Interreg Mediterranean

EUROPEAN UNION

STEPPING

Project co-financed by the European Regional Development Fund

# MED EPC GUIDELINES

SEPTEMBER 2019

# Contents

# 1.

# Executive Summary

The MED EPC Guidelines (MEG) aim to provide step-by-step guidance for the energy retrofitting of public buildings in the MED area through the use of Energy Performance Contracts, taking into consideration the intrinsic characteristics of the region. The MEG target primarily public authorities, but also EPC facilitators, ESCOs, financing institutions and market actors.

These intrinsic characteristics, summarized as “MED specific context”, include: the climatological conditions, the buildings typology, the economy and market conditions, the governance structures that exist in the Mediterranean and affect the roll-out of EPC in the MED area.

Drawing from the outcomes and lessons learnt during the energy retrofitting of selected public buildings with EPC in 7 countries – France, Greece, Italy, Malta, Portugal, Slovenia and Spain – the MEG do not re-invent the standard EPC roll-out process; on the contrary, they tailor it to the MED-specific conditions, which stakeholders should not lose sight of, when aiming to identify EPC projects, develop investment plans, overcome barriers and create enabling frameworks for the EPC market uptake in the MED area.

# 2.
# Introduction

Energy efficiency is at the heart of Europe's energy policy framework. Guided by the principle "energy efficiency first", Europe is set to transition away from fossil fuels towards cleaner energy and to deliver on the Union's commitments to the Paris Agreement for reducing greenhouse gas emissions.

The Clean Energy for all Europeans package, i.e. a set of legislative proposals tabled by the European Commission in 2016 to deliver "a resilient Energy Union and a forward-looking climate change policy", resulted in the amendment of two key directives that will allow Europe to meet its energy and climate targets by 2030 and its long-term strategy for carbon neutrality by 2050. These are the **Energy Efficiency Directive (2018/2002)**, amending Directive 2012/27/EU and the **Energy Performance of Buildings Directive (2018/844/EU)** amending Directive 2010/31/EU.

The new Energy Efficiency Directive (EED) sets binding targets of at least 32.5% energy efficiency by 2030, relative to a 'business as usual' scenario, with an upwards revision clause by 2023. Furthermore, the Directive includes an extended energy savings obligation to achieve new annual energy savings of at least 0.8% (of final energy consumption) for the period 2021-2030 and beyond, coming from new energy efficiency renovations or other measures in end-use sectors (11% more ambitious than in the current period). Strengthened rules on individual metering and billing of thermal energy to ensure consumers are better informed, thus more empowered, are also part of the new EED.

The new **Energy Efficiency of Buildings Directive (EPBD)** on the other hand covers a broad range of policies and supportive measures that will help Member States boost energy performance of buildings and improve the existing building stock. Some of the key features of the directive are summarized below:

- Stronger national long-term renovation strategies, aiming at decarbonisation by 2050, with a solid link between energy efficiency and financing;
- A Smart Readiness Indicator enhancing the building's ability to adapt its energy consumption in response to the needs of the end-user while maintaining energy, healthy indoorclimate conditions and overall flexibility of its electricity demand;
- Targeted support to e-mobility infrastructure deployment in buildings' car parks.
- Enhanced transparency of national building energy performance calculation methodologies.

Overall, the EPBD assigns greater role on renovation, smart systems and financing, through initiatives like the Smart Finance for Smart Buildings Initiative, more effective use of public funds, creation of project pipelines etc.

**Energy Performance Contracting (EPC)** has been for years acknowledged as a useful instrument that can help mobilize private financing for energy efficiency in public buildings.

Its role is further recognized in the new policy framework. In May this year, in a recommendation regarding building renovation, the European Commission provides a non-exhaustive list of examples of financial mechanisms to guide investment in an energy-efficient public building stock, where EPC features prominently. The text outlines the following measures that can enable the uptake of EPC in national contexts, namely:

1. Assistance for the use of EPC (market facilitators, framework contracts, practical guides, etc.);
2. A legislative framework conducive to the development of ESCOs and the energy services market in general;
3. Capacity-building through project development assistance, training, peer-to-peer assistance, etc.; and
4. Aggregation of small projects in public buildings (e.g. similar projects from different public authorities or public owners).

Although the role of EPC in accelerating the energy retrofitting of public buildings has been acknowledged, public authorities across Europe have not been in a position to fully capture its benefits; not at least in the Mediterranean, as can be drawn from the recent JRC report "Status of the EPC market in Europe, 2017".

Building on the lessons learned from the previous programming period (2007 – 2013) and studies covering the Mediterranean and Europe as a whole, the Interreg MED programme for the current period (2014-2020) has prioritized the energy retrofitting of public buildings in the cooperation area it covers, referred to as MED area, and more so through the use of third-party financing, like EPC; the aim being to create a favourable policy, market and investment framework, reflective of and tailored to the MED specific context.

The MEG, core deliverable of STEPPING project, contribute to the Programme's priority by breaking the MED specific context down into different characteristics and providing hands-on guidance on how to tailor the EPC roll-out to this context so as to increase the energy retrofitting of the MED public building stock.

# 3.

# MED Specific Context

Building on the STEPPING pilots and policy recommendations, and through desk research on statistical and other data, a significant set of characteristics specific to the MED area stand out. These characteristics appear to affect the adoption of EPC in the countries of the MED area to a different degree. In the following analysis they are grouped in five main categories:

a. climate and geography,

b. buildings,

c. economy,

d. market and

e. governance.

For each one of these categories, the respective characteristics are analysed in the following chapters.

Climate & Geography

Buildings

Economy

Market

Governance

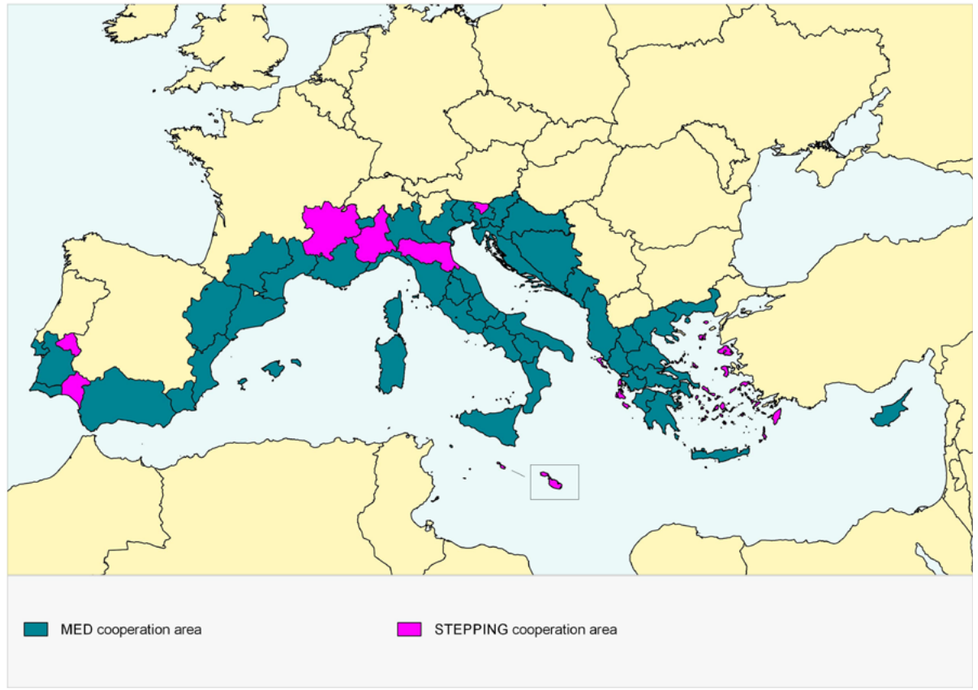



*Figure 1. MED and STEPPING cooperation areas*

# 3.1.

# MED Climate & Geography Context

The MED area is generally characterized by relatively mild winters and very warm summers. Therefore, the heating season is shorter and heating costs are lower compared to North Europe. However, there is also significant variation of the climate conditions within the borders of the MED area. Not all areas have a Mediterranean climate; this depends on their distance from the coast, the albedo and the altitude. Thus, different climate zones are usually identified in each Mediterranean country. The buildings' structural characteristics and systems are directly linked to those climate zones, resulting to varying building types even within the same country. The Köppen climate classification map shows the distribution of climate types.

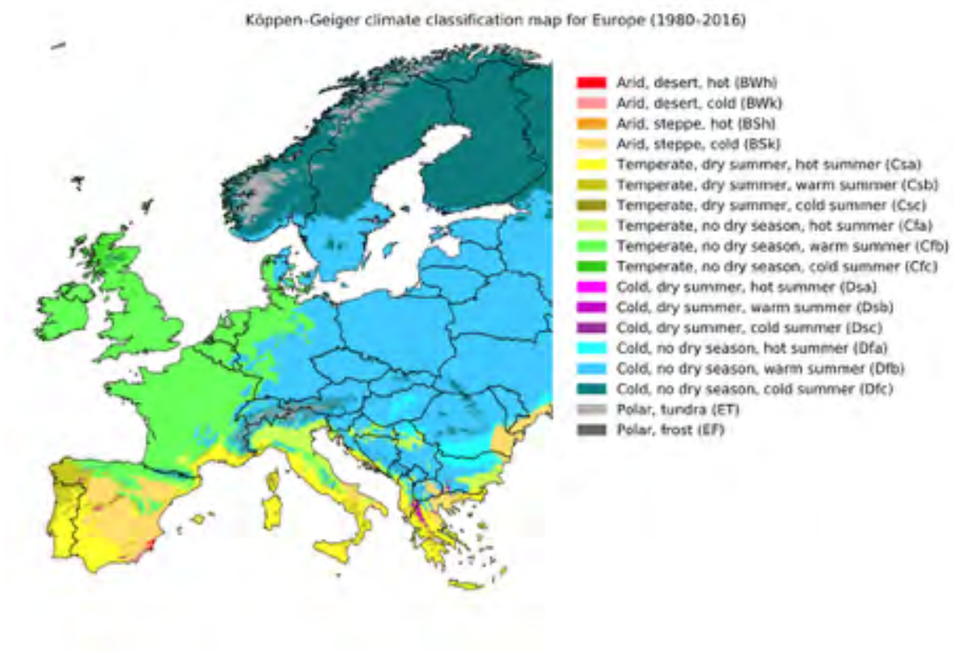



***Figure 2.*** *Köppen climate classification map for Europe (source: Beck, H.E., Zimmermann, N. E., McVicar, T. R., Vergopolan, N., Berg, A., & Wood, E. F.)*

In order to facilitate energy auditing and the classification of climate conditions, EU Members States have proceeded to a more detailed specification of their climatic zones. As each country is still following its own characterization, there is no interregional climate zone mapping.

The following graphs represent the climatic zones in STEPPING participating MED countries, with the exemption of Malta, which can be considered as mono-climatic due to its size.

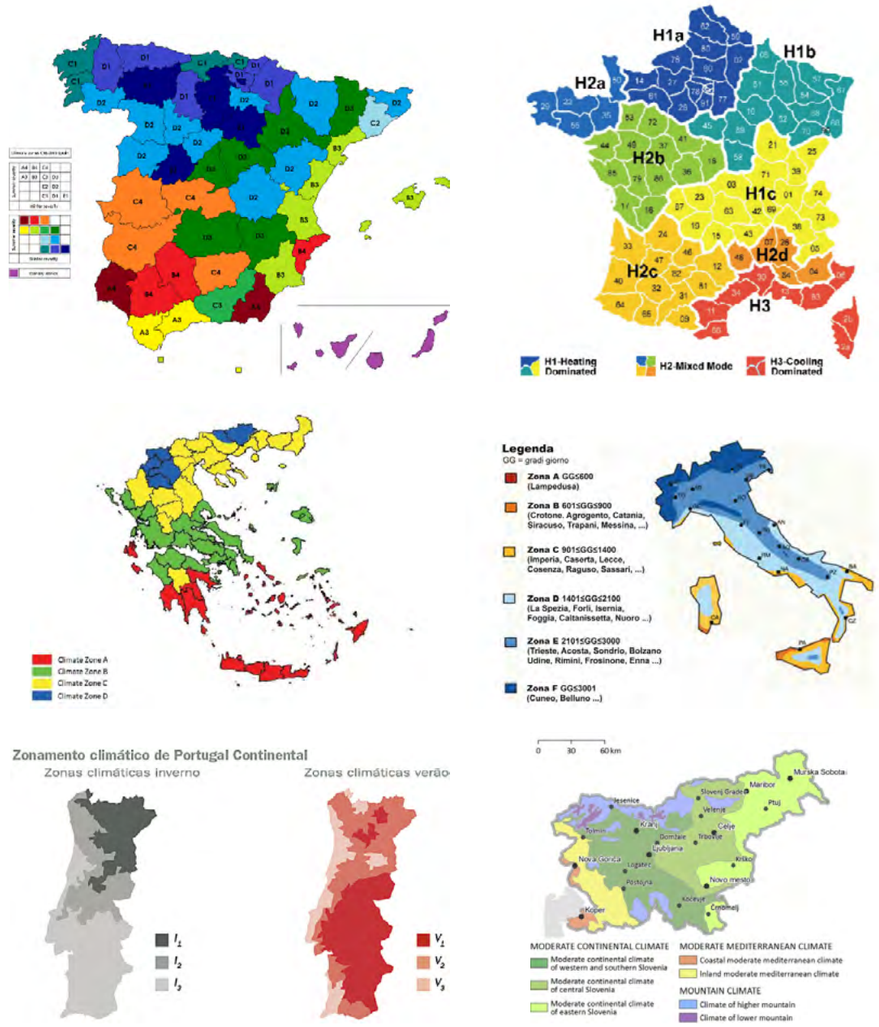



***Figure 3.*** *Climatic zones in some STEPPING partner countries (source: Portugal SIAM Project, Greece Ministry of Environment, Spain, Ministry of Development, France Journal Officiel de la République Francaise (2010, Italy Presidential Decree n. 412 of 26 August*

3.1.1.

# Heating Degree Days

The heating degree days in the MED area are in general lower than those in the rest of the EU Member States as presented in the following graph. The lower heating energy demand creates less favourable conditions when it comes to potential energy savings through interventions aiming to upgrade the efficiency of the public buildings' heating systems.

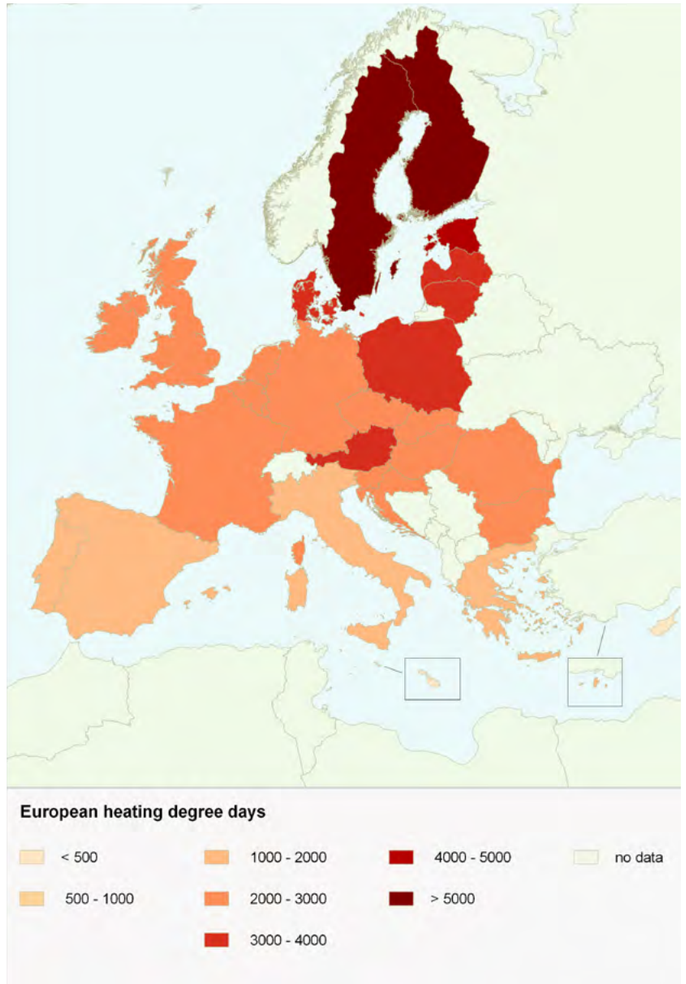



***Figure 4.*** *EU Member States Heating Degree Days (source: Eurostat)*

3.1.2.

# Cooling Degree Days

The cooling degree days in the MED area are in general higher than those in the rest of the EU Member States as presented in the following graph. The higher cooling energy demand creates more favourable conditions when it comes potential energy savings through interventions aiming to upgrade the efficiency of the public buildings' cooling systems.

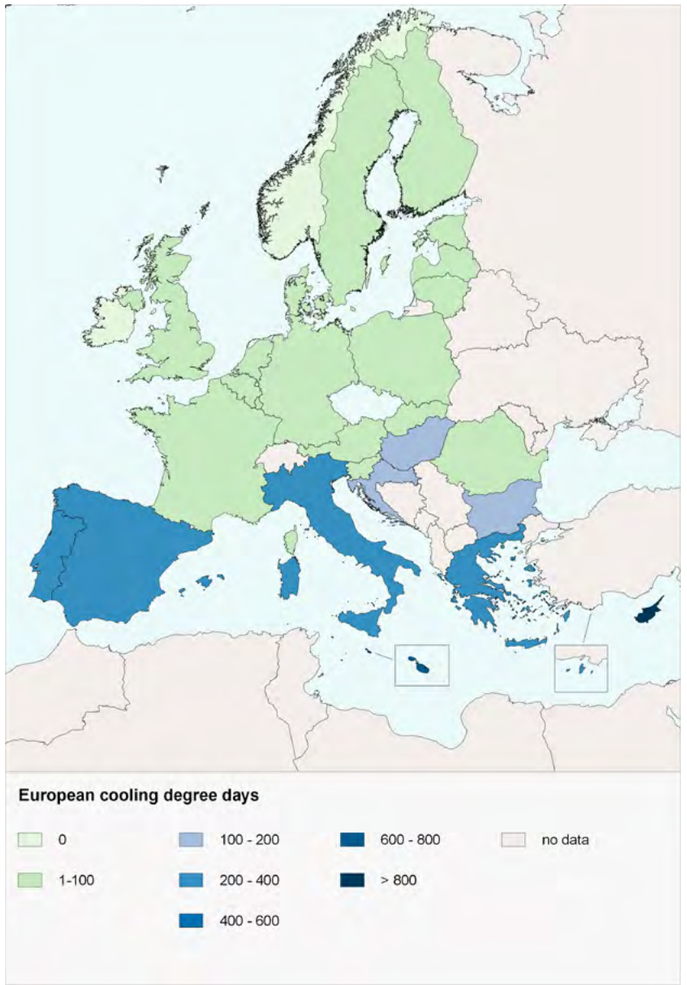



***Figure 5.*** *EU Member States Cooling Degree Days (source: Eurostat)*

3.1.3.

# Solar Irradiance

Solar irradiance in the MED area is on average higher than in the rest of the EU Member States as presented in the following graph resulting to feasible technological solutions exploiting solar energy for heat (solar thermal systems) and electricity (photovoltaic systems) production.

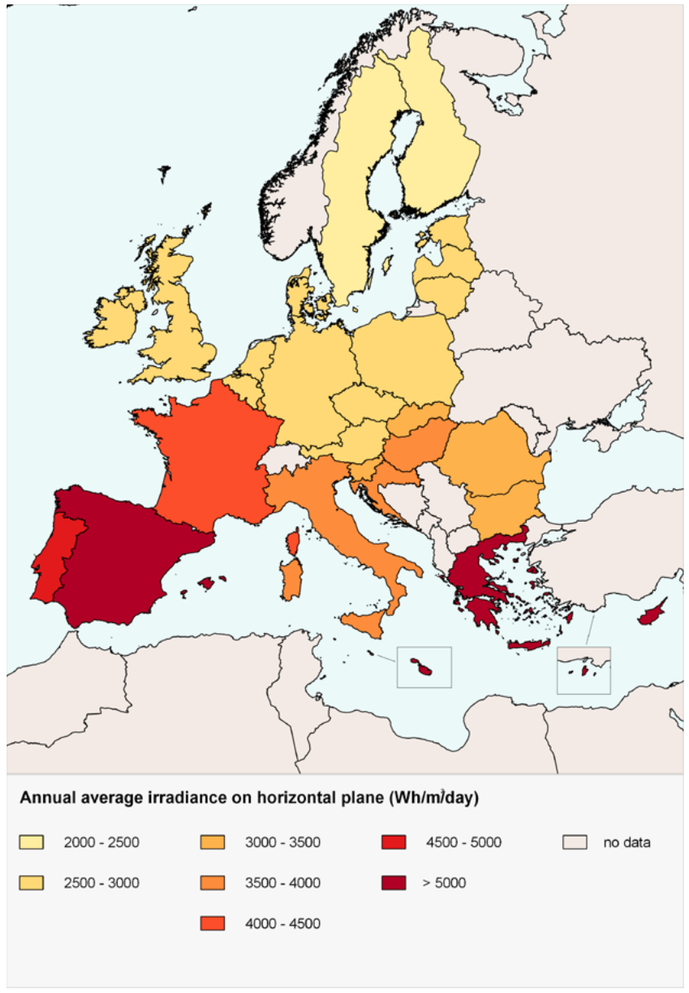



***Figure 6.*** *EU Member States Annual Average Irradiance on horizontal plane (source: PVGIS)*

3.1.4.

# Proximity to Sea

Structural and maintenance costs increase with proximity to sea due to the adverse climate conditions, such as salinity, humidity, wind and sun exposure. These reduce the building structure and the building services lifetime. Coastal areas are exposed to flooding and strong winds. Both should be taken into account early in the building design process, but also later on since they increase the budget for repair purposes. Exposure to solar radiation is another factor that demands the use of special materials, otherwise the need for maintenance is often increases the overall maintenance cost. Corrosion and moisture also damage the building envelope and the building systems. To sum up, the specific climate conditions force the selection of special materials, products and construction methods and the regular care for necessary repairs.

The key point to consider when selecting building materials for constructing buildings near the coast is durability. This is because the building would be exposed to different elements as compared to those in non-coastal areas. The combination of sand, moisture and saline water result in wear and tear of building materials. Materials and construction methods in coastal environment should be resistant to flood and wind damage, wind-driven rain, corrosion, moisture and decay (due to sunlight, aging, insects, chemicals, temperature or other factors), while ease of installation should be taken into account.

More so, a large share of the population resides close to the coast in Europe, as shown in the following graph. Hence, a significant number of people have to cope with the extreme conditions affecting the buildings that they occupy.

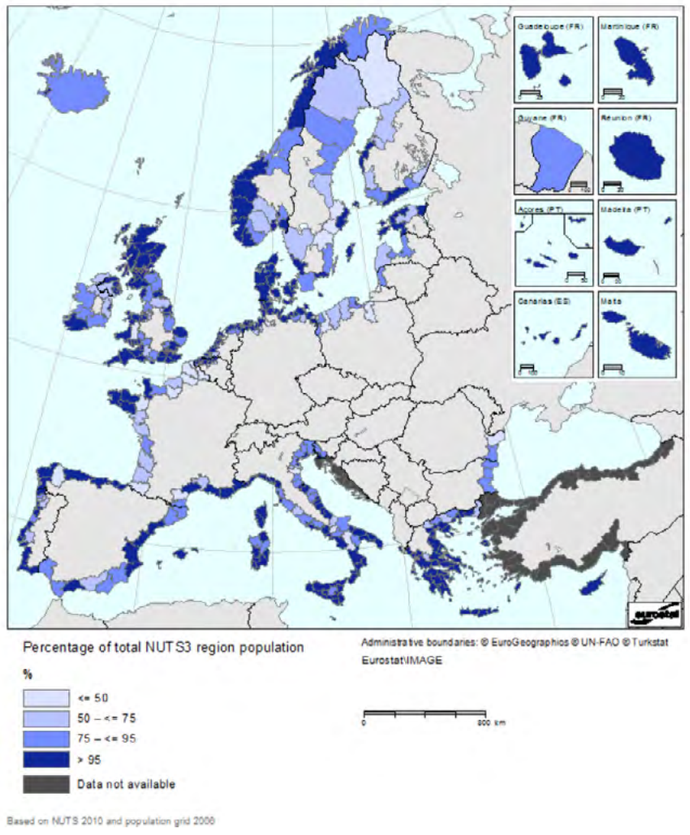



***Figure 7.*** *EU Member States Annual Average Irradiance on horizontal plane (source: PVGIS)*

### 3.1.5.

## Population Seasonality

Seasonality plays a crucial role in the population and the energy needs in the coastal strip of the MED area. As shown in the tables below, the population is augmenting dramatically during the summer season, hence affecting all energy efficiency measures.

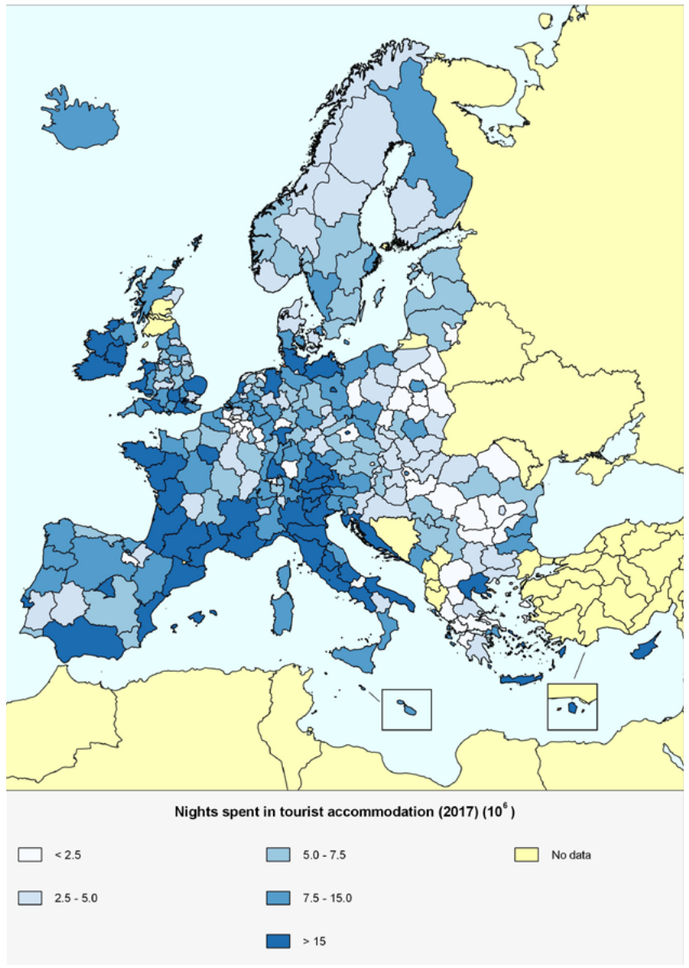



***Figure 8.*** *Nights spent in tourist accommodation/area in EU countries in 2015-2017 (Source: Eurostat)*

# 3.2

# MED - Buildings Context

The MED area shares some common characteristics with regards to the features of the public building stock, which justify synergies and common solutions to improve the energy efficiency of buildings.

## 3.2.1.

## Heating / Cooling Technologies

Due to varying climate conditions at national, regional, and local level but also local availability of energy carriers and national energy planning decisions, space heating demands have been met in many different ways in Europe. In some countries, the use of natural gas in local boilers dominates. In other countries, district heating systems occupy the largest share of the low temperature heat market. The annual heat demands are low in the MED area, so space heating is traditionally not addressed at building and not community/city scale.

In the north of Europe, on the other hand, central and district heating are much more popular because of increased demand for heat. At the same time, district heating, by nature, is a technology that enables the pooling of buildings and the concerted delivery of interventions in bundled projects.

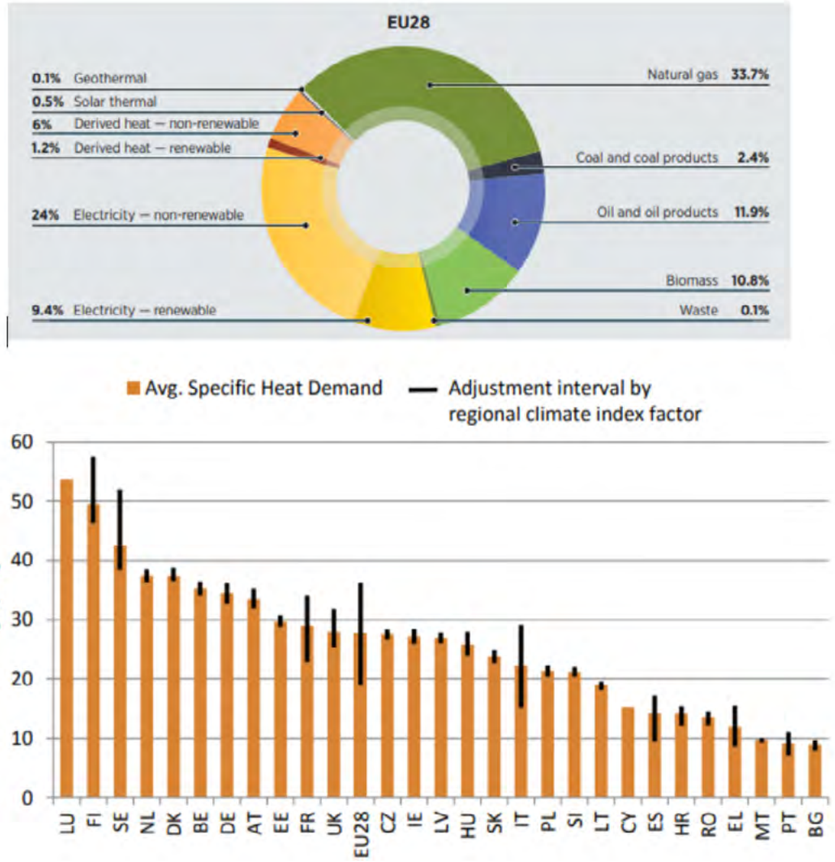



***Figure 9.*** *Average EU28 and Member State specific heat demands for final consumption of space heating and hot water preparation, with indicated adjustment interval by adaptation of regional climate index factors, 2010 (Source: STRATEGO-WP2-Background-Report-4-Heat-Cold-Demands.pdf)*

3.2.2.

# Cultural Heritage and Architecture Restrictions

The long-term objective is to achieve carbon neutral buildings, which means reducing the demand for energy and maximizing the amount of renewable energy supplied. Nevertheless, to do this, one should consider the age of the building stock. Buildings which cannot be retrofitted due to their architectural and historical features have to be approached differently.

The Energy retrofitting of historic buildings faces limitations in terms of technologies than can be introduced and savings achieved. However, state-of-the-art technologies that could be used, e.g. advanced sensors, controls and management systems, may enhance the energy efficiency of installed systems, without affecting the building's appearance.

Upgrading the control systems to reduce the use of energy and ensure comfortable conditions is very cost-effective. Changing people's behaviour in the buildings can also be a no-cost measure, providing significant energy savings as well as improved comfort conditions for occupants and users.

*"Integrating renewable energy into a historic urban district may at first seem impossible due to the significant visual impact of many well-known technologies. However, cooling and hot water can be generated very efficiently and cost effectively using smart technologies.[1]"*

The percentage of historic buildings before 1945 in the EU is presented in the following graph. The graph shows that in the MED area a fair amount of buildings is considered historic according to the respective classification.

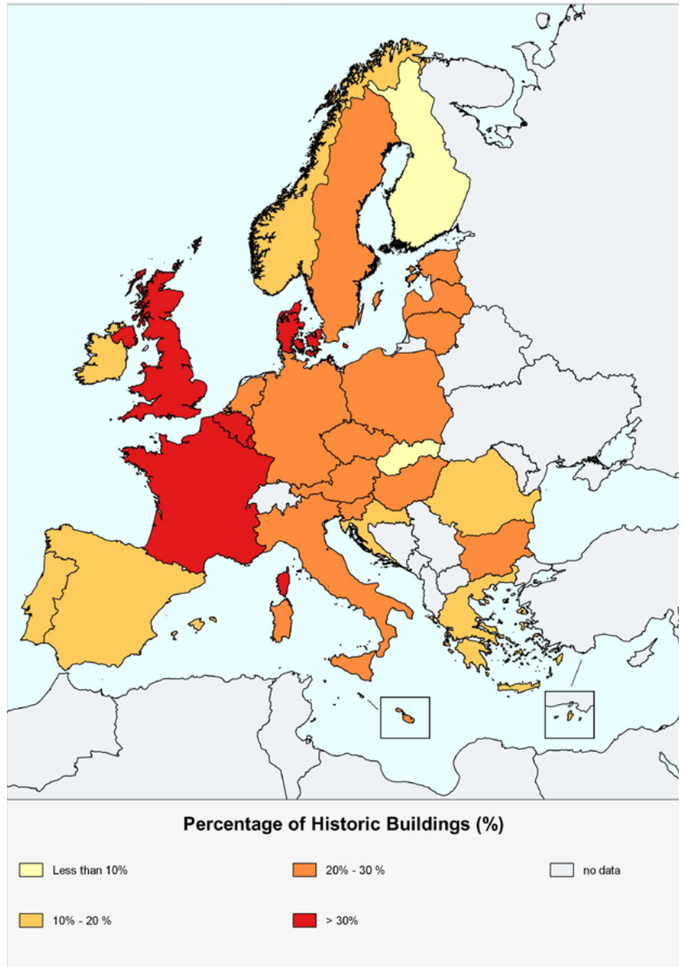



***Figure 10.*** *Percentage of Historic Buildings in EU (source: Eurostat)*

[1] *Economidou, Marina & Atanasiu, Bogdan & Staniaszek, Dan & Maio, Joana & Nolte, Ingeborg & Rapf, Oliver & Laustsen, Jens & Ruyssevelt, Paul & Strong, David & Zinetti, Silvia. (2011). Europe's buildings under the microscope. A country-by-country review of the energy performance of buildings. (http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf)*

3.2.3.

# Static Reinforcement Requirements in Seismic Areas

The building stock in the MED area is characterized by certain limitations (architectural, technological, materials, technical systems, etc.), which are aggravated as a result of lack of regular renovation / and external factors, such as seismic activity.

A large number of regions in Europe is earthquake-prone, as documented recently in Greece, Spain, Italy. Hence, the opportunity to combine energy and seismic renovation turns out to be crucial for many countries.[2] On the other hand, this creates challenges for the implementation of an EPC as the costs might be much higher, when a deeper renovation is foreseen.

In Italy for instance, seismic retrofitting should be mandatorily foreseen during energy retrofitting activities. This can be a barrier or an opportunity for buildings' energy efficiency. In the latter case, the part of the subsidies used for seismic retrofitting can be used for the energy conservation measures.

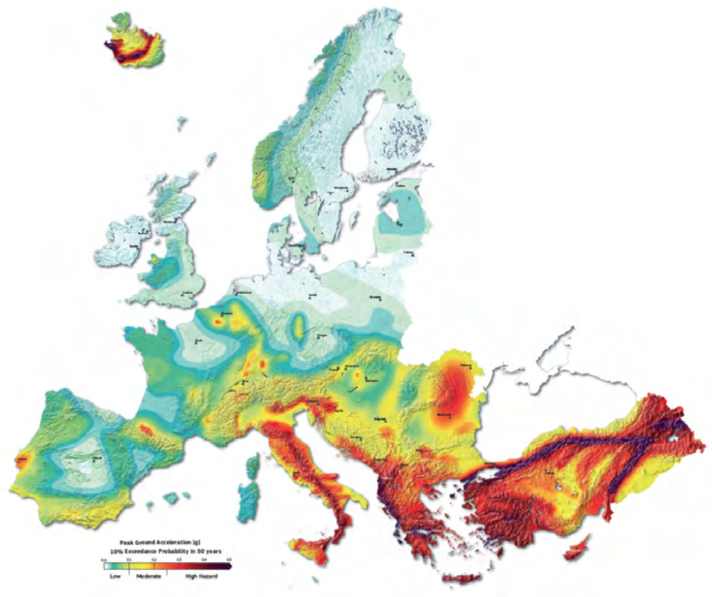



***Figure 11.*** *European Seismic Hazard Map (ESHM) displays the ground motion (expected to be reached or exceeded with a 10% probability in 50 years.) (Source: SHARE, http://www.share-eu.org)*

The Seismic Code Index is another index that reveals the quality of the seismic resistant and/or seismic code in each country, regardless of enforcement and building practice factor. The Seismic Code Index calculated for 2012 for the EU Member States is presented in the graph below.

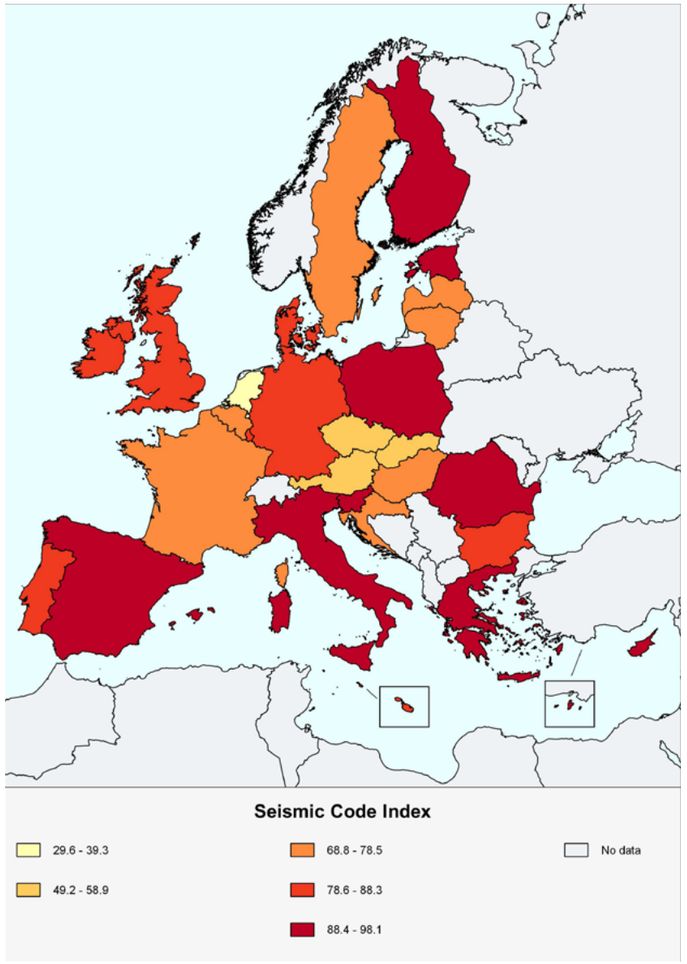



***Figure 12.*** *Seismic Code Index in EU Member States*

[2] *Seismic and Energy Renovation: A Review of the Code Requirements and Solutions in Italy and Romania by Emil-Sever Georgescu 1OrcID, Mihaela Stela Georgescu 2, Zina Macri 2, Edoardo Michele Marino 3, Giuseppe Margani 3OrcID, Vasile Meita 1, Radu Pana 1, Santi Maria Cascone 3, Horia Petran 1, Pier Paolo Rossi 3OrcID, Vincenzo Sapienza 3,*OrcID and Marius Voica 2) (https://www.mdpi.com/2071-1050/10/5/1561/htm)*

3.2.4.

# Ownership Status of Public Buildings

The structure of ownership and occupancy has a significant relevance on the ability to renovate. There are some cases of overlapping authority on buildings due to multiple owners, or absence of legal documents and recording of buildings. This fact hinders a clear ownership status.

The ownership of buildings has a bearing on the rate at which renovations are undertaken and the depth of the energy savings measures that may be included in renovation projects. Arguably, the public sector should be taking the lead in 'deep renovations' and its large portfolio of buildings provides many opportunities for economies of scale. Private owners may be reluctant to act early and may require encouragement, incentives and regulations to stimulate reasonable rates and depths of renovation.[3]

In the recent years MED governments have ordered regularisations of the existing cadastres in order to include buildings with unidentified ownership status or that were not declared in any way.

The following graphs show the example of Spain and Greece, where in the first case the national cadastre was subjected to a new regularisation and in the second case is still at the phase of completion.

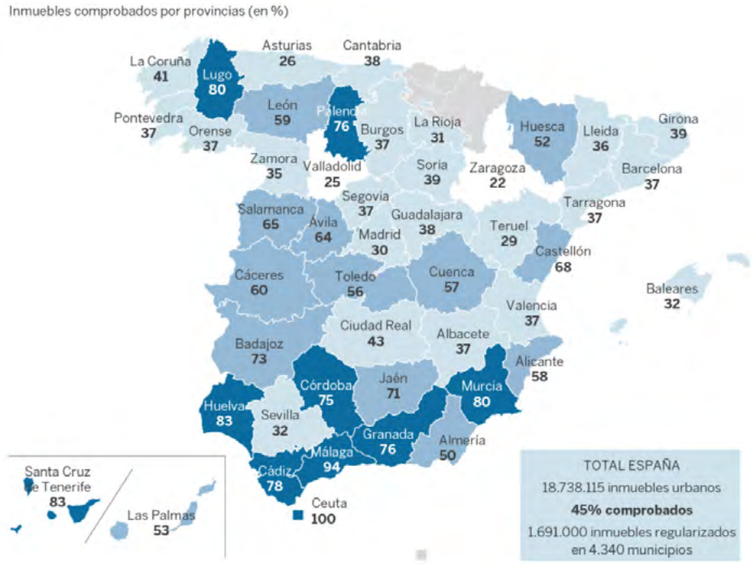



***Figure 13.*** *The recent regularisation of the Spanish cadastre in 2016, percentages of checked buildings (source: Ministerio de Hacienda y Administraciones Publicas)*

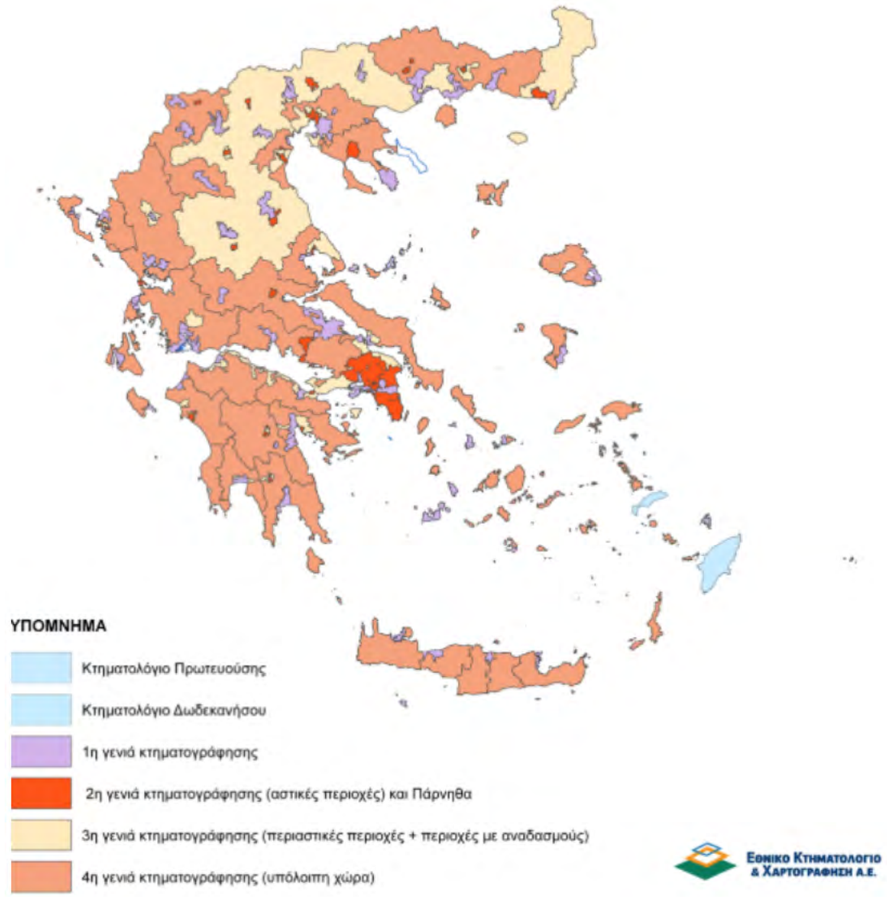



***Figure 14.*** *Degree of completion of the Greek cadastre, the last (2017-2022) stage in brown colour (source: Greek National Cadastre)*

[3] *Economidou, Marina & Atanasiu, Bogdan & Staniaszek, Dan & Maio, Joana & Nolte, Ingeborg & Rapf, Oliver & Laustsen, Jens & Ruyssevelt, Paul & Strong, David & Zinetti, Silvia. (2011). Europe's buildings under the microscope. A country-by-country review of the energy performance of buildings. (http://bpie.eu/wp-content/uploads/2015/10/HR_EU_B_under_microscope_study.pdf)*

# 3.3.

# MED Economy Context

The MED area has been hit by the global economic crisis to a larger extent compared to the rest of Europe. Moreover, some countries within the MED area struggle even more with the impacts of the recession, still facing high unemployment, stagnant wages, high debt-to-GDP ratios, a weakened public administration and low levels of investment, both public and private. These elements put together, have had a toll on the ability of national and regional governments to absorb European Structural and Investment Funds, and - more so - to use them as lever for the mobilization of private investment. Furthermore, the uptake alternative financing instruments has been relatively slow.

## 3.3.1.

## National Public Debt

National public debt of EU Members States is presented in the table below. Data from Eurostat (Q3 2018) demonstrate that MED area countries are more indebted compared to those of Northern Europe. STEPPING countries, in particular Greece, Italy and Portugal, rank among the most indebted.

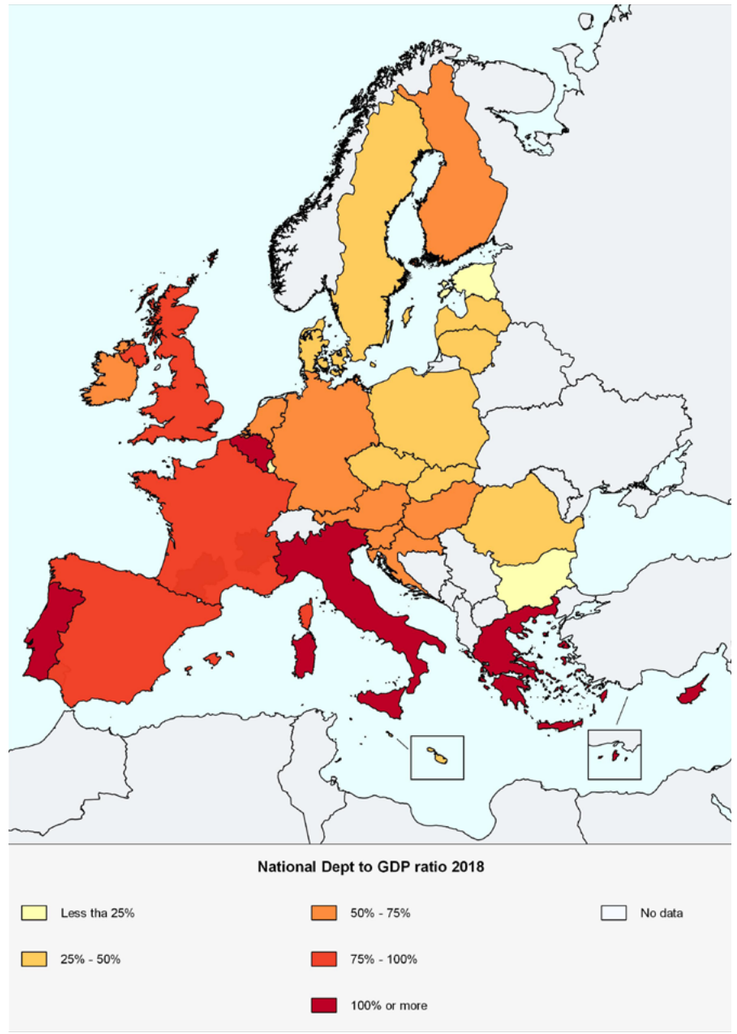



***Figure 15.*** *EU Member States National Debt to GDP ratio 2018*

3.3.2.

# Financing Energy Efficiency

At EU level, the European Structural and Investment Funds, in particular the Cohesion Fund, the Social Fund and the European Regional Development Fund, allocate €18 billion to energy efficiency in the period 2014-2020. Among other priorities such as renewable energy, research and innovation, energy efficiency receives the largest share of funding for low-carbon economy, which already captures 20% of the ESIF (approximately 23 billion).

Despite energy efficiency gaining momentum in the cohesion budget, data from the European Commission [4] demonstrate the inefficient earmarking of ESIF and more so, the low absorption rate of those funds, particularly in the MED area, as illustrated in the maps below.

This is due to a number of challenges (complex state aid rules; lack of capacity within Managing Authorities; bureaucracy and red tape), which the new programming period 2021-2027 seeks to address.

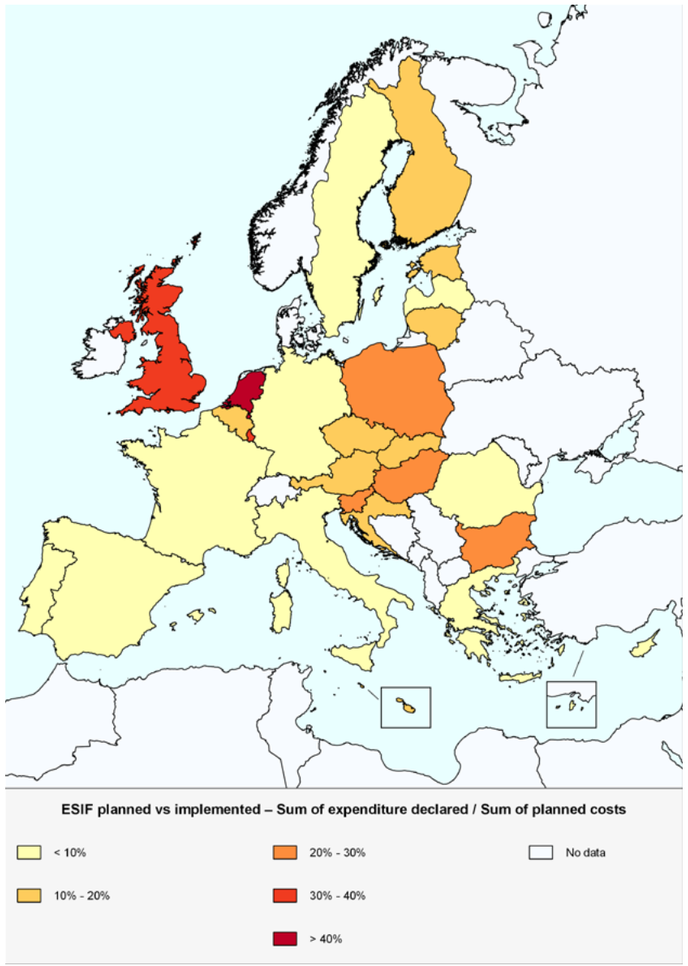



***Figure 16.*** *Percentage of declared expenditures over planned costs for energy efficiency renovation actions financed by the ESIF Operational Programmes per Member State (source: DG REGIO)*

[4] https://cohesiondata.ec.europa.eu/2014-2020/ESIF-2014-2020-categorisation-ERDF-ESF-CF-planned-/3kkx-ekfq

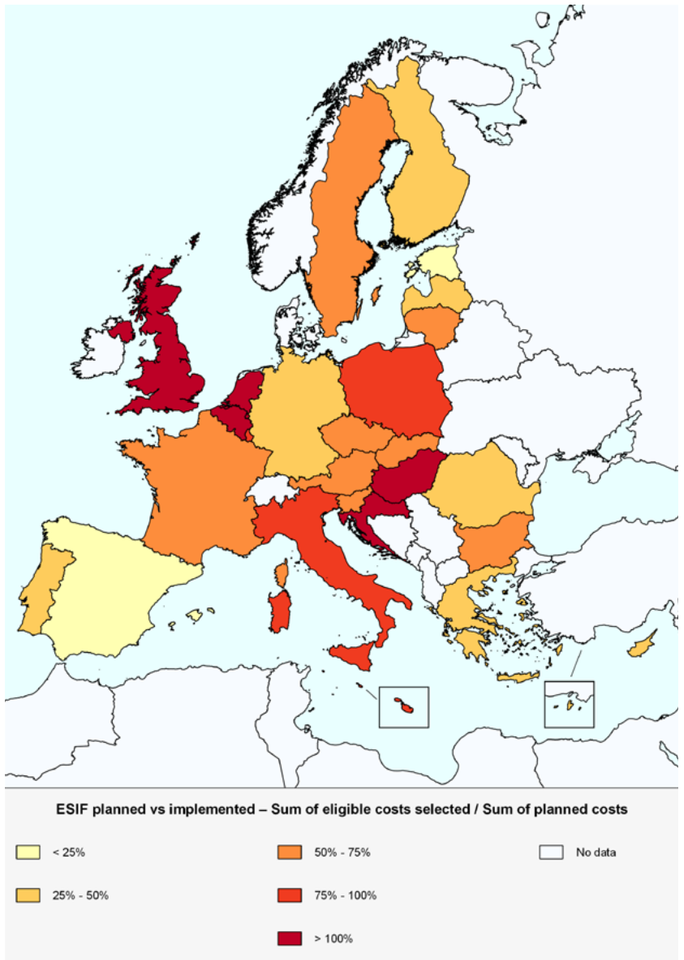



***Figure 17.*** *Percentage of eligible costs selected over planned costs for energy efficiency renovation actions financed by the ESIF Operational Programmes per Member State (source: DG REGIO)*

Nevertheless, as public finance alone is not enough to respond to the scale of the challenge and the ambition of the EPBD, the current programming period foresees the combination of the ESIF with the European Fund for Strategic Investments (EFSI) – the so-called "Juncker Plan" – and other programmes, so as to bring forward new hybrid opportunities of financing besides public sector support.

EPC is seen as effective market-based instrument, which, possibly with a relatively small contribution from the public budget, e.g. in the form of a loan or a grant (ESIF), could finance both interventions with a shorter payback time and capital intensive interventions with a longer payback time, aiming at "deep renovation" of public buildings.

Such combination of public and private funds creates structures, i.e. financial instruments (FIs), which are key to further mobilise private financing for energy efficiency and renewables in buildings. FIs are managed by ESIF Managing Authorities, who, nevertheless lack the technical assistance needed to establish such instruments and may be intimidated by such process.

Adding to that an ingrained preference for grant schemes, which have been traditionally used for ESIF distribution, may slow down the uptake of FIs.

3.3.3.

# Building Construction Market

As some of the MED countries were heavily affected from the recent economic crisis, new construction almost seized, therefore the need for refurbishment became unpreceded. Available data show that even though general construction expenditure in MED countries is stagnant, renovation investment shows a weak recovery, signalling a tendency of investment in renovation, as shown in the following figure, rather in new constructions.

**EU-28 Construction, annual rate of change 2005 - 2017, calendar adjusted data**

| | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EU-28** | 1.7 | 3.8 | 3.4 | -1.9 | -7.7 | -2.3 | -0.1 | -5.5 | -1.7 | 2.7 | 1.1 | 2.5 | 3.8 |
| **EA-19** | 2.1 | 3.5 | 3.0 | -2.8 | -6.5 | -5.2 | -1.4 | -5.3 | -2.3 | 0.6 | -0.7 | 2.6 | 2.6 |
| **Belgium** | 0.5 | 3.7 | 2.0 | 0.8 | -3.2 | -1.7 | 5.3 | -0.9 | -2.2 | -0.7 | -2.4 | 0.3 | 0.7 |
| **Bulgaria** | 31.8 | 24.1 | 27.4 | 12.3 | -14.4 | -14.7 | -12.8 | -1.2 | -3.4 | 6.8 | 11.1 | -16.3 | 4.7 |
| **Czech Republic** | 5.2 | 6.3 | 7.1 | -0.2 | -0.9 | -7.6 | -3.4 | -7.3 | -6.8 | 4.2 | 7.0 | -5.8 | 3.5 |
| **Denmark** | 5.5 | 6.0 | 2.6 | -0.1 | -11.5 | -6.4 | 3.3 | 0.8 | -0.5 | 4.4 | 4.4 | 4.6 | 4.3 |
| **Germany** | -5.3 | 6.1 | 2.9 | -0.3 | -0.1 | -0.9 | 7.3 | 0.0 | -0.1 | 2.9 | -2.2 | 5.6 | 3.2 |
| **Estonia** | 22.3 | 26.9 | 13.6 | -13.1 | -29.9 | -8.6 | 27.3 | 16.6 | -0.1 | -2.1 | -3.5 | 4.6 | 17.7 |
| **Ireland** | 9.9 | 3.9 | -13.5 | -29.2 | -36.9 | -29.7 | -16.7 | -2.4 | 11.3 | 8.2 | 7.9 | 18.3 | 17.4 |
| **Greece** | -38.8 | 3.3 | 14.3 | 7.8 | -17.1 | -29.6 | -41.3 | -33.5 | -8.2 | 15.5 | 3.1 | 22.9 | -14.6 |
| **Spain** | 10.9 | 2.2 | -4.3 | -16.3 | -11.2 | -20.4 | -19.8 | -5.4 | 1.5 | 17.4 | 1.7 | 5.1 | -1.7 |
| **France** | 3.0 | 2.5 | 4.4 | -1.9 | -5.8 | -2.4 | -1.8 | -5.1 | 0.6 | -2.6 | -2.2 | -0.2 | 3.0 |
| **Croatia** | -1.1 | 10.7 | 4.3 | 12.9 | -5.8 | -17.3 | -11.3 | -12.2 | -4.6 | -7.3 | -1.0 | 2.4 | 1.5 |
| **Italy** | 1.0 | 3.8 | 6.4 | -0.8 | -11.5 | -3.5 | -4.4 | -13.4 | -10.3 | -6.7 | -1.9 | -0.3 | 0.3 |
| **Cyprus** | 2.8 | 4.1 | 6.8 | 2.3 | -10.6 | -8.0 | -6.8 | -21.1 | -18.9 | -21.7 | 0.2 | 9.0 | : |
| **Latvia** | 15.2 | 13.3 | 13.7 | -2.9 | -34.9 | -23.5 | 12.4 | 14.4 | 7.3 | 7.9 | -1.2 | -17.8 | 19.3 |
| **Lithuania** | 9.4 | 21.4 | 22.4 | 4.3 | -48.3 | -7.6 | 22.4 | -7.2 | 11.7 | 16.6 | -3.6 | -9.6 | 9.6 |
| **Luxembourg** | -1.0 | 2.3 | 2.8 | -1.1 | 0.0 | 0.2 | 1.4 | -3.8 | -4.2 | 4.2 | -1.5 | 3.7 | 0.4 |
| **Hungary** | 15.9 | -0.8 | -14.3 | -5.1 | -4.3 | -10.4 | -8.0 | -6.6 | 8.5 | 13.6 | 3.0 | -18.9 | 29.6 |
| **Malta** | 18.6 | 4.8 | 8.7 | 7.4 | 3.4 | 1.7 | 4.5 | 1.7 | 1.8 | 2.5 | 15.9 | -3.8 | 13.0 |
| **Netherlands** | 5.1 | 3.3 | 6.2 | 3.9 | -4.6 | -10.7 | 0.5 | -7.7 | -5.1 | 4.2 | 8.2 | 7.0 | 6.5 |
| **Austria** | 4.9 | 5.9 | 3.9 | -0.8 | -1.8 | -4.1 | 1.9 | 3.5 | 0.4 | -1.7 | -1.7 | 2.3 | 5.8 |
| **Poland** | 9.2 | 16.6 | 16.2 | 9.7 | 4.1 | 3.6 | 16.1 | -5.2 | -9.9 | 4.0 | 0.2 | -14.5 | 14.2 |
| **Portugal** | -1.4 | -6.3 | -3.8 | -4.6 | -10.4 | -11.7 | -12.7 | -16.1 | -16.2 | -9.6 | -3.1 | -3.8 | 2.2 |
| **Romania** | 7.0 | 15.7 | 33.0 | 27.0 | -15.2 | -13.5 | 3.1 | 1.8 | -0.7 | -6.6 | 10.3 | -4.4 | -5.1 |
| **Slovenia** | 2.1 | 15.6 | 18.5 | 15.5 | -21.0 | -17.0 | -24.8 | -16.8 | -2.6 | 19.5 | -8.2 | -17.7 | 17.7 |
| **Slovakia** | 14.0 | 15.8 | 5.6 | 11.7 | -11.2 | -12.0 | 6.0 | -12.0 | -5.2 | -4.5 | 18.1 | -10.9 | 3.6 |
| **Finland** | 4.4 | 7.7 | 10.9 | 3.3 | -12.6 | 11.5 | 8.0 | -0.9 | -3.2 | 0.4 | 5.7 | 5.7 | 5.4 |
| **Sweden** | 0.0 | 11.5 | 11.4 | -1.4 | -12.2 | 8.1 | 2.5 | -6.3 | -3.3 | 1.0 | 8.0 | 9.3 | 7.5 |
| **United Kingdom** | -0.5 | 1.4 | 2.3 | -1.2 | -11.7 | 7.2 | 2.2 | -6.9 | 1.5 | 9.0 | 4.4 | 3.9 | 5.1 |
| **Norway** | 8.3 | 6.1 | 6.0 | 1.4 | -8.7 | 0.0 | 3.0 | 7.5 | 6.3 | 4.6 | 1.5 | 3.6 | 4.4 |
| **Switzerland** | 3.4 | 3.7 | 0.5 | 2.1 | 0.7 | 1.2 | 2.8 | -0.7 | 1.5 | 1.6 | -3.8 | 0.1 | 3.2 |
| **Montenegro** | 5.6 | 42.3 | 1.4 | 19.4 | -18.4 | -0.3 | 18.3 | 7.8 | 40.0 | 34.9 | 20.3 | 47.7 | 42.0 |
| **Former Yugoslav Republic of Macedonia** | : | : | : | 20.4 | 7.5 | 16.7 | 28.4 | 8.0 | 43.3 | -3.4 | 40.8 | 8.0 | -25.9 |
| **Albania** | : | : | : | : | : | : | : | : | : | : | : | : | : |
| **Serbia** | 13.8 | 10.0 | 21.9 | 4.0 | -18.3 | -7.8 | 18.8 | 0.3 | -20.7 | 2.9 | 21.1 | 7.3 | 6.3 |
| **Turkey** | : | : | : | : | : | : | : | : | : | : | : | : | : |
| **Bosnia and Herzegovina** | : | 5.4 | 13.0 | 8.8 | -7.7 | -12.4 | -5.6 | -2.9 | -2.5 | 7.2 | -3.2 | -1.0 | -2.3 |

( : ) not available

*Source*: Eurostat (online data code: sts_copr_a)

eurostat

***Figure 18.*** *Construction value in 2005-2017. (source: Eurostat)*

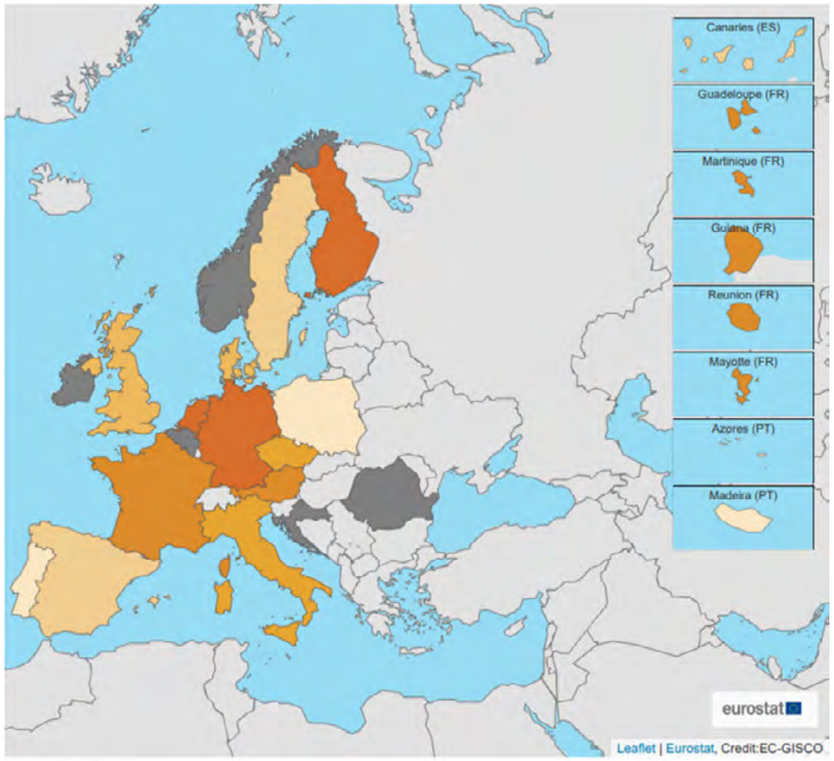



***Figure 19.*** *Household investment rate 2018. (source: Eurostat)*

# 3.4.

# MED Market Context

The ESCO market in the MED area is characterized by fragmentation and relatively low levels of maturity. The low pace at which MED area countries have adopted and/or implemented the EPBD, the – at some times – nascent or small sized ESCO markets, the low awareness of setting-up and realizing energy retrofitting projects using EPC along with the fact that despite substantial experience with PPPs, this has been mostly negative, paint a bleak picture of the MED EPC market.

### 3.4.1.

## ESCO Market and EPC Awareness

Lack of or limited knowledge, information and experience regarding energy efficiency in general and EPC in particular stands out as a key characteristic of the MED area. Stakeholders, including ESCOs, end-users, policy-makers at all levels and financial institutions have trouble recognizing the technical, economic and financial aspects of energy services and thus cannot easily identify the benefits associated with an EPC, adopt and promote it. Low awareness of financial instruments for building renovation, including the ESCO model and EPC, and energy efficient technologies, make energy efficiency investments look like a risky endeavour for public authorities. More so, previous unsuccessful experience with ESCOs breed reluctance from the side of public authorities to collaborate with ESCOs.

In the following graphs the number of ESCOs per capita and the size of EPC market are presented at EU scale. As it is presented in the map, there is few data on the development of the EPC market in most of the EU Member States. There are only a few countries with a developed EPC market.

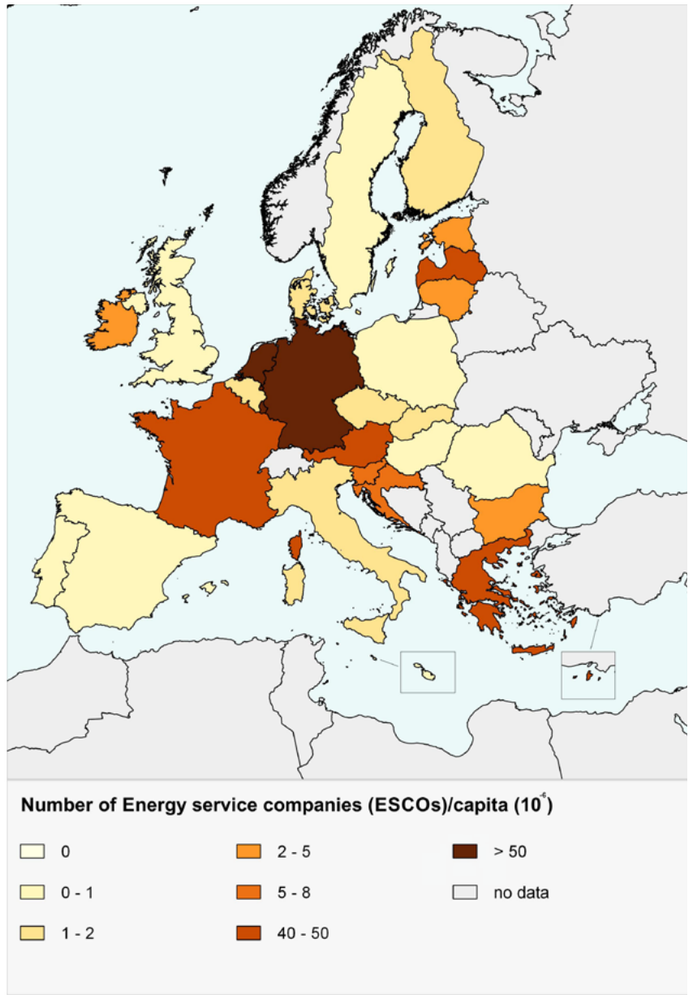



***Figure 20.*** *Number of Energy Service Companies (ESCOs) per capita in EU Member States (source: JRC European Commission)*

With the exception of France and Italy the ESCO capacity in the rest of the MED countries is considered weak and in some cases synergies between energy providers and construction companies are needed in order to provide a complete service.

In Central and Northern Europe, ESCOs represent typically a small branch of a larger engineering firm or technology provider, such as Honeywell, Siemens, or Schneider Electric operating in a mature market which allows for project aggregation. In this case, ESCO services may have access to equity to finance a project, or might find it easier to borrow due to a high credit rating. In most of the MED countries however, a standalone ESCO company generally counts 20-50 employees and is solely focused on delivering energy savings measures. Their independent model of operation and small size often limits the financing capabilities of these compa-nies.

The lack of economies of scale discourages ESCOs to proceed to self-financing of projects and sometimes financing from banks is limited. As a result, ESCOs in the MED area are more eager to get involved to O&M contracts, or to co-participate in subsidized projects.

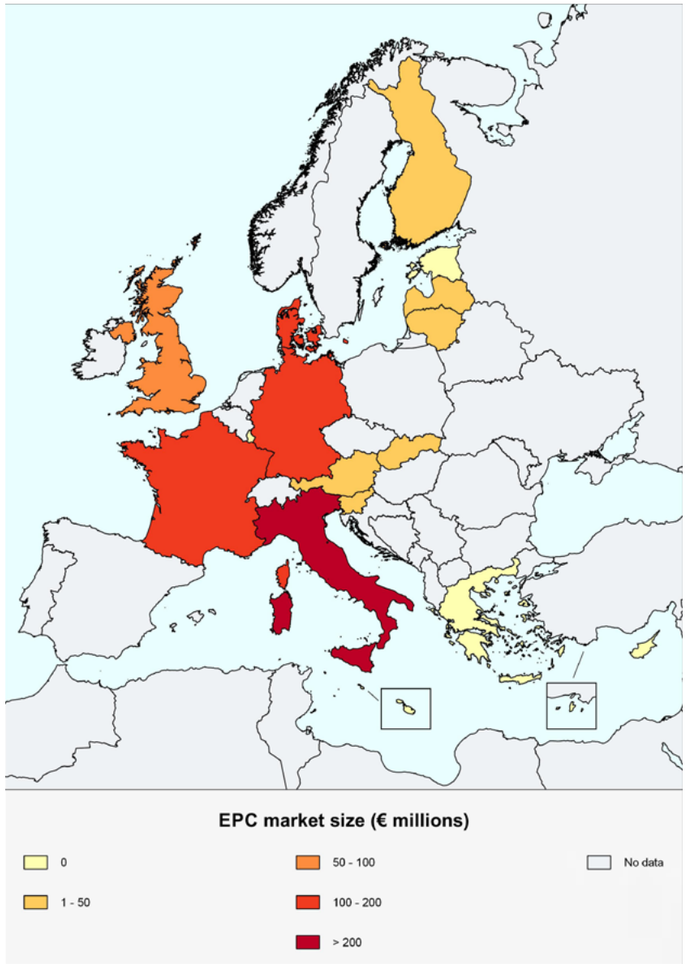



***Figure 21.*** *EPC market size in EU Member States (source: JRC European Commission)*

3.4.2.

# Experience with PPPs

A high amount of Public and Private Partnership projects (PPPs) of significant value has been deployed in the MED area, as shown in the maps below.

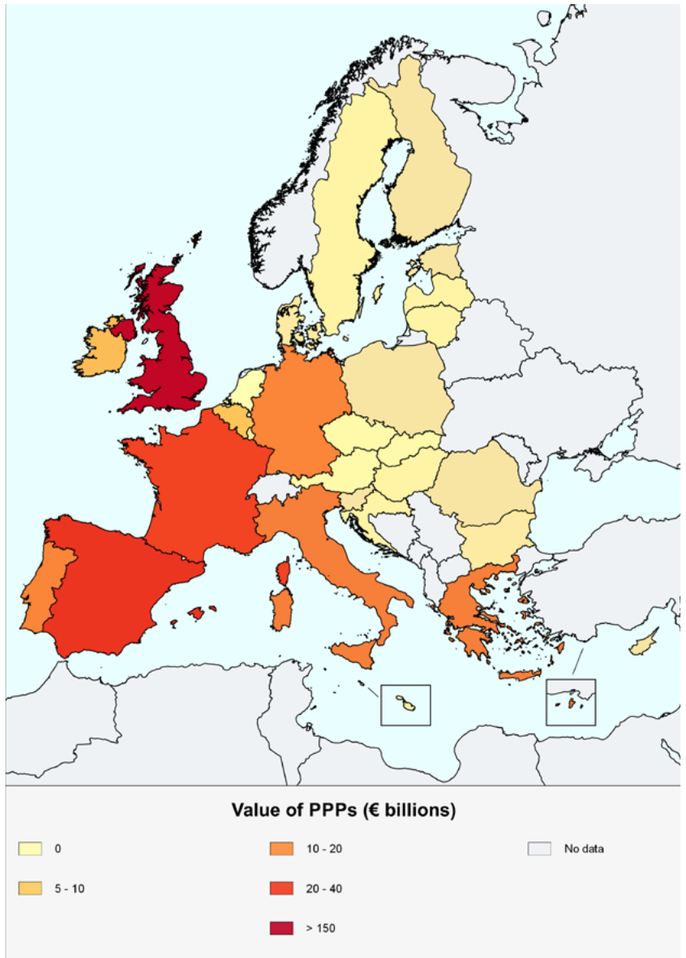



*Figure 22. Value of PPPs in EU Member States (source: European Court of Auditors)*

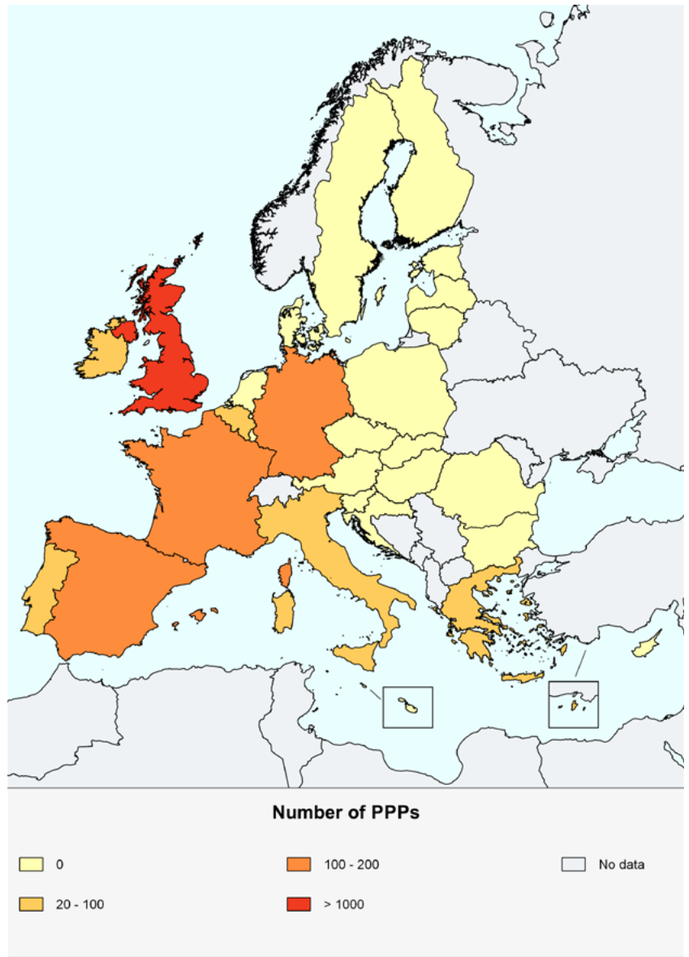



*Figure 23. Number of PPPs in EU Member States (source: European Court of Auditors)*

The experience derived from PPPs provides useful insights on the collaboration between the public and the private sector in general and on the roll-out of an EPC in particular, since the EPC has a lot in common with a PPP.

In its report[5], following the auditing of 12 PPPs in Greece, Spain, France and Ireland, which accounted for around 70 % of the total project cost (29.2 billion euro) of EU-supported PPPs, the European Court of Auditors (ECA) concludes that increased administrative capability, robust institutional and legal frameworks and long-lasting experience are the three fundamental preconditions that should be in place to ensure sound implementation of PPPs.

More specifically, findings in the report that are most pertinent to the retrofitting of public buildings through an EPC are outlined below:

- PPPs allow procurement to be done through a single procedure, yet this increases the risk of insufficient competition, putting contracting authorities in a weaker negotiating position.
- Elements of the contract require further discussion and negotiation, yet the under-resourcing of public authorities often results in premature and insufficiently effective contracts being procured.
- Long contract durations are suitable in sectors where rapid technological developments occur.

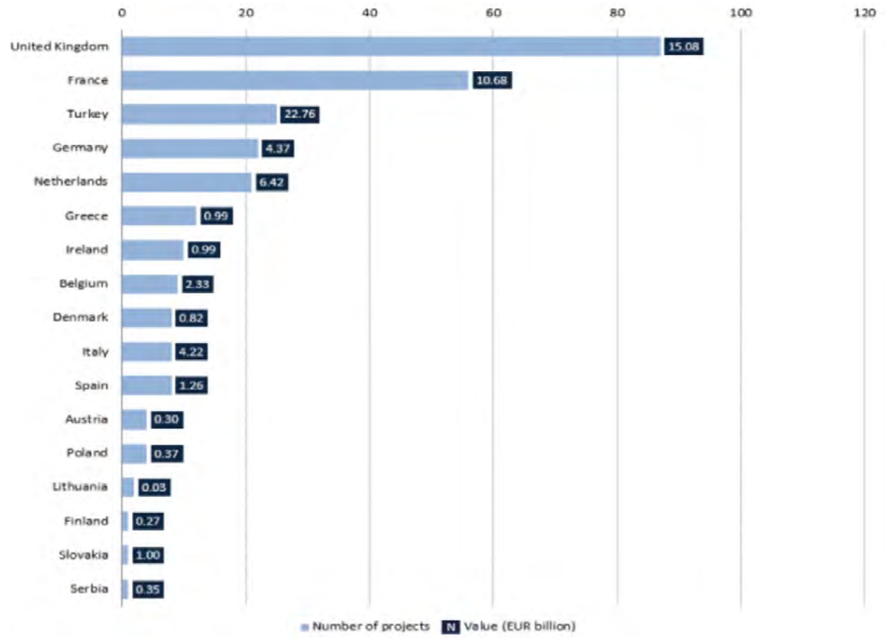



***Figure 24.*** *Value and number of PPP projects, 2018 (source EIB-EPEC)*

[5] *"Public Private Partnerships in the EU: Widespread shortcomings and limited benefits" (2018)*



### 3.4.3.

## Adoption and Implementation of EPBD

The latest report of the EPBD Concerted Actions[6] reports that the overall architecture of the Directive is working, combining minimum requirements and certification in particular for new buildings. Yet, correct transposition is not yet ensured for all provisions and countries[7].

In general, MED area countries have adopted the EPBD, either by transposing it as a separate piece of legislation, or as a measure into their national strategic plans. Some countries (e.g. France) have developed regulation frameworks for the direct implementation of the EPBD [Réglementation Thermique 2012 encourages the construction of low energy buildings, the reduction of the energy use of existing buildings by 38% by 2020 (by 40% in public buildings) and the energy efficient renovation of social housing][8].

Nonetheless, due to – mostly – lack of political will, the EPBD has not been effectively implemented, hampering the uptake of energy retrofitting in the public building stock in the MED area.

[6] *Implementing the Energy Performance of Buildings Directives, 2016, Concerted Action EPBD*
[7] *Evaluation of Directive 2010/31/EU on the energy performance of buildings*
[8] *Analytical Report – Improving energy and resource efficiency, 2018, European Construction Sector Observatory, EC*

# 3.5.

# MED Governance Context

Energy renovation in buildings suffers from a poor integration into the different levels (European, national, regional and local) of energy efficiency policy. MED area countries have different governance structures and procedures, with different levels of competence and financial capacities,

In all cases, in order to effectively implement the EU Directive in their territories, Mediterranean State Members should articulate their long-term strategies in accordance with regional and local strategies, which would contribute to overcome a certain number of barriers.

## 3.5.1.

## Experience with PPPs

The story of administrative organization and power devolution is different across the Mediterranean. As shown in the following graph, countries like France, Italy and Spain, the MED countries with the higher population too, have still a high per capita number of local authorities. As a result the number of public buildings falling under the jurisdiction of each local authority is small, making bundling a prerequisite for EPC projects. The situation could be different for counties like Greece, Portugal and Cyprus where the number of local authorities has been significantly reduced the last years.

In addition, countries with high number of small local authorities are more probable to lack capacity to support an EPC process and would need to depend a lot on EPC facilitators or external advisors. This can result to significant delays even if the local authority takes part in a bundled project.

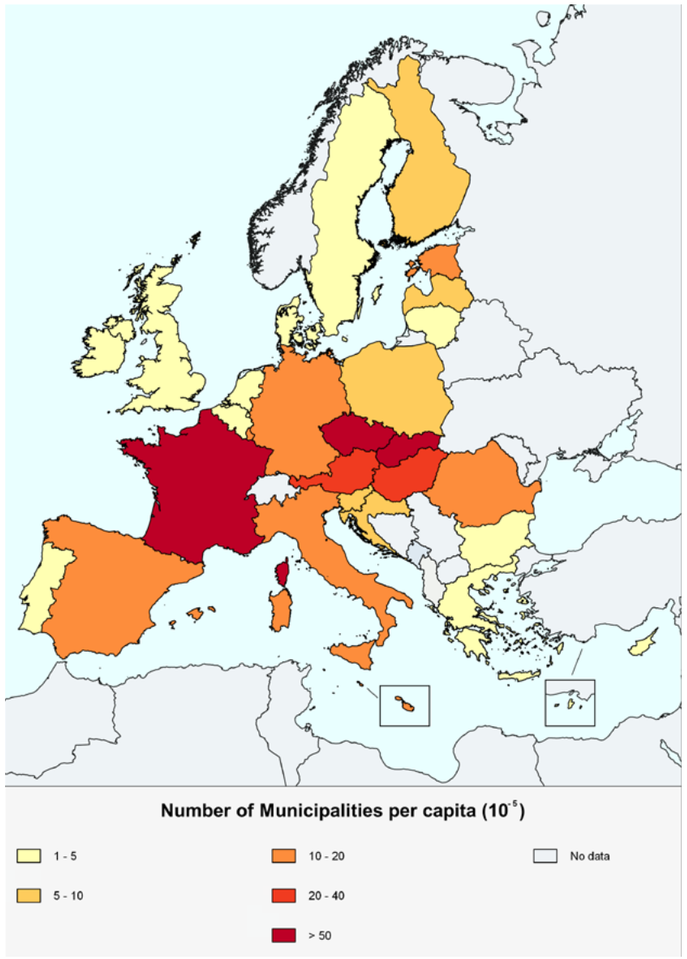



***Figure 25.*** *Number of public authorities per capita in EU Member States (source: CCRE CEMR)*

3.5.2.

# Existence and Reliability of Energy Actions Plans

As shown in the following graphs the ratio of Sustainable Energy Action Plans (SEAPs) to the number of public authorities in Mediterranean countries is high. Yet, SEAPs, a tool promoted by the European Initiative “Covenant of Mayors” (CoM) to empower cities in their energy transition, need to be drafted two years after a public authority joins the CoM; while after being adopted, a Monitoring Report should be produced to every second year to evaluate the progress achieved.

Thus, the sole existence of Action Plan is not a valid metric and should be considered in tandem with complete Monitoring Reports.

In the following maps [figures 27 to 29], the countries with higher Action Plan “density” are presented together with an overview of the progress on the adoption of Action Plans.

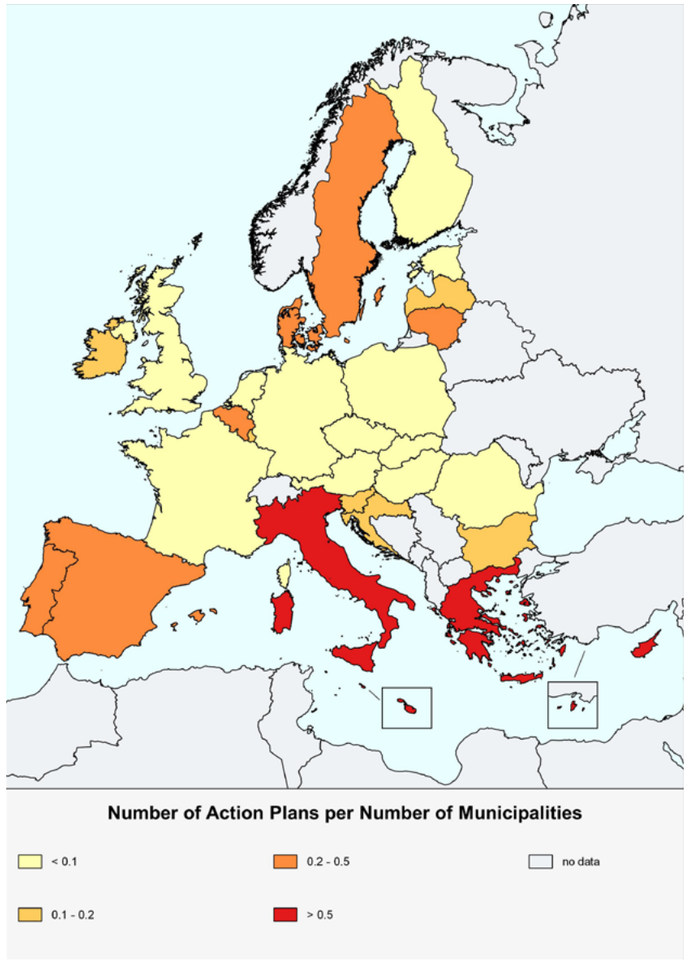



***Figure 26.*** *Number of Action Plans per Number of public authorities in EU Member States (source: CoM platform)*

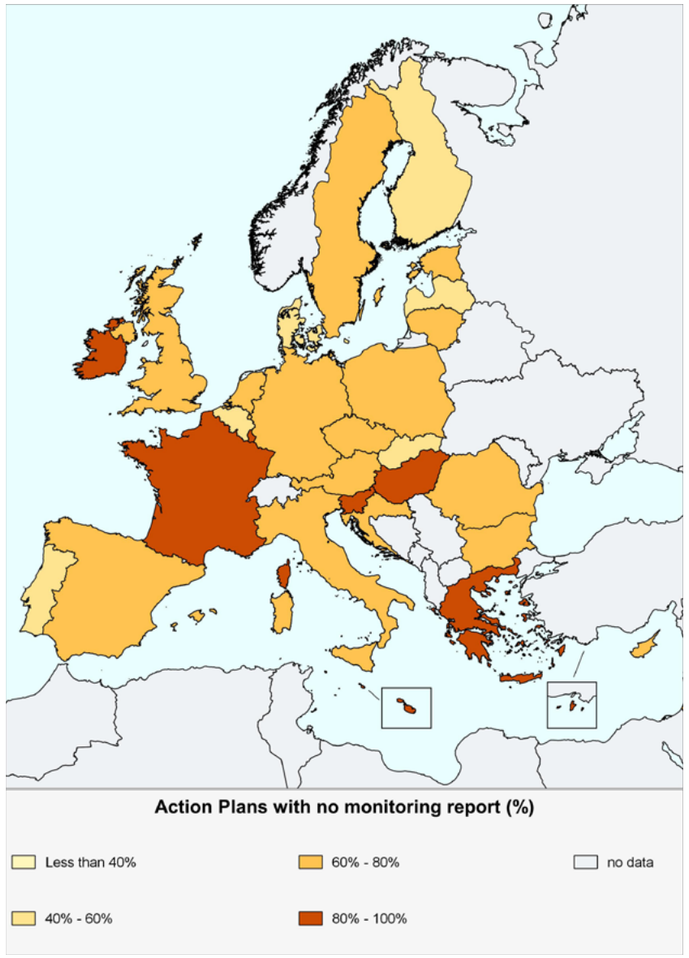



*Figure 27. Percentage of Action Plans with no monitoring report in EU Member States (source: CoM platform)*

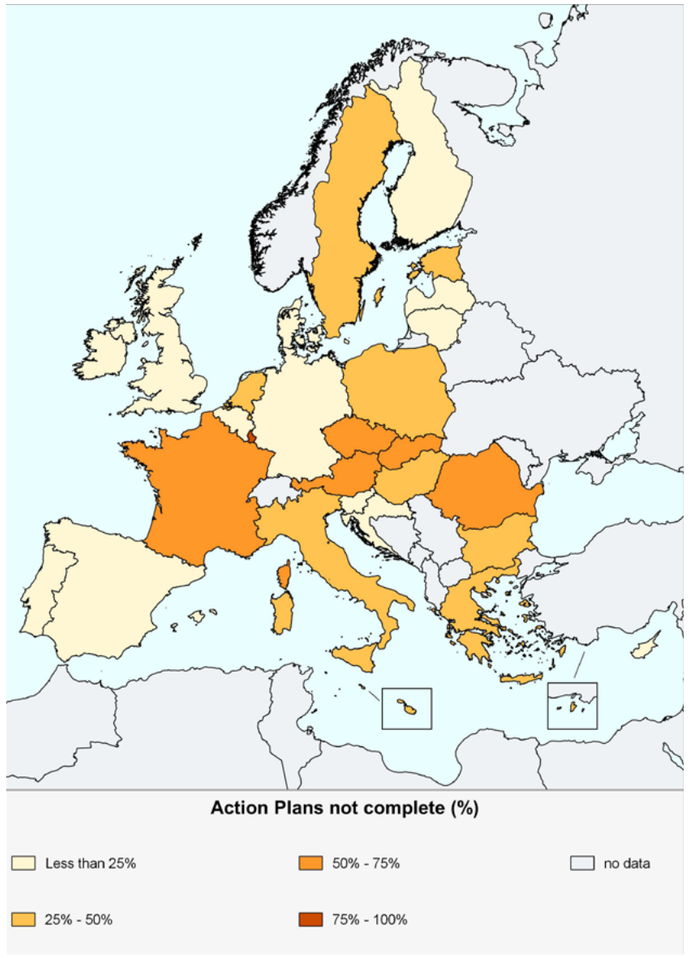



*Figure 28. Percentage of not completed Action Plans in EU Member States (source: CoM platform)*

3.5.3.

# Experience in Bundling Energy Efficiency Projects

With the purpose of supporting public authorities to develop bankable sustainable energy projects, the European Commission has set up a series of instruments, such as the Project Development Assistance (PDA).

*"The PDA facilities aim to bridge the gap between sustainable energy plans and real investment through supporting all activities necessary to prepare and mobilise investment into sustainable energy projects. These activities can include feasibility studies, stakeholder and community mobilisation, financial engineering, business plans, technical specifications and procurement procedures. The PDA facilities were funded through the Intelligent Energy - Europe programme (IEE) and now through Horizon 2020 Energy Efficiency.Under IEE, they were managed by different entities with specific targets and criteria. 4 ELENA facilities (European Local ENergy Assistance) were managed by public banks, and one facility (MLEI-PDA) was managed by the EASME."*[9]

The PDA was effective in promoting energy efficiency investments as shown in the table below.

| PDA Facility | Total Planned Investment | % |
|---|---|---|
| **ELENA** | **€4.924.136.489** | **91%** |
| CEB | €74.175.000 | 1% |
| EBRD | €5.300.000 | 0,1% |
| EIB | €4.663.627.736 | 86% |
| KfW | €181.033.753 | 3% |
| **MLEI** | **€482.848.577** | **9%** |
| **Total** | **€5.406.985.066** | **100%** |

***Figure 29.*** *Expected investments triggered by PDA facilities (source: European Commission)*

[9] European Commission, EASMEProject, Development Assistance (PDA)

Regarding the MLEI-PDA, a total of 30 projects in the fields of buildings and street lighting have been recorded since 2012. The distribution of projects across the EU is presented in the map below. This includes completed and on-going projects.

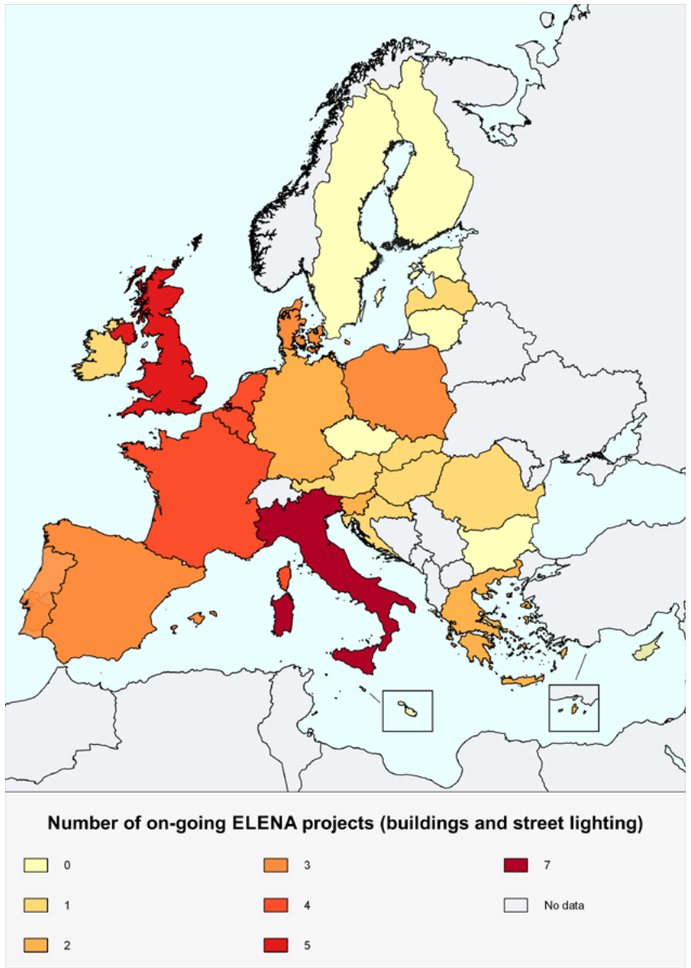



***Figure 30.*** *Number of on-going ELENA projects (buildings and street lighting) in EU Member States (source: European Investment Bank)*

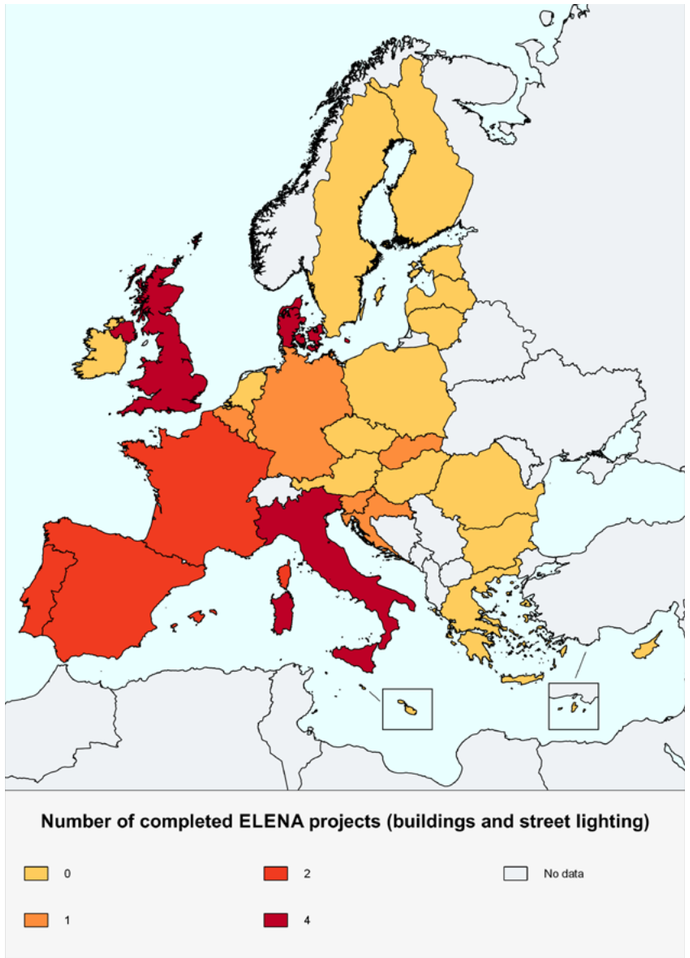



*Figure 31. Number of completed ELENA projects (buildings and street lighting) in EU Member States (source: European Investment Bank)*

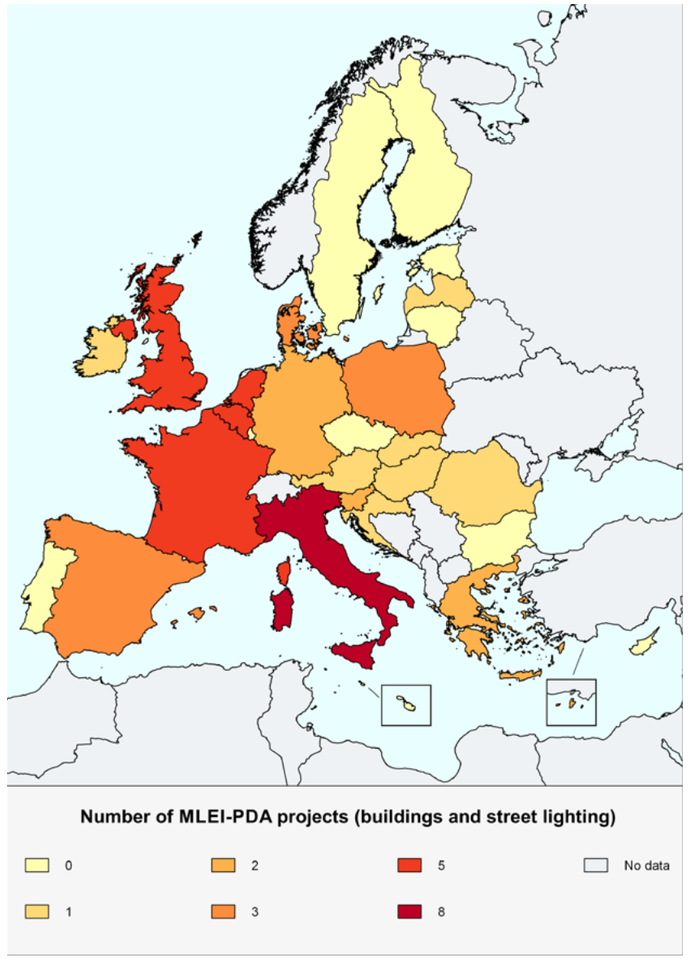



*Figure 32. Number of MLEI-PDA projects (buildings and street lighting) in EU Member States (source: EASME)*

# 3.6.

# MED Specific Context Summary

In the following table a summary of the MED-specific characteristics and their respective impact on energy retrofitting of public buildings through EPC is presented. Each characteristic is annotated with positive or negative impact.

| MED specific characteristics | Impact to energy retrofitting of public buildings through EPC | |
|---|---|---|
| **MED Climate and Geography Context** | | |
| Heating degree days | Low heating demand resulting to longer payback when retrofitting the heating system | − |
| Cooling degree days | High cooling demand resulting to shorter payback when retrofitting the cooling system | + |
| Solar irradiance | High solar irradiance resulting to shorter payback when installing solar-heating or PV systems | + |
| Proximity to sea | High cost for materials resulting to longer payback when retrofitting buildings near the coast | − |
| Population seasonality | Low exploitation of buildings in non-touristic periods resulting to longer payback because of under-using systems sized for the peak demand | − |
| **MED Buildings Context** | | |
| Heating / Cooling technologies | Small share of district heating making bundling more difficult and less feasible | − |
| Cultural heritage and architectural restrictions | High share of cultural heritage or similar buildings introducing uncertainties when applying energy retrofitting | − |
| Static reinforcement requirements in seismic areas | Strict requirements increasing the cost of retrofitting of introducing risk of delays in licensing | − |
| Ownership status of public buildings | Unclear ownership status of public buildings introduce uncertainties in terms of readiness of buildings for energy retrofitting investments | − |

| MED specific characteristics | Impact to energy retrofitting of public buildings through EPC | |
|---|---|---|
| **MED Economy Context** | | |
| National public debt | High national public debt reducing the accessibility of public authorities to loans | − |
| Financing for energy efficiency | Low/slow exploitation of ESIF for energy retrofitting projects resulting to reluctance for EPC | − |
| Building construction market | Low building construction activity creating favourable market conditions for retrofitting projects | + |
| **MED Market Context** | | |
| ESCO market and EPC awareness | Small ESCO market and low EPC awareness creating unfavourable conditions for EPC | − |
| Experience with PPPs | Good experience with PPP may positively affect energy retrofitting through EPC | + |
| Adoption and implementation of EPBD | Overall, the pace of adoption and implementation of EPBD is lower than other parts of Europe and this could hinder the preparation of the EPC market. | − |
| **MED Governance Context** | | |
| Number of local authorities | Large number of small local authorities makes bundling of buildings and political engagement more difficult | − |
| Existence and reliability of energy actions plans | High number of not monitored energy action plans show low political engagement for energy efficiency measures | − |
| Experience in bundling energy efficiency projects | High number of PDA projects show existing experience with project bundling in the area | + |

# 4.

# MED EPC GUIDELINES

The STEPPING MED EPC Guidelines (MEG) build on the standard steps that public authorities and EPC facilitators should follow to deliver projects for the energy retrofitting of public buildings through EPC. In parallel, the MEG deliver recommendations and testimonies that reflecting the specific context of EPC in the MED area. MEG respond to the specific conditions that apply in the Mediterranean and as such allow for lessons learnt to be transferred beyond the STEPPING intervention areas. The MEG steps are grouped under three phases;

A. Preliminary assessment,

B. Investment plan preparation and

C. Tender development and realization.

Each phase consists of different EPC development steps. The relevant actions per step are briefly presented and analyzed while additionally the MED touch is provided through the STEPPING MED recommendations and testimonies, backedup by the identified MED specific context

## PHASE A: Preliminary Assessment

STEP 0: How to assess the EPC preconditions

STEP 1: How to select a public authority

STEP 2: How to select a public building

## PHASE B: Investment plan preparation

STEP 3: How to conduct the energy audit

STEP 4: How to involve the EPC market

STEP 5: How to conduct a detailed analysis

STEP 6: How to evaluate the funding possibilities

## PHASE C: Tender development and realization

STEP 7: How to prepare to tender

STEP 8: How to monitor the project execution and operation

# 4.1.

# PHASE A: Preliminary Assessment

The preliminary assessment phase includes four important steps that guide the MEG user on **i]** "How to assess the EPC preconditions", **ii]** "How to select a public authority", **iii]** "How to select a public building" and **iv]** "How to conduct the energy audit".

The first two steps are especially important in the case where the MEG are used by EPC facilitators who should assess externalities before getting involved in the preparation of an EPC project and supporting a public authority towards this direction.

## STEP 0

## How to assess the EPC preconditions

Prior to launching an effort to develop an EPC project, the STEPPING experience shows that three preconditions need to be met, without which it is extremely hard to proceed with the realization of the energy retrofitting of public buildings through that scheme. The preconditions are the following:

- existence of a robust national legal framework for EPC;
- sufficient knowledge and dissemination concerning EPC and the efficiency of savings guarantee;
- a functional energy supply market and established ESCOs.

Public authorities that consider using EPC for the energy retrofitting of their building stock should take the above preconditions seriously into account in order to avoid waste of resources and delays in reaching their energy efficiency and climate change mitigation targets.

## STEP 1

## How to select a public authority

The preliminary assessment phase starts with the validation of the assumption that the energy retrofitting of public buildings using EPC is an adequate solution for a public authority. This step is critical, especially in the case of several individual public authorities bundling projects under a common EPC managed by a higher level public authority (e.g. several public buildings bundled by the respective Region).

Other elements that also need to be in place and to the knowledge of the public authority are: the type of building stock available, the local climatic conditions and the existence and responsiveness of relevant stakeholders, i.e. ESCO's, financing institutions, energy retrofitting market to the EPC tender.



In order to evaluate the motivation, capacity – both in terms of human resources and financial means – and readiness of a public authority to tender the energy retrofitting of its public buildings through EPC, coupled with the parameters presented above, the following actions need to be carried out, either by the authority itself or by an EPC facilitator supporting the public authority.

Overall two are the main approaches in selecting public Authorities. A more "engineering" one, based on building stock with good technical (high consumption) or financial (subsidies) potential; and a more "political" one, where public authorities are willing to create a pool of buildings which need to be retrofitted. In this case, the selection process is made on a voluntary basis, using as much as possible existing networks and relationships. In the latter case, a second step of building selection is necessary.

In both cases, it makes sense to start from the Covenant of Mayors network or from those public authorities that have committed themselves to any kind of Sustainable Energy Action Plan.

## Actions

### Action 1.1: Preliminary estimation of the public building stock energy saving potential

Assess the:

- availability of a sufficient number of public buildings with a need to be retrofitted, which could make up a project of significant budget to attract the EPC market;
- existence of recent and accurate Retrofitting Plans for the public authority's building stock;
- existence of Sustainable Energy Action Plan (SEAP) or equivalent built on concrete, recent and accurate data.

### Action 1.2: Assessment of the public authority's and council's political engagement

Assess the:

- willingness of political leaders to take decisions at council level to proceed with such a project;
- chance that elections are coming up soon and a possible change in leadership would result in loss of support for the project;
- engagement of the public authority through EU initiatives related to energy efficiency and sustainability (e.g. Covenant of Mayors or similar);
- prior experience of the public authority in establishing public-private partnerships for the realization of projects.

### Action 1.3: Evaluation of the public authority's personnel capacity

Assess the:

- tendering capacity of the public authority;
- availability of reliable long-term data on energy consumption and cost of the building stock;
- experience of public authority staff with third-party financing mechanisms, tendering and monitoring such projects.

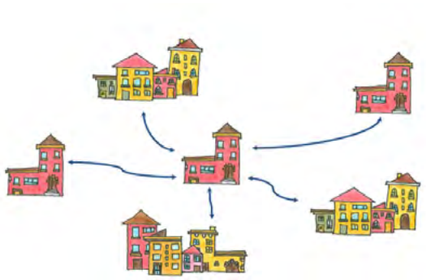
### Action 1.4: Assessment of the local market availability and readiness

Assess the:

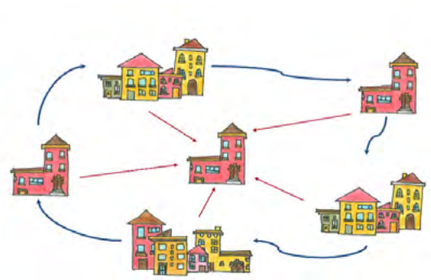
- existence of ESCOs present in the area and with previous experience;
- number and quality of similar projects realized in the broader territory;
- availability of technical assistance by EPC facilitators;
- existence of previous established synergies with other public authorities, energy agencies, private sector, ESCO's etc.

### Action 1.5: Signing of an agreement between public authorities and the coordination structure

The agreement can follow two schemes, as described in the pictures below. The first one is linking each public authority to the same coordinator, but all public authorities are not bound together. In the second scheme public authorities are either bound together or to the coordinator.



Scheme 1



Scheme 2



Scheme 1 is preferred because no major problems would occur in the case of withdrawal of one single public authority. Based on this assumption, it is possible to provide the following remarks about the agreement to be signed:

1. If the agreement is made between the public authority and the contracting authority, the public authorities are not all bound together. This is very important in order to give flexibility to the process. Since tender preparation requires a lot of time, it is important that the overall process is not jeopardised by the resignation of any actor.
2. The agreement should fix the deadlines, obligations and contractual liabilities of the parties.
3. The contracting authority must be able to influence the public authorities (political power) and/or the other way around, so that there is a common interest. As soon as a bundling project starts its preparation, it is likely that ESCOs will approach public authorities for a one-to-one engagement for alternative approaches.
4. The bundled sample of buildings must be interesting for ESCOs in terms of the amount of investments and returns. This means that attention must be paid to technical and administrative constraints (investments already implemented, architectural constraints, and management contracts in place).
5. Given that the best buildings are those with low performance and high consumption, "low-hanging fruits" can be bundled together with less profitable ones, bearing in mind that the bundling itself must be interesting for ESCOs.

**STEPPING MED Lessons Learnt**

- The MED area is characterized by a high number of small local public authorities with limited size of building stock making bundling a precondition for EPC.
- EU energy efficiency and clean energy initiatives are very popular in the MED area where a high level of engagement by public authorities, mainly municipalities, is observed. However, plans and strategies (e.g. Covenant of Mayors SEAPs) are rarely monitored or even used by the public authorities. The actual engagement of public authorities and accuracy of developed plans should be carefully evaluated.
- Public authorities in the MED area are lacking experience in EPC and are often depending heavily on ESIF's or National funds, therefore an extra effort in training the staff and politicians and significant facilitation activities are required.
- Experience in PPP's in the MED area, often for large-scale infrastructure projects, is an asset to build on when promoting EPC as a solution for realizing energy retrofitting projects. Failures of the past should be taken in consideration.

- Extra effort might be needed in gathering information on ownership, legal papers, even blueprints. Public authorities with a higher degree of readiness to provide all desired information are preferred candidates.

## STEPPING Testimonies

### Testimony 1.1: Availability of subsidies turns public authorities reluctant to EPC

*"In Greece reluctance by the public sector to retrofit public buildings through an EPC is common. This is mainly due to the fact that ESIF funds are available and turning to subsidies is an easier task for public authorities. At the same time, there is no provision to counter that trend by mixing the two instruments, thus the EPC remains an undeveloped option. The criteria considered for selecting the pilot public authorities include: existence of PoI/CoM commitment and (i) SEAP in place; participation in EU funded projects; demonstrated interest in energy upgrading of buildings."* **(AEGEA, Greece)**

### Testimony 1.2: Lack of skilled personnel to handle EPC

*"Public Authorities involved in the pilot project claimed to have the sufficient investment capacity (mainly thanks to ERDF funds available) for undertaking energy retrofits to buildings and to be interested in using tender schemes that guarantee the achievement of energy targets. The challenges from the public authorities' point of view are linked to the lack of skilled human resources that can handle the process of EPC validation and contracting. In addition, due to the low energy consumption of the studied buildings, it can be challenging to draw up an investment plan with real cost-effective measures."* **(MIEMA, Malta)**

### Testimony 1.3: High number of small public authorities require early facilitation

*"In Spain there are around 8,500 municipalities, most of them small-sized and not capable of accessing resources for lunching an EPC tender. In order to speed up the process in buildings of public authorities, it is important to create a working team that could act as an EPC facilitator supporting the public authorities in the whole EPC tender process. Therefore, it is critical to provide both the tender document plus the procedure that covers from the early launch to the roll-out of the EPC project.* **(Diputacion de Huelva, Spain)**



# STEP 2

## How to select a public building

The exercise of selecting a public building or group of buildings that is "fit" for EPC goes hand in hand with Step 1, since the success of an EPC scheme largely depends on the building stock that will undergo the energy retrofitting. Often the majority of public buildings need to undergo an energy retrofitting to some extent since the NZEB target is not reached in most of the cases. However, this is not an indication that all those public buildings can be adequate for an EPC project.

Technical characteristics, i.e. consumption levels, general condition, use patterns; political priorities, i.e. social, environmental; volume of investment needed and payback period length– all play a role in the prioritization and selection of a building.

The selection of the above data is often carried out by an EPC Facilitator (i.e. energy agency or similar) along with the Energy Manager of the Public Body.

### STEPPING Pilot Implementation Handbook – Priority Buildings Selection

Some qualities that might make a building a good EPC candidate include:

- Excessive or higher than market annual utility costs with savings opportunities;
- Outdated or near the end of life of equipment/systems;
- Consistent energy-use patterns over several years
- Relatively consistent use of the facility (e.g. office, bank, etc.) and stable occupancy;
- Access to several years of energy data;

The STEPPING Pilot Implementation Handbook provides good guidance on key issues to be taken into consideration while identifying "priority buildings" for energy retrofitting through EPC but also on making a first estimation of the baseline energy costs and potential investment and saving volume.

## Actions

### Action 1.1: Preliminary estimation of the public building stock energy saving potential

Assess the:

- Collect energy data through a questionnaire regarding the energy uses and carriers (electricity, oil, gas, biomass, etc.).

- Collect energy data through a questionnaire regarding the energy uses and carriers (electricity, oil, gas, biomass, etc.).
- Interview the building users to collect their feedback on thermal comfort, indoor air quality conditions and their energy use habits.
- Use a check-list to ensure that all required data are collected.
- Engage expert engineers to conduct a quick assessment of the collected data and evaluate the energy retrofitting potential of the recorded buildings.
- Develop a preliminary technical assessment report ranking the candidate buildings to inform the decision makers and assist the selection of buildings.
- Check if important interventions have been implemented in recent years or have been planned in the coming months/years.

### Action 2.2: Ownership assessment and legal framework analysis

- The public authority must be not only the owner of the asset, but also the one who pays its energy bills.
- Assess the ownership status of the candidate public buildings and rank them in terms of complexity to assist the selection of public buildings at the end of this step.
- Constraints that could hinder the implementation of energy renovation (i.e. for building: architectural, seismic, etc.) must be absent.
- Check regulatory and legislative framework regarding the retrofitting permits, the potential limitations to integrate external units (PVs, solar-thermal, heat pumps etc.).
- For buildings of cultural heritage where architectural, morphological and material limitations will apply, contact the respective licensing authorities to have a preliminary estimation of their willingness to assist the retrofitting process.
- Develop a preliminary assessment report on the ownership and licensing conditions per building to supplement the technical assessment and assist the selection of buildings.

### Action 2.3: Evaluation of the building's social and economic importance

- Assess the importance of a building to the local community especially in those cases where public buildings are part of the local social and health system.
- Estimate indirect socio-economic benefits from the energy retrofitting of the candidate buildings (e.g. new job positions, better indoor climate for a significant number of users etc.).



- Assess the importance of a building to the local community especially in those cases where public buildings are part of the local social and health system.
- Estimate indirect socio-economic benefits from the energy retrofitting of the candidate buildings (e.g. new job positions, better indoor climate for a significant number of users etc.).

### Action 2.4: Preliminary energy retrofitting feasibility and selection of buildings

- Identify possible energy retrofitting solutions and estimate for each one of the candidate buildings its retrofitting budget and respective payback period; consider including alternative scenarios based on payback.
- Produce a ranking of the candidate buildings based on the payback time of the required interventions.
- Estimate the overall budget of the energy retrofitting interventions project and assess the size of the project and whether it can interest the ESCO market.
- Assess the potential existence of subsidies that can enhance the feasibility of the possible EPC project.
- Carry out a final evaluation of the candidate pubic buildings by taking into consideration the results from Actions 2.1-2.3 and proceed with a selection of buildings to pass to the next step.

**STEPPING MED Lessons Learnt**

- Energy consumption and climate conditions across the MED area are highly diverse. In some areas Cooling Degree Days can be comparable to the Heating ones. Energy and building characteristics should be carefully assessed when developing an EPC project where the intervention area spans across large geographies and different climate zones.
- Buildings in coastal strips face heavy charges as a result of high levels of corrosion. The selection of specific materials that will avoid high O&M costs should be considered; however, this may affect the project's feasibility.
- Seismic activity in some parts of the MED area is high, requiring compliance with legislation; therefore, before considering an EPC, all prerequisites should be met. Funding may be available for static reinforcements and, if combined with the EPC project, can deliver additional energy retrofitting.
- The high dependence of MED economy on tourism and the seasonality that comes with it in terms of buildings' use and population levels, creates special conditions that affect the feasibility

of retrofitting measures. An accurate assessment of the energy consumption profile of the building is critical. Equally important is the selection of adequate technical solutions that can ensure a flexible and dynamic coverage of the buildings' energy needs.

- The typical periodic renovation of public buildings is often disregarded. A deep renovation could be combined with energy retrofitting. In that case own-funding from the public authority or subsidies could be combined with an EPC.
- Architectural restrictions and legal framework sometimes leave limited options of energy retrofitting measures to be taken. In such cases where usually special technical solutions are required and the viability of the project can be challenging an EPC can safeguard energy efficiency and savings. Combination with subsidies could also work in favour of such projects.

## STEPPING Testimonies

**Testimony 2.1: Buildings with secured financing selected**

*"Buildings having already received regional funding (ERDF) for the improvement of energy efficiency or for seismic aspects upgrade were prioritized."* **(AESS, Emilia Romagna, Italy)**

**Testimony 2.2: Successful data collection shows motivation**

*"The selection of buildings for inclusion in the STEPPING project was based on the consumption ratio (data collected by the shared energy consulting service), pre-audit visits to check on pre-selected buildings to see if they were suitable for refurbishment and the possibility of implementing the necessary measures (e.g. constructive aspects, limitations of physical space, possible problems in the structure, etc.). Gathering all this information was also an opportunity to test the motivation of public authorities."* **(Auvergne-Rhône-Alpes Energie Environnement, France)**

**Testimony 2.3: Energy manager existence is valuable for the building selection**

*"For the renovation of public buildings through EPC, it is important to choose the appropriate priority buildings. This phase of the project proved to be quite challenging, because it takes a lot of effort and meetings, to persuade public authorities to cooperate, to sign a mutual agreement and to gather all the necessary data needed for the definition of priority buildings. In this phase it is very useful to have a reliable and responsive energy manager, who can provide a lot of necessary data and recommendations. This makes the process easier and less time consuming."* **(BSC, Business Support Centre, L.t.d., Kranj, Slovenia)**



# 4.2.

# PHASE B: Investment plan preparation

The investment plan preparation phase includes three important steps that guide the MEG user on **i]** "How to conduct the energy audit", **ii]** "How to involve the EPC market", **iii]** "How to conduct a detailed analysis" and **iv]** "How to evaluate the funding possibilities".

The "investment plan preparation" phase is of great importance for the overall success of an EPC. In this phase a decision must be made regarding the feasibility of an EPC, stakeholders have to be motivated and available funding must be explored.

## STEP 3

## How to conduct the energy audit

The first step in the investment plan preparation is to conduct an energy audit of the selected buildings. Through the detailed analysis of the energy use, building characteristics, weather data and use of the building, an energy audit reveals its energy retrofitting needs. These are then assessed to identify energy and cost savings, improvements in the comfort levels and positive impact for the environment.

As described in the STEPPING Implementation Handbook the factors that ensure good quality of an energy audit are: its credibility (i.e. quality of data), completeness (i.e. whole system analysis), traceability (i.e. well-defined procedures of the analysis), usefulness (i.e. profitable interventions) and verifiability (i.e. identifiable benefits).

To deliver a sound energy audit, field visits to the buildings are of crucial importance. This is because an on-site inspection can give an accurate picture of the state of the building, the consumption levels, the use patterns etc.

The energy audit process is regulated in EU and national laws and standards apply in each Member State, allowing for the better control and evaluation of the results. In the case of energy retrofitting projects using EPC, energy audits are even more important since costs and benefits from the planned measures must be objectively assessed in order to ensure the fair share of the benefits among the involved parties. The following list of actions presents briefly the standard process followed by STEPPING partners while conducting the energy audits in their areas. The MEG propose these same steps to be followed. For further details, the STEPPING Implementation Handbook and the EPC Investment Plans for Public Buildings may be consulted.

# Actions

### Action 3.1: Preparation of an energy audit

- Ensure that designs, studies, current energy certificates, equipment invoices, analytical energy bills and any other data relevant to the building and its energy profile are collected. The data already collected in the preliminary phase should be enhanced and deepened at this step.
- Assess the collected data in terms of accuracy, sufficient resolution and duration.
- Communicate with users and building managers in order to identify building's needs and particularities to be better prepared for the audit, special equipment may be needed, and confirm their presence during the audit.

### Action 3.2: Conducting an energy audit

The following list of recommendation should be taken into account when conducting the energy audit.

- The energy audit should be conducted by an expert, who is either a member of the public authority's technical unit or more often a third party (EPC facilitator). When a formal energy certificate needs to be issued, a certified engineer in line with the national regulation should be engaged.
- The Data collection during the audit should be standardized to assist post-processing, modelling and development of an investment plan to be used during the development of the EPC tender documents.
- The efficiency of the structural elements and systems should be accurately assessed along with the behavioural patterns of the users.
- Data traceability should be taken into consideration while conducting the audit to assist the EPC tendering process.
- The energy auditor will provide proposals regarding adequate energy retrofitting measures which will be analytically assessed in the next Investment plan preparation phase.

### STEPPING MED Lessons Learnt

- Existence of analytical and accurate energy track records must be secured. In some occasions, sourcing them might need significant effort especially when there are no well-established collaborations and contact with the local utilities or when there is no well-organized accounting system in the public authority.
- Incompatibilities between as-built plans and actual buildings have been often encountered while selecting pilot buildings for STEPPING. New plans and licensing procedures may be required in these cases delaying the EPC maturation process.
- Solar irradiance in the MED area is high; exploiting solar energy for producing hot water and/or electricity can be beneficial for the feasibility of the identified measures.
- Sometimes monitoring devices and applications might be needed to be installed especially when there is an indication of unreliable or difficult to mine energy consumption data. Taking into account that seasonality of occupancy in MED areas is high, an energy audit could result in proposing energy retrofitting measures that can prolong the occupancy of the building.
- Proposed retrofitting measures should be applicable and pragmatic. Sometimes highly sophisticated or grand scale interventions might not be applicable in some MED areas with minimum energy resources, no district heating networks, or architectural restrictions.

# STEPPING Testimonies

### Testimony 3.1: Retrofitting scenarios have to be compared to a reference scenario

*"For each building, the consultant had to indicate which works it was necessary to implement within 10 years because of regulation and/or obsolescence (e.g. old boiler) even without any refurbishment program to define the reference investment scenario. A specific work has been done to search and define the subsidies available for each scenario of each project. With these information, AURA-EE produced a financial analysis for each building, to compare the global cost of the 3 scenarios and the reference scenario (only mandatory works) for each year. This analysis took into account the Energy price evolution for each type of energy (Including the future Carbon Tax). This allowed determining the actual return time of investment to help public authorities to choose between the scenarios."* **(Auvergne-Rhône-Alpes Energie Environnement, France)**

### Testimony 3.2: New plans and legalizations to update build permits

*"The majority of the monitored schools audited was lacking accurate and high quality plans. New plans had to be conducted and legalization of the additional constructions or modifications of initial build permits had to be carried out requiring additional resources for the maturation of the projects."* **(AEGEA, Greece)**

### Testimony 3.3: Enhancing energy efficiency along with investment potential

*"The traditional type of measures with HVAC or insulation must be improved with led lighting, RES production to increase the investment potential and users' involvement to increase the efficiency and sustainability of the measures."* **(REGPIE, ENVIPARK, Italy)**

# STEP 4

## How to involve EPC market

When launching the investment plan preparation phase, it is recommended to consider early on how to approach and involve the EPC market (i.e. local construction and relevant companies and ESCOs) and the financing institutions. It is important to do so before proceeding with further in-depth analysis and formulation of the investment plan, since the specific conditions of the local and regional market and the condition of the economy can affect significantly the success of an EPC project.

In a sound EPC development process, all the concerned actors need to be involved since the very beginning. The purpose of this participatory approach is to ensure the proposed measures are in line with the expectations of market stakeholders (local companies and ESCOs) and those of financial institutions (credit institutions, equity private funds, investment platforms etc.) and that they, in turn, react positively and take active part in the call for tenders for the EPC contract. This step is expected to run through most of the project development period and could be launched even during the preliminary steps to assist building selection and auditing standardization.

## Actions

### Action 4.1: Market mapping and analysis

- Identify the potential local companies and ESCOs that could be interested for the project and have the relevant expertise. Consider also those local companies that their business could be affected by the project.
- Define the market interests and for example the minimum project budget size or the type of ESCOs/companies that can be interested.
- Analyse the capacity of the identified market to reflect to the specific tendering requirements of the EPC project.
- Organise meetings to further assess the companies' capacity to participate in the project.
- Similar activities should also be carried out with the financial institutions. To proceed beyond initial mapping activities to meetings, the existence of a good draft investment plan is useful.

### Action 4.2: Establish local committees to support project development

- Consider creating a local committee with members from all interest groups. The committee will assist the EPC development process by providing periodically their feedback.
- Local committee meetings will be also an opportunity to detect the needs and tools useful to boost the market development (e.g. training to SMEs from Chamber of Commerce, meetings with insurance companies, public guarantee for small enterprises investments).
- In cases of low awareness on EPC the local committee can support the organisation of workshops and seminars in collaboration with EPC facilitators, academia and others to support building capacity of the market.
- At a later stage of the investment plan preparation, the local committee can provide further comments and feedback on the content and specifications.

### STEPPING MED Lessons Learnt

- As the EPC market in some MED countries is still developing, ESCOs should be involved at an early stage in the formation of a solid EPC in order to avoid fruitless tender procedures.
- Local companies when compared to ESCOs have normally lower engineering capacity, limited geographical outreach and limited human and financial capacity. However, local companies in the MED area are often deeply rooted to the local socio-economic fabric, so it recommended to provide them assistance/training on the EPC process and procedures to ensure their potential access/participation in the EPC projects.
- Some examples of inefficient PPPs in the MED area, often for large infrastructure projects, might affect public and market perception on the usefulness of EPCs, therefore in some cases an extra effort on raising awareness is needed.
- For countries with a small EPC market, which is typical for the MED area, there is a real interest/need to define as early as possible the ESCOs' interests, the minimum project budget size or the type of ESCOS/companies that may be interested.
- Sometimes, a market has to be created for the project and this takes time. For example, lighting measures and insulation are not made by the same companies than HVAC (traditional ESCOs and sometimes, a gathering is necessary from companies' side to organize an offer).
- In case of deeper renovations promote synergies between traditional ESCO's and other companies of the construction sector. Synergies could be promoted.

## STEPPING Testimonies

### Testimony 4.1: Early-bird broad dissemination activities of the EPC project

*"The first presentation of the Investment Plan took place in the Workshop "Energy Efficiency as a Tool for Sustainable Development". At the event, attended by more than 60 participants (among public authorities, inter-municipal communities, companies (SME, ESCO's) and several reference entities at local and national level), the main topics of discussion were related to the implementation of EPCs, Joint Actions for Energy Efficiency in public infrastructures, the important issue of the concession of the low voltage network - opportunities, challenges and actions integrated between public authorities, sustainable and intelligent inter-urban development, electrical mobility and network of nature routes."* **(AREANATejo, Portugal)**

### Testimony 4.2: Choice of measures should relate to the local market capacity

*"In the French experience, the choice of measures must also relate to the local market skills and its capacity to meet such a demand. For example, in case there is need to proceed with roof insulation and replacement of a boiler, one needs to understand that the concerned enterprises are different and have to organize a gathering to give a common offer with shared saving guarantee. This takes time and effort...If one simply goes straight to the market, then it will be only big enterprises who will be able to give an offer."* **(Auvergne-Rhône-Alpes Energie Environnement, France)**

### Testimony 4.3: Global refurbishments vs. energy supply dominant services

*"In case of an EPC service with a short pay-back measures, energy supply is the most important part of the contract (70-90%). In that case, only big energy suppliers can be interested, and their interest starts at minimum €1 or 2M contract;*

*In case of global refurbishment, O&M and energy supply represent less than 20% of the budget. In that case, SMEs are more concerned because they are not able to make good supply offers and, in this case, energy supply is less important, investment is high and risky and usually public authorities have to participate to reduce the risk."* **(Auvergne-Rhône-Alpes Energie Environnement, France)**

# STEP 5

## How to conduct a detailed analysis

When launching the investment plan preparation phase, it is recommended to consider early on how to approach and involve the EPC market (i.e. local construction and relevant companies and ESCOs) and the financing institutions. It is important to do so before proceeding with further in-depth analysis and formulation of the investment plan, since the specific conditions of the local and regional market and the condition of the economy can affect significantly the success of an EPC project.

In a sound EPC development process, all the concerned actors need to be involved since the very beginning. The purpose of this participatory approach is to ensure the proposed measures are in line with the expectations of market stakeholders (local companies and ESCOs) and those of financial institutions (credit institutions, equity private funds, investment platforms etc.) and that they, in turn, react positively and take active part in the call for tenders for the EPC contract. This step is expected to run through most of the project development period and could be launched even during the preliminary steps to assist building selection and auditing standardization.

### STEPPING Pilot Implementation Handbook – Feasibility study details

The feasibility study verifies the site information provided by the energy audit and confirms the viability of the energy efficiency improvements that are outlined in the energy service company's proposal. To a minimum level, the feasibility study includes the following activities:

- physical inspection of the design and condition of all energy systems
- measurement of airflow rates, combustion efficiency and other variables
- review of standards of service and comfort, e.g. temperature and air quality required by building occupants, and a comparison of existing conditions with these standards

The completion of the detailed analysis signals whether the EPC project brings about the anticipated energy savings, keeping the interest of the EPC market high. At this stage, the ESCOs, may exercise their right to terminate their engagement in the project preparation if, based on their own studies and analysis, they find that the forecasted energy savings do not cover the project's overall costs and that the pubic authority does not intend to provide any capital or subsidy/grant support to the project.

## Actions

### Action 5.1: Analysis of the current status and proposed retrofitting scenarios

Assess the:

- Modelling of the selected and audited buildings to assess their current energy demand status, their structural characteristics and systems.
- In-depth analysis of the energy retrofitting solutions identified in the preliminary phase and proposed during the energy audit. Elaboration and evaluation of alternative scenarios based on the different return on investment of each aggregated set of measures.

### Action 5.2: Elaboration of an Investment Plan

The Investment Plan should contain at least the following:

- general info on the public authority and the scopes of the project;
- description of methodology followed the set-up the project (building selection, energy and building audit);
- description and analysis of energy demand condition (baseline and current situation);
- description and analysis of proposed energy retrofitting measures and scenarios;
- proposal of energy retrofitting strategy and measures;
- budget analysis and presentation of the feasibility study;
- proposal on the monitoring and verification method and process to be followed.

**STEPPING MED Lessons Learnt**

- The quality of the audits has to be guaranteed by internal or external experts to avoid taking into audits that may lead to ineffective outcomes.
- Ensure that the investment plan is adapted to the legal framework and tender procedure (e.g. in some countries a minimum size is necessary to use certain EPC procedures) and to the envisaged grouping organisation (e.g. the constraints of the individual building renovation timetable are compatible with a common tender)
- Investment Plans should be tailored to the current techno-economic situation and include projections of a future status. The MED PPP experience showed that many miscalculations could be avoided through a more accurate study.
- As the ESCO market is limited and with few financial resources, an Investment Plan should be attractive to investors, but at the same time keeping the EPC on balance sheet for government.

## STEPPING Testimonies

### Testimony 5.1: Detailed designs from the public authority leave room for all candidates

*"The audits were presented to the public authorities. Based on the different options, preliminary designs (simple or detailed) were produced for each project. This led to one major change in one project (it was impossible to install the pellets boiler due to its size), and a different proposal of works made to the public authority. The preliminary designs have been done on heating and ventilation systems, not on building refurbishment (for which a preliminary design is not as useful). The goal of this preliminary design is to offer the candidates information on a possible solution. They will be able to propose another solution if they wish, but local candidates may not want or be able to make design studies for the tender, so these preliminary studies leave every candidate with a solution to work on."* **(Auvergne-Rhône-Alpes Energie Environnement, France)**

### Testimony 5.2: The more detailed an analysis, the less risk for the investment

*"Before drafting an Investment Plan a vigorous analysis of the existing data should take place. An Investment Plan then will have clear targets and well documented data. As a consequence, the financial risk will be minimized for both the public authorities and the ESCO's thus improving the chances of a successful tender process for each group of buildings, overcoming the uncertainty of different parties to get involved."* **(AEGEA, Greece)**

# STEP 6

## How to evaluate possibilities

In parallel with the detailed analysis and the involvement of the EPC market, funding possibilities shall be analysed to help assess the investment required for implementing the different energy retrofitting scenarios delivered after the energy audit. This will provide alternative business cases that may deliver different scale of savings, costs, risks and broader benefits and in the end determine the viability of the EPC.

Since energy conservation measures targeting different parts of the building are associated with varying payback periods, a public authority should consider to match the different interventions with the appropriate funding / financial instrument. This would potentially lead to an efficient combination of public funds e.g. European Structural and Investment Funds, channelled to the insulation of the envelope, an intervention with high payback period; and the use of EPC for the retrofitting of the building's heating system, an intervention with low payback period.

In order to support public authorities in better using resources available for renovation of public buildings, the "STEPPING EPC Simulation Tool" was developed[10]. Such tools can provide essential and comparable data that can facilitate the evaluation of the course of action to be taken regarding the EPC type to be chosen, the retrofitting measures and the formation of the Investment Plan.

## Actions

### Action 6.1: Assess the available funding sources

- Conduct a mapping and analysis of the available funding sources. Consider contacting financing institutions and governing bodies that can provide information on forthcoming subsidy programmes and financial instruments. Assess the public authority's own-funding potential and the possibility for the authority to apply for a loan.
- Evaluate combinations of funding opportunities (e.g. subsidies, loans, self-financing) and correspond each one of them to the respective retrofitting measures based on the analysed return on investment.

### Action 6.2: Evaluate EPC viability

- Develop detailed descriptions of the EPC scenarios most probable to proceed to tender, on the basis of the technical analysis and funding possibilities identified.
- Use the Stepping EPC simulation tool or equivalent to carry out a preliminary evaluation of the viability of the above EPC scenarios.

[10] *The Stepping EPC Simulation Tool was designed by ENVIPARK to evaluate the financial sustainability of a proposed EPC. It helps the user to understand how the EPC works, how many energy savings is possible to achieve, how long is the Return on Investment period, what is the value of the fee and which economic, financial and technical indicators are key to attract potential investors. Among the many advantages, tool provides the possibility to save 5 different scenarios (result of 5 different EPC parameters combination and input data combination).*



**STEPPING MED Lessons Learnt**

- The project budget has to be calculated for the whole contract duration.
- The PPP experience in the MED area should be taken in consideration. Budgeting issues, O&M costs projection and liabilities are core issues.
- Funding of a MED EPC project could be a combination of ESIFs, other subsidies, loans, etc. Projects should be attractive for the ESCOs, since the majority of them in the MED countries is lacking the means of self-financing.
- Bundling of projects could help authorities provide a safer and more attractive investment package.

## STEPPING Testimonies

**Testimony 6.1: STEPPING EPC Simulation Tool provides the possibility to save 5 different scenarios**

*Since EPC is primarily based on the investment approach rather than on the technical ability, "hands on" trainings during which everything is demonstrated are undertaken. The Simulation Tool is essentially an Excel file that comes up with different EPC scenarios, evaluating the financial sustainability of a proposed EPC. The tool helps the user to understand how the EPC works, how much energy savings can be achieved, what the Return on Investment looks like, what is the value of the fee and which economic, financial and technical indicators are key to attract potential investors. The aim is also to support public authorities in better using resources available for renovation of public buildings. Among the many advantages, the tool offers the possibility choose among 5 different scenarios (result of 5 different EPC parameters combination and input data combination).* **(REGPIE, ENVIPARK, Italy)**

**Testimony 6.2: STEPPING EPC Simulation Tool to cross-check calculations**

*Once the energy audits were completed, the STEPPING team within DPH inserted the acquired data both into the EPC Simulation Tool and the Provincial Energy Service Tool to calculate the NPV and the IRR in EPC contracts. The results, with some discrepancies, were similar in both cases.* **(Diputacion de Huelva, Spain)**

# 4.3.

# PHASE C: Tender development and realization

The investment plan preparation phase includes three important steps that guide the MEG user on **i]** "How to conduct the energy audit", **ii]** "How to involve the EPC market", **iii]** "How to conduct a detailed analysis" and **iv]** "How to evaluate the funding possibilities".

The "investment plan preparation" phase is of great importance for the overall success of an EPC. In this phase a decision must be made regarding the feasibility of an EPC, stakeholders have to be motivated and available funding must be explored.

## STEP 7

## How to prepare to tender

In this step the public authority should choose the type of tender, define the awarding procedure, decide the EPC contract content and develop and O&M plan to be included in the contract too.

The tender specifications data must be used to fix the baselines for the tendering procedure. The bidders will be asked to submit a proposal that would simultaneously increase the minimum energy savings percentage, the investment value and the cost savings. In consequence, the pubic authorities will receive an energy renovation of the assets, with investments implemented and financial savings on the current expenditures.

Analytical information on the above steps are presented in the STEPPING Pilot Implementation Handbook for a more in-depth guidance on the tendering preparation phase. In many EPC projects the tender development process is strongly supported by an EPC facilitator that can secure the reliability of the activities to be carried out.

Tender models, specifications and contract schemes for EPC procurement should be consulted for the tender procedure.

## Actions

### Action 7.1: Decide the tender type and content

- The different tender types should be analysed according to the national and EU legislative framework. Make a distinction between public works contracts, public supply contracts, and public service contracts.
- The content of the tender documents should be defined. Indicatively the documents should include **i]** tender specifications (e.g. length of the contract; minimum energy savings required; minimum cost saving required; minimum investment value required), **ii]** management and technical specifications, **iii]** M&V plan, **iv]** EPC contract scheme with duties and liabilities, **v]** risk matrix and vi] templates for the financial offers.
- Tender documents should be drafted and formed according to the market reality. Involvement of various stakeholders is desirable.
- Define realistic specifications as it is important to use the available knowledge and experience of market actors relating to energy-saving measures.

### Action 7.2: Define the awarding procedure

- Define the list of typical selection criteria that the bidders should submit during the tender. Grounds of exclusion should be used to check whether the candidate is subject to personal circumstances that preclude admission to the procedure.
- Define the requirements for experience in the analysis and design of energy-saving measures, in the design of energy-efficient systems, in the implementation of energy-saving measures, in the maintenance and repair of buildings and systems and in monitoring energy performance and maintenance.
- Define which type of certificate should be provided by bidders e.g. a valid certificate of an environmental management system; a valid certificate of a safety management system and a valid certificate of a quality management system

### Action 7.3: Develop an O&M plan to be included in the contract

- Define whether the ESCO will be responsible to establish a training schedule for O&M coinciding with the commissioning of the EPC.
- Assess the potential additional benefit of having the staff trained and exposed to new equipment, standards of practice and leading to general improvement of their skills.
- O&M can be a contested field in an EPC, therefore a high degree in detailed requirements and obligations should be expected.

### Action 7.4: Define the EPC contract content

- Identify the experience of the public authority's staff to develop the EPC contract.
- Examine similar contracts to use as a template after critically evaluating their success in previous tenders.
- Set the required clauses in the EPC contract, which are necessary to ensure the success of the project

### Action 7.5: Launch the tender

- Ensure that the public authority is supported by the adequate legal and technical support to carry out the tendering process.
- Ensure that the tendering process is in full compliance with the rules and principles governing tenders at national and EU level.
- Once the preparations have been concluded and the tender documents are ready, including terms, requirements, and criteria, the selected tender procedure can be initiated.

### STEPPING MED Lessons Learnt

- Two bundling approaches tested in STEPPING:
  - Bundling of public authorities: Several public authorities grouped under one tender; Challenges: timing, coordination, selection of procurement authority
  - Bundling of buildings: Several buildings grouped under one tender; The procurer may be a public authority (owner of the buildings), a public ESCO on behalf of the public authorities, an energy agency or a public body working as a facilitator.
- Some public authorities might need assistance in deciding and forming tender documents. EPC facilitators, energy agencies or other public authorities could be of assistance.
- The experience in some MED areas showed that the detailed analysis and the choice of tendering through a negotiation procedure, that allowed ESCOs to undertake investment surveys and to negotiate terms, contributed into a more successful EPC.
- Consortiums with local companies of different skills and expertise could be encouraged to participate in the tender process.
- There are some cases of overlapping authority over public buildings. In this case multiple public authorities can create a Special Purpose Vehicle (SPV – a company specifically set up for this purpose).
- In the case where a public authority is handing ownership of the project for a period of time (this could work for example in municipal hostels, commercial real estate or other properties in various MED areas), one should consider the requirements on the handing back the facility.
- The ESCO may train public authority staff and keep them focused on energy savings, all while using their feedback to fine-tune the installed systems for increased savings.

## STEPPING Testimonies

### Testimony 7.1: Offering technical and legal assistance to public authorities

*"The STEPPING project team (Piemonte Region and Environment Park) offered pilot public authorities technical assistance which included support in each phase of the EPC Investment Plan preparation up until the drafting of the tender documents to be launched. To do so, an external expert in legislative and legal aspects was recruited to join the team."* **(REGPIE, ENVIPARK, Italy)**

### Testimony 7.2: Tendering phase is just the beginning of an EPC; yearly reports are crucial

*"For Forlì tender we followed an open procedure. The tender was awarded in line with the most economically advantageous criteria. The tender includes also an O&M Plan. Considering the tender typology, according to the Italian Law for EPC, the risk assessment is not needed. On a yearly basis the economic and financial plan is updated taking into account: Degree days, building volumes, building main uses, technical parameters related to energy savings targets, energy market price adjustments. No special contract clauses are foreseen in the EPC contract."***(AESS, Emilia Romagna, Italy)**

# STEP 8

## How to monitor the project execution and operation

In this final step, after the successful completion of the tender, the implementation of the energy retrofitting measures start and the pubic authority should monitor the project execution. After the end of the retrofitting works the public authority will have to start monitoring the efficient operation of the systems according to the agreed monitoring and verification process.

Depending on the type and content of EPC, the ESCO might be expected to handover the equipment and its ownership to the public authority after the completion of the works; or in other cases the O&M combined with ownership remains in the control of the ESCO; a way to keep the investment off balance sheet for the public authority. In the first case a handover has to be supplemented with training and support on the use of the new systems.

## Actions

### Action 8.1: Approval of the energy retrofitting work

- The pubic authority supervises the implementation of the retrofitting either using in-house capacity or by procuring a service of technical consulting work that can take the responsibility to monitor the works and co-sign the delivery of the service ensuring high quality.

- A pilot operation period could be agreed with the ESCO after the delivery of the works. During that period the public authority can test the good operation of theinstalled systems; request additional trainings and guidance etc.

### Action 8.2: Monitoring and verification – Guaranteeing savings

- After the completion of the EPC service the agreed framework for monitoring and verification should be applied according to the provisions of the EPC. An independent M&V entity is best to be involved in order to avoid conflict of interest in the process.
- Review and approve (as appropriate) Reconciliation Reports and engage with the ESCO on any discrepancies in the savings or consumption information
- Report any changes to the ESCO in building use, changes in occupancy, operational or any other changes that may impact upon energy consumption.

### STEPPING MED Lessons Learnt

- Beginners in an EPC project should consider contracts of limited risks for both sides. Investors and financiers in the MED area seem reluctant to invest to high risk EPC projects.
- Contract insurance (clauses) might be helpful in case that one party breaks the agreement. Some MED EPC market stakeholders expressed their concern in case the other party breaks the agreement.
- The basis of an EPC is the energy consumption monitoring. Trained personnel should conduct measurements on behalf of public authorities and the ESCOs.

## STEPPING Testimonies

### Testimony 8.1: Public authority as the project owner & guarantees with contactor

*"Because the project was partnership contract, the client (public authority) was responsible for energy savings whereas the contractor was responsible for the quality of the construction materials and works. The share of savings between public authorities was defined in extended energy audits and has been included in contracts, so that every public authority is responsible for its own savings. The Contractor is responsible for possible errors in the construction of the facility under contract, which concern its solidity, ten (10) years, and for the quality of the works carried out, five (5) years from the acceptance and delivery of the facility from the date of use. For installed equipment, the manufacturer's warranty is valid at least one (1) year from the date of acceptance and delivery of the facility. For the installed roof cover, the manufacturer's guarantee shall be valid for at least five (5) years from the completion of a successful quality inspection and acceptance of the facility by the client. The warranty periods start to run from the date of the final of contractual works and when all the possible errors and missing works have been corrected. A new warranty period starts on the day of acceptance for the replaced parts and works during the warranty period.* The warranty is based on normal conditions of use and adequate and professional maintenance. Measurement and Verification Plan was made in accordance with IPMVP protocol where two documents on building level were made (IPMVP plans). In those documents data like temperature deficit, number of users, indoor physical parameters were analysed and standard values for those parameters were also defined." (BSC, Bussines Support Centre, L.t.d., Kranj, Slovenia)

### Testimony 8.2: Joined procurement procedure between public authorities

*"Several meetings took place between the technical assistance service and the public authorities in order to define the tender documents, most of them were by mail or online. A face to face meeting took place on the 25th of February in Ghemme. Afterwards the documents have been prepared and delivered to the public authorities with the note n. 00030793/2019 on the 29/03/2019. For the joint procurement procedure, public authorities were asked to sign a Memorandum of Understanding (MOU) in order to approve the investment plan from a formal point of view and appoint a contracting authority. An MoU was approved by Ghemme and by Borgomanero. After that, the respective heads of public works departments approved the tender documents.*

*Finally, all the tender documents have been delivered to the Contracting Authority appointed (Centrale Unica di Committenza Unione tra Baraggia e Bramaterra). The tender procedure was launched in late summer 2019. Additional calls are planned to be launched with similar scheme and approach"* **(REGPIE, ENVIPARK, Italy)**

### Testimony 8.3: EPC procurement is a balancing procedure

*"Running an EPC procurement is a balancing act between high-level technical solutions and guaranteed results that should be to a certain degree proposed by the bidders and compliance with public procurement policies that include non-discrimination rules and prohibit post-tender changes. Therefore, requirements are expected to be described, procured and materialized, avoiding discriminatory technical standards and other references which would favour or exclude specific providers, products or services, while at the the same time making the investment opportunity attractive."* **(AEGEA, Greece)**

# 4.4.

# MEG Gantt diagram

In the following Gantt diagram a proposed time sequence of the different EPC project development steps is presented. Besides the first and last steps, the in-between auditing, analysis and tender preparation steps may be done simultaneously, to enable the faster maturation of the projects. Generally speaking, the EPC market should be involved in the process from the energy auditing onwards, in order to ensure a proper level of engagement and support for the project's successful tendering and implementation.

| | **EPC project development steps** | M3 | M6 | M9 | M12 | M15 | M18 |
|---|---|---|---|---|---|---|---|
| **1** | Select a public authority | | | | | | |
| **2** | Select a public building | | | | | | |
| **3** | Conduct the energy audit | | | | | | |
| **4** | Involve the EPC market | | | | | | |
| **5** | Conduct a detailed analysis | | | | | | |
| **6** | Evaluate the funding possibilities | | | | | | |
| **7** | Prepare to tender | | | | | | |
| **8** | Monitor the project execution and operation | | | | | | |

**Project:**
STEPPING

**Program:**
Interreg MED

**Duration:**
1/11/2016 – 31/10/2019

**Total Budget:**
1.943.112,50 €

**ERDF Funding:**
1.651.645,63 €

**STEPPING Website:**
https://stepping.interreg-med.eu/

**MED EPC Online Platform:**
http://steppingplatform.com/