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Contents

Abstract

One mechanism for increasing the uptake of energy efficiency projects is Energy Performance Contracting (EnPC). A major advantage of the latter is its capacity to mobilize the private sector to provide finance, performance guarantees and sharing risks.

The commitment of the public sector to renovating and improving the performance of its buildings is fundamental because the latter account for around 12% of the heated total floor space in the EU. EnPCs are also suitable and relevant for the renovation of public lighting. Increased potential could develop in the use of EnPC for renovating district heating systems, the adoption of renewables, and for the smartification of infrastructures. Moreover, this commitment is key because the public sector plays an exemplary role in the development of building renovation and energy efficiency markets and in the adoption of sustainable support mechanisms for the private sector to improve the energy performance in this sector too.

The European Commission's Joint Research Centre (JRC) has been regularly reviewing the status and development of the energy service markets of the EU Member States since 2005. The present report builds on the previous knowledge developed in previous EC JRC reports, and uses the same methodology to investigate national and subnational markets in terms of their status, barriers, driving factors, best practices, and impact of EU support and policies during 2017-2019. Ultimately, it proposes a set of recommendations of relevance for EU policymaking in the context of renewed impetus to building renovation, energy performance and financial sustainability.

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Executive Summary

Great potential for saving energy and contributing to decarbonizing the EU economy may be found with public buildings. The use and operation of buildings is responsible for 40% of the EU's energy consumption and 36% of EU CO_2 emissions.[1] The construction of buildings also embeds energy and carbon, making it necessary to include life cycle considerations (European Commission 2020d). Public lighting is also a key domain of the public sector in which energy may be saved (street and traffic lighting). Energy consumption related to public lighting can account for up to 50% of municipality energy expenditure. The energy-saving potential of renovating public lighting reaches 70-80% when including led technology, and smart management and service contracting, hence creating both monetary and energy-saving opportunities for municipalities. Policies are needed because on average only about 1% of building stock is renovated annually to current energy performance standards. The commitment of the public sector to renovating and improving the performance of its buildings is fundamental because the latter account for around 12% of the heated total floorspace in the EU, and because the public sector plays an exemplary role in the development of building renovation and energy efficiency markets (Directive 2012/27/EU, Art. 5). Doubling and intensifying the depth of building renovation are key for post-Covid recovery (European Commission 2020c)

The new Climate Target Plan 2030 calls for net greenhouse gas emissions to be cut by at least 55% by 2030 compared to 1990, i.e. 60% cuts in buildings. This implies that buildings' final energy consumption need to be cut by 14%, and energy consumption for heating and cooling needs to be cut by 18% compared to 2015 levels (European Commission 2020c; 2020d). In order to fulfil the Climate Target Plan, the EU Renovation Wave, pursues to make the European buildings more energy-efficient, to reduce their carbon intensity over their full life-cycle, to double the renovation rate, with a focus on deep renovations and renewable generation. Stepping up efforts of building renovation requires €275b of additional investments per year (European Commission 2020d). To address the EU 2030 targets, the European Commission has confirmed its commitment to mobilize private capitals (European Commission 2018; European Commission and Directorate-General for Energy 2019; European Commission 2020c; 2020d).[2]

One mechanism for mobilizing private capital for saving energy is energy service and Energy Performance Contracting (EnPC) [3]. A major advantage of the latter is its capacity to mobilize the private sector to provide performance guarantees and sharing risks.

About this report series

The European Commission's Joint Research Centre (JRC) has been regularly reviewing the status and development of the energy service markets of the EU Member States since 2005. The report series includes a first comprehensive exploration of EnPC markets in the public sector for the period 2014-2016. The present report builds on the previous knowledge developed in previous EC JRC reports, and uses the same methodology to investigate the status, barriers, and driving factors – with a focus on

[1] According to the Odyssey-Mure database (http://www.odyssee-mure.eu/), only computing public offices, education and health facilities, the public sector is responsible for 17-30% of the total final energy consumption of EU Member States. There are data limitations to provide more precise estimations: "Statistics on energy consumption of public services is not available in most [EU] countries ... Usually there is data only for the whole services sector" (Gynther 2016).

[2] This commitment was already part of the *Final Action Plan: Financing Sustainable Growth* (2018).

[3] In this report we abbreviate Energy Performance Contracting as EnPC (not as EPC) in order to differentiate the former from Energy Performance Certificates (see List of Abbreviations and Definitions).

best national practices, the impact of and recommendations for EU support and policymaking – of EnPC in the public sector in the EU and its Member States during 2017-2019.

EnPC – Opportunities and barriers for saving energy in the public sector

Energy Performance Contracting is "a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings" (Directive 2012/27/EU). This contractual arrangement creates the possibility for the public sector to overcome a series of financial and technical barriers to improve the energy performance of buildings and the energy efficiency of systems and technologies such as public lighting (e.g. street and traffic lighting). The use of specialized energy services can potentially a) enable the public sector to tap into more ambitious energy-saving potential, b) avoid locking-in future interventions and savings, and c) serve to reduce costs in comparison to in-house solutions. A fundamental difference between other types of Energy Service Contracting is that EnPC involves the transfer of technical and financial risks to the private sector. In an EnPC contract, the remuneration of the provider is directly linked to the performance of the contracted project. The provider is thus incentivised to maximise projected and delivered savings. Moreover, performance guarantees generate liabilities on the side of the provider, hence creating new financing possibilities. However, the need for verification and monitoring increases the cost of intervention. Performance guarantees make providers conservative in their choice of solutions and contracts. There is a risk that providers will prefer well-tested solutions and easier interventions over more innovative, complex, and ambitious ones. This can contribute to reaping the benefits of low hanging fruit and locking in a significant portion of the potential savings achievable with state-of-the-art solutions. For the public sector to address these more ambitious and challenging projects, and to lead market transformation, it is possible to tender pools of projects that have different potential and risk. However, this approach does not fully resolve matters of interest and the capacity of providers to apply to these tenders. It is also possible to decrease the risk of the activities of providers and financing institutions by a) fostering the development of knowledge about the cost, savings, and risks of project typologies; and b) providing finance guarantees (e.g. guarantee funds)[4] and economic incentives – e.g. conditional allocation of investment grants to the incorporation of EnPC or other instruments that incorporate private investment and risk sharing. Thus, assessing the suitability of EnPC for a Member State, a public sector project, or pool of projects requires a comparison of the life-cycle costs and savings of EnPC with in-house and other alternative solutions, both from the perspective of the implementing public body and the supporting national and EU budgets. Public investment, and hence the allocation of EU funds and efforts, needs to ensure that support for EnPC in the public sector responds to the ultimate targets of saving energy, reducing greenhouse gas emissions, and engaging private investment in bridging the financing gap. There is also a need of ensuring that EnPC, in combination with other funding and financing options, contributes to sustainably financing the energy saving and other works necessary for the deep renovation of public buildings.

[4] Energy performance or saving *guarantees*, characteristic of EnPC, should not be confused with the guarantee mechanisms that serve to overcome issues of provider liability and which make problematic their access to financing (See List of Abbreviations and Definitions).

Policy framework

Energy services and EnPC have already been defined and required in the Energy Services Directive (2006/32/EC), repealed by the Energy Efficiency Directive (EED) (2012/27/EU). The EED provides for the promotion of energy performance contracting (Art. 18), calls for public bodies to save energy in public buildings and procurement (Art.5, Art .6), and establishes mechanisms for obligations and national fund contributions to finance energy services (Art. 7, Art. 20). The role of EnPC was emphasized in the amended Energy Performance of Buildings Directive (EPBD).[5] The revised EPBD recognizes the capacity of EnPC to deliver performance in thermal systems (Art. 14 and Art. 15), and strengthens national obligations regarding: a) the establishment of long-term renovation strategies (Art. 2a), b) overcoming finance and market barriers, and c) provision of information. Adding complexity to this picture, the Eurostat and EIB guidance on the treatment of EnPC contracts in government accounting (2017, 2018) have reinterpreted the ESA 2010. Contracts for which most of the risk is borne by the provider are "Maastricht neutral" (i.e. they can be treated off balance sheet for the public building owner). Finally, the EU has deployed technical and economic efforts through the Smart Financing for Sustainable Buildings (SFSB) initiative, which brings together a diversity of technical and finance support elements for Member States, regions, and local governments that are designed to help the latter incorporate innovative financing mechanisms into their efforts to save energy in buildings. Whilst Member States are required and supported by the EU to promote energy services and energy performance contracting, the degree of commitment of national and subnational authorities and bodies to foster and to adopt EnPC is widely diverse and dependent on national and local conditions (Boza-Kiss et al. 2017). After renewed efforts to support EnPC in the public sector at the European level (SFSB Initiative), and the Eurostat and EIB clarification of the accounting treatment of EnPC projects (2017, 2018), the market broadly appears to have continued to develop. There has been development and specialization of model contracts and guidelines, with variable degrees of market satisfaction. Similarly, there is a diverse degree of compliance with the requirements of introducing quality assurance mechanisms (e.g. lists of qualified actors), demonstration, and information (promotion of facilitation and One-stop-shops). There are cases where the regulatory framework and the availability of providers still represents a barrier to the development of these markets. In other cases, finance, technical, and administrative capacities limit or counter the adoption of EnPC by public bodies.

Market status (2017- 2019) and trends

The market evolution confirms findings in the EC JRC 2017 report (Boza-Kiss et al. 2017), whereby expert expectations about the growth of most national markets were found to be overly optimistic. In general, the development of EnPC in the public sector is aligned with the development of ESCO markets as reviewed in the EC JRC Report of 2019 (Boza-Kiss et al. 2019). This excludes France, Luxemburg, Latvia and the Netherlands– where the development of EnPC in the public sector is slower than in other markets. [6] The EnPC markets of Croatia, Czechia, Belgium, and Slovenia have continued to develop, spearheading innovation in the development of novel mechanisms. The public lighting refurbishment markets in south European Member States have rapidly developed, especially in Italy, Portugal, and Spain. An increase in quality is considered a driver (Belgium, Bulgaria, Greece, Croatia, Czechia, Poland, Italy, and Spain). However, some developed markets are static or have turned to alternative mechanisms of intervention (Germany, Austria, the Netherlands, and Sweden). Also, the French markets have not developed due to a legislation and definition of EnPC which

[5] Amending Directive 2018/844, adopted as part of the Clean Energy for All Europeans package

[6] The UK markets are not reviewed in this report.

continues to fail to address payment for services related to savings. The availability of investment grants for building renovation and public lighting constrains interest in EnPC (e.g. in Bulgaria, Latvia, Romania, and Spain). There is also significant pressure on the public lighting markets of Member States with mild climates, where building renovations are often perceived as less attractive (Portugal, Spain, Italy, and Croatia). In the absence of measures to promote building renovation, this is the path that Greece, Malta, and Cyprus may follow when and if their expected take off occurs. An exception in terms of mild climates is Slovenia, where the Ljubljana municipality spearheads deep interventions to buildings. Initial market development has taken place in Ireland, Poland, Estonia, and Latvia (the first projects being developed in the latter two). A series of common barriers explain the limited development or halting of other markets. A combination of mistrust and a lack of understanding about EnPC has deterred the further engagement of building owners, e.g. in Ireland, regardless of the increase in government support. Political and regulatory issues have so far obstructed markets in Luxembourg and Latvia. In Hungary and Romania a combination of bad experiences, the political situation, and reliance on EU investment grants have set the market back to a preliminary status, and new uptake is not expected in the immediate future.

The national EnPC markets in the public sector in 2017-2019 show a very diverse picture across the EU Member States. The status of different countries can be summarized in six groups:

a) Mature and developing in Croatia, Czechia, Slovenia, Slovakia – in Belgium the market is developing and in Wallonia is mature;
b) Mature but static in Austria, Germany, Denmark and the Netherlands – in Sweden a relatively small market has become stagnant;
c) Sizeable and developing markets in Italy, Spain and Portugal (especially in public lighting);
d) Small but developing markets in Bulgaria (slow development), Ireland, Lithuania, and Poland
e) Preliminary markets in Latvia, Estonia, Finland (static), France (static due to legal issues), and Greece (activity in public lighting corresponds to a vague conception of EnPC)
f) Non-existent markets in Romania, Cyprus, Luxemburg, Malta and Hungary

Expectations for the period 2020-2023 appear to be more optimistic than actual in progress in the previous period. The overall EU trend is upward for 2017-2019, and is expected to accelerate in the period 2020-2023. One major reason is the ongoing implementation of Eurostat and the EIB Guide on the statistical treatment of EnPC, which addresses a major barrier reported in 2017, and the ongoing adoption of standard contracts. Expectations for 2020-2023 need to be interpreted with caution since expert expectations for 2017-2019 turned to be overly optimistic. Six groups of Member States can be differentiated:

a) Austria, Bulgaria, Denmark, Germany, the Netherlands and Sweden, are expected to reverse negative trends;
b) Cyprus, Estonia, Greece, Lithuania, and Latvia may take off;[7]
c) Finland, Poland, and Spain may accelerate market growth trends;
d) Belgium, Croatia, Czechia, Ireland, Italy, and Slovakia are projected to maintain growth;
e) Slovenia and Portugal are expected to undergo some degree of market stagnation;
f) France, Hungary, Malta, Luxemburg and Romania are not expected to take off in 2020-2023.

Remaining barriers

The main barriers to the uptake of EnPC in the public sector that remain, as identified in this report, are:

[7] There are also weak expectations for Hungary to take off again.

Barrier 1. Conceptual confusion about the advantages of EnPC regarding the provision of performance guarantees and quality assurance. Overcoming this is important to help differentiate EnPC from competing mechanisms, and for performance guarantees, along with assurance mechanisms of measurement and verification, to be perceived as an advantageous means of meeting energy saving targets.

Barrier 2. Structural and regulatory barriers, procurement incompatibilities – these include low energy prices due to subsidies and tax reductions (Croatia, Lithuania, Germany, Latvia); the uncertain implementation of carbon tax systems (Germany); the fact that the public sector has access to lower interest rates than ESCOs (Germany, Denmark, and Sweden) – although in combination with EnPC the former can foster quality, deep renovation; and low levels of political commitment. The latter may be reflected in regulatory barriers, procurement incompatibilities and complex processes (Barrier 4). Expectations involve the development of national renovation strategies (Art. 2a) that can help overcome the reticence of decision-makers, and increased emphasis on deep renovations and life cycle considerations (the Netherlands).

Barrier 3. Insufficient trust in the system and access to information. Addressing this barrier at a Member State level requires continuing efforts at quality assurance (regarding provision quality, and measurement and verification to become normalized in public sector interventions), the development of up-to-date demonstration examples (e.g. adapted to new contract possibilities), as well as the development of local assistance capacities through facilitation and One-stop-shops.

Barrier 4. Actual and perceived complexity, transaction and administrative costs. Even when capacities are developed to engage with EnPC in the public sector, there seems to be a realization that administrative costs will be a notable component due to the added complexity of EnPC (Croatia, Germany, France). Even technical support which is highly appreciated (e.g. ELENA) may result in increased administrative burdens for small actors; for example, in relation to the requirements of project aggregation and implementation (Italy). This type of support is widely demanded on a project basis in the process of attaining a sufficient degree of standardization. There is additional need for technical support for conducting preliminary assessments.

Barrier 5. Limited commitment of Member States to mechanisms which, like EnPC, foster the engagement of private investment and risk sharing. There is a need for more efforts of Member States towards EnPC and, overall, the adoption of energy saving practices in the public sector. There continue to be disincentives, including energy subsidies, lack of energy saving strategies and targets, competition of grants with EnPC, prevalence of the split incentive and limited implementation of the exemplary role of public buildings.

Barrier 6. Insufficient access to competitive financing for ESCOs and especially for EnPC providers. Risk awareness is particularly problematic when operating under Maastricht neutral contract modalities – these require that the income of providers depends on the verification of contractual guarantees. Insufficient access to financing is most problematic in Member States in which financing is particularly advantageous for public organizations (e.g. Germany, Austria, Czechia, and Slovakia). It is also a problem wherever EU funds that can be only allocated to public bodies play a key role in the development of EnPC (e.g. ESIF support to HBOR in Croatia).

Barrier 7. Remaining uncertainty about the Maastricht neutrality of contracts, especially in combination with public grants and forfaiting. Financial support and instruments used in combination with EnPC can support market development and more challenging interventions (e.g. deep renovations). Expectations on the repayment of deep renovations only through energy savings are problematic. Uncertainties regarding the possibility of including EU support in Maastricht-neutral

projects have reduced the commitment of MS to off-balance contracting, and of public bodies to EnPC.

Policy recommendations of relevance to EU policymakers

The following policy recommendations are the result of studying the situation of markets, their development, main barriers, driving factors, and good practices, as well as of the impact of EU support mechanisms in the 27 Member States of the Union:

Recommendation 1. Increase emphasis on guaranteed performance (in terms of kWh or tCO_2) in definitions, support, and communications. These factors are enablers for Member States to achieve their energy-saving- and building-renovation targets with the involvement of private investment.

Recommendation 2. Follow up on Member States' reporting and transposition, along with additional guidance and requirements. In addition to compliance with reporting obligations, there is the potential for a more nuanced evaluation of transposition of the EU legislation relevant to EnPC markets and energy performance interventions in the public sector – for example, in terms of success and remaining barriers in the national contexts (EED Art. 18).[8] New Commission's guidance and requirements on public procurement and building renovation is expected alongside the update of the EED and the EPBD in 2021.

Recommendation 3. Develop and require measurement and verification and, overall quality assurance capacities. These need to be more strictly prescribed in contracts. EnPC could be promoted as a learning ground for the establishment of mandatory measurement and verification mechanisms in public sector interventions – particularly in relation to the receipt of EU funding.

Recommendation 4. Further foster national capacity and knowledge to reduce administrative costs and financing risks. Three main areas for further development standout: a) Support the standardization of contracts, procurement and tendering procedures; b) Develop advisory services in relation to setting up project pipeline, and conducting preliminary assessment on the suitability of EnPC; c) Make further effort to develop comparative data about project risks (e.g. DEEP, EEFIG-Toolkit). The standardization of contract typologies at EU level could contribute to reduce capacity needs and project costs, as well as to the creation of cross-border markets – and hence to the benefits of economies of scale and to ensure sustained provision of services in small markets (e.g. Croatia). Importantly, when assessing the cost of using EnPC, it is important to differentiate transaction costs from costs linked to greater depth, quality, guarantees, and quality assurance (relates to Recommendation 1).

Recommendation 5. Furthering the impact of EU funds. There is potential for furthering the compatibility of EU support and making it conditional to a) project coherence with National Energy and Climate Plans (NECPs) and Long-Term Renovation Strategies, b) the enforcement of quality assurance mechanisms, and c) the assessment of the suitability of EnPC in the specific context of the relevant Member State and project. Issues of compatibility between support mechanisms need also attention, for these to contribute to leverage private investment. Expectation is put on the developments derived from the Renovation Wave Strategy, which intends to address these issues. A new opportunity is the allocation of €672.5 billion in loans and grants in the framework of the

[8] An important domain in which feedback from the Commission is expected is the Long-Term Renovation Strategies (Art. 2a of the EPBD, introduced by the amending Directive (EU)2018/844) which had to be submitted by 10 March 2020.

Recovery and Resilience Facility for reforms and investments undertaken by Member States. This Facility is the centrepiece of the temporary recovery instrument NextGenerationEU, and which will also provide additional support to Horizon2020, InvestEU, and the Just Transition Fund. Legislative adaptation at EU and Member States level to enable the allocation of these funds through and in combination with EnPC would be key for the stablishing sustainable financing mechanisms, also in those Member States that are not eligible for Cohesion Funds.

Recommendation 6. Pursue specific financing to leverage private investment. The Renovation Wave plans to further capacities to leverage private financing both at EU and national levels. Expectations are put on the InvestEU to step up the capacity of EFSI to provide financing and guarantees to EnPC providers. National Energy Efficiency funds can have an important role in creating financing and advisory facilities (Croatia).

Recommendation 7. Maintain effort to clarify and communicate Eurostat treatment and fund allocation rules. This is important for EnPC to be *instrumental* (a possible means, not the goal) in the pursuit of saving energy and deep renovation. Ultimately, support needs to create advantages for the client and sustain the EnPC principles of transferring costs and risks to the private sector. These efforts need to be matched at the national level. A combination of contracts (works and performance) and PPP are alternatives to be considered, especially in the case of deep renovations.

The way forward

Overall, the EnPC markets in the public sector across EU Member States have developed in the period 2017-2019, and at least 12 out of 27 Member States have grown. The general trend is for continued growth. This is the result of the reduction of earlier barriers as well as progress towards the European Green Deal and the Renovation Wave in the post-Covid-19 context. Private capital will be more needed than ever for a green economy. In the aftermath of Eurostat guidance (2017, 2018), there is a new opportunity to combine EnPC with EU grants – e.g. through guarantee funds and capital expenditure – and forfaiting as instruments (Fi-Compass 2020) when suitable for national markets. Energy and climate targets, as well as building and urban goals can benefit from an improved and further developed EnPC market in the public sector, making it viable to ensure that relevant policies enable these.

As EnPC markets take off and develop, they demonstrate complexity related to their local context. This means that there is no one-size-fits-all policy, but general guidelines are required for EnPC to contribute to speeding up the scale of energy performance interventions and improvements. Fundamentally, policies and practices for promoting EnPC should not lose sight of its instrumental function that involves contributing to a) the attainment of the ultimate EU goals of saving energy, and b) renovating public building by, c) leveraging private investment to fill the EU annual investment gap estimated in €270b (European Commission 2020c).

The choice of EnPC for a public sector project should be based on a complex assessment process that includes consideration of life cycle costs, savings, and the risks borne by the public treasury – from the local to the EU level. Fundamentally, this assessment needs to consider the options for combining funding and financing options with EnPC, overall overcoming widespread consideration of grants as alternative to EnPC. Failing to conduct these assessments – e.g. by relying on public sector perceptions of transaction costs and risks – may result in failure to develop promising capacities for the decarbonization of the public sector and the economy. In contrast, public support for EnPC markets risks curtailing the role of EnPC in reducing the finance and technical risks incurred by the public sector. The same may occur in presence of weak requirements for performance guarantees

and for measurement and verification mechanism. Loosening these requirements, moreover, counters the development of a knowledge basis necessary for improving projects and guaranteeing the achievement of energy saving targets, whilst locking in energy saving potential at the expense of taxpayers' money. The adequate adoption of performance guarantees and quality assurance mechanisms in public sector interventions can create an invaluable basis for learning in relation to the mainstreaming of quality assurance requirements concerning performance interventions in public sectors. A steppingstone that could foster performance guarantees and quality assurance is conditioning EU support to the coherence of projects with NECPs and Long-Term Renovation Strategies,[9] and to the verification of project performance.

[9] Progress in this direction is expected from the implementation of the Renovation Wave Strategy (European Commission 2020d). Progress in this direction is expected from the implementation of the Renovation Wave Strategy (European Commission 2020d).

1. Introduction

The new Climate Target Plan 2030 calls for net greenhouse gas emissions to be cut by at least 55% by 2030 compared to 1990, which implies that the greenhouse gas emissions associated with buildings need to be cut by 60%. It also implies that buildings' final energy consumption need to be cut by 14%, and energy consumption for heating and cooling needs to be cut by 18% compared to 2015 levels (European Commission 2020c; 2020d). In order to fulfil the Climate Target Plan, the EU Renovation Wave Strategy, pursues to make the European buildings more energy-efficient, to reduce their carbon intensity over their full life cycle, to double the annual building renovation rate, and to focus on deep renovations and the integration of renewables. Stepping up efforts of building renovation requires €275b of additional investments per year. Of these between 85 and 90 billion need to be allocated annually to energy efficiency investments. (European Commission 2020d).

The European Commission's Joint Research Centre has conducted a series of surveys and reviews to map energy service markets across the EU Member States since 2003. Key publications in the series provide comprehensive and deep insight into this market, and date from 2005, 2007, 2010, 2014, 2017, and 2019. The EC JRC 2017 report (Boza-Kiss et al. 2017) constitutes the most comprehensive and updated review of the status of Energy Performance Contracting (EnPC) in the public markets of the EU. Since its publication, a series of key policy developments have taken place, including the 2018 amendments of the directives on Energy Efficiency (EED) and on the Energy Performance of Buildings (EPBD). These support the claim of the relevance of making interventions in the public sector.[10] The Eurostat Guidance note of 2017 and the Eurostat and EIB Guide of 2018 have clarified that EnPC in the public sector should not be treated in national accounts as off-balance sheet (i.e. as Maastricht neutral, or as not contributing to national debt). Increased attention has been paid to building renovation and to the exemplary role of public buildings (EED Art. 5) in paving the way to the achievement of EU targets related to energy saving and reducing carbon emissions. These efforts have been strengthened and consolidated through the Sustainable Financing for Smart Buildings initiative (SFSB) – better known amongst practitioners for framing ELENA, Project Development Assistance (PDA), Horizon 2020, the De-risking Energy Efficiency Platform (DEEP), and the EEFIG Underwriting Toolkit. The adoption of the European Green Deal and its Renovation Wave initiative (December 2019, January 2020) further demonstrates the EU's commitment towards the decarbonization of the economy and the public sector, and also recognizes the need to leverage private investment, which largely justifies a reliance on EnPC of the public sector.

The present report refers to the 2017-2019 period to map the status, recent evolution, and projection of the EnPC markets within the public sector of EU Member States, as experienced by sectoral experts. The report also reviews the barriers, driving factors, and best practices identified at diverse administrative levels of the 27 Member States, along with the impact of EU support mechanisms. Ultimately, the report provides a set of recommendations that are of relevance to policymakers, with special focus on the EU level.

In a strict sense, energy efficiency refers to those techniques, technologies, systems, materials, and designs that require less energy than those that they replace to generate similar or improved services. To align with the conceptual focus of the EPBD and EnPC, in this report we use the term "energy performance". Improving energy performance involves saving energy through energy efficiency improvements and renewable generation solutions. The Eurostat guidelines (2018, 2019) clarified that it is possible to incorporate renewable generation as contributing to contractual performance improvement. Investment in energy efficiency and energy performance potentially contributes to a

[10] Directive 2018/2002 and Directive 2018/844 (European Parliament and Council of the European Union 2018a; 2018b).

positive economic balance through the cost-savings which accumulate during the service life of technologies, buildings, systems, and infrastructures. Accordingly, the pursuit of energy saving does not need to be restricted by cost-economic considerations.

The largely untapped potential for energy performance improvements has been identified in the public sector, particularly in relation to its buildings and the lighting of outdoor spaces. These improvements involve upfront costs that require the availability of financing, and involve other barriers that presently contribute to the status quo, constituting what has been termed the "energy efficiency gap" (Jaffe and Stavins 1994), and more recently the "energy performance gap" (Sovacool et al. 2015; Galvin 2014). The potential of EnPC in the public sector is restricted by a specific set of barriers, whose overcoming requires policy support (Section 1.2). Foremost, conceptual certainty is key to fostering the development and adoption of this mechanism (Section 1.1).

1.1. Definitions

According to the definitions provided in the EED (2012):

> Energy performance contracting [referred to as EnPC in this report[11]] means a contractual arrangement between the beneficiary (or client) and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings.

The distribution of cost-savings in EnPC contracts creates an incentive for the client to engage in the contract, and allows the provider to recover its investment costs, the transaction costs, and service costs. Fundamentally, EnPC needs to be differentiated from other energy services due to the fact that the provider guarantees a certain level of energy savings (or related economic savings) during the contract period. Despite efforts by the European Commission, Member States, and ESCO associations to define energy services terms more precisely, this market is still characterised by definitional confusion (Panev et al. 2014; Boza-Kiss et al. 2017; Boza-Kiss, et al. 2019).

In previous reports in this series it was observed that there is a diversity of understandings of the term EnPC, involving different degrees of emphasis on the requirement of contractual performance guarantees. This is problematic, because these guarantees are key to differentiating an EnPC from other energy service contracts. Eurostat guidance on the treatment of EnPC in national accounts (2017, 2018) has further contributed to differentiating EnPC by ruling that only guaranteed contracts can be accounted for off-sheet balance. Simpler definitions and a focus on energy performance guarantees have been called for by the GuarantEE Project, which proposes that "Energy Performance Contracting is the provision of energy services with guaranteed energy savings"(Hayden and Eoin 2019). In this report we have opted for a stricter definition of EnPC that involves contractually guaranteed saving, and the inclusion of renewable and efficient solutions as contributing to performance improvements. The basic arrangement of an EnPC project is represented in Appendix 2.

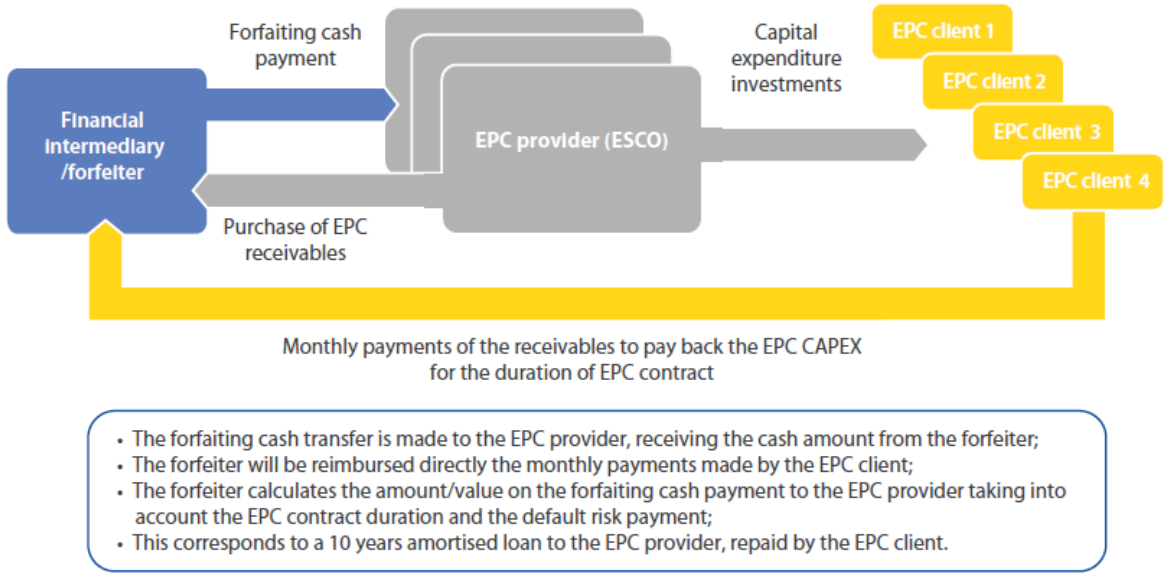
EnPCs can be financed through a diversity of instruments and their combination, as assumed by the client or the provider (Fi-Compass 2020; Pernetta and Bender 2020; Economidou, et al. 2019):[12]

[11] The use of the abbreviation "EnPC" as opposed to EPC in this report – following the convention of the EC JRC 2019 report – helps to avoid confusion related to the abbreviation for Energy Performance Certificates.

[12] The complexity of the financing environment for building renovation has been recently covered in a EC JRC report (Economidou et al. 2019).

- The provider or the client's own funds;
- Long-term loans – the provision of long-term financing in accordance with the contract duration; these involve stable interest rates; can serve to finance revolving funds and deep renovations;
- Short-term loans – overdrafts or merchant credits, frequently used in combination with refinancing approaches, such as forfaiting;
- Leasing – a form of asset-related financing which can take the form of operating leasing – very similar to tenantry, where the lessor is responsible for repair and maintenance – or financial leasing – where the lessor is typically the legal owner of the asset for the duration of the lease, and the lessee has operational control over the asset.
- Guarantees and guarantee funds – a risk-reducing tool which may help to attract financing. These are convenient for reducing the risk of default for the finance intermediary (technical and performance risk);
- Equity financing – serves to support the set-up of new providers and to increase the capital base of an existing one; these usually involve higher interest rates than loans due to the finance-related risk involved;
- Grants – the former are addressed to incentivising energy performance or specifically EnPC;
- Forfaiting – a mechanism that allows an agent to secure financing by selling receivables (i.e. the future cost-savings or fees charged by the provider) to a finance intermediary (i.e. the forfaiting provider); this allows the EnPC provider to lower its debt after commissioning the project and to undertake new projects, and allows the finance intermediary to access a long-term, low-risk payment stream. Forfaiting has been traditionally used in some Member States (Czechia, Austria, Belgium, and Latvia – for residential buildings), and new opportunities are associated with the possibility of incorporating it into off-balance sheet contracting (Figure 1).

Figure 1. Example of EnPC forfaiting. Source: FI-Compass 2020.



1.2. Policy relevance

The policy relevance of EnPC in the public sector involves its potential contribution to the EU targets of saving energy, reducing CO_2 emissions, promoting the green economy, leveraging private investment, and speeding up the rate and depth of building renovation (Appendix 1). During the

reported period, addressing the EU targets for 2030 (32.5% energy efficiency improvement, 32% of renewable energy share, and 40% cuts in greenhouse gas emissions relative to 1990 levels) was acknowledged to require mobilizing private capital to help close an annual investment gap of €180b (European Commission 2018; European Commission and Directorate-General for Energy 2019; European Commission 2020c).[13] This investment gap has been widened during 2020 with the adoption of a new greenhouse gas emission target for 2030 of 55%. The new target trickles down to buildings. The greenhouse gas emissions of buildings need to be cut by 60%, respect to 1990. Their final energy consumption needs to be cut by 14% respect to 2015 levels, hence requiring €275b of additional yearly investments in building renovation. Additional consideration needs to be paid to the full life-cycle chain, to double the annual building energy renovation rate by 2030 and to foster deep energy renovations (European Commission 2020d; 2020c). To meet these targets, the European Commission emphasizes the need of involving private investment alongside public funds.

EnPC is a key instrument for the private sector that can help share the risks incurred by the public sector in enacting its leading role, and hence has been prioritized in the European Green Deal, 2019, and the Clean Energy for All Europeans package, 2018. Finally, EnPCs provide additional capacity for the public sector in order to reduce the risk of "locking-in" potential savings by focusing on "low hanging fruit" and failing to address more technically and economically challenging measures (Boza-Kiss et al. 2017; Economidou et al. 2019). However, the most common public support schemes for EnPC in the public sector, are grants and soft loans (Economidou et al. 2019; ECA 2020). According to the ECA the use of EnPC should be prioritized to improve the impact of EU funding and support (2020). There is a need for more sustainable public financing schemes, including guarantee funds (Economidou et al. 2019). Incorporating EnPC into procurement processes involves overcoming a series of specific barriers, along with variants of the general barriers to energy performance that exist in the public sector. The barriers for public bodies include limited creditworthiness, procurement and budgetary rules, the absence of long-term renovation strategies, long and complex decision-, administrative- and technical processes, the limited commitment of authorities and public bodies, a lack of technical and budgetary capacities, and split incentives.[14] EnPC often adds to the complexity of procurement, increases transaction costs, requires measurement and verification mechanisms, has specific procurement and tendering needs, and furthermore needs to appeal to markets specifically geared to provision and financing of EnPC. Policy support and the development of a knowledge basis is of foremost importance for take-off and upscaling.

The EU Directive 2012/27, as amended by Directive 2018/2002 (referred to as "EED"), establishes a common framework of measures for Member States to promote energy efficiency. Directive 2010/31/EU as amended by Directive 2018/844, commonly referred to as "EPBD", fosters energy performance improvements in the commercial and residential buildings of the EU.[15] These directives do not involve a direct obligation for the public sector to use EnPC, although there are a series of instruments and actions that are required or recommended which are capable of fostering the development of EnPC in public sector markets:

[13] Although these values were no longer current when drafting this report, they were the reference during the reported period.

[14] The split incentive is a structural barrier related to the fact that energy savings do not revert to the public bodies occupying the related buildings who are in charge of their maintenance. This barrier is to be addressed in accordance with Art. 10 EPBD. The EC JRC 2019 report praised the efforts of the GuarantEE project to find alternative solutions in various countries and the introduction of on-bill financing that helps to recognize energy service contracts as linked to building assets, which can therefore be sold or rented together with the asset itself.

[15] When not otherwise specified, the articles or provisions referred to were not modified in the amending directives of 2018. A summary of the changes introduced by the Clean Energy for All package is available in BuildUpon2 (2019).BuildUpon2 (2019).

- EED Art. 5, central governments to pursue a renovation rate for public buildings; regional and local bodies are invited to use EnPC;
- Art. 6 EED, central governments to only procure high performing buildings and services; public bodies are invited to assess the possibility of using EnPC;
- EED Art. 7, energy operators are required to achieve energy savings in consumer premises;
- EED Art. 18, Member States to provide EnPC model contracts, best practices, lists of qualified providers, enable facilitation, and remove barriers;
- EED Art. 20, creation and maintenance of a National Energy Efficiency Fund (EEF)
- Art 2a EPBD 2018,[16] creating and updating the Long-Term Renovation Strategies with a focus on public buildings;
- Art. 5 and Art 20 EED, Art 10 EPBD, ensuring transparency related to building performance, costs and savings of renovations;
- EPBD Art. 10, provision of finance incentives to avoid competition of public funds in leveraging private financing – increasing focus on savings over cost-optimality (2018) – with EU support and assistance;
- Art. 14 and Art. 15 (2018) eliminates requirements of inspection for HVAC systems in EnPC contracts which incorporate adequate requirements on providers to conduct inspections;
- Art. 20 EPBD, providing information on technical and finance options for building renovation, including One-Stop Shops.

These articles are summarized, and their status of compliance as relevant for EnPC in the public sector is reviewed in Appendix 3.

1.3. Background

The EC JRC 2017 & 2019 reports described a diverse picture of the current status of EnPC in the public sector in Member States. A well-developed market was identified for Denmark and Germany.[17] Also, advanced markets were identified in Finland, Czechia, and the Netherlands. A special situation was identified in France, where the possibility for savings to repay investment in EnPC is limited by legislation. In general, national experts expected upcoming growth for the EPC market in the public sector. These expectations were reported as overly optimistic in view of concerns about debt considerations in ESA 2010 (most relevant in Romania, Slovakia, Slovenia, Czechia, Sweden, Spain, Portugal, and Poland). On a positive note, the EC JRC 2017 Report forecast that entry-level barriers would be soon overcome in most late-adopting countries (Boza-Kiss et al. 2017). An expectant attitude of the public sector in relation to the ESA 2010 was also reported in the EC JRC 2019 report, regardless of the publication of the Eurostat guidance documents in 2017 and 2018.[18] The EC JRC 2019 report also described increasing recognition of EnPC as a differentiated type of contract, with specialized providers and facilitators working for the public sector (Boza-Kiss et al. 2019).

In addition to the barriers common in energy performance interventions (e.g. limited finance resources and/or creditworthiness of clients, limited human and technical capacity, and split incentives), the EC

[16] The first national Long-Term Renovation Strategies were to be submitted by 10 March 2020. Although they are a key input for the allocation of efforts as part of the Renovation Wave, by October 2020 only 14 national strategies had been submitted (https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en#national-long-term-renovation-strategies-2020).

[17] An advanced market in the UK was also identified in the EC JRC 2017 report. This country is currently excluded from this report.

[18] A thorough set of recommendations for exploring the potential of energy service markets was included in the EC JRC 2019 report (Boza-Kiss et al. 2019).

JRC 2017 report identified a series of barriers specific to the development of EnPC in the public sector markets of the EU (Boza-Kiss et al. 2017):

a) Lack of information and awareness in the public sector;
b) Lack of trust and track record in the public sector;
c) Project development capacity in the public sector;
d) Complex procurement processes for selecting adequate EPC providers in the public sector;
e) Access to finance for EPC providers;
f) Incompatibility and competition with EU and national grant schemes; and,
g) Statistical treatment of EnPC contracts regarding Maastricht commitments (ESA 2010).

Most of these barriers (a-f) have been addressed by the EED and EPBD articles referred to in Section 1.2, as well as new support instruments framed in the Smart Finance for Smart buildings initiative, as reviewed in Section 1.4. Barrier (g) has been addressed through specific guidelines from Eurostat and the EIB (2017, 2018) and related communication efforts.

1.4. New developments at the heart of the report

In addition to the regulatory changes in the EED and the EPBD, as reviewed in Section 1.2, after the publication of the EC JRC 2017 report, a series of remarkable developments originated from a) increased EU support and assistance (SFSB), b) adapted guidance on the treatment of EnPC in the public sector in national accounts regarding Maastricht neutrality (Eurostat guidance of 2017 and 2018). Already in 2020, after the reported period (2017-2019) Fi-Compass has issued clarification about the use of ESIF and forfaiting mechanisms in combination with off-balance treatment (Fi-Compass 2020). Renewed efforts have originated from the European Green Deal, the new Climate Target Plan, the Renovation Wave Strategy, and recovery efforts in response to the Covid-19 crisis (European Union 2019; European Commission 2020c; 2020d).

1.4.1. Smart finance for Smart Buildings initiative

The Smart Finance for Smart Buildings initiative (SFSB) was launched by the European Commission in 2016 in collaboration with the EIB as part of the European Buildings Initiative, with the intention of building on the success of the European Fund for Strategic Investments (EFSI) "to further accelerate the renovation of buildings and support the transition to a clean energy building stock" (European Commission 2016). Through upscaled ESIF financing provided by the EIB, it is intended to develop sustainable energy financing models based on national investment platforms. The initiative also pursued further facilitation of the combination of ESIF and EFSI through regulatory amendments, overall making financing options more attractive to beneficiaries. The SFSB pursues these objectives through three pillars (European Commission 2019a):

a) Pillar I. More effective use of public funds by channelling and coordinating public funds to speed up the deployment of financial instruments. Emphasis is put on the sharing of risk. Efforts include (i) capacity-building to promote the deployment of finance instruments (e.g. SEIF); (ii) the development of flexible energy efficiency and renewable financing platforms; and (ii) clarification of the accounting treatment of energy performance contracts. Following this package, the scope of Cohesion Funds was broadened to address improving efficiency and renewable use. ERDF incentivises low-carbon economy projects, especially in developed regions. There are also expectations concerning

the introduction of a *SFBI guarantee* facility, which is under development according to CR (EU) 2019/786 (European Commission 2019a).[19]

b) Pillar II. Aggregation and project development assistance. This involves i) making more project development assistance available at the EU level; and ii) encouraging the development of local/regional One-Stop Shops for energy efficiency services;

c) Pillar III. De-risking, implemented by the Energy Efficiency Financial Institutions Group (EEFIG). This is done through the introduction of: i) an open-source DEEP database, which provides evidence about the real technical and finance performance of energy efficiency investments; and ii) the EEFIG underwriting tool – a consensual framework for underwriting energy efficiency investments that provides guidance for assessing the risks and benefits associated with such investments.[20]

Progress in the implementation of these three pillars is signified by: a) clarification of the statistical treatment of public sector investments in asset renovation through EnPC (Pillar I); b) an increased capacity of PDA facilities (ELENA) and development of One-stop-shops – although typically focused on residential buildings (Pillar II); and c) progress in the development of a consensual framework for the underwriting of sustainable energy building investments; publication of an open-source database for benchmarking energy efficiency investment (Pillar III). Also, the European Commission has provided detailed examples about the opportunities for Member State implementation of Art. 2a(3) on the obligation to facilitate access to mechanisms for supporting the mobilisation of investments made available in Section 2.4 of the European Commission Recommendation (EU) 2019/786 of 8 May 2019 on building renovation, and are presented as related to the activities of SFSB. These were provided along the lines of a) the aggregation of projects, b) the reduction of perceived risk, c) public funding, d) guiding investment in energy-efficient public buildings, and e) accessible and transparent advisory tools, and energy advisory services.[21]

A series of SFSB facilities support Member States to set up, facilitate, and access innovative financing – i.e. pursuing the leveraging of private investment for building renovation:[22]

- Sustainable Energy Investments Forums (SEIF) promote and publicize exchange events with national stakeholders, along with national roundtables and webinars. The purpose is to increase energy efficiency financing efforts related to buildings and businesses. SEIF builds on the works of the EEFIG. The resulting materials and presentations are available on its website;[23]
- The ManagEnergy initiative (supported with H2020 funds) that facilitates exchanges of experience and supports training for more than 300 public energy agencies throughout the EU;[24]
- European Local Energy Assistance (ELENA) provides technical assistance related to energy performance investments in buildings, public lighting, and urban transport; In the public sector those eligible for ELENA support are EU Member States, governmental organisation, regional, local, and

[19] Financing energy performance in the public sector is one of the priorities of Cohesion policy. It provides support to eligible countries through Objective 4. Supporting the shift towards a low-carbon economy (ERDF, CF, ESF); Objective 6. Preserving and protecting the environment and promoting resource efficiency (CF); and Objective 11. Improving the efficiency of public administration (ESF). A map of MS and regional eligibility for Cohesion funds and Structural Funds (ERDF and ESF) in the reported period is available at https://ec.europa.eu/regional_policy/en/policy/how/is-my-region-covered/.

[20] https://deep.eefig.eu/; http://www.eefig.eu/index.php/underwriting-toolkit

[21] Notified under document C(2019) 3352) http://data.europa.eu/eli/reco/2019/786/oj

[22] CR 2019/786 provides a comprehensive review of relevant EU projects, initiatives, and good practices for both private and public building renovation (European Commission 2019a). See also Barglazan 2019 for an overview of the Policy Framework for Financing Energy.

[23] https://ec.europa.eu/energy/en/financing-energy-efficiency/sustainable-energy-investment-forums; See for instance: the webinar on Practitioner's Guide on Energy Performance Contracts https://ec.europa.eu/info/events/sei-forum-events/webinar-practitioners-guide-energy-performance-contracts-2018-jul-04_en

[24] https://www.managenergy.eu

municipal authorities, public corporations, and financial institutions; In the private sector private entities, including finance-related ones, are eligible;[25]

- Project Development Assistance (PDA) facilities, formerly funded through Intelligent Energy Europe, and in the period 2018-2020 through Horizon 2020 Energy Efficiency (budget €212m for the period). Horizon 2020 provides grants for energy efficiency calls with an innovative element, often requiring or inviting EnPC to participate in the public sector, such as by combining EnPC in the public sector with comprehensive renovation and the setup of innovative financing schemes;[26]
- FI-Compass, an advisory service of the European Commission and the EIB about ESIF (Robino 2019);[27]
- The European Investment Advisory Hub provides investment support to public and private actors; the work of the EIAH is related to the allocation of EFSI by aiding potential clients and collaborating with national promotional banks (EIB n.d.).

1.4.2. Eurostat guidance on the treatment of EnPC in the public sector in national accounts

The European System of National and Regional Accounts – widely referred to as ESA 2010 – (EU 2013) entered into force in September 2014, and was clarified in the Eurostat guidance note of 2015 on "The impact of Energy Performance Contracts on government accounts". These instruments ruled that capital expenditure in the framework of EnPC contracts should be accounted for on national balance sheets, except when the contracts could be considered part of PPPs or operating leases. The guidance did not give a value to those EnPC projects whose investment or part thereof was offset by monetary energy savings, regardless of these being guaranteed. As a result, most EnPC contracts would be accounted as contributing towards national debt, hence hindering Member States from meeting the debt-reduction commitments of Maastricht. This has resulted in market uncertainty – as reported, e.g., in EC JRC 2017 (Boza-Kiss et al. 2017).

Since 2015, uncertainty about the statistical treatment of EnPC in the public sector has been reported as a fundamental barrier to the development of these markets in the EU. Member States have been hesitant to promote and allow EnPC to avoid increasing their public debt. A particularly negative impact was reported for markets in Austria, Belgium, Bulgaria, Ireland, Portugal, Romania, Slovakia, Slovenia, Spain, and Sweden (Litiu et al. 2016). The EC JRC report on EnPC in the public sector of 2017 showed that these concerns had been highlighted by the respondents of most Member States. At that stage, it was not fully clear whether investments made by an EnPC provider in publicly owned buildings or installations were supposed to be treated as PPPs or EnPCs and added to the national accounting, and thus to public debt.

In order to clarify the application of ESA 2010 to EnPC contracts, Eurostat published a Guidance note on the revised treatment of EnPC in government accounts in 19 September 2017 (Eurostat 2017), and a Practitioners' Guide on the updated Eurostat guidance in May 2018 (Eurostat and EIB 2018). These two documents re-interpreted the conditions for the off-balance treatment of EnPC contracts, providing a more flexible accounting framework that makes a wider range of these contracts eligible for "off-balance sheet treatment" or "Maastricht neutrality". Foremost, for a contract to be considered Maastricht neutral, most costs, risks, and rewards must accrue to the provider, which becomes this way the economic owner of the assets. These conditions can be met under PPP or EnPC rules (Eurostat and EIB 2018; Eurostat 2019; Sigüenza 2018; Pernetta and Bender 2019c):

[25] http://www.eib.org/en/products/advising/elena/index.htm

[26] http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-energy_en.pdf

[27] https://www.fi-compass.eu/;

- Foremost, a contract needs to be treated as PPP if the amount of CAPEX in the refurbishment of an existing asset represents at least 50% of the value of the asset after completion of works, *and* the provider is remunerated based on the availability of and/or demand for the infrastructure. A PPP contract can be written off balance provided six criteria are met: a) it lasts at least ten years; b) it refers to a clearly identifiable and specifically designed asset; c) there is a significant CAPEX contribution by the provider; d) the phases of construction and operation are differentiated and are part of the contract; e) in the case of renovation, the CAPEX of the administration amounts to at least 50% of the final asset value; f) the majority of risks are transferred to the provider.
- If PPP rules *do not* apply, Eurostat Guide of 2018 applies to contracts which a) refer to a relationship between a governmental client and a non-government provider; b) have a duration of at least eight years; c) address assets that reduce energy consumption (including renewable technologies); [28] and d) are maintained and financed by the provider. The Eurostat Guide of 2018 allows for an EnPC to be considered as Maastricht neutral provided that the conditions referred to in the guide are achieved, the most relevant being that: a) guaranteed savings exceed all government payments; b) savings must be derived from a reduction in energy consumption; c) there is a robust measurement and verification mechanism; d) the provider is fully liable for savings shortfalls, and, d) in the case of excess savings being shared, the provider needs to retain least two-thirds of them. Finally, attention needs to be paid to the incorporation of government financing in the project, since this can distort the statistical treatment. The contract becomes automatically on-balance when government financing reaches 50% of CAPEX. In contrast, EU financing is treated as neutral.

If these conditions are met, the public sector can write off EnPC expenditure from its accounting books, and only regular payments are to be recorded (“*Maastricht neutral contract”)*, virtually leaving untouched public sector capacity to sign more contracts and save more energy.

Further clarification provided by EIB in its dissemination activities covers the requirements for off-balance sheet treatment (2018). By making payments conditional on the achievement of savings, the new guidance helps consolidate a definition of EnPC whereby savings are guaranteed.

To further counter the stagnancy caused by ESA 2010, the EIB has a dedicated credit line for supporting EnPC financing under the joint Commission EIB initiative PF4EE, along with awareness raising and technical assistance. By 2018, the Eurostat guidance and EIB support had been acknowledged for having contributed to removing uncertainties and improving the openness of public authorities and bodies to engage with EnPC as a means of achieving energy savings in the public sector (EED 2018; Boza-Kiss et al. 2019). However, market development had dramatically slowed in some Member States (Czechia and Hungary), and there was still some confusion amongst Member State experts (Austria, Belgium, and Bulgaria) (Boza-Kiss et al. 2019). Nowadays, there are expectations for further support to be made available under InvestEU, starting in 2021.

1.4.3. Fi-Compass guidance on the use of forfaiting and of ESIF funds in combination with off-balance sheet contracts

The latest developments in the domain of securing sustainable finance for EnPC in the public sector involve increased clarity in the utilization of ESIF grants in combination with EnPC. This has been the object of continuous communication efforts by the EIB and the European Commission through FI-Compass. These sources have clarified that ESIF grants can address as beneficiaries both the clients and the providers of EnPC in the public sector. The latter option is preferable for ensuring the Maastricht neutrality of the EnPC (Pernetta and Bender 2020). Most recently (in May 2020), Fi-

[28] All investments that are not directly linked to energy savings are automatically on balance sheet.

Compass published new guidance on the feasibility of combining ESIF with forfaiting mechanisms and EnPC, and concerning how these are eligible for off-sheet balance treatment (2020).

The Eurostat and EIB Guide (2018) referred to "Factoring/forfeiting arrangements" without differentiating between the alternatives. The Guide required these instruments to adequately be used in combination with off-balance sheet contracts (Figure 1). This means that for off-balance sheet treatment to be applicable, the provider must retain liability in the provision of performance guarantees, and the client must have the capacity of recourse in relation to potential saving shortfalls. A recent FI-Compass review of the matter (2020) concluded that ESIF finance instruments in the form of loans and finance guarantees are suitable for overcoming EnPC market barriers. The review reinstated the three situations that permit the mobilization of ESIF to support forfaiting in Maastricht-neutrality conditions (Eurostat and EIB Guide 2018). Namely:

- ESIF loan products that finance providers at preferential interest rates and/or over longer tenures, overall supporting EnPC for comprehensive building refurbishments that usually require between 8 and 15 years;
- ESIF guarantee products designed to cover credit risk for the client and performance risk for the provider, hence providing financing for providers to kick-start financing for providers;
- ESIF "forfaiting" loans or guarantees to the 'forfeiter' (i.e. EnPC with forfaiting). The instrument reduces credit risk for the client, and performance risk for the provider. This is usually needed for the development of a long-term financing scheme, and can reduce the financing cost of projects significantly. This way, the provider has access to long-term financing, and the forfeiter (financial intermediary) receives a guarantee. Since forfeiting banks tend to overestimate the risks of EnPC, ESIF support can be useful for fostering EnPC, especially when addressed at deep renovation strategies. It also creates the conditions for integration of renewables, with long return periods. Fundamentally, "the forfaiting transaction should not be considered refinancing" because it takes place as part of a project, and within the time boundaries of its physical implementation.

The three options have in common one requirement: the economic advantage generated by the ESIF grant must be passed over from the provider to the client, who shall benefit from a lower EnPC fee.

1.4.4. Renewed efforts: the European Green Deal and the Renovation Wave

EnPC constitutes an element in the development of a sustainable finance market for the EU, but also requires that sustainable financing mechanisms are in place for markets to take off and scale up. Hence, EnPC received increased attention in the EU Action Plan on Financing Sustainable Growth (2018), the implementation of the European Green Deal (11 December 2019), and the related investment plan (14 January 2020). EnPC in the public sector may benefit from the implementation of the EU Framework to Facilitate Sustainable Investment (Council of the European Union 2020; 2019). This provides an opportunity to improve project transparency, data gathering, and comparability, and hence to enable investment prioritization both from a finance and sustainability perspective.[29] A work stream of the European Green Deal on Sustainable finance recognizes the need for private investment as a complement to public money in steering the transition to a climate-neutral economy (European Commission and DG Communication 2019).

[29] The Framework is based upon the work of the High-Level Expert Group on Sustainable Finance (HLEG) that called for i) a common sustainability taxonomy; ii) an observatory of sustainable finance to support evidence-based policy financing; and, iii) the upgrade of disclosure rules on sustainability risks.

As part of the Recovery and Resilience Facility, 37% of €672.5 billion will be allocated through loans and grants for reforms and investments undertaken by Member States and addressed to green investments and reforms). The Facility is part of the NextGenerationEU, which will also provide additional support to Horizon2020, InvestEU, and the Just Transition Fund. NextGenerationEU also pursues simplified rules for combining different funding streams, and multiple incentives for private financing.[30] The launch in 2020 of an ambitious Renovation Wave strategy and the European Renovation Financing Facility brings together social, economic and environmental considerations about building renovation with the need for scaling up investment for a post-Covid economic recovery. The Renovation Wave Strategy focuses on a set of key areas of intervention that are core to the focus of this report:

- Strengthening information, legal certainty and incentives – for both owners and tenants to renovate buildings – and extending current requirements for building renovation to all public administration levels.
- Ensuring adequate and well-targeted funding by increasing the amount and possibility to combine grants, technical assistance, project development support and loans.
- Stepping up the Commission's efforts in promoting a "genuine" market for energy services by improving access to private financing (Renewed Sustainable Finance Strategy) and scaling up technical assistance (ELENA and Resilience and Recovery Fund). The latter is to become "closer" to regional and local actors.

The Strategy also focuses on facilitating the integration of smart technologies in building renovations, improving the adaptive capacity of the construction sector to the energy renovation agenda, addressing energy poverty – relevant in this report for the renovation of public social housing, and promoting the decarbonisation of heating and cooling. The facility will centrally manage funds through, inter alia, ESIF (grants) and InvestEU (guarantees).[31] It will increase the policy focus on the energy performance of buildings and innovative financing mechanisms – with the pursuit of leveraging private capital. The initiative is planned to be an open platform for engaging stakeholders – particularly local authorities – in order to promote pool renovation efforts that benefit from economies of scale and increase the attention paid to schools, hospitals, and social housing (European Commission and Directorate-General Communication 2019; European Commission 2020d). With the contribution of this initiative, the Commission aims to at least double the annual building renovation rate and to further efforts of life cycle decarbonisation, and to intensify the depth of renovation, whilst further to integrating renewable generation in buildings. Conditionalities, control and advisory mechanisms are being introduced or reinforced as part of the Renovation Wave.[32] However, EU institutions, Member States, and sectoral actors need to work towards ensuring that the influx of new money does not further compete with EnPC but fosters sustainable financial instruments that engage the private sector for this to contribute to multiply the investment capacity, and to share the cost and risk of investing in energy performance.

[30] https://ec.europa.eu/info/strategy/recovery-plan-europe_en

[31] The Climate Target Plan brings about a Just Transition Fund which will increase from EUR 7.5 billion to EUR17.5 billion, partly allocated to a loan facility for public authorities in coal and carbon-intensive regions to invest, inter alia, in clean heating, and buildings renovation; the REACT-EU initiative, which includes EUR 47.5 billion to be allocated to by the end of 2023 to the cohesion policy through the European Regional Development Fund (ERDF) and the European Social Fund (ESF); the InvestEU scheme, with an €8.4 billion budget provision; and a new Strategic Investment Facility, with €15 billion provision, addressed to engage private capital, amongst other, in projects including renewable energy and energy efficiency (European Commission 2020c).(European Commission 2020c).

[32] The renovation wave introduces "sustainability proofing" for certain financed by InvestEU and Technical Support for the "scaling up and improving the quality of green investments". Moreover, "the Commission will track progress on renovation through the European Semester and the monitoring and reporting mechanisms set out in the Governance of the Energy Union and Climate Action"(European Commission 2020c)."(European Commission 2020c).

2. Methodology

The scope of the current report, as with the EC JRC 2017 Report, covers the EnPC market in the public sector. The study period is 2017-2019. A diversity of qualitative, semi-quantitative, and quantitative data was collected between February and June 2020, through a) an expert survey and interviews (74 respondents); b) a document review; and, c) expert feedback and validation.

Qualitative data was used to assess barriers, driving factors, best practices, opportunities, and recommendations. Quantitative data that were collected included typical contract size, average contract duration, average contracted savings, overall number of contracts, and market size. Semi-quantitative data were used to assess market trends, the impact of policy instruments (Eurostat guidelines, EEFIG, DEEP, PDA), the commitment of administrations to EnPC, and their use to fulfil exemplary obligations (Art. 5 of the EED). The survey was rather long (requiring about 20-25 minutes to fill in) in order to cover critical aspects. As with earlier reports, approximately 25% of respondents skipped parts of the survey, except for the section on PDAs, where the response rate was around 50%.[33] A more detailed description of the data collection phase is summarized in Appendix 4. This includes the questionnaire used in the EC JRC Survey 2020. Finally, feedback from a selected group of experts was incorporated into the draft report in two rounds taking place in August-September 2020 and November-December 2021. During this process of feedback and validation, 22 pieces of written input were received from individual experts and organizations. Expert discussion on the facts presented in the report and its recommendations was also part of the process of validation (online workshop organized the 3rd December 2020). During the data processing and analysis phase, JRC expertise related to the topic and the drafting of previous reports constituted fundamental grounds for the interpretation and consolidation of the data, and was of fundamental importance in terms of appraising the validity of the data and findings.

The limitations of the research used as the basis for this report involve definitional diversity and respondent bias in the analysis of markets related to the most recent developments during the research period – especially given the disruptive Covid-19 crisis that was taking place during the period of data collection. Regardless of this disruptive situation, expert participation in the survey was similar to previous reports. Additional improvements made through a round of feedback on the draft, and validation in a workshop guarantee the reliability of the present report as a guide to market actors and policymakers at multiple scales.

The data, findings, and recommendations in this report are not to be considered official statements either from Member States or from the European Commission. They are based on the opinions of experts and the analysis of the authors, and are designed to highlight the market perceptions, concerns, and forecasts put forth by practitioners.

3. Overview of EnPC use in the Public Sector in the EU in 2017-2019

The status of the development of the EnPC in the public sector market is assessed based on the following indicators (Appendix 5):

- Number of contracts and overall size of the market as compared to the size of the public sector (number of employees and area of public buildings)

[33] This is a rather low non-response rate considering the increased length of the questionnaire that resulted from the need to include new developments in policy and support instruments.

- Number of providers and of facilitators compared to the size of the public sector (number of employees and area of public buildings)
- Market evolution 2017-2019 and trends
- Status of EnPC in the public sector in comparison to other contracts
- Contract characteristics
- Types of interventions and intervention sites

When suitable, data from the EC JRC 2020 Database referring to these indicators was compared to data presented in the EC JRC 2017 report and other sources regarding the status of EnPC and other energy service markets.

3.1. Market size

3.1.1. Number and size of contracts

In absolute terms, the largest number of contracts during the report period were concluded in Italy (230), Spain (59), Germany (58), Croatia (50), and Slovenia (49). Medium-range values were reported for Slovakia (25), Czechia (25), and Hungary (20).

The actual size of the market was largest in Italy (€250m), Greece (€100m), [34] Slovenia (€96m), Germany (€90m), France (€70m), Denmark (€70m), and Spain (€60m). Markets at a preliminary stage were identified in Cyprus, Luxemburg, Malta, and Romania (no contracts). A first contract has been signed in Latvia and also in Estonia.[35] Additionally, the market has slowed down in Sweden, where only one contract was concluded during the reported period.

The relative market size ratios provide a more representative estimate of the status of market development. This indicator shows Slovenia as the undoubted leader in EnPC in public sector contracting, followed by Denmark, Croatia, Italy, Portugal, Slovakia, Ireland, and Czechia. These are followed by Spain and Belgium, with relatively sizeable markets (Appendix 5.1).

3.1.1. Sufficiency and quality of providers and facilitators

The terms “provider” and “facilitator” have diverse uses. The former descriptor is unprotected, since it is not only ESCOs that can act as providers. Clarity about the use of the terms is thus important for increasing clients’ trust of the model. According to Pernetta and Bender (2019a), EnPC providers encompass “equipment producers, utilities, facility managers, engineering companies – usually large and medium companies”. The same authors list as facilitators “advisory companies working on behalf of the client to [help] procure and/or implement an energy service project [who] may also verify energy savings results during the duration of the contract”. Facilitators may be public bodies, such as energy agencies, or private consultancy companies. In addition, there are One-stop-shop that may have a variety of functions, including facilitating public bodies to access financial and technical expertise. One-stop-shops, therefore, can be difficult to differentiate from in-house facilitation services.

The data collected through the EC JRC Survey 2020 is summarized in Appendix 5.2. Accordingly, the markets best supplied with both provision and facilitation services are Austria, Belgium, Bulgaria,

[34] Note that the market size presented for Greece refers to lean EnPC contracts for lighting. Greek contracts involve supply and maintenance. In these, 30% of the payment to contractors is distributed over the 10-year duration of the contract, dependent on performance, hence making it difficult to claim performance guarantees, and lessening the incentive of providers to pursue challenging improvements.

[35] The contract in Estonia refers to a kindergarten in Viljandi (about €1m) https://www.effect4buildings.se/effect4buildings-project-partners-and-public-building-managers-gain-valuable-experience-in-viljanditartu-and-parnu/.

Czechia, Finland, Germany, Ireland, Italy, Netherlands, Slovakia, Slovenia, and Spain. [36] There is an absence of activity in Cyprus. In Latvia, the efforts of facilitators have started to generate projects.

Facilitators play a role in activating the market, as reported for Latvia, Romania, and Hungary. A sufficiency of facilitation activity appears to support markets especially in Germany and Italy, but also in Belgium, Finland, Lithuania, Poland, and Spain, and to an extent in Sweden. High satisfaction was also reported in the Netherlands. There is potentially greater demand for facilitation than is currently available in Croatia, Denmark, France, Greece, Ireland, Portugal, Slovakia, and Slovenia. Also, there is potential for private facilitators to play a role, along with the national coordination institution (CRES), in Greece. The need for expertise to transform the market to increase engagement with off-balance sheet contracting was reported for Slovakia. It may also be important to develop facilitation capacities for enabling markets willing to overcome the limitations of Chauffage, Facility Management, and Consultancy with technical guarantees (e.g. in France).

A high rate of providers was found in Austria, Belgium, Bulgaria, Finland, Germany, Italy, Poland, and Spain. A high level of satisfaction also allows us to estimate a sufficiency of provision in the Netherlands, where the ratio of providers to market size could not be calculated. Insufficient provision could be claimed for Croatian buildings, as well as those located in Denmark, Greece, Lithuania, Portugal, Slovakia, and Slovenia. Although there is a relatively low number of providers, respondents claimed a large degree of satisfaction in Czechia. The availability of providers appears to be adequate in the cases of Spain, Italy, and Ireland, but some experts complained about the limited availability of smaller, local providers.

The assessment of provision and facilitation sufficiency and quality supports claims made in Section 3.1.1 that the most active markets are in Belgium, Czechia, Ireland, Italy, Slovakia, Slovenia, and Spain, and, to an extent, Portugal. It also shows the existence of an active market in the Netherlands. Insufficient services may be slowing the development of otherwise active markets in Greece, Denmark, and Croatia (especially in relation to buildings).

Based on the number and size of contracts and the availability and sufficiency of services, the market status of EnPC in the public sector in 2019 and 2016 is the following (Table 1).

Table 1. Market status of EnPC in the public sector in EU Member States - 2016 and 2019. Sources: EC JRC 2017 Report and EC JRC Survey 2020.

	2016	2019
AT	Unsure, probably slight decrease, but large regional differences. Public sector is the main client	Mature, but static
BE	Pilot project phase, continuous growth. Private and public.	Developing (Mature in Wallonia)
BG	Very small market, slowly increasing trend. Public sector leads.	Small, slowly developing
HR	Relatively small, growing continuously. Public sector leads	Mature, developing (esp. lighting)
CY	Underdeveloped, maybe two pilots can start	Non-existent (expected to take off)
CZ	Well developed, growing. Public sector leads.	Mature, developing
DK	Young, stable market, slowing down. Only public sector.	Mature, static
EE	No projects	Preliminary, emerging (First local project being initiated)
FI	Young, moderately developed. Municipalities lead	Small, static
FR	Stable and growing. Public and private sectors	Preliminary, developing (problematic conception of performance guarantees in the public sector)
DE	Stable, large market, still growing, large regional differences exist. Public and private sectors	Mature, static (after a stagnant period, the market is stabilizing, with growth expectations)

[36] The large supply of both provision and facilitation services in Spain needs to be interpreted with caution due to the lack of a specific list for actors working with EnPC in the public sector, although the expert assessment was positive.

	2016	2019
GR	Negligible, pilot status. Only public sector	Preliminary (Significant activity in public lighting, corresponds to vague conception of EnPC)
HU	Huge fluctuations, currently weak. Private only	Non-existent or very small, not expected to take off
IE	Still preliminary. Public sector pilots.	Small, developing
IT	Rather underdeveloped. Public and private sectors	Sizeable, developed
LV	Preliminary and fully dependent on subsidies. Pilots in public sector.	Preliminary (fully dependent on subsidies, pilots in four municipalities started in 2017)
LT	Preliminary	Small, emerging (first project ongoing)
LU	Preliminary. Public sector reluctant	Non-existent
MT	Not yet deployed	Non-existent
NL	Boom during recent years. Public and private actors.	Active, static besides a set of frontrunning municipalities
PL	EnPC is not common, struggling to take-off. Public and private sectors.	Small, emerging
PT	Emerging now. Mostly public sector	Sizeable, developing (public lighting)
RO	Stagnant and has not grown recently. Public sector, but hindered by debt barriers	Non-existent
SK	Considerable growth until 2015 (public sector), now totally halted.	Mature, developing
SI	Steady growth. Mainly public sector.	Mature, developing
ES	Slowly emerging. Private sector lead, public projects available.	Sizeable, developing (esp. lighting)
SE	Market has been decreasing, and now at a rather minimal level. Public sector leads.	Small, static

Comparison of current and previous data (Boza-Kiss et al. 2017; 2019; Lanhenke 2018) shows that the market has been static in Austria, Germany, Netherlands, Sweden, and to an extent, in Denmark. In the Netherlands, the availability of providers and facilitators points at the existence of an active market, but the use of EnPC in the public sector has been marginalized by other contracts, countering previous expectations (as reported in Boza-Kiss et al. 2017 and Lanhenke 2018). Market recovery is remarkable in Croatia and Slovakia, where markets had previously stagnated due to ESA 2010. Rapid development has taken place in markets that were previously at a preliminary (Greece) or initial stage (Slovenia, Italy, Portugal, Slovakia, and Ireland, and, to an extent, Spain and Belgium), aligned with previous projections (Boza-Kiss et al. 2017 and Lanhenke 2018). In contrast, expectations in 2017 for Lithuania and Romania do not seem to have materialized. In general, there is correlation between the status of EnPC in the public sector markets, and of ESCO markets (both markets rely on similar enabling factors, and in some cases EnPC in the public sector constitutes a significant share of ESCO markets). ESCO markets are significantly more active than EnPC in the public sector in the cases of Germany, France, Austria, Luxemburg, Netherlands, Denmark, and Slovakia, while EnPC in the public sector leads the ESCO market in Croatia, Denmark, Greece, and Portugal.

3.2. Market evolution and trends

Regarding expert perceptions about the market trends, Table 2 shows that in 2016 most national EnPC markets were characterized by uncertainty. At that time, some respondents expressed concern about the effects of ESA 2010, the economic situation, and a diversity of political (Greece, Romania, Hungary), and market uncertainties (Poland, Portugal, Romania, Slovakia). Also, the saturation of the market for public buildings was already a problematic factor in Denmark.

The review of new data shows that:

- Growth expectations reported in the EC JRC 2017 report have materialized for Belgium, Slovenia,[37] Croatia, and Czechia. Unexpected development has also taken place in Estonia – which is currently initiating a first municipality project – Ireland, Italy, Portugal, and in Slovakia;
- Negative forecasts in 2017 have been fulfilled for Bulgaria and Latvia, but some activity is expected to take place in the former and some has already been initiated in the latter. The uncertainty for Austria reported in 2017 has materialized in stagnation. An absence of take-off in Greece and Malta confirms concerns raised in the EC JRC 2017 report. The use of soft EnPC contracts could be considered a form of progress in Greece, but risks generating a negative inertia where the sector becomes accustomed to the lack of adequate performance guarantee mechanisms;
- Countering expectations, the market in Cyprus is still lagging behind take off, and formerly ongoing growth in the Netherlands has halted.[38] On basis of the data that has been reviewed, activity in the public markets of Luxemburg and Malta continues to be limited or non-existent.

Expectations for the period 2020-2023 appear to be more optimistic than actual progress in the previous period. The overall EU trend is upward for 2017-2019 (0.19), and is expected to accelerate in the period 2020-2023 (0.45).[39] One major reason may be the ongoing implementation of Eurostat and the EIB Guide on the statistical treatment of EnPC, which resolves a major barrier reported in 2017. These expectations for 2020-2023 need to be interpreted with caution since overly optimistic expert expectations for 2017-2019 were reported in 2017. Six groups of Member States can be differentiated:

- Bulgaria, Netherlands, Austria, Sweden, Denmark, and Germany are expected to reverse negative trends;
- Cyprus, Estonia, Greece, Lithuania, and Latvia may take off;[40]
- Finland, Poland, and Spain may accelerate market growth trends;
- Belgium, Croatia, Czechia, Ireland, Italy, and Slovakia are projected to maintain growth;
- Slovenia and Portugal are expected to undergo some degree of market stagnation;
- France, Hungary, Malta and Luxemburg are not expected to take off.

Attention needs to be paid to the risk of market saturation (fulfilling the current market potential, which is limited by technical, financial, or political-regulatory conditions). This has occurred in Danish, Slovenian, and Romanian markets, to Bulgarian buildings, and to Spanish public lighting. In Slovenia, only two cities have the size and capacity to access ELENA support. Market saturation in Bulgaria is the result of the availability of investment grants (as opposed to grants fostering technical capacity, facilitation, or the overcoming of financing barriers). The availability of investment grants has engaged Spanish municipalities to invest in the performance of public lighting. However, the availability of public funds has limited the interest of municipalities in alternative financing mechanisms. Grants are also considered to play a key role in deterring take off in Latvia and Romania. One way to escape the market saturation reported by experts is to pursue the greater quality and intensity of interventions (Section 3.5). The careful allocation of investment grants should avoid

[37] Slovenia has been characterized as one of the strongest growing EnPC markets in 2017-2018, along with Italy and the Netherlands (Pernetta and Bender 2019a). Slovenia has been characterized as one of the strongest growing EnPC markets in 2017-2018, along with Italy and the Netherlands (Pernetta and Bender 2019a).

[38] The halting of the market in the Netherlands is corroborated by a recent report that indicates that risk awareness in the market is driving participants away from guaranteed contracts (Van Kempen 2020), hence countering the wider trend in ESC and EnPC markets (Boza-Kiss, et al. 2019). The halting of the market in the Netherlands is corroborated by a recent report that indicates that risk awareness in the market is driving participants away from guaranteed contracts (Van Kempen 2020), hence countering the wider trend in ESC and EnPC markets (Boza-Kiss, et al. 2019).

[39] The EU values should be considered the most robust ones because they are the result of averaging national values.

[40] There are also weak expectations for Hungary to take off again.

competition with EnPC. Attention also needs to be paid to specific barriers in the public sector so as to increase alignment with the more positive overall trend of EnPC and ESCO markets (e.g. in the Netherlands, Denmark, and Luxemburg).

Table 2. Market trends as foreseen in 2017 (EC JRC 2017), observed for 2017-2019 and foreseen for 2019-2023. **Source:** EC JRC 2020 Database.

MS	EC JRC 2017 Report Expected development 2017-2019	EC JRC 2020 Database	
		2017-2019	2020-2023
AT	Big projects are to continue, but smaller projects are problematic	-0.75	**0**
BE	Growth expectations mainly in the public sector	0.75	0.75
BG	Very vulnerable to problems	-1.00	**0.25**
HR	The EnPC market indicates a growing trend, but ESA 2010 is a problem	1.00	0.70
CY	Recent policy improvement can create a favourable environment	0.00	0.50[41]
CZ	The public sector is seen as a seeding source for EnPC in other sectors	0.50	1.00
DK	Unclear, because application to public buildings is saturated	0.00	0.75
EE	Very unclear, some positive signs combined with negative expectations	0.50	0.50[42]
FI	Continuous growth is expected in the public sector	0.00	1.00
FR	Continued growth is expected	0.00	0.00
DE	Growth of the EPC sector is expected	0.20	0.70
GR	There is a high level of uncertainty related to the economy, albeit interest in EnPC	0.00	0.50[43]
HU	Unsure due to policy instability	0.00	0.25
IE	Unsure because of lack of information	0.75	1.00
IT	Market hindered by a few key barriers; limited growth expectations	1.00	1.00
LV	No optimistic forecasts	0.00	0.25
LT	Uncertain development of EnPC (other energy services are more popular)	0.00	0.50
LU	Not enough information	0.00	-
MT	No take-off is expected	0.00	-
NL	Continued growth is expected	-0.50	0.50
PL	With the current market conditions, development is not foreseen	0.25	0.50
PT	Unclear; there is commitment, but the market is limited by major barriers	1.00	0.50
RO	Under current market conditions, development is not foreseen	0.00	0.00
SK	Under current market conditions and barriers, development is uncertain	0.75	1.00
SI	Further market growth is expected	1.00	0.00
ES	A few key barriers hinder the expected level of development	**0.25**	**0.75**
SE	Depending on market conditions, momentum may be regained	-1.00	0.00
EU	Expert assessment 2019	0.00	0.00
EU	Average Member State assessments 2019	0.19	0.46

Scale: Upward (1, in green), Stable (0), Downward (-1, in red). Expert estimates in EC JRC Survey 2020 are averaged. Bold values: highly divergent set of responses.

[41] EnPC Project guidelines are under preparation and expected to be ready in the first half of 2021.

[42] The rated trends for Estonia reflect the impact of a first contract been signed. These expectations need to be taken with caution due to unclear commitment of the central government and lack of market capacity.

[43] Driven by public lighting.

3.3. Types of EnPC contracts in the public sector

The characteristics of contracts have been reviewed in terms of Maastricht treatment, size, duration, and savings (Appendix 5.3).

3.3.1. Accounting treatment

Since the publication of the Eurostat Guidance note in 2017 and the Eurostat and EIB Guide in 2018 (henceforth "Eurostat guidance"), a number of Member States have started to mostly rely on off-balance sheet contracts when using EnPC in the public sector – namely, Finland, Italy, Slovakia, and Slovenia. These contracts are also partially used in Austria, Belgium, Croatia (public lighting), Denmark, Portugal, and Spain. The statistical treatment is of little relevance due to financing conditions in Austria, Germany, Czechia, the Netherlands, and Sweden. Off-balance sheet contracts were not developed or are not in use in Bulgaria, France, Hungary, Ireland, Lithuania, Poland, and Romania. There is no information about EnPC being used in the public sector in Cyprus, Greece, Latvia, Luxemburg, or Malta. Further information about the relevance of ESA 2010 as a barrier and on the impact of Eurostat guidance is reviewed in Sections 4.2.1. and 5.1.1.

3.3.2. Contract length

The length of contracts is relevant because the lengthiest contracts allow for deeper renovations. In general, deep renovations are considered possible for contracts of a duration of between 8 and 15 years. Contract duration is important, because achieving Maastricht neutrality requires contracts that are longer than eight years (Eurostat and EIB 2018). Contracts of above eight years duration are found in most Member States (Austria, Belgium, Bulgaria, Croatia, Czechia, Denmark, France, Germany, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Slovakia, Slovenia, Spain, and Sweden). Thus, Maastricht neutrality conditions are a factor in deep renovations and affect how the EnPC market exploits energy saving potential in contributing to EU targets. However, lengthier contracts are considered problematic by many experts, who expressed a preference during the reported period for shorter guarantee periods as one way to minimize risk aversion. In general, contracts are longer whenever financing from EU sources and international institutional support is involved, and in markets where there is more trust amongst actors (Boza-Kiss et al. 2017).

The EC JRC 2020 Database shows that, in general, 95% of contracts last between 4 and 12 years. The longest contracting periods exist in Denmark, France, Lithuania, and Slovenia. There are contracts 15 years or longer in use in Belgium, Denmark, Croatia, France, Lithuania, Slovenia and Portugal. Moreover, contracts longer than 10 years are typical in Austria, Czechia, Germany, Greece, Hungary, Ireland, Poland, and Spain. The shortest contracts occur in Finland, and Sweden (seven- and six-years' average duration, respectively). Comparison between the EC JRC 2020 Database and the findings in the EC JRC 2017 Report shows that there has been a general increase in the duration of contracts. This may be a sign of maturity in the related markets and of increased trust in the EnPC system. The longer duration of contracts may also reflect the support of the EU, international financing institutions, and national instruments.

3.3.3. Contract size

Contract size indicates the capacity to address large projects and to aggregate smaller ones. In 2018, it was estimated for a group of 15 Member States that 67% of contracts were smaller than €1m, 29% between €1m and €5m, and only 4% were above €5m (Szomolányiová and Keegan 2018). Examples of large contract sizes include those for hospitals in Ireland and Denmark (€15m and €14m, respectively), and regional and local projects in Italy and Portugal (€6m and €5.3m). Contracts of more than €2m are common in Croatia, Belgium, France, Italy, Poland, Portugal, Slovenia, and Sweden. The relatively large size of contracts in Greece (€4.5m) is due to a lean conception of EnPC (Section 3.1). The €1m threshold is also overcome in Austria and Spain. Aggregation plays a key role in Italy and Portugal – attributable to ELENA support – and in Denmark – related to support from a national fund for councils and regions.

3.4.4. Contract savings

The range of savings that is expected differs primarily in relation to building and lighting interventions. Building interventions with savings of more than 40% that last for longer than eight years are considered deep renovations, which are key for meeting the EU decarbonisation targets set for 2050 (FI-Compass 2020). Contracts for public buildings make savings ranging from 19 to 50% of baseline consumption. The data indicate the existence of long and deep renovations in Germany, Poland, and Slovenia. Similar claims cannot be made in the case of Spain, Italy, and Bulgaria, since values represented aggregate building renovation and public lighting. Low savings in Austria, Czechia, Denmark, France, Ireland, Slovakia, and Sweden indicate the need to incorporate mechanisms that make contracts more ambitious. The engagement of EnPC in deep renovations is limited. These are often addressed through in-house mechanisms. The engagement of EnPC in deep renovation requires additional support for non-energy saving measures. These measures may be better addressed through the combination of works and performance contracts (Croatia, Catalonia in Spain). Lack of standardization in this sort of contracts counters the comparability of savings achieved in different projects and markets.

Savings reaching 70-90% of the baseline consumption are commonly pursued in public lighting interventions that are prevalent in southern countries (Greece, Portugal, Spain, Italy, and Croatia). Lighting contracts provide an entry-level opportunity for Member States with less developed structures to conduct EnPC in the public sector, or with climates unfavourable to achieving quick returns from building refurbishment. The aforementioned conditions coincide in Greece, Cyprus, and Malta. In the case of Greece, there is potential for current model contracts to increase the liability of providers.

3.4. Types of intervention sites

The expert assessment of the relevance of public buildings and lighting in public EnPC markets is summarized in Appendix 5.4. There is a prevalence of interventions in public buildings in the EU overall, but most particularly in Austria, Belgium, Czechia, Denmark, Finland, Germany, Ireland, Lithuania, Poland, Slovenia, and Sweden. This accords with the situation in the period 2015-2017 (Boza-Kiss et al. 2017). Pilots reported in 2017 for Ireland and Lithuania appear to have succeeded in kickstarting the market. However, pilots in Cyprus and Greece have not progressed. Activity in Latvia has expanded to buildings in four municipalities.

The prevalence of building-related interventions is shared with those for lighting in Bulgaria and Italy. This is also the case in France, where EnPC for district heating and cooling is also of relevance. Similarly, in the Netherlands district heating and cooling is, along with buildings, the most common intervention site. In the Netherlands, a stagnating ESCO and EnPC market has given way to contracts for the supply of renewable systems and thermal storage.

Public lighting is the prevalent intervention site in Croatia, Greece, Hungary (data on Hungary may refer to previously concluded contracts), Portugal, Slovakia, and Spain. Lighting is also of relevance in Bulgaria, France, and Italy. Most of these Member States have mild climates over a large portion of their geography, and were categorized as preliminary or incipient markets in the EC JRC 2017 report. A new emphasis on street lighting has taken over the activity and potential of building interventions of Portugal, Croatia, and Bulgaria. Public lighting may be the stepping stone to the development of the EnPC in the public sector, especially in Member States with climate barriers, with regard to activity related to public buildings. The potential of public lighting makes it attractive to councils, especially since public lighting can account for 30-50% of their electricity consumption, and the energy saving potential is estimated at 30-70% (OÖ Energiesparverband 2015). More recently, technology suppliers claim that a combination of current led technology and smart systems with adequate contracts can generate savings of up to 80% (Derler 2020).

In addition to public buildings and lighting, district heating and cooling is key to understanding EnPC in the public sector in the Netherlands, Romania, and France, and, to an extent, in Czechia, Germany, Ireland, Italy, Lithuania, and Spain. Smart grids and transportation infrastructure appear to be of marginal relevance in these markets but have awakened interest in a diversity of Member States.

Project pools may benefit from economies of scale and a reduction in administration costs and are a way to engage providers in working with less attractive intervention sites. However, they also add complexity to contracts, especially when different types of buildings or more diverse sites of intervention are included. The relevance of project pools was highlighted for Austria, Germany, Slovakia, Ireland, Czechia, Spain, and Netherlands. These pools are formed by:

a) different types of buildings in Austria, Germany, and, to some extent, Slovakia and Ireland;
b) public lighting and municipal buildings in Czechia, and to some extent in Spain;
c) solar systems and other projects (the Netherlands and Spain); the same pools are also expected to gain relevance in Portugal in 2020-2023;
d) renewable heating grids and building renovations in Germany.

Due to their capacity to extend the scope of EnPC, the interest of Croatian and Catalan (Spain) contracts related to water savings is also remarkable. Including water savings appears to be especially relevant in locations with a dry climate and, overall, for pursuing integral improvements in public sector sustainability and demonstrating exemplarity.

The development of technologies and environmental sensitivity is increasingly leading to combinations of efficiency-, renewable-, water-saving-, storage-, and smart potential at multiple scales and sites of operation aimed at improving the overall sustainability of the public sector and reducing its energy and climate footprint.

3.5. Types of interventions in buildings

A review of the EC JRC 2020 Database (Appendix 5.5) clarifies the sites and technologies preferred in buildings:[44]

- Interventions in service facilities are common in all Member States, often in hospitals and council facilities, or facilities managed by central governments and regional governments with devolved capacities (Germany, Slovenia and France).
- Interventions in public offices are common in most countries, except for Denmark, Finland, France, Ireland, and Sweden.
- Interventions in social housing is common only in seven countries (Czechia, France, Germany, Italy, Slovakia, and Sweden).[45]
- There is a shared interest among Member States for specific technologies (at times alongside envelope renovations) in all countries but Slovenia and Finland, which focus on deep renovations. (Interestingly, in Finland these deep renovations take place within a relatively short contracting period – See Appendix 5.3).
- There is a trend towards increased quality, depth, and comprehensiveness of interventions in Belgium, Bulgaria, Czechia, Germany, and Poland. Also, there is an expectation that Greece will step up from lighting projects with loose enforcement of performance guarantees to interventions in buildings involving technology replacement and deep renovation.
- In pursuing climate neutrality, Belgium, Germany Austria, Denmark, Italy, Spain, and Portugal either include or plan to include renewable generation in EnPC in public sector contracts (see Appendix 5.4).[46] There appears to be potential for including renewables in most Member States, particularly as the cost of technologies gradually becomes more competitive with fossil fuels, and renewables are permitted in off-balance sheet contracts.
- Maintenance is typically part of the EnPC interventions in Belgium, France, Hungary, the Netherlands, Portugal, Spain, and Sweden. The inclusion of maintenance in energy service contracts is suitable for furthering performance and avoiding conflicts between service providers. However, it may constitute a barrier to the penetration of EnPC contracts and overall to prioritizing energy performance in public contracts (e.g. France, Spain).

4. Assessment of key remaining barriers to EnPC in the public sector

As forecast in the EC JRC 2017 report, there is an ongoing process of overcoming entry-level barriers in Member States whose markets were at preliminary or initial stages of development in 2016 (Appendix 6.1). In general, there is less concern about information availability, and about ESA 2010. Nowadays, there is more concern about the technical capacities of clients, providers, and

[44] Methodologically, the updated questionnaire used in 2020 has permitted the capture of the difference between the type and site of intervention, building typologies, and intervention techniques. Importantly, it has avoided conceptual confusion between public building and public administration buildings, i.e. offices. The evolution of these improvements is relevant for further study in a structured manner. Appendix 5.5 is a useful reference which stakeholders may use to find and compare interventions of interest, and hence as a tool for peer-to-peer learning.

[45] Note that the market in Latvia appears to be restricted to privately owned residential complexes .There are expectations about how this market may lead to the adoption of EnPC in the public sector. A similar situation exists in Luxemburg, where there are reportedly no steps being taken by the government towards the adoption of EnPC in the public sector, regardless of the country capacity to rely on market developments in neighbouring MS.

[46] The absence of references to renewables in supply interventions (e.g. in France) may be related to the type of contracts dominant in this MS.

facilitators, and the need for political and policy commitment to overcoming the in-house- (contracts, guidelines, targets, and legal frameworks), and market barriers (quality standards) necessary for further deploying EnPC in the public sector.[47] Financial concerns have also become more refined to address the problematic role of investment grants and the need for more advanced financing instruments such as forfaiting and guarantees.

A series of factors external to EnPC of a structural nature in the public sector limit the development of markets, including climate and public sector size, dependency on grants, subsidized energy prices, access to advantageous financing for the public sector, pre-existing contract structures, and in-house technical capacity to conduct energy performance interventions, and market saturation (Appendix 6.1). The latter may be related to the accomplishment of accumulated targets, as reported in Tsemekidi-Tzeiranaki et al. (2019; 2020) or to overreliance on EU and Member State investment grants. This cause was reported for Bulgarian buildings, Spanish public lighting, and the Hungarian market, and is most probably also relevant for other Member States. (It is likely that many experts do not reflect on this barrier when assuming that investment grants have a positive impact on their respective national economies and the energy performance of their respective public sectors.)

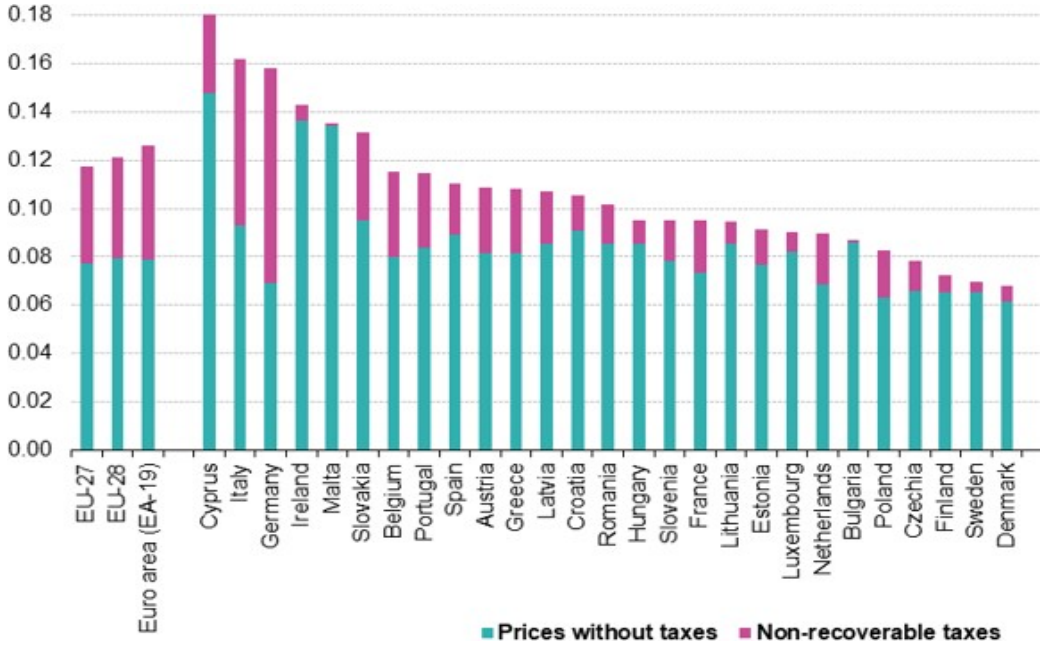
Structural barriers specific to Member States are mild climates, especially when combined with small market size (Greece, Cyprus, Malta, Portugal, and Croatian buildings) and scale of local authorities (Slovenia), influential interests vested in fossil energy (Latvia, Germany), and well established contract services (France, Spain, Netherlands, Cyprus),[48] public sector access to low interest rates (Germany), low energy prices (reported for Croatia, Lithuania and Germany[49] but potentially problematic for several other MS, as seen in Figure 2), and the existence of in-house capacity to engage with energy performance interventions. The latter was reported for the Netherlands, Denmark, Sweden, and Spain alongside the initial use of maintenance contracts, and a fear of long-term engagement with a contractor. The in-house capacity of the Swedish and Danish may be also problematic in terms of ambition and accomplishments, particularly in the current context of voluntary action and calls for mandatory targets and strategies, as well as a focus on performance guarantees and M&V (See also 4.1.2). The reticent efforts of Sweden, Finland, Belgium, and Luxemburg, especially in terms of central government buildings, could be related to the early overachievement of building renovation targets, as reported in Tsemekidi-Tzeiranaki et al. (2019; 2020). This problem highlights the risk that EU reliance on regulatory targets may fail to motivate Member States to commit to common goals, and the need for efforts to be framed in the form of long-term strategies.

[47] For instance, experts from Italy, Portugal, and Spain are now most concerned about the quality of supply and facilitation, whilst in 2017 their major concern was a lack of information about the instrument. This is also the case for Member States in which EnPC is still at a preliminary status, such as in Greece and Cyprus where respondents are already acquainted with the workings of EnPC and it is the lack of experience, which limits the capacity of public bodies.

[48] In Cyprus the management of street lighting has traditionally been undertaken by the electricity supplier company. This contractual option has deterred the development of EnPC in the public sector.

[49] As reviewed in BfEE 2020. As reviewed in BfEE 2020.

Figure 2. Electricity prices for non-household consumers in the second half of 2019 (Eur/kWh). Source: Eurostat 2020



After these reflections on general barriers and barriers external to the EnPC market, the following sections focus on market-, regulatory- , and finance-related barriers.

4.1. Market barriers

Market barriers are categorized in this report according to a) market inertia; b) client awareness; knowledge and technical capacity; c) competing contracts; and, c) availability of EnPC providers, facilitators and One-stop-shops.

4.1.1. Market inertia

Market inertia is fundamental explanation for the limited engagement with EnPC. Such is the case of preliminary markets. In Latvia, for instance, municipalities prefer conventional procurement supported with well-tested intervention support mechanisms – most often national and EU and national grants or preferential financing. Thus, political incentives (e.g. citizen recognition of sustainable financing efforts), financial restrictions, or legal requirements for more cost-effective contracts need to be in place before other market barriers become relevant. Market inertia is applicable to other countries, such as those in which in-house capacities deter long-term engagement with external contractors (Denmark, Sweden, the Netherlands, and Spain – see Introduction to Part 4).

4.1.2. Lack of client trust, awareness, and understanding

Since 2017 there has been an overall increase in client awareness and understanding regarding the opportunities represented by and mechanisms of EnPC in the public sector. These appear to be linked to improved trust in the mechanism and its market (Appendix 6.1). This is probably related to the impact of EU support mechanisms (Part 7). Remaining issues concerning awareness and

understanding have been reported in Belgium, Bulgaria, Czechia, Hungary, Italy, and Romania. This is most problematic amongst financiers and external advisors (Czechia, Ireland, and Portugal).

Revolving issues of trust in the service were highlighted in Belgium, Bulgaria, Cyprus, Czechia, Hungary, Ireland, Italy, the Netherlands, and Sweden. In some cases, trust issues are seen as most problematic in relation to lengthy contracts such as those required for deep renovations and for off-balance sheet treatment (the Netherlands). In addition to a lack of awareness and knowledge, a lack of trust is related to a) bad experiences (Sweden, Bulgaria, and Hungary), and frequent litigation (Italy, Bulgaria);[50] and to b) the insufficient quality of the services of provision and facilitation. There are limitations in terms of quality and sufficiency of provision in Bulgaria, Croatia, Denmark, France, Greece, Hungary, Ireland, Lithuania, Poland, the Netherlands, Romania, and Spain (Section 4.2.5). Also, facilitation plays a fundamental role in ensuring the adequacy of contracts and the fulfilment of their terms. Limited satisfaction with facilitation capacities may be problematic, as shown in Appendix 5.2, in the cases of Croatia, Denmark, France, Portugal, Ireland, and Poland. Limitations of provision and facilitation are of most relevance whenever there is lack of in-house technical, finance and legal capacity to deal with contracts (e.g. Ireland, Lithuania, and Poland).

The development of quality assurance mechanisms (e.g. certification of providers, M&V systems) and of a track record of public sector interventions is fundamental to nurturing trust in providers and the EnPC model (Section 4.2.5) (as also argued by Pernetta and Bender 2020). The development of a knowledge base about the performance of public sector interventions is the object of the SFSB support instruments DEEP and EEFIG underwriting toolkit (Part 7).

4.1.3. Competing contracts

The relevance of alternative contracts as barriers to the development of EnPC markets was only highlighted for a limited number of countries (Cyprus – provision of public lighting services, bundled supply, procurement and installation; France – bundled supply, procurement and installation, facility management; Italy – chauffage; the Netherlands – shorter contracts; DB(f)MO; Spain – shorter maintenance contracts; Denmark and Sweden – the latter two relying largely on in-house capacity)[51] (Appendix 6.1). However, Appendix 6.2 shows that there is a variety of well-established contracts competing with EnPC in the public sector with lesser focus on saving energy (e.g. related to facility management, chauffage, and energy supply) or which do not involve the provision of performance guarantees but the outsourcing of investment, renovation, and maintenance:[52]

- EnPC with guaranteed savings is the second most common type of contract in the EU, behind facility management and followed by consultancy with technical guarantees. This is of relatively high importance in Austria, Belgium, Croatia, Czechia, Denmark, Lithuania, Poland, Slovakia, and Slovenia. (This contract modality was also highlighted in Hungary, although most respondents claim an absence of activity.)
- Facility management is the most common type of contract overall, and since it does not usually incorporate efficiency provisions and is well established, it constitutes a major barrier to the adoption of EnPC in the public sector. However, incorporating performance guarantees

[50] Bad experiences have a long-lasting effect. In the case of Hungary and Sweden, the former failed projects that now harm the current level of trust took place before the EC JRC Report.

[51] A general preference for conventional procurement was also reported for Finland and Lithuania, particularly in central government buildings.

[52] The assessment presented in this section needs to be interpreted with caution because there is large variability in appraisals amongst respondents from the same country. This factor is most problematic in Austria, Belgium, Denmark, Greece, Germany, Ireland, Latvia, Slovakia, and Spain.

into these contracts constitutes a potential area for the development of EnPC in the public sector;

- EnPC with shared savings is most relevant in Italy, Poland, and Slovakia (along with guaranteed contracts), Spain, and Sweden, and is of some relevance in Austria and Ireland;
- Chauffage, Efficiency improvement, and other contracts whereby clients take on the performance risk is of relative importance in all countries except Denmark;
- Consultancy with technical guarantee is well established in Bulgaria, Croatia, Finland, France, Germany, Greece, Netherlands, Poland, Romania, Sweden, and Denmark.

Thus, in addition to Cyprus, France, Italy, the Netherlands, Spain, Denmark and Sweden, the list of Member States where alternative mechanisms constitute a barrier needs to include Bulgaria, Finland, Germany, Greece, Ireland, Latvia, Poland, and Romania.

Alternative contracting options to EnPC may be perceived as advantageous over the continued preference for conventional procurement and reliance on in-house interventions, but risks locking in the potential performance of and need for leveraging private investment. Moreover, these contracts often rely on well-established structures of service supplies. This is common for facility management (Spain, Italy, Finland, France, Germany, Ireland, Lithuania, Netherlands, Poland, Romania) and chauffage (France, Italy, Romania, the Netherlands). Particularly problematic for introducing EnPC appears to be the inertia involved in bundling energy supply services, equipment procurement, installation, and facility management over periods longer than 15 years, common in France. Moreover, reclaiming guarantee provisions can be problematic (Greece, Romania). There is increasing recognition about the need of mixed mechanisms whereby clients take risks (Lithuania) and non-energy and energy-saving investment is separated, making PPP contracts preferable (Croatia).

An underlying problem that explains the continuing preference for alternative contracts is the negative perception of EnPC as costly due to the requirement of performance guarantees (Portugal, Italy, Greece, and Romania),[53] and the cost of measurement and verification (Croatia). According to this perspective, EnPC adds to the complexity of tendering and procurement (Section 4.2.3). This shows that there still exist deeply established criteria and procurement processes based on contract price.

An interesting trend has been identified towards the development of "partnering models" whereby the provider guarantees the exploitation period, but the cost of intervention is covered by the client (Sweden). There is also a trend towards pursuing shorter and more flexible contracts (Netherlands) and shorter contracts with an increased emphasis on performance guarantees (Germany). However, there is a risk that these contracts will fail to fulfil the ultimate goal of increasing the intensity of interventions such as deep building renovation. This is also problematic in Member States that are concerned about the accounting treatment of contracts, because the Eurostat guidance requires a minimum contract duration of eight years.

The defining of standard contracts (EED Art. 18), procurement procedures based on cost-benefit and life-cycle assessments (EED Art. 18, EPBD Art. 2a), backed by long-term renovation strategies and targets (Art 2a. EPBD) are necessary mechanisms for performance guarantees to obtain a competitive advantage amidst other contracting criteria.

4.1.4. Availability of providers, facilitators, in-house capacity, and One-stop-shops

There is a diverse degree of satisfaction with the availability and quality of providers and facilitators in Member States (Appendix 5.2). Amongst the markets with reported activity, dissatisfaction

[53] In Greece and Romania there are weak versions of EnPC in the public sector in use, with limited guarantee liability.

with provision was reported for Croatia (lack of providers for public buildings), Denmark (the amount of providers is critical for some tenders), Ireland (providers focus on large projects), Lithuania and France (providers focus on facility management), Slovenia (a lack of standardization), Spain (lack of retail service), Italy (local providers too small to participate in ELENA-aggregated projects), Poland (low quality of provision), and Sweden (demand is too low to withhold a sufficient provision). There is potential for providers and facilitators to contribute to shifting away from alternative contracts with less focus on energy savings and performance guarantees (France, Lithuania, Bulgaria, Portugal, Spain and Sweden).[54] Moreover, since issues of trust concerning EnPC providers are common in a diversity of Member States (Section 4.1.2), it would be of relevance to improve the quality and supply of services to foster training, quality assurance mechanisms, and One-stop-shops. For instance, the voluntary adoption of codes of conduct (found to be satisfactory in Bulgaria and Czechia) has been recognized for its capacity to improve clients' trust in the system, and for the latter to engage in more, longer, and more ambitious contracts.

Regarding facilitation, respondents in well developed markets generally reported a high degree of satisfaction with facilitation services. The role and specialization of providers and facilitators is recognized to be of significant relevance to the development of EnPC in the public sector, especially in the process of adopting Maastricht-neutral contracts – e.g. as reported for the cases of Latvia, Ireland, Slovenia, Portugal and Croatia. Amongst the active markets, there is a reported absence of facilitation in France, and a need for more active facilitators in Ireland and Portugal. Also, there is potential for more independent facilitators in Greece, Latvia, Cyprus, Malta, and probably Lithuania (few data are available about the latter) to contribute to market kick off.[55]

One-stop-shops provide an opportunity to: increase the impact of financial instruments by combining them with structured assistance (e.g. to cover the costs of project preparation with project technical assistance from ELENA); foster the introduction of codes of conduct; introduce standard contracts that reduce transaction costs; and facilitate procurement, negotiations, and project implementation (Pernetta and Bender 2020). The relevance of One-stop-shops was only reported for Germany, Hungary, and the Belgian regions of Flanders (VEB) and Wallonia (RenoWatt, financed by EEF and PDA H2020).[56] Upcoming efforts include the creation during 2020 of the *Ontzorgingsprogramma maatschappelijk vastgoed* in the Netherlands. There is potential for the development of these services, as suggested in compliance with the required provision of information by Member States (Art. 20 EPBD). Based on experience, the development of One-stop-shops and in-house technical support could serve to help structure support for these to be tailored to the needs of public bodies. This is key to helping administrations navigate the increasingly complex process of sustainable procurement and financing, to unlock their potential performance at earlier stages of market development, in attempts at scaling up, and to counter market stagnation.

[54] Luxemburg appears to prefer the development of the private EnPC market prior to the development of a public sector market. In this way, Luxemburg would follow the path of Latvia and Lithuania, where only private sector interventions have so far taken place. The success of this approach is yet to be tested – for instance, whether providers will be able to adapt to the public sector, or will find the private sector more interesting. Moreover, this approach appears to be misaligned with the exemplary role that the public sector is expected to play in energy performance.

[55] Moreover, the role of facilitators was not always mentioned by respondents. Their role and terminology were referred to in diverse ways. The insufficiency of the activity of facilitators may go unreported in Member States where there is insufficient familiarity with their role – e.g. markets at preliminary stage.

[56] According to Boza-Kiss and Bertoldi, in 2018Boza-Kiss and Bertoldi, in 2018 there were One-stop-shops providing services to the public sector in Bulgaria (Rhodoshop PDU 2017-2020, EERSF – formerly BEEF – which operates as a revolving fund with national and international financing investment), and the Walloon region of Belgium (RenoWatt financed by EEF). There are also experiences in Slovakia involving financing with EBRD credit lines (MunSEFF, 2010-2015, and SlovSEFF, 2007-2012).

4.2. Regulatory barriers

Significant regulatory progress occurred in the period 2017-2019 (Introduction to Part 4). This progress can be largely attributed to the new Eurostat guidance of EnPC treatment in government accounts (2017, 2018), and to the introduction and update of standard contracts, guidelines, contracting and procurement rules. The data gathered on regulatory barriers is summarized in Appendix 6.3. These can be grouped into four categories: a) The need for regulatory adaptation to off-balance sheet treatment; b) A lack of political commitment, targets, and strategies; c) Procurement bottlenecks and problematic procedures; and, d) a set of other regulatory deficits involving the standardization of definitions, contract standards, guidelines, provision of information, and lists of provider accreditation and demonstration.

4.2.1. Need for regulatory adaptation to off-balance sheet treatment

The accounting treatment of EnPC in the public sector has ceased to be of key concern in most Member States, unlike as it appeared to be in the EC JRC 2017 report. Exceptions were Member States with specific national financing conditions (e.g. access to own financing in Danish municipalities) and reliance on forfeiting (e.g. some German councils - Berlin - and landers) (Appendix 6.1). Although the EU rules have changed, not all Member States have developed and adopted Maastricht-neutral contract models.

The lack of off-balance sheet contracts and their delayed use may represent a lost opportunity for market development in Member States with debt concerns (Bulgaria, Croatian buildings, France, Hungary, Ireland, Italy, Lithuania, Poland, Portugal, Romania, and Spain) (Appendix 6.4).[57] Market development during the period 2017-2019 was affected by concerns about the possibility to incorporate ESIF and forfaiting to off balance sheet contracts (Section 4.3). The disruptive effect of ESA 2010 has remained relevant for early mover Member States, such as Croatia and Slovakia. In Croatia, an off-balance sheet contract model for buildings is yet to be developed. In Czechia, the debt neutrality of Maastricht-neutral contracts is still questioned by the Ministry of Finance, hence limiting their use to central government contracts. Remaining negative effects of ESA 2010 also involve constrained trust in the model and its legal certainty, as reported for Ireland, where finance and statistical officials and decision-makers have been reluctant to accept EnPC and actors promoting the model have "burned out". Moreover, the ongoing adoption of an off-balance model clashes with government concerns about public spending causing inflation.[58] In Italy, lack of regulatory clarity has resulted in problems with the application of the Fiscal Compact, and there are calls for a completely new regulatory framework based on the adoption of off-balance treatment (i.e. that incorporates quality assurance mechanisms; targets, incentives and the backing of contracts with public guarantees). There are also cases where national budgetary rules concerning public debt and lending impose limitations on local and regional authorities, which are similar to those previously imposed by ESA 2010 (Austria, Belgium, Romania, Denmark, and the Netherlands).

[57] The limited impact in Austria and Germany, whose governments operate on sheet balance, relates to the favourable financing conditions and the self-financing of the model based on savings on previous projects. Accordingly, German regions have mostly decided not to rely on the model. A similar situation may be seen in Denmark and Finland, whose public sectors and ESCOs enjoy favourable financing, as well as in Sweden and The Netherlands, where the national statistical treatment provides an opportunity for municipalities to bypass deficit financing (Bank Nederlandse Gemeenten) when ESCOs provide investment (Table 3).

[58] An assessment of the suitability of EnPC in Ireland (ongoing at the end of 2019) could open the way for the development of guidelines, the registration of providers and facilitators, model contracts, and tendering procedures.

The reported set of regulatory barriers to the adoption of off-balance sheet contracting involve a negative *perception* of the EnPC model. This is reported to have increased the burden of administering contracts to ensure that they remain off-balance (Lithuania, France), raised the risk for providers, distorted existing guarantees (Czechia), led to too many restrictions (Slovakia), represents a problematic requirement for longer contracts (Belgium, Czechia), and means additional costs related to transferring risks to providers (Ireland, the Netherlands). These barriers need to be understood in a dual sense: on the one hand, it is undeniable that EnPC involves additional effort, while on the other, these additional efforts need to be framed in relation to the benefit of performance guarantees and the leveraging of the private sector that is pursued. These advantages of EnPC should not be overridden, and moreover should be more clearly conceptualized and communicated to enable an adequate assessment of its potential and barriers.

4.2.2. Political commitment, targets and strategies

Member State action related to EED Art. 5 and EPBD Art.2a during the period 2017-2019 has been reviewed as insufficiently ambitious and showing limited commitment (Appendix 3). This is problematic because the next long-term renovation strategies are to be submitted in 2029. Member State action towards the fulfilment of obligations (EED Art. 5) do not always promote deep renovations. Some Member States have not yet updated their renovation plans to accord with EPBD Art. 2,[59] and there are concerns about the quality and comprehensiveness of the submitted strategies. There is a general lack of requirements for guaranteeing savings and leveraging private investment such as through EnPC (Austria, Hungary, Luxemburg, Germany, Spain, Greece, Italy, Cyprus, Italy, Portugal, and Ireland) (Appendix 6.5).

Limited commitment to saving energy and using EnPC in the public sector can cause market uncertainty, both in Member States with developed markets that are now stagnant or static (Austria, Germany), and the least developed markets (Hungary) where opportunities for take-off are therefore limited. Particularly problematic is the limited commitment of central governments towards using EnPC in fulfilment of exemplary obligations defined in EED Art. 5 – e.g. in Czechia, Slovakia, Cyprus, and Bulgaria. There is also a general need for more *communication about* exemplary efforts, and the use of mechanisms such as EnPC. A series of specific areas for improvement have been identified:

- Absence of long-term visions, real estate renovation strategies, and national mandatory targets for regions, councils and bodies (e.g. Denmark, Sweden, Austria, and Belgium);[60]
- Prevalence of status quo explains, according to national experts, the remaining government opposition to EnPC in Latvia, and the delayed incorporation of stronger energy taxation and life cycle assessment in Germany;[61]
- The transparency involved by EnPC may require overcoming structural barriers (Romania and Hungary). To this problem is added, in the case of Hungary, a lack of state commitment to energy performance and to compliance with Art. 5 – especially when not relying on EU investment grants – and government constraints imposed on the activity of local authorities;

[59] Two previous batches of long-term renovation strategies were submitted in fulfilment of the EED in 2014 and 2017.

[60] In the case of the Netherlands, a strategy and roadmaps per sector for public buildings were expected when conducting EC JRC Survey 2020 https://vng.nl/nieuws/routekaart-helpt-bij-verduurzamen-maatschappelijk-vastgoed

[61] Life-cycle considerations are included in the Climate Protection Law (Klimaschutzgesetz) from February 2019. Although the use of EnPC is recommended in the German energy efficiency strategy 2050, some expect a stronger legal requirement.

- Subsidized energy prices constitute a deep-rooted barrier to energy performance (Croatia,[62] Lithuania, Germany, Latvia). (See Figure 2 for an overview of non-residential electricity prices in Member States);[63]
- Overachieved obligations regarding EED Art. 5 (Finland, Germany, Croatia, Belgium, Luxemburg, and Ireland) (Tsemekidi-Tzeiranaki, S. et al. 2019, 2020) could explain the reduced interest of Member States;
- The prevalence of alternative types of contracts and a preference for contracts wherein energy performance plays a marginal role, hence preserving the status quo regarding employees and service suppliers (France, the Netherlands);[64]
- Absence of instruments of implementation in the national legislation. Even in Portugal, where there is a national requirement to prioritize the use of EnPC in fulfilment of EED Art. 5, there is a problematic lack of implementation capacity.

Similarly to central governments' commitment, overall public sector interest in EnPC could be improved for some Member States to enable take off or to scale up (Greece, France, Hungary, Italy, Luxemburg, Netherlands, Poland and Sweden).

A lack of interest is problematic amongst some local and regional bodies, as reported for Germany, Sweden, Denmark, Latvia and Netherlands, where these actors have limited incentive to engage with EnPC due to access to low interest rates. An opportunity to change attitudes, strategies, plans and final energy savings obtained is represented by the drafting and reporting to the Commission of long-term strategies, as required by EPBD Art. 2a.

There are also concerns about added costs (the Netherlands) and risks (Portugal). However, few authorities are conducting assessments to establish the position of authorities (Ireland, German lands). The elaboration of these financial assessments shows commitment and reduces the uncertainty of building owners and local decision makers. Issues related to the availability of transparent and comparable information on project performance and risks is reviewed in Part 7.

There is an overall need to improve the public sector attitude towards EnPC, and to establish strategies that maximise the energy savings generated through public spending (most Member States besides Slovakia, Slovenia, Spain, Lithuania, Finland, Denmark, Cyprus, and Croatia). Regarding Art. 5, there are central and regional authorities using EnPC in their exemplary efforts in Czechia, Germany, Slovenia and Spain. In general, additional efforts are needed in relation to communicating the relevance of Art. 5, and the exemplary actions being conducted by Member States. Suitability assessments and long-term strategies are deemed necessary to clarify the instrumental role of EnPC in achieving energy saving and building renovation targets.

[62] For instance, VAT on electricity price is 13% in Croatia, whilst the national VAT is 25%.

[63] Since at the time of this reporting energy prices were bottoming out, there appears to be certain resilience in the EnPC markets to energy prices, which may be related to commitment being relatively independent of cost savings (e.g. targets), and contractual guarantees being subject to energy savings, not costs, to avoid expanding risks for providers.

[64] In attempting to overcome this barrier, France published its first contract models in 2012, a methodological guide for energy results guarantee in 2016, and additional support to EnPCs in thermal systems (2016, 2018), and there is in place a bonus system for guaranteed savings, and an observatory for EnPC (Guermont 2019; ADEME 2017).(Guermont 2019; ADEME 2017). However, the complex service supply system in France leaves little room for EnPCs, and still marginalizes performance guarantees in energy service provision.

4.2.3. Procurement bottlenecks and problematic procedures

Issues of the incompatibility of the national legal and regulatory frameworks with EnPC in the public sector constitute a major regulatory barrier. These are most common in but not exclusive to small and preliminary markets (Appendix 6.3):

- Limited contract duration. In Latvian procurement law, service contracts are limited to five years (EnPC could be addressed as a form of PPP contract but this would be excessively complex for current sizes of projects); in Bulgaria, contracts are limited to 10 years, and there is an EnPC size limit for municipalities;
- The financing of public sector projects is legally problematic (France, Romania and Slovakia); In Slovakia and Romania, local authorities are banned from engaging in contracts of variable service value; in Bulgaria, until recently, the legal framework deemed incompatible the combined use of investment grants with EnPC;
- Public tenders do not permit the multiannual allocation of payments to providers. Such is the case of Portuguese buildings, regardless of the fact that EnPC in the public sector is prioritized as a means of fulfilling EED Art. 5 (ECO.AP framework, and national budgets);
- Insufficient regulatory support for enforcement performance guarantees. In Romania, part of the guarantee needs to be returned to the contractor at the end of the work, hence making it impossible to execute guarantees; in Greece, only part of the guarantee can be reclaimed at the end of a project;
- Insufficient attention in procurement criteria towards long-term savings. In Germany and Sweden, the incorporation of life-cycle considerations has been delayed (EED Art. 18 and EPBD Art. 2a); In the Netherlands, building renovation strategies were being developed during the drafting of this report;
- Procurement criteria fail to foster the development of local capacities of service provision (EED Art. 5, EED Art. 7, EPBD Art. 2a). In Portugal, tendering practices limit the participation of small and medium-sized providers.[65] In Italy, local providers have difficulty opting for the aggregated projects promoted by ELENA.

In addition to obstructive barriers, procurement procedures are problematic due to their complexity and time-consuming nature, especially when involving EnPC (Pernetta and Bender 2019a). Procurement procedures are considered to be overly complex in Austria, Belgium, France, Germany, Greece, Hungary, Italy, and Cyprus. These issues are understood by contributing experts to be related to the inertial activity of administrative bodies and to the interests of the energy and service supply sectors. The latter should be addressed in fulfilment of EED Art. 18. In Greece, a lack of clarity in the procurement law sustains an initial preference for procurement. In Lithuania and Poland, the categorization of EnPCs as PPPs adds complexity and uncertainty to procurement procedures. Moreover, additional administrative time and cost increase risk for clients and providers in relation to engaging in EnPC in public sector preparation due to slow decision processes (Denmark, Italy, Czechia, Spain). Even in cases where intrinsically regulatory constraints are being overcome, as in the case of Spain with its new procurement law and model contracts, decision processes are reported to be even slower than financing ones. Additional to this administrative burden are off-balance sheet treatment (Belgium, Lithuania); an insufficiency of providers interested in tenders (Denmark and Spain); and restrictive performance guarantees and quality assurance requirements. These aspects need to be reviewed in light of the instrumental purpose of EnPC.

[65] A bad tendering practice reported for Portugal was the habit of inviting a limited number of suppliers and allowing only a few days (at times fewer than 15 days) for tender applications.

4.2.4. Provision of definitions, contracts, guidelines, lists of accredited actors, information and demonstration

The following sections review the information summarized in Appendixes 6.6 and 6.7 about government efforts to provide standard definitions, contracts, and guidelines, as well as lists of accredited actors, tailored information and demonstration.

Definitions

The availability and adequacy of definitions was found problematic in eight Member States: Croatia, Netherlands, Poland, Sweden, Greece, Hungary, and Ireland. Definitions are considered insufficient, unclear, or confusing in Croatia, Netherlands, Poland, and Sweden; and non-existent in Greece. In some cases, definitions are found problematic due to their being mere repetitions of those available in EED (Hungary). Limited adaptation of definitions to the national needs was also found problematic for Portugal. There is an overall need for definition simplification (Ireland), and for greater focus on the provision of performance guarantees as the aspect differentiating EnPC. This is important for countering what Hayden and Eoin refer to as "the most common misconception of EnPC [which] is that it should only be considered if you need external finance for a project". Accordingly, these authors have recommended "Chang[ing] the E[n]PC narrative with a simple and consistent message: Energy Performance Contracting is the provision of energy services with guaranteed energy savings" (2019). Also, especially in southern Member States, there is a preoccupation with limitations on including renewables in Maastricht-neutral contracts (Spain, Italy). This preoccupation responds to the long periods of return in these latitudes of thermal insulation, and the potential for solar generation. The further consolidation and communication of definitions would therefore align with the ultimate goals of saving energy and the development of a green economy referred to the EU Green Deal is of paramount relevance.

Contracts and guidelines

Model contracts and guidelines are considered problematic in 10 Member States: Austria, Belgium, Croatia, Cyprus, France, Greece, Latvia, Poland, Portugal and Sweden. An absence of contract models and guidelines was reported for Greece, Latvia (in process), and Poland. In Poland and Lithuania, existing guidelines refer to PPP contracts. This is considered to add administrative complexity.[66] The contract model and guidelines are found insufficiently adequate for not being Maastricht-neutral and lacking adequate verification processes (France and Croatia). The communication and use of pre-existing contracts could be improved in Austria, Belgium, and regarding Portuguese buildings. A lack of adequate standard contracts results in the use of bespoke contracts in Ireland and Denmark. In general, there is a need for the continued adaptation of model contracts to market developments. Facilitation services and One-stop-shops can foster adaptation to specific conditions. A process of update and adaptation was reported to be ongoing in Ireland, Italy the Netherlands, Slovenia, Czechia, Denmark, Germany and Sweden. The degree of adoption of off-balance sheet contracts is reviewed along with the impact of the Eurostat guidelines in Section 5.1.1.

Accreditation of providers and facilitators

The availability of accreditation systems (EDD Art. 16) is necessary for the quality of project implementation, developing the capacity to engage with complex projects – pursuing challenging savings – and generating trust amongst clients. A key role is played by lists of qualified operators, which are often supported by ministries and government agencies. A review of Appendix 6.6. shows that lists of qualified operators are outdated, incomplete, or non-existent for Croatia, Denmark, France, Greece, Hungary, Ireland, Latvia, Poland, and Spain. Voluntary standards are also useful – e.g.

[66] On the contrary there is successful combination of EnPC with PPP in Slovenia, where EnPCs are under PPP law, in Croatia, where EnPC and PPP are treated as complementary, and in the Netherlands, where both models coexist and are adopted by frontrunner local authorities.

the signature of codes of conduct (Bulgaria, Romania). However, government efforts related to qualification and dissemination are a way of showing political commitment and increasing trust in the system. For instance, the establishment of quality standards along with targets is considered necessary in Italy as a means for governments to show the way forwards and avoid uncertainty.

Provision of information and demonstration

Limited provision of information and demonstration projects appear to be correlated (Appendix 6.7). Insufficient effort related to demonstration was reported in Belgium, Croatia, France Germany, Ireland (lack of disseminated projects), Latvia, Poland, Portugal, and Romania. Even in advanced markets (Germany), there is a need for locally adapted information and demonstration examples to cope with regulatory and technical evolution. Consensual understanding may be lacking amongst sectoral experts about "demonstration". In some cases, the mere existence of interventions appears to be considered demonstration by some respondents, whilst others apply the term to projects in which technologies and contracts are tested and then disseminated. Greater effort at disseminating models and practices in place, along with the results and lessons obtained, would increase the role of potential demonstration projects. Demonstration projects should not be understood in terms of technological demonstration, but need to showcase and serve as learning grounds for new mechanisms that meet specific needs, such as off-balance sheet treatment, the testing of innovative financing, or the creation of One-stop-shops (Rhodoshop in Bulgaria).[67] Arguably, their role could contribute to: a) the development of knowledge, b) overcoming risk aversion, and c) the continuous adaptation of models and practices.

4.3. Financial barriers

Member States are expected to address finance barriers in alignment with Art. 10 of the EPBD and Art 18 of the EED. In these articles, EU support is allocated to setting, supporting, and accepting new and specific solutions. In addition to aspects of balance-sheet treatment covered by Eurostat guidelines and adapted contracts (Section 4.2.1), international finance standards[68] still contribute to confusion amongst financiers, since these standards require contract stipulations either of "pay as you use" or of "pay as you save". European Commission and EIB collaboration in the Fi-Compass (2020) project has involved working on creating national capacities to overcome the remaining finance barriers (Table 3).

Table 3. Financial barriers and opportunities for EnPC in the public sector. Source: Pernetta and Bender (2019b).

Barriers	**Opportunities**
Project preparation cost	Technical support, standardisation
Access to finance in view of "Maastricht constraints"	Using "Maastricht-neutral" preferential financing, e.g. ESIF FIs
Lack of familiarity of intermediaries with EnPC	Capacity building of finance intermediaries; specialised fund
Long payback times; Potentially, not all investment can be recouped by energy savings	Long-term financing; Using grants, e.g. from ESIF
High risk during implementation, but low risk during performance period	Using different forms of financing during project implementation
ESCOs have limited balance sheet; EnPCs do not have tangible forms of collateral	"Off-loading" debt from ESCO's balance sheet; "Step in rights" of financial intermediary

[67] Rhodoshop is a pilot One-Stop-Shop in the Rhodope Region of Bulgaria created under the H2020 grant. It is a structure that acts as central procurement agency on behalf of local authorities to undertake energy retrofitting works in their buildings and street lighting systems. It gathers in one place competencies and resources for the development of bankable EE projects (audits, works to be realized, financial viability calculations, preparation of public tendering procedures).

[68] IFRS Standard 16 (https://www.ifrs.org/issued-standards/list-of-standards/ifrs-16-leases/).

Our analysis in this section excludes some of the barriers that were covered in the regulatory sections: namely, project preparation cost, and lack of familiarity of intermediaries with EnPC, covered in Sections 4.2.3 and 4.2.4. The remaining barriers – lack of financing for reviewers, and aspects related to the competition and compatibility of ESIF as identified in the EC JRC 2020 Database (Appendix 6.8) – are reviewed in the following sections.

4.3.1. Limited access to financing for providers

EnPC providers and other energy service providers compete for limited financing and business opportunities. Moreover, as reviewed by Fi-Compass, providers tend to have limited access to financing due to their limited balance sheet resources. This is particularly problematic in the case of: a) deep building renovation, because this requires long-term financing, and b) off-balance sheet treatment, due to the minimum duration of eight years (2020), the risks associated with the provision of performance guarantees, and the additional costs of measurement and verification. Risks are much higher during implementation than during the period of performance, making it necessary to use different forms of financing for the former phase (Table 3), and for the client to bear most risks during this phase (e.g. Berlin City Council, Sweden). The lack of capacity to assess risks was explicitly reported as a barrier to EnPC in the public sector development in Denmark and Portugal.

Problematic access to financing for providers to engage in EnPC in public sector contracts, especially for off-balance sheet contracts, was identified in the cases of Bulgaria, Croatia, Germany, Italy, Latvia, the Netherlands, Poland, Portugal and Spain. These issues are likely to be applicable to several other countries.[69] Amongst the reasons for this situation are a lack of understanding of EnPC by banks (Croatia), and the greater risk perceived in off-balance sheet treatment (Portugal). Access to private financing involves high equity interest (Germany), hence making EnPC less competitive with public procurement, which often has better access to low cost financing. In other cases, providers are expected to bring in a substantial amount of their own resources (20-30% in the Netherlands).

The development of efficiency and guarantee funds is needed, in alignment with the opportunities granted by compliance with Art. 20 and Art. 7 of the EED. The need for EU and national support for national energy efficiency and guarantee funds is problematic in Bulgaria, Croatia, Czechia, Italy, Latvia, and Poland. In Bulgaria, guarantee funds could reduce contract risk, which is high due to termination rates. Similarly, they could support off-balance sheet contracting in Portugal, where investors prefer on-balance contracts due to their lower complexity and easy access to EU and national funds. Although White Certificates are in place in Italy, there is the potential for a guarantee fund to be supported with performance bonds. This could serve to support the entry of small providers to a market in which project aggregation promoted by ELENA blocks entrance to small actors.

There are sectoral demands for ESIF instruments for supporting guarantee funds (e.g. Croatia, Czechia, and Poland). In the cases of Czechia and Croatia, expectations are that ESIF shall guarantee projects, especially through forfaiting. One such instrument has been successful at enabling EnPC in the public sector in Germany and Austria. The aspects of compatibility between ESIF, EnPC and forfaiting are reviewed in Section 4.3.2.

[69] The following arguments support the potential relevance of this barrier in other Member States: a) the diversity of the markets where this barrier is relevant, b) the fact that the expert assessment of finance barriers was provided in the form of narratives – a closed set of options was not provided in the questionnaire, and c) because not all participants were financing experts (Appendix 4.2).

One alternative for EU to finance providers is the use of EFSI loans, but these are a more costly form of financing (venture capital). Hence, EFSI is only accessible to providers of a relatively large scale. [70] There is a risk that potentially upcoming InvestEU funds for energy efficiency from 2021 will also fail to allow for a combination of financing mechanisms beyond the project level. Another mechanism that allows access to financing for providers is forfaiting and revolving funds, since these provides the opportunity to cash in the life-cycle benefits of energy performance interventions (Economidou, et al. 2019).[71] Remaining barriers to the development of these mechanisms include the need for the further interest of financial institutions in the purchase of receivables.[72] There are also aspects of compatibility with public support, covered in the next section.

4.3.2. Competing and incompatible financing

In the absence of renovation strategies and targets, EnPC is often perceived as costlier than direct public investment and contracting modalities without performance guarantees. Public sector access to low interest rates (e.g. Austria, Germany), and the preferential public financing of municipalities (Sweden, Denmark, Netherlands, Latvia, and Spain) puts the private financing of EnPC providers at a disadvantage.

The availability of EU and national investment grants hinders interest in EnPC in public sector markets. These funds have reduced a large amount of the potential necessary for take-off in EnPC lighting markets (Hungary, Greece, and Spain), and for the development of EnPC in the public sector in public buildings (Croatia, Portugal, Latvia, Romania, and Bulgaria).[73] The creation of national grant schemes for building renovation supported with EU funds appears to be fundamentally problematic, especially in cases where the allocation of funds lacks strict control of the profitability, quality, and efficiency of expenditure, and there is insufficient transparency and clarity concerning measurement and verification mechanisms. Moreover, public financing channelled through specific public funds and cooperative financing mechanisms (Denmark, Netherlands, and Sweden) is a fundamental reason for public bodies to disregard EnPC (KommunKredit in Denmark or Bank Nederlandse Gemeenten in the Netherlands).

The relative relevance of EnPC with respect to other financing mechanisms needs to be assessed both from a cost-effectiveness and a strategic perspective to include its capacity for leveraging private investment, provision of performance guarantees, and incorporated capacity of measurement and verification. Priority attention should be paid to this issue in EU attempts to further exploit the

[70] According to the consulted data, to date, only Slovenian Resalta has received a €12m loan from the EIB to operate in South-Eastern Europe and the Western Balkans https://ec.europa.eu/commission/presscorner/detail/en/ip_20_242

[71] Forfaiting constitutes the sale without recourse of receivables to a third party, meaning that the responsibility of the provider cannot be enforced in case of no repayment (FI-Compass 2020)

[72] The interest of financial institutions is restricted by: a) the scale of operations, i.e. the nation-based operations of financing institutions pose a problem of scale; however, financing from dedicated transnational funds is costlier; b) the relatively small size of transactions, especially in the case of public lighting; c) the delayed payment of public sector fees (e.g. in Italy); e) legal issues at the national level (e.g. Bulgaria and France – mismatch of forfaiting with the French model of Cession Dailly).

[73] In Spain, the EEF – which is funded by EEOs and structural funds (see Rodrigo 2019) – provides financing at low interest rates for energy performance interventions and has been deemed to constitute considerable competition to EnPC, especially for the public lighting sector. In Portugal, the competing funds reported originate from H2020 and a national grant; In Bulgaria, the competition has until recently come from the legal impediment of combining investment grants with EnPC, resulting in a preference for the former over the latter.

potential of private investment in the achievement of EU targets.[74] The European Court of Auditors has also found problematic the limited priority granted to mechanisms that multiply the capacity of public funding by engaging private investment – specifically indicating EnPC (2020).[75]

There are also problems of compatibility. Until recently, grants were incompatible with EnPC in Bulgaria. Incompatibility between ESIF and off-balance sheet contracts has been reported as problematic for the development of EnPC in the public sector markets (Croatia, Czechia, Slovakia, and Portugal). This is problematic because public funds help to make feasible long-term deep building refurbishment projects. To reverse this situation, EnPC would benefit from the preferential or conditional allocation of grants based on an assessment of projects being *EnPC-able*. For this to happen, it is necessary to implement the EU framework to facilitate sustainable investment (Council of the European Union 2020; 2019), which along with the DEEP and EEFIG-underwriting toolkit, foster the transparency and comparability of projects from a financial and sustainability perspective. The EU Green Deal, its Financing Plan, and the Renovation Wave Strategy provide solid grounds for establishing energy saving goals and the development of sustainable green financing as criteria in EU fund allocation.[76]

Also, during the reported period there have been concerns about the compatibility of forfaiting with off-balance sheet treatment and financial support from public sources (e.g. ESIF). (This is reasonable, because whilst providing financial support and waiving the off-balance treatment the EU needs to ensure that EnPC transfers risks to the private sector.) These incompatibility matters have been problematic in the advanced markets of Czechia and Slovakia where providers fully finance projects largely based on the forfaiting. To overcome these issues, Bulgaria and Czechia have relied on on-balance contracts,[77] hence limiting the potential for development of EnPC with guarantees, fostered by Maastricht neutrality requirements. The forfaiting model also provides an opportunity for Member States with preliminary markets. Such is the case of Latvia, where expectations are strong involving the already approved creation of a bank for forfaiting projects (an activity similar to LABEEF).[78] These markets would benefit from public support (e.g. ESIF, InvestEU) combined with forfaiting and off-balance sheet contracts, hence gaining scale and engaging with more challenging projects such as deep renovations.

A will to overcome issues of incompatibilities and the competition of public funding with private financing was already core in the SFSB initiative and has been strengthened in the text of the Renovation Wave Strategy (2020). However, the latter was published after the reported period, meaning that no primary data was collected on the expected impact of the Strategy.

[74] A similar problem with PPPs has been recognized by the EU: in "cohesion countries, the availability of ERDF/COHESION FUNDS grant can crowd out private sector investments" (European Union 2016, Performance management strategy guidance. PPP and Cohesion policy -POL_STU(2017)602010_EN).

[75] According to ECA 2020: "Grants remain the main form of support for energy efficiency investments funded by the EU and are not reserved for deep renovation". Accordingly, ECA recommends "Improving the planning and targeting of investments" for these to foster deep renovation, align with NECPs and LTRS, and define estimated energy savings – which therefore need to be verifiable. However, in its response the European Commission claims it cannot allocate funds in the period 2021-2027 based on cost effectiveness because projects are not comparable, especially across Member States, and that "there is no requirement that indicators should report primarily on the amount of energy saved … The regulation allows using programme specific indicators, which are not possible to aggregate due to their nature."

[76] The Renovation Wave makes fund allocation conditional to contributing to long-term renovation strategies, and plans reported in NECPs, such as the creation of energy efficiency funds and national mechanisms to contribute to these funds (e.g. EEOs and White Certificates).

[77] The same applies to Germany and Austria, where the existence of forfaiting mechanisms counters the development of off-balance sheet contracts.

[78] The Latvian Building Energy Efficiency Facility (LABEEF) manages a fund for renovating multifamily buildings.

4.4. Remaining barriers and recommendations

A series of recommendations of relevance primarily to Member States can be summarized based on the barriers reviewed in Part 4:

Market inertia, lack of trust, awareness and understanding (4.1.1, 4.1.2). The development of facilitation and One-stop-shops, along with the development of provision capacity and quality, is fundamental for increasing trust in the market and for public bodies to access the best opportunities for energy performance interventions that address long-term energy savings and engage private investment.

Competing contracts (4.1.3) and additional transition costs of EnPC due to problematic procedures (4.2.3). The simplification, standardization, and continuous updating of definitions, contracts, guidelines, and procurement processes – ideally at EU level –, along with the provision of lists of providers and guidelines and demonstration projects (Section 4.2.1., 4.2.4) are needed to reduce the costs associated with EnPC and other suitable alternatives, thereby improving perception and interest, and furthermore enabling a greater allocation of public and private sector investment to energy saving interventions. To this end, the development of standard definitions, contracts, guidelines, and demonstration projects is key.

Availability of providers, facilitators, in-house capacity, and One-stop-shops (4.1.3). The specific training and accreditation of EnPC providers, along with an increase in the capacity of facilitation and One-stop-shops are needed to overcome issues of limited trust and transaction costs in the complex and changing environment of EnPC in public markets.

Procurement bottlenecks and problematic procedures (4.2.3). In addition to the need to simplify procurement processes, there appears to be a need to introduce life-cycle considerations and co-benefits in procurement criteria. These would make EnPC more competitive in comparison to other varieties of contracting. Similarly, enforcing measurement and verification requirements in the public sector – both *within and beyond* EnPC – would remove the incentive to engage with alternative contract modalities.

Political commitment (4.2.2). Strategies, targets, and technical support are a fundamental means of overcoming barriers associated with administrative burdens. These involve developing experience, introducing cost-effectiveness criteria for the allocation of national and EU funding, and overcoming the limited motivation of decision-makers and advisors.

Limited access to financing for providers (4.3.1). Increased technical and finance-related capacity requires continued support from EU assistance and guidance mechanisms, as well as the creation of national databases in fulfilment of EPBD Art. 2a. In addition to the removal of market disincentives (4.2.2), there is a potential for introducing incentives including energy-saving tariffs, on-tax and on-bill schemes, and taxation tools, which along with energy efficiency obligation schemes (EED Art. 7) can make financing available to EnPC providers.[79]

Need for regulatory adaptation to off-balance sheet treatment (4.2.1) and the provision of definitions, contracts, guidelines, lists of accredited actors, information and demonstration (4.2.4). Overcoming these barriers is instrumental to overcoming other barriers; see, e.g., Sections 4.1.2, 4.1.3.

[79] These instruments are proposed for Member States to implement in the Renovation Wave Strategy.

Competing and incompatible financing (4.3.2). There is a need for conditionality requirements in the allocation of NEEFs, grants and guarantee funds for these to have a multiplier effect in private investment. Other incompatibilities, e.g. of EnPC with forfaiting and ESIF grants, are been addressed (Fi-Compass 2020). The Renovation Wave (2020) has taken issue on homogenising support mechanisms to avoid funding incompatibilities, and to ensure that public support leverages on private capital investment.

5. Assessment of key enabling factors

The main motivation for the public sector to engage with EnPC originates in: a) the need to access private sources of financing, b) interest in guaranteed savings, and c) the need to access technical capacity. These sources of motivation are mediated by a set of factors identified through the analysis of the EC JRC 2020 Database (Appendix 7). These are reviewed in two blocks: regulatory progress and financial factors.

5.1. Regulatory progress

5.1.1. Standardization and aggregation

Standardization, including the development and adoption of model contracts, is necessary for markets to scale up and needs to build on clarity about Member State commitments and capacities (Hayden and Eoin 2019). The development of model contracts is fundamental if markets are to overcome legal, procurement, and uncertainty constraints. Model contracts reduce risks and transaction costs (Frangou et al. 2018), and foster quality improvements by permitting the replication of working procedures. This is important for debt-concerned Member States that are willing to exploit the advantages of off-balance sheet treatment, and for others, e.g. to reduce transaction costs. During the period 2017-2019, the development of contracts, largely fostered by the adoption of Eurostat guidelines, has been widely recognized as having a driving effect (Croatia, Cyprus, Czechia, Ireland, Latvia, Romania, Slovakia, and Spain). Following the adoption of a Guide on Energy Performance tendering specifications for the public sector, Cyprus is preparing tendering guidelines for EnPC in the public sector (expected for the first half of 2021).

The development of model contracts alongside pilot projects can be a suitable strategy to show government commitment and to develop model contracts adapted to the local conditions. For example, the development of pilot projects in facilities with large consumption has been used as the basis for drafting model contracts (Hospitals in Italy and Ireland, sport and training centres in Catalonia- Spain). Based on these experiences, the combination of pilot projects with the availability of model contracts and providers exist has high potential for successfully upscaling the market.

Together with project and contract standardization, aggregation is an instrument of fundamental importance for reducing the transaction costs related to the tendering and procurement complexity of EnPC. Efforts at tender aggregation have intensified since the Eurostat and EIB Guide of 2018. Aggregation is also supported by ELENA and EBRD (one contract per country).[80] Recent examples of

[80] National aggregation is conditional to forfaiting and integral support in projects supported by the EBRD. EBRD support promotes one contract per country (including Lithuania in EU Public buildings: 12 EnPC tenders published for € 5.4m; 9 EnPC tenders under implementation; 3 projects with feasibility studies ready; Street lighting: 3 EnPC tenders published; 1 street lighting EnPC tender in negotiation (potential of €15m) with integral assistance and guidance to foster national capacities, whilst increasing project duration and depth. The process involves use of a model of forfaiting with limited recourse and quick assessment (Miller 2019) to prioritize the addressing of strategic development goals.

aggregated tendering have taken place in Bratislava (four lots of EnPC projects for buildings in 2020), and the aggregation of police and fire-stations in Catalonia (Spain). Often, aggregation efforts are addressed at buildings with high consumption and similar typologies that depend on a single authority to initiate upscaling pilots and normalize the use of EnPC in public buildings. Initial developments in the market with public lighting are common in Portugal, Croatia, Italy, and Spain. These markets have benefitted from ELENA support, which has brought about a culture of tender aggregation. By working with public lighting, these markets have developed client capacities, contracts, guidelines, procurement and facilitation services.

The updated Eurostat guidance of 2017 on the treatment of EnPC in the public sector and the practitioners' guide issued in collaboration by the EIB and Eurostat in 2018 have been praised for overcoming legal uncertainty (ECA 2020; EED 2018). Deficit-related considerations drive interest in EnPC in the public sector, as explicitly reported in Czechia, Greece, Ireland, Italy, Poland, and Slovakia. It appears, moreover, that Eurostat guidance and SFSB dissemination efforts have increased familiarity with EnPC in the public sector model.[81] Eurostat guidance has contributed to an increase in awareness and transparency, the clarity of tenders, and to a better understanding of EnPC by finance and statistical bodies, overall contributing to the position of the sector (Belgium, Croatia, Portugal, Slovakia Spain, and Lithuania). The highest impact was reported for Belgium, Croatia, Czechia, Italy, Slovakia, and Spain; their drive has also increased the expectation that the market will take off in Lithuania and Latvia (Table 4). This set of Member States includes some where the off-balance sheet treatment has become mainstream (Italy, Slovakia, lighting contracts in Croatia); some, where on-balance and off-balance contracts coexist (Belgium, Croatia and Spain); and others where off-balance contracts are yet to be developed (Czechia, Lithuania, and Latvia).[82] In the case of Czechia, where treatment is considered marginally relevant, there are expectations about the development of off-balance contracts making projects more acceptable to the central government. A limited impact of Eurostat updated guidance was reported for markets where contracts were developed earlier, have a recognized degree of maturity, and where off-balance sheet treatment is considered unimportant (Austria, Germany, Denmark, the Netherlands). The impact was also reported to be negative for Czechia due to the country having a working system and off-balance sheet treatment not being important. The relevance of contracting as a driver was also not reported in Cyprus, Greece, Ireland, Lithuania and Romania, where there are, however, high expectations for these markets to take off concerning the adoption of off-balance sheet contracting. The limited relevance of the updated Eurostat guidance for public sectors with access to low interest rates calls for greater definitional, communication and regulatory emphasis on the provision of performance guarantees and the establishment of quality assurance mechanisms.

Table 4. Assessment of the impact on EnPC in the public sector markets of the Eurostat guiding note (2017) and the Eurostat and EIB Guide (2018). Source: EC JRC 2020 Database.

Member State	**Impact (0-4)**	**Resulting change**
AT	1.0	None (no relevance for Statistik Austria).
BE	3.0	Transparency in writing off process; Since savings have to be higher or equal to EnPC price, solutions are limited, excluding structural insulation works
BG	0.0	Demand more passive, not implemented; Compatibility issues with ESIF have been overcome; Pursuing off-balance template which includes non-efficiency measures (longer contracts)

[81] Off-balance contracts have been consulted with national statistical offices in Austria, Belgium, Czech Republic, Greece, Ireland, Latvia, Lithuania, and Poland (Pernetta and Bender 2020). There are already off-balance sheet contracts in use in use in Austria, Belgium, Croatia, Denmark (hospitals only), Finland, Portugal, Slovakia and Slovenia. They constitute the main form of EnPC in public sector contracting in Finland, Italy, Portugal, Slovakia, Slovenia and the regions of Wallonia (Belgium) and Catalonia (Spain).

[82] Impacts on Lithuania and Latvia, where EnPC contracts are yet to be developed, relate to the capacity of the Eurostat and EIB Guide (2018) to provide structure to EnPC contracts (considered as PPPs in Lithuania) and to further encourage proponents of the model in their efforts to promote its adoption by the public sector (Latvia).

Member State	**Impact (0-4)**	**Resulting change**
HR	4.0	The previous Energy Efficiency Law treated the EnPC as non-public debt, tenders in public lighting are clearer, and banks understand the model better. Not working for public buildings (performance not measured). Trials of combining of ESIF with EnPC for guarantee fund[83]
CY	0.0	Not implemented yet.
CZ	3.5	Treatment not important but Eurostat rules distort a functioning, balanced system, Finalization of off-balance contracts will make projects more acceptable to the administration. Combined use of EnPC + structural funds is taking off
DK	0.0	No change at all
FI		Consulted national experts claimed not to be acquainted with Eurostat rules
FR	0.0	No change at all
DE	1.0	Eurostat guidance is mostly disregarded. EnPC is considered to be similar to third party financing; comparison between EnPC and own investment is required and is widely standardized process
GR	1.0	Not widely known by authorities. A contract model in use involves limited provider liability
HU	0.0	No impact
IE	1.0	Ongoing exploration of the off-balance model, but pioneering individuals were burned out in the past (before Eurostat clarification)
IT	4.0	Less investment but more economically focused; increased awareness and focus (Guide used as check list); confusion about application
LV	2.0	Mobilizing already motivated sector. No contracts.
LT	4.0	Provides structure and standardization capacity lacking in the country (EnPCs as PPP)
NL	0.0	Not an issue
PL	1.0	Not much
PT	1.0	No sensible changes
RO	0.0	No effect
SK	3.0	Better awareness, clearer regulation and facilitation mechanisms, simpler projects and increased confidence (but projects restricted by Eurostat Guide, i.e. market disruption)
SI	0.0	Requirements adopted at national level, no further changes
ES	3.4	Better understanding; Adapted procurement law and contract models; Conservative and slow interpretation of Eurostat and EIB Guide (slowing regional adoption). ESCO with EU funds (IDAE, lighting)
SE	-	Consulted national experts were not acquainted with Eurostat rules
EU	4.00	

Country colour code: off-balance sheet (green), on-balance sheet (orange) or a combination of both treatments (blue). Impact colour ranges from dark red (0) to dark green (4).

Overall, contract models, whether off- or on-balance have been recently or are now being updated in at least 16 Member States (Austria, Belgium, Croatia, Czechia, Greece, Ireland, Italy, Latvia, Lithuania, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, and Spain) (Appendix 6.6). Fundamentally, model contracts need to incorporate balanced guarantees and penalty mechanisms to ensure both that they attain their goals whilst not driving away EnPC providers' interest for public markets to opt for other public tenders or prefer the private sector (Portugal and Czechia). However, EnPC needs to be sufficiently restrictive to deliver results that correspond with the efforts put in by the EU and public sectors to develop these markets. Fundamentally, for contracts to drive the market they need to engage project measurement and verification (Bulgaria) and increase simplicity as they become tailored to local needs (Portugal, Germany) and EU conditions (e.g. Eurostat guidance), and procurement become adapted to contemporary values and needs.

[83] A combination of EnPC with ESIF is considered important for building renovation (payback period of 15-20yrs). This is related to national misinterpretation. There appears to be some progress in deals by ERGEA (West Croatia) with on-balance contracting.

5.1.2. Commitment of the authorities

The commitment of public authorities towards saving energy and fulfilling EU obligations and recommendations is key for the engagement of public bodies to engage with EnPC and to pursue ambitious contracts. Part of this commitment can be considered the fulfilment of public building targets in EU directives (EED Art. 5), the establishment of long-term renovation strategies (Art 2a EPBD), the allocation of effort to achieving verifiable savings (EPBD Art. 10), and increased effort towards more complex interventions with higher energy savings and the greater engagement of private investment (EED Art. 18, European Green Deal). The EED and EPBD, as well as new developments in the framework of the European Green Deal, are expected to further Member State commitment with the establishment of strategies and transparent reporting. The development of a policy framework, and in particular the establishment of long-term commitments and strategies is fundamental to overcoming regulatory and administrative barriers (Barglazan 2019; Ryan 2020).

Public sector commitment is considered to drive markets in Slovakia, Slovenia, Spain, Lithuania, Finland, Denmark, Cyprus, Croatia and Austria. Ongoing improvements involve efforts to define national energy saving objectives for renovation. For instance, in Bulgaria – driving improvement in project quality; Denmark, Greece – newly introduced strategy and obligation for buildings; Netherlands – upcoming strategy for public real estate management; Portugal – new legislation supporting renewable energy technology deployment; Slovakia – building renovation targets. In Slovenia, the market is driven by the high-level targets established in Ljubljana. A change in attitude may also occur in Ireland, where an assessment of the suitability of EnPC in the public sector (public building sector) is being carried out with SRSS support. The overall positive attitude of public authorities as reported in Cyprus, Lithuania, and Spain raises expectations that these markets will increase in relevance in the coming years (Appendix 7.1).

Member State strategies are of key importance in relation to whether public bodies receive clear signals about the central government being serious about its commitment to saving energy and to engaging private investment, and hence with regard to whether the latter bodies to pay greater attention to guaranteed savings, and to EnPC in the public sector. Targets and government commitments appeared to be the most relevant drivers for participants in the EC JRC Survey 2020 (Appendix 7.1) – this was highlighted by experts from 12 Member States (Bulgaria, Denmark, Greece, Hungary, Ireland, Italy, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain). The implementation of Art. 5 plays a relevant role in the adoption of EnPC in public buildings of central governments and some regions (Czechia, Netherlands, Germany, Slovenia, and Spain). While improvement is taking place (Section 1.2), additional efforts are needed to communicate Art. 5 within and beyond the domain of EnPC in the public sector. A recent quantitative assessment in the Netherlands found that most experts support more restrictive regulations, to be accompanied with increased exemplary efforts (Hoevenagel 2020). However, the overall attitude of public authorities towards EnPC is considered better than the efforts allocated to using EnPC in fulfilment of exemplary obligations (EED Art. 5). Local and regional authorities are driving the adoption of EnPC in Cyprus, Denmark, Finland, Hungary, Lithuania, Portugal, Slovakia Slovenia, and Spain (Appendix 6.5). As argued in 4.2.2, this reflects the limited fulfilment of Art. 5 and the prevalence of interventions in lighting in a wide array of markets.

Another way for authorities to demonstrate their commitment towards EnPC and energy performance is fostering quality, both in terms of sectoral capacity and project implementation. As shown in Appendix 7.2, there is an increase in interest in quality, and more complex projects have started in Belgium, Bulgaria, Greece, Croatia, Czechia, Poland, Italy and Spain. These developments involve a greater focus on buildings, on deep and comprehensive renovations, and on the promotion of project bundles. These qualitative improvements are driven by a diversity of factors, including a) the need to provide a qualitative difference with other contracting and financing mechanisms (Bulgarian buildings, Spanish lighting) (Appendix 6.1); b) the development of technical capacity (Croatia, Czechia);

c) the availability of examples and good practices (Poland); and, d) the Eurostat requirements for savings to add up to more than the investment inefficiency (Italy, Spain) (Appendix 7.1, Table 4).

A series of instruments are in the hands of Member States to foster quality: a) lists of qualified operators as satisfactorily provided by governments in Austria, Belgium, Czechia, Finland, Germany, Lithuania, Netherlands, Portugal, Slovakia, Slovenia, and Spain (Appendix 6.7); b) greater effort regarding the provision of information and demonstration cases that are adapted to market and regulatory developments; and, c) the development of quality assurance mechanisms and the adoption of M&V mechanisms. At the EU level, the transfer of technical capacity to incipient markets is needed to avoid locking in potential. The ongoing development of quality guidelines for energy services (QualitEE 2020) is expected to contribute to these ends.

To ensure the capacity of EnPC to drive the improvement of the public sector performance, there is a need for government commitment that goes beyond the strict promotion of EnPC. A lack of or the existence of lean performance guarantees and M&V can do more harm than good, i.e. by creating a market but failing to pursue and deliver challenging projects, and overall failing to contribute to the attainment of EU 2030 targets). One alternative to lowering the bar for EnPC is universalizing its requirements to public sector interventions by requiring performance guarantees and M&V mechanisms in *all* energy performance interventions in the public sector – at least when supported with EU funds or technical support facilities. This measure would make EnPC more competitive, or even define it as the default option. Moreover, the measure would partially mitigate the additional costs that would be involved, by supplying data for enhancing risk assessment and hence reducing finance fees.

5.1.3. Quality assurance: provider accreditation and M&V

Without M&V, it is not possible to provide realistic performance guarantees. There is a need to conduct preliminary energy audits and draft clear measurement and monitoring plans. These are typically based on the International Performance Measurement and Verification Protocol (IPMVP). Otherwise, the energy savings that are the object of the contract cannot be measured during project implementation (QualitEE Project 2020; Boza-Kiss et al. 2017). However, measurement and verification constitute a competitive burden for EnPC. This competitive disadvantage should be resolved through effort to mainstream measurement and verification requirements in public sector interventions in energy performance, and by engaging accredited professionals to ensure that costs do not to outweigh quality-related benefits.

Work from the Transparense project recommended the establishment of quality labels and developed a code of conduct for providers (2015). The project QualitEE has recently recollected a set of best practices on the institutionalization of quality assurance in 11 Member States (Table 5) that highlight the incorporation of EnPC quality assurance into the national standards scheme in Spain, the individual certification of projects and providers in Czechia, the use of trade association schemes in Austria, the incorporation of EnPC providers into approved lists of ESCOs, the development and adoption of the European code of conduct for EnPC in Bulgaria and Slovakia, and the sampling of projects to accredit providers in Belgium and Czechia.

Table 5. Business Cases of National Quality Assurance Schemes for Energy Efficiency Services. Source: QualitEE 2020.

Incorporation into national standards – (Spain) integrates quality criteria into existing standards published by the national standards body UNE (UNE 216701 for Classification of Energy Service Providers)
Government scheme – (Czechia) uses the national adaptation of quality criteria as the basis for a scheme led by the Ministry of Industry and Trade. Energy Performance Contracting projects are individually certified past the first savings verification point, and service providers are certified based on achieving 2 or 3 certified projects dependent on value.

Trade association schemes – (Austria & UK) similar to in Czechia, the UK scheme – to be administered by the Energy Services & Technology Association – uses sample project verification past the first savings verification point to accredit service providers. The established DECA scheme in Austria offers a project-level label to providers that commit to deliver services in line with the quality criteria.
Incorporation in national ESCO registries – (Greece, Latvia & Slovenia) all EU countries were required to establish ESCO registries under the Energy Efficiency Directive. The quality criteria are incorporated into the process for appointing ESCOs to these registries.
Enhanced code of conduct – (Bulgaria & Slovakia) where quality criteria have been included as an extension of the European code of conduct for Energy Performance Contracting, which has been signed by service providers in these countries.
No formal scheme – (Belgium & Germany) In Germany, the German association of municipal utilities uses quality criteria to offer a contract checking service. In Belgium it was found that the market was not yet sufficiently mature to accept a scheme, although useful groundwork was laid for the future. Interestingly, the most popular approach during consultation was a hybrid scheme using sample projects to accredit providers, similar to the approach selected in Czechia and the UK.

5.1.4. Development of adaptive, internal capacities

The development of internal capacities in the public sector needs to be continuously updated to keep pace with the increasingly changing and complex context of EnPC. Dedicated agencies and department units, as well as One-stop-shops, aid the development of EnPC in the public sector by assisting public bodies with guidelines, model contracts, technical assistance, contract drafting, and access to financing, overall reducing transaction costs and reducing uncertainty by making knowledgeable advice available. Their role has been highlighted in Slovenia, the Netherlands, Spain – Catalonia, Belgium – Flanders, and Germany). One-stop-shops appear to be a relevant target for EEF co-financing in order to adjust business models to client needs. Such is the case of the German Energy-Service Hub in Berlin (EDL_HUB) whose purpose is to overcome barriers to the ESCO markets in Germany. The EDL HUB provides follow up to finalised ELENA projects (InEECo). In the pursuit of tailored incentives, EDL-HUB, in collaboration with the lander, are considering the possibility of providing bonus subsidies for contracts that achieve more than 50% CO_2 reduction – hence contributing to differentiate EnPC projects, whilst reducing the risk of free riding – problematic in grant schemes. There is potential for the development of these services, as suggested in compliance with the required provision of information by Member States (EPBD Art. 20). Based on experience, the uptake of One-stop-shops as a variation of in-house capacity facilitation or relying on the development of external facilitation capacities could help with leap-frogging markets willing to upscale and increase quality of intervention, as well as help to engage with ever more complex interventions, including non-efficiency solutions (renewable generation and smart technologies).`

To navigate EnPC procedures, a close relationship of mutual support and trust with providers plays a fundamental role for the administration, as reported for Germany. This example shows the often-unclear delineation between the roles of independent advisor, facilitator, and consultant, and the provider of the services. The development of these close relationships requires a degree of expertise in the administration and recognized quality of provision. It is particularly advantageous to reduce the cost of tendering for the client and the provider. The participation of providers in early tenders represents an opportunity to remove constraints created by technical capacities in the administration related to project design and the access of providers. Hence, this sort of close collaboration furthers the advantages of EnPC in supplying technical capacity to the public sector.

The development of technical capacities and their availability to national, regional and local bodies is also fundamental for contracts and projects to be adapted to the context. Such is the case of

renewable energy and water saving criteria, considered relevant in (Spain, Italy, Greece).[84] In these Member States, the increase of renewable ratios in EnPC contracts could ease the choice of cost-effective means for deep energy renovations. Alike these, the incorporation of renewables, requires contracts longer than 10 years (Frangou et al. 2018). These examples and arguments support claims about the need of developing local capacities, since these are needed for developing, advocating for, and implementing context-relevant contracts.

5.1.5. Consideration of EnPC as the default option

In some public administrations, EnPC is set as default option for energy performance improvement interventions and building renovations. The initiation of energy performance improvement procedures needs to be preceded by assessments of the suitability of EnPC (Ireland, the Netherlands). Similar rules apply to public buildings in Austria, Slovakia and Germany. In Austria, federal buildings are mostly under a single form of management that uses EnPC as the default option for building renovation.[85] In Slovakia, the renovation of a public building must be preceded by verification of the possibility to engage an EnPC contract (the mandatory national off-balance contract model). Investment grants are then provided through EnPC procurement. In Germany, Federal Buildings use EnPC as default option, and the states need to explain the use of EnPC when asking for federal funding. EnPC is also recognized as the favoured mechanism for fulfilling EED Art. 5 in Portugal and Catalonia (Spain),[86] and towards building renovation in Wallonia (Belgium). A similar requirement in Portugal is expected to have an important effect once other barriers to building renovation are overcome. A similar strategy is making the provision of subsidies conditional on the utilization of certain contracts, as in the case of Italy. In Italy, subsidies funded with White Certificates are allocated on the condition of contracting energy services. In general, it is recommended that feasibility assessments are conducted for batches of buildings, and not on an individual basis, to limit costs. These buildings can be then tendered in an aggregated manner.

As a general rule, EnPC needs to remain instrumental to achieve energy saving and building renovation targets. For instance, narrowing the focus of contracting to EnPC may dismiss the possibility of successful combination of EnPC with PPP. For instance, in Slovenia EnPCs are under PPP law, in Croatia EnPC and PPP are treated as complementary, and in the Netherlands both EnPC and PPP models coexist and are adopted by frontrunner local authorities (municipalities of Rotterdam, Enschede, and Eindhoven).

[84] See Frangou et al. (2018)Frangou et al. (2018) for an assessment of the potential of renewable energy development in Greece as supported by EnPC. An example is the Catalan EnPC contracts, which include renewable generation to the extent allowed to remain off-balance, and include water saving considerations – most relevant in contracts associated with the sports facilities and police and firefighter academies where the model was developed and tested. The model includes maintenance in a second contract. The maintenance staff oversee the ESE, overcoming risk aversion. Management and administrative staff appreciate the advantage of longer contracts than those associated with FM. Another example is the renovation of a hospital in Split, the contract is supported by the Croatian EPEEF (Environmental Protection and Energy Efficiency Fund) and ESIF. This combines activities in 12 buildings and incorporates solar panels. The Fund covers 40% of investment and the provider the remaining 60%. The expected savings are 56%, with a return period of 14 years.

[85] Austrian Government building renovation plans are part of the integral management of buildings (contracts with works). The tendering process starts when buildings are two years old; contracts are on-balance sheet because the savings achieved during more than 15 years of EnPC balance out the upfront costs of upcoming projects.

[86] The Catalan Plan for Saving Energy in Government Buildings prioritizes external investment and the use of EnPC.

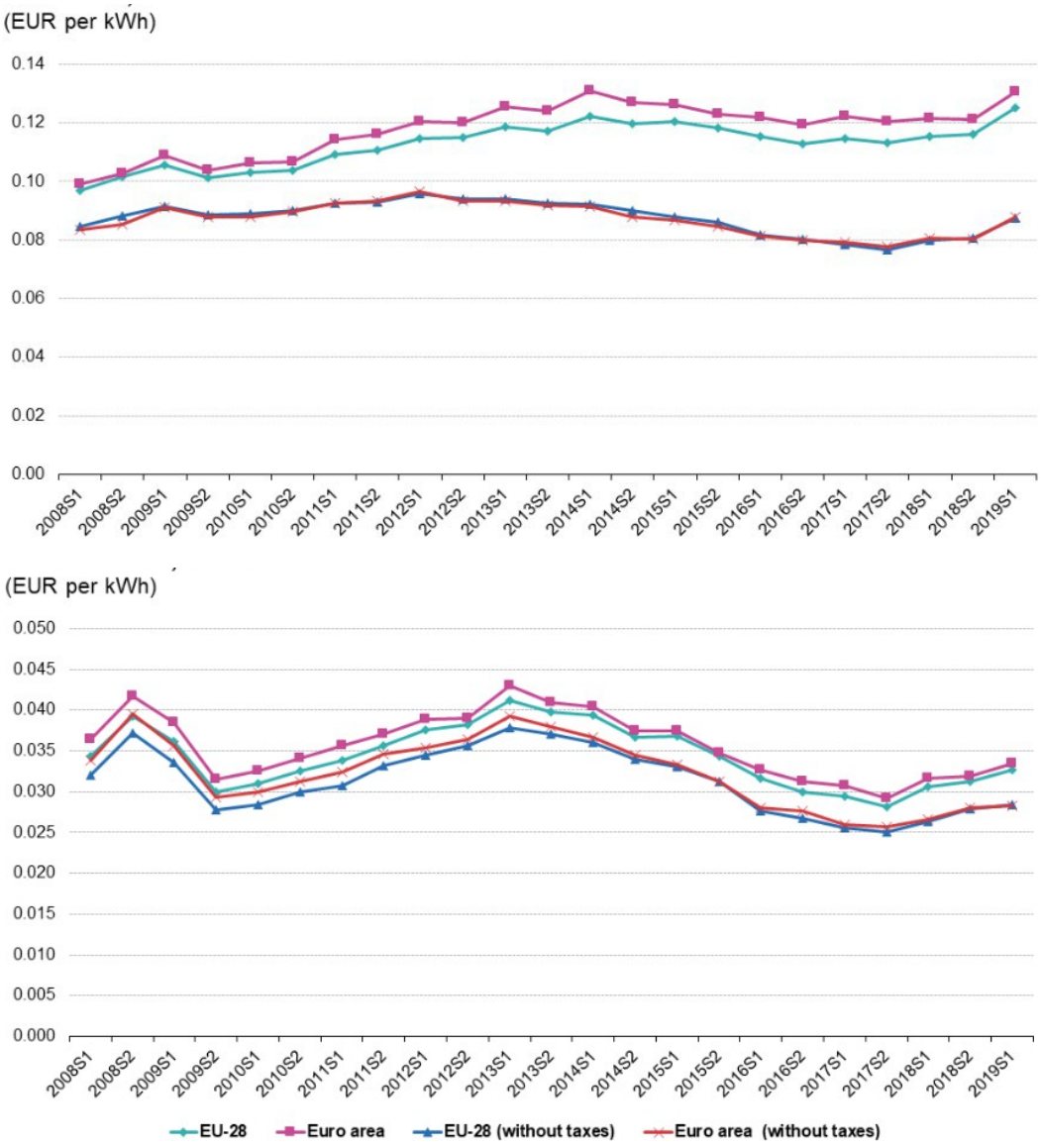
5.2. Financial factors

The relevance of financial factors has been assessed based on the EC JRC Database on financial barriers and on key factors related to market development (Appendixes 6.7 and 7).

5.2.1. External factors: budgetary limitations, energy prices

A major driver for clients' engagement with EnPC is budgetary limitations. An insufficiency of funds and the need for alternative financing acts as a driver in Czechia, Greece, Ireland, Italy, Poland, and Slovakia. The limited availability of EU funds in the reported period has awakened new interest in the EnPC market in Poland. The expectation of increasing energy prices has been reported in the past but was marginally reported as a driver at the time of writing this report. This may be related to the relative recovery of energy prices during the period 2017-2019 (Figure 3), and to the decoupling of performance guarantees in EnPC contracts from energy prices.

Figure 3. Evolution of electricity (above) and natural gas prices (below) for non-household consumers in the EU 28 (2018-2019). Source: Eurostat 2020.



5.2.2. Financial support for the deployment of EnPCs: compatibility and conditionality

Finance support is fundamental for EnPC in the public sector to:

a) engage with deep renovation strategies (Czechia, Germany and Portugal),
b) counter the risk aversion of finance institutions and providers, especially for long contracts, (Germany, Bulgaria, Croatia, and to some extent Spain, use equity financing, raising the costs of EnPC in the public sector), and
c) removing the risk to providers of off-balance contracts, for these to widely address integral renovations and incorporate non-efficiency improvements (considered necessary in Belgium, Bulgaria, and Spain).

EU finance and economic support to EnPC in the public sector is considered a market driver in nine Member States (Bulgaria, Croatia, Czechia, Germany, Greece, Ireland, Latvia, Portugal, Slovenia), and its relevance has been highlighted elsewhere for a wider array of Member States. The use of EU funds to support EnPC projects and strategies has the potential to drive the market in the upcoming period. These improvements could be important in relation to building renovations and projects with long payback periods being widely addressed through EnPCs. The use of ESIF in combination with EnPC has been recently permitted in Bulgaria. Spain has also relied on the combined use of ESCO and ESIF (ERDF) funds administered by the IDAE to support municipal lighting projects. The funds are also available for the municipal buildings' renovation (thermal envelope, thermal installations or outdoor lighting).[87] In Croatia, where off-balance sheet treatment has so far only been used for lighting, there is the potential for combining EnPC with ESIF for building renovation (payback of 15-20 years). Some deals with on-balance contracting conducted by REGEA in West Croatia could lead to this market overcoming national interpretations of the opportunity of combined fund use. The same situation exists in Czechia. Adequate guidance and communication of these advances could drive the development of markets, particularly in debt-concerned Member States, including already advanced markets such as those in Slovakia where off-balance sheet contracts are mandatory.

Introducing EU and national-level mechanisms to avoid incompatibilities between EU grants and EnPC appears to be fundamental to multiplying the effect of tax-payer money whilst avoiding a policy-induced barrier to EnPC. An advance in this sense is the publication of Fi-Compass guidelines in 2020, which recognize the capacity of grants to ease access to long-term financing. Also, national funds are key to the adoption of off-balance models and to allowing for conditionality requirements to incentivise EnPC and other service markets. Expectations are, for instance, written into the Italian EEF, created with the contributions of White Certificates, which act in combination with the Conto Termico, overall meaning that are partially channelled through EnPC.[88] In Ireland, a National Energy Efficiency Fund established in 2014 that has been underused is expected to drive the market, in combination with the upcoming adoption of off-balance models. These mechanisms are also available in France, and could enable market growth provided there is legal recognition of the possibility to pay back contracts with energy savings. Progress in this sense could be expected alongside the adoption of off-balance sheet contracting. Regarding EU funding, the experts participating in this research expressed few expectations regarding the establishment of conditional requirements related to the use of EnPC in the public sector, such as the establishment of cost-effectiveness criteria (ECA 2020), and which would be justified by the EU strategic goals of leveraging private investment (European Union 2019; European Commission and DG Communication 2019; HLESF 2018). The recent publication of the Renovation Wave, however, incorporates conditionality requirements on the allocation of new money, such as the projects being aligned with the national Long-term renovation strategies (European Commission 2020d).

[87] https://sede.idae.gob.es/lang/modulo/?refbol=tramites-servicios&refsec=ayudas-eell-proyectos-inversion#

[88] The Conto Termico is an Italian government grant for thermal energy efficiency measures whose allocation requires energy service contracting to be part of the project.

One mechanism for supporting the sustainable financing of EnPC in the public sector systems is forfaiting, in combination with energy efficiency and guarantee funds (e.g. Czechia, and partly Austria). Forfaiting provides an opportunity to enable private financing to further participate in EnPC in the public sector. It has the potential to enable more and longer-term projects which are then financed through a revolving fund contributed to by savings from previous projects. However, during the reported period the extent to which forfaiting was compatible with off-balance sheet contracts and EU funding has been unclear. Most recently, Slovakia tested a solution for forfaiting risks which has been accepted by Eurostat as suited for off-balance sheet contracts.[89] Making advances in terms of combining forfaiting without recourse with off-balance contracting (Czechia) and on-balance (Croatia) is an opportunity recently recognized in a clarification note published by Fi-Compass (2020). The further clarification and dissemination of these practices at a national level represents an opportunity for markets to mobilize EU funding and to motivate private investment. A market assessment of forfaiting and other refinancing options is being conducted by H2020 project REFINE, which was initiated in 2020.

In markets without restrictions to operate on-balance there is a potential for the utilization of revolving funds as a means to integrate EnPC in public sector operations, as in the case of the building stocks of the City of Berlin, and the Austrian Federal Government.[90]

5.3. Recommendations based upon the review of enabling factors

Standardization, model contracts and aggregation (5.1.1) has been a key development in the reported period, largely linked to the adoption of off-balance sheet contracts. Contracts, guidelines and demonstration need to be continued to test and improve current standards for these to adapt to a changing situation. Together with project aggregation, standardization allows to reduce transaction costs.

Government commitment to saving energy and to guaranteed savings (5.1.2) plays a fundamental role in ensuring that public bodies engage with EnPC. The establishment of verification and monitoring requirements throughout energy performance interventions in the public sector (EPBD Art. 10) appears to be a key means of ensuring that EnPC and alternative mechanisms fulfil energy saving expectations. This approach would furthermore eliminate negative discrimination against EnPC in the public sector regarding its measurement and verification costs. The future share and impact of

[89] https://www.mfsr.sk/en/finance/public-private-partnership-ppp/energy-performance-contracts/EnPC-methodology-contract-template.html

[90] The Berlin Real Estate and Energy Management agencies (BEM, BIM) operate using Energy Performance-Related Payment. The instrument partially relies on authority access to low-interest financing to support a soft EnPC model. The instrument uses an internal revolving fund – which lowers finance costs – and a simpler contractual guarantee which makes only a portion of the payment conditional on performance. To the simplicity and flexibility of the model contributes the limited preoccupation for on-balance sheet treatment in Germany. This model results in lower investment risks for providers and overcomes the issue of split incentives (Blaschke 2020).(Blaschke 2020). The model serves to finance projects with a high investment requirement, such as holistic refurbishments with more than 200 €/m² investment. Its advantage can be assessed in comparison to projects that were predominant in Berlin in the early 1990s which involved investment of 20-30€/m². The prevailing share of Austrian federal buildings are owned and managed by the Federal Real Estate Company (BIG), which uses EnPC as the default option for those buildings that are not envisaged to undergo deep renovation within the next 10 years. Due to market maturity, the new projects can be financed with previous savings; this is an interesting example of good practice because building renovation plans are part of the integral management of buildings – the tendering process starts when buildings are two years old. These contracts are on-balance sheet because EnPC represent a small portion of the public assets managed by BIG (see also www.klimaaktiv.at; Bundesministerium Digitalisierung und Wirtschaftsstandort 2019).Bundesministerium Digitalisierung und Wirtschaftsstandort 2019). Another example of the successful implementation of revolving funds is LABEEF in Latvia, applied to the renovation of multifamily buildings.

EnPC in public sector performance will largely depend on the European Commission's reaction to the newly drafted long-term renovation strategies (EPBD Art. 2a).

Quality assurance (5.1.3). Without mechanisms that ensure that M&V is in place, it is problematic to speak about the status and development of EnPC (e.g. Greece), and quantitative comparisons between projects and Member States are questionable. The development of capacities in the sector is of furthermost importance for M&V to be appraised as an advantage and not a threat to the sector.

The development of internal capacities (5.1.4) is necessary to cope with the changing regulatory and market context. One-stop-shops and dedicated agencies are considered capable to address these issues, specially alongside aggregation efforts, which serve to reduce transaction costs. The development of internal capacities can be most cost-economic and effective when providers are involved at early project (design) stages (Germany). Doing this requires overcoming trust issues whilst allows reducing administrative burden, transaction costs, whilst increasing the potential savings of the project (reduced risk that favourable options are foreclosed in internal decision processes preceding tendering).

Consideration of EnPC as the default option (5.1.5) is a sensible approach to leverage on private investment and to mainstream the introduction of M&V mechanisms. This step is being taken in Ireland, German lands, and the Netherlands. One such requirement should be preceded by sensible assessments about the suitability of EnPC in the public sector, and the existence of EnPC provision capacity (Portugal). In addition, there remains a need for regulations and targets to foster the commitment of public bodies and local governments (Germany, Sweden, Denmark and the Netherlands).

Budgetary limitations and energy costs (5.2.1) are a driver for the public sector to engage with EnPC. There is the risk that new funding put in place as part of the Renovation Wave and the Recovery Fund distort the current situation. Hence it is very important that the fund allocation and control mechanisms planned in the Renovation wave are developed and strictly applied having in sight the need of leveraging on private investment and the continued development of sustainable financing mechanisms and markets.

EU and national support to EnPC (5.2.2) has showed most successful when involving conditionality requirements (e.g. for off-balance sheet treatment of contracts) to incentivise EnPC and other service markets. Continued efforts to avoid incompatibilities between funding mechanisms (e.g. Fi-Compass guidelines, 2020) and their prioritization according to their relevance in Long term renovation strategies and cost-effectiveness, included in the Renovation Wave, are expected to further the development of EnPC in public markets.[91]

[91] The research conducted prior to the publication of the Renovation Wave showed a widespread desire amongst experts and practitioners for the establishment of conditional requirements concerning the provision of ESIF related to cost-effectiveness criteria and to the EU strategic goals of leveraging private investment (European Union 2019; European Commission and DG Communication 2019; HLESF 2018). The research conducted prior to the publication of the Renovation Wave showed a widespread desire amongst experts and practitioners for the establishment of conditional requirements concerning the provision of ESIF related to cost-effectiveness criteria and to the EU strategic goals of leveraging private investment (European Union 2019; European Commission and DG Communication 2019; HLESF 2018).

6. Role of EU financing and assistance instruments (SFSB) in the public sector

As part of the SFSB initiative, the EU has deployed during the reported period a diversity of instruments to support the development of EnPC in public sector markets (see Section 1.4.1). The EC JRC 2020 Database includes an assessment of the instruments deployed by the SFSB (Appendix 9) which permits the identification of the following highlights about the perceived role of the SFSB:

- The expert responses show limited knowledge of non-financial SFSB instruments, especially DEEP and EEFIG;[92]
- ELENA is considered by experts to be the most impactful of SFSB instruments in the period 2017-2019 (rated 2.3 on a scale from 0 to 4), followed by PDA H2020 (impact rated as 1.5) while low ratings were granted to de-risking instruments (DEEP, EEFIG), except in the cases of Croatia, Czechia and Spain;[93]
- Although ELENA is highly appreciated, a few aspects are found to be problematic: the investment entry level and related need of tender aggregation, the eligibility of non-energy related measures, the complexity of application, and the related administrative requirements; there are also calls for ELENA to support preliminary development of capacities and assessment;
- There are concerns about the competitivity of PDA H2020 calls which are considered to grant an advantage to experienced actors, hence marginalizing the experience and needs of markets at different stages of development, and the possibility for cross learning and replication, otherwise considered to be means of simplifying processes and reducing costs.
- In addition to limited familiarity, the expert perception of DEEP and EEFIG involves concerns about the quality and usability of data provided for estimating savings, largely that which originates from other countries and does not correspond with real-life values, including aspects of performance, budgeting, and status of maintenance, hence limiting the potential use of the data for improving risk assessments.

A series of recommendations can thus be summarized:

- The need for further communication and promotion of non-financial support, and for continuing / strengthening efforts to build awareness amongst financiers, statisticians, legal advisors, and clients;
- The further development of advisory services as part of cohesion coverage, SRSS, Fi-Compass; and grants (e.g. new EIB TA services) for setting up project pipelines. One potential instrument would be supporting ELENA-like programs at a national level to develop demand;[94]
- The need for real-life data (e.g. metered savings) to feed in to de-risking databases which should be based on standardized data collection processes (aligned with implementation of the EU Framework to Facilitate Sustainable Investment - Council of the European Union 2020; 2019). EU support could be made dependent on data availability concerning public buildings

[92] Around 51% of respondents claimed to be acquainted with SFSB instruments, and many did not respond to all questions (Appendix 4.2 and 9.1). Responses were obtained for 20 MS in the case of ELENA, 19 MS in the case of PDA H2020, and 15 responses in relation to de-risking instruments.

[93] From the 18 Member States that were assessed, the impact of ELENA was greatest for respondents in Slovenia, Poland, Croatia, and Czech Republic, followed by Germany, Spain, Slovakia and Ireland.[93] Limited impact was reported for Austria, Bulgaria, and Portugal. The impact of PDA H2020 is most appreciated in Bulgaria, Croatia, Germany, Greece, Hungary, Ireland, Lithuania, Poland, Spain and Sweden. New enthusiasm for ELENA has been reported in Greece, where successful applications have just been granted support.

[94] One example is the Cariplo Foundation initiative in Italy.

(performance, budget, maintenance). This could be supported with grants for monitoring, high quality audits, and M&E;

- Greater support for quality assurance is needed. The limited quality of project design causes unexpected costs, making risk assessment ineffective. This leaves the necessary standardized risk assessment mechanisms that review projects at the design phase. To overcome this barrier, EU support instruments should further support quality assurance and hence trust and collaboration between actors, overall contributing to the quality and adequacy of projects;
- More assistance and guidance regarding setting up targets, obligations, and thresholds. These are necessary to increase the policy pressure to save energy in the public sector. The incorporation of life-cycle considerations as required in EPBD Art. 2a should be supported;
- Improve the allocation mechanisms for investment grants. Grants could be allocated conditionally in relation to the depth of intervention and its consistency with policies and strategies (e.g. requiring feasibility studies of EnPC on building batches, NECPs and long-term renovation strategies). Key aspects to be addressed are the adjustment of remuneration to performance and the support granted to non-energy components, which are key part of deep renovations;
- More locally adapted support. There is an apparent tendency amongst national and sub-national experts to rely on EU support programs. Further reliance on national finance support programs (e.g. relying on EEF) and technical support (e.g. development of One-stop-shops) appears necessary for this support to become adapted to local needs and financially sustainable.

7. Discussion on markets status, drivers and barriers as the basis for EU policy recommendations

Energy Performance Contracting has increasingly become an option for public authorities and bodies of Member States to meet EU targets related to public building renovation and saving energy. The analysis of Member-State-level data in this and previous reports in the EC JRC Report Series on energy services shows that the barriers and factors that determine the development and suitability of EnPC in the public sector market are distinctly local, hence limiting the possibilities for comparison and for experience transfer. However, there is unexplored potential for EnPC in public sector markets to: a) increase the number and intensity of energy performance interventions; and b) to leverage private investment, deemed necessary to contribute to increase annual investment in building renovation by €275b (European Commission 2020c; 2020d).

The vague and diverse conceptualizations that are of relevance to EnPC markets, along with the insufficiency of comparable data[95] constrain the development of tailored policies and the capacity for risk assessment. The insufficient availability and quality of reference data for sustainable financing is a problem in the Union (HLEG 2018), addressed by the EU framework for sustainable investments. This report, and the EC JRC series of energy services, rely on a mix of quantitative and semi-quantitative data, along with qualitative expert assessments to identify and prioritize the themes that require the reflective engagement of policy-makers, public bodies, and authorities in terms of adopting energy performance interventions, along with sectoral actors.

[95] As reported by the HLEG, "official information on the ability and effectiveness of the EU's finance system to deliver sustainability objectives is currently incomplete and highly fragmented" (2018).

7.1. Market status and driving factors

The relative market size ratios described in Section 3.1. show that that Slovenia is currently the market leader in EnPC in public sector contracting, followed by Denmark, Croatia, Italy, Portugal, Ireland and Czechia. Other Member States follow with relatively sizeable markets – Spain, Slovakia, Belgium, Austria, and Germany. Market recovery is remarkable in Croatia and Slovakia, whose markets had halted due to ESA 2010. Fast development has taken place in markets that were previously reported to be at preliminary (Greece)[96] or initial stages (Slovenia, Italy, Portugal, Slovakia Ireland and, to an extent, Spain and Belgium. Estonia has concluded its first contract, and Latvia was during the drafting of this report about to conclude its first contract. Public EnPC markets lead the respective ESCO markets of Croatia, Denmark, Greece and Portugal.

The previously active and mature markets of Germany, Austria, and Sweden have stabilized or become stagnant. Growth expectations in the EC JRC 2017 Report for Lithuania and Romania have not materialized. Reticent public sectors in the Netherlands, Austria and Germany, and Luxemburg are not aligned with the positive developments in the respective service markets which are common elsewhere (Boza-Kiss et al. 2019). The markets of Cyprus, Malta, Luxemburg, Romania and Hungary remain or have returned to a preliminary status of development. Stagnation and limited growth are related to the absence of political commitment, the availability of alternative financing (i.e. low interest rates and grants in Germany, Austria, and Spain; lighting projects in Bulgaria; buildings in Romania); the remaining disruptive effect of ESA 2010 (Croatia – buildings), and a preference for in-house capacity and alternative contracting (Denmark, Sweden, the Netherlands, and France).

Seven major driving factors were identified in the reported period (2017-2019) and are expected to play a key role in the upcoming period (2020-2023):

Driver 1. Government commitment, strategy development and target-setting – the commitment of public authorities towards saving energy and fulfilling EU obligations and recommendations is key for the engagement of public bodies to engage with EnPC and to pursue ambitious contracts;

Driver 2. Standardization and continued updating of contracts, definitions, and guidelines – need to cope with changing context and new opportunities (e.g. Maastricht neutrality, forfaiting, and ESIF compatibility, simplification);

Driver 3. Tailored demonstration and information, along with provider qualification – to test and adopt to the developments indicated in Driver 2;

Driver 4. Advances towards prioritizing contracts that provide performance guarantees and leverage private investment – the renovation of buildings of certain administrations needs to consider EnPC as the default option (Ireland, the Netherlands, Germany, Austria, and Slovakia). In other cases, it is considered as a favoured option (Portugal, Catalonia – Spain – Wallonia – Belgium), or the provision of subsidies is conditional to the use of EnPC (Italy);

Driver 5. Recognition of client needs – through adapted contracts, support (in-house or One-stop-shop) and specific financing lines that reduce transaction costs and make EnPC a cost-effective option;

[96] The data on Greece shows a sizeable EnPC market in public lighting, but the contracts that are used make it difficult for clients to reclaim performance guarantees and compensation.

Driver 6. Quality of interventions – in terms of more challenging interventions (such as deep renovations and combinations of user-centric improvements like efficient, renewable, management systems) with greater performance guarantees and capacity for measurement and verification;

Driver 7. Continued EU and national engagement in the adaptation of EnPC to local needs and EU goals, including a) national guarantees mechanisms, b) facilitators, and One-stop-shops – c) National Energy Efficiency Funds (EED Art. 20); c) contribution of Eurostat, the EIB and Fi-Compass to adjust Maastricht neutrality conditions; d) technical support from ELENA ; and e) EEFIG instruments, which are expected to further develop. New provisions that will foster the impact of these drivers are contained in the Renovation Wave Strategy (European Commission 2020d).

7.2. Barriers at Member State level and recommendations for EU policy and support

The uptake of measures and instruments suitable to overcome energy saving barriers is generally slow. Their effect requires sustained action because these barriers are embedded in the complex regulatory, cultural, finance, and administrative practice. The following set of barriers identified at Member State level and recommendations for EU policymaking and support draw from the analysis conducted in Parts 4 to 7 of this report.

Barrier 1. Conceptual confusion – performance guarantees and quality assurance

There has been progress in the national adoption of EnPC definitions, model contracts, and guidelines for the public sector (Section 4.2.4), contributed to by the Eurostat guidance on the treatment of EnPC in national accounts. However, conceptual discrepancies remain and there is minimal emphasis on performance guarantees, which can modify the essential goals of EnPC.[97] Moreover, the need for measurement and verification is often perceived as adding to the costs to EnPC, and not as an added and necessary value. This is particularly problematic in relation to exploiting the potential of off-balance sheet treatment (e.g. Belgium, Lithuania). Further clarity is needed in the decisions of public bodies and authorities about engaging with EnPC.

Recommendation 1. Emphasis on performance guarantees – M&V and long-term strategies

EU and Member State policy, communication, awareness-building, and technical support should re-direct attention towards the provision and enforcement of performance guarantees as the definitive aspect of EnPC. This is key for the public sector to be certainty of progress towards fulfilling its decarbonization and building renovation targets. Fundamentally, measurement and verification need

[97] This may be problematic in: a) developed EnPC markets where Maastricht neutrality is considered of little relevance (Germany, Austria, and Denmark); b) markets where off-balance sheet contracting has not yet been developed (Croatia – buildings –, Greece, France); and c) wherever in-house solutions (Netherlands, Denmark, and Sweden) and alternative contracts are preferred (France). These markets could be failing to exploit the potential in EnPC contracts connected to when a provider is committed to achieving savings, and these savings are verified.

to be communicated as value added to energy performance interventions, and as necessary for assessing project performance, and for performance guarantees to have legal certainty.[98]

The provision of guarantee performance, along with M&V, the engagement of private investment, and life-cycle considerations need to be part of long-term strategies for building renovation (EPBD Art. 2a) and for public sector investment in energy performance. These strategies should define reasoned grounds for public authorities and bodies for opting (*not* opting) for EnPC, and for decision and contracting processes to be simplified, overall reducing uncertainty and costs, whilst minimizing biased perceptions about EnPC costs and risks. An opportunity posed by the Renovation Wave Strategy is the coupling of EnPC with resilience contracting by insurers, because have expertise in risk assessment and management.

The adoption of this recommendation – e.g. in EU supported programs – would enable the use of EnPC as a learning ground and an intermediate step towards the establishment of mandatory M&V mechanisms in public sector interventions. The universal introduction of mandatory measurement and verification in public sector interventions would eliminate the disincentives against EnPC in the public sector (Barrier 3). This challenge could be fulfilled along with the commitment of the Commission in the Renewed Sustainable Finance Strategy to introduce additional standards and labels for sustainable financial products, whose impact and reliability could be improved with adequate M&V.

Barrier 2. Structural and regulatory barriers, procurement incompatibilities

Different levels of legislative and procurement barriers exist. Even in advanced markets, there is a focus on intervention costs and the delayed adoption of life-cycle considerations in procurement and tendering (Germany and Sweden). Energy prices continue to diminish the interest of the public sector in saving energy (Croatia, Germany, Lithuania, and Latvia). Member State efforts to update regulatory frameworks to align with Eurostat has brought new impetus to some markets (Czechia, Croatia, Slovenia, and Spain). However, complex service supply frameworks (e.g. France) and alternative contracting modalities (e.g. Netherlands, Lithuania, Bulgaria, Portugal, Spain and Sweden) need to be aligned with EU directives to prioritize energy savings and performance guarantees.

Recommendation 2. Follow up on Member State reporting, increased guidance and requirements

The existence of regulatory and procurement incompatibilities involves a failure to fulfil national requirements to remove barriers to energy services (EED Art. 18 and EPBD Art. 10). Adequate adoption of Long-term renovation strategies (EPBD Art. 2a) and the exemplary role of public bodies' buildings (EED Art. 5) create the capacity to establish top down regulations and strategies that foster energy saving and sustainable financing. Limited efforts of implementation and reporting from Member States constitute a call for the EU to act. In this sense, the European Commission will play a key role in reviewing, commenting and setting milestones based on the national Long-Term Renovation Strategies submitted in 2020. Expectations are put in a set of new instruments upcoming in 2021 and promoted by the Commission, i.e. the Energy Efficiency First principle for public authorities to incorporate efficiency to procurement criteria, the extension of existing renovation requirements to all public buildings – revision of the EED –, the introduction of minimum energy

[98] The existence of reliable M&V is the basis for the development of out-of-court resolution mechanisms, and for improving performance guarantees and penalties, risk assessments, contracts, guidelines, and other forms of quality assurance (certification of providers, facilitators, and projects).

performance standards – revision of the EPBD –, and new guidance on procurement and sustainable public investments. It would be key to speed up the development of green public procurement criteria for public buildings – including life-cycle considerations - which is to be addressed by the Commission by June 2022 (European Commission 2020d). Earlier development and initiation of procedures for their transposition would increase the competitivity of EnPC for its capacity to address integral renovation projects.

Barrier 3. Insufficient trust in the system and access to information

Insufficient trust in the system appears to be related to insufficient information, demonstration, facilitation capacity, and the quality assurance of providers. [99] Demand for improvements in the quality of services are being made, along with explicit calls for their standardization and specialization (Slovenia and Spain), and increasing interest in the quality of interventions (Belgium, Bulgaria, Czechia, and Germany). Whilst EED Art. 18 requires Member States to make publicly available and regularly update a list of qualified energy service providers and to encourage the development of quality labels, there is no directive-based requirement for specialized qualifications related to EnPC in the public sector. This is problematic due to the increasing complexity of EnPC in the public sector and because the existence of quality mechanisms is a key element of client trust in the EnPC system.

Limited trust, information, and awareness amongst financiers, statisticians, and legal advisors may be a major impediment. This exists along with lack of familiarity and satisfaction with de-risking mechanisms (DEEP, EEFIG Underwriting Toolkit), which are therefore less used, reviewed, and contributed to with local data, hence contributing to the lack of comparable information and the lack of trust.

Recommendation 3. Develop and require measurement and verification and, overall quality assurance capacities

Implementation of the EU framework to facilitate sustainable investment (Council of the European Union 2020; 2019) represents an opportunity to improve project transparency, data gathering, comparability, and hence strategic project prioritization. EU support mechanisms need to promote quality assurance as the basis for information provision, technical support, and risk assessment. Six mechanisms are proposed:

a) Ensuring the specific qualification of EnPC providers, facilitators, and One-stop-shops (regulating provisions in EED Art. 18) is fundamental to engaging with the increasingly complex regulatory and finance framework, to promoting projects with long-term repayment periods, and to involving life-cycle considerations. New efforts of developing sectoral capacities, and standardised One-stop shops for these to be deployed at national, regional and local levels – anticipated in the Renovation Wave Strategy – need to address the particularities of EnPC in the public sector.

b) Further developing and harmonizing quality assurance schemes in order to improve comparability of data (Szomolányiová and Keegan 2018), and for interventions to contribute to DEEP

[99] Limited trust in providers or the quality of their services was reported for Belgium, Netherlands, Lithuania, Poland, Cyprus, Czechia, Hungary, Ireland and Sweden. In addition, service provision was found to be insufficient for Croatian buildings, Denmark, Greece, Lithuania, Portuguese buildings, Slovakia, and Slovenia. There are also quality deficiencies in a series of MS. Quality of service deficiencies involve the focus of providers on other contracts (France, Lithuania), and a lack of technical expertise (Portugal, Poland). A lack of updated lists of qualified providers was reported in Croatia, Denmark, France, Greece, Hungary, Ireland, Latvia, Poland, and Spain.

and EEFIG databases to de-risk investment, contributing to reducing financing costs (Barrier 6), and prioritizing projects according to their impact, cost-effectiveness, and, as requested by the European Commission, capacity to capitalize on private investment (2020);

c) Measurement and verification requirements need to be more strictly prescribed in contracts. These could be more clearly prescribed in relation to EED Art. 5 and EPBD Art. 2a. This appears particularly feasible for programs and interventions supported with EU funding, thereby contributing to improving the competitiveness of EnPC in the public sector (Recommendation 1);[100]

d) Information and awareness-building programs need to address financiers, statisticians, and legal advisors, and be related to de-risking instruments (DEEP, EEFIG Underwriting Toolkit). This needs to be addressed from the renewed support from the Commission to EEFIG and SEI Forums, as highlighted in the Renovation Wave Strategy. These are to be further used, reviewed, and improved with project and national data. This is also important for reduce risk aversion by financial institutions and hence for improving access to financing for EnPC providers (Barrier 6);

e) Demonstration programs need to communicate new regulatory and finance developments. Aligning with the need to grant further visibility and to demonstrate the gains of investing in efficiency to decision-makers and financial institutions, there is a potential in the upgrade of the Energy Performance Certification system planned for 2021 (European Commission 2020d).

Barrier 4. Complexity – actual and perceived transaction and administrative costs

EnPC in the public sector increases the administrative complexity and decision uncertainty of public procurement. These costs and uncertainties are perceived by clients (as providers) as particularly problematic in the case of off-balance modalities, which require intense monitoring.[101] From this perspective, the additional burden offsets the benefits of EnPC contracts, and clients may become an administrator of externalized services. Accordingly, small administrations often perceive ELENA support – which is largely appreciated, overall – as adding to this administrative complexity, partially due to aggregation requirements.[102] The risk associated with engaging with ELENA is related to slow political, administrative, and finance-related processes, which may not support the progress of technical teams (Italy, Spain, Ireland), and the lesser development of local provision capacities (Italy). However, technical support is widely needed on a project basis in the process of attaining a sufficient degree of standardization.

Recommendation 4. Further fostering national capacity and adapted knowledge

The EU can take action to reduce administrative and transaction costs by enforcing EED Art. 6, Art. 18, and EPBD Art. 2a, and Art. 20:

a) Continue support to the standardisation of contracts, procurement and tendering procedures. The standardization of contract typologies at EU level could contribute to reduce capacity needs and project costs, as well as to the creation of cross-border markets – and hence to the benefits of economies of scale and to ensure sustained provision of services in small markets (e.g. Croatia). Importantly, the European Commission highlights in the Renovation Wave Strategy these processes of standardization will continue to be in the focus of existing forums;

[100] These M&V requirements could be lifted from interventions conducted through EnPC contracts, provided these have in place adequate equivalent mechanisms (similarly to the approach used in Art. 14 and Art. 15 of the EPBD 2018).

[101] This barrier has been reported for a variety of well and less developed EnPC markets and economies, including Austria, Belgium, France, Germany, Greece, Hungary, Italy, and Cyprus.

[102] ELENA is an important element for fostering the capacity to aggregate of projects and reducing transactions costs (Art. 2a EBRD 2018 and the SFSB).

b) Following up with Member States in their efforts towards information provision, promotion of facilitation, and the development of One-stop-shops; for these to specialize in EnPC and incorporate specific requirements on this matter (EED Art. 18 and EPBD Art. 20). This is important in light of the increased complexity of the EnPC model and need to reinstate its advantages (Recommendations 1 and 2). It is also relevant in the context of the planned efforts anticipated in the Renovation Wave Strategy for standardizing One-stop-shops and fostering their national, regional and local development;[103]

c) The integration of energy saving and private capital leveraging criteria in procurement processes requirements could be implemented along with the ongoing adoption of e-procurement processes, and much needed simplification (reported for Ireland, Italy, Spain, Portugal); new opportunities arise from increased recognition of the need for regular updating of model contracts, guidelines, and tender procedures – also supported by standardization support fostered by the Renovation Wave;[104]

d) Following up – as planned – with Member States' transparency efforts that are framed in their long-term renovation strategies (Art 2a EPBD 2018);

e) Fostering national and subnational contributions to and dissemination of DEEP and EEFIG data – e.g. through SEIF and national taskforces. Ideally, these contributions should rely on savings measured throughout the life cycle of interventions;

f) There is a demand for ELENA advisory services for to support the setting up project pipelines and conducting preliminary assessments. New funds allocated to H2020 could serve to provide technical assistance to comparing the suitability of EnPC in respect to other mechanisms. Also, ELENA-like support at a national level (e.g. Fondazione Cariplo in Italy), and national mechanisms of support to both ELENA and PDA H2020 (e.g. EFFs) would serve to adjust the business and contractual model to client needs. Aligning with this recommendation, the Renovation Wave plans for the Commission and the EIB to foster the replication of the ELENA model at national level through Cohesion Funds, InvestEU, and Recovery and Resilience Facility (European Commission 2020d).

Fundamentally, these efforts need to be addressed at locally adapting the knowledge, contracts, guidelines, and tender procedures to better respond to the overall objective of reducing costs and risks by creating simpler and more user-centric processes. This is important if more administrations are to find EnPC advantageous, and for those with experience with it to be rewarded for transition efforts conducted so far.

Barrier 5. Limited commitment of Member States and competition for public support

There are concerns about national commitment towards using EnPC in fulfilling EED Art. 5 and EPBD Art 2a, as well as EED Art. 18 and EPBD Art. 20 – the latter two leaving more room for the activities of Member States (Appendix 3). This may constitute a lost opportunity, since EnPC could be key to leveraging necessary private investment and to creating contractual guarantees of the ambitious

[103] Successful technical support at the national and subnational level takes the form of specialized units (ICAEN in Catalonia – Spain); in-house facilitation capacity (Codema in Dublin); and One-stop-shops (Germany, Bulgaria, Slovakia, and Belgium – Wallonia, Flanders). Experience from Germany shows that early collaboration between provider and client in the tendering process reduces tendering costs and improves project at the design stage, whilst avoiding to prevent potential options and opportunities. Limited action regarding the development of "accessible and transparent advisory tools such as renovation advice and One-stop-shops" constitutes an infringement of EPBD requirements according to Art. 20.

[104] Eurostat requirements for off-balance sheet treatment are yet to be incorporated by several potentially interested MS (Bulgaria, France, Hungary, Ireland, Italy, Lithuania, Poland, Romania, and Spain). There is also a need to incorporate into national regulations and practice the recent clarification on the combined use of ESIF with off-balance contracts and forfaiting (Fi-Compass 2020). There is also the potential for lifecycle and co-benefits to be included in procurement assessments (Spain, Portugal, Germany, Netherlands) (Art. 18 EED and Art. 2a EPBD).

EU and energy and climate targets being achieved. Increasing the political commitment of Member States could be done by:

a) Avoiding low and subsidized energy prices, and the application of energy taxes (problematic in Croatia, Lithuania, Latvia, and Germany);
b) Addressing the split incentive (EED Art. 19; EPBD Art. 2a) through regulation, and mechanisms that transfer energy costs and savings to the bodies that decide on the contracting of renovation and maintenance interventions;
c) Sending clear signals to public bodies through targets and strategies (demanded in Denmark, Sweden, and the Netherlands);
d) Increased recognition and communication about EED Art. 5 obligations and achievements;
e) Preferential use of EnPC in fulfilment of EED Art. 5 (Portugal, Spain - Catalonia) and overall energy performance interventions (Croatia, Slovenia – Ljubljana, Slovakia, German federal buildings, Austrian federal buildings, Belgium - Wallonia);
f) Avoiding the use of competing grants (Spanish lighting, Bulgarian buildings, Romania), since EU and national grants with weak energy saving thresholds and limited attention to national strategies and plans (NECPs) counter the development of EnPC and furthermore risk locking in performance potential.

Recommendation 5. Furthering the impact of EU funds – e.g. through conditionality

Conditionality requirements have long been recommended (Šijanec Zavrl 2018), and there are claims that these should be in place by the time that 2021-2027 programmes are approved (ECA 2020).[105] These conditionality measures are furthermore supported by EPBD Art. 10.[106] The following list details a series of EU mechanisms that are available to further Member State commitment, and for this to trickle down to departments and subnational bodies:

a) Enforcing mandatory audits (EED Art. 8), as a possible means of implementing Energy efficiency funds;
b) Following up on the long-term renovation strategies of Member States (EED Art. 5, EPBD Art. 2a) – there are high expectations for the follow up of the European Commission, with the first long-term renovation strategies being submitted in 2020 in fulfilment of EPBD Art. 2a, and valid until 2029; some relevant areas are Member State efforts involving project aggregation, the creation of financing mechanisms and tools to attract private capital, and the incorporation of lifecycle considerations;
c) Conditioning EU finance and assistance support to energy performance indicators; feasibility studies; real estate management strategies; coherence of interventions with National Energy and Climate Plans (NECPs); the establishment of verification mechanisms; the qualification of providers; the existence of mechanisms that ensure that performance guarantees can be reclaimed; and the degree of capitalization on private investment – these could be part of comprehensive long-term renovation strategies;
d) Public support, e.g. ESIF, cohesion funds, InvestEU, could be conditional to the use of adequate financing support mechanisms (e.g. as contributed through EEOs or White Certificates – EED Art. 7) such as guarantee funds, and forfaiting (See also Recommendation 6). Besides directly supporting

[105] According to the ECA "Grants remain the main form of support for energy efficiency investments funded by the EU and are not reserved for deep renovation … [Hence, b]efore using significant levels of grant support, Member States should consider using … mechanisms such as energy performance contracting" (2020).
[106] Art. 10 EPBD indicates that the European Commission will examine: the effectiveness of instruments deployed by Member States, especially when relying on EU funds, as well as the coordinated use of EU and national funding

EnPC contracts, public support is fundamental to ensure the viability of deep renovations, e.g. by supporting the non-energy components of these renovations.

A new opportunity is the allocation of €672.5 billion in loans and grants in the framework of the Recovery and Resilience Facility for reforms and investments undertaken by Member States (37% addressed to green investments and reforms). This Facility will allocate 37% of the funds to green investments and reforms, and is the centrepiece of the temporary recovery instrument NextGenerationEU. The instrument will also provide additional support to Horizon2020, InvestEU, and the Just Transition Fund. Legislative adaptation at EU and Member States level to enable the allocation of Recovery and Resilience funds through and in combination with EnPC would be key for establishing and developing these markets, especially in Member States that are not eligible for Cohesion Funds.

This recommendation is of the utmost relevance for fostering an impact-driven administration of the Covid-19 Recovery Package and minimizing the risks posed by the influx of grant money in disincentivizing EnPC.

Barrier 6. Insufficient access to competitive financing for EnPC providers

Limited access to financing by EnPC providers is problematic because it limits the availability and competitiveness of their services, particularly wherever Maastricht-neutral contracts enforce the existence of guarantees, hence the income of providers depends on verification that guaranteed performance has been accomplished. Insufficient access to financing is most problematic in Member States in which financing is particularly advantageous for public organizations (e.g. Germany, Austria, Czechia, and Slovakia). It is also a problem wherever EU funds that can be only allocated to public bodies play a key role in the development of EnPC (e.g. ESIF support to HBOR in Croatia).

Recommendation 6. Specific and improved financing for leveraging private investment

There are expectations of support from InvestEU in terms of addressing energy services and EnPC providers, and allowing their combination with other forms of EU financing and grants. In general, the national incorporation of FI-Compass (2020) clarifications regarding the possibility of using grants and forfaiting mechanisms for off-balance sheet contracts would be welcomed by sectoral players – for instance, as part of new InvestEU instruments. The Renovation Wave Strategy brings about hope in this direction.

The development of national commitments, awareness raising, demonstration, model contracts, quality assurance, guidelines, risk assessments, and support through specific instruments or National Energy Efficiency Funds are valuable ways in which finance institutions may engage with EnPC financing.[107]

At the national level there is still the potential for developing EEFs with contributions from EEOs (EED Art. 7) and public sector obligations towards EED Art. 5. This is important, because EEFs constitute a flexible instrument that can ensure that cost effective, strategic investments are prioritized.

[107] A fundamental role in building the trust of financing institutions is played by the development and demonstration of contracts, and for these to be adapted to local conditions in terms of duration, guaranties, and penalties (Slovakia, Croatia, Portugal, and Czech Republic), especially after the disruption generated by Eurostat guidance. National Energy Efficiency funds can have an important role in creating financing and advisory facilities – as such has been proposed for a Croatia National Programme for Combined Financing in the Public Sector (REGEA 2020).

Amongst the projects supported by EEFs may be the creation of support units and One-stop-shops and guarantee funds. As argued in Recommendation 5, the conditional allocation of EU involve a requirement that Member States develop adequate financing support mechanisms for EEOs and White Certificates to leverage private investment – e.g. through guarantee funds, and forfaiting. In addition to the potential of developing EEFs on the basis of EEOs, the Renovation Wave Strategy calls for Member States to introduce mechanisms which can make financing available to EnPC providers, involving energy-saving tariffs, on-tax and on-bill schemes, and taxation tools, which along with energy efficiency obligation schemes.

Other new commitments of the European institutions reflected in the Renovation Wave Strategy that could address the problematic access of providers to financing include: a) new standards and labels for sustainable financial products, such as green mortgages, green loans and green bonds, which are intended to make energy efficiency lending products more widely available; b) the potential introduction of a dedicated prudential treatment to financial products associated with building renovation; c) the potential support from the EIB to new ways to attract private finance, including energy efficiency mortgage-based lending or securitisation; and d) the upcoming EU Taxonomy that is expected to direct private capital towards investing in energy renovation.

Barrier 7. Uncertainties about Maastricht neutrality and funding compatibilities

During the reported period (2017-2019) there has been confusion about the compatibility of EU grants with Maastricht neutral contracts, and with forfaiting instruments. This has disincentivised Member States from relying on ESIF, and also those with well-established forfaiting from adopting off-balance sheet contracts. The opportunities for the combined use of ESIF and forfeit mechanisms with off-balance contracts were clarified in a Fi-Compass report (2020) by the time the EC JRC Survey 2020 was closed to respondents. Current interpretation appears to be supportive of the scaling up of forfaiting facilities through guarantee funds at a Member State level, alongside the development of EEFs. Forfaiting constitutes an opportunity to develop long-term finance (Miller 2019), and hence to help develop the challenging strategies necessary for the EU to meet its decarbonization targets.

Concerns also remain about Eurostat requirements (2018) concerning contract duration, increased risks for providers (Czechia, Portugal, Bulgaria), and limitations in relation to renewable energy generation (Croatia, Spain, Portugal, and Greece, and also relevant for Malta and Cyprus to take off). Increasing the share of renewables in off-balance sheet contracts is considered to be able to potentially ease the development of markets in countries with moderate climates, where thermal insulation has a long return period, and energy-saving projects tend to focus on lighting (Spain, Croatia, Portugal, and Italy). Moreover, EnPC continues to count towards the debt of local and regional authorities (Denmark, Germany). There are also concerns about off-balance sheet treatment resulting in increased public spending and rising inflation (Ireland). Expectations on the repayment of deep renovations only through energy savings are problematic, and add to the complexity of EnPC contracts, making necessary to consider alternative modalities of combining works and performance contracts, as well as of using PPPs as either an alternative to EnPC or as its overarching framework (Croatia).

Recommendation 7. Continued efforts of adjusting, clarifying and communicating Eurostat treatment and fund allocation rules

The European Commission, the EIB, and Eurostat need to continue to follow up, update, and disseminate the conditions for the Maastricht neutrality of EnPC contracts, and for these to reflect the spirit of cost-effectively meeting energy-saving targets and engaging private investment. The overall goal needs to be to develop a framework according to which contracting quality

and guaranteed performance is competitive, without losing sight of the intent of transferring costs and risks to the private sector. Clarification efforts from Eurostat guidance (2017, 2018) and the Fi-Compass report on the combined use of ESIF with EnPC (2020) need now to be matched at the national level through the continuing adaptation of contracts, guidelines, provider qualifications, and demonstration efforts. It is expected that with these clarifications there will be greater interest from Member States in engaging with off-balance sheet treatment (e.g. in Austria, Germany, and Czechia), and removing national expenditure ceilings. Also, there is a need of considering the limitations of EnPC to fully address deep renovations. EnPC needs to remain instrumental in the achievement of savings and deep renovation rates. Its combination with other contractual mechanisms of intervention needs to be promoted, e.g. contracts for non-energy saving related components of building renovation, and PPPs. The Renovation Wave Strategy brings about a new opportunity with the commitment of the Commission and the EIB to further cooperate with Member States and market actors to implement a set of rules about the combination of programmes, instruments, public and private funds for building renovation.

7.3. Closing remarks and way forward

Although there has been progress in the development of EnPC in public sector markets, their potential to contribute to energy saving and carbon emission reductions in the EU appears largely unexploited. EnPC provides an opportunity to capitalize on private investment, whilst reducing the technical, administrative, and finance efforts and risks of the public sector. EU technical and finance support continues to be an invaluable tool for developing and upscaling most markets. Continuing support needs to be designed and implemented with a view to creating sustainable markets that are perceived as advantageous for the public sector and for sectoral actors. Fundamentally, the former needs to address the issue of impacts, whilst increasingly focusing on the development of technical and financial capacities for adapting EnPC to local conditions and simplifying its adoption. Renewed commitment and capacities from national governments and public sectors overall are the key to success.

In line with previous reports in this series, the recommendations presented here largely involve extending and intensifying the provisions contained in the EED and the EPBD. However, there is a need for the promotion, adaptation, and adoption of EnPC in the public sector, which largely remains at the national level. Also, in accordance with the findings of previous EC JRC reports, the authors of this report understand that there is limited common ground in Member States for comparing the data about EnPC in public sector markets. Therefore, there is a need for a comprehensive and common methodology based on EED definitions that includes data collection, reporting, M&V, and policy assessment to enable better comparison of costs and impacts *within and beyond EnPC in the public sector*. Expectations are that the implementation of the EU Framework to Facilitate Sustainable Investment (Council of the European Union 2020; 2019) will foster adequate data collection, disclosure, and registration. Improved data availability and comparability is needed to reduce public sector costs and, overall, the risks of interventions. The latter need to be strategically chosen and supported based on their contribution to the EU commitments of saving energy and renovating buildings to high energy performance standards. Enforcing contributions to this database from public sector projects appears to be particularly feasible when such projects and programs are contributed by the EU (Art. 10 EPBD). Until more data is made available, however, the EnPC system needs to keep close track of its intent to leverage private investment; of the need to foster challenging projects for all technical, administrative, and financing efforts so far conducted by the EU, Member States, providers, public bodies and financing institutions to be rewarded with significant performance improvements. The recommendations presented herein need to apply to the €249 billion endowed

in 2020 to climate-related expenditure by the Recovery and Resilience Facility. These initiatives need to send clear signals about EU commitment to sustainable investment – i.e., the type of investment which improves energy performance and private sector engagement.

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List of abbreviations and definitions

AT – Austria

b – billion

BE – Belgium

BOOT – Build-own-operate-transfer. This model resembles a special purpose enterprise created for a project. Clients enter long term supply contracts with the BOOT operator and are charged accordingly for the service delivered; the service charge includes capital and operating cost recovery and project profit. BOOT schemes are becoming an increasingly popular means of financing combined heat and power projects in Europe (E3P 2020)

Chauffage – Contract energy management. These contracts are typically very long (20-30 years) and the ESCO provides all the associated maintenance and operation during the contract (E3P 2020)

BG – Bulgaria

CAPEX – Capital expenditure. Payments made to acquire or to improve existing assets over a period of more than one year. Capex is recorded as liabilities on a balance sheet gradually over the course of an asset's useful life

Cohesion fund. Funds transport and environment projects in countries where the gross national income (GNI) per inhabitant is less than 90% of the EU average. In 2014-20, these are Bulgaria, Croatia, Cyprus, the Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia (European Commission, n.d.). During this period, around EUR 17 billion in cohesion funds were dedicated to building renovation (European Commission 2020d).

CO_2 – carbon dioxide

CR – Croatia

CY – Cyprus

CZ - Czechia

DE – Germany

DBFMO – Design (D), Build (B), Finance (F), Maintain (M) and Operate (O)

DEEP – De-risking Energy Efficiency Platform

DK – Denmark

Due diligence – Research and analysis of a company in preparation for a business transaction (EIB)

EBRD – European Bank for Reconstruction and Development

EC JRC 2017 – EnPC Report (Boza-Kiss et al. 2017)

EC JRC 2019 – ESCO Report (Boza-Kiss et al. 2019)

EE – Estonia

EED – Energy Efficiency Directive (Directive 2012/27/EU as amended by Directive 2018/2002)

EEO – Energy Efficiency Obligation (Scheme)

EESI2020 – European Energy Service Initiative towards the EU 2020 energy saving targets

EIB – European Investment Bank

EMAs – Energy Management Systems

EnPC – Energy Performance Contracting. In this report we abbreviate Energy Performance Contracting by using EnPC (and not EPC as widely used in the past) following the practice used in Boza-Kiss et al. (2019); this is important to differentiate Energy Performance Contracting from Energy Performance Certificates, commonly abbreviated as EPC

EnPC with guaranteed savings – contractor guarantees energy savings, clients take the finance risk. The customers are financed directly by banks or by a financing agency;

this is an advantage over shared savings because finance institutions are better equipped to assess and handle customer's credit risk than ESCOs (E3P 2020)

EnPC with shared savings – both parties share the savings, contractor take finance risk. Under a shared savings the client takes over some performance risk, hence it will try to avoid assuming any credit risk. A shared savings contract is likely to be linked with financing coming from the client and the ESCO whereby the ESCO repays the loan and takes over the credit risk (E3P 2020)

ES – Spain

ESA 2010 – European System of National and Regional Accounts. Internationally compatible EU accounting framework. The ESA 2010 was published in the Official Journal on 26 June 2013. It was implemented in September 2014; from that date onwards the data transmission from Member States to Eurostat is following ESA 2010 rules

EFSI – European Fund for Strategic Investments

ESIF – European Structural and Investment Funds

EPBD – Energy Performance of Buildings Directive (Directive 2010/31/EU as amended by Directive 2018/844)

ESC – Energy Service Contract/Energy Supply Contracting

ESCO – Energy service company

EU – European Union

EUROSTAT - statistical office of the European Union

EVO – Efficiency Valuation Organisation

FM – Facility Management

FI - Finland

Forfaiting – Sales of future receivables without recourse against the seller (true sale).

FR – France

GR – Greece

Guaranteed savings or performance, energy saving guarantees or performance guarantees are a definitive characteristic of EnPC, whereby the income of the provider is dependent upon achievement of contracted performance

Guarantee (finance, funds, insurances) – serve to overcome issues of limited access to financing and liability by EnPC providers

H2020 – Horizon 2020

HVAC – Heating ventilation and air-conditioning systems

HU – Hungary

IE – Ireland

IT – Italy

JRC – Joint Research Centre of the European Commission

LV – Latvia

LT – Lithuania

LU – Luxemburg

m – million

M&V – Measurement and Verification

MT - Malta

NEEAP – National Energy Efficiency Action Plan

NL – the Netherlands

PL - Poland

PT – Portugal

Public lighting – Lighting for street, traffic and other outdoor public space

PV – Photovoltaic energy

RO – Romania

PPP – Public-private partnership

PDA H2020 – Project Development Assistance

NPV – Net present value

One-stop-shop – Integral advisory services for energy performance projects

OPEX – Operational expenditure. Reunites expenses related to the production of goods and services. Operating expenses do not include taxes nor debt service

Recourse – in the context of forfaiting, when the sellers' responsibility can be enforced in case of receivables' payment default

Receivables – Future contracting fees

Forfaiting – Assignment of the rights (sale) related to clients' invoices to a finance company at a discount price (purchase price)

SEIF – Sustainable Energy Investments Forums, promote exchange events and publicize results with national stakeholders. SEIF builds on the works of the EEFIG to further energy efficiency finance (European Commission 2020a)

SFSB – Sustainable Financing for Smart Buildings initiative. EU facility created in February 2018 to channel and increase efforts towards effective the use of public funds, provision of assistance, project aggregation, and knowledge development for de-risking investment in energy performance of buildings (European Commission 2020a)

SK – Slovak Republic

SI – Slovenia

SE – Sweden

SRSS – European Commission's Structural Reform and Support Service supports Member States with the preparation, design and implementation of growth-enhancing reforms. DG REFORM was created in January 2020, taking over the mandate previously carried out by the SRSS (European Commission, n.d.)

Step-in rights – The right of a lender to replace the ESCO in the EnPC contract (World Bank 2016; Pernetta and Bender, n.d.)

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Appendixes

Appendix 1. Potential for energy performance in the public sector of the EU

A largely untapped potential for saving energy through energy performance improvements has been identified in the a) public sector, and, in particular b) public buildings and c) public lighting:

a) Public sector. Public spending accounts for 17% of EU GDP, as recognized in Energy Efficiency Plan of the EU (European Commission 2011b).[108] According to Eurostat and EIB (2018): "The [EU] public sector's annual energy bill of €47 billion represents a large, untapped savings potential in energy efficiency."[109] Adding to this relative relevance, the public sector is expected to play an "exemplary role" in paving the way for third parties to act (EED Art. 5).

b) Public buildings. Around the final energy of the EU is consumed in buildings and it has been recognized that "the greatest energy saving potential lies in buildings" (EU Energy Efficiency Plan, 2011). The EPBD considers that an average annual renovation rate of 3% is deemed necessary to accomplish EU targets in a cost-effective manner. Such is the rate required in the EED for central governments to renovate their buildings in fulfilment of its exemplary role.[110] EU public buildings consume 42Mtoe (See figure below) and have low performance due to aging, maintenance requirements, and need of refurbishment, which relates to the split incentive between budgetary departments a user bodies. The potential savings for EU public buildings is 58.5 TWh with an investment of €39.4b (Boza-Kiss et al. 2017).[111]

b) Public lighting (i.e. street- and road-lighting). In 2015 there were more than 56 million street lighting luminaires in operation in the EU, with an estimated electricity consumption of 35 TWh/year. The widespread existence of old and inefficient systems implies that street lighting can account for 30-50% of the total electricity consumption of some municipalities. With current technologies 30-70% energy savings are generally possible (OÖ Energiesparverband 2015). According to technology and service supplier Signify, the combination of led technology, smart systems and energy service contracting can provide up to 80% savings (Derler 2020).

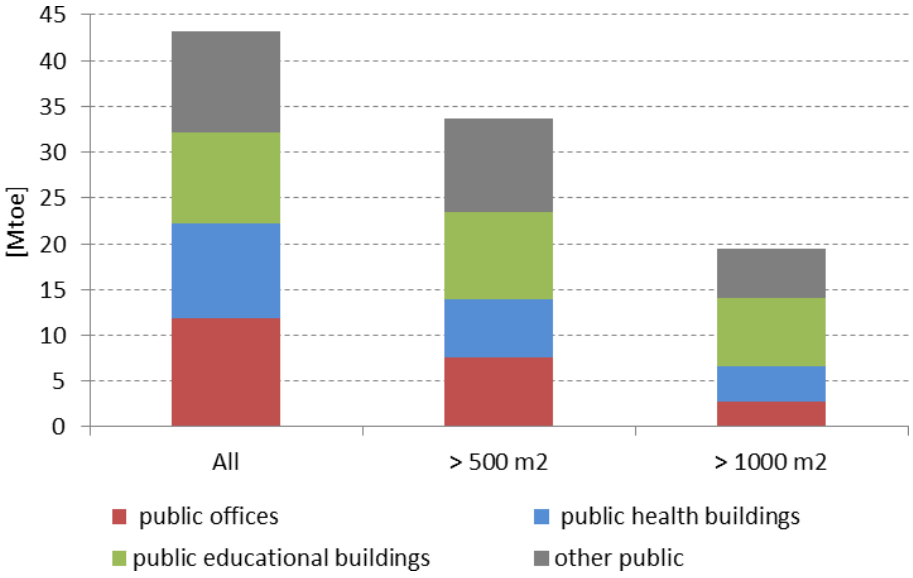
[108] This is the most recently available data found. Authors' review of Eurostat data shows that this value may be an underestimation.

[109] The estimates used by Eurostat and EIB (2018) are based in Borg et al. (2006).Borg et al. (2006). Most recently available information from Eurostat does not differentiate public sector energy spending. For instance, buildings are categorized as tertiary and residential, hence overseeing the difference between public and private.

[110] To untap the energy saving potential of public buildings, the public sector is expected to play an exemplary role by enforcing a 3% average annual renovation rate in its buildings, and leading the way in the adoption of NZEB standards for new buildings and adopting long-term renovation strategies towards achieving 80-95% greenhouse gas emission reductions by 2050 as compared to 1990 (EPBD 2018).

[111] These estimates are for public buildings larger tan 500m2 and considering energy prices of 2016.

Total final energy consumptions associated to all EU public buildings and to those larger than 500 m2 and 1000 m2. Source: EC JRC 2017.

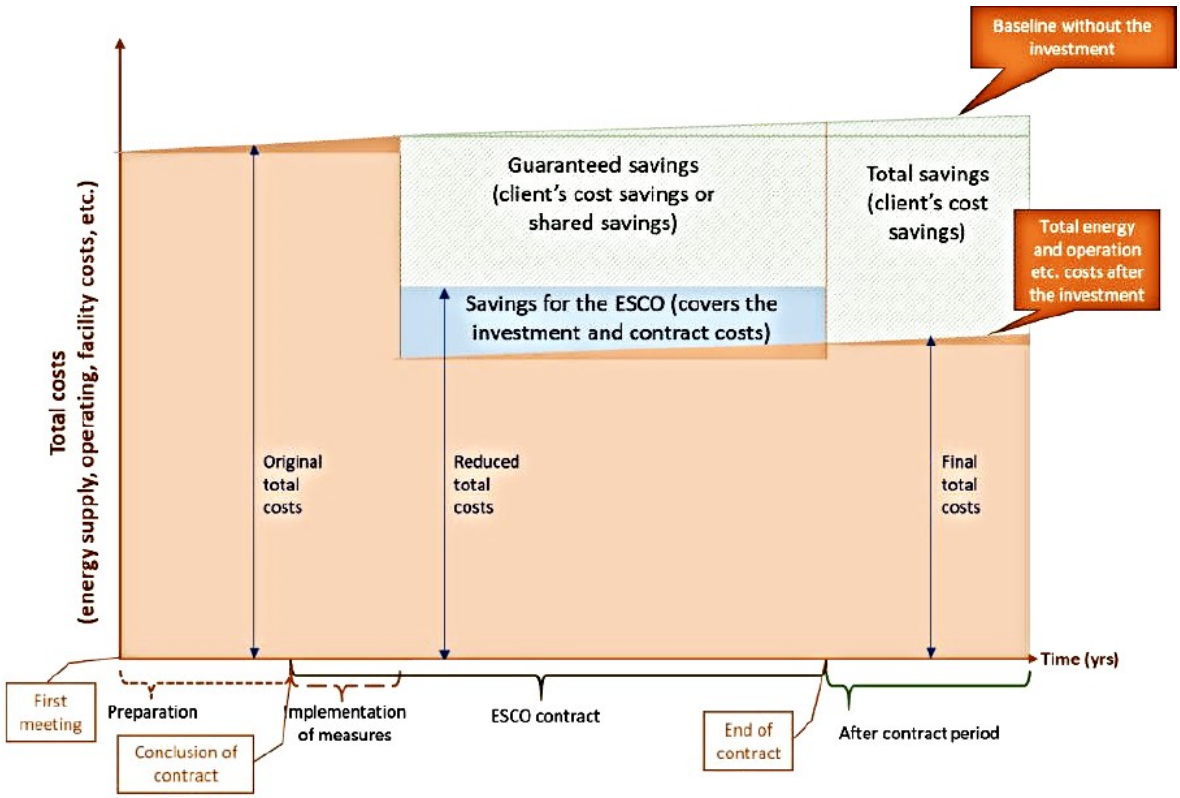


Appendix 2. Basic arrangement of an EnPC

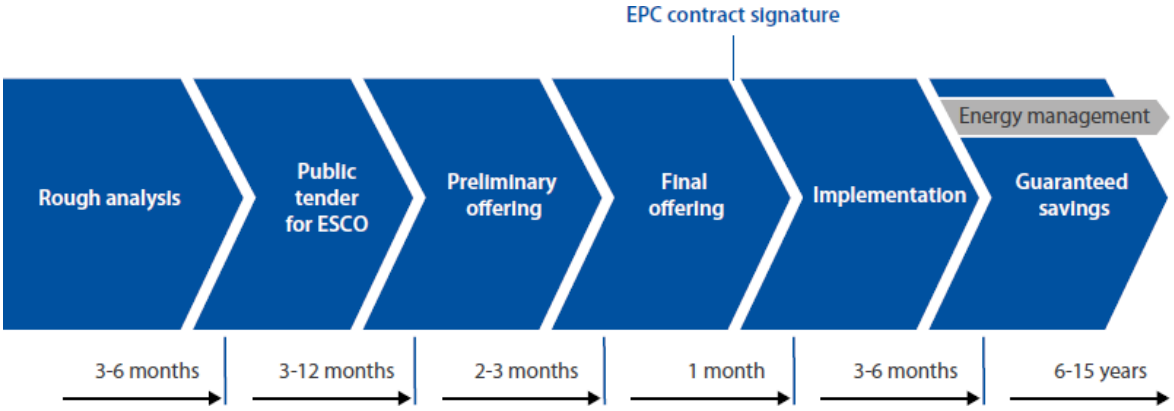
The costs incurred by the client before the EnPC project include the supply of energy, operation, facility management and other running costs. The EnPC project preparations involve feasibility studies and data collection, baseline measurements, identification of measures, several consultations, and negotiations. The preparation period is much longer than conventional procurement and can take up more than one year (See figures below). Measurement and verification take place throughout the overall process. In an ideal scenario, where the savings achieved correspond to those guaranteed in the contract, there is no adjustment of payment. In case of underperformance, the provider needs to compensate the client and in case of overperformance, the provider receives a bonus – equivalent to at least two thirds of the overperformance value in the case of Maastricht-neutral contracts (Eurostat 2017; Eurostat and EIB 2018). Compensation or penalty may cover for the unachieved savings during the contract period but also for the overall lifetime of the installed improvements, as well as for the cost of opportunity incurred, and for the impact on the client's reputation. A sufficiently stringent compensation is necessary for guaranteeing the commitment of the provider to fulfil its contractual obligations. However, a too stringent penalties and guarantees may discourage ESCOs from entering the EnPC market.

Measurement and verification are fundamental for a system with performance guarantees to work, i.e. for clients to be able to claim a compensation, and for providers to claim their fees and bonuses. However, these processes also involve an additional cost which places EnPC in disadvantage over other mechanisms of procurement. Understanding that measurement and verification are but an advantage of EnPC, and the adoption of simplified mechanisms agreed between the contract parts are key for success of the EnPC model.

Distribution of costs and relative savings during the lifetime of an EnPC scheme. Source: EC JRC 2017 – modified from Szomolanyiova & Sochor (2013).



Typical timeline of an EnPC project. Source: Fi-Compass (2020)



Appendix 3. Regulatory framework (EED and EPBD) and status of implementation

EED Art. 5. Exemplary role of the public sector

In accordance with Art. 5 of the EED (2010), Member States are requested to annually renovate 3% of the heated or cooled floor area of buildings larger than 250sqm owned and occupied by the central administration, and optionally by regional governments. These renovations need to be conducive to meet at least the national minimum energy performance requirements. Alternatively, Member States may opt for alternative measures in their government buildings to attain equivalent savings to those expected from the application of the default option. Article 5 also advises that public bodies "use, where appropriate, energy service companies, and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term." This is advantageous for the development of service provision, economies of scale, information, standards and guidelines on EnPC. The deployment of EnPC in the public sector is furthermore sustained by the setting of databases on public building performance, necessary for theimplementation of Art. 5. [112]

Compliance with Art. 5 has increased over the recent years. In 2019 only 5 Member States did not provide the requested update. However, only Spain, Italy, Luxemburg, Latvia, Austria, Finland, Ireland, Croatia, Slovakia, and Poland met their cumulative targets for the period 2014-2018. Insufficient data is reported in the cases of 12 countries Bulgaria, Estonia, Greece, Spain, Hungary, Italy, Lithuania, Latvia, Romania, Denmark, Malta, Portugal, and Sweden. Of note, Romania and Malta have completely missed their reporting obligations; reports from 2018 and 2019 are missing for Belgium and the Netherlands; Belgium and Finland reported having exceeded their cumulative targets and have lowered their efforts towards fulfilment of this article (Tsemekidi-Tzeiranaki et al. 2019, 2020) .

EED Art. 6. Purchasing by public bodies

The EED requires public bodies of Member States to prefer high energy-efficiency performance services, products and buildings. Fundamentally for the scope of this report, "Member States shall encourage public bodies, when tendering service contracts with significant energy content, *to assess the possibility of concluding long- term energy performance contracts* that provide long-term energy savings." (Art 6. EED, our emphasis). EnPC in the public sector is therefore considered instrumental to save energy and to avoid locking in potential savings. Moreover, in requiring Member States to "ensure that central governments purchase only products, services and buildings with high energy-efficiency performance", the EED settles the basis for the pursuit of guaranteed savings. A recent assessment on the implementation of Art. 6 EED (Luyckx and Ortega 2020), indicates that:

a) Implementation requires capacity building, and is time-consuming for public servants;
b) Budgetary, legal and institutional barriers are still relevant;
c) The article is sufficiently restrictive;
d) Further involvement of small and medium-sized suppliers is needed;
e) Local and regional authorities need support to shift procurement habits; networks are a powerful dissemination instrument;
f) 55% of public procurement procedures use purchasing cost as the only award criteria;
g) There is a potential for simplification alongside the development of e-procurement.
h) These barriers are often magnified in public sector markets of EnPC.

[112] This is important because, as argued in the Energy Efficiency Plan of 2011 "the deployment of energy performance contracting is hampered in many Member States by ambiguities in the legal framework and the lack of reliable energy consumption data to establish the baselines against which performance is measured" (European Commission 2011b).(European Commission 2011b).

EED Art. 7. Energy Efficiency Obligations

Art. 7 triggers the use of EnPC to improve the performance of private and public sectors by requiring energy distributors and retailers to achieve 1.5% annual energy savings in consumer premises. Its implementation potentially contributes to the development of EnPC in the public sector both a) through the fulfilment of EEOs and b) by allowing alternative contributions to an Energy Efficiency National Fund (EEF)– Article 20(6). The latter can play a key role in the development of EnPC because EEFs can be used as sources for grants, financing and guarantee mechanisms to EnPC.

This article was designed to deliver more than half of the energy savings required to Member States under the EED (European Commission 2011a). However, attaining this potential requires greater efforts of measurement and verification, recognizing the water management in energy consumption, and the increasing need to account renewable generation as contributing to saving energy and reducing greenhouse gas emissions (European Commission 2019b). The latter two provide opportunity to increase the potential of public sectors, especially in mildest climates.

Although the cumulative target has been overachieved by the overall EU in 2014-2017, a diverse degree of implementation has been reported (Tsemekidi-Tzeiranaki et al 2020).[113] An European Commission assessment of the Member State achievements and projections serves to categorize Member States according to the likelihood of achieving Art. 7 related targets by the end of 2020 (2020):

a) Very likely overachievement in Austria, Cyprus, Denmark, Finland, Ireland, Latvia, Malta, the Netherlands, Poland, Slovakia;
b) Likely overachievement in Belgium, France, Germany and Slovenia;
c) Unlikely achievement in Czechia, Estonia, Greece, Hungary, Italy and Sweden;
d) Very unlikely achievement in Bulgaria, Croatia, Lithuania, Luxembourg, Portugal, Romania and Spain.

EED Art. 16. Availability of qualification, accreditation and certification schemes

Member States are invited to develop reliable and transparent quality assurance systems for energy service providers, amongst others. These quality assurance systems encompass “certification and/or accreditation schemes and/or equivalent qualification schemes, including, where necessary, suitable training programmes”, and need to be publicized in fulfilment of Art. 18.

Quality assurance mechanisms are called in to improve trust in providers (Szomolányiová and Keegan 2018). In 2019 quality assurance schemes were available in Austria, Belgium, Bulgaria, Czechia, Finland, Slovakia and Spain, but the success and extent of application was uncertain (Boza-Kiss et al. 2017; 2019; GuarantEE 2020). Further efforts to implement quality standards, management and audit systems, as well as for their harmonisation is needed to ensure data comparability and improve risk assessment (Szomolányiová and Keegan 2018). It is expected that a review of the EED in 2021 will place further emphasis on qualification, accreditation and certification schemes.

EED Art. 18 Energy services

In its Art. 18, the EED (2012) provides the policy framework for the development of energy services. It requires Member States to:

a) Disseminate clear and easily accessible information;
b) Encourage the development of quality labels;
c) Enable access to lists of qualified energy service providers;[114] and

[113] Tsemekidi-Tzeiranaki et al 2020 reported, based on national reports: a) Target achievement and overachievement in Belgium, Denmark, Germany, Estonia, Ireland, Latvia, Lithuania, Malta, Netherlands, Austria, Poland, Slovakia, and Finland. b) Slight underachievement in Greece, Spain, France, Italy, Cyprus, Hungary and Slovenia. c) Underachievement in Czech Republic, Bulgaria, Croatia, Luxembourg, Portugal and Romania. (Sweden failed to provide sufficient data in latest reporting periods).

[114] Service providers may be certified in accordance with Article 16 EED.

d) Support the public sector in taking up EnPC, in particular for building refurbishment;
e) Report developments in National Energy Efficiency Action Plans;
f) Provide model EnPC contracts and information on best practices, including, if available, cost-benefit analysis using a life-cycle approach;
g) Ensure that energy suppliers, distributors and retailers do not obstruct energy services markets.

Moreover, Member States are advised to:

a) Publicize information points for final customers – e.g. One-Stop Shops;
b) Remove regulatory and non-regulatory barriers to energy services and EnPC;
c) Enable mechanisms to speed up the handling of complaints and the settlement of disputes;
d) Enable the role of market intermediaries (facilitators in this report).

In 2018, the article implementation success was found "extremely patchy", with the most successful provision being information provision, and several provisions not being adopted (Boza-Kiss et al. 2019). Fundamentally, in 2018 model EnPC contracts were available in at least 14 Member States (Szomolányiová and Keegan 2018). However, models were considered successful only in seven Member States, i.e. Austria, Czechia, France, Germany, Greece, Slovenia, and Spain (Boza-Kiss et al. 2019). Although the public sector has been leading in the adoption of model contracts according to Art. 18, their availability has not resulted in widespread use. A standardization wave has been contributed by the Eurostat guidelines for off-balance treatment of EnPC in government accounts, particularly in Member States concerned about public debt.

EED Art. 20 Energy Efficiency National Fund, Financing and Technical Support

This article requires Member States to facilitate the creation and use of financing facilities for "energy efficiency and energy renovation sustained by National Energy Efficiency Funds (EEFs) which can serve, amongst other to fulfil obligations in Art. 5 and Art. 7. The Commission and European finance institutions will provide support by facilitating the exchange of best practices, the creation of databases and forums. The amended EED (2018) places emphasis on improving the use of energy audits (EED Art. 8) and of the instruments of the Smart Finance for Smart Buildings initiative (Section 1.4). The amendment also puts emphasis on the Commission commitment to mobilise private financing, to improve knowledge on financial risks and benefits and provide guidance for Member States on how to unlock private investment (by 1 January 2020).

The establishment of national funds (EEFs) constitutes a flexible instrument to ensure that cost effective and strategic allocation of investments. Along with technical and financial support of the EU institutions, EEFs constitutes an opportunity for EnPC markets.

EPBD Art. 2a Long Term Renovation Strategies

Aligning with EED Art. 5, the EPBD Art. 2a encourages the public sector to lead the decarbonisation of national building stocks. Incorporating previously existing requirements (Art. 4 EED), Art. 2a requires, since its introduction in 2018, Member States to establish a Long Term Renovation Strategies (LTRS) and roadmaps for the decarbonisation of national building stocks by 2050, including: a) an overview of national building stocks, and share of renovated buildings by 2020; b) the identification of cost-effective approaches to renovation, optionally involving life-cycle considerations; and c) instruments fostering cost-effective deep renovations, especially targeting all public buildings. Moreover, Member States are expected to facilitate mechanisms for: a) project aggregation, b) perceived risk reduction; c) the use of public funding to leverage private-sector investment or address specific market failures; and e) provide advice to consumers (e.g. One-stop-shops – Art. 20).[115] The implementation of Art. 2a

[115] A series of additional recommendations where added by the European Commission (2019d). A series of additional recommendations where added by the European Commission (2019d).

is to be supported by the European Commission as part of the Smart Finance for Smart Buildings initiative (see section 1.4.1) by collecting and disseminating best practices of energy efficiency (with a focus on public buildings) and renewable energy technologies, considering cost-efficiency differences between Member States.

The implementation of Art. 2a has been slow. At the time of writing this report, only 13 Member States had submitted their first LTRSs under Art. 2a of the EPBD, and there was preoccupation about delayed submission and insufficiently ambitious strategies both in terms of savings targets and the incorporation of EnPC (e.g. Latvia). Long term renovation strategies would benefit from further use of sustainable financing mechanisms to promote private financing and deeper renovations. One limitation of this and other articles in the EED and EPBD is the absence of requirements to leverage private investment, e.g. by making conditional EU grant allocation. The role of the European Commission in reviewing these strategies is crucial because next strategies are to be submitted in 2029.

EPBD Art. 10 Financial incentives and market barriers

Member States are required transparency on the measures and instruments used for building energy performance. Their effectiveness is to be examined by the Commission, especially when relying on the use of EU funds. In addition to its supervision role, the European Commission provides national and regional assistance through exchange of best practices in setting national or regional support programmes. The 2018 amendment establishes energy saving as the policy goal, hence setting the grounds for more complex and deep interventions, and hence for public bodies to pursue external support through EnPC. Moreover, the establishment of measurement, verification, and data gathering instruments constitutes furthermore a key mechanism for enhancing the comparability between projects, risk assessment, and the allocation of national and EU funds.

Limitations of the article include the absence considerations on the capacity of financing mechanisms to leverage private investment. This would be important to counter the continued preference for grants and loans over sustainable financing mechanisms (Economidou 2019), and to foster EnPC in the public sector. Limited progress has been achieved in the use of knowledge databases, monitoring, verification and decision mechanisms. This limits the capacity of assessing the cost-effectiveness of EU support in generating energy savings (European Court of Auditors - ECA - 2020).[116]

EPBD Art. 14 and Art. 15 Inspection of heating and air-conditioning systems

Articles 14 and 15 of the EPBD included in 2018 an exemption from inspection requirements for technical building systems covered by energy performance contracting, provided the contract involves equivalent inspection measures to those required in these articles. This modification constitutes an incentive for both the adoption of EnPC and for these contracts to involve close management of the systems – hence contributing to improve the quality of service and its performance.

EPBD Art. 20 Information

Art. 20 of the EPBD is about the provision of information on available methods and practices, including finance instruments, for cost-effective energy performance improvement. Since 2018 the recommend the deployment of integral advisory services, such as One-stop-shops (One-stop-shops) to cope with the complexity of mechanisms such as EnPC. A potential for the development of One-

[116] The text of the European Court of Auditor reads: "We assessed whether EU co-funded energy efficiency investments in buildings had cost-effectively helped the EU toward its 2020 energy saving target. We concluded that the operational programmes and the project selection were not driven by a cost-effectiveness rationale... We recommend improving the planning, selection and monitoring of the investments to improve the cost-effectiveness of the spending" (ECA 2020). The responses of the European Commission, available in the ECA report, confirm that there is a limited data comparability which limits the possibility to allocate project funds according to their expected cost-effectiveness.

stop-shop has been identified ; in 2018 only a few One-stop-shop were reported to provide service to the public sector (Boza-Kiss and Bertoldi 2018).[117]

[117] In 2018 One-Stop-Shop providing support to the public sector were found operating in in Bulgaria (Rhodoshop PDU, EERSF – formerly BEEF, and REECL), the Walloon region of Belgium (RenoWatt), and Slovakia (MunSEFF, and SlovSEFF). These were mostly established with support of Horizon 2020, EEEF, EBRD credit lines and international financing institutions (in the case of EERSF) (Boza-Kiss and Bertoldi 2018).

Appendix 4. Data collection

Appendix 4.1.

Methods

The study period is 2017-2019. Data collection was conducted during February-June of 2020, involving a) an expert survey, b) interviews, and c) document review.

a) A survey (Appendix 3) was prepared and distributed mainly among national, regional and local experts. Some EU-level experts were also contacted.[118] Contacts were provided through the JRC ESCO network, and new contacts were also identified using a snow-ball technique. The survey had an estimated response time of 20-25 minutes and was sent out to around 300-400 contacts between February and May 2020. The responses were mostly collected electronically through the EU Survey platform. In some cases, the questionnaire was filled over the course of phone interviews to honour the preference of the participants. In the questionnaire, response anonymity was granted to respondents and these were asked for permission to acknowledge their participation. A total of 67 survey responses were obtained. Some of these responses are the result of collective efforts of various respondents. The publication of the survey in February of 2020 coincided with the initial outburst of a Covid-19 pandemic that negatively affected the availability of respondents. However, the resulting database is the richest and most up to date collection of experiences and reflections on EU EnPC in the public sector markets.

b) Semi-structured interviews were conducted (over the phone and in person), either as part of preliminary research (interviews with 7 experts) or follow up to questionnaire response (See point a). The survey was used as a template for these interviews, but focus was put on key areas of relevance for each respondent. These interviews were intended to enable greater depth of understanding of national, regional and local cases and circumstances, and to identify key matters to be included in the survey. Both survey and interview participants (totalling 74) and their organizations are acknowledged in the report when the formers did not opt for the anonymity option.

c) National, regional and local documents, reports, websites, project outcomes and presentations were reviewed. The findings of H2020 projects on multiple geographic scales were used to contrast the analytical insights of this report. The EC JRC 2017 report on EnPC in the public sector was used as a reference to observe possible transformation in the EU market and – to some extent – in national markets. To include recent information about this changing market, presentations in events attended by the authors or available online were also reviewed.

Appendix 4.2. Profile of respondents

The 67 questionnaire respondents self-identified as working in: companies whose activities include or are fundamentally of supplier in ESCO and EnPC markets (32%), facilitation (18%), associations (23%), consultancies (25%), finance institutions (9%), government organizations (20%), research-academia (14%), and intergovernmental organizations (5%) (Table 3).[119] In their geographic area of expertise, the respondents stated a combination of national, regional and local levels. For each Member State where responses were obtained at least one respondent stated to have expertise at national level, and all of them reflected on the national level at various stages of their responses. The

[118] In addition, to the country specific responses, information was gathered from experts acquainted with a diversity of markets. This has been included in thematic tables and provides relevant information for markets where a) no or b) fewest country-specific responses were obtained, i.e.: a) Luxemburg, Malta, Estonia, and b) Cyprus, Greece, Finland, France, Poland, Sweden, Denmark, Lithuania, Netherlands, Belgium, Romania, Slovakia, Slovenia.

[119] The percentages do not add up because the respondents were offered the possibility to choose multiple options.

diversity of responses sets the ground for rich representation of the EU market. On the contrary, given the response size for each country, the diverse expertise of respondents could contribute to a bias towards different aspects of the market being highlighted in the Member States, e.g. types of drivers and barriers. According to this argument, **there is a need to strictly consider data on Member States as the grounds for an assessment of the EU market and policies.** On the contrary, the low rate of preference for anonymity (18.5%) permits a follow up to study the evolution of the Member State markets in further reports (See table below).

Affiliation (multiple responses possible)	Answers	Ratio
ESCO / EnPC provider (a company whose core activity is providing ESCO services)	11	16.9%
A company which offers ESCO solutions among other services (e.g. installer, engineering, energy agency, etc.)	10	15.4%
ESCO / EnPC facilitator	12	18.5%
Association	15	23.1%
Utility	1	1.5%
Government Organisation	13	20.0%
Intergovernmental Organisation	3	4.6%
Financial Institution	6	9.2%
Consultant	16	24.6%
Academic/research	9	13.8%
Total responses (65 respondents online)	96	
	Answers	Ratio
Privacy options		
Please, do not acknowledge my participation in the report.	12	18.5%
You may indicate my name and affiliation … in the acknowledgements …	53	80.0%
No Answer	1	1.5%

Source: EC JRC 2020 Database

Questionnaire respondents were offered the possibility to state their acquaintance with the implementation of financing schemes, the Eurostat Guidance note of 2017 and the subsequent Guide to the Statistical Treatment of Energy Performance Contracts (May 2018), as well as with PDAs and de-risking instruments. Most respondents considered themselves acquainted with the financing schemes and responded to the related responses (75%). Interestingly the positive response was even higher regarding the statistical treatment of EnPC in the public sector contracts (83%) showing the interest and learning that policy reflection has generated. On the contrary, familiarity with PDAs and de-risking instruments is lower (51% of positive responses) (See table below).

	Answers	Ratio
Acquaintance with the financing schemes used for EnPC in the public sector of the country/subnational entity of expertise		
Yes	49	75.4%
No	16	24.6%
Acquaintance with the implementation of the Eurostat Guidance Note (September 2017) and the Guide to the Statistical Treatment of Energy Performance Contracts (May 2018) in the public sector of the country/subnational entity of expertise		
Yes	54	83.1%

No		11	16.9%
Acquaintance with Project Development Assistance facilities (PDA) and de-risking instruments (Smart Finance for Smart Building Initiative) as implemented in the public sector of the country/subnational entity of expertise			
Yes		33	50.8%
No		28	43.1%
No Answer		4	6.2%

Source: EC JRC 2020 Database

Appendix 4.3. Limitations

A series of limitations need to be considered when using the results presented in the current report:

First of all, the summaries and recommendations included in this report are largely based on expert opinion collected via the stated research methods. They are not to be considered as official statements either from the side of Member States nor from the European Commission. The assessments and conclusions were purely based on the information collected through the survey, interviews and desk research. As such, the assessment presented reflects the understanding about the market status and the implementation of relevant policies of those working on the ground. This may even significantly differ from the official or legally reported situations or even from other researches. Yet, the report is meant to highlight the market perceptions, concerns and forecasts as put forth by practitioners. These are key to explain market developments and expectations.

Secondly, the EnPC concept is still not fully rolled-out evenly across Member States, and its use may even differ between respondents in the same Member State. This limits the comparability of information and data collected. To overcome this problem, we have referred to the most important terms and definitions (in line with official terminology in European policies) in the online survey and during interviews. This way, we also had a chance to promote the official definitions stipulated in the EED. Questionnaire respondents were also reminded about the scope of research (EU EnPC in the public sector) in each question, however in some cases they indicated to have only information on the overall EnPC or ESCO market (these data were treated accordingly). Geographically, the data gathering intended to expand the focus of previous reports on EU and national level to include experiences about regional and local governments. However, most quantitative and semi-quantitative information has naturally a national scope. This was the scale of reference for most respondents. On the contrary, there are cases when actions at regional and local level are most relevant, making it difficult to consolidate national information. Such is the case of Italy where information was mostly available for regional projects.

Thirdly, regarding the timeframe researched, respondents were reminded about the focus on processes occurred in 2017-2019. However, objective and consolidated data is not always available and most responses to the questionnaire were based on the subjective assessment of respondents. This is particularly problematic when assessing quantitatively aspects like market size or signed contracts in the period. Follow up emails and calls with the respondents served to clarify timeframe and scope issues whenever the data appeared dissonant with previous reports and parallel responses of other experts. In some cases, however, the dissonances between responses could not be resolved, and are therefore indicated in the data representations. Another limitation regarding the timeframe and the subjectivity of response was caused by the delayed response that can be partially attributed to the pandemic situation lived in Europe during the first months of 2020. The EnPC markets are quickly changing, and belated response well in 2020 implies that multiple respondents intended to include ongoing contracting processes in 2020, as well as expectations related to conjectures about possible public sector reaction to the Covid-19 crisis. Whenever these reflections were detected they

were either removed from the analysis or considered in addition to the main analysis (e.g. as a footnote).

Fourthly, the expert response rate to the questionnaire was slightly lower than in JRC reports on ESCO and EnPC in the public sector status – the latter got 80 responses in 2017. As in previous reports, gathering data has proven extremely time-consuming. Research activity has been growing in the field, and potential respondents have many surveys to administer, thus they are reluctant to spend time with answering. The questionnaire was rather long (requiring about 20-25 minutes to fill in) in order to cover critical aspects. As in previous reports, only around 25% of the respondents skipped parts of the survey, except for the section on PDAs, where response rate was around 50% (Previous table). This is a rather low rate of non-response considering the increased length of the questionnaire that resulted from the need to include new developments in policy and support instruments.

A need of increased efforts to gather participants and to timely receive their responses, which made necessary extending the deadline for response until July 2020, probably resulted from the incidence of the Covid-19 pandemic in 2020 – multiple experts were working away from their offices and may have preferred to focus on their core activities. There were a few Member States where expert responses were not received (Estonia, Luxemburg and Malta) (See table below). This does not appear as fundamentally problematic because these countries have either non-existent or very small markets. In 12 Member States the response rate was below or equal to 2 (Belgium, Cyprus, Denmark, Finland, France, Greece, Latvia, Lithuania, Netherlands, Poland, Slovenia and Sweden). This can be problematic to capture a diverse and robust representation of the market status in Member States. However, these responses were from recognized actors and in some cases (Netherlands) the result of collective input. An effort to compensate the risk of bias was grounded on the authors and JRC experience with energy services, EnPC, and overall public sector procurement and energy performance in buildings. To this end also contributed data comparison with the findings in previous JRC and third-party reports.

Austria	3	Estonia	0	Italy	5	Portugal	3
Belgium	2	Finland	1	Latvia	2	Romania	3
Bulgaria	5	France	1	Lithuania	1	Slovakia	2
Croatia	4	Germany	5	Luxemburg	0	Slovenia	1
Czechia	4	Greece	2	Malta	0	Spain	8
Cyprus	1	Hungary	3	Netherlands	1	Sweden	1
Denmark	2	Ireland	4	Poland	1	EU	2
Total: 74, of which 67 filled the EC JRC 2020 Survey							

Source: EC JRC 2020 Database

Appendix 4.4. European Questionnaire on the Status of Energy Performance Contracting in the Public Sector – 2019

This questionnaire is about **Energy Performance Contracting (EnPC) in the public sector of your country and/or subnational entity of expertise**. Please, make sure to report on EnPC understood as the
following: A contractual arrangement between the beneficiary and the provider of an energy performance improvement project, which is verified and monitored for the sake of the contract. These improvements may refer to existing and new infrastructure and involve efficiency improvements and on-site renewable capacity development. Service providers are paid for in relation to a contractually agreed level of energy performance improvement or other related criterion, such as financial savings.
We kindly ask you to answer to the best of your knowledge, based on your experience, market information or simply your estimates. Whenever possible, please indicate the extent of your confidence in the information provided and/or to reference the data source (feel free to attach the sources to your response email). All questions refer to the public sector, in general. Whenever you find it relevant, however, please reflect on the particularities of different government levels (central/ federal, regional or local) in the free text blocks (length unrestricted).

Personal information and privacy

Your answers will be used only for the report indicated above and will be anonymized; i.e. only aggregated data will be published. For information on the JRC privacy policy (GDPR) please see the document end of the questionnaire.

- *Privacy options (required)*

Please, do not acknowledge my participation in the report.
You may indicate my name and affiliation alongside those of other experts in the acknowledgements of the report (name and affiliation).

- *Name (optional)*
- *Organization (optional)*
- *Organization (optional)*
- *Email address (optional).* Your contact details will not be disclosed to third parties. However, we would like to send you the published report. Also, it would be useful in case we need to contact you to clarify some information provided.
- *Country/subnational entity of expertise (required)* Should you have information on more than one country, we would like to ask you to be so kind as to fill-in the survey for each of these countries.
- *Government level(s) of expertise (required)* Please indicate the governance level or levels of your country on which you have insight in relation to planned or implemented EnPCs (think about: central, regional, local, etc. and feel free to indicate more than one).
- *Your affiliation (required – please choose as many as relevant)*

o ESCO / EnPC provider (a company whose core activity is providing ESCO services)
o A company which offers ESCO solutions among other services (e.g. installer, engineering, energy agency, etc.)
o ESCO / EnPC facilitator (please specify type in the free text box at the end of the section)
o Association (please specify type in the free text box at the end of the section)
o Utility
o Government Organisation
o Intergovernmental Organisation
o Financial Institution
o Consultant
o Academic/research
o Please specify the type of ESCO/EnPC (Private/ Public/PPP)
o Other (please specify in free text box at the end of the section)
o Please specify the type of company (Private/Public/PPP)
o Other (please specify in free text box at the end of the section)
o Please use the following free text box to specify the type of affiliation as required

1. Market overview

1.1. Although this report is about EnPC, we would like to know first about the most common service contracts in the public sector of your country/subnational entity as of 2019.

Please rate the following types of contracts from 1 (least common) to 4 (most common). Indicate "n/a" if the type of contract is not used

- EnPC with guaranteed savings (contractor guarantees energy savings, clients take the financial risk)
- EnPC with shared savings (both parties share the savings, contractor take financial risk)
- Build-own-operate-transfer (BOOT)
- Contract energy management (chauffage)
- Facility management
- Consultancy and technical guarantee
- Energy efficiency improvement contracts
- Other (please, specify and rate)

1.2. Describe the EnPC contracts (implemented or planned in 2019 in the public sector of your country/subnational entity of expertise) by answering the next indicators:

- Typical size. EUR contract value.
- Average duration. Years
- Average savings contracted (Please indicate the figure and the units you are using, % of baseline
- consumption; MWh/ year; or EUR/ year).
- Please provide further information or clarification if available.

1.3. How many EnPC projects have been initiated in the public sector of your country /subnational entity of expertise in the period 2017-2019? [Please make sure to specifically refer to public sector projects.]

- Number of contracts:
- Overall size (in Eur or MWh):
- Could you identify a clear trend (upward, stable or downward trend) for EnPC projects in the public sector for the period 2017-2019?
- What are the market expectations for EnPC projects in the public sector for the period 2020-2023?
- What are, in your understanding, the major drivers explaining these trends?

1.4. Please rate the most common interventions addressed through EnPC contracts in the public sector of your country/subnational entity of expertise.

- From 1 (least common) to 4 (most common). Indicate with "n/a" if not addressed
- Public buildings
- Street and traffic lighting
- District heating/cooling
- Smart grids
- Transportation infrastructures
- Project pools. (Indicate what are the typically bundled interventions)
- Other, please specify

- Explain the most common types of interventions in public buildings (e.g. maintenance, renovation, replacement of specific technologies).
- Indicate the type of public buildings (Offices; Service facilities; and Social housing) that are most commonly addressed through EnPC contracts.
- Describe the extent EnPC contracts are used to fulfil the requirements in Art. 5 of the EED (Exemplary role of public bodies' buildings).

- Could you identify a transformation in the type of EnPC projects in the public sector for the period 2017-2019? And for the period 2020-2023?
- Please explain what are in your opinion the drivers for these changes.

1.5. How many EnPC providers and facilitators work currently (in year 2019) in the public sector of your country/subnational entity of expertise?

- Providers:
- Facilitators:
- Please describe the sufficiency and quality of service supply.

2. Supporting framework and practices

2.1. How would you describe the approach to EnPC of the public authorities in your country /subnational entity of expertise? (Please think about their level of understanding, interest, and willingness to use EnPC in the public sector).

- Please enter text here
- Please describe to the best of your knowledge the adoption and adequacy of:

a) definitions
b) guidelines
c) model contracts
d) lists of qualified operators
e) information instruments
f) demonstration projects

2.2. What, if any, government rules and practices of procurement, contracting and tendering hinder **the adoption** of EnPC in the public sector of your country/subnational entity of expertise, and/or **the degree of performance** improvement pursued? Please enter text here

2.3. What, if any, government rules of procurement, contracting and tendering would you highlight as good practices in fostering **the adoption** of EnPC in the public sector of your country/subnational entity of expertise, and/or **the degree of performance** improvement pursued? Please enter text here

2.4. Financing of EnPC in the public sector

- Are you acquainted with the financing schemes used for EnPC in the public sector of your country/subnational entity of expertise? Yes/ No
- Please explain briefly the most common financing schemes (on-balance/off-balance sheet solutions, equity versus project financing, as well as the use of credits and leasing) used for EnPC in the public sector.
- Describe the barriers and opportunities that this/these financing schemes imply for the development of the EnPC market in the public sector.
- Could you briefly describe the barriers and opportunities posed by existing financing schemes for the development of the EnPC market in the public sector.

2.5. Statistical and financial treatment of EnPC.

- Are you acquainted with the implementation of the Eurostat Guidance Note (September 2017) and the Guide to the Statistical Treatment of Energy Performance Contracts (May 2018) in the public sector of your country/subnational entity of expertise? Yes/ No
- Please rate the impact of these instruments from 0 (no impact) to 4 (big impact- upscaling of the market).
- Please explain to what extent and how the approach of the public sector to EnPCs has changed in relation to the introduction of these instruments.
- Please indicate good practices in the implementation of these instruments (providing specific examples) or recommendations for further policy development and implementation?

- What are, if any, the remaining barriers related to the financial and statistical treatment of EnPC in the public sector?

2.6. Project development capacities and risks for EnPC.

- Please indicate whether you are acquainted with Project Development Assistance facilities (PDA) and de-risking instruments (originated from the Smart Finance for Smart Building Initiative) as implemented in the public sector of your country/subnational entity of expertise Yes/ No

Please, rate the impact of these instruments from 0 (no impact) to 4 (big impact- upscaling of the market) and explain your assessment. Note that more information is accessible via the link (click in the name).

ELENA; PDA H2020; De-risking Energy Efficiency Platform (DEEP); EEFIG Underwriting Toolkit

  - Rating (0 - 4).
  - Comment

- Please indicate good practices of implementation (providing specific examples) and recommendations for further policy development and implementation.
- What are, if any, the remaining barriers in terms of capacity building and risk assessment?

4. Follow up

Please use the following space to insert additional notes, references to literature or to potential interviewees that could help update the Commission's knowledge on the status of EnPC in the public sector of your country/subnational entity of expertise.

Appendix 5. EC JRC 2020 Database: market overview

Appendix 5.1. Number and size of contracts

Questionnaire participants were asked to estimate the number of contracts and the overall size of their markets of expertise, i.e. national, regional or local. The absolute values indicated for each Member States in the following table are the result of critically reviewing national and sub-national expert estimates (EC JRC Survey 2020). These absolute values where then compared to public sector market size – number of employees in the public sector (Hammerschmid et al. 2018) and area of public buildings as assessed in the EC JRC 2017 report. The latter estimate of public sector size is particularly imperfect way to assess the relative size of the EnPC in the public sector market for Member States where public lighting has a relevant weight (mainly Croatia, Greece, Hungary, Portugal, Slovakia, Spain, Bulgaria, France, and Italy). However, both ratios improve the comparison of national market sizes as enabled by absolute metrics.

MS	Number of contracts	Overall size (m€)	Public employment (x1000)	Market/ public sector (€/employee)	Public buildings (Mm2)	Market/ public sector (€/m2 x1000)
AT	11	6.5	347	19	70	93
BE[120]	11	20	1064	19	50	400
BG	10	3	138	22	30	100
HR	50	25	317	79	10	2500
CY[121]	0	0	58	0	1	0
CZ	25	21	532	40	50	420
DK	9	70	717	98	55	1273
EE[122]	1	1	118	8	2	500
FI	5	3.5	536	6.5	50	70
FR[123]	50	70	6180	11	355	197
DE	58	**90**	4609	20/65	390	**231**
GR[124]	**8**	**100**	566	176	20	5000
HU[125]	20	2.8	873	3	50	56
IE	4	16.6	298	56	20	830
IT	**230**	**250**	3233	77	140	1786
LV[126]	**6**	**12.6**	227	55	10	1260
LT[127]	6	3.2	315	10	15	213
MT	-	-	33	-	1	-

[120] Probably underestimated due to market fragmentation.

[121] Cyprus has been granted H2020 support to Delivering Nearly Zero Energy Building renovations of 25 schools through Energy Performance Contracting – PEDIA. https://ec.europa.eu/easme/en/news/57-projects-launched-horizon-2020-energy-efficiency-support; Data was completed with government reporting (Cyprus 2017)Data was completed with government reporting (Cyprus 2017)

[122] Estonia is starting a first project at municipal level.

[123] Rosenstein 2020; ADEME 2017; ADEME, CEREMA, and CSTB 2019.Rosenstein 2020; ADEME 2017; ADEME, CEREMA, and CSTB 2019.

[124] Values provided by the government agency CRES. These are dissonant with sectoral claims on the nature of contracts, according to which not real EnPC would be in place but PPPs.

[125] Values obtained for Hungary contrast with pessimistic expert claims about the practical absence of a market in this MS.

[126] There is incomplete information on the activity in the country. Accelerate SUNShINE (April 2017-March 2021) triggered six EnPC contracts in the public sector (kindergartens, schools, swimming pool) for €12,6m. The project combines interventions in public buildings and interventions in private residential buildings for €26m, and pursuing 26Gwh/yr savings (https://cordis.europa.eu/project/id/754080). More recently, the Latvia government has signed new ELENA for contract and project preparation.

[w]ith support of EBRD. For public buildings there were 12 EnPC tenders published for € 5.4m; 9 EnPC tenders under implementation; 3 projects with feasibility studies ready. For public lighting there were 3 EnPC tenders recently published and 1 street lighting EnPC tender in negotiations, altogether with a potential of €15m (Miller 2019).(Miller 2019).

MS	Number of contracts	Overall size (m€)	Public employment (x1000)	Market/ public sector (€/employee)	Public buildings (Mm2)	Market/ public sector (€/m2 x1000)
NL[128]	-	-	844	-	165	-
PL	13	39	2527	15	165	236
PT	13	50	658	76	35	1429
RO	0	0	1190	0	35	0
SK	25	25	350	71	70	357
SL	44	96	163	590	2	48000
ES	**59**	**60**	2479	24	135	444
SE	1	10	1079	9	80	125
sum	617	965	29459	1428	2058	63830
Avg	27	42	1091	62	76	2775

Lowest magnitudes are highlighted in dark red and highest magnitudes in dark green. Bold values indicate dissonance between expert estimates. Public employment (Hammerschmid et al. 2018) and floor area of public buildings (Boza-Kiss et al. 2017) were used as proxies of public sector potential, and to generate relative values of EnPC in the public sector market sizes. Source: EC JRC 2020 Database

Appendix 5.2. Sufficiency and quality of providers and facilitators

The following table shows the average of expert estimates on the number of providers and facilitators per Member State (EC JRC Survey 2020). A relative index was calculated to relate these estimates to the market size (using the number of public servants in Hammerschmid et al. 2018). A qualitative assessment was also required from survey participants. These were then rated according to a semi-quantitative scale.

[128] Pooled expert response for the Netherlands referred the absence of consolidated data.

MS	Providers (abs.)	Providers (rel.)	Facilitators (abs.)	Facilitators (rel.)	Sufficiency and quality of services	Rating 0-1
AT	5.0	0.3	3.0	0.2	Very good, supply quality criteria defined and operationalised by DECA (34 members)[129]	1.0
BE	9.0	0.5	5.0	0.3	Sufficient (for small market), experienced and well known	0.9
BG	5.8	0.3	2.5	0.1	Sufficient, average quality. Improving (government support, ESP association, EnPC code of Conduct). No interest from international actors.[130]	0.9
HR	10.5	0.1	2.5	0.0	Limited, good quality for public lighting	0.6
CY	0.0		0.0		There are 12 registered ESCOs	
CZ	7.2	0.2	7.5	0.2	Good quality (certification in preparation for projects and companies; Code of conduct and working group, common procedures and documents), sufficiency	1.0
DK	2.7	0.0	2.3	0.0	Experienced actors. High quality of service supply. Critical number of suppliers for competition in tenders.	0.6
EE	2	0.3	-			
FI	3.0	0.5	3.0	0.5	Sufficient services, decent quality	0.8
FR	10.0	0.9	0.0	0.0	Sufficient services, but dominated by FM companies and utilities (push for long contracts, where performance becomes is one more criterion)	0.6
DE	8.0[131]	0.4	25.0	1.3	Good quality, needs to grow faster, development of One-stop-shop (relevance of ESCOs administrative support to admin)	0.8
GR	12.0	0.01	3.0	0.0	Discrepancy: CRES is the only body acting as facilitators; CRES claims there are 5 facilitators	
HU	4.0	1.2	2.5	0.8	Limited number of players due to insufficient demand	0.5
IE	10.8	0.2	4.0	0.1	Sufficient providers but interested in large projects with facility management. Most municipalities need facilitators	0.5
IT	20.0	0.3	50.0	0.6	Good. Important role of independent advisors	0.9
LV	0.0		1.0		Facilitators are promoting projects, with no results	-
LT	2.0	0.2	10.0	1.0	Supplier focus on FM. Facilitators: satisfactory, need certification and guidelines.	0.6
LU	-	-	-	-	Public sector expectation that the private sector quick-starts EnPC	
MT	-		-			
NL	40.0	Nd	10.0	Nd	Sufficient, good quality.	0.9
PL	7.5	0.5	7.5	0.5	Insufficient, due to low expectation of the investors	0.5
PT	15.0	0.2	5.0	0.1	Need more facilitation capacity to provide capacity building for municipalities	0.7
RO	4.0		3.0		Values provided by sectoral actor. According to ministerial sources there are no actors.	-
SK	8.5	0.1	5.0	0.1	Sufficient, good quality. Facilitators important for regions and municipalities to use off-balance contracts	0.9
SI	6.0	0.0	5.0	0.0	Satisfactory quality, but not yet standardised. Fundamental facilitation role of local energy agencies and ELENA[132]	0.8
ES	>50	2.1	>150	6.2	Very good: technical and investment from large ESCOs and FM, insufficient retail. [133]	1.0
SE	3.0	0.3	3.0	0.3	Demand is insufficient to withhold the market supply	-
avg	8.4		6.9		"Provider" is unprotected term. Diverse uses of "facilitator"	0.7

Relative values (rel.) refer the average of expert estimates about the number of providers and facilitators (abs.) in relation to the market size, estimated based on to the number of public servants (Hammerschmid et al. 2018). The rating (0-1) is based on expert assessments on the sufficiency and quality of services (0 = lowest values; 1 = highest values). High values are indicated in green; low values are indicated in red. Source: EC JRC 2020 Database.

[129] DECA (2020) DECA (2020)

[130] Alliance for Energy Efficiency Bulgaria (n.d.) Alliance for Energy Efficiency Bulgaria (n.d.)

[131] The data presented is based only on estimates about actors working with the public sector. According to Bfee 2020, there are 50 providers and 51 facilitators actively working with EnPC in the private and public sectors.

[132] Assessment in Staničić (2019) was used to complete expert estimates for Slovenia. Assessment in Staničić (2019) was used to complete expert estimates for Slovenia.

[133] https://www.idae.es/ca/proveedores-de-servicios-energeticos; ANESE (2018)ANESE (2018)

Appendix 5.3. Contract characteristics and metrics

EC JRC Survey 2020 respondents were asked about the characteristics of contracts, in terms of Maastricht treatment, size, duration, and savings. The responses on contract metrics were averaged.

MS	Typical size (m€)	Range - comment	Duration (years)	Range - comment	Savings contract (%)	Range - comment
AT	1.3	0.5-2	10 (3)		21	15-25%
BE	2.3		11 (10-15)		28	
BG	0.3		8 (7-9)		40	
HR	2.0	0.5, 1.5, 2m	10 (3-7 and 12-15)	lighting	60	50-70%, 0.3m€/yr
CY	0.0		0		0	
CZ	0.9	Councils 0.7-1	10 (8-12)	8-12	20	15-25%
DK	14.0	Hospitals 6-22	18 (8-25)	15-20	25	0.5 - 2 m€/yr
EE	1		-	-	-	-
FI	0.7		7		-	Data is not public
FR	7.0		10 (8-20)		27	
DE	0.2	0.05-1.5	13 (<15)	6-18	38	20-60% baseline[134]
GR[135]	**4.5**	**0-6**	**12 (2-3)**	lighting	**71**	
HU	0.1		13	12-15	65	
IE	15.0	Hospitals	12	10-15	25	
IT	6.0	4-8	18 (8-9)	15-20	65	50-80% lighting
LV[136]	1.2	n/a	5	n/a	40-50%	Only data from Accelerate sunshine
LT	0.5		18	15-20	35	30%-40%
LU	-	-	-	-	-	-
MT	-	-	-	-	-	-
NL	-	-	-	-	-	-
PL	3.0	1-5	12 (10)	10-15	45	40-50%
PT	5.3	1.5-10	10 (15)	7-12	70	Street lighting
RO	0.0	(0.07/yr chauffage)	0	Not legal	0	
SK	0.5		10 (10)		20	10% annual cost
SI	2.7		15(10-15)		50	Building renovations
ES	1.0	0.4-2.8	11 (<10)	8-15	50	Streetlight 65-90%, buildings 30-50%
SE	4.5	2-7	6 (5-10)		12	10-15%
EU			8	4-12		

The shading of Member State names indicates prevalence of off-balance contracts – green; combination of off-balance and on-balance contracts – blue; and prevalence of on-balance contracts – green. Highest values of contract size, duration and savings are indicated in green and lowest values in red. Brackets indicate the duration of contracts as reported in EC JRC 2017. Source: EC JRC 2020 Database.

[134] Cost savings: 70- 80% (with fuel switch)

[135] There are large divergences between ESCO and government sources due to definitional reasons.

[136] EnPC is only used in private multi-apartment buildings.

Appendix 5.4. Types of intervention sites

The EC JRC Survey 2020 involves a semi-quantitative assessment of the frequency of intervention sites addressed through EnPC in the public sector: Public buildings; Public lighting; DHC; Smart grids; Transportation infrastructure; projects pools, and other type of intervention sites. The average values of national responses are presented in the following table.

MS	2015-2017	2017-2019							
		B	L	H	S	T	Project pools		Other
AT	B, L	3.0	**1.3**	1.3	0.3	0.3	3.0	Schools and office buildings	Pumps, LED, PV, MMC Systems
BE	B	4.0	1.5	1.0	0.5	0.5	1.0		
BG	B, L	3.2	3.2	1.4	0.4	**0.6**	0.6	Local educational buildings	
HR	B, L, W	2.0	4.0	0.3	**0.7**	**1.0**	**1.0**	Street lighting	Water (hospitals)
CY	B	0.0	0.0	0.0	0.0	0.0	0.0		
CZ	B, L	4.0	2.2	2.0	1.0	**1.0**	3.0	Public buildings & street lightings in cities	
DK	B, L, W T, H	4.0	**2.0**	0.0	0.0	0.0	0.0		
EE	(B, L)[137]	1.0	0.0	0.0	0.0	0.0	0.0		
FI	B, L	4.0	0.0	0.0	0.0	0.0	0.0		
FR	B, L	3.0	3.0	3.0	1.0	0.0	0.0		
DE	B, L	4.0	**1.5**	2.0	1.0	0.3	3.3	Multiple types of buildings	Renewable heat grids + building renovation
GR	B, L	0.5	4	0.5	0.5	0.5	0.5	[138]	
HU	(L)	2.0	3.5	2.5	0.5	0.5	0.5		
IE	(L)	3.5	1.3	**2.0**	0.5*	0.5	2.0	Large and smaller buildings	*Interest for integrating smart systems in EnPC
IT	B, L	3.6	4	**1.4**	**1.4**	0.75	2	Lighting, buildings (hospitals)	
LU	(B)								
LV	(B), L	0.0	0.0	0.0	0.0	0.0	0.0		
LT	(B)	4.0	1.0	2.0	0.0	0.0	0.0		
MT	no								
NL	B	4.0	1.0	4.0	2.0	1.0	4.0	Commercial buildings; solar systems (supply contracting)	
PL	B, L	4.0	2.0	0.0	0.0	0.0	1.0		
PT	B	**1.0**	4.0	0.5	0.3	0.3	0.5	Possibility for school PVs	
RO	B, L	0	**1**	2.7	0	0	0		
SK	(B, L)[139]	**2.5**	3.5	**2.5**	0.0	0.0	2.0	Buildings	
SI	B, L	4.0	2.0	2.0	0.0	0.0	0.0		
ES	B, L	**2.4**	4.0	**1.9**	0.8	0.7	1.3	Lighting & buildings	PV Projects
SE	B	4.0	0.0	1.0	0.0	0.0	0.0		

[137] Refers to expectations at the time

[138] According to sectoral actors, in Greece there are no actual EnPC in the public sector contracts but PPPs. The government agency CRES claims that "first attempts of EnPC in street lighting projects appeared in the market. Most of them are 100% financed by the ESCO and shared saving contract type. For buildings only small-scale projects have been implemented mainly as pilot projects"

[139] No activity at the time

MS	2015-2017	2017-2019							
		B	L	H	S	T	Project pools		Other
EU		3.0	4.0	2.0	2.0	0.0	0.0		
avg		2.9	2.2	1.5	0.5	0.3	1.1		

B. Public buildings, L. Public lighting, H. DHC, W. Water systems, T. Transport, Brackets indicate upcoming expectations/ pilots. Values range from 0 (non-existent) to 4 (most common). Green cells indicate estimated frequency above 2.6. Bold red values indicate high variability of response (>2). Other: reflects interventions reported by at least one respondent.
Source: EC JRC 2020 Database

Appendix 5.5. Types of buildings and of interventions in buildings

The following table compares the types of buildings and most common interventions conducted through EnPC in the public sector, as reported in the EC JRC Survey 2020, and in the EC JRC 2017 Report.

MS	**Types and sites of intervention 2014-2016**	**Types of buildings 2017-2019**	**Types of interventions in buildings 2017-2019**
AT	Education, hospitals	Offices, Service (education, sport, leisure, courts)	Specific technologies (HVAC, lighting, BMS, efficient pumps, PV)
BE	Schools, education	Offices, Service facilities (Sports), Social housing	Specific technologies, renovation & maintenance. Trend: deep retrofitting, quality
BG	Education, health, offices, dormitories	Offices, Services (educational hospitals)	Envelope, specific technologies (boilers, lighting, BMS, fuel switch). Trend: more quality[140]
HR	Hospitals	Not currently	Not currently- HVAC - Focus on lighting
CY	No projects yet	No EnPC in the Public Sector	No EnPC in the Public Sector
CZ	Education, sports, dormitories, hospital	Town halls, Services (education, health, culture), housing	Renovations, specific technologies, roof and window
DK	Building envelopes,	Service facilities (hospitals, schools, day-care nursing)	Envelope renovation, specific technologies (HVAC, lighting, pumps, solar panels, BMS)
EE	Expectations	Kindergarten	Municipality buildings
FI	Buildings	Service facilities	Renovation
FR	Swimming pools	Service facilities (Schools), social housing, military bases	Maintenance, energy supply, renovation
DE	Offices, education, hospitals	Offices, services (diverse), housing	Building systems (HVAC…), Envelope, windows, DHC, water, renewables. Trend: integral renovation
GR	Hospitals	Expectations for offices, hospitals, and education	Expectations on lighting, HVAC, rooftop insulation, PVs, and maintenance.
HU	Not relevant	Offices, services (hospitals, schools)	Specific technologies (heating), maintenance, insulation
IE	Only pilot projects	Service facilities (hospitals, local leisure facilities)	Specific technologies (lighting, HVAC, with FM), some retrofit - Integration of smart systems
IT	Education and hospitals	Offices (town halls), Services (schools, hospitals, elderly)	Specific technologies (HVAC, lighting, BMS), PV Plants, maintenance
LV	Pilots for buildings	Services (schools, kindergarten and a public swimming pool)	Comprehensive renovation (HVAC + envelope) (Accelerate SUNShINE)
LT	Three pilots	Offices, Services (museums, education)	Envelope and building systems
LU	One pilot	-	-
MT	No EnPC projects	-	-
NL	Schools, day-car, s. pools, museum	Offices (Council), Service facilities (schools)	Deep renovations, maintenance, commissioning, BMS.

[140] In Bulgaria there is a saturation of building renovations, largely due to the use of EU investment grants, hence expectations are put on the development of public lighting.

MS	Types and sites of intervention 2014-2016	Types of buildings 2017-2019	Types of interventions in buildings 2017-2019
PL	Education, hospitals		Maintenance and lighting, HVAC, windows. Trend: integration of management
PT	Hospitals, leisure, sports, schools	Offices, Services (education, pools, museums, other)	Envelope, heating, water and lighting systems[141]
RO	Buildings	Social housing	Renovation
SK	No activity at the time	Offices, Services (hospitals, education), Social housing	Envelope, heating, lighting
SI	Hospitals, sports, education	Offices, Services (education, health, sport, courts)	Comprehensive renovation
ES	Hospitals, education	Offices, Services (hospitals, education, leisure)	Renovation and maintenance, HVAC, lighting - Increase in HVAC system renovations
SE	Offices, schools, healthcare	Services (schools), Social housing	Maintenance, building system renovation (lighting, ventilation, others)
EU		Offices and Services	Building infrastructure and HVAC

Source: EC JRC 2020 Database

[141] There are plans for 2020-2023 to include PV projects and to bundle projects with community funding.

Appendix 6. EC JRC 2020 Database: Barriers

Appendix 6.1. Main barriers

Respondents to the EC JRC Survey 2020 were asked to freely state the barriers to EnPC in the public sector remaining in the period 2017-2019. This was intended not lead the answers. A reviewed version of expert answers is presented in the following table alongside those reported in 2017 (Boza-Kiss et al. 2017).

	Barriers reported in 2017	Barriers reported in 2019
AT	Lack of understanding, acceptance, and trust; negative experiences; lack of tenders & low number of respondents; availability of affordable finance; ESA 2010	Procurement procedures; Financial issues; Regulatory uncertainty; low push; reluctancy to develop skills; Need local demonstration; Financing and risk uncertainty; Missing knowledge about benefits of EnPC
BE	Lack of disseminated best practice examples; lack of in-house expertise, e.g. to formulate tenders; reluctance to rely on facilitators; Low energy prices; strong focus on payback times; ESA 2010	Lack of understanding; complexity of the model; lack of knowledge; lack of trust between ESCO and authorities; lack of long-term vision; need contract model (in use)
BG	Lack of information; lack of trust; lack of capacity to prepare EnPC tenders; lack of facilitators; ESA 2010; Low and unpredictable energy tariffs; EnPC projects and providers are not eligible for public funding;	Limited awareness; Availability of investment grants and, previously, incompatibility with EnPC projects;[142] most buildings already renovated through grants, legal framework (contracts limited to 10 years, limits in EnPC size for municipalities), bad experiences
HR	Lack of understanding; Low energy prices; Lack of standard procedures, documents, MM&V; Lack of tendering knowledge; no interest from banks & high financing costs for ESCOs; ESA 2010 definition	Time and cost demanding project preparation; building projects need support and standardization; disruption by Eurostat and EIB Guide: Need new contract for buildings; Lack clarity on M&V rules for off-balance sheet treatment; lack of public financing
CY	Lack of trust from the clients' side; lack of expertise; relatively small market; high interest rates; lack of access to finance	Climate; market size (small project size); Lack of standardization; experience and trust; high transaction costs; procurement barriers (rigid budgeting and long procurement processes); Need exemplary role; System of provision of street lighting services
CZ	Lack of trust in the model; lack of specific knowledge; split incentives; liquidity; ESA 2010	Lack of trust and state example; need better information & stronger technical assistance; Slow decisions; Eurostat rules.
DK	Market saturation; high transaction costs; split incentives; low energy prices	Low interest from municipalities (public financing & in-house capacity); perceived burden and risk; Need locally adapted and updated information; "Annual Investment Ceiling"
EE	Complex procurement and contracts; lack of model contracts and guidelines; lack of technical understanding; Lack of funding mechanisms; ESA 2010	Problems of scale and need to address non-energy benefits; lack of trust; lack of active facilitators; lack of good practice examples
FI	Lack of knowledge or information; Complex procurement; time consuming processes and high transaction costs; Bad experiences	Laws of public procurement
FR	Complexity; lack of understanding (e.g. conditions for guarantees to be reclaimed), and trust; Short-term investment return; Main: P	Lack of off-balance contracting; Bundling energy supply (>15 years: procurement, installation, FM is complex, time consuming). Limits competition since not many companies can compete in such RFPs[143]
DE	Limitations of tendering; complexity for the administration; opt-out option for clients is risky for providers; need a mandatory step to check the viability of EnPC; ESA 2010 definition	Low energy prices; the public sector has access to lower interest rates than providers; Complexity of the product & the procurement process; Legal uncertainty (climate goals; refinancing depending on energy and carbon taxes; Lack of (but upcoming) introduction of LCA requirements
GR	Lack of awareness and confidence; finance obstacles (e.g. need to cut expenses); overall market uncertainty	Lack of capacity and experience, SRSS; unclear procurement law, inertial preference for procurement.
HU	EU Grants and expectations; very complex procurement of ESCO projects increases overall and transaction costs; failed projects in the past; ESA 2010 definition	EU investment grants; mistrust in ESCO models (experiences of corruption) and problematic adoption (transparency needs); legal uncertainties for long term contracts & accounting issues for municipalities; unknown EU mechanisms; complexity of procurement; lack of commitment to energy efficiency; Need expertise, examples.
IE	Not enough information is available on this market	Limited supply & facilitation; legal and bureaucratic problems; lack of top-down commitment (providing examples, building trust & awareness, producing guidelines, registering actors; model contracts, tendering procedures, financial assessments); no list of providers recognized by government

[142] Investment grants support renovation with payment for performance (no guarantee).

[143] Only very large FMs have the portfolio, the political clout and the capacity to invest in the costly preparation of such RFPs, which discourages smaller competitors and reduces client's interest.

IT	Very small demand; no tenders; lack of confidence and awareness; EnPC providers prefer other types of clients (less risk)	Frequent litigation; Lack of standards for small projects, complexity and cost of contracts, lack of knowledge; market fragmentation; settled chauffage system; Need quality standards; targets, incentives and public guarantees for backing projects
LV	Public procurement and tendering procedures; low quality of technical documentations; insufficient awareness (efficiency and EnPC); trust; low demand; low energy tariffs for heating (legal)	Strong resistance at various levels and energy sector interest (blocks renewables); contradictory legislation (service procurement limit contracts to 5 years, and energy efficiency law to 20 year); funding vetoed by treasury (wrong transposition EED)
LT	Buildings upgraded through EU Structural Funds; split incentive; Complexity of public procurement procedures; Limited in-house expertise for EnPC procurement and implementation; Time-consuming decisions increase risks; Subsidized heating	Low energy prices; need standardization (EnPCs are considered PPPs, making lengthy the approval process); lack of competencies in public buildings (piloting and assistance from ELENA TA, and external competent teams)
LU	Not enough information is available on this market	Expectations are put on the development of the private sector first
MT	No EnPC market, focus is on supply optimisation	No EnPC market; size, climate, and EU policy exceptions
NL	Municipality concerns about out-sourcing; limited capacities for tendering; lack of standardized contracts; lack of M&V protocols (increase risks and transaction costs); complex decision-making structures and procedures; competition with other instruments	Lack of real estate strategy plans (push); preference for in-house solutions, perceived as more cost-effective; preference for shorter, more flexible contracts, and DB(F)MO in central government
PL	Complex public procurement procedures, with exclusive focus on economic criteria (lowest price); regulatory instability (limits the interest in long-term contracts); ESA 2010; collision of interest with state funded programmes; lack of understanding and interest along with insufficient promotion	Decrease of EU Funds in previous period; need a single model contract (instead of many); insufficient use of technical advice (unfavourable contracts for clients); changing legal context
PT	Lack of in-house capacities for tender development and implementation; lack of facilitators; projects are not preferred by EnPC providers and the finance sector; ECO.AP programme[144] not yet attractive	Size and climate; lack of expertise in municipalities; legal constrains of public tenders for buildings (ECO.AP); buildings perceived as risky; Unclear off-balance treatment; Complex, burdensome tendering, restrictive for providers and for quality of project, technical capacity of clients; excessive performance guarantees and finance penalties (small and medium contracts); complex M&V; lack of insurance system for performance guarantees
RO	ESA 2010; missing legal (e.g. model contract) and procedural frameworks (e.g. electronic system for procurement not adapted for EnPC); EnPC projects are dependent on international financing grants; problems with the payment behaviour of clients; procurement process is still too complex, ambiguous and time-consuming; lack of trust between client and ESCO	Regulatory and political barriers (transparency); restrictive and complex public procurement procedures (Variable value contracts not allowed for councils)[145]; lack of understanding; Part of the performance guarantee needs to be returned to the contractor at the end of works - making impossible to execute performance guarantees)
SK	Competition with public grants (and expectations of their continuity); obsolete technical state of public buildings hampers the payback of projects; lack of knowledge about contract procedures; ESA 2010	First movers, were disrupted by Eurostat Guide (limited by rigidity of model contract required by Eurostat)
SI	EnPC falls under PPP, adding complexity; lack of trained personnel; lack of qualified facilitators; distrust and fear; supply side is still very small; ESA 2010	Central government underperforming, long project preparation phase
ES	Unclear underlying barriers; lack of trust and awareness; difficulties in procuring complex projects, such as EnPCs; ESA 2010	Poor regulatory framework recently updated; many lighting projects are already done; in-house capacity, preference for shorter, maintenance contracts; fragmented market; lack of government exemplarity; Insufficient information (e.g. off-balance treatment); Short-term culture; interest for highly visible hi-tech
SE	Lack of client capacity to formulate EnPC project/tender; lack of trust between ESCOs and clients (fear of getting locked-up with an unwanted contractor); bad experiences; preference for in-house solutions	Lack of trust in model, potential "partnering" model; preference for in-house solutions, perceived as more cost-effective; bad experiences; priority to cost

Source: EC JRC 2020 Database.

[144] The Energy Efficiency Program in Public Administration is setting amongst other targets for 2020, an energy efficiency fund and capacity building.

[145] Procurement regulations and the local budgeting ban local authorities from engaging in contracts with variable value of the service/savings.

Appendix 6.2. Contracts used in the public sector

The EC JRC 2020 Survey asked respondents to indicate how common are different types of contracts in the public sectors of their Member States and subnational areas of expertise. The following table presents the average of expert responses.

	Guaran-teed savings	Shared savings	BOOT	Energy man. - chauffage	Facility man.	Consultancy & technical guarantee	Efficiency improv.	Other/Notes
AT	3.0	**2.5**	0.5	**2.5**	3.5	1.5	3.0	
BE	3.5	1.5	0.5	**2.0**	3.5	2.5	3.5	
BG	1.0	2.2	0.8	1.0	2.0	2.8	3.6	[146]
HR	3.0	2.0	0.7	1.0	2.3	2.7	2.7	Yes[147]
CZ	4.0	1.5	1.4	1.9	2.8	1.3	2.3	Yes[148]
CY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4[149]
DK	3.0	0.5	0.5	0.0	**1.5**	**2.0**	**1.5**	
EE								
FI	0.0	0.0	2.0	1.0	4.0	3.0	0.0	
FR	1.0	1.0	2.0	4.0	4.0	4.0	2.0	
DE	1.4	**1.0**	**1.5**	**1.9**	3.2	**2.7**	1.4	**3**[150]
GR	1.0[151]	1.0	0.5	0.5	**1.5**	**2.0**	**2.0**	
HU	3.0	0.5	1.5	0.5	2.5	0.5	2.5	
IE	**1.3**	**2.0**	1.3	**1.5**	**3.0**	**2.3**	**2.0**	
IT	1.8	2.6	1.2	1.8	2.6	1.0	2.2	**3**[152]
LV[153]	1.0	0.0	0.0	0.0	**2.0**	0.5	3.0	
LT	4.0	0.0	0.0	0.0	4.0	1.0	0.0	4[154]
LU								
MT								
NL	1.0	1.0	0.0	4.0	4.0	4.0	2.0	4[155]
PL	3.0	2.0	1.0	2.0	4.0	0.0	3.0	
PT	1.0	3.3	0.7	0.7	0.7	3.0	2.3	
RO	0	0	0	2.5	0.5	4	**1.5**	**4**[156]
SK	3.5	3.0	**1.5**	**2.5**	4.0	**2.0**	0.0	
SI	4.0	0.0	0.0	0.0	0.0	0.0	3.0	
ES	**2.0**	**2.9**	**2.8**	**3.1**	**2.6**	**1.4**	**1.6**	**3**[157]
SE	1.0	4.0	0.0	1.0	0.0	4.0	3.0	
EU	1.0	3.0	1.0	2.0	3.0	1.0	1.0	
AVG	2.1	1.6	1.1	1.8	2.9	2.0	2.0	

Response range: 0 (not in use), 1 (least common), 4 (most common). Green shading: indicates the contracts that are more frequent in each Member State, and those immediately following (with less than 0.5 difference). Bold values: variation >2. Source: EC JRC 2020 Database.

[146] According to some respondents, "all" energy performance improvements are fully subsidized.
[147] Currently expected contracts where the client takes financial risks and monitoring.
[148] Boot operates mainly in Chauffage contracts.
[149] Provision of public lighting services, bundled supply, procurement and installation.
[150] Combined energy savings and supply contracting.
[151] Large divergence between ESCO and government sources (CRES).
[152] Leasing, renting.
[153] EnPC is only used in private multi-apartment buildings.
[154] Building renovation design and construction: clients take project risk.
[155] Energy supply contracting; DB(F)MO.
[156] Energy efficiency/performance consultancy.
[157] Maintenance with equipment finance; bundling services; renewables contracts.

Appendix 6.3. Regulatory barriers

Respondents to the EC JRC 2020 Survey were asked to state the major regulatory barriers remaining in the reported period (2017-2019). These are summarized in the following table along with additional reviews from the literature.

AT	No pressure to do and guarantee performance improvements; Need support to local demonstration and reduce uncertainty.
BE	Lack of real estate strategy, willingness and knowledge of the public authorities; fragmented market
BG	Contracts limited to 10 years; Limitation of EnPC size (% of municipality capital expenditures)
HR	Lack clarity on M&V rules for off-balance sheet treatment
CY	Need exemplary role, rigid budgeting and long procurement processes
CZ	Lack of awareness, trust and technical capacity of clients. Slow decisions. Eurostat rules.
DK	Need of locally adapted and updated information; "Annual Investment Ceiling" (temporarily cancelled with Covid19 crisis); municipality access to finance and existing technical capacity (DIY)
EE	Complex procurement regardless of approved model contract
FI	Laws of public procurement
FR	Systemic preference for >15years) contracts, bundling FM services, renovation and energy supply
DE	Decision making often in disregard to life cycle costs (upcoming legal update); EnPC contracts complex and facilitation comparable costly (3-5% of investment costs); some subsidies not accessible; some details of the legal framework are disadvantageous for EnPC and ESCos in comparison with other business models
GR	Unclear procurement and tendering law; inertial preference for conventional practice
HU	Opaque and corruption-prone procurement; Lack of understanding and (good) experiences; Lack of expertise, budget to buy knowledge, and examples; Lack of trust in a system with long payback time (unclear legal framework, lack of government commitment to efficiency, opaque procurement)
IE	Legal and bureaucratic issues (e.g. obtaining proof of accounting treatment) except in Dublin; Lack of understanding EnPC and off-balance treatment (contracting, risk management); SEAI on-balance contracts, Government procurement does not support 'as a service' nor a framework of EnPC providers; technical capacity (e.g. for portfolio development)
IT	Settled chauffage system (lobby); normative complexity and cost make EnPC interesting only for administrations without resources (See also Minchio 2018)
LV	Problematic national law (service procurement limit to 5-year contracts); funding vetoed by the Treasury; incorrect transposition of EED
LT	Consideration of EnPC as a PPP (adds complexity, time demanding)
NL	Mistrust novel mechanism along with long, complex decision-procurement processes. Clients preference for short term contracting. Central government still uses DB(F)MO. G; "perception that supplier does not deserve payment", protecting inner jobs, risk aversion, including loss of flexibility in management of real estate stock (van Kempen 2020)
PL	Multiple interpretations regarding debt, changing legal context
PT	Climate (work in lighting only); Unclear application of Maastricht neutral contracts and accounting; Complexity, and administrative burden of tendering (along with shortage of technical capacity in public sector); practice of inviting a reduced number of suppliers; evaluation criteria do not include co-benefits; restrictive technical criteria limit the quality of projects; procedure response limitations (less than 15 days); excessive performance guarantees and finance penalties for small and medium-sized contracts; excessive contractual penalties; complex measuring and verification; lack of insurance providers
RO	Restrictive and complex regulatory framework; no definitions, procurement and local budgeting regulations ban local authorities from engaging in EnPC due to variable value of the service/savings. Part of the performance guarantee needs to be returned to the contractor at the end of works - making impossible to execute performance guarantees (Hayden and Eoin 2019)
SK	No (besides disruption by Eurostat and EIB Guide to first movers)
SI	Indirectly: problematic concessions; Deep renovation and NZEB is not feasible; Low finance share of savings (10 %); Length of project preparation (Loose and Šeme 2019)
ES	Decentralized decisions in Central Government (different ministries); Lack of exemplary role (Art 5); Insufficient information (e.g. off-balance treatment); Procurement Law and Tendering rules (barrier to efficiency); Short term management culture; interest for highly visible hi-tech.
SE	Procurement rules prioritize low costs
EU	Incompatibility of the legal and regulatory framework

Source: EC JRC 2020 Database.

Appendix 6.4. Barriers to the adoption of Maastricht-neutral contracts

Respondents to the EC JRC 2020 Survey were asked to state the major barriers remaining in the reported period (2017-2019) to the adoption of Maastricht-neutral contracts. These are summarized in the following table along with additional information from the literature.

AT	Disinterest of the statistical office; Guide not communicated to local authorities; Remaining uncertainty
BE	Off-balance financing may constrain market development. Off-balance treatment requires savings to be higher or equal than the EnPC price, excluding envelope works for their long pay-back (promotion of low-hanging fruits)
BG	The Guidance note needs to be implemented, e.g. in model contracts.
HR	Lack strategy to leverage investment with private capital, off-balance sheet;[158] Need TA and Cohesion-related (SRSS) Support; need supporting EU grants for building tenders to be possible (<20 years)
CY	
CZ	Lack of information; negative perception from providers (Eurostat Guidance as disbalancing the market, increasing complexity, risks, and disincentivising forfaiting); the Ministry of Finance considers these contracts as debt, restricting their use to the central government only
DK	A "fixed ceiling" for public bodies acts alike the EU Financial and Statistical treatment
EE	
FI	No barriers
FR	Local and regional actors need simplification and agility
DE	On-Off balance debate is of no relevance in Germany
GR	
HU	
IE	Premium costs of transferring risk to ESCOs, especially in off-balance sheet treatment; difficult to include renovation and energy refurbishment in a single contract from balance sheet treatment perspective
IT	Too demanding rules, unclear application, need examples and political support to quality standards to counter private interests; complex scheme, it should be useful the increase of technical and finance knowledge of public managers, together with a clarification (and simplification) of legal and administrative requirements of the EnPC contract
LV	Lack of national legislation on finance and statistical treatment, and lack of understanding among national finance and statistical institutions. Energy interests and fear of increased transparency
LT	Burdensome monitoring to ensure contract remains off balance
NL	Disinterest of the statistical office; Guide not communicated to local authorities; Remaining uncertainty
PL	unclear interpretation by different Regional Accounting Chambers
PT	Lack of information, awareness and technical capacity (especially for statistical and budgetary actors)
RO	Not specific to Eurostat Guide: Lack of legal framework, namely the Fiscal Code and lack of interest of the Ministry of Finances
SK	Restrictive EnPC models, excludes other savings (personal, maintenance)
SI	Further model development subject to long approval process; alternative financing (Cohesion grants to public bodies; Energy efficiency loans to public bodies or ESCOs – SID Bank) and lack of support from equity and quasi-equity, green bonds, forfeiting; and bridge financing
ES	Greater promotion from Central Government, Fragmentation of the market
SE	
EU	Remaining sectoral confusion

Source: EC JRC 2020 Database.

[158] There is a Funding Agreement between the Croatian Bank (HBOR), the Croatian Ministry of Regional Development and the EU for the Implementation of Financial Instrument "ESIF Public Lighting Loans" (HBOR- Croatian Bank for Reconstruction and Development 2018)(HBOR- Croatian Bank for Reconstruction and Development 2018)

Appendix 6.5. Interest of authorities and the use of EnPC in fulfilment of exemplary provisions (Ar. 5 EED)

The interest towards EnPC of public bodies and authorities, and its utilization in fulfilling EED Art. 5 in Member States was gathered from respondents in the EC JRC Survey 2020. In order to enable comparison, both datasets are presented together in the following table.

MS	Understanding, interest and willingness of authorities towards EnPC in the public sector		Use of EnPC in the public sector in implementation of EED Art. 5	
AT	Very good. Nationally supported, awareness but limited knowledge. Default option in Central Gov buildings. Decision makers often block initiatives.	1.0	Used by central government, limited use at other levels	0.9
BE	No willingness.	0.0	Very limited	0.2
BG	Low interest, willingness and understanding (esp. from local governments). Uncoordinated ministries.	0.2	Low - Very limited	0.1
HR	High interest and motivation subject to availability of competing financing (investment grants). Variable understanding.	0.8	Not in the reported period. Halted progress in renovation of large hospitals and national real estate company	0.1
CY	Good level of understanding, interest, and willingness	1.0	Non-existing, exemplary role is needed	0
CZ	Variable in central administration. Municipalities prefer procurement	0.3	Diversity of responses: being vetoed by MoF, some respondents claim that EnPC is in use in a diversity of Government buildings	0.5
DK	Positive attitude at national (passive) and regional levels (active implementation). Municipality reluctance	0.5	Not relevant (exemplary nor EnPC action). Calls to regional and local authorities to use EnPC not framed as exemplary	0.1
EE	Interest and willingness of some local authorities	0.3	Recent improvement from EnPC not considered an option for central government buildings (study from 2013) to the existence of guiding rules for public buildings[159]	0.1
FI	Interest and willingness of local authorities	0.5	Very low	0.1
FR	Medium understanding, low interest and willingness	0.2	Marginal	0.1
DE	Inertial, variable attitude. Ranging from lack of understanding and mistrust to a good understanding, at federal and national levels (Dept of Energy is developing business conditions)	0.3	Ranging responses: Not known -Yes, in use	0.5
GR	No willingness since 2014. Expectations on adequate enforcement of National Energy Action Plan to foster efficiency. Reluctance to administrative burden	0.1	Not used. Conventional contracts with Structural funds are preferred. Expectations for upcoming period	0.0
HU	Lack of understanding and willingness. New interest with promises of a public ESCO. Renewed interest from municipalities but blocked by central government	0.3	Non-existent	0.0
IE	Unclear support from Central Gov't (concerns about inflation, officials worn out). Besides Dublin, local authorities awaiting forerunners	0.2	Slow uptake ("Climate Action Plan'). Promotion amongst regional and local authorities (Art. 5.7)	0.2
IT	Low understanding and willingness to change, but fiscally motivated; fragmented market	0.2	Absence of reference to Art 5. Low use (only 5% of interventions)	0.2
LV	Low understanding and willingness	0.1	None	0
LT	Encouragement and financing conditions (Ministry of Energy). Absence of additional assistance	0.5	Small use, procurement is preferred.	0.2

[159] A feasibility study conducted by the Estonian State Real Estate company (Riigi Kinnisvara 2013) concluded the limited feasibility and lack of national scale for public buildings to engage in EnPC. In 2019, a standard contract and additional guiding material for EnPC in the public sector was approved (Estonian Ministry of Economic Affairs and Communications 2019). A feasibility study conducted by the Estonian State Real Estate company (Riigi Kinnisvara 2013) concluded the limited feasibility and lack of national scale for public buildings to engage in EnPC. In 2019, a standard contract and additional guiding material for EnPC in the public sector was approved (Estonian Ministry of Economic Affairs and Communications 2019).

MS	Understanding, interest and willingness of authorities towards EnPC in the public sector		Use of EnPC in the public sector in implementation of EED Art. 5	
LU	The Governments expects the real estate sector to lead	0	Expectation that private sector leads the market	0
MT	Nd	Nd	Nd	Nd
NL	Resistance, mistrust towards ESCOs and EnPC. Leading municipalities in saving energy are active in EnPC.	0.2	Difficult connection. Local authorities do not assume their role	0.3
PL	Rising awareness (deficient finance and technical support environment)	0.2	None. Small scale contracts	0.1
PT	Regulatory commitment; low understanding besides low risk options (lighting)	0.6	Required as the main financing related to Art. 5 but not functioning in practice (no building market)	0.2
RO	Unwillingness and incapacity at all government levels	0	don't know/no reply	0.0
SK	Interest of authorities (esp. national and regional)	0.7	Small- Marginal	0.1
SI	General unwillingness of central government bodies but leadership of some bodies (finance, infrastructure ministries). Overall good understanding and widespread use. Highly motivated City Council of Ljubljana	0.7	Medium (3 out of 6 comprehensive renovations in central government buildings). (raise the rating)	0.7
ES	Renewed interest from the Government unsupported with renovation plans: diverse awareness and attitude of building owners. Leading regions (e.g. Catalonia, Extremadura); municipalities in outdoor lighting	0.6	Alternative measures implemented through other contracts. Increasing awareness and fulfilment of Art 5, especially in Catalonia	0.3
SE	Individual but no general interest.	0.2	Some activity (2/5)	0.4
EU	Big lack of awareness among MEPs	-	Need financial resources for the uptake of the EnPC business model	-

Narrative responses were interpreted and graded from 0 (no willingness/ not addressed in implementation of EED Art. 5 –in red) to 1 (Very good/ EnPC is commonly used to fulfil Art 5 EED – in green). Source: EC JRC 2020 Database.

Appendix 6.6. Availability and quality of definitions, guidelines and model contracts

Respondents to the EC JRC Survey 2020 were asked about the availability and adequacy of definitions, contracts and guidelines. This information is presented in along with additional information gathered in the following table.[160]

MS	Definitions	Model contracts	Guidelines
AT	Good	Yes, insufficiently known (on-balance)	Medium
BE	Yes, ok	Several templates, not being used by authorities. Upcoming official off-balance contracts	Yes (IPMVP, quality criteria)
BG	Good, in the energy efficiency act	Good, need development (not Maastricht-neutral)[161]	Good
HR	Yes, but unclear	Several. Good for lighting and smart city (off-balance); bad for public buildings (savings are not verified)	No, especially for off-balance sheet treatment
CY	Yes, ok	Models available online (for street lighting)	No, ongoing preparation (expected beginning 2021)
CZ	Yes, well adapted to legislation (energy efficiency code)	Yes, very good, proven and mandatory use. Off-balance adapted in 2020	Yes, well adapted to legislation (on-balance)
DK	Adopted, good, flexible (to be fully paid by savings)	Depends on facilitators (adapt to local conditions)	Energy agency homepage (best practice)
EE	Yes	Yes	Yes (2019)[162]
FI	Adopted, good	Yes	Very good
FR	Adopted, ok	Yes, but no Eurostat	Yes, but problematic
DE	Yes, good	Yes, several standard contracts.[163] There is a government will to test simpler and more flexible models	Yes, several. Biannual regional guideline. Need adaptation
GR	No	Yes, for guaranteed and for shared savings	No
HU	Yes, mere transposition EU	No	Yes, mere transposition EU
IE	Yes, but confusion exists, need simplification	Yes, need update (on-balance SEAI contracts)	Yes, but need update, not well understood, untested.
IT	Good[164]	Imperfect models, new ones under development	Yes, unofficial; reliance on EU supported projects as reference
LU			
LV	Yes, wrong: includes financing (not financing risk)	No, drafting (EnPC- Works for national real estate company)	No, under development
LT	Very good	Good[165]	Good
MT			
NL	Multiple, unclear separation between energy service types	Yes, being updated (RVO)	Yes, being updated (RVO - market facilitator of energy services)

[160] Additional references used: Loose and Šeme 2019 – Slovenia; Hayden and Eoin 2019 – the Netherlands, Austria, Germany, Belgium, Czech Republic, Slovakia and Slovenia; van Kempen 2020 - the Netherlands; Miller Toivo – Lithuania, Latvia; BEACON on LABEEF – Latvia; REGEA 2020– Croatia; Stanicic 2019 – Slovenia. Additional references used: Loose and Šeme 2019 – Slovenia; Hayden and Eoin 2019 – the Netherlands, Austria, Germany, Belgium, Czech Republic, Slovakia and Slovenia; van Kempen 2020 - the Netherlands; Miller Toivo – Lithuania, Latvia; BEACON on LABEEF – Latvia; REGEA 2020– Croatia; Stanicic 2019 – Slovenia.

[161] Ordinance RD-16-347 of 2nd April 2009 to the Energy Efficiency Act serve as guidelines and model contract.

[162] Guidance materials are available from the Estonian Ministry of Economic Affairs and Communications (2019). Guidance materials are available from the Estonian Ministry of Economic Affairs and Communications (2019).

[163] BfEE features several of the existing model contracts on its webpage: https://www.bfee-online.de/BfEE/DE/Energiedienstleistungen/Contracting/Mustervertraege/mustervertraege_node.html

[164] Lack of clarity regarding efficiency vs performance; investment (work, supply, service), and renewables (Dlgs 102/14).

[165] This information is discrepant with the findings of Project GuarantEE (Hayden and Eoin 2019), probably due to the drafting of the contract after 2018. This information is discrepant with the findings of Project GuarantEE (Hayden and Eoin 2019), probably due to the drafting of the contract after 2018.

MS	Definitions	Model contracts	Guidelines
PL	Yes, insufficient	No, difficult with changing legal context	No (PPP apply)
PT	Good (guaranteed savings)	Yes, but untested	Good/ not available (diverse responses)
RO	Not for EnPC nor ESCO	Discrepant opinions: not existing/ adopted	Not existing
SK	Largely adopted	Fully and adequately adopted (reviewed by Eurostat)	Largely adopted
SI	Ok	Adopted and adequate. To be updated by 2021	Adopted and adequate (multiple, well detailed)
ES	Yes, ok	Yes, good (for buildings and outdoor public lighting)	Yes, ok
SE	Yes, unclear timeframe and guarantee requirements	Yes, insufficient	Yes, need adaptation
EU	The basic definition is simple	Contract variants and financing constructions are source of misunderstandings and ambiguities	

Source: EC JRC 2020 Database.

Appendix 6.7. Lists of accredited providers, information programs and demonstration

Respondents to the EC JRC Survey 2020 were asked about the availability and adequacy lists of providers, demonstration and information programs. This information is presented in the following table, along with additional information gathered.[166]

MS	**Lists of qualified operators**	**Information instruments**	**Demonstration projects**
AT	Good	Sufficient	Good
BE	Yes, good	Yes, not centralized	Yes, 7 projects, insufficiently communicated
BG	Only voluntary code of conduct	Medium-good (Campaign 2019)	medium- good: OSO
HR	No	No (Ministry website outdated)	No
CY	Registry, ESCO code of conduct	Working group	No. Expecting first projects
CZ	Yes	Good, continued efforts (APES)	Manifold
DK	No (outdated)	Homepages government and ESCOs	Yes, numerous
EE			
FI	Yes	Yes, websites	Yes, project website
FR	No	No	No
DE	Yes, good (BfEE)[167]	Yes, good. Strong campaign in 2015- 2019. Need adaptation. DENA supports facilitation	Yes, project databases (80+). Possibility for more standardized examples
GR	No	No	No
HU	No	No, One-stop-shop (H2020) by associations[168]	No
IE	Yes, but poor and incomplete. No facilitator registry	Yes, very good	Very few (2 projects usually referred)
IT	ESCo certification (UNI CEI 11352)	Diversity of responses	Not explicitly, several experiences
LU			
LV	No (but there is experience in the private sector)	No	No. Much needed
LT	Very good	Perfect	Very good[169]
MT			
NL	Sufficient, and there is list of signatories of EnPC code of conduct (Transparense)	Yes, EnPC Check, RVO site	Yes, 5 whitepapers
PL	No	Yes, bad quality and communication	No
PT	Good, Quality screening[170]	Not enough, website outdated	Some, need dissemination
RO	Only voluntary CoC (Transparense)	None	None
SK	Fully and adequately adopted	Yes, could be improved	Available, but need better promotion
SI	Adequate. Qualification process to be updated by 2021	Available, being updated.	Yes
ES	Yes, need test and standardization	Yes, poor. Mainly from ELENA	Few, need promotion
SE		Lack of local information	

Limitations and barriers are marked in red. Source: EC JRC 2020 Database.

[166] Additional references used: Loose and Šeme 2019 – Slovenia; Hayden and Eoin 2019Hayden and Eoin 2019 – the Netherlands, Austria, Germany, Belgium, Czech Republic, Slovakia and Slovenia; van Kempen 2020 - the Netherlands; Miller, n.d.– Lithuania, Latvia; BEACON on LABEEF – Latvia; REGEA 2020 – Croatia; Stanicic 2019 – Slovenia.

[167] Federal Energy Efficiency Center. https://elan1.bafa.bund.de/bafa-portal/bfee-suche/).

[168] MEHI and Energia Club

[169] Data for Lithuania could refer to private sector contracts.

[170] Portuguese Energy Directorate

Appendix 6.8. Financial barriers

EC JRC Survey 2020 respondents were requested to indicate the most common financial features of EnPC in the public sector (on-balance and off-balance sheet solutions, equity, project financing, credits and leasing), along with the most relevant finance barriers in their markets. These were then categorized as: a) unexploited potential for off-balance sheet treatment; b) lack of financing for providers; c) competing grants and other competing financing; and d) other. This information was combined with additional data gathered.

MS	Financing schemes	Unexploited off-balance	Financing for providers	Investment grants -other financing	Other barriers
AT	Off-balance: forfaiting; on-balance with financing from previous savings	Municipalities and regions			Fragmentation, small projects
BE	Off-balance; on-balance (public authority financing)	Municipalities and regions			Burdensome accounting of off-balance contracts
BG	On-balance (equity financing)		Need support to EERSF / local banks for long term financing[171]	Need conditional investment grants [172]	
HR	Primally off-balance; on-balance street lighting (commercial loans, low interest rate, 25% equity)		Banks understanding; Need (more) ESIF for guarantee fund	Competing ESIFs: no tenders for buildings	Standardized documentation, and FI set up
CY	There are no financing schemes				
CZ	On-balance (forfaiting without recourse)	Impact on debt of public sector and ESCOs	Need (more) ESIF to guarantee forfaiting[173]		Eurostat and EIB Guide distorted market[174]
DK	Mostly on-balance, off-balance in some hospitals (leasing)	EnPC included in gov. lending ceiling on municipalities		Low financing costs[175]	
FI	Off-balance solutions and leasing			Low price of money	
FR	Mostly on-balance	Financing is seen as unlawful			Low budget allocation to the public sector[176]
DE	On/off balance considered unimportant (often with forfaiting; mostly equity: ESCo 30- 40%, mixed funding 40- 60%)		High equity interests	Low price of money	Refinancing depending on energy and implementation of carbon taxes[177]
GR	Dissonant claims: PPPs with SRSS vs EnPC (off-balance possible when financed by providers, but rare)			SRSS and national funds for buildings (100% of investment)[178]	

[171] EERSF Bulgarian Energy Efficiency and Renewable Sources fund, formerly BEEF. In Bulgaria there i is high risk of contract termination, which explains limited interest of private FIs.

[172] Recently overcome but acting as a barrier during reported period.

[173] Combined use of EnPC + structural funds is taking off lately, important for comprehensive renovations,

[174] Eurostat and EIB Guide had a negative effect in Czech Republic where treatment is not considered important; also, some clients do not like to transfer the receivables to the bank

[175] All financing for hospitals and municipalities comes from bank jointly owned by municipalities (KommuneKredit 2019). All financing for hospitals and municipalities comes from bank jointly owned by municipalities (KommuneKredit 2019).

[176] French commitments to renovation of PS buildings is diluted in commitment to renovate residential and tertiary sectors.

[177] The regulation for the non-ETS sector was passed in December 2019 (Gesetz über einen nationalen Zertifikatehandel für Brennstoffemissionen – BEHG.)

[178] There is no existing financing scheme that gives partial subsidies, compatible with EnPC; Low interest loan program provided by Deposit and Loans Fund - TPD to municipalities can be combined with EnPC financing for lighting.

MS	Financing schemes	Unexploited off-balance	Financing for providers	Investment grants -other financing	Other barriers
HU	No use. (on-balance financing)	Limits to council lending or leasing		Full financing to councils [179]	
IE	On-balance (developing off-balance model) (Project financing, some equity; government loans)	Concerns about EnPC causing inflation			
IT	Off-balance sheet (third party financing, national contributions)	Public debt, Upcoming Fiscal Compact	Need public guarantee fund		
LV	On-balance		Obstructed bank for forfaiting	Investment grant scheme (building renovation)	
LU	No market				
LT	On-balance (PPP) (Co-financed by a loan and a repayable grant (80%) and the ESCO)			Low energy prices	Costs of administering EnPC as PPP
MT	No market				
NL	Off-balance	Municipalities[180]	ESCOs are required 20-30% own financing		
PL	On-balance		Need guarantee funds	Need EU with private funding	
PT	Off-balance project financing		Disinterest of investors in off-balance[181]	Harsh competition of structural funds (no EnPC in public buildings)	
RO	On-balance (off-balance contract may be upcoming)	Constraints to councils[182]		Financing from European Commission and others	
SK	Off-balance (obligatory) (ESCO financing through forfaiting)			Need EnPC with ESIFs & other contracts[183]	
SI	Off-balance sheet (40% cohesion funding, 9% public budget, 51% private capital)			Need more co-financing (COHESION FUNDS & ELENA)	
ES	Mostly on-balance; off-balance in Catalonia (credit/leasing; some equity)	Limited capacities	Limited borrowing capacity	More ESCO with EU funds (IDAE, lighting)	
EU			High competition for small market		

Colour code. Prevalence of off-balance treatment, in green; prevalence of on-balance treatment, in orange, co-existence of both contracting modes, in blue. Source: EC JRC 2020 Database

[179] KEHOP https://www.palyazat.gov.hu/doc/4382

[180] EnPC provides opportunity to bypass deficit financing for municipalities (Bank Nederlandse Gemeenten) when ESCOs do the investment.

[181] Budgets do not include multi-annual allocation for payments to ESCOs, and off-balance sheet contracts are not eligible for EU and national funds.

[182] Procurement regulations and the local budgeting ban local authorities from engaging in contracts with variable value of the service/savings.

[183] Eurostat and EIB Guide need to permit to combine EnPC with other contracts for overall building renovation.

Appendix 7. EC JRC 2020 Database: Enabling factors

Appendix 7.1. Major factors for market development

Expert insight was gathered on the factors for market trends and changes in project typology for 2017-2019 and 2021-2023. These factors are summarized in the table along with additional information gathered.

Member State	Targets- commitment	Contracting	Deficit	Guarantees	Awareness	Technical capacity	Examples- experience	Financial support	Other, notes
AT				Y					Financing capacity of mature market, partly through forfaiting; adaptation to Eurostat
BE					Y	Y			Focus on quality of the EnPC-process (close support from QualitEE, RenoWatt)
BG	Y			Y				Y	More quality and control (Largest most attractive projects done through investment grants); removal of incompatibilities of EnPC in the public sector with grants; impending energy efficiency act (2020) is expected to improve definition, and models[184]
HR		Y			Y	Y		Y	Lighting only
CY		Y							
CZ		Y	Y		Y	Y*	Y	Y**	Certification (projects and providers); *More technical capacity upcoming; ** Subsidies for envelope (2019) & Well-established financing based on forfaiting
DK	Y				Y*				*Overcoming in-house reticence
EE							Y		
FI									Changes to energy support system 2020
FR									Pre-existing service structures- Barrier
DE						Y		Y*	More guaranteed savings; Shorter contracts *Regional subsidies; more cooperative model
GR	Y**		Y			Y	Y*	Y	*Initial experience with lighting; ** Strategy and obligation for buildings[185]
HU	Y*				Y*				Expectations on: Government change in councils (2019); *organization of SEIF round (2020), possible new commitments
IE	Y*	Y	Y		Y		Y	Y	*Refers to EU sources
IT	Y*		Y						*Refers to EU sources[186]
LV		Y*						Y*	*Expected
LT						Y*			*Expected
LU									Private sector adoption of EnPC
MT									
NL	Y				Y				
PL			Y			Y	Y		
PT	Y*							Y*	Simplification, rebalanced guarantee and risks; *Legislation and support for renewable energy
RO	Y	Y							Expected drafting of model contract, legislative update and political commitment (take off 2022?)
SK	Y*	Y **	Y		Y				*Building renovation; **Off-balance (obligatory)
SI	Y*					Y		Y	*Strong targets in the City of Ljubljana
ES	Y*	Y							*New Government attitude (2020)
SE								Y*	Interest in developing a partnering model, whereby the contractor guarantees savings during the exploitation phase; *Savings need to be greater than investment;
EU	Y*								*Art 5 EED

(*) Indicates that a note about this cell has been included in the notes' column. Source: EC JRC 2020 Database.

[184] Addressing barriers identified by H2020 FinEERGo-Dom.

[185] Lighting. National Plan for Energy and Climate Greece (ΕΣΕΚ 2020-2030), programming from 2021: Energy Efficiency Obligation Scheme ; building renovation strategy; financing (new Electra program, National EE fund for lending and guarantee, and structural funds) and technical support (funding to facilitation), innovative financing (blended-hybrid, guarantee tools) to apply to ESCOs.

[186] Financing needs (Fiscal compact for Municipalities and off-balance opportunities of investment), impact of off-balance sheet contracts on PPP; procurement code adaptation; standard EnPC contracts by CONSIP; development of MVP, monitoring data; sustainability awareness, EU targets. Street Lighting and Thermal plants drive the market; experience of aggregation to engage EU facilities (ELENA); knowledge diffusion

Appendix 7.2. Ongoing changes in project typologies, and drivers for these changes

EC JRC Survey 2020 respondents were requested to indicate the main changes experienced in terms of project typology and the factors driving these changes for both the period 2017-2019 and 2020-2023. These are summarized in the following table.

MS	Changes 2017-2019 and 2020-2023	Drivers for these changes
BE	More focus on deep retrofitting/climate neutrality and on quality of the EnPC	Political interest and commitment
BG	Focus on lighting; Reduction of size and increase of quality (the latter is expected to continue)	Potential of public buildings already exploited through grants, Potential in street lighting (shorter payback period): Largest, most attractive projects already done
HR	Focus on lighting	TA support and availability of contract model
CZ	From only technologies to complex thermal renovation, to continue in the future	Since 2019 subsidies allow to include building envelope; Upcoming better availability of technical assistance.
DE	More cooperative model (cooperative energy management); More integral renovation: envelope + renewables+ HVAC; more user centric projects; less shared savings and more EnPC with guaranteed savings and shorter contract durations	Development of technical support (financing not problematic)
GR	From pilots in public lighting to efforts in buildings including efforts for comprehensive renovation	Progressive implementation of EnPC commitments
IE	Integration of smart systems in EnPC projects	
IT	Compliance with Eurostat	Eurostat requirements (savings must be greater than investment in efficiency)
NL	Maybe more bundles	Growing urgency
PL	More comprehensive interventions to include heating, management and lighting	Increasing confidence from good practices and examples
PT	2020-2023 PV projects intended through EnPC, bundle projects with community funding	Legislative trend to foster renewable energy communities
RO		
ES	Increase in HVAC system renovations	In buildings savings must add up more than the investment in efficiency.
SE	Expectations for partnering model: client takes risk in intervention, and contractor provides guarantees about the exploitation period	Competence of customers and mistrust towards contractors' "fix prizing"

Source: EC JRC 2020 Database.

Appendix 8. EC JRC 2020 Database: Good regulatory practices and recommendations

EC JRC Survey 2020 participants were asked to identify good regulatory practices in their Member States of expertise and to provide specific recommendations. These are presented in the table along with additional information gathered from the literature.

MS	Good practices	Recommendations
AT	Guidelines for bid selection, negotiated procurement procedure (not often applied); "Bundescontracting" cooperation between the BMDW and BIG	
BE	IPMVP, Quality criteria (QualitEE project), contract models. (SuperESCO not mentioned by local respondents)	Communication, e.g. contract models and examples. Need easier procedure; fostering role of facilitators in spreading knowledge
BG	ESCO contracts not counted as public debt; Ongoing proposal for legislative changes to unlock market; Support from Sustainable Energy Development Agency (SEDA)	Include non-efficiency measures; longer term EnPC; foster demand, e.g. through incentives and changes in regulatory framework
HR	Energy Efficiency LAW: Building renovation obligation; (Procurement, contracting and tendering; Ongoing development of quality standards for facilitation. Requirement for off-balance treatment (GuarantEE 2020)	Standardized documentation would lower costs and build trust
CY	None	
CZ	Good standard contract, good information and demonstration projects; Expert facilitators involved at initial phases of project development; Taste for comprehensive renovations.	Need awareness and exemplary state action; simplifying and speeding up technical assistance; Expert facilitators involved at initial phases of project development
DK	Public tendering with dialogue/"negotiation" (before handing in the Best And Final Offer); financing fund for municipalities (KommuneKredit 2019)	Adaptation of EnPC to local conditions, more flexibility (co-learning and co-creation)
EE	Model contract and recommendations (2019)	Need good practice examples
FR		Guidelines and contracts to foster shorter contracts (3 or 5 years), requiring major changes in energy consumption (20, 30%), not bundling many services. Tendering should start asking for a more cost-effective preliminary assessment.
DE	Simplified administration in State of Berlin; Ministry for Economic Affairs and Energy fosters experience exchanges between administrations; Continuous improvement (procurement regulations, access to subsidy programs for ESCOs	1. Centralized and simplified administration: Simplified approval projects: Harmonization and clarity of regulations (e.g. should apply to municipalities under finance supervision); 2. Regulation: Efficiency as award criterion, refurbishment and modernization only allowed with proven energy savings, framework conditions (national and regional) that do not discriminate ESCO models (to be available in 2-3 years); Payments to the contractor (remuneration) are not counted towards the credit line; 3. Reliance on principles of exemplary governance (Transparency and data gathering); 4. Potential in One Stop Shops to overcome the nitty gritty EnPC
GR	None	
HU	Plans for EEO and Public ESCO (unfortunately without legal and finance backing)	

MS	Good practices	Recommendations
IE	Eurostat and EIB Guide clearly written and experts available for further guidance; The e-tenders portal, used to promote projects; Competitive dialogue mechanism. Need to clarify definitions: Officially involving guaranteed savings and risk transfer). Also used vaguely to refer to 'as a service' contracts, basic energy performance guarantees, and local energy supply contracts.	Clear implementation of Eurostat and EIB Guide; fostering understanding in the public sector; Need to highlight "guaranteed performance" in definitions and communications; Legal and technical support for contracts and portfolio development.
IT	Separation of services, fragmented market; the mandatory application of an EnPC contract to achieve public subsidies ("Conto termico")[187]; Provide the energy baseline, the normalization factors, and the desired minimum energy efficiency improvement for the contract duration (or CO_2 reduction) to ESCos and let them define the best available techniques to implement and guarantee the savings	Standardization and information; separation of services
LV	Regulatory attempts remain blocked with contradictory rules; To overcome barriers of legal restriction on contracts longer than 5 years and other barriers, the Latvian government has signed new ELENA for contract and project preparation	Need examples
LT	None	
NL		Economic and fiscal incentives to increase motivation; Standardized processes and market facilitator or SuperESCO alike the Belgian one
PL	Framework projects, consulting fora but focus on PPP, EIB working group	
PT	National standard (ECO.AP), best monitoring (e.g. IPMVP) and tendering practices	Efficiency targets and debate in the administration, exemplary role (extensive to regional administrations); Capacity building for municipalities and consultancy companies; Complementarity with other financing instruments; development of an insurance market; aggregation of public sector efficiency projects (including water); standardization (contracts, project typologies, assessment models, simplified M&V): priority to energy efficiency in national finances and at organization scale; Clarification of the nature of debt
RO	none	
SK	Standard contract template	
SI	Competitive dialog - higher savings with lower investments - and comprehensive renovation - avoid lock-in; Deep renovation plan, Project implementation unit for public building energy renovation, introducing EMAs, preparation of sustainability criteria for public buildings; Proving that the building renovation cannot be financed by EnPC is required. (cost-benefit analysis per building (should be per bundle); EU grant only through EnPC procurement, if EnPC possible; Creation of baselines, controlling retrofit costs. All risks of renovation, maintenance, energy management and energy savings taken by private partner; strict guarantee (no payment) (Loose and Šeme 2019)	NEEAPs as programming tool for EnPC support and developing capacities in efficiency and performance of (public) buildings (Stanicic 2019)

[187] The Conto termico is a government grant for thermal energy efficiency measures.

MS	Good practices	Recommendations
ES	Contract models and Procurement Law adapted to Eurostat and EIB Guide; Centralized decisions in local administrations; Investor Confidence Project (ICP EU) good sample contract and ESCO guidance; ELENA in some cities; Exemplary regulations and mainstreamed action in Catalonia	Centralized decisions; Exemplary government
SE	n/a	
EU	Should stick to proven business model; Avoid new financing instruments with more stakeholders – are costlier and less attractive to the parts.	Note: Deferred achievements and dry magnitudes make EnPC less attractive for MEPs, who are willing to demonstrate active and fruitful parliamentary work

Source: EC JRC 2020 Database.

Appendix 9. EC JRC 2020 Database: EU financing and assistance instruments

Respondents to the EC JRC 2020 Survey where asked to state their acquaintance about key mechanisms of the SFSB: ELENA, PDA H2020, and de-risking instruments (DEEP – De-risking Energy Efficiency Platform – and EEFIG Underwriting Tool Kit). Affirmative respondents were then invited to rate these mechanisms from 0 (no impact) to 4 (big impact- upscaling of the market), and to comment on each rating. The tables in 9.1 represent a consolidated assessment, and the quantitative assessment for each mechanism. To complete the assessment, respondents were invited to reflect on good practices of implementation, remaining barriers and policy recommendations for EU financing and assistance instruments (9.2).

Appendix 9.1. Impact of EU support instruments (ELENA, PDA H2020, DEEP, EEFIG) in Member States.

Member State	ELENA	PDA H2020	DEEP	EEFIG
	0.0	1.0	-	-
BE	2.0	1.0	0.0	0.0
BG	0.3	2.0	1.0	1.0
HR	4.0	2.7	1.3	1.3
CZ	4.0	1.0	1.0	2.0
DK[188]	3.0	-	-	-
DE	3.3[189]	1.5	0.5	0.5
GR	1.5	2.0	1.0	1.0
HU	2.0	2.0	1.0	1.0
IE	3.0	2.0	1.0	1.0
IT	**2.0**	1.0	1.0	1.0
LV	-	**2.0**	0.0	0.0
LT	2.0	3.0	1.0	0.0
NL	0.0	0.0	0.0	0.0
PL	4.0	4.0	-	-
PT	**1.3**	2.0	1.0	**1.0**
RO	0.0	0.0	-	-
SK	3.0	0.0	0.0	0.0
SI	4.0	0.0	0.0	0.0
ES	3.0	**2.3**	2.3	2.5
SE	2.4	1.5	0.8	0.1
avg	2.4	1.5	0.8	0.8

The colour shading ranges from nil impact (0, in dark red) to major impact (4, in dark green). Bold values indicate high variability between responses (>2). Source: EC JRC 2020 Database.

[188] In the case of Denmark, the rating was assessed by the authors based on the qualitative assessments provided by respondents

[189] The strong activity in Germany refers only to Baden Württemberg, where an ELENA program led to 50 m€ ESCO investment in 32 projects. In general ELENA support is found too complicated and rejected in lands.

MS	Impact	ELENA
AT	0.0	There are no ELENA-projects
BE	2.0	Several projects were made financially feasible
BG	0.3	Too high investment required (The EUR 30 million threshold is too high for local authorities, and bundling projects is hard)
HR	4.0	Used for public lighting projects in Zagreb county
CZ	4.0	Good technical assistance for preparation; Important support received at council and government levels
DK	3.0	Copenhagen area Hospitals and another coordination project
DE	3.3[190]	Successful and simple to operate, but demanding requirements (e.g. signed EnPC contracts); support < 5% of the investment
GR	1.5	ELENA facility has been implemented in Greece at regional level.
HU	2.0	Insufficient use of ELENA (2 ongoing projects?) due to dependency on investment grants and complexity of ELENA administration processes. Novel interest from municipalities
IE	3.0	Codema interested (model of Ljubljana and GOLEA)
IT	**2.0**	Diverse opinions: (4) Very good, but high finance threshold; (0) Problem to aggregate projects, for client and small providers
LT	2.0	Does not overcome slow decisions on buildings
NL	0.0	There are no ELENA-projects
PL	4.0	
PT	**1.3**	Diverse ratings (0-4). Good experiences contrast with complaints about problematic need to aggregate projects. Need preliminary technical expertise to acknowledge risk of projects fading out in authorisations
RO	0.0	No ESCO involvement[191]
SK	3.0	
SI	4.0	4 ELENAs implemented
ES	3.0	Found burdensome to request (1 years, size issues)[192] and execute. Considered not useful for street lighting.

The colour shading ranges from nil impact (0, in dark red) to major impact (4, in dark green). Bold values indicate high variability between responses (>2). Source: EC JRC 2020 Database.

	Impact	PDA H2020
AT	1.0	Few projects, not upscaling the market
BE	1.0	Only RenoWatt (One-stop-shop in Wallonia); Need more replication and communication of results
BG	2.0	
HR	2.7	
CZ	1.0	
DE	1.5	not being used
GR	2.0	Project PRODESA bundling projects for 116 municipal buildings and 22.000 luminaires of street lighting. Intended EnPC 35%-45%, - Public grant 55% - 65% and - Municipal own resources or debt financing 15%-35%.
HU	2.0	Only one PDA in the private residential sector. Barriers of grant-dependency and procurement; One-stop-shop project (Horizon) driven by associations (MEHI and Energia Club)
IE	2.0	Codema interested. (model of Ljubljana and GOLEA)
IT	1.0	Too competitive calls, preference for showcasing (no replication and policy implementation)
LV	0.0	Resistance stronger than the support from the Sunshine Accelerate project
LT	3.0	Increased number of trained consultants
NL	0.0	
PL	4.0	
PT	2.0	Several proposals and projects ongoing for municipalities (H2020 BundleUP and GLEE AM)
RO	0.0	
SK	0.0	
SI	0.0	
ES	**2.3**	Insufficient promotion, it has more impact in private sector.

The colour shading ranges from nil impact (0, in dark red) to major impact (4, in dark green). Bold values indicate high variability between responses (>2). Source: EC JRC 2020 Database.

[190] Ibid.

[191] ELENA grants have been used in the country during the report period but without involvement of Energy Service contracting.

[192] An application can take as little as 4 months from request to award.

MS	Impact	DEEP	Impact	EEFIG
BE	0.0	Not used by investors nor by the banking sector	0.0	Not used by investors nor by the banking sector
BG	1.0	Data quality and access to be improved; unpopular mechanism amongst financing institutions	1.0	
HR	1.3	Still not used - focus on other finance risks	1.3	Still not used. Hope that SEIF will introduce it from 2020
CZ	1.0	n/a	2.0	maybe in the future
DE	0.5	irrelevant: calculated values in DEEP do not correspond with real life performance data	0.5	behind German regional standards
GR	1.0	Lack of information on projects implemented in the Member State	1.0	Lack of information on projects implemented in the Member State
HU	1.0	Not well known, especially amongst financiers	1.0	Not well known amongst financiers and decision-makers
IE	1.0	Not used by Codema	1.0	Codema considering as part of application to PDA
IT	1.0	Needed mandatory metered savings in publicly financed projects	1.0	Good know-how, need more disclosure throughout project lifetime
LV	0.0	No awareness locally	0.0	Resistance stronger than efforts from Latvian Building Energy Efficiency Facility (LABEEF)
LT	1.0	Data from other countries does not enable standardized assumptions, e.g. to estimate savings	-	
NL		There are Dutch projects in the DEEP database; but the information is not available nor used by the sector	NL	Not used by investors nor by the banking sector
PT	1.0	Street lighting in Central Alentejo (12m€ contract)	**1.0**	Not in use but appreciated and used as reference by some respondents
SK	0.0		0.0	
SI	0.0		0.0	
ES	2.3	Insufficient promotion; need more local data.	2.5	Insufficient promotion - only FIs members of EEFIG are acquainted
SE	0.8		0.1	

The colour shading ranges from nil impact (0, in dark red) to major impact (4, in dark green). Bold values indicate high variability between responses (>2). Source: EC JRC 2020 Database.

Appendix 9.2. Remaining barriers, good practices of implementation, and recommendations related to SFSB

EC JRC Survey 2020 respondents were invited to reflect on remaining barriers, local good practices and possible policy recommendations for improving the SFSB and its implementation. The following tables summarize the responses obtained for 15 Member States where data was available.

MS	Remaining barriers related to EU mechanisms of assistance and guidance
AT	Lack of pressure to do efficiency
BE	Too few projects.
HR	Risk of project development without certainty of implementation (e.g. securing own financial share), poor project design (REGEA 2020)
CZ	Lack awareness; often lack of the experience of the (public) building owner and his mistrust in (private) consultant or ESCO
FR	Low administration knowledge, low promotion of these mechanisms
DE	ELENA-like program needed to develop more the demand
GR	n/a
HU	Lack of awareness about alternatives to investment grants (too advantageous) and other EU support (ELENA; DEEP and EEFIG).
IE	Immature market, need significant support to develop ESCO, client (e.g. statistics office) and facilitator capacity
IT	Costs of Technical Assistance; Lack of a performance bond market; Decision making instability in PA (litigation frequent and resolution slow); Procurement slow (up to 7 years) and TA contracts shorter (3 years); Lack finance to monitoring; Small size of construction companies
LV	Old way of doing
LT	inadequate budgets and maintenance of buildings makes difficult understanding and transferring risks
PL	Insufficient use of technical advisors, lack of guarantee funds
PT	Need nationally adapted capacity building and risk assessment tools (Lack of capacity and awareness within finance authorities and legal advisors causes uncertainty for EU supported projects)
SI	Support scheme to providers and facilitators; Further work on Quality assurance (e.g. QualitEE)

Source: EC JRC 2020 Database.

MS	Good practices of implementation	Recommendations
AT	-	
BE	There are plans to develop a risk assessment once there will be cases	
HR		Need advisory services (e.g. part of cohesion coverage, including SRSS advisory services on national programme setting-up); fi-compass on a financial instruments set-up; EIB – (new) TA services – providing grants for financing costs related to setting up project pipeline
CZ		Continuing efforts of awareness building
FR		Needed promotion of these instruments amongst administrations
DE	ELENA is very successful in 2015- 2019 (InEECo)[193] when addressing client needs	User centric models and processes
IT	Replication of ELENA at subnational level the Fondazione Cariplo Foundation initiative (n.d.)	Analysis. mismatch TA and demand capacities, especially in terms of project size
LV		
LT	Issues with energy efficiency data, should be made public, e.g. in public buildings	
PT	Most satisfactory ELENA and PDA projects	Support for preliminary technical expertise and assessment of administrative barriers (avoiding projects to fade out due to slow and reticent administration)
SI	Implemented ELENA projects	
ES	IDAE tool (PAREER-CRECE) tested for years.	Still speaking about goodness of EnPC. Need to overcome barriers

Source: EC JRC 2020 Database.

[193] ELENA program 2015- 2019 by KEA resulted in 45 m€ investment in EnPC and EnPC + Energy supply contracting

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