ePANACEA

Smart European Energy Performance Assessment & Certification

This project has received funding
from the European Union's HORIZON 2020
research and innovation programme
under grant agreement No 892421

Stakeholder Analysis Report

General and country specific stakeholder maps
Version 1, September 2020

IZES gGmbH – Institut für Zukunftsenergie und Stoffstromsysteme
www.epanacea.eu

Published and produced by: IZES, with support from SYMPRAXIS, VITO, CENER and CRES

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Layout: SYMPRAXIS

Cover image: Rawpixel / Depositphotos.com

Dissemination level: Public

Website: www.epanacea.eu

Project duration: June 2020 – May 2023

Grant Agreement: 892421 – ePANACEA – H2020-LC-SC3-2018-2019-2020 / H2020-LC-SC3-EE-2019

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CENER NATIONAL RENEWABLE ENERGY CENTRE
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OVERVIEW OF ePANACEA PROJECT

After 10 years of track record, the current Energy Performance Certificate (EPC) schemes across the EU face several challenges which have led to not fully accomplish their initial objectives: lack of accuracy, a gap between theoretical and real consumption patterns, absence of proper protocols for inclusion of smart and novel technologies, little convergence across EU schemes, lack of trust in the market and very little user awareness related to energy efficiency.

The objective of the ePANACEA project is to develop a holistic methodology for energy performance assessment and certification of buildings that can overcome the above mentioned challenges. The vision is for ePANACEA to become a relevant instrument in the European energy transition through the building sector.

ePANACEA comprises the creation of a prototype (the Smart Energy Performance Assessment Platform) making use of the most advanced techniques in dynamic and automated simulation modelling, big data analysis and machine learning, inverse modelling or the estimation of potential energy savings and economic viability check.

A relevant part of the project is to have a fluent dialogue with European policy makers, certification bodies, end-users and other stakeholders through two types of participatory actions: a feedback loop with policy makers through the so-called Regional Exploitation Boards (REBs) covering EU27+UK+Norway on the one hand, and dialogue with the end-users by means of specific thematic workshops on the other.

Thanks to these participatory actions it is ensured that the ePANACEA approach is aligned with and meets the needs of national public bodies, end-users and other stakeholders with a view to test the acceptance and to validate the methodology developed.

ePANACEA will demonstrate and validate reliability, accuracy, user-friendliness and cost-effectiveness of the methodology through 15 case studies in 5 European countries.

EXECUTIVE SUMMARY

This document contains the stakeholder analysis developed from the end user perspective within the ePANACEA project, in order to identify EPC end-users and other stakeholders who are more or less directly involved with EPCs and may influence end user behaviour and decision making in relation to the energy performance of their buildings. The analysis aims to guide the subsequent interviews and workshops that will feed the user needs analysis. The report includes two main sections: (i) the general stakeholder analysis to comprehend the context of EPCs and EPC end-users and how other stakeholders may influence end user behaviour and decision making and (ii) the analysis of the country specific EPC implementation in order to understand the different implementations as a factor which influences the use and acceptance of EPC by end users. This document includes 3 figures for the stakeholder analysis at a general level, to acknowledge the differences between various end user and other stakeholder types. In addition, the report includes 6 figures- one for each of the 6 ePANACEA focus countries (Spain, Belgium, Finland, Austria, Greece and Germany) - to present the country specific EPC implementation as well as the acceptance and use of EPCs by end users at national level.

1. INTRODUCTION

EU member states need to comply with the Energy Performance of Buildings Directive (EPBD) since January 2009. One of the requirements of the EPBD is the introduction of Energy Performance Certificates (EPCs). EPCs shall be issued when a building is built, sold or rented, or undergoes a major renovation. EPCs are also issued for buildings occupied by public authorities and buildings frequently visited by the public above a specific useful floor area threshold. The EPBD sets general mandatory requirements but leaves a degree of freedom on how these requirements are implemented, so that member states can fit the requirements to their national context (BPIE, 2010). This leads to a wide range across the EU of calculation methods for the energy assessment of buildings, training and accreditation schemes of energy experts, communication and promotion actions for the EPC, as well as quality control, enforcement and penalty procedures, and financial handling of the EPCs (Ibid.).

The EPC was implemented as a key policy instrument to promote energy efficiency in the building sector (Taranu & Verbeeck, 2018). It should incite acquisition of sustainable energy technology and investment in renovation measures (Selvakkumaran & Ahlgren, 2019). Knowledge about energy issues can raise awareness of strategic behaviour and therefore also positively influence the intention to act (Delzendeh *et al*. 2017). However, information may change people's knowledge and awareness but does not necessarily impact their behaviour. (Schuitema, Aravena & Denny, 2019). Moreover, besides the EPC, many other factors influence the energy behaviour of residents: Selvakkumaran and Ahlgren (2019) suggest six categories: economic factors, environmental factors, personal preferences and values, social factors, household characteristics and market and policy factors. For instance, the most important factors when purchasing a heating product are found to be prior experience, technical parameters, and financial aspects (Munkacsi & Mahapatra, 2019). Besides, the building location and building characteristics (Huebner, Cooper and Jones, 2013) play an important role, as well as social-demographic aspects (Trotta, 2018; Huebner, Cooper and Jones, 2013). Next, psychological factors play a major role in optimising energy efficiency as all behaviour is initiated by a person, e.g. tenant or landlord, who needs to be motivated to initiate measures and needs knowledge to implement measures which is mostly transmitted by other people, e.g. craftsmen. The implementation of behaviours, i.e. the selection and execution of strategic behaviour is affected mostly by different factors than intention to act, namely advice of intermediaries, perceived behavioural control, attitude towards behaviour/acceptance of potential strategic energy measures (Arning, Zaunbrecher & Ziefle, 2019; Abrahamse & Steg, 2009; Abrahmse & Steg, 2011; Brandon & Lewis, 1999). Based on this, the different types of end users of EPCs probably have developed different energy behaviours, adopted by the respective individual and contextual factors. Also, they may have different purposes of contact with the EPC, knowledge, interest and needs regarding the EPC.

Energy behaviour can be strategic (one-off/one-shot actions) or habitual (Verbong, Beemsterboer & Sengers, 2013). According to Huebner, Cooper and Jones, 2013) the impact of strategic behaviour is larger than curtailments linked to everyday practices (Delzendeh *et al*., 2017). One-off/one-shot behaviours require monetary investments and reduce energy consumption but can be distinguished into energy efficient retrofit investments and adoption of energy efficient appliances (Trotta, 2018). The difference is that energy efficiency retrofit investments require high resources of cost, time, and skills. Typically, professional contractors who have adequate technical expertise conduct energy efficient retrofits. Also, these actions are bound to the house infrastructure, opposed to appliances. Therefore, energy efficient retrofit measures mostly concern space and water heating. By comparison, the adoption of energy efficient appliances is an activity which citizens can conduct themselves, without the help of experts. Besides, they require lower investment costs and are mainly related to electricity consumption (Ibid.). By contrast, in other literature sources energy efficient retrofit activities are defined as energy efficiency measures to the building envelope (composed of windows, insulation of roof, façade or basement), or the heating system (boiler replacement), microgeneration of heat or microgeneration of electricity (Arning, Zaunbrecher & Ziefle, 2015). Likewise, for this stakeholder analysis we chose the term *energy efficiency measure* to refer to both, renovations and the acquisition of renewable energy technology.

1.1. Objective of Stakeholder Analysis in the context of ePANACEA's exploration of user perception

The ePANACEA project's objectives relate to numerous and varied entities; the project has therefore worked on a broad recognition of relevant stakeholders and target groups in the context of its communication and dissemination activities. In the present context of the project's exploration of user perception, it is essential to understand *who* the EPC end users are, how they get in contact with the EPC and what they need from the EPC, as well as who are other stakeholders, more or less directly or indirectly connected to the EPC, who play a role by influencing end user behaviour and decision making in relation to the energy performance of their buildings. It is also important to understand their concerns so that the next generation of EPCs can be designed in a way which fits to the end users' needs. The main objective of the current stakeholder analysis is to identify who gets in contact with the EPC and in what way. The relevant stakeholder maps

shall serve as a basis for the bilateral conversations with project partners of the countries where stakeholder interviews will be conducted (Spain, Belgium, Finland, Austria, Greece and Germany). After that, the needs of different EPC end user types will be addressed in workshops with end users. The stakeholder analysis can deliver first insights into the needs of end users. The identification and understanding of end users and relevant other stakeholders also builds a good basis on increasing the dissemination, exploitation and replication potential of ePANACEA.

The final stakeholder map shall present information about the following key aspects:

- ✓ For what reason stakeholders had contact with the EPC
- ✓ The importance of the EPC to end users and relevant stakeholders
- ✓ The end users' individual state of knowledge about the EPC
- ✓ Perceived connection of the EPC and the energy transition
- ✓ The information on the EPC which is central to the end users and relevant stakeholders.
- ✓ The structure and connections of user groups with the EPC

1.2. Research Approach

To create the stakeholder maps, literature was reviewed with a focus on the identification of who has contact with the EPC in different situations. First, literature was reviewed so that a general understanding of stakeholders and EPCs was created. In this context, outcomes from other EU projects (e.g. X-tendo and iBRoad) were considered, and exchange took place with project partners, in particular in relation to communication and dissemination. After that, the literature review was more focused on country specific aspects (Spain, Belgium, Finland, Austria, Greece and Germany). In case controversial/no information was found among different literature sources, the project partners from the respective countries were consulted. At a later phase, the stakeholder maps can be supplemented by the outcomes of the stakeholder interviews.

This document will first emphasise why it is important to include in the analysis also stakeholders who may only indirectly be linked to the EPC. Then the relevant stakeholder groups are identified. Next, the report presents the general stakeholder maps, including a description of the different end user and other stakeholders types. After that, the report shows the country specific stakeholder maps which show differences regarding the implementation of the EPC scheme and acceptance/use of the EPC by the public.

2. GENERAL STAKEHOLDER ANALYSIS AND MAPS

2.1. Identification of End Users and other Relevant Stakeholders

This section aims at pointing out who are considered end users in the context of ePANACEA and why it is considered important to include other stakeholders which are only indirectly linked to the EPC in this stakeholder analysis.

Transitions such as the energy transition are "multi-actor processes" which entail interactions between social groups (Wittmayer *et al*., 2017). Therefore, we may anticipate that the energy transition entails interaction between social groups, also in the building sector. Accordingly, interactions between social groups regarding the EPC may be important to foster the energy transition. Likewise, Bavaresco *et al*. (2020) emphasise the influence of other stakeholders like building designers, managers, operators, policymakers, technology developers and vendors on the energy use of building occupants. Regarding the decision making process for the purchase of e.g. heating products end consumers actively search for information online and consult their social network (Munkacsi & Mahapatra, 2019). According to Munkacsi and Mahapatra (2019, p.1) the market operation of heating products is determined by "the varying purchase behaviour of the end customers, the influence of installers and other professionals; the interest of manufacturers and trade partners; and diverse governmental, political, and legal measures regarding energy efficiency". From this we may conclude that also the installation of renewable energy sources or the initiation of energy efficiency retrofits in households is influenced by other stakeholders next to the end consumer alone. Intermediaries like installers and other professionals (e.g. retailers, planners, architects, energy consultants etc.) play an important role in the decision making process because of the technical complexities of the products and the compulsory governmental regulations. Besides, models of social construction question the "individuality" of decisions and demonstrate the influence of social systems (Munkacsi & Mahapatra, 2019).

According to Munkacsi and Mahapatra (2019) communication channels have an influence on the adoption and diffusion process of a product. This general finding can be projected onto the EPC or energy efficiency measures. It shows the importance of communication channels (and who provides information) about the EPC and energy efficiency measures. In any case the adoption process of a product begins with understanding and knowledge about it for which information is necessary (Ibid.). The importance of social interaction, which is also called "peer effects", can lead to social spillovers (or transfer effect), pointing out the relevance of information of existing owners for the decision making process of future owners. In most cases end users search for references of products, installers and services (Munkacsi & Mahapatra, 2019). Additionally, Arning, Zaunbrecher and Ziefle (2015) emphasise that intermediaries can be powerful actors because they share knowledge, shape the scope and quality of energy efficiency retrofits and affect the consumption pattern in the residential sector.

From literature review different stakeholders can be identified as important regarding the contact with the EPC and contact to end users of EPCs. For instance, Arning, Zaunbrecher and Ziefle (2015) define building intermediaries to range from architects, building managers, regulators and building innovation organisations. Next, Anagnostopoulos et al. (2015) identified three main groups who have an important say in the uptake of renovations:

1) Building owners or building managers
2) Policy makers and government related stakeholders: they require significant sources of information to design effective policies, targeting the required renovations
3) Financial sector, comprising of banks, investors, businesses, banks, or hedge funds (aiming at longer-term secure investments)

That is why next to direct end users of the EPC, other relevant stakeholders are considered as well in this stakeholder analysis. We do not study end users of the EPC as an isolated group, but as a group which is embedded into a social context. We expect that the inclusion of other stakeholders in the analysis will help to understand end users' decision making and behaviour regarding the use of EPCs and the uptake of energy efficiency measures.

Definition of end users: In this analysis we define end users of EPCs as: building owners, building (social) tenants, building occupants and building managers. The different end user types mainly refer to their relation with the building.

Definition of other stakeholders: In this report we define as other stakeholders all those stakeholders who have more or less direct or indirect contact with the EPC and get in contact with or influence the energy decisions of EPC end users. Policy makers are considered although they do not directly interact with end users but their decisions regarding the implementation scheme of the EPC determines the acceptance and use of the EPC by end users (BPIE; 2010; Taranu & Verbeeck, 2018). That leads us to the following categorisation of other stakeholders: policy makers and national and regional public authorities, certifiers of EPC, informants and multipliers of EPC, advisors for energy efficiency measures, financiers for energy efficiency measures and implementers of energy efficiency measures.

2.2. The Roles of Stakeholders regarding EPC and Energy Efficiency Measures

This section aims at providing a general idea of who engages with the EPC and end users of the EPC. The first figure of the general end user stakeholder maps (Figure 1) presents “who” has contact with the EPC and what stakeholders’ action regarding the EPC is. It shows the range of potential stakeholders for different phases regarding the EPC. The overview distinguishes between the formal process around EPC, the process of multiplication of EPC and information about EPC for end users in the housing market and the process related to the implementation of energy efficiency measures for which EPCs should serve as basic information tool. In this sense, it mediates an overview of the context of EPC; how the EPC can be used after it is implemented and certified: multiplication of the EPC as a tool for decision making about energy efficiency measures. End users are visualised in an arrow bar to indicate that they can have direct contact to stakeholders in the phase of information and multiplication of the EPC and initiation of energy efficiency measures. How far end users engage with energy efficiency measures is open, it is not mandatory that they initiate energy efficiency measures. The content of the figure should be „read“ from left to right. In this way, it can be comprehended which actions related to the EPC take place in the beginning, and what possible actions can follow. The figure indicates for each action by which type of stakeholders it is conducted. In addition, the black arrows indicate that the end users can interact with certain stakeholders, while they are only in indirect contact with others (indicated by blue arrows). That also shows that EPC end users usually only become active in processes in the housing market and processes referring to the initiation of energy efficiency measures. Regarding this, they can also make decisions, which are influenced by the attributions they have with certain stakeholder (e.g. trustworthy, sincere etc.).

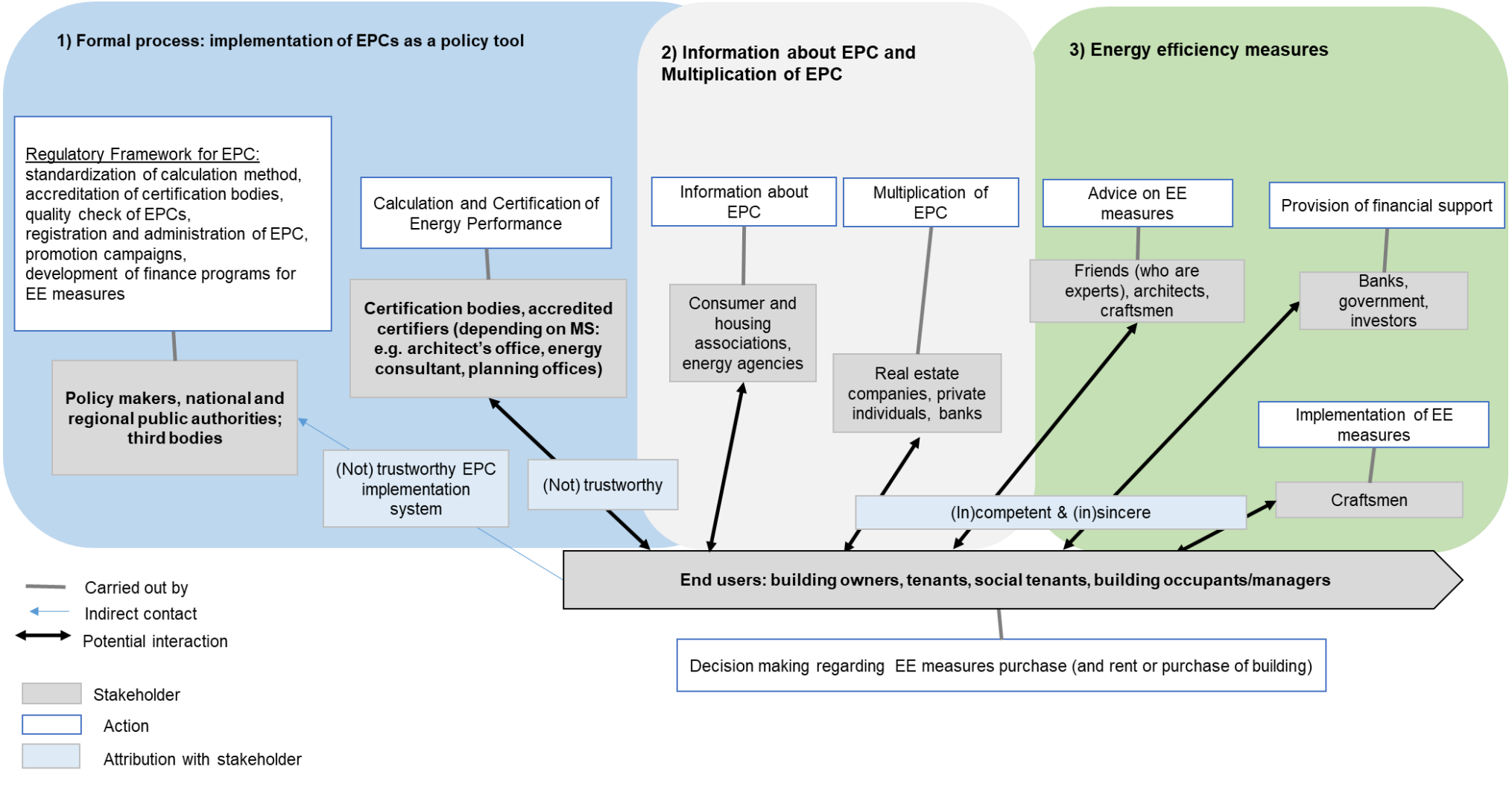


Figure 1: The Roles of Stakeholders regarding EPC and Energy Efficiency Measures

2.3. Description of Main Stakeholder Groups

In this subchapter the aforementioned stakeholders are described more in detail regarding their purpose of contact with the EPC and interest and knowledge regarding the EPC.

2.3.1. Description of main stakeholder groups

This section gives a short summary of the role, knowledge and interests of policymakers, national and regional public authorities, certifiers, end users, informants and multipliers of EPCs, as well as advisors, financiers and implementers of energy efficiency measures.

EPC end users

Building owners have a need for autonomy, also due to the information asymmetry between experts and laypersons. End users seek to understand the sense of measures, appreciate to receive information about material and technologies, as well as about possibilities for grants and potential implementers of measures (planners, craftsmen and companies; Fokken, Noll and Rogalla, 2017). For end users it is difficult to invite and compare offers of buildings based on their energy efficiency. That is why owners strive for gaining own expertise in order to compare offers. Besides, they conduct small measures in the household to increase energy efficiency themselves (Fokken, Noll and Rogalla, 2017).

According to Kastner and Stern (2015) residents have 'beliefs' about the consequences of energy efficiency measures for their household and beyond (e.g. the energy transition). Owners consider it as handicap that they do not know about the financial implications of owning a building with a certain energy efficiency class (Ibid.). This points to potentials for improvement in the next generation of EPCs.

Regarding the interpretation of the information of the EPC, occupants might have heuristic and rational thinking. Biases in their interpretation of the information are common (Taranu & Verbeeck, 2018). End users' decisions are affected by limited memory, limited attention, and limited cognitive ability. Characteristics of the certificate such as complexity of the information, choice overload and lack of salience are a few of several factors that contribute to heuristic thinking. Moreover, people do not always take cold-minded and rational decision because they are affected by emotions. For example, citizens choose buildings which are attractive and justify their choice by distinct reasons. Therefore, the EPC might have a small impact on the purchase decision. (Taranu & Verbeeck, 2018). Accordingly, Schuitema, Aravena and Denny (2019) mention that the EPC is often not considered in the decision process of renting or purchasing a building because the information of the EPC is too complex and other attributes such as price and location of the building are more important factors.

Referring to Schuitema, Aravena and Denny (2019) buyers and renters of buildings often recognise the EPC but do not use it. The provided information may change end users' knowledge and awareness but does not necessarily impact their behaviour. Trust is a key determinant of their attitude towards EPCs. The lack of trust may be one reason for the discrepancy between recognising the EPC and using the provided information (Ibid.). Trust is recognised as multi-dimensional construct, comprising aspects like competence, fairness, and transparency (Ibid.). The perceived credibility of the source is an underlying reason for trust in energy efficiency labels. The perceived source credibility refers to the extent to which people believe a party has expertise (Ibid.). At last, the knowledge about the EPC, the perceived importance of it and the interest in energy efficiency measures may be as diverse as the types of end users: building owners, (social) tenants, building occupants, building managers (cf. 3.3).

End users of EPCs do not need to know everything to plan energy efficiency measures since there are advisors. However, in general, end users have a negative image of energy advisors - especially those without certificate are rejected. Regarding the contact of energy advisors Arning, Zaunbrecher and Ziefle (2015) point out that often energy advisors are only consulted by end users because their involvement is mandatory to receive certain state subsidies. In addition, end users have a low willingness to pay for the advice since it is not clear what it entails (technical training background of energy advisors varies, in addition there is a lack of transparency on the quality standards for the advisory process of energy advisors). Finally, although consulted, energy advisors have little influence on the decision and design of the retrofit project. Also, homeowners might preferably choose intermediaries from their personal network to advise them on energy efficiency measures (Arning, Zaunbrecher & Ziefle, 2015). Expectations regarding consultancy vary from 'the necessary evil' to 'an important source of information' (Fokken, Noll and Rogalla, 2017). Looking at who end consumers consult in their decision making process, it appears that they mostly search for information on the internet and consult family, friends or other customers, instead of looking for assistance from professionals in stores. Hence, they show a so called "social-search behaviour" (Munkacsi & Mahapatra, p.2). Some studies emphasise the diminishing importance of the installer because of the increasing importance of the internet as source of information (Munkacsi & Mahapatra, 2019).

Policymakers, national and regional public authorities

Policy makers routinely take the statistical information derived from EPC databases into account for policy formulation (Anagnostopoulos, Arcipowska, and Mariottini, 2015). Information from databases can be used by local authorities and policy makers to analyse the housing quality, to improve subsidy programmes, make targeted retrofit investments and promote support schemes in the process of designing policies. So far, data from EPC databases has been used to optimise renovation and financing programmes (Ibid.). National and public authorities shape the EPC implementation scheme by standardising the energy performance calculation method, accrediting certifiers, controlling the EPC quality and possibly enforcing EPC schemes through penalties in case of non-compliance. Thereby, national and regional authorities ensure the quality of the EPC in the respective country (Arcipowska *et al.,* 2014).

Certifiers

Certifiers may issue the EPC. Member states created their own scheme on determining who is authorised and accredited as certifier. For instance, architect's offices, energy consultants and planning offices could be the issuer of an EPC. The educational requirements and required professional experience vary as do the regulations about examination and training of certifiers. Some countries provide a list of authorised certifiers (BPIE, 2015).

EPC informants

Consumer associations, energy agencies and housing associations act as informants about the EPC. Consumer associations and energy agencies inform end users on the use of EPCs for buildings. Consumer associations also engage in lobbying activities on behalf of consumers. Housing associations inform real estate agencies on their obligation to include EPCs in their advertisements and building owners on their obligation to obtain an EPC for their building.

EPC multipliers

According to Geissler and Altmann (2015) the publication of energy indicators in the housing market is mandatory. That means that if an EPC of a building exists, it must be included in the commercial advertisements of buildings offered for rent or purchase. In this sense, print and electronic media as well as search engine operators distribute information about energy indicators of buildings. The way this information is presented has an influence on how end users receive and use it (Geissler & Altmann, 2015). Real estate companies, private individuals and banks can act as multipliers of EPCs.

Financers of energy efficiency measures

The financing industry and business community have a lot to gain from the mainstreaming of renovation activities since energy efficient refurbishments are very secure: they are long-term investments with extremely stable cash flow and low risk. Accordingly, there is interest from both, business and financial institutions to invest (Anagnostopoulos, Arcipowska, and Mariottini, 2015). The access to anonymised information through the EPC data base provides business with clear targets to contact, and an opportunity to optimise their strategies. The standardisation of EPC calculation methods and inclusion of econometric parameters as output is becoming more important in the finance industry´s requirements. Likewise, cross boarder comparisons of assets are becoming more important for investors to reach investment decisions. However, certain vital details remain uncertain to investors, such as payback periods and the risk of investment (Anagnostopoulos, Arcipowska, and Mariottini, 2015). Also, as mentioned already under 'policy makers', the countries can mobilise private and public financing to achieve renovation in the residential sector (Anagnostopoulos, Arcipowska, and Mariottini, 2015). Banks, the government and/or companies may act as financial supporters of energy efficiency measures.

Advisors of energy efficiency measures

According to Arning, Zaunbrecher and Ziefle (2015) there are diverse types of intermediaries in the context of residential building refurbishments. They distinguish intermediaries into advisory and implementing intermediaries. The first advise building owners or managers, design specific energy efficiency measures and develop a refurbishment plan (for instance energy advisors who advice building owners or managers on the need and possibility of energy efficient-refurbishments; architects and civil engineers). Fokken, Noll and Rogalla (2017) indicate that before the implementation of energy efficiency measures diverse sources of information may be consulted by end users such as the internet and conversations with friends and acquaintances; craftsmen and experts; brochures and banks. Experts, end-users are friends with, are especially trustworthy and helpful to them; they can overcome the possible lack of trust regarding third parties. This special group of friends (who are experts) should be activated as communication channel in order to foster the initiation of energy efficiency measures (Fokken, Noll & Rogalla, 2017). Preliminarily, architects, companioned experts and craftsman act as advisors regarding energy efficiency measures for end users (Ibid.).

Implementers of energy efficiency measures

Implementing intermediaries are craftsmen who install the energy efficiency measures, procure material and technology, introduce building owners/managers to their usage and perform maintenance work (e.g. installers, roofers and painters). In Germany, craftsmen can also function as planners. For instance, in 2018, a new policy was introduced, which promotes the energy advisory services. It allows craftsmen to conduct advisory services and to implement them. It is expected that by acquiring this competence craftsmen might become more aware and knowledgeable in the field of energy efficient-retrofitting and might act as more efficient multiplicators in the diffusion of energy efficiency-measures and technologies (Arning, Zaunbrecher & Ziefle, 2015). Craftsmen can e.g. include painters, roofers, and installers (Ibid.).

Based on this information we can confess that some stakeholders have multiple functions: e.g. policy makers can also provide grants and therefore also act as financier of energy efficiency measures. Likewise, banks can be multipliers of EPCs and financiers for energy efficiency measures. Finally, in Germany implementers of energy efficiency measures (e.g. installers) can also officially act as advisors. Besides, in transitions new roles can be created, old ones can be broken down and existing ones can be altered (Wittmayer et al., 2017). The fact that roles are not rigid, but flexible (Volt et al., 2020) is beneficial because certain stakeholders did not yet develop their full potential referring to their influence in fostering the awareness of the EPC and the initiation of energy efficiency measures (e.g. multipliers of EPCs, installers of energy efficiency measures).

2.3.2. Stakeholders of EPCs and Energy Efficiency Measures: Knowledge and Interests

Figure 2 was developed to indicate the purpose of contact with the EPC, interests, and knowledge of each stakeholder group. This figure is based on the categorisation into three processes from Figure 1 (represented by different colours: blue - formal process, light grey – information and multiplication of EPCs in the housing market and green – energy efficiency measures). The arrow in the background indicates again that EPCs, once the regulatory frame is set and the certificate is issued, can foster energy efficiency measures, initiated by the end user. The black arrows show again with who the end users can interact directly, hence it also shows which stakeholders might have a bigger influence on end users' decisions. Bold arrows indicate a stronger interaction. Moreover, this slide gives a short information on the purpose of contact with the EPC and what the stakeholder's role regarding the EPC is. Besides, the knowledge/competence and main interest regarding the EPC and energy efficiency measures, including the most interesting information of the EPC, is shown.

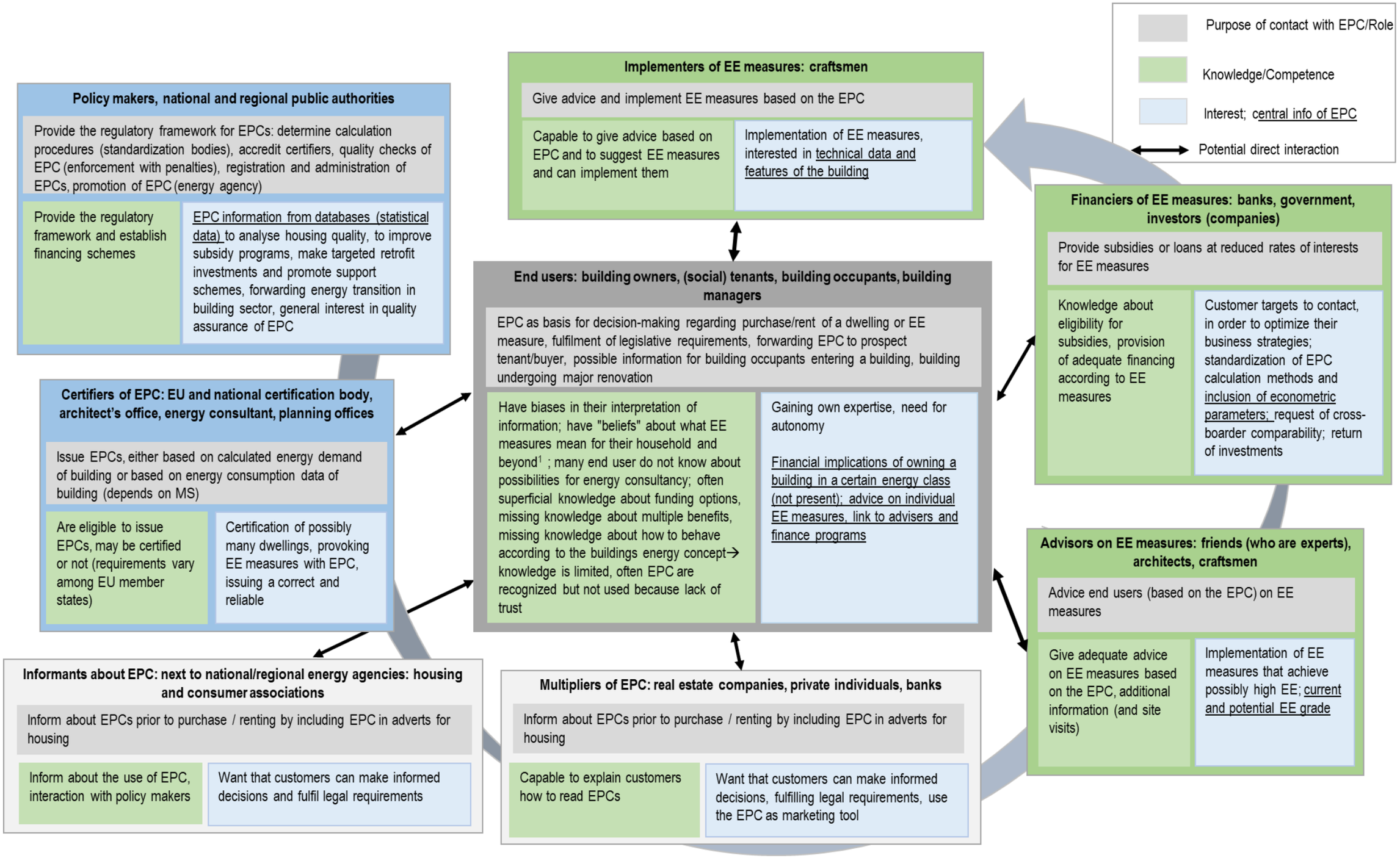


Figure 2: Stakeholders of EPC and Energy Efficiency Measures: Knowledge and Interests

2.4. Different Types of End Users

In this subchapter the end users of EPCs are analysed specifically since they are the focus group of the stakeholder analysis. As introduced in the beginning of the report there are different types of end users of EPCs, depending on their relation with the building (owning, (social) renting, managing, occupying). Also, the type of building (e.g. multi-family/single-family) and the use of the building (residential/non-residential, private or public, etc.) determine the user type.

2.4.1. Split incentives among landlords and tenants

Often opinions about renovation by owners and tenants diverge; they have spilt incentives regarding refurbishment which leads to the so-called owner - tenant – dilemma (Anagnostopoulos, Arcipowska, and Mariottini, 2015; Castellazzi, Bertoldi & Economidou, 2017). Spilt incentives are a common barrier between landlords and tenants which hamper the uptake of energy efficiency-retrofits, one reason are cost-recover issues related to energy efficiency upgrade investments. Financial obligations and rewards of the investments between involved actors are not effectively distributed (Castellazzi, Bertoldi & Economidou, 2017). Accordingly, split incentives can arise if the actor that invests in energy efficiency measures is not the same as the actor who reaps financial benefits (actor in charge of operational benefits). Landlords might not be motivated to invest in energy efficiency upgrades because they do not directly benefit and often cannot capitalise upgrades based on energy efficiency measures into higher rents because of the uncertainty regarding how the upgrade impacts the value of the property. Moreover, they often lack experience on rent premiums (Ibid.). Hence, regulatory and financial support is often missing, which can lead to disagreements among stakeholders with influence (Anagnostopoulos, Arcipowska & Mariottini, 2015). Moreover, occupants who are directly responsible for paying bills for energy fuels and service tend to be more active in saving energy (Delzendeh et al., 2017).

2.4.2. Types of end users and their interests and scope of actions

Following the preceding passage, the various end user types have different interests and scope of actions regarding the initiation of energy efficiency measures. The different types of EPC end users, including their scope of action and their interests regarding energy efficiency measures are presented in Figure 3. The scope of action was evaluated based on the relation end users have to the building (tenant/owner/manager/occupant). The scope of action regarding knowledge, time and budget is neglected. This figure shows that tenants and private landlords may have conflicts due to different interests routing from the fact that they would not pay and benefit equally from energy efficiency measures. Based on the evaluation of end users' interests and scope of action, the potential of initiating energy efficiency measures was estimated and is visualised by three colours: green (high potential), yellow (medium) and red (low). This categorisation may serve as a basis to identify the need for improvements in regulations, for instance a new division of costs and benefits for landlords and tenants could help to foster the uptake of energy efficiency measures. Besides, different end user type needs regarding the next generation of EPCs may be derived from this categorisation.

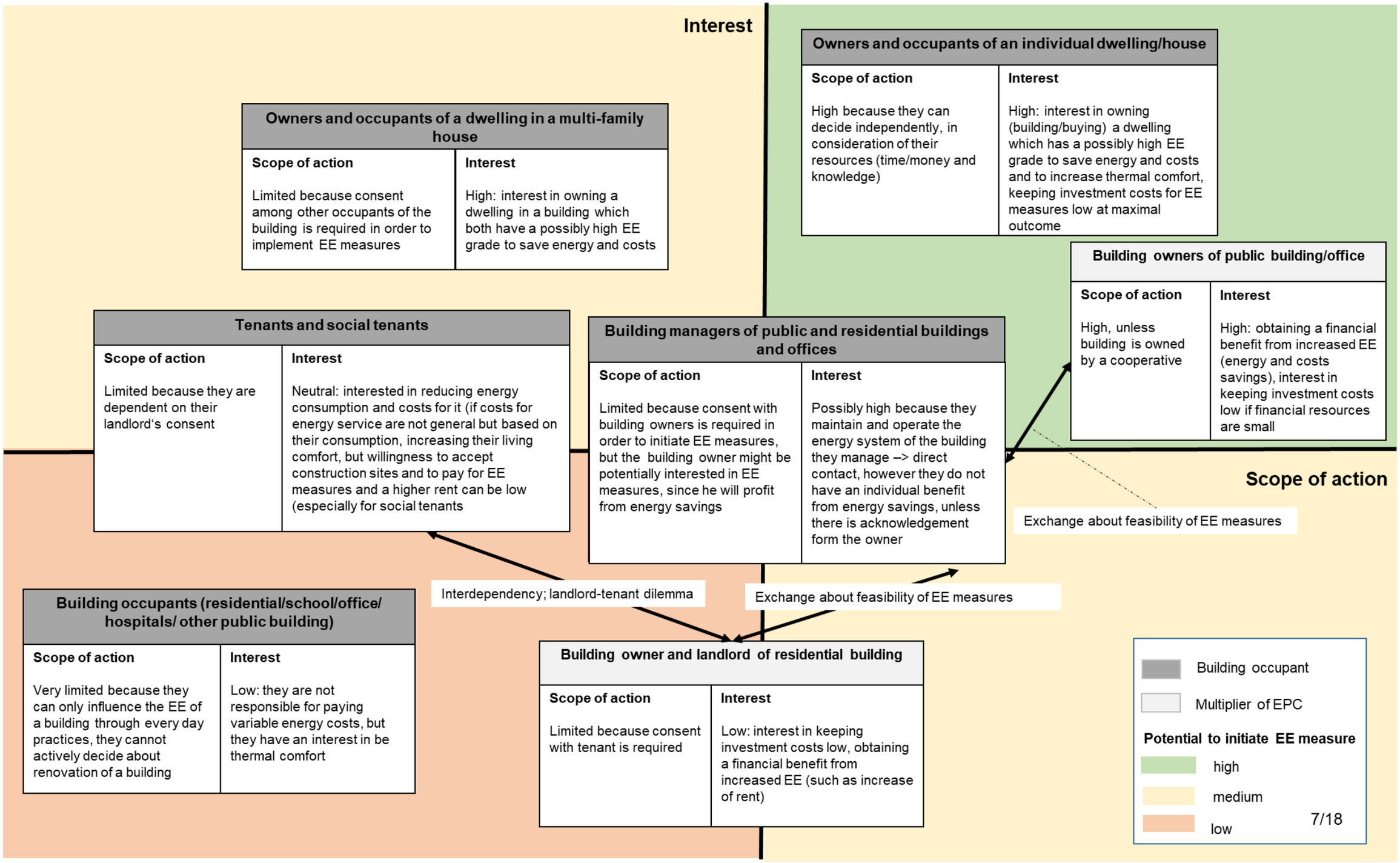


Figure 3: Types of end users and their interests and scope of actions

2.5. Country Specific Stakeholder Maps

After having obtained a general understanding of who is engaged with EPCs and end users the analysis is narrowed to the six ePANACEA pilot countries: Spain, Belgium, Finland, Austria, Greece and Germany. In this subchapter the insights gained through the general stakeholder analysis are complemented by country specific stakeholder analysis.

2.5.1. Countries' degree of freedom regarding the implementation of the EPC

Among EU countries there are many differences, regarding "culture, politics, national policy and legislation, building traditions, financial situation, energy infrastructure, climate, etc." (BPIE; 2010, p. 9). Thus, the approaches aiming at a successful implementation of the EPBD vary among EU members states (BPIE; 2010). However, according to Li *et al*. (2019) the main objective of the EPC implementation is the same in all MS: "promoting improvements in building energy performance to reduce carbon emissions" (Ibid., p. 2). At latest by 4th January 2009, all MSs were expected to have implemented effective schemes, applying it to all types of buildings which include:

1) "Newly constructed buildings or buildings undergoing major renovation
2) All buildings which are rented or sold to new tenants or buyers
3) All buildings with a total floor area over 1000m^2, which are occupied by public authorities or frequently visited by the public. The threshold was reduced to 500m^2 from 9 January 2013 and to 250m^2 from 9 July 2015" (Li *et al*., 2019)

However, in other literature sources, e.g. De Meulenaer and Triest (2018), Androutsopoulos and Giakoumi (2018) and Arcipowska *et al*. (2014) we found different information about the applicability of the EPC among EU member states. This indicates that the progress of EPC implementation differs among EU member states. According to BPIE (2010) it is unlikely that the EPC is used as decision support because in most countries EPCs are only issued when a building is rented/ bought and not when it is advertised. But, the use of the EPC in advertisements is one of the most important factors to increase the demand for energy efficient buildings (Arcipowska *et al*., 2014). Therefore, the EPBD recast required that at the stage of advertisement of a building, the energy efficiency class must be indicated in commercial media (Art., 12, EPBD; Ibid.). However, the level of compliance is still low; there are only a few countries which evaluate its enforcement (e.g. Flanders, Ireland and France; Ibid.).

Regarding the calculation method, the content and the layout, each member state had a certain level of freedom in decision making (Taranu & Verbeeck, 2018. p. 1746). Along these lines, each member state defined different priori for the purpose of the EPC (Taranu & Verbeeck, 2018). Up to now, all EU member states have formally introduced the EPC; however, the stage of implementation and how the certificate is called varies among members states (Schuitema, Aravena & Denny, 2019). Atanasiu & Constantinescu (2011) explain that the EPC schemes vary because of different needs, the respective structure of the building stock and climatic conditions of member states. In most member states the EPC scheme was first applied to new residential buildings before they were implemented for non-residential buildings and the existing housing stock (Ibid.). The acceptance of end users and how the EPC is used is often related to the design of the entire EPC scheme, with regard to the design of the certificate (length, content and layout) and the assessment method (e.g. a system based on default values or an intensive assessment system including detailed building inspections; BPIE; 2010; Taranu & Verbeeck, 2018). The public acceptance of the EPC and its use in the professional market and in the public depend on the quality and the costs for the certificate (BPIE; 2010).

2.5.2. Short insights into peculiarities of the EPC implementation in the pilot countries

In Spain there is a large proportion of secondary residences (about 8 million), which are not used or vacant during some part of the year. These buildings present a less promising potential for energy renovations compared to primary residences (Heiskanen *et al*., 2012). In Belgium three regions (Wallonia, Flanders, and Brussels) are responsible for the implementation of the EPC. The general public acceptance of the EPC is high, a large percentage of building owners (80%) perceive the EPC as a useful tool to stimulate energy efficiency (BPIE; 2010). In Flanders, the EPC is generally well accepted. Also, for newly constructed and renovated buildings the EPC is well established because it is linked to the building permit and because it is legally mandatory (Volt *et al*., 2020). Finland has a large share of well-established rental social housing providers which presents a good basis for the introduction of energy efficiency measures in rental apartments (Heiskanen *et al*., 2012). In Austria there is a large proportion of well-established rental social housing providers, too, which next to concentration of power and systemic renovation schedules presents a good basis to introduce energy efficiency measures in the rental sector. Moreover, the landlord tenant dilemma is mitigated in Austria because the landlords also profit from renovations (Heiskanen *et al.,* 2012). The EPC in Austria indicates the annual heating demand but does not show the total energy performance. The information provided by the EPC is very detailed and complicated and the recommendations to improve energy efficiency of a building are not always provided

and clear which leads to limited transparency for the end user (BPIE; 2010). Based on studies within the X-Tendo project, we can assume that there is a general acceptance of the EPC from the perspective of buyers and tenants, whereas seller and renter lack understanding (Volt *et al*., 2020). In Greece all energy auditors and inspectors are qualified engineers. They are classified in three categories according to their ability and experience. The use of the EPC is fully integrated in the building market and the EPC is obligatory for building transactions. Currently the state addresses the uptake of EPC recommendations through financial incentives and information campaigns as well as with national and European programmes (Androutsopoulos & Giakoumi, 2018). The EPC is well accepted in Greece; it is considered as a mandatory document for building transactions or at the generation of a building permit (Volt *et al*., 2020). In Germany many citizens have heard about the funding of the KfW (state owned development bank), but end users often only have superficial knowledge about what is eligible for financial grants. In addition, motivation to use the existent possibilities for funding is reduced by the high bureaucratic effort. Therefore, many funding opportunities stay unused (Fokken, Noll and Rogalla, 2017). Another critical aspect is the search for qualified craftsmen (Fokken, Noll and Rogalla, 2017). Many end-users do not know about possibilities for energy consultancy despite the governmental efforts (Fokken, Noll and Rogalla, 2017). A survey among 662 residents who recently had purchased a building concluded that purchasers understand the information. However, they often do not remember or trust it (Volt *et al*., 2020).

Figures 4-9 give an overview of how the EPC is implemented in different countries and present relevant stakeholders in the formal process of EPC implementation. The figures provide information on the EPBD/EPC implementation, the applicability, promotion administration/registration, public acceptance and use of the EPC, and available finance programmes for energy efficiency measures. The categorisation is based on the information which was available in present literature sources and provided by project partners from the respective countries (VITO and VTT). Moreover, the figures seek to mediate an understanding of the acceptance and use of the EPC in different countries based on the EPC implementation. The information is presented per country in the following order:

- Figure 4: Spain
- Figure 5: Belgium
- Figure 6: Finland
- Figure 7: Austria
- Figure 8: Greece
- Figure 9: Germany

1) EPBD/EPC implementation

Implementation: national and regional[1]

Quality check: regional governmental body, Autonomous Communities registries (responsible for control and inspection works)[2]

Enforcement: monetary penalty[3]

Accreditation: no accreditation scheme, central and regional governmental body are responsible for the qualification of certifiers[2]

2) Applicability

- New and existing buildings
- Certification of new buildings has become mandatory for building permits requested after 31 October 2007[4]
- Residential and commercial buildings, in case the building is sold or rented.
- Public buildings which are bigger than 250 m^2, and public buildings of which the total useful area is bigger than 250 m^2 and is rented[2]
- Sale and rent advertisements are obliged to include the energy performance label[2]

3) Promotion

- No specific national promotion for the general public regarding EPCs
- There is limited local promotion[4]

4) Certification

Assessment method: calculated rating

- Mainly architects and engineers who are qualified to design buildings and technical installations are involved in the certification process (are authorized)[4]

EPC in Spain

5) Administration/registration of EPC

- The information of the EPC is collected and registered in each of the 17 Autonomous Communities and in the 2 Autonomous Cities of Spain → 19 official EPC registries have been established[2]

6) Public acceptance and use of the certificate

- The public awareness is low[1]

7) Finance programmes

- PAREER-CRECE3 is a support programme to encourage and promote the implementation of EE measures (project managed by IDEA)[2]

Source: compiled from 1. Atanasiu & Constantinescu (2011), 2. Martin (2018); 3. Mariottini (2015); 4. BPIE (2010)

Figure 4: EPC implementation in Spain

1) EPBD/EPC implementation

Implementation: regional: Flanders, Wallonia and Brussels[1]
Quality check: regional governmental body, regional penalty system
e.g.: **Flanders**: strict enforcement system with financial penalties for non-compliance with EPC regulations (for building owners and energy experts).
Enforcement: strict enforcement system with penalties[1]
Accreditation: based on a set of requirements for experts (requirements for two types of assessors: inspectors and auditors). Accreditation scheme depends on the region.[1]

2) Applicability

- Flanders: EPC is issued at moment of transaction of a building , but very seldom available when a building is advertised.[1]
- For non-residential buildings: EPC implementation is still in process.
- Since June, 2010: the Walloon region implements the EPC for existing buildings in phases, buildings will have an EPC when a sale transaction takes place.[1]
- Walloon region: new rules apply from 1st of May 2010 for construction and major renovation. An EPC has to be made for renovation/construction work that is part of the building permit procedure.[1]

3) Promotion

- Regional promotion
- **Flanders:** information is provided to the public regarding the EPC related to subsidies and tax benefits.[2]
- **Brussels:** communication started towards professional target groups which will be involved in the EPC schemes (information, training, help desks for professionals, brochures and seminars).[3]
- **Walloon:** provides continuous information on EPCs and energy efficiency, etc. to the general public and to professionals through different communication tools[4].

4) Certification

- Experts have to pass a theoretical exam[5].
- Walloon region approves the energy experts: the energy administration of the public services give approval[3].

EPC in Belgium

7) Finance programmes

Walloon region: Allowances covering part of the amount of renovation work.
• Short-term credit (Eco packs / Renopack8s) or mortgage loans (Accesspack9) at preferential rates[3].
Brussels region: A Green Loan, with a 0-2% rate, can be received for renovation works in residential buildings. Since 2004, renovation works on insulation, mechanical ventilation, thermal regulation etc. are supported by energy premiums[4].

6) Public acceptance and use of the certificate

- Public acceptance is high, a large percentage (80%) is convinced that the EPCs are a useful instrument for stimulating energy efficiency.[1]
- The EPC is generally well accepted.[6]
- EPC for newly constructed and renovated buildings is linked to the application of the building permit and is legally mandatory[1].

5) Administration/registration of EPC

- Regional data bases
- Flanders region: database in which all EPCs are collected, used for quality control, for the building permit process and for the automatic attribution of subsidies and discounts for energy efficient buildings[2].

Source: compiled from 1. BPIE (2010), 2. De Meulenaer & Triest (2018), 3. Govaert, M. *et al.* (2018), 4. Fourez, B. *et al.* (2018), 5. Mariottini (2015), 6. Volt et al. (2020)

Figure 5: EPC implementation in Belgium

1) EPBD/EPC implementation

Implementation: ministry of environment is responsible for transposing and implementing the EPBD in Finland[1]
Quality check: The ARA (central governmental body) can make compliance checks of issued EPCs.
Enforcement: administrative penalties[2]
Accreditation: The Ministry of the Environment has designated two accreditation bodies, "FISE ry" and "Kiinteistöalan Koulutussäätiö ry", to approve qualified experts[1]

2) Applicability

- EPCs are required for all new buildings (along with the building permit application) and for the sale or rental of existing buildings.
- All requirements apply to private and public buildings (residential, commercial and public).
- Single apartments of a building complex are not certified separately.
- EPC is now also required for swimming halls, indoor skating rinks, warehouses, logistics buildings and motor vehicle buildings (garages over 50 m^2).
- The EPC must be displayed to the public in buildings where over 250 m^2 of total useful floor area is occupied by public authorities and visited by the public. In addition, the EPC must be displayed to the public in all buildings that already have an EPC and that have over 500 m^2 of total useful floor area visited by the public.
- Real estate agents are required to ensure that the energy class of a building that is being sold or rented is posted with advertisements and other marketing materials[1].

7) Finance programmes

Finnish government has introduced various financial instruments and incentives: for public and private sector buildings there are financial subsidies available for investments for energy efficiency as well as for energy auditing[1]

6) Public acceptance and use of the certificate

Energy costs are part of the rent → landlords benefit from renovations (landlord-tenant dilemma is alleviated)

5) Administration/registration of EPC

The ARA is the administrative authority, which ensures the quality of certificates and qualified experts. The national database for EPCs is used to control certificates since 2015.[1]

EPC in Finland

4) Certification Bodies

EPC is produced by qualified experts.
There are two levels of qualified experts, with the higher level needed for buildings requiring dynamic simulations (e.g., for new buildings with cooling facilities).[1]

Registration of certification bodies: there are 970 registered qualified experts, of which 711 possess base level qualifications, and 259 possess higher level qualifications[1]

3) Promotion

- Finland has information campaigns and advice programmes for energy efficiency and renovation. An energy advice programme which is targeted at households promotes energy efficiency and RES, with the link to advisory in several regions featured on a comprehensive website. The energy authority of Finland provides national funding to the advisory programme. Additionally, there is a network of local advisors focusing on advice to elderly people. The renovation advice programme is coordinated by the ministry of environment.
- In 2016, an information campaign was launched by the ministry of environment which targets housing companies. The aim of the campaign is to support the implementation of simple and affordable energy efficiency measures. It is featured on a website which provides
- Advice and information tailored to the building type[1]

Source: compiled from 1. Haakana, Laitila & Forssell (2018), 2. Mariottini (2015)

Figure 6: EPC implementation in Finland

1) EPBD/EPC implementation

Implementation: at national and regional level: federal republic of Austria and the nine provinces, each province has its own regulations and ways of practical implementation, a national guideline provides basic calculation methods and sets energy performance requirements for buildings[1]

Quality check of EPC: regional governmental body, Austrian provinces regularly conduct random automated EPC controls[2]

Enforcement: administrative and monetary penalty[3]
Accreditation: no accreditation scheme[3]

2) Applicability

- At the point of sale or rent of a building or building unit
- An EPC has to be provided for both residential and non-residential buildings (commercial and public)
- Displaying the front page (including the labelling) of EPCs in buildings frequently visited by the public is mandatory in all federal provinces[2].
- An EPC also has to be issued when applying for a building permit for a new construction and for major renovations, as well as for requesting subsidies[2].
- Since 2012, if a building or building unit is advertised (either in print or online) for sale or rent, the space heating demand and the total energy efficiency factor (fGEE) must be provided[2].

3) Promotion

- Regional promotion through regional energy agency
- The Austrian regions and their regional energy agencies offer comprehensive information campaigns, competitions and energy advice services for building owners and users as well as international conferences. They develop and implement training programmes for different target groups in the building sector[2].
- The Austrian klimaaktiv initiative provides training for professionals and disseminates information to home owners and companies.The klimaaktiv platform will continue setting best practice examples for the promotion of sustainability in buildings[2]

EPC in Austria

4) Certification

- EPC should be issued by an authorized expert in the field of construction, engineering and energy[1].
- No obligation for experts to take a training course or pass an exam for energy inspections[1]

5) Administration/registration of EPC

- Several regional data bases are used for EPCs and for subsidy schemes
- The regional databases are also set up to perform a basic consistency check[1]

6) Public acceptance and use of the certificate

- EPC shows annual heating demand and not the total energy performance, information on EPC is very detailed and complicated. The total energy performance and recommendations are not always presented (clearly)[4].
- In practice it does not stimulate the taking of energy saving measures, the limited transparency and limited practical usability of the EPC for building owners creates a barrier for its use and effects public acceptance.[1]
- Acceptance from the tenant and buyer point of view, lack of understanding on the seller and renter side[5]

7) Finance programmes

- Financing by the user/consumer, public subsidies and commercial bank loan financing
- Banks are offering special credit lines for energy efficiency measures.
- In some regions, the granting of a subsidy is tied to the utilization of energy advice in the planning phase of the new construction or renovation project. In most regions, energy certificates are compulsory when applying for state subsidies
- Also commercial banks offer loans for energy refurbishment.

Source: compiled from 1.BPIE (2010), 2. Altmann-Mavaddat *et al.* (2018), 3. Mariottini (2015), 4. Atanasiu & Constantinescu (2011), 5. Volt et al., (2020)

Figure 7: EPC implementation in Austria

1) EPBD/EPC implementation

Implementation: the ministry of environment and energy (YPEN)[1]
Quality check of EPC: central governmental body, the Departments of Energy Inspection are responsible for carrying out random EPC control checks
Enforcement: Administrative and monetary penalties[4]
Accreditation: governmental body is responsible for accreditation of professional associations

2) Applicability

- Legal requirement that each new rental or sale transaction must be accompanied by an EPC
- All buildings used by the public sector and visited by the public must ensure that the EPC is publicly displayed, accounts for buildings with a surface of 250m^2 or more
- The inclusion of EPC in the advertisements for sales or rentals of buildings that already have an EPC is mandatory

3) Promotion

- National information campaigns

EPC in Greece

4) Certification

- All energy auditors and inspectors are qualified engineers, mandatory exam required[4]

5) Administration/registration of EPC

- The department of energy inspection have developed a web platform which provides statistical data of the issued EPCs[1].

6) Public acceptance and use of the certificate

- EPCs are well accepted as part of the legal documentation of the building file, e.g. when obtaining a permit or in market transactions[3]

7) Finance programmes

- Subsidy schemes are tied to an obligation to have a valid EPC and its input in the database allows for more effective management of funds[2]
- National programme that offers financial support, coming from structural and national funds, for interventions in the building envelope, the heating/cooling systems and the installation of RES for DHW production.
- Programme provide investment through subsidies and zero-interest loans
- The programme was based on a collaboration between major banks and the former YPEKA ministry[1].
- Control: calculations performed from the issued EPCs before and after the intervention[1].

Source: compiled from 1. Androutsopoulos & Giakoumi (2018), 2. Atanasiu & Constantinescu (2011), 3. Volt et al. (2020), 4. Mariottini (2015)

Figure 8: EPC implementation in Greece

1) EPBD/EPC implementation

Implementation: national level[1]
Quality check: central and regional governmental body
Enforcement: in case of non-compliance of the EPC-obligation at the time of transaction there are penalties (monetary) set by the government[2]
Accreditation: German regions set the accreditation requirements for experts (no uniform accreditation system), therefore rules and qualifications may vary considerably by region[2].

2) Applicability

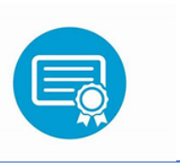
- Residential and public buildings
- Obliged for all apartment complexes that are sold/rented
- Obliged during promotion in real estate market
- Buildings smaller than 50m^2 are not obliged to present an EPC

3) Promotion

- National promotion campaign by energy agency[2]

4) Certification bodies

- Different professionals may issue certificates, such as for instance: architects, engineers, natural scientists with building related degree and master craftsmen[2]
- Often, there are differences about what version a specific group of professionals are allowed to issue[2]
- Mandatory examination for certifiers[3]
- No official register of experts; DENA has started its own database with available energy experts who have the authority to issue EPC[2]



5) Administration/registration of EPC

- No central database[2]

7) Finance programmes

- KfW is Germany's state owned promotional bank and is mandated by law to carry out its promotional activities[7].
- Provides financing by soft loans and grants for energy efficient construction and refurbishment activities for the German residential sector.
- Individual or combined measures, as well as complete packages seeking to achieve a KfW Efficiency House are promoted[7].
- The involvement of an energy consultant is mandatory in the process of application for promotional loans or grants[7]

EPC in Germany

6) Public acceptance and use of the certificate

- Purchasers are aware of the certificate but often do not use it[4].
- Purchasers understand the information but often do not trust or remember it[5].
- EPC does not show desired information (financial implications), energy bills serve as a more useful source of information about the financial impacts of EE[6].
- The difference between the two versions of EPC might not be correctly understood[2]
- The certificate does not stimulate energy efficiency effectively because of the lack of useful information for the building owner[2]

Source: compiled from 1. Atanasiu & Constantinescu (2011), 2. BPIE (2010), 3. Mariottini (2015), 4. Schuietema, Aravena & Denny (2019), 5. Volt et al. (2020), 6.Anagnostopoulos, Arcipowska & Mariottini (2015), 7. Schettler-Köhler & Ahlke (2018)

Figure 9: EPC implementation in Germany

3. CONCLUSIONS & OUTLOOK

In respect to the EPC and the relation with end users, relevant stakeholders can be allocated to different phases: the formal process of EPC implementation, information and multiplication of EPCs, and initiation of energy efficiency measures for which the EPC can serve as information tool. Next to end users other relevant stakeholder groups which were identified are: policy makers and public national and regional authorities, certifiers, informants and multipliers of the EPC, as well as advisors and implementers of energy efficiency measures. There are different types of end users, depending on their relation with the building, the function of the building and the type of the building – leading to different interests and scope of actions regarding the uptake of energy efficiency measures. In general the insights based on literature review indicate that end users do not actively use the EPC since the provided information is not significant enough to them. Regarding the six focus countries (Spain, Belgium, Finland, Austria, Greece and Germany) differences regarding the implementation scheme were identified which entail the involvement of different stakeholders. Differences in the implementation process display variations regarding the accreditation and quality check, applicability, promotion, the choice of certification bodies, registration of EPCs and financial programmes for energy efficiency measures. Therefore, the stakeholders who play a role in in the respective states and regions vary, too. The different implementation systems may be one of several factors which influence the acceptance and use of the certificate by end users. In this sense, the country specific stakeholder analysis can serve as a basis to identify different end user needs (depending on the respective implementation scheme of a country or region). Therefore, it may also serve as a basis for the identification of potential for improvement in each country. Also, the design of the EPC itself varies among member states, as well as presumably the end user types. This will also influence end users (common) needs regarding the EPC. User's needs will be further addressed in the EPANACEA project.

From the insights gained through literature research as presented in this report, questions for the stakeholder interviews can be derived, in order to deepen understanding of the needs of end users and other relevant stakeholders, and to check if the gained insights can be verified. As mentioned before the stakeholder roles are anticipated to be dynamic, i.e. that they change over time and new stakeholders may arise (Volt *et al*., 2020). Therefore, the visual stakeholder maps would need to be adapted over time too. Also because of this it is beneficial to conduct stakeholder interviews, in order to capture a picture of the *current* engagement of stakeholders with the EPC.

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