

PUBLEnEf final report

“Supporting Public Authorities to implement energy efficient policies”

Editors: Vlasios Oikonomou (JIN Climate and Sustainability)

February 2019

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What do the policy makers have to say about PUBLEnEf?



“Taking part in PUBLEnEf project activities gave the opportunity to discuss all the issues regarding energy cluster development with different organizations and other energy clusters’ members during project meetings and events. It was very useful for the municipality. One-day information campaign with use of Energy Bus is a good way to engage local stakeholders, to increase knowledge on sustainable energy and low-emission economy. The municipality is going to use other tools and best practices for further development of local energy efficiency policy. Implementation and development of local energy cluster gives the benefits beyond one municipality. The guideline document will be very useful for other municipalities and for development of energy policy at regional and even national level”.

Joachim Bargiel, Mayor of Gieraltowice Municipality (2010-2018)



“What makes PUBLEnEf project Toolbox unique is the variety of topics it covers and different types of energy-efficiency related tools and resources. The key advantage of this digital tool collection is the type and search option which greatly simplifies its use and also enables users to focus on specific needs. The fact that users can interact with the collection, adding their own tools, and updating and editing information makes the collection active and relevant. The Toolbox has a practical use in different activities like supporting other EE-related projects, evaluation of policies, information exchange, etc. and Energy Institute Hrvoje Požar has used it both to gather information and also to promote possible solutions by adding our tools to the collection”.

Lovorko Marić, Senior researcher at Energy Institute Hrvoje Požar, Zagreb, Croatia



“On behalf of Sustainable Energy Development Agency of Bulgaria I would like to express our satisfaction with the successful implementation of the PUBLEnEf project. The buildings are responsible for approximately 40% of the final energy consumption and 36% of CO₂ emissions in the EU. A large percentage of them do not have energy efficiency measures implemented and thus the sector has the greatest potential for energy savings. The roadmap is a good approach for sustainable energy planning that municipalities in Bulgaria can apply when implementing their energy and environmental policies and when making an inventory of the GHG emissions” We hope the good results of the project would have an opportunity to be multiplied in future.

Tsvetomira Kulevska Director at “Coordination and Management of EE and RES” DG Sustainable Energy Development Agency



“The PUBLEnEf project has made it possible to create a tool, the Energy Efficiency Helpdesk for SMEs, which in several sections guides companies on those elements that can help them improve efficiency and save energy. One section compiles the measures classified by topics and provides simple information of different measures that can be implemented; another section is a form to request information from companies that decide to implement any of these measures; another is a map where SMEs that provide information will be located; and, another contact area and general information. This tool helps the municipality achieve its goals within the Covenant of Mayors: 20% savings in emissions in 2020. It is also a very important awareness tool for citizens.”

M^a José Ruiz de Villa Revuelta, Director of the Municipal Energy Agency of Valladolid



“For the Provincial Energy Agency of Alicante, collaborating with the PUBLEnEf project has meant obtaining a very useful study for our province and has allowed us to obtain a tool with which to develop and implement small-scale wind energy. With this tool we can develop other alternative energies to those already developed by taking advantage of the natural resources we have in the province of Alicante. For the Agency, the project is another aid to continue collaborating with the municipalities in the development of the Covenant of Mayors for Climate and Energy and thus achieve reduce CO2 emissions and contribute to the economic development of our province.”

M^a. Magdalena Martínez Martínez, Directora Agencia Provincial de la Energía de Alicante



“Taking part in the PUBLEnEf project supported the ability of Tipperary in drafting the sustainable energy action plan and the roadmap to investing in the energy efficient lighting opportunity for the county. The toolkits and collaboration with other European partners allowed us to access ELENA funding for sustainable Tipp and supported the commencement of replacement of our inefficient lighting stock. Just under 15% of the existing lighting is now replaced with LED lighting with the plan to have the remainder replaced by 2021/2022.”

Michael McCarthy, Elected member of Tipperary County Council, Irish member of the Committee of the regions.



“PUBLEnEf project helped the municipality of Castelbuono, specifically the technical staff, to be autonomous in the management of the installed geothermal technology. Thanks to training on the job in a pilot-building and classroom sessions, the roadmap supported the decision-making process of the municipality for the fine tuning of all the installed heat pumps in the public buildings of the town, thus providing a contribution in the monitoring of the Sustainable Energy Action Plan, adopted within the Covenant of Mayors.”

Mario Cicero, Castelbuono Mayor



Comune di
Catania

“PUBLEnEf project will speed up the adoption of the Energy Performance Contract (EPC) scheme for the public buildings, not only in Catania but at national level also. Indeed, the pilot study of the roadmap provided an essential contribution to make soon possible one of the first applications in Italy of the new national EPC guidelines, currently under review by the Ministry of Economic Development, and consistent with the Energy Efficiency Directive (2012/27/EU - EED). “

Carmelo Oliveri, Municipality of Catania - Department of Environmental Protection and Energy Policies



Regione Siciliana

“The EPC instrument could be the main tool supporting the energy refurbishment of historic buildings also. Thanks to the tools, good practices and the pilot study made available by PUBLEnEf it will be possible to accelerate the path of energy efficiency, overcoming technical, legal and governance obstacles.”

Roberto Sannasardo, Sicilian Region - Department of Cultural Heritage and Sicilian identity



“Through our participation in the Publenef project, we have been given the opportunity to be informed and improve the energy performance of our Municipality. We have strengthened our human resources know-how and developed more skills in finding ways to fund and implement the Actions of the SEAP. In cooperation with

CRES and the PUBLNEF network, we will continue to use the Toolkit and the results of the project in implementing the Corinthian Municipality's strategy for sustainable energy and environmental protection”.

Mayor of Korinthos, Greece



"The region of Upper Austria has ambitious energy goals and the municipalities have a key role to play in achieving them. The PubleneF project has very successfully supported the region in conceptualising and rolling-out the "Gemeinde-Energie-Programm" (GEP) programme. The programme triggers energy-related investments in Upper Austrian municipalities by activating, motivating and providing technical advice and support to municipalities in preparing concrete investments. Since launching the GEP programme in March 2017, over 60 projects totalling more than 6 million Euro investments have been triggered. Together, they result in over 7 GWh/year in energy savings. Direct contact with municipalities and tailor-made support have shown to be crucial elements for triggering investments. The PubleneF project has enabled us to carry out these activities with significant results. By helping increase energy-related investments, the PubleneF roadmap has contributed to the local energy transition in the region of Upper Austria."

Christiane Egger, Deputy Manager of the Energy Agency of Upper Austria (OÖ Energiesparverband)

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1 Introduction to PUBLnEf

1.1 Technical details

The PUBLnEf project (Supporting Public Authorities for Implementing Energy Efficiency Policies) is funded by the European Commission under the Horizon 2020 programme and ran from February 2016 until January 2019 under the coordination of Dr. Vlasios Oikonomou at JIN Climate and Sustainability in the Netherlands, with a consortium of 12 partners from 11 European Member States (MS).

Table 1: PUBLnEf Project consortium

Partner	Country
Joint Implementation Network (JIN)	The Netherlands
Centre for Renewable Energy Sources and Saving Foundation (CRES)	Greece
The Polish National Conservation Agency (KAPE)	Poland
Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas (CIEMAT)	Spain
Institute for European Energy and Climate Policy Stichting (IEECP)	The Netherlands
Association of Bulgarian Energy Agencies (ABEA)	Bulgaria
OÖ Energiesparverband (ESV)	Austria
Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA)	Italy
European Federation of Agencies for Regions and the Environment (FEDARENE)	Belgium
Energy Cities (ENERGY CITIES)	France
Tipperary Energy Agency (TEA)	Ireland
ARENE Île-de-France (ARENE)	France
Local Energy Agency Bucharest (AEEPM)	Romania

The overall objective of PUBLnEf was to assist EU Member States (MS) in implementing effective and efficient sustainable energy policies (with the focus on energy efficiency) and empower them to make use of the best practices and policy processes implemented in other MS at the national, regional and/or local level. The specific objectives of PUBLnEf were:

Objective 1: Assess and learn from existing energy efficiency policy implementation practices in EU MS, regions and cities

Objective 2: Strengthen networking opportunities for public agencies on the national, regional and local level

Objective 3: Develop and adjust tools for public agencies to help them implement energy efficiency policies

All the information and project findings are published on the project webpage www.publnef-project.eu, while a special platform for policy making with customized policy tools is developed in: www.publnef-toolbox.eu.

1.2 What PUBLEnEf aimed at

Departing from the transposition and implementation process of the European Union Energy Efficiency Directive (EED), the role of the multilevel governance is of utmost importance, as all policy layers (national, regional and local) contribute to the overall energy saving target of each MS. To support this process, a key message to local and regional authorities is that once their MS transpose the EED fully, it will be their task to ensure that national legislators implement it. Regions and cities should thus design their sustainable energy strategies (through supporting mechanisms such as the Covenant of Mayors), provide the required means for attracting investments to finance their strategies, scale up efforts, implement policies to achieve their targets, and monitor and verify the policy outcomes. Action at local level is thus essential. The EU, national governments, cities, regions, industry and citizens must work together and follow a shared roadmap and mutually supportive policies to accelerate action in the short and long term.

In this respect, the full title of PUBLEnEf was “Supporting Public Authorities for Implementing Energy Efficiency Policies”, and that is exactly what has been accomplished during the project lifetime (2016 – 2019). PUBLENEf partners have engaged with policymakers at MS, regional, and local levels across the EU related to energy efficiency to provide them with credible information, insights, and tools, in order to make the policy processes more efficient and effective and to improve the overall quality of decision-making and policy implementation.

In order to enable mutual learning from energy efficiency policies and their implementation across the EU, a **needs assessment** together with the identification of good practices and

useful **tools for policy-makers** have been carried out. Policymakers at national, regional, and local levels were interviewed, to identify strengths, weaknesses, opportunities, and threats (SWOT), as they perceive them while undergoing the energy efficiency policy implementation process. The key outcomes of this needs' assessment are presented in chapter 2.

In addition, a set of **good practices** in energy efficiency policy implementation was collected among policymakers in Europe. Reports about these practices elaborate the details of successful implementation of policies in various countries, regions, and municipalities. Showcasing these practices aimed to help other policymakers to better understand the fundamental drivers of effective and efficient policy implementation. In order to assist policymakers experiencing certain difficulties, the identified good practices were matched to the relevant needs from the needs assessment. The results of the **matching exercise** linking up good practices to needs are described in chapter 3.

In addition to the good practices, PUBLnEf gathered over 200 'tools' aimed at assisting the policy implementation processes in energy efficiency. These tools include digital handbooks, stakeholder engagement guidance, resource planning or process monitoring tools, e-learning courses, software and others. All tools, as well as the aforementioned 'good practices', have been collected in an online repository titled as the PUBLnEf Toolbox. More information on this toolbox is available in chapter 7.

One of the key activities of PUBLnEf and a practical approach to ensure more in-depth involvement and learning on energy efficiency policy implementation issues, were the development of 15 **roadmaps** at the national, regional, and/or local levels in 11 EU MS. PUBLnEf partners worked closely with policymakers in implementing energy efficiency policies, departing from the existing plans (in the form of Sustainable Energy Action Plans (SEAPs) or Regional Plans) to their actual implementation. Apart from having led to direct energy savings in the involved regions, the roadmaps provide useful replicable lessons for policymakers across the EU. The 15 roadmaps are introduced and synthesised in chapter 4.

As mentioned above, one of the key objectives of PUBLnEf was to strengthen networking opportunities among relevant stakeholders. A wide range, therefore, of stakeholder meetings, workshops, discussions, and other events have been organised. In all roadmaps, as well as in the needs assessment, the importance of stakeholder involvement and engagement was emphasised. This is further explained in chapter 6. Other key lessons throughout PUBLnEf were shared through policy briefs, as shown in chapter 5.

In short, PUBLnEf has led to energy savings in regions and municipalities across Europe. More than that, however, it has worked on knowledge sharing on energy efficiency policy

implementation, leading to capacity building for policymakers, now and in the future. This final project report provides a brief overview of the project implementation, outcomes, and lessons learned.

2 Key outcomes of needs assessments for energy efficiency policy making

In the early stages of PUBLnEf, a detailed needs assessment in energy efficiency policy making was carried out, with specific reference to Articles of the Energy Efficiency Directive (EED):

- ➔ Strategies: goals, targets, specific measures and policies (Article 3)
- ➔ Exemplary Role of Public Buildings (Article 5)
- ➔ Purchasing by Public Bodies Article 6).
- ➔ Energy Audits and Management Systems (Article 8)
- ➔ Technology (i.e. Promotion of efficiency in heating and cooling relating to Article 14)
- ➔ Availability of qualification, accreditation and certification schemes (Article 16)
- ➔ Information and Training (Article 17)
- ➔ Energy Services (Article 18)
- ➔ Other measures to promote energy efficiency (Article 19)
- ➔ Energy Efficiency National Fund, Financing and Technical Support (Article 20)
- ➔ Review & Monitoring of Implementation (Article 24)

This assessment provided PUBLnEf stakeholders with an information base to enable public authorities at local, regional and national levels to understand their shortfall in needs on energy efficiency policy. The process is depicted in Figure 1 and the main findings of this need assessment can be summarised in the following Tables (2 and 3).

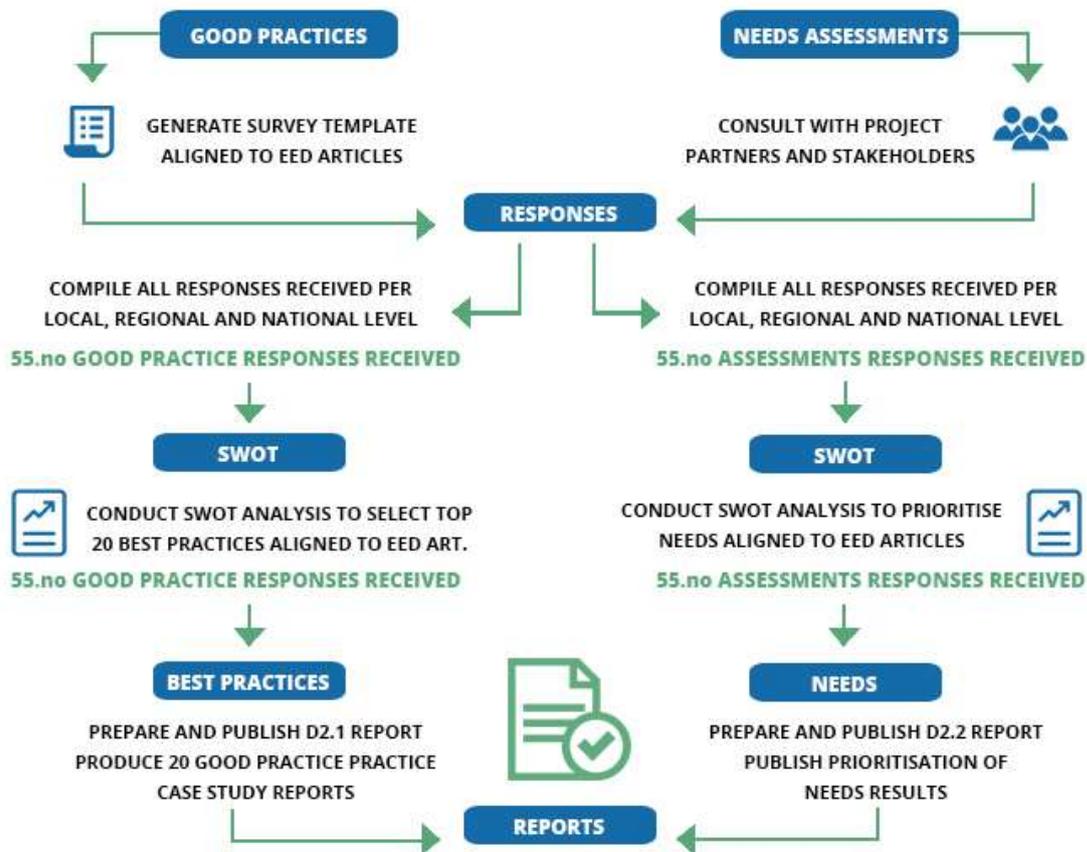


Figure 1: PUBLnEf process

Table 2: Summary of most important Local/regional needs and opportunities

Local/regional needs assessment:	
Strengths	- in-house expertise about communication - in-house expertise about consultation - mobilisation of the relevant in-house services
Weaknesses	- insufficient budget - lack of stakeholders' available time - mobilisation of the stakeholders
Opportunities	- sufficient information regarding legal and administrative aspects - sufficient information regarding training possibilities - sufficient information regarding energy technologies
Threats	- the existing legislation needs to evolve to allow the development of energy efficiency policies and projects - need for simplification regarding administrative procedures - need for training of the elected representatives regarding energy efficiency issues

Table 3: Summary on the main findings from the National needs assessment

National needs assessment	
Strengths	<ul style="list-style-type: none"> - <u>Purchasing by public bodies</u>: the public sector (and not only the central government) purchase energy efficient buildings, products and service at national level and tools/framework are in place to assist the public sector in those procurements. - <u>Energy audits and management systems</u>: the energy audits seem well implemented with a programme for conducting them, quality assurance schemes, and technical and financial feasibility assessments. - <u>Availability of qualification, accreditation and certification schemes</u>: the level of technical competence, objectivity and reliability of providers of energy services, energy audits, energy managers and installers of energy-related building elements is considered as sufficient to contribute to national energy efficiency objectives. The presence of accreditation schemes and/or equivalent qualification schemes are also considered as strengths. - <u>Energy efficiency national fund, financing and technical support</u>: presence of an Energy Efficiency National Fund and use of this fund by the public sector.
Weaknesses	<p>The National public bodies didn't perceive any significant weaknesses, However, if we look at the highest weakness score, the following parameters can be underlined:</p> <ul style="list-style-type: none"> - <u>Goals, targets, specific measures and policies</u>: absence of energy modelling at the local and regional level. - <u>Exemplary role of public buildings</u>: absence of programme for monitoring energy efficiency at local level. - <u>Technology</u>: due to really low response rates for most of the questions, we cannot draw any conclusion regarding the weakness factors of this category. - <u>Energy Services</u>: lack of information on best practices for energy performance contracting. This question reaches the same level as a strength (sufficient information). Therefore, this parameter can be considered as significantly different from one country to the other. - <u>Review and monitoring of implementation</u>: no implication to the public sector where targets are not being met.

Key findings from needs assessment

It is clear from a detailed review of the policies implemented at a local and regional level there is a significant absence in the fulfilling of the leading role by public authorities. This is generally identified in two key areas:

➔ Lack of Skilled resources:

Public bodies often do not have the financial capacity to support resources, and when specific resources are looked for there is a clear lack of skilled resources available (both internal and external). This is mainly as a result of lack of knowledge on operationalizing funding programs and lack of respective demand. If a public body needs to implement a task (and is ahead of the market), there is a difficulty in securing the external consultant, or training courses to build skills within the public body.

➔ The will to change

In addition to this challenge of skills, if there is willingness to move a policy forward, there is a significant lack of political will or motivation of public staff to implement it and lead by example. This is evident as a weakness in many public bodies. Many public bodies feel the legislation is weak or not adequately enforced.

PUBLEnEf is seeking to overcome these issues, supporting the will to change by engaging and informing, and finally by ensuring knowledge and abilities of public authorities to take up innovative financing schemes.

3 Matching tools and best practices to overcome policy needs

As a first step to provide information to policymakers on how to implement in practice energy efficiency policies, a series of good practices and tools were assimilated and matched with the expressed needs through three steps:

- ➔ GP analysis to better understand the fundamental drivers in energy efficiency policy design and implementation, through their classification by EED Articles and territorial level;
- ➔ Needs classification, by EED Article; and
- ➔ GPs-needs matching at national, regional, and/or local levels.

To this aim, a **matching matrix** is developed (see Annex 1) showing in detail how many good practice(s) can be used to overcome the needs identified . It is worth to note that each good practice can potentially cover different needs¹ The replicability of regional good practice in other countries and regions could potentially speed up the energy efficiency uptake in the public sector. The key conclusions from this matchmaking are summarized:

- For EED Article 3 (Goals, targets and policies), the lack of both operational goals and energy trend modelling are perceived as the main barriers to be faced also through the replication / adaptation of some of the collected good practices.
- Concerning EED Article 5 (Exemplary Role of Public Buildings), the main barrier stated is the difficulty in the involvement of Energy Service Companies (ESCOs) for the renovation of public buildings, through Energy Performance Contracts (EPC) also; by contrast, a number of matched good practices focus on the renovation strategy in public buildings. Furthermore, this controversy often derives from the fact that ESCOs cannot compete with ‘cheap’ / free national subsidies from European Regional Development Funds (ERDF) funds provided for renovations.

¹ For example, the Good Practice “Action Globale Innovante pour la Région – Innovative Global Action for the Region” (AGIR) gathered by Fedarene covers 24 different needs, selected 82 times by the interviewed national experts, and relative to 6 different EED articles (art. 5, art. 8, art. 14, art. 17, art. 18 and art. 20), thus addressing different topics such as: the exemplary role of the Public sector; energy audits and management systems; adoption of energy efficient technologies, as heating/cooling systems; information and training (the most addressed); availability of energy services; energy efficiency national fund, financing and technical support.

- For the EED Article 6 (Purchasing by Public Bodies), the main needs refer the lack of the life-cycle cost analysis within the public procurement process, the long-term duration of EPCs that make them unattractive for public authorities, and the request for assistance in the procurement: unfortunately, for none of them a good practice has been matched yet.
- Concerning the EED Article 8 (Energy audits and energy management systems), all needs expressed were equally important, and a number of good practices can be consulted, in particular for the financial approval for uptaking the energy efficiency measures suggested by energy audits, and for the development of programmes for the implementation of energy management systems. Furthermore, most of the matched good practices are implemented at local level.
- For the EED Article 14 (Promotion of heating and cooling) good practices are mainly addressed to the assessment of the potential at local and regional level of efficient heating and cooling systems, in particular those implementing high-efficiency cogeneration.
- On the EED Article 17 (Information and Training), the highest number of needs and best practices were documented, mainly from regional and local governments that lack capacity, resources and skills to communicate and replicate their own action plans and strategies in their jurisdictions and target groups.
- For the EED Article 18 (Energy Services) there are several needs (mainly on financing) and good practices in place. The common denominator singled out for this strand of needs is that the market uptake of EPC contracts should facilitate the process of the building renovation in the public sector through available funds, which is not fully exploited yet in the market. This relates also to EED Article 20 (financing) where the main barrier from policymakers is the adoption of non-customized innovative financing mechanisms
- Finally, the main obstacle for achieving energy saving targets in the public sector (EED Article 24) is that there are no implications to the public sector where targets are not being met. To date, no good practices have been matched to this important issue.

The matchmaking exercise is also implemented for regional/local policymaking needs, grouped into three main general strands, related to communication and consultation with citizens (EED Article 12), information and training (EED Article 17), and financing tools and technical support (EED Article 20). As shown in Table 4, a total of 18 needs were identified, selected 211 times by the interviewed regional and local experts, and matched with 47 GPs, relative to different territorial level. More specifically, Good Practices cover 11 different needs, for a total of 133 preferences gathered through questionnaires (Table 4).

Table 4: Needs identified at local and regional levels by EED Articles, number of times each of them was selected by experts in the questionnaires, and number of matched good practices

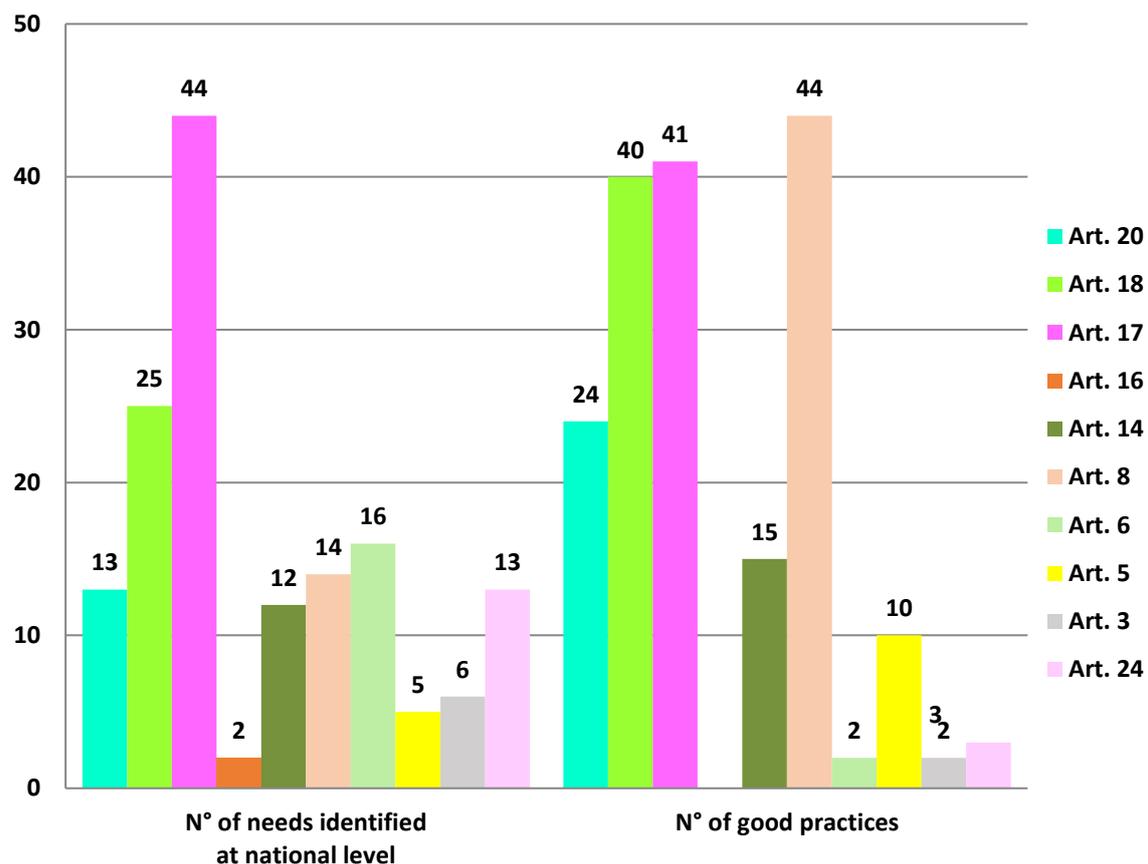
Related EED Article	Type of need	Preferences	Good practices
 <p>EED Article 12 Communication and consultation with citizens</p>	Lack of in-house expertise about communication	4	3
	Insufficient budget	25	
	Lack of in-house expertise about consultation	6	
	Lack of mobilisation of the relevant in-house services	5	
 <p>EED Article 17 Information and Training</p>	Insufficient in-house expertise about legal and administrative aspects	13	3
	Insufficient in-house expertise about training	10	3
	Insufficient in-house expertise about energy technologies	11	6
	Insufficient in-house expertise about financial tools	11	4
	Insufficient in-house expertise technical tools	11	3
	Difficulties to mobilize all stakeholders	17	2
	Lack of expertise and capacities in the concerned organisations	12	
	Competition between national, regional and local stakeholders	8	
	Lack of interest for energy efficiency	12	
	Stakeholders' lack of available time	19	2
 <p>EED Article 20 Energy efficiency national fund, financing and technical support</p>	Insufficient own funds requirements	16	6
	Lack of knowledge regarding existing financial tools	12	5

Source: PUBLnEf needs assessment

On the regional and local policymaking levels, the dominant needs are:

- ➔ “insufficient budget” referred to EED Article 12 (25);
- ➔ “stakeholders' lack of available time” referred to EED Article 17 (19);
- ➔ “difficulties to mobilise all the stakeholders” referred to EED Article 17 (17);
- ➔ “insufficient own funds requirements” referred to EED Article 20 (16);
- ➔ “insufficient in-house expertise about legal and administrative aspects” referred to EED Article 17 (13);
- ➔ “lack of expertise and capacities in the concerned organisations (banks, private sector and public institutions);” referred to EED Article 17 (12).

From the PUBLnEf matchmaking analysis some key issues faced by regional and local public bodies in implementing their energy efficiency measures may be singled out, such as the insufficient budget available and resources to develop the actions, lack of expertise and capacities and skills for adopting action plans or strategies in the municipalities. Best practices provided by PUBLnEf to overcome these hurdles (such as the experience of the Energy Desk in Messina, Italy) are the starting point to develop a programme to optimise the decision making in terms of lack of time, resources and skills for project planning, thus facilitating the necessary investments also. The adaptation/replicability of the identified good practices could potentially help regions and cities to design their sustainable energy strategies (for example in the view of the Covenant of Mayors), mobilise all the stakeholders, provide the required means for attracting investments to finance their strategies, scale up efforts, and support actions to reduce emissions. Action at local level is thus essential.



As depicted in Table 5, there is a broad range of tools available for supporting the policy making processes on different layers, especially for: information and training (Article 17), for example through software or online platforms addressed to regions and municipalities; financing and technical support (Article 20); energy services (Article 18) and audits (Article 8); and for renovation strategies (Article 4) also, even if no needs have been identified for this

topic (both at national and regional/local level). By contrast, there are almost no tools on the exemplary role of public buildings, metering, billing, cost of access to metering and billing, penalties, energy transformation, distribution, qualification, accreditation and certification schemes; such issues require further support to assist regions and cities (see Table 5 related to EED Articles). The detailed results per every identified need are given in Annex 2.

Table 5: Summary of specific needs by EED Articles and number of tools identified

Source: PUBLnEf needs assessment No. tools 

Energy Efficiency Directive Article 	Art. 3	Goals, targets, specific measures and policies	19
	Art. 5	Exemplary Role of Public Buildings	10
	Art. 6	Purchasing by Public Bodies	39
	Art. 8	Energy Audits and Management Systems	51
	Art. 12	Consumer information and empowering program Communication and consultation with citizens	11 1
	Art. 14	Technology i.e. Promotion of efficiency in heating and cooling	10
	Art. 17	Information and Training Communication and consultation with citizens Project Management	87 4 33
	Art. 18	Energy Services	89
	Art. 20	Energy Efficiency National Fund, Financing and Technical Support Financial tools and taxation	36 27
	Art. 24	Review & Monitoring of Implementation	35

Given that the main needs faced by public bodies at regional/local level are also directly related to EED requirements, an alignment between national and local regulations and implementation is necessary, in order to develop a sound framework to roll-out energy efficiency measures, with a focus on successful energy efficiency policy and programmes at local level, mobilising support and participation of citizens, and stakeholder engagement and coordination.

4 Roadmaps for energy efficiency policy implementation

The support of PUBLnEf in implementing energy efficiency policies was carried out also in field work through roadmaps. Roadmaps refer to technical assistance to regions and municipalities in overcoming specific barriers they faced in implementing their existing plans (SEAPs or regional strategies). A roadmap development standardized process with concrete steps enabled the best use and exchange of PUBLnEf sources to finalize each roadmap. A total of 15 roadmaps were selected covering local, regional and national cases and also addressing a broad range of needs (Figure 2). The summary documents of the contents and the main findings of each roadmap are publicly available.

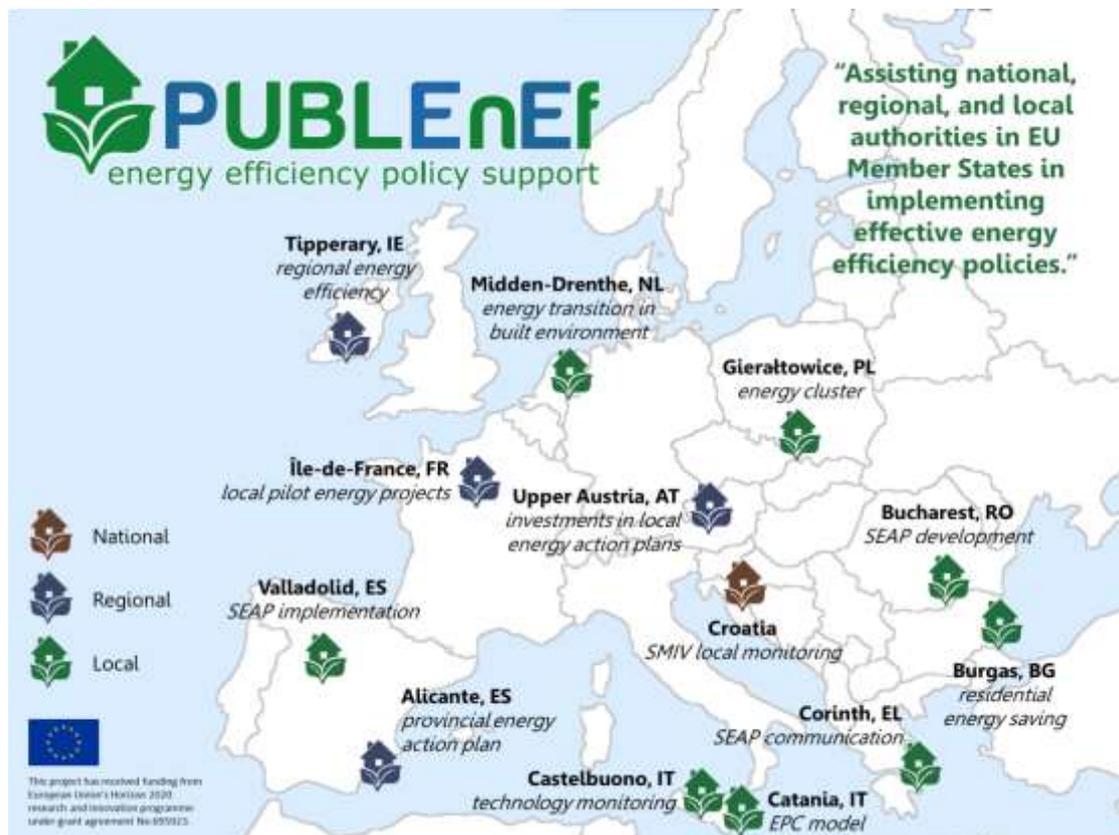


Figure 2: Map of Europe, indicating the various roadmaps

The PUBLnEf roadmaps focussed on a range of different topics (Table 6), related to the implementation of energy efficiency policies in the EU and provided inspirations to several other regions and cities outside the project consortium for follow-up actions.

Table 6: Summary of PUBLEnEf roadmaps

Overview of roadmaps per country	
The Netherlands	<p>JIN developed two roadmaps in The Netherlands. The first one aimed to help the municipality of Midden-Drenthe in its heat energy transition. It focused on bringing together the key actors, in order to get a process started for defining the future heating landscape of the town of Beien, and the municipality at large. Although, the heating transition is seen as an important topic and challenge by all actors, such as the municipality, private companies, and the housing cooperative, we found that, there is a lack of coordination among these parties, since there is no natural leader who governs the local heat transition. As a result of this roadmap process, the main actors have been convinced of the need for early (pre-commercial stage) cooperation and coordination.</p> <p>In the second Dutch roadmap JIN collaborated with the Municipality of Midden-Drenthe to identify and analyse possibilities for accelerating the energy transition in the built environment, with a focus on the residential sector. The main challenge in this sector lied with upgrading or converting the existing housing stock to become energy or even climate neutral. The PUBLEnEf analysis showed that scaling up and accelerating the transition for existing buildings will foremost require additional efforts from all private and public stakeholders within the sector. To speed up the process the sector can benefit from combining their knowledge and resources to develop and implement ‘integrated energy solutions’ for buildings. However, developing integrated energy solutions in a highly fragmented and diversified stakeholder landscape is challenging. With several market parties, including construction and installation companies, mortgage advisors, real estate agents, and energy consultants, we discussed and explored how the building refurbishment process can be simplified so that the transition can be accelerated. This has led to three possible future organizational modalities or approaches, in which local authorities and market parties can streamline the energy transition in buildings.</p>
Greece	<p>CRES worked on a local roadmap in the Greek municipality of Corinth with the aim of supporting it in adapting the SEAP to the current situation and implementing the actions foreseen according to the priorities and financing opportunities. CRES experts in cooperation with Municipal staff identified specific actions to increase energy efficiency in the sectors of direct influence of the Municipality (e.g. staff capacity building, public buildings, fleet management/driving and public lighting). These actions were gradually implemented within the PUBLEnEf time life in Corinth and are expected to be continued acting as a best practice for private sector and citizens after the project end.</p>

Poland	<p>KAPE implemented a local roadmap in the Municipality of Gieraltowice in Poland to support the transformation of the mining municipality into a “green” municipality through creation of an energy cluster ensuring energy self-sufficiency of the municipality based on methane from mines and agricultural resources (biogas). Energy Clusters, a concept introduced by the Ministry of Energy, are civil law agreements between different entities including local governments, which aim at becoming energy efficient regions through a more effective use of local renewable energy sources.</p>
Spain	<p>CIEMAT has been working on the development of 2 roadmaps in Spain, one at the local level and one at the regional one. At the local level, the roadmap in the city of Valladolid aimed to support the implementation of the SEAP focusing on the energy consumption of commercial and small and medium industry sectors of the city. These sectors were considered by the municipality as very difficult to reach due to the high number of involved stakeholders. To overcome this limitation, the main achievement consisted on the development of an active webpage with the collaboration of the Local Energy Agency (AEMVA) in order to support SMEs and businesses from the city of Valladolid to adopt measures to reduce the energy consumption and to be more energy efficient</p> <p>The regional Spanish roadmap was undergone in the Spanish province of Alicante, with the objective to support its Energy Agency in implementing a plan for the exploitation of the coastal wind resource using small wind turbines. The development of this plan was considered a Technological Innovation System at the provincial level with potential to be replicated at regional and national level.</p>
Croatia	<p>A national roadmap was developed in Croatia with the objective of helping the implementation of the System for monitoring and verification – SMIV. SMIV is a system for measuring and verifying energy savings. The public sector, energy service companies and subsidy providers are obliged to enter data on all implemented energy efficiency measures. This kind of monitoring is a prerequisite for systematic and consistent measurement of savings achieved at the national level.</p>
Bulgaria	<p>ABEA developed a local roadmap in the Municipality of Burgas in Bulgaria to support the implementation of the SEAP with a target of a 21% reduction in energy consumption by 2020. The focus of this roadmap was the housing sector, as it has the highest energy consumption and no major energy efficiency measures had been undertaken. As part of the roadmap activities, energy efficiency measures were realised in more than 18,000 dwellings. The roadmap development improved the knowledge of the municipal experts about the amount of energy consumption and fuel types, how to collect and process energy data.</p>

Austria

ESV's regional level roadmap consisted of the development and successful implementation of the "Gemeinde-Energie-Programm" (GEP), a programme that aims to trigger energy-related investments in Upper Austrian municipalities. The programme was conceptualised using input from the PUBLnEf project. It is based on the principles of activation, motivation & provision of technical advice and supports municipalities in preparing concrete investments. The GEP programme supported projects totalling investments of over 6 million Euro, including advice and support services for streetlight refurbishment projects with energy contracting. By helping increase energy-related investments, the roadmap is contributing to the local energy transition in the region of Upper Austria.

Italy

ENEA worked on two roadmaps at the local level in Italy. In the municipality of Catania, the second largest city of Sicily after Palermo, the main objective was to contribute to diffuse the application of EPCs for public buildings in Italy and to facilitate the fulfilment of EED requirements. In this roadmap, ENEA and the University of Catania have identified the barriers and the regulatory framework needed for an effective adoption of EPC in Italy for public buildings.

In the town of Castelbuono, in the Metropolitan City of Palermo, Sicily the main objective was to promote energy efficiency in heating and cooling in public buildings. Specifically, the roadmap worked on the monitoring of energy consumption of geothermal heating and cooling systems installed in the secondary public school 'Minà Palumbo' to verify their energy efficiency and their appropriate installation. The roadmap collected monitoring data and worked hand in hand with the municipal staff that was trained to adequately and autonomously run the installation.

Ireland

TEA developed a regional roadmap in the Tipperary region of Ireland oriented at overcoming barriers and facilitating progress on the national and local public lighting strategy, improving knowledge and information and implementing demonstrated solutions.

France

ARENE worked on a roadmap in the region of Ile-de-France in France targeted to local authorities (from municipalities to Regional Council) and focused on renovation of public buildings and lighting through a local pilot experimentation. The actions were oriented to train and inform about the new technical and financial energy efficiency solutions through capacity building workshops targeted to elected people and technicians. A pilot energy project was implemented in order to be further replicated in all the municipalities of the region.

Romania

In Romania, AEEPM worked on two roadmaps in the city of Bucharest in order to support the municipality in the development, implementation and monitoring of its SEAP.

In order to enhance cooperation and exploitation of synergies among the different roadmaps, they were grouped in clusters according to the different thematic and addressed needs (see Figure 3). In this way, roadmaps of the same cluster could exchange experiences and explore solutions for the common challenges. There is of course a lot of overlapping among the different clusters reflecting the fact that roadmaps are multifaceted and deal with different issues at the same time. There were many roadmaps working on consumer information and capacity building issues in the form of capacity building workshops and road shows, web pages, on-site energy consultation and support visits and other activities specifically tailored to each roadmap target. Some roadmaps worked with issues that affect public buildings' energy efficiency in different ways including renewable energy installations for heating and cooling of electricity production such as in the ENEA's, JIN's and CIEMAT's roadmaps or monitoring issues such as in the CEI roadmap. Public lighting has been the topic mainly selected for the TEA's roadmap while ESV and ARENE have also some actions including public lighting optimization in their regions. Although residential sector is a difficult to deal sector, three roadmaps for instance included actions to improve residential sector energy efficiency in different ways. Finally, three of the roadmaps have taken advantage of specific financing programmes for the energy efficiency measures.

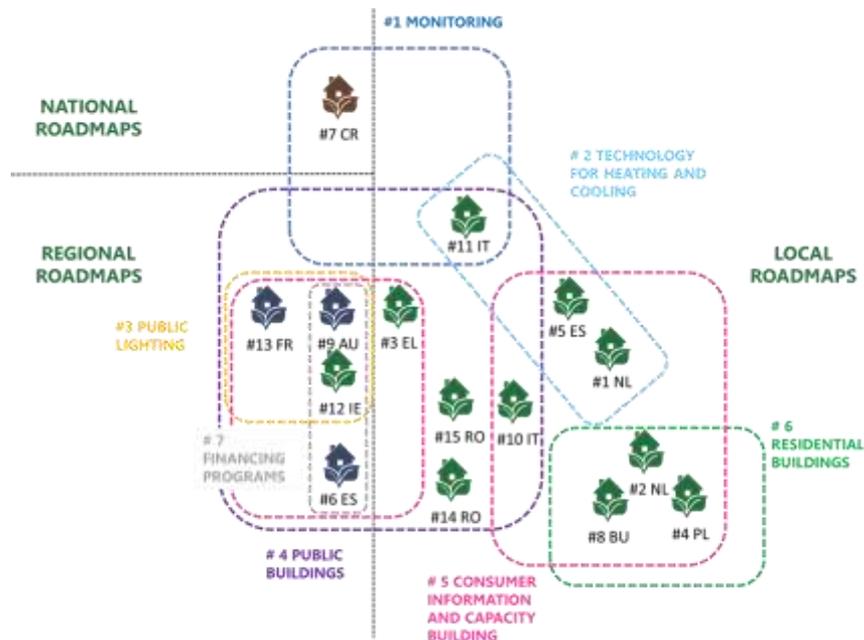


Figure 3: Clustering of the PUBLnEf roadmaps

4.1 Roadmaps' connection to Energy Efficiency Directive Articles

Each PUBLnEf roadmap focused on furthering the knowledge and experience on the topics of one or more of the EED Articles.

The main EED Article addressed by the majority of the roadmaps was 17 (Information and Training), which reads “Member States shall ensure that information on available energy efficiency mechanisms and financial and legal frameworks is transparent and widely disseminated to all relevant market actors, such as consumers, builders, architects, engineers, environmental and energy auditors, and installers of building elements”. This is sensible, as Article 17 suits the aim of PUBLnEf’s roadmaps, which is to further the knowledge and information on energy efficiency policy issues. Other EED Articles where the roadmaps focused Exemplary role of public bodies' buildings (Art. 5), Purchasing by public bodies (Art. 6), Promotion of efficiency in heating and cooling (Art. 14), and Energy services (Art. 18).

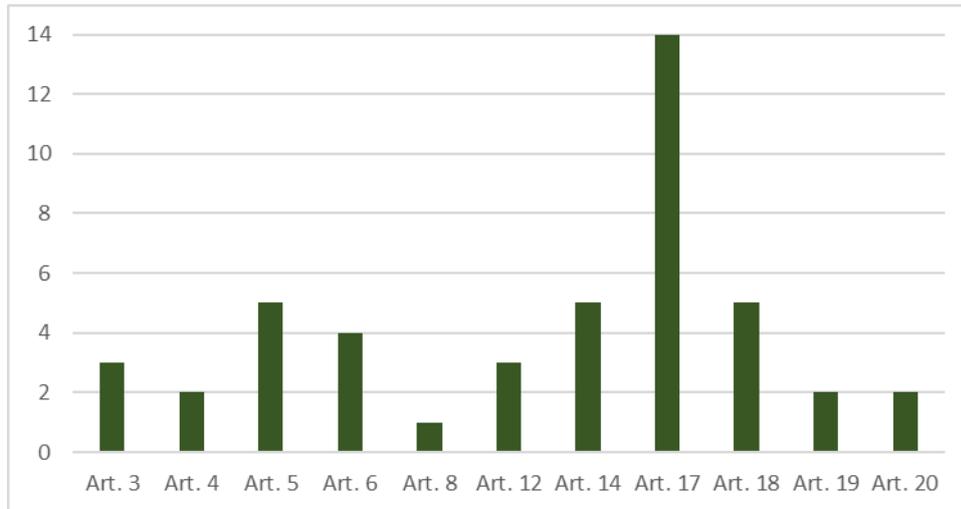


Figure 4: Number of roadmaps per EED Article

4.2 Needs and objectives addressed in roadmaps

In each PUBLNEF roadmap, 3 to 5 key needs from policymakers that they aim to address were identified, and a similar number of main objectives (Figures 5 and 6). The main need addressed by most roadmaps is that related to stakeholder mobilisation. The difficulties to reach stakeholders are often related to another key need: a lack of staff, or a lack of time among staff. Inadequate staff capacity within the public body often also leads to a lack of time for the involvement of external stakeholders or experts.

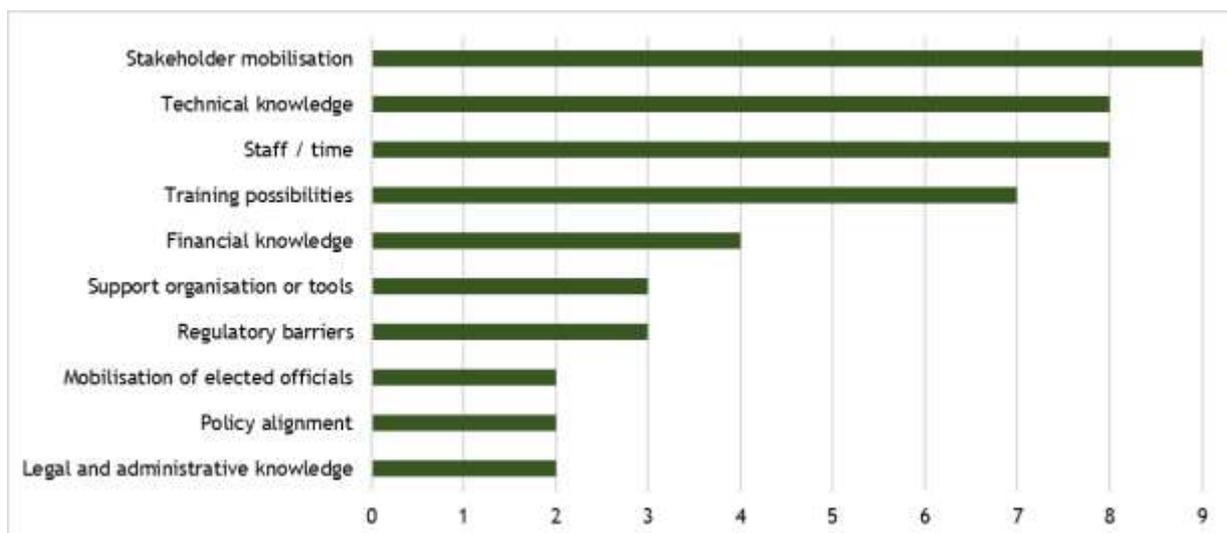


Figure 5: Aggregated overview of needs addressed by roadmaps

The key objective of all PUBLEnEf roadmaps is to reduce energy use and to mainly enhance stakeholder engagement and capacity building.

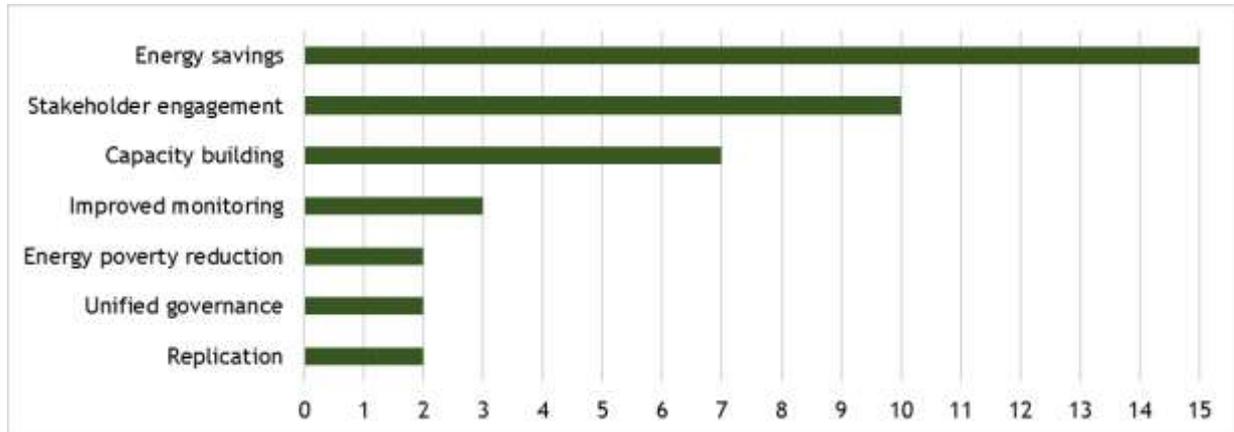


Figure 6: Aggregated overview of objectives of the various roadmaps

4.3 Use of good practices



In the early stages of PUBLEnEf, a screening of other relevant EU projects was carried out and a selection of more than fifty ‘good practices’ for local and regional energy efficiency policy implementation was made. Developers of Roadmaps received a suggestion of relevant EU projects and good practices in a targeted way and each roadmap got inspired or replicated even some good practices. The following two good

practices have been used in most roadmaps.

- **iURBAN project:** The iURBAN project is aimed at building and piloting a real-time energy monitoring and management system at urban level. It covers both public and private buildings, both energy consumption (electrical energy, heating energy, water and gas) and energy production (PV and solar thermal).
- **Establishing a team responsible for the implementation and monitoring of Low Carbon Economy Plan for the city of Opole:** The team was created to realise the requirements of implementing the low carbon economy plan and ensuring a correct delivery date, as well as monitoring of the plan's implementation in Opole in Poland.

4.4 Use of tools

In addition to good practices, a range of tools were included in the PUBLnEf Toolbox. These tools were mainly used by partners as for guidance and an inspiration for future actions related to their roadmap, or they were also adapted to address the specific roadmap needs. Such needs were mainly capacity building and improving different energy efficiency-related skills, and the most frequently used ones were different guidelines, handbooks, training tools, various types of training manuals, courses, and others. Since tools and tool information were often available in languages other than their national language, the language barrier was generally not considered an obstacle in the use of the Toolbox. Due to different roadmap objectives and characteristics, the tools used vary from partner to partner and from roadmap to roadmap.

4.5 Impacts of roadmaps

4.5.1 Monitoring impacts

Based on the experience on monitoring and the objectives of the each PUBLnEf roadmap, a monitoring plan was employed specifying what had to be measured and/or reported, in which way, and how often. This plan was filled in on a regular basis, to allow for verification of whether objectives were being met, progress over time, as well as cross-comparison between the various roadmaps. It consisted of data on the characteristics of the roadmap, types of detailed needs from public officials, policies with their technical and implementation characteristics, usage of best practices and tools, level of interaction with the target groups and other roadmaps under the same cluster, stakeholder communication, political commitment, technical capacity change within the staff members, and others). Besides being a method of control the roadmaps implementation progress, the monitoring aimed to encourage continuously exchange information on best practices and assist partners in coping with the ongoing and new challenges in their roadmap development. PUBLnEf roadmaps aimed at contributing to the following five impacts (Table 7).

Table 7: Five impacts of PUBLnEf

Impact	Measurement
1 Capacity enhancement to set up plans at local/regional/national level	75% of policymakers with roadmaps declare that they have improved their speed, efficiency and effectiveness of policies and measures (through questionnaires)
2 Networking opportunities among policymakers	Number of policymakers and implementers per event (target: 25-50 per event)
3 Policies and strategies created/adapted to include sustainable energy issues	Number of citations/statements from public bodies that claim the project's usefulness
4 Market stakeholders with increased skills, capabilities or competencies on energy issues	Number of market actors (e.g. ESCOs) with increased capacity
5 Energy savings triggered by the project	Primary energy savings triggered (GWh/year)

4.5.2 Socio-economic impacts and capacity building

The PUBLnEf roadmaps have led to capacity enhancement in a wide range of policy makers and other stakeholders, and through the networking opportunities and future collaborations, while it is expected that the roadmaps will have a lasting and growing impact, as they are promoted for further replication through the project means and the Covenant of Mayors.



Figure 7: Policy makers gather at the final project conference to exchange experiences



PUBLnEf has been presented in a series of meetings and events at EU level (such as the EU Sustainable Energy Week, the UNFCCC COP24 and others) and in various MS, while customized events have been organised specifically in the framework of the various roadmaps. The events varied widely in scope and size, from small focus group discussions with a few participants, to large conferences with more than a hundred

attendants. Based on the information in the various monitoring reports, at least 80 events have been organised with in total more than 3,500 participants. Apart from the opportunities to share the outcomes of PUBLnEf and collect input on the roadmap work, the events as organised for the PUBLnEf roadmaps have created opportunities for key stakeholders in the various regions to get together. All the capacity-building impacts achieved by PUBLnEf are displayed in Table 8.

Table 8: Overview of capacity-building impacts

Project partner	Impacts			
	Capacity enhancement	Networking opportunities	Policy creation	Stakeholder capacity
JIN (1)	2 policy makers directly impacted	Events and information exchange	Municipal energy neutral heat plan drafted	Wide range of stakeholders involved and influenced
JIN (2)	2 policy makers directly impacted	3 events with about 50 participants	-	Various market parties influenced and trained
CRES	2 policy makers directly impacted 9 municipalities and 2 regional authorities	6 events with in total about 200 participants	Submission of policy proposal	Increased capacity through networking
KAPE	8 local policy makers involved	3 regional events with in total 176 participants, 1 national event with 56 participants	Guideline document “How to create municipal energy cluster on the example of Gieraltowice”	-

CIEMAT (Alicante)	Energy Agency director and technical staff influenced	1 event with 16 participants	Next regional energy plan will include special clause for financing small wind turbines	-
CIEMAT (Valladolid)	Councillor and technical staff influenced	2 events with 60 participants	-	-
CEI*	-	4 events with about 45 participants	19 new energy efficiency plans submitted	-
ABEA	5 municipality experts increased capacity	In total more than 20 events organised	-	Market actors influenced through events
ESV	442 municipalities reached; over 500 enquiries answered; direct support and advice to 94 municipalities	5 events with a total of 196 participants	23 concrete projects implemented based on the roadmap	ESCOs are supported through the roadmap
ENEA (1)		6 events with in total more than 200 participants		
ENEA (2)				
TEA	30 policy makers involved in stakeholder process	5 events with in total about 130 participants	-	Through a market engagement event held at Energy Show 2018
ARENE	All 1276 municipalities reached, and direct support for 4 pilot municipalities	Several events with in total hundreds of participants	Energy audits carried out in pilot municipalities	-
AEEPM (1)	New energy team with 7 staff set up and trained	Multiple events with in total about 150 participants	-	Working group with all major stakeholders established

AEEPM (2)	-		Action plan established	-
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4.5.3 Energy savings

For each roadmap the total energy savings are calculated. If the roadmap implementation led to a real investment on energy efficiency in a municipality or a region during PUBLnEf, then the energy savings generated from this investment could be counted in full as a result of the roadmap. If the roadmap implementation led to the preparation of the launching of an investment (for instance a tender procurement document or a subsidy/grant application), or a general awareness raising or significant administrative changes in the energy efficiency policy implementation, then the energy savings claimed by the roadmap were 1% of the expected savings from these actions. This is a fairly conservative attribution, considering that some roadmaps would not at all occur without PUBLnEf.

Table 9: Energy savings impacts as a result of PUBLnEf roadmaps

Country, region	Description of roadmap savings and other impacts
Midden-Drenthe, NL	The heat transition roadmap focused mainly on reducing the use of natural gas in buildings. The total use of natural gas in buildings in Midden-Drenthe in 2016 was 1,049 TJ, or 291 GWh. The municipality aims to phase out the natural gas use completely, partly through energy savings and partly through a transition to sustainable energy sources. For the PUBLnEf roadmap, a 50/50 share of these two options is considered, and 1% of the savings are attributed to the roadmap: 1.46 GWh per year.
Midden Drenthe, the Netherlands	The roadmap aimed to involve market parties in the process of getting households to reduce energy. The total energy use of buildings, including both electricity and natural gas, in 2016 was 893 TJ or 248 GWh. The roadmap is expected to advance the energy reduction in this sector, but exact numbers are not yet to be given. Therefore, a conservative estimate of 0.1% attributable to PUBLnEf is used, giving annual savings of 248 MWh.
Corinth, Greece	The roadmap in Corinth had aimed to contribute to the local government's energy reduction target, which was to reduce the total energy consumption from 825 GWh in 2011 to 739 GWh in 2020.

	<p>Considering the roadmap's contribution, 1% of the savings are attributed to PUBLENEF, measuring up to 0.86 GWh. For three specific additional measures as initiated through the roadmap, 1% of the savings are added to this figure. These are 3.1 MWh for the energy upgrade of the swimming pool, 0.7 MWh for the installation of solar PV, and 0.5 MWh for further interventions, giving a total of 864.3 MWh.</p>
Poland	<p>The energy consumption in municipal buildings in 2015 was 2,987 MWh. The municipality plans to achieve a 20% reduction in energy consumption in these buildings, i.e. 597 MWh per year. Attributing 1% of this to the PUBLENEF project, the triggered savings have been 6 MWh per year.</p>
Alicante, Spain	<p>The wind turbines roadmap focused on municipality where a total annual electricity production has been quantified to around 42 MWh using the Enair 30PRO wind turbine, 62 MWh using the Enair 70PRO wind turbine and 494 MWh using the Enair 200 wind turbine. With an annual total production between 42 and 494 MWh of electricity and considering a primary energy conversion factor of 2.21 for the Spanish electricity², the primary energy savings would be 92-1092 MWh. Considering that 1% of these savings can be attributable to this roadmap the primary energy savings would be 9-109 MWh.</p>
Valladolid, Spain	<p>The SEAP inventory in 2010³ has been used to quantify the baseline electricity consumption in the commercial sector: 559534.24 MWh per year. According to the municipal energy agency (AEMVA) the target is to reduce the electricity consumption by 50% compared to 2010. This target translates in a reduction of 280 GWh of electricity annually. Considering a primary energy conversion factor of 2.21 for the Spanish electricity in 2010, the primary energy savings would be 618 GWh. Considering that 1% of these savings can be attributable to this roadmap the primary energy savings would be 6 GWh.</p>

² [http://www.idae.es/uploads/documentos/documentos_Factores_de_Conversion_Energia_y_CO2_\(2010\)_931cce1e.pdf](http://www.idae.es/uploads/documentos/documentos_Factores_de_Conversion_Energia_y_CO2_(2010)_931cce1e.pdf)

³ https://www.covenantofmayors.eu/about/covenant-community/signatories/action-plan.html?scity_id=4139

Croatia	The roadmap led to 19 new energy efficiency plans being submitted, jointly leading to 128 GWh of savings. With 1% of these savings being attributed to PUBLNEF, the resulting roadmap savings are 1.28 GWh per year.
Bulgaria	The roadmap focused on renovation of residential buildings. The energy savings for the period 2015-2020 are 370,494 MWh in terms of primary energy consumption, or 74,099 MWh per year in this period. Allocating 1% of these savings to the PUBLNEF roadmap, the savings induced by the roadmap are 741 MWh per year.
Upper Austria	The roadmap triggered 64 concrete projects in the region's municipalities (including streetlight refurbishment projects with EPC), of which 34 have been already implemented. It is reasonable to assume that the majority of the projects implemented would not have taken place without the comprehensive support offered through PUBLNEF and the GEP programme. The total primary energy savings have been estimated at over 7.3 GWh per year.
Castelbuono, Italy	Roadmap concerned energy efficiency interventions in a number of public buildings. During the running time of the roadmap, only in one building, a secondary school, an air-water heat pump with 45 kW low-enthalpy geothermal exchange was installed. A simulation using the TRNSYS model shows a baseline of 31.3 MWh energy use, and primary energy savings estimated at 23% or 7.3 MWh per year.
Catania, Italy	The roadmap worked on involving ESCOs in public building renovation. Primary energy savings per year have been calculated at 123.5 MWh. All the savings foreseen are attributed to the implementation of PUBLNEF roadmap through the use of the EPC in public building for the renovation strategy.
Tipperary County, Ireland	The public lighting has estimated annual savings based on the lighting installed. By 2021, the annual savings will amount to 794,146 kWh per year. Considering that the PUBLNEF roadmap has been responsible for the strategic planning, the engagement with all key stakeholders, the sourcing of funding, etc., 75% of these savings are attributed to the roadmap, i.e. 595.6 MWh.
Paris region, France	The French roadmap triggered 2,842 MWh primary energy savings through the pilot buildings.
Bucharest, Romania	The roadmap of supporting Bucharest SEAP implementation in the first sector through implementing measures in public and private

	buildings, integration of RES in buildings and public lighting is calculated to deliver 45.875 GWh savings per year. Attributing an estimated 1% of the total energy savings to PUBLNEF, we get 459 MWh savings per year.
Bucharest, Romania	The relevant savings in implementing SEAP in Bucharest's fourth sector are 464.49 GWh per year. Attributing 1% of these savings to the PUBLNEF roadmap gives savings of 4.65 GWh per year.

PUBLnEf has shown that social interventions such as implemented in the various roadmaps are sufficient to increase energy savings significantly.

Although the scopes, dimensions and applications of the various roadmaps are quite different, all of them have contributed to energy savings in Europe. Based on the measurements, estimates, and projections of the various partners, the total annual primary energy savings as expected as a result of the fifteen roadmaps are set at 26.64 GWh.

Finally, this figure can increase substantially, as the lessons from the roadmaps can be replicated, and in many cases the established institutions and networking opportunities can lead to more initiatives in the coming years.

5 Lessons from policy briefs

One of the means of communicating the outcomes of the PUBLEnEf project were policy briefs targeted at national, regional, and local policymakers regarding the implementation of energy efficiency policies. By sharing the experiences of project partners in development their roadmaps, three important topics were highlighted: renovation strategies; aggregation policy in energy efficiency projects; and monitoring and verification aspects in the regional and local governance.

1st policy brief – Focus on local and regional renovation strategies - April 2018.



The objective of this policy brief was to bring representatives of public authorities closer with possibilities of stimulating energy efficiency renovations in building sector. It gives an overview of state of play of renovation in Europe and how it contributes in delivering the EU's long-term climate and energy targets. It also refers to the PUBLEnEf analysis showing the barriers that public authorities face to unlock their full renovation potential. Project partners from JIN Climate and Sustainability - The Netherlands, and IAU IDF – France illustrate their ideas to tackle the barriers to the implementation of renovation strategies that they developed

in their energy efficiency policy roadmaps.

The lack of staff working on sustainability and energy in the municipal administration is a typical barrier for small municipalities. The roadmap implemented by partners from the Netherlands focused on delivering specific solutions for public administration supporting increasing the awareness about energy efficiency measures. Through the roadmap they developed effective communication plan targeted to new home owners on what they can do by themselves to make their houses more energy-efficient. The solutions proposed during the roadmap are not costly and may be easily replicated in other municipalities with similar problems. The actions carried out by roadmap's leaders from JIN may be inspiring not only for small municipalities but also in bigger ones where the administration has to influence much bigger population.

The roadmap in Île-de-France region developed by IAU IDF-département Énergie at Climat ARENE has been developed in answer for multiple barriers: low or inadequate budgets mostly in local communities, difficulties to identify and to access funding or contracting, lack of time dedicated to this issues, weak participation and support of technical and financial institution,

lack of permanent structures specialised in energy efficiency, and lack of knowledge and strategies for public real estate. The solutions offered through the PUBLnEf roadmap such as organization of workshops targeted to elected people and technicians, supporting the regional council in development of the new regional energy efficiency action plan with sustainable building plan, and implementing pilot energy projects have been conducted to tackle with these key barriers. Roadmaps leaders share their insight on how the EU level policy may trigger the implementation of renovation strategies.

2nd policy brief – Focus on the scale-up of energy efficiency projects –October 2018.



This policy brief explains why aggregation of small projects is a key solution in unblocking the financing sustainable energy projects. Document provides a short overview of EU instruments supporting scaling-up energy efficiency projects. Experts from Ireland (Tipperary Energy Agency) and Austria (OÖ Energiesparverband) share their insight on the conditions and main drivers to consider when attempting to up-scale energy efficiency projects. Document presents also the conclusions of the Policy Conference of EUSEW 2018 where project PUBLnEf was presented as part of the seminar on Energy plans and roadmaps for sustainable future.

Refurbishing the public lighting in Tipperary County was the main focus of PUBLnEf energy efficiency policy roadmap in Ireland. The need assessment carried out within the first phase of PUBLnEf project identified main constraints in the implementation of the county’s Strategic Energy Management Plan. These were: significant funding deficit, complexity of energy performance model contracts; not very developed cooperation at regional level; need for trainings of the elected representatives regarding energy efficiency issues. The successful ELENA application in the frame of PUBLnEf roadmap was very supportive for up-scaling public lighting investments in the county.

The lack of resources and skills for project planning was a major barrier identified through PUBLnEf need assessment in Upper Austrian municipalities. The main focus of the Austrian roadmap is supporting energy-related investments in the form of the regional technical assistance programme “GEP” - energy programme for municipalities that offers tailor-made support to municipalities by adapting financing models to specific legal, economic and social contexts of each region and project. Implementing smaller projects by bundling them within a municipality or across municipalities is one of programme’s benefits.

3rd policy brief – Focus on monitoring and verification –January 2019.



This policy brief answers the question what the role of the monitoring and verification tools is in achieving the national energy efficiency targets. Examples of actions supporting specific monitoring and verification solutions implemented in Croatia and Italy through PUBLEnEf roadmaps were presented. It describes the needs their roadmaps answer, barriers they faced during roadmaps implementation, the way their actions support local strategy, the possibilities of further replication and the main lessons learnt from their roadmaps. The policy brief introduces also energy efficiency tools related to monitoring and verification gathered within project PUBLEnEf and uploaded on PUBLEnEf-toolbox.

The main barriers encountered by partners from Italy during the roadmap implementation were a low awareness of local politicians and citizens of Castelbuono municipality on energy efficiency and lack of expertise of local public technicians on appropriate use, monitoring and maintenance of the technologies increasing energy efficiency in municipality's public buildings. The PUBLEnEf roadmap was focused mainly on delivering the trainings for municipality staff and provide monitoring instruments, so that they could benefit from a new technology in implementation of local strategy.

As the main objective of the roadmap implemented in Croatia was to improve the dialogue between local, regional and national levels of administration, and the quality and results of energy efficiency planning on all levels, the series of trainings were conducted introducing an improved and unified approach. The roadmap's activities were focused on the use of national monitoring system of energy savings (SMIV). The tool gathers local energy efficiency plans and implemented energy efficiency measures what gives the continuous bottom-up feedback for national energy efficiency plans.

6 Importance of stakeholder engagement in policy implementation

The series of cross-border needs assessment and networking events, held at EU and regional level, from North to South and from West to the Central and Eastern European countries (CEEC) targeting local and regional authorities, have resulted in three key lessons learnt about why it is essential to engage with this critical group of stakeholders in EU energy efficiency policies.



Firstly, the PUBLnEf events showed that local and regional authorities can play a key role in implementing and scaling up innovative energy efficiency strategies in the field of building renovation, thereby providing an essential contribution to implementing the EED and the Energy

Performance of Buildings Directive (EPBD). Local and regional governments can e.g. partner up with energy advisory services, ESCOs and (local) banks to maximise their impact of their renovation programmes, and also set up one-stop-shops to better support citizens in their home renovation efforts. However, local and regional authorities participating in the events deemed it critical to have a strong and obligatory EU energy efficiency policy framework that enforces an enabling national regulation to facilitate their ambitious action. The EU energy efficiency policies should not only put local and regional authorities, citizens and energy advisory services at the centre, but also channel significant European funds into local and regional energy efficiency investments, as the EU funding programmes continue to be the major financial tool for energy efficiency investments for local and regional authorities, in particular in the CEEC area. Nevertheless, local and regional authorities engaged by PUBLnEf recognised that they also need to take on a more proactive role as key energy efficiency stakeholders, such as by leveraging private investment through the set-up of sustainable business models for the energy renovation of private buildings in particular. Indeed, as the use of ERDF for energy efficient housing renovation is lagging behind in several CEEC countries

and the foreseen subsidies for housing have been redirected for public buildings, this becomes of utmost importance.

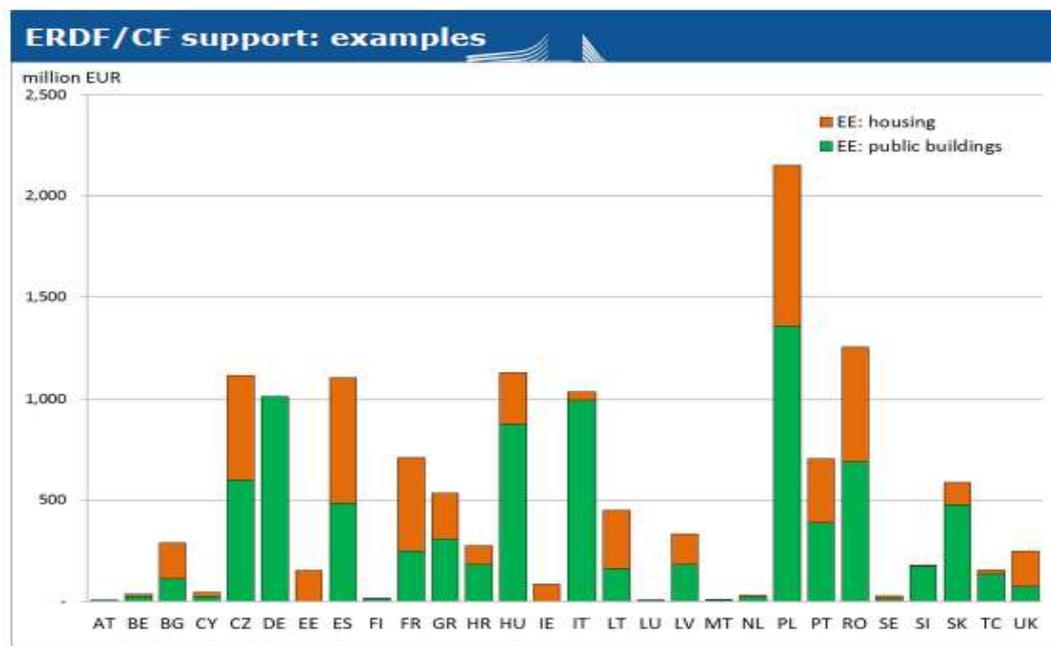


Figure: The use of ERDF for housing vs. public buildings EE renovation

Source: P. Kalinka, DGREGIO, at Publenef event @ CAEForum 2018, Poland



Secondly, local and regional authorities in the CEEC area noted that European energy efficiency legislation was an indispensable driver for any local action in their region and constituted the basis for national energy efficiency legislation. In terms of engaging this group of key stakeholders in the CEEC region, it is essential for EU policymaking to ensure that multi-level governance becomes a

strong and effective principle in the management and disbursement of EU (structural) funds. By doing this, more cities and regions in this area can benefit from critical funding support for their local sustainable energy projects, especially in countries like Croatia or Hungary where EU funds are essentially the only relevant funding source available for local authorities that they can use for their energy efficiency investment efforts.

Thirdly, these events organised by PUBLEnEf have made it clear that EU energy efficiency policies can benefit greatly from engaging with local and regional authorities as a key stakeholder group. Local and regional authorities can provide valuable feedback to the EU and national level on gaps and bottlenecks in the EU energy efficiency policy framework, as they are in the “frontline” of policy implementation. Moreover, local authorities in particular, being the governance level closest to citizens, can also support EU and national policymakers in better identifying and meeting the needs of citizens in terms of energy efficiency policies (especially in terms of housing renovation). By doing this, the EU and national energy efficiency policy framework can also benefit from greater support from and engagement by citizens, thereby resulting in a more ambitious, accelerated and effective implementation of EU and national energy efficiency policies.

Some important take away lessons from the PUBLENEF Final Conference and consultations with European, national, regional and local stakeholders:

- ✓ All policy layers (national, regional and local) contribute to the overall energy saving target;
- ✓ structure a programme to optimise the policy process in order to deal with the lack of time, resources and skills for project planning, which would facilitate the implementation of the investments ultimately;
- ✓ develop a ‘technical assistance service’ at local level, that can guide individuals through the ‘journey’ of energy related investments;
- ✓ cities and regions, in order to enable investments through the EU funds, must provide ambitious targets and put in place policies bundled with suitable incentives;
- ✓ the key message from the financing perspective is the simplification of the procedures required in order to better address the envisaged target groups and trigger energy efficiency investments (mainly in the public buildings and lighting);
- ✓ instead of standardization of energy efficiency projects, a requirement for the regional and local authorities would be to focus and invest more in intermediation;
- ✓ there is a need to increase the expertise in financial and technical issues in energy efficiency, while there is a need for enhancing monitoring, reporting, and verification (MRV) schemes and their transparency, in order to secure the investment turnover to the ESCOs (in terms of savings’ accuracy);
- ✓ energy cluster concept can optimise the use of local resources, stimulate local economic development, improve local energy security, and ease the acquiring of co-financing for planned investments

7 A useful tool for resolving policy implementation barriers

PUBLEnEf recognised the need for preserving the tools, trainings and other materials knowledge for future use, as in most countries, because of frequent staff changes (or understaffing), the level of **institutional know-how** is under pressure and resource seeking is often cumbersome. This can reduce not only the effectiveness, but also the cost effectiveness of new public administrations. This PUBLENEf online repository serves as an easy exchange of good practices; implementing bodies can download and upload the supporting tools and resources they use / need for energy efficiency policy planning, development, implementation of actions Plan and evaluation.

The PUBLEnEf online platform is available at www.publnef-toolbox.eu and contains over 300 tools and good practices for energy efficiency policy implementation.

The PUBLEnEf online platform is significant for helping all stakeholders, local and regional policy makers and staff to find tools and good practices. Those tools contain both the roadmaps and tools from PUBLEnEf and other EU funded projects, in the format of tailored solutions to the policy makers needs for fulfilling the EED obligations. It is an important and versatile tools collection with a very advanced search function and a Matchmaking module, which matches **needs** of users with **tools and good practices** registered on the platform.

The PUBLEnEf online platform is available online, and regularly updated at least until January 2021 and, through a clean and user-friendly structure, it provides a wealth of resources related to energy efficiency and tailored to the needs and challenges faced by each group of actors.

These resources are classified in four types:

- ➔ **Library elements** to inform on energy efficiency news and events (opportunities);
- ➔ **Experts communities** on energy efficiency and closely related fields to help with guidance if they do not find on this platform a tool to fit with exposed needs (over **35 experts** registered so far);
- ➔ **Good practices** to inspire and adapt to their contexts (over **80 good practices** registered so far); and
- ➔ **Tools** to plan, implement, evaluate, and disseminate actions in response to their needs connected with the EED (**250 tools registered** so far by the consortium).

The tool addresses the typical steps, as well as different actors and fields of action relevant to sustainable Energy Planning development – from setting targets to monitoring, and from financing action to engaging all stakeholders.

The platform is available to use for all public administrations wanting to post either their **solution** or a **problem** on a specific energy efficiency topic. In this way, policy makers on all level across EU could easily come together and find partners for projects (knowledge emitters and receivers), solve problems and/or share/sell their own energy efficiency solutions.

All the key issues addressed by the Platform are *connected to the specific EED requirements*. Everyone can browse the tool, and staff from public authorities could log-in and post problems or good practices.

Annex 1

Table 7: needs identified at national level by EED Articles, number of times each of them was selected by experts in the questionnaires, and number of matched Good Practices (GPs)

Related EED Article	Need (Weakness)	Frequency	Good Practices
Goals, targets, specific measures and policies (Article 3)	no EE policy public sector strategic goals with defined targets at national level	0	-
	no EE policy public sector operational goals with defined programme to deliver them	2	2
	no energy modelling of future public sector energy trends has been undertaken at national level	4	-
Exemplary Role of Public Buildings (Article 5)	the government hasn't any programme in place to carry out energy efficient renovations on at least 3% of the buildings they own and occupy by floor area	1	7
	the public sector doesn't use energy service companies, and energy performance contracting, to finance renovations and implement plans to maintain or improve energy efficiency in the long term	3	1
	there isn't any programme for monitoring energy efficiency levels at national level	1	2
Purchasing by Public Bodies (Article 6)	the central government in your country doesn't purchase energy efficient buildings, products and services	1	1
	the wider public sector doesn't purchase energy efficient buildings, products and services at national level	1	1
	there are no long-term energy performance contracts in place in the public sector	3	-
	public procurement doesn't include life-cycle cost analysis	7	-
	there are no tools/frameworks in place to assist the public sector in the procurement of energy efficient building, products and services	4	-
Energy Audits and Management Systems (Article 8)	there isn't any programme for conducting energy audits in the public sector at national regional or local level	3	6
	there isn't any quality assurance scheme in place for energy audits	1	6
	energy audits don't include both technical and financial feasibility assessments	2	4
	the recommended actions from the energy audits completed are not implemented	2	4
	business cases for the recommended energy actions arising from energy audits aren't prepared and presented for financial approval	3	12
	there isn't any programme to implement energy management systems in the public sector at national regional or local level	3	12
Technology (i.e. Promotion of	No comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling has been completed at national level	3	1

Related EED Article	Need (Weakness)	Frequency	Good Practices
efficiency in heating and cooling - Article 14)	the potential for high-efficiency cogeneration hasn't been evaluated at national level	3	-
	there isn't any policy which encourage the due taking into account at local and regional levels of the potential of using efficient heating and cooling systems, in particular those using high-efficiency cogeneration	3	1
	the potential for developing local and regional heat markets hasn't been taken into account	3	13
Availability of qualification, accreditation and certification schemes (Article 16)	the level of technical competence, objectivity and reliability of providers of energy services, energy audits, energy managers and installers of energy-related building elements isn't sufficient	1	-
	there aren't any accreditation scheme and/or equivalent qualification scheme, including, where necessary, suitable training programmes	1	-
Information and Training (Article 17)	insufficient information on legal and administrative aspects	2	4
	insufficient information on training possibilities	2	6
	insufficient information on energy technologies	6	6
	insufficient information on financial tools	3	3
	insufficient information on technical tools	3	3
	lack of in-house expertise about legal and administrative aspects	2	-
	lack of in-house expertise about training	3	-
	lack of in-house expertise about energy technologies	4	2
	lack of in-house expertise about financial tools	4	2
	lack of in-house expertise about technical tools	3	-
	absence of automatic tools supporting EE measures development	2	2
	absence of software supporting EE measures development	2	2
	absence of guidelines & handbooks supporting EE measures development	2	3
	absence of other tools supporting EE measures development	0	-
	absence of support organisations in your territory addressing energy efficiency matters	0	2
	support organisations have insufficient competency and knowledge	1	2
	inadequate information on best energy efficiency practices	5	4
the build-up skill programme is no more in place	0	-	
Energy Services (Article 18)	lack of clear and easily accessible information on available energy service contracts and clauses	2	5
	lack of clear and easily accessible information on financial instruments, incentives, grants and loans	4	
	there isn't any support available to the public sector in taking up energy service offers, in particular for building refurbishment	2	
	no access to model contracts for energy performance contracting	4	

Related EED Article	Need (Weakness)	Frequency	Good Practices
	lack of information on best practices for energy performance contracting, including, if available, cost- benefit analysis using a life-cycle approach	5	
	no qualitative review in the framework of the National Energy Efficiency Action Plan regarding the current and future development of the energy services market has been completed	3	
	no measures in place to remove the regulatory and non-regulatory barriers that impede the uptake of energy performance contracting	2	
	the public sector doesn't use energy service companies, and energy performance contracting	3	
Energy Efficiency National Fund, Financing and Technical Support (Article 20)	financing facilities aren't established for energy efficiency improvement measures	1	8
	European financial institutions aren't utilised for financing and technical support schemes	2	3
	absence of an Energy Efficiency National Fund	0	2
	the National Fund isn't accessed and utilised by the public sector	0	2
	innovative financing mechanisms aren't used	8	7
	there isn't any financial institution which act as Energy Efficiency National Fund	2	2
Review & Monitoring of Implementation (Article 24)	national monitoring and reporting aren't undertaken to demonstrate progress achieved towards national energy efficiency targets	1	1
	regional and local monitoring and reporting isn't undertaken to demonstrate process achieved towards regional or local energy efficiency targets	2	2
	individual public bodies aren't aware of their progress towards their energy efficiency targets	3	-
	there is no implication to the public sector where targets are not being met	7	-

Source: PUBLnEf needs assessment

Annex 2

Table 8: Specific needs by EED Articles and number of tools identified

EED Article	Specific Needs (D2.2)	No. of tools
Goals, targets, specific measures and policies (Article 3)	no EE policy public sector strategic goals with defined targets at national level	6
	no EE policy public sector operational goals with defined programme to deliver them	3
	no energy modelling of future public sector energy trends has been undertaken at national level	10
Exemplar Role of Public Body Buildings (Article 5)	the government do not have any programme in place to carry out energy efficient renovations on at least 3% of the buildings they own and occupy by floor area	3
	the public sector does not use energy service companies, and energy performance contracting, to finance renovations and implement plans to maintain or improve energy efficiency in the long term	3
	there is no programme for monitoring energy efficiency levels at national level	4
Purchasing by Public Bodies (Article 6)	the central government in your country do not purchase energy efficient buildings, products and services	2
	the wider public sector does not purchase energy efficient buildings, products and services at national level	6
	there are no long-term energy performance contracts in place in the public sector	10
	public procurement does not include life-cycle cost analysis	3
	there are no tools/frameworks in place to assist the public sector in the procurement of energy efficient building, products and services	18
Energy Audits and Management Systems (Article 8)	there is no programme for conducting energy audits in the public sector at national regional or local level	14
	there is no quality assurance scheme in place for energy audits	3
	energy audits do not include technical and financial feasibility assessments	8
	the recommended actions from the energy audits completed are not implemented	2
	business cases for the recommended energy actions arising from energy audits are not prepared and presented for financial approval	3
	there is no programme to implement energy management systems in the public sector at national regional or local level	21
Consumer information and empowering programme (Article 12)	There is no specific need identified	1
Communication and consultation	lack of in-house expertise about communication	11

EED Article	Specific Needs (D2.2)	No. of tools
with citizens (Article 12)		
Technology (i.e. Promotion of efficiency in heating and cooling (Article 14))	No comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling has been completed at national level	2
	there is no policy to encourage the due considering at local and regional levels of the potential of using efficient heating and cooling systems, in particular those using high-efficiency cogeneration	5
	the potential for developing local and regional heat markets been taken into account	3
Information and Training (Article 17)	insufficient information on legal and administrative aspects	4
	insufficient information on training possibilities	103
	insufficient information on energy technologies	42
	insufficient information on financial tools	34
	insufficient information on technical tools	80
	lack of in-house expertise about legal and administrative aspects	5
	lack of in-house expertise about training	50
	lack of in-house expertise about energy technologies	34
	lack of in-house expertise about financial tools	33
	lack of in-house expertise about technical tools	79
	absence of automatic tools supporting energy efficiency measures development	7
	absence of software supporting energy efficiency measures development	8
	absence of guidelines & handbooks supporting energy efficiency measures development	28
	absence of other tools supporting energy efficiency measures development	55
	absence of support organizations in your territory addressing energy efficiency matters	122
support organizations have insufficient competency and knowledge	122	
inadequate information on best energy efficiency practices	67	
insufficient in-house expertise about legal and administrative aspects	2	
Communication and consultation with citizens (Article 17)	lack of mobilization of the elected representatives	4
Project Management (Article 17)	difficulties to mobilise all the stakeholders	13
	lack of expertise and capacities in the concerned organizations (banks, private sector, public institutions, ...);	5
	lack of interest for energy efficiency matter	1
	difficulties to find the right person within each organization	2
	stakeholders' lack of available time	12
Energy Services (Article 18)	lack of clear and easily accessible information on available energy service contracts and clauses	16

EED Article	Specific Needs (D2.2)	No. of tools
	lack of clear and easily accessible information on financial instruments, incentives, grants and loans	6
	there is no support available to the public sector in taking up energy service offers, in particular for building refurbishment	12
	no access to model contracts for energy performance contracting	14
	lack of information on best practices for energy performance contracting, including, if available, cost- benefit analysis using a life-cycle approach	10
	no measures in place to remove the regulatory and non-regulatory barriers that impede the uptake of energy performance contracting	2
	the public sector does not use energy service companies, and energy performance contracting	29
Energy Efficiency National Fund, Financing and Technical Support (Article 20)	financing facilities are not established for energy efficiency improvement measures	4
	European financial institutions are not used for financing and technical support schemes	1
	absence of an Energy Efficiency National Fund	5
	the National Fund is not accessed and utilised by the public sector	4
	innovative financing mechanisms are not used	20
	there is no financial institution which act as Energy Efficiency National Fund	2
Financial tools and taxation (Article 20)	insufficient own funds requirements	2
	lack of knowledge regarding financial tools	25
Review & Monitoring of Implementation (Article 24)	national monitoring and reporting are not undertaken to demonstrate progress achieved towards national energy efficiency targets	6
	regional and local monitoring and reporting is not undertaken to demonstrate process achieved towards regional or local energy efficiency targets	10
	individual public bodies are not aware of their progress towards their energy efficiency targets	16
	there is no implication to the public sector where targets are not being met	3

Source: PUBLnEf needs assessment

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