resources to support energy efficiency in public buildings.

To this purpose, the deliverables released by modular projects up to January 2019 were consulted.

A direct interaction with modular projects on the topics of the present policy paper was established, by means of virtual meetings with modular projects coordinators carried out in January and February 2019, in order to elicit further relevant information and opinions.

Four modular projects (ENERJ, NEW FINANCE, SISMA and STEPPING) have focused on financing energy efficiency improvements in public buildings. However, this does not preclude that valuable policy insights for the topics of this report may came from the policy lessons learnt by any modular project in the EEB thematic area; indeed, a couple of illuminating policy lessons, relevant for the financial aspects of energy efficiency in buildings, were suggested by non-financial projects.

The interaction with modular project was initiated by eliciting the views of the project coordinators' about three questions, sent a few days before the actual virtual meeting:

- Which are the main policy lessons learnt within your project so far?
- Have you derived concrete policy recommendations so far? If so, for which level of jurisdiction (EU-wide, national, local)?
- If you derived policy lessons or recommendations, how do they fit, in your opinion, within the current EU policy framework?

The questions were intentionally formulated as open-ended, in order to allow the respondents to elaborate freely their answers in the hope that this would have resulted in a richer provision of information.

Overall, we received a good level of feedback either in written form or as live discussion during the virtual meeting or by means of further feedback after the meeting. The main – and only – limitation we encountered was that in a couple of cases the planned timing of some modular projects' activities implied that the official release of policy recommendations will occur at a much later stage than the release date of the present deliverable. For these projects, some provisional input was provided by the coordinator[18].

Another important source of information for this report, is the work carried out by IREC on technical lessons from modular projects. which identified a number of barriers to the implementation of energy efficiency investments in public building evidenced as relevant by the modular projects. These barriers included:

- *structural issues*, mainly related to the regulatory framework and the cumbersome bureaucratic procedures required to secure sufficient funding for energy efficiency projects, and to the heterogeneity of rules across countries and, within the same country, across jurisdictions, something that can lead to conflicts among administration levels and contradictory prescriptions and procedures for the actors involved in the investment process;
- *technical issues* related to the complexity of innovative energy efficiency projects, along with the scarcity of clear technical information about the projects;
- *financial issues* such as the scarcity of dedicated financial mechanisms for energy efficiency in public buildings, coupled with the limited financial autonomy of local administrations, and the lack of confidence of commercial banks in energy efficiency projects, resulting in high interest rates[19];
- *information issues* such as a pervasive lack of knowledge of the necessary financial, technical and regulatory details among all actors involved; and the sheer high granularity of energy efficiency projects, resulting in their small average size and low appeal for investors. Besides private residential housing, this can be relevant for public buildings at the local level.

[19] Although local administration can have access to special, more favorable conditions for their loans, if local or national policies support that. This is the case, for instance in France.

Direct interaction with **STEPPING**[20] highlighted a number of policy lessons, derived through the engagement of the project's stakeholders, which included policymakers. The main insight so far reported by STEPPING, is that the implementation of Energy Performance Contracts (EPCs) requires multidisciplinary skills. A strong and sound technical knowledge of energy issues is crucial, but so it is a deep awareness of administrative procedures. Public procurement is a key step in the process of implementing EPCs and calls for an effective setup. Administrative and legal skills are, thus, essential underpinnings of the process. As a rule, such skills are not widespread among public administration staff, particularly when small and medium local public authorities are concerned.

STEPPING's representatives reported that the following key points emerged from the discussion with their stakeholders:

- In general, there is a need to increase the knowledge of Public Authorities about EPC opportunities (i.e. training, communication campaigns, networking, pear learning, etc.);

- Setting up a one-stop shop technical assistance service can help overcome the lack of technical skills of local public administrations in the development of energy efficiency projects. Territorial coordinators (such as Energy Agencies, Regional Authorities, etc…) could take the lead in establishing such services in order to support small and medium municipalities with technical, administrative and legal support. This action would also contribute to fostering energy transition through the preparation and implementation of aggregated projects and by facilitating the cooperation and decision process. Incidentally, this Action is in line with the provisions of the new EPBD, mentioned in Section 2;

- A further key step that could boost and ease the tasks related to EPC implementation would be the promotion of the standardization of procedures and approaches in order to upscale the implementation of EPC at local level. The opportunity of taking measures in this area is also recognized by ESCOs and contracting authorities;

- The current European energy efficiency regulatory framework prescribes energy audits only for private buildings, not for public ones. This causes a very relevant knowledge gap that needs to be urgently filled. The promotion of widespread energy audit campaigns for public buildings in order to prepare the ground for energy efficiency investments is thus seen as a necessary policy tool to be put urgently in place.

The **SISMA** project, albeit at the time of writing the present report already concluded without issuing explicit policy recommendations, evidenced, by means of its

[20] STEPPING has been granted a 6-month prolongation, until the end of October 2019. Final policy recommendations will be delivered by that time.

dissemination material and events, the usefulness of a clear organization of relevant information for determining the actual viability of projects aimed at energy efficiency renovations in public buildings. Furthermore, direct interaction with the project coordinator (INFORMEST) and the partner that developed the SISMA tool (APE FVG) highlighted a number of policy relevant lessons.

The project implemented a tool that systematizes all the relevant financial, regulatory and technical information related to project into a single coherent quantitative framework. Using such tool, SISMA strived to help local public administrations to effectively increase their chances of turning energy efficiency projects into reality. The main added value of the tool is twofold: on one hand, it helps computing the share of the investment that is likely not to be funded by means of commercial loans, and hence should be integrated with public funds from higher-level public authorities. In the wording of the SISMA project, it helps computing the amount of subsidy that must be sourced from public funds in order to ensure the bankability of the energy efficiency project under scrutiny. On the other hand, it helps quantifying the costs of implementing the desired energy efficiency improvements under alternative assumption about the comprehensiveness of the energy efficiency upgrades, ranging from the minimal intervention necessary to achieve a desired energy efficiency target, the most comprehensive intervention, and an intermediate solution. This allows the public building owner to evaluate the economic soundness of the project, discard unfeasible or highly improbable options (those requiring a large proportion of public funds) and hence ultimately, to gauge the financial credibility of the project.

The wide applicability of the SISMA tool highlights that there is a potential divergence between the typical level of profitability of ESC for energy efficiency in public buildings and the level required by commercial banks in order to grant the loan. Energy efficiency improvements in public building usually are characterized by excessively long payback periods and excessively low internal rates of return which in general preclude the access to commercial loans[21]. The SISMA tool assumes that either the user of the tool has already performed an energy audit of the building which will receive the energy efficiency improvement, or in any case the user is well aware of the energy efficiency needs of the buildings it manages. In practice, the energy efficiency improvements to be analyzed by the tool are expected to be worthwhile from the social point of view.

Beside pointing to the usefulness of specific tools to compute such gap, a first important policy lesson from SISMA is indeed that, even when the most feasible options are chosen, there could be still a significant market failure in the financial landscape that should be overcome by means of complementary, public funds. This is incidentally very much in line with the provision of the EPBD, mentioned in Section 2, that requires Member States to mobilize public funds to overcome such market failures. Now, while the tool is not able to determine whether the energy efficiency project under scrutiny is indeed the

[21] https://sisma.interreg-med.eu/fileadmin/user_upload/Sites/Efficient_Buildings/Projects/SISMA/What_we_achieve/3_reporting_period/D_3.4.2_SISMA_Training/D_3.4.2_-_SISMA_Training_IT/D3.4.2_SISMA_Training_scheme_-_Modulo_3_ITA.pdf

most effective and cost-effective option among those technically feasible, it is still able to identify it is able to identify and quantify the extra financial effort needed to implement a socially desirable improvement.

A measure of the policy relevance of such bankability gap is the number of projects that have applied the SISMA tool and found a significant need for extra funding. The SISMA representatives reported 65 downloads of the tool, and the Friuli Venezia Giulia Region reports the application of the tools to all municipalities in the Region considering energy efficiency in buildings, and it is currently applied to 20 projects. Similar numbers are registered in Slovenia and in France[22].

The interview with SISMA representatives highlighted some further policy relevant aspects that their project came across through the interaction with stakeholders and policy makers.

For instance, the SISMA tool can foster the aggregation of energy efficiency projects in large clusters, because it helps identifying the financial needs of each project through a detailed analysis at the single building level.

More importantly, SISMA highlighted that there is an urgent need to tailor the regulatory model to local specificities, particularly in the area of EEB. The differences in climate characteristics between north Europe and MED Member States imply that standardized energy efficiency improvements are and will increasingly be less commercially attractive in the MED area. In practice there is much less need to save heat in winter in the MED area, and this makes the profitability lower and the payback time much longer in the MED area for traditional heat-saving energy efficiency improvements, compared to north European countries. Conversely, the typical improvements needed in the MED area (related to cooling needs) are not easily quantifiable and comparable across countries, and this again speaks against the bankability of such projects in a strictly commercial perspective. Another specificity of MED public buildings, is that they often start off from a more heat-efficient condition than their northern and eastern European counterparts, as they may feature more efficient gas furnaces instead of coal-or oil-fueled ones and in general more performing building envelopes (although the energy performance of the building envelopes is often quite high in Scandinavian and north West EU.). The energy efficient features of the buildings in the MED area, particularly with respect to cooling needs, is to a certain extent due to the traditional way of building which is prevalent in traditionally hot regions of the EU, and which can provide interesting technical solutions to keep indoor temperatures within acceptable standards while limiting or even excluding the use of air conditioning systems, thanks for instance to the high thermal mass of thick brick and stone walls, the shape of indoor spaces, the features of the

[22] Unfortunately, continued monitoring of the tool has not been possible due to the termination of the project, but if resumed, it would provide an important indicator of the evolution of the bankability of energy efficiency projects in public buildings in the MED area, as this can add evidence to the view that there is indeed a need to streamline further energy efficiency considerations into policy and financial decision processes, as suggested by the Energy Efficiency First Principle.

landscape surrounding the buildings ( trees and other elements providing shading and favouring airflow), and the buildings' orientation (IEA 2018).

Thus, EU-level good practices based on the improvement of a very different building stock may not apply to the MED situation. In terms of the EU energy efficiency policy objectives for public buildings, these specificities point to an intrinsic infeasibility of the N-ZEB targets based on private financial instruments in the MED area, as there is a persistent gap between profitability and payback expected for such projects and what is deemed acceptable by private financing institutions. ESCOs in the SISMA stakeholders' network indicated a maximum acceptable payback period of 15 years, and 8 to 15 % as a minimum return on investment. These criteria are generally met by efficient public lighting projects, for which ESCs with ESCOs are successful and widespread, but virtually never for energy efficiency upgrades of public buildings in the MED area. SISMA argues that in order to overcome such infeasibility, some public financial measures tailored for the MED areas should be put in place.

Another set of constraints typical of the MED area has to do with the stability pact rules for public administration. In many instances local public administration would have the financial solidity to afford traditional commercial loans or even directly pay the energy efficiency improvements through their positive cash flows but are prevented to do so by stability rules. Again, there is a need to adjust these rules to the specificity of the MED area and to mobilize adequate public funds, in order to give a concrete chance to the 3% target of the EED and to the N-ZEB target of EPBD in the MED area. To the latter purpose, more uniformity and comparability of N-ZEB definitions across EU Member States is also a desirable step to be taken, according to SISMA.

Both ENERJ and NEW FINANCE explored the very policy-relevant issue of the barriers encountered or perceived by relevant actors in the process of financing energy efficiency improvement projects. Their methods and findings have been described in detail in the technical paper D. 4.3.1. Here we limit ourselves to highlighting a few key barriers, which by and large resonate with the issues mentioned in Section 3 with regard key factors in the financial landscape.

A crucial precondition is reducing the major knowledge gaps that affect this field. A key information that appear to be sorely missed in the by stakeholders in the EEB community is the sheer knowledge of the actual status quo of energy efficiency in public buildings. There is a fundamental need to clearly identify and catalog public buildings, something which is still an undergoing and unfinished process despite the prescription of the EPBD to this effect. This is particularly urgent in the interplay between local and national governments, as diverging definitions may have implications in terms of eligibility for the access of public and supra-national funds. The other element about the status quo of public buildings flagged as urgently needed by these modular projects, is clearly the urgent need to systematically audit the energy performance of public buildings, also mentioned above among the STEPPING's policy lessons.

A key barrier frequently noted by stakeholders is the typical dimension of energy efficiency projects, too small to be attractive from a purely commercial point of view. The way around this problem suggested by stakeholder is the one also envisaged at the EU level (for instance within the SFSB initiative): it is important to find a way to regroup small and dispersed projects within sizeable and coherent clusters of projects, which allow curbing wasteful multiplications of transaction costs and reducing risks.

Another important barrier evidenced is the complexity and lack of homogeneity of the paperwork need to finance energy efficiency projects. The lack of standardization of procedures (also noted by the STEPPING project) seems to be pervasive, and it appears to be due to the accumulation of preconditions and requirement demanded by different and overlapping regulations and jurisdictions. Thus, procedural simplification appears to be an important lever to be tapped, and indeed it has already been the object of EU and transnational initiatives. For instance, the EEFIG 2015 report identifies it as one of the main barriers to energy efficiency investments, along with the lack of evidence on the performance of energy efficiency investments. This prompted EEFIG to develop the EEFIG Underwriting Toolkit, released in June 2017. Two of its features are intended in particular as a remedy to this issue: providing a common framework for evaluating energy efficiency investment risks and fostering a common language between project developers and financial institutions. The tool does not cover all the procedures involved, but at least introduces a common ground for a key step in the procedure, underwriting, that is "*appraising the value and risks of an investment or a loan in order to make a decision to finance the project*" (EEFIG 2018).

Direct interaction with modular projects representatives has highlighted further the policy-relevance of education and capacity building among public administration officers in order to allow them understanding the relevance of energy efficiency upgrades and of the funding opportunities, as well as mastering the procedures for accessing the funds and interacting with ESCOs on ESCs. The relevance of knowledge and capacity building is indeed crucial, and it is cross-cutting across all the thematic areas of the EEB community. Indeed, the urgency of bringing the relevant information to the relevant actors and helping them overcoming their information disadvantages is a recurrent policy lesson reported by the vast majority of EEB projects, and it is the obvious *trait d'union* between the topics summarized in the present reports and the ones to be covered in the forthcoming policy paper, which will deal with the various aspects of bringing robust and relevant knowledge into the picture of promoting energy efficiency in public buildings.

# 5 Final recommendations and conclusions

The European Energy Strategy has been giving increasing relevance and centrality to energy efficiency, as an energy source in its own right and as an opportunity to be pursued systematically in any policy and investment decision in the energy field. Among the strategic actions put in place for this goal, the idea that public administration bodies in the Member States must lead the way and play an exemplary role in enacting concrete and visible improvements in the energy performance of their building stocks, certainly places energy efficiency investments in buildings at the center stage in this policy process. The recently published draft NECPs, however, highlight that this not yet widely implemented in the Member States, although a few EU countries, including some in the Mediterranean area, do give high relevance to the role of public buildings and to the exemplary role of public administrations. Such exemplary role however needs to be urgently become a reality across the EU.

The activities of the modular projects of EEB MED thematic area have highlighted, on one hand, that they have indeed activities already put in place to facilitate this role, such as the provision of tool for the evaluation of the bankability of investments in this field, or the creation of a networking platform, or the provision of training and capacity building activities. On the other hand, modular projects contributed to the policy debate by flagging some critical barriers that may still hinder this process. Some of them are already perceived as important in the public policy debate: for instance, the need to overcome the typical fragmentation of the energy efficiency investment by clustering them in consistent aggregated super-projects is something that both the EC and the EIB are promoting in their initiatives. Other issues, although generally acknowledged, might not be fully understood yet in their implications. The following **policy lessons** can be derived:

1. There is a **need for a clearer interaction between local and national administration levels,** and for clarification of specific aspects of the generally acknowledged information gaps that need further efforts in order to be thoroughly understood and effectively tackled.

2. The very knowledge base needed to exert the aforementioned exemplary role is still faulty: there is an **urgent need for a systematic enforcement of energy audits of public buildings**, together with a clear identification of which buildings qualify as public both a the central and the local government level, in order to be able to identify the baseline against which energy efficiency in public buildings should be improved, in order to effectively allow the latter to play their exemplary role.

3. Importantly, public buildings in the MED area have specific features that should be taken into account when setting energy efficiency targets and devising the financial instruments to achieve them. Buildings in the MED area use energy

in a different way than northern European buildings, and **there is no one-size-fits-all approach to improving energy efficiency across the EU**, and hence to finance such improvements.

4. Another important overall policy lesson, to a large extent tied to the ideas just mentioned, is that **knowledge is key** in this process. Indeed, a good deal of the policy lessons related to financing have to do with improving the knowledge and expertise of those involved in the financing process.

5. Finally, a way to help mobilizing funds is also to make sure that money is spent in an the most efficient way. This is for instance the case for White Certificates, that allow an efficient allocation across economic agents of energy efficiency improvements necessary to achieve a policy-determined target by allowing the trade of certificates, which testify that said improvements have been implemented. Beside serving the important purpose of certifying increases in energy efficiency, their key feature is that the market mechanism thus put in place makes sure that improvements are undertaken first by those for whom it is least costly to do so, while those for whom implementing improvements is expensive may find it cheaper to fulfill their obligations by buying the certificates. This mechanism is currently active only in a handful of EU Countries (France and Italy and to a more limited extent, the UK and Poland (Giraudet and Finon, 2014) and it would be advisable to spread such scheme throughout the EU. In Italy, for instance studies by ENEA (Nocera et al, 2014; Moneta et al. 2015) show that White Certificates are way more cost-effective tool for promoting energy efficiency than income tax deductions .

Overall, fine-tuning policy measures to provide the right incentives, and increasing knowledge and awareness about energy efficiency, are all well-known remedies to the so-called "energy efficiency gap" (Jaffe and Stavins, 1994) that is, the disappointingly low uptake of energy efficiency improvements despite their advantage in terms of energy savings (usually observed among residential consumers, but relevant for the whole economy). In the field of public buildings, reducing this gap is all the more relevant in view of the exemplary role that bestowed onto public administrations within the Energy Efficiency Directives.

Even within financial institutions and public administrations, investment decisions in energy efficiency improvement projects are ultimately taken by human beings, which are subject to human behavioral patterns. Behavioural patterns are indeed another crucial factor often mentioned in the literature as a possible reason for the energy efficiency gap. Behavioural sciences suggest that a key determinant in the response to a change in the cost of energy is its salience: unless changes are clearly visible and perceived as permanent, people will tend not to respond to them (Chetty et al., 2009). The policy recommendations listed above ultimately boil down to the simple yet powerful rule of making energy investments **salient** to the MED society and administration: promoting the energy efficiency that make sense in the MED area, implementing the policy tools

that trigger the right incentives, and making sure that all interested parties understands all the implications.

Obviously, information is key in this perspective. This means that, although the focus of the present report is on financing and the focus of the forthcoming policy paper is on information, the two topics are very tightly intertwined: the policy lessons to be analyzed in that report will matter, to a certain extent also for financing consideration, and the financial viability of energy efficiency projects is key element in the knowledge base underpinning any decision concerning energy efficiency in public buildings.

## References


Chetty, Raj, Adam Looney, and Kory Kroft (2009), "Salience and Taxation: Theory and Evidence," American Economic Review, 99(4), 1145–1177

D'Agostino D., Zangheri P., Cuniberti B., Paci, D., Bertoldi, P. (2016) "Synthesis Report on the National Plans for Nearly Zero Energy Buildings (NZEBs) - Progress of Member States towards NZEBs". JRC Science for Policy report , Joint Research Centre, Ispra, Italy. http://publications.jrc.ec.europa.eu/repository/bitstream/JRC97408/reqno_jrc97408_online%20nzeb%20report%281%29.pdf

European Commission (2016) "EU Reference Scenario 2016 - Energy, transport and GHG emissions Trends to 2050 - Main results" Brussels https://ec.europa.eu/energy/sites/ener/files/documents/20160712_Summary_Ref_scenario_MAIN_RESULTS%20%282%29-web.pdf

European Commission (2018a) "Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions and the European Investment Bank - A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy". COM(2018) 773 final, Brussels. https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_en.pdf

European Commission (2018b) "Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions - Action Plan: Financing Sustainable Growth", COM(2018) 97 final, Brussels. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52018DC0097

IEA 2018 The future of cooling
https://webstore.iea.org/download/direct/1036?fileName=The_Future_of_Cooling.pdf

Jaffe, Adam B. and Robert N. Stavins (1994), "The Energy Efficiency Gap. What Does It Mean?" Energy Policy, 22(10), 804-810.

Gerarden, Todd D., Richard G. Newell, and Robert N. Stavins. (2017). "Assessing the Energy-Efficiency Gap." Journal of Economic Literature, 55 (4): 1486-1525.

Giraudet, Louis-Gaëtan, D. Finon. European experiences with white certificate obligations: A criticalreview of existing evaluations. 2014. hal-01016110. https://hal.archives-ouvertes.fr/hal-01016110/document

Hassett, K. and Metcalf, G. (1993) Energy Conservation Investment: Do Consumers Discount the Future Correctly? Energy Policy, Volume, 710-716

Moneta, Roberto, Nino Di Franco, Ilaria Bertini, and Alessandro Federici. 2015. 'Rapporto Annuale Efficienza Energetica-RAEE 2015'. http://openarchive.enea.it/handle/10840/7099.

Nocera, M. (2014). Le Detrazioni Fiscali Del 55% Per La Riqualificazione Energetica Del Patrimonio Edilizio Esistente – 012. ENEA, ROME. ISBN 978-88-8286-301-2 http://efficienzaenergetica.acs.enea.it/doc/Rapporto55%25_12.pdf

Rademaekers, K., Eichler, L., Perroy, L., van der Laan, J. (2017) "Assessing the European clean energy finance landscape, with implications for improved macro-energy modelling", European Commission, Bruxelles. https://ec.europa.eu/energy/sites/ener/files/documents/macro_eu_clean_energy_finance_final.pdf