ePANACEA

Smart European Energy Performance Assessment & Certification

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Energy Performance Certificates (EPCs) potential linkage with Digital Building Logbooks and Building Renovation Passports

Report on the current status of national plans, schemes and initiatives on Building Renovation Passports

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1.2	21.05.2021	CRES	Draft for review by VTT, IZES, SYMPRAXIS
1.3	31.05.2021	CRES	Final version after review

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OVERVIEW OF THE ePANACEA PROJECT

After 10 years of track record, the current EPC schemes across the EU face several challenges which have led to a not full accomplishment of 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 Europe, 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 of ePANACEA is 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, carried out through the so-called Regional Exploitation Boards (REBs) covering EU-27+UK+Norway on the one hand, and dialogue with end-users, established by means of specific thematic workshops, on the other.

Thanks to these participatory actions, the acceptance of the ePANACEA approach will be tested and validated in order to become aligned with and meet the needs of national public bodies, end-users and other stakeholders.

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

EXECUTIVE SUMMARY

The EU has set clear targets regarding energy conservation of buildings and heavily supports activities towards achieving these targets on a European scale. The Green Deal, renovation wave, Energy Performance of Buildings Directive (EPBD) and Energy Efficiency Directive (EED) are some examples of EU's actions. For more than a decade, Energy Performance Certificates provide detailed data about the current energy needs of a building/building unit as well as information about the building construction and systems. A Building Renovation Passport (BRP) has, on a European level lately, been conceived as a tool that can stimulate cost-effective renovation in the form of a long-term basis, step-by-step deep renovation roadmap following defined quality criteria, and outline energy renovation measures that will improve the energy performance of the building. A Digital Building Logbook (DBL) is another tool that can serve as an archive where all building information can be stored and continuously updated. In this way a full record of the building history will be electronically available with data regarding construction plans and permits, maintenance and system replacement activities, energy and heat consumption and production, etc.

Building Renovation Passports and the Digital Building Logbook are tools that can help in achieving energy efficiency in existing buildings and contribute to reaching the EU renovation wave goals.

The objective of this report is to investigate how the current EPC schemes best make the link towards the BRP and the DBL to further incentivise and stimulate cost-effective deep energy renovations of buildings across Europe.

Two surveys were carried out to collect relevant information about the current status of the EPC data records and to identify stakeholders' potential needs, perceptions, thoughts and expectations, regarding a future connection between the EPC and the BRP or DBL. These surveys were prepared in two forms: using an excel file format circulated via email, and using an online questionnaire, and 16 countries contributed to their completion.

Regarding the EPCs, the state or regional energy agencies are the owner of the EPC data records and make full use of them. Their current main usage is for statistical reasons in the majority of the countries and their access is publicly available in half of the responding countries. Many common data is stored in the EPC database which can be linked with other tools (half of the EPC databases are already linked with another source).

Regarding the BRP, a review of existing European schemes showed that successful BRPs have combined the renovation advice with financial support, legal requirements and/or communication campaigns. An important factor of the BRP is that it should be issued by a qualified expert and should provide customised measures for the specific building together with the investment costs per renovation measure(s).

The DBL analysis showed that it should provide access to building information and contribute to better decision-making for future interventions as well as operation, use and maintenance records. The building owner/user is proposed to have full access to the logbook and provide/input about energy bills and building plans/construction materials info. An important aspect is that every time the building undergoes intervention works the DBL should be updated accordingly. The most important barrier is the lack of motivation to update the DBL contents followed by the absence of synergies and consistency with other tools.

Another interesting finding is that both BRP and DBL should be fed automatically by EPC data without any user interference.

There is a clear possible interconnection between EPC data and BRP and DBL future contents. An update of the current report is expected in 2023 which will incorporate more detailed input from EU countries, socioeconomic aspects and constitute to a potential linkage guide.

GLOSSARY

The following abbreviations are used in this report

AT	Austria
BE	Belgium
BU	Bulgaria
BRP	Building Renovation Passport
CY	Cyprus
CZ	Czech Republic
DBL	Digital Building Logbook
DE	Germany
EC	European Commission
EE	Estonia
EED	Energy Efficiency Directive
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
ES	Spain
EU	European Union
FI	Finland
FR	France
GR	Greece
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LU	Luxemburg

MT	Malta
NL	Netherlands
NO	Norway
PL	Poland
REB	Regional Exploitation Board
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
UK	United Kingdom

1. INTRODUCTION

The objective of this report is to investigate how the current EPC schemes best make a link towards the Building Renovation Passport (BRP) and the Digital Building Logbook (DBL) to incentivise energy renovations across Europe and stimulate cost-effective deep renovation of buildings.

The information described in this report is based on input from the ePANACEA project partners as well as desk research. Two surveys took place; one targeted to the ePANACEA partners and the other targeted to REB members. The aim of the surveys was to collect information about the current situation of EPC schemes and EPC data fields and to identify stakeholders' potential needs, perceptions, thoughts and expectations regarding a possible link between the EPC and the Building Renovation Passport and/or the Digital Building Logbook.

The survey questionnaire (see Annex 1) was answered by ePANACEA contributing partners TU WIEN, EASt, VITO, VTT, IDAE and IZES. The survey, provided in the form of an excel file, compiled the input provided in Task 2.3 "Linking EPC and Smart Readiness Indicator", enhanced with questions about the EPC data fields. The questionnaire was divided into two sections. The first section comprised 14 questions covering the national status of the EPC database, and the second section comprised 164 questions covering the EPC data fields.

The online survey, was developed in Google Forms and divided into two versions (see Annex 2): a full version of this survey was provided to the national Regional Exploitation Board (REB) members[1] outside the ePANACEA partners' countries (i.e., Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, France, Hungary, Ireland, Italy, Luxemburg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, the United Kingdom) and a short version was provided to the REB members (i.e., AT, BE, FI, DE, GR, ES). The full version comprised three sections covering questions on the national status of the EPC scheme, potential links between the EPC, the BRP and the DBL. The short version included only the potential links between the EPC and the BRP and between the EPC and the DBL.

The following types of stakeholders replied to the online survey.

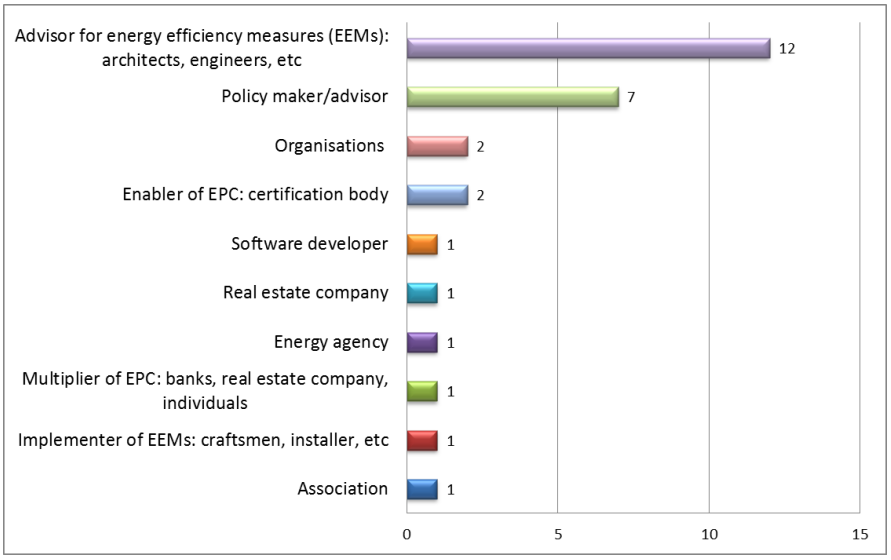

Figure 1: Type of stakeholder

[1] Regional Exploitation Boards (REBs) as defined in the ePANACEA project: European policy makers, certification bodies, end-users and other stakeholders. The Regional Exploitation Boards (REBs) are organised based on their geographical location. In total, there are five REBs established, in order to cover all EU Member States (EU27+Norway+UK)

The analysis of the desk research and the surveys is presented in the following chapters.

The current status of national EPC data regarding administrative issues, use, and person and data accessibility together with their links is presented in Chapter 2.

Existing initiatives of Building Renovation Passports and their potential link with the EPC are provided in Chapter 3.

Chapter 4 deals with the Digital Building Logbook, current initiatives and their potential interconnection with the EPC.

Chapter 5 summarises the findings from the analysis of surveys and pinpoints the most important factors in relation to EPC data that could be useful during the development of these tools from a preparation and completeness point of view.

2. EPC SCHEME NATIONAL STATUS

The Energy Performance Certificate (EPC) is a tool which provides information about the overall building energy performance. The European Commission considers that EPCs and their availability in accessible databases is a key instrument that can help improving transparency of the performance of the building stock. At the building level, EPCs inform about energy performance, the share of renewables and energy costs. At district, regional, national or Union level, they are crucial for identifying the worst-performing buildings; buildings which are in urgent need of renovation. On the other hand, the implementation of the EPC schemes varies significantly across Europe in terms of scope, information, comparability, and user-friendliness, limiting its acceptance by users as well as its market penetration and impact on investments in energy renovation measures. However, the enhancement of EPCs provides the potential for EPCs to become a crucial instrument to incentivise energy renovations across Europe. In addition, there is a need to promote the effective use of the EPC data. A well-functioning EPC system accompanied by an EPC database provides a ready-to-use source of information on the building stock[2]. The EPC databases can become an effective tool to assure data quality and collect important data for the building stock.

In the next section, an overview of the EPC databases in ePANACEA partners' and REB members' countries is presented. The analysis was based on the replies from both the survey questionnaire and the online survey and it refers to 16 countries. Specifically, these countries are: Austria, Belgium (Region of Flanders), Croatia, Estonia, Finland, Germany, Greece, Ireland, Italy, Norway, Poland, Portugal, Romania, Slovakia, Spain and the UK.

2.1. EPC Database

Apart from Norway (non-EU member state) and Slovakia, most of the countries have an EPC database in place, either national or regional, which is owned by the public authorities. The table below presents an overview of the EPC database existence and ownership.

Table 1: EPC database overview

Country	EPC database existence	Regional or national	EPC database ownership
Austria	Yes	Regional	Public Authorities
Belgium / Region of Flanders	Yes	Regional	Flemish Government; Flemish Energy Agency (VEA)
Croatia	Yes	National	Ministry
Estonia	Yes	National	Ministry of Economics and Communication
Finland	Yes	National	The Housing Finance and Development Centre of Finland (ARA) that is a

[2] Buildings Performance Institute Europe (BPIE), *Energy Performance Certificates Across the EU. A mapping of National Approaches*. 2014.

Country	EPC database existence	Regional or national	EPC database ownership
			governmental agency of the Republic of Finland operating under the supervision of the Ministry of the Environment.
Germany	Yes	National	Federal states operated by central agency
Greece	Yes	National	Ministry of Energy and Environment
Ireland	Yes	National	SEAI
Italy	Yes	Regional [a)]	National Agency for New Technologies, Energy and Sustainable Economic Development [b)]
Poland	Yes	National	The Ministry responsible for building sector
Portugal	Yes	Regional	National Energy Agency (continental + Madeira island) and Energy Regional Authorities (Azores island)
Romania	Yes	National	Ministry of Development, Public Works and Administration (MDLPA)
Spain	Yes [c)]	Regional	The Autonomous Authority
UK	Yes	Regional	UK Government and Scottish Government

[a)] Since 2015 a national database (interoperable with the regional ones) has been set up, called SIAPE (Information System on Energy Performance Certificates)

[b)] Still, data from 7 regions (out of 22 areas) are not interoperable with SIAPE

[c)] 19 databases, one per region

Country focus: Finland

The EPC database is national and managed by Asumisen rahoitus- ja kehittämiskeskus (ARA) that is also the data controller. The Housing Finance and Development Centre of Finland (ARA) is a governmental agency of the Republic of Finland operating under the supervision of the Ministry of the Environment. The technical management of the EPC database is contracted out to an IT service provider. Only registered persons have right to input and read the data.

The main usage of the EPC database is for statistical reasons (Austria, Croatia, Estonia, Finland, Greece, Ireland, Italy, Poland, Portugal and UK), as seen by the respondents in Figure 2. Also, the EPC database can be used as a tool to set funding programmes (Estonia, Ireland, Italy, Portugal, Romania and UK) and for benchmarking (Ireland, Italy, Portugal, Romania and UK). It is also noted that policy decisions (Ireland, Italy, Portugal, Romania and UK) can be influenced as the EPC database can be a useful source of information for building stock energy performance. Austria, Finland, Greece and Spain make control checks based on the data provided in the EPC database.

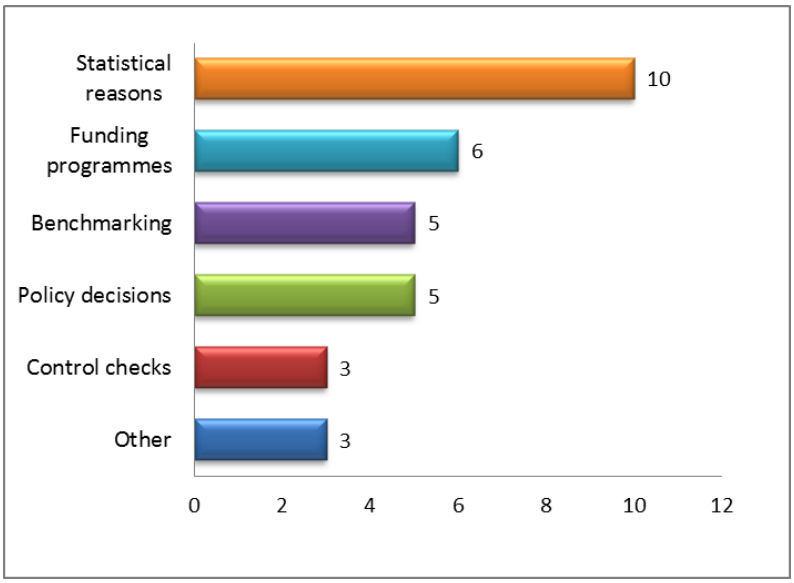

Figure 2: EPC data usage

Regarding the accessibility of the EPC database there is a variety across the surveyed countries. Public authorities are the main stakeholders who have access, while building owners and building managers have limited or no access.

Table 2: EPC database access

Country	Building owners	Building managers	EPC assessors	Public authorities	Building professionals
Austria			X	X	X
Belgium / Region of Flanders	X			X	
Croatia	X	X	X	X	X
Estonia	X	X	X	X	X
Finland [a)]			X	X (only ARA)	
Germany				X	
Greece				X (only the competent	

Country	Building owners	Building managers	EPC assessors	Public authorities	Building professionals
				Ministry)	
Ireland	X	X	X	X	X
Italy	X	X	X	X	X
Poland	X	X	X	X	X
Portugal	X		X	X	
Romania				X	
Spain	X (only your own EPC)			X (only the competent Ministry)	
UK	X	X	X	X	X

[a] Everybody can read the first two pages of the EPC (except for buildings with one or two apartments). Assessors have the right to read all data for the EPCs they issue. ARA has all the rights.

Country focus: Region of Flanders

In the region of Flanders there is a unique integral digital file of each individual building (The Woningpas). The file can be retrieved by the building owner and by individuals who have authorised access. The logbook features energy performance, renovation advice, the housing quality (such as stability, humidity, and safety), data on the environment and, in the future, other building aspects such as durability, water, installations and building permits. The Woningpas will make it possible to track the evolution of each individual building.

Data protection and privacy play an important role regarding the management/handling of information stored in the EPC database. In many countries, as presented in Table 3, data is not publicly available while aggregated data for different building types is accessible in some countries. It is worth noting that in the UK, the data is publicly available for public buildings, commercial buildings, and residential buildings.

Table 3: EPC open access data

Country	Open access data	Explanation
Austria	No	Regional owner of EPC databases can use the data anonymously. Cities and municipalities have access to data of their territory for different reasons such as spatial planning purposes, statistical evaluations, etc.
Belgium / Region of Flanders	Yes	Accessible online but only for authorized actors - not publicly available.
Croatia	Partially	
Estonia	Yes	Public buildings, Residential buildings
Finland	Yes	The first two pages of the Finnish EPC are public, except for the smallest residential buildings.
Germany	No	
Greece	No	
Ireland	No	
Italy	Yes	Only aggregated data
Poland	Yes, but with limited parameters	Public buildings
Portugal	Yes	Public buildings, Commercial buildings, Residential buildings (Only limited aggregated data)
Romania	No	
Spain	No	
UK	Yes	Public buildings, Commercial buildings, Residential buildings

The EPC database is a source of information which can be an essential repository for other data sources and web services. In Austria, the EPC database is linked with the land registry while in Greece it is also linked with national funding programmes. Similarly, the region of Flanders has established links with various services.

Table 4: EPC database links with other databases

Country	Links with other databases	Explanation
Austria	Yes	Land registry
Belgium / Region of Flanders	Yes	The data is collected through existing databases and information platforms (e.g., EPC database, subsidy database, solar potential map, etc.), to which it is connected.
Croatia	No	No
Estonia	Yes	Building Register
Finland	No	No
Germany	No	No
Greece	Yes	Land registry, Tax Authority and platform of the national incentive programme 'EXOIKONOMO – AUTONOMO"
Ireland	No	No
Italy	Yes	The EPC database at national level is: https://siape.enea.it/
Poland	No	No
Portugal	Yes	Receive: National building ID and Utilities IDs; Provide: National Statistics with data from the building stock and Real Estate Market with EPC label
Romania	No	No
Spain	No	In the majority of cases
UK	Yes	Ordinance Survey's unique property reference numbers (UPRNs) database.

Countries focus: Greece

In Greece, the EPC database is linked to other data sources. Specifically, users (Building Inspectors) of the Land Registry's GIS system specify the exact location of the building and then they store the corresponding Land Registry ID to the EPC. The link with the Tax Authority concerns the validation of the fee data (for each EPC issuance a fee must be paid) and the rent / lease contract to an EPC. In addition, the EPC Database is linked to the platform of the national incentive programme 'Energy Efficiency at Household Buildings' because an EPC should be issued before and after the renovation.

Countries focus: UK (Scotland)

In Scotland, to help Scottish local authorities achieving their target, energy advisors are funded to provide them with in depth, address level, data on their housing stock and rates of fuel poverty using the Energy Saving Trust Home Analytics dataset (which combines EPC data with regression analysis, socio-demographic data and historic data to give a picture of the whole housing stock accessible through a single data portal).

2.2. EPC data fields

Based on the survey questionnaire filled in by the contributing ePANACEA partners, the analysis showed that the data stored in the EPC databases varies across ePANACEA partners' countries. More specifically, in:

- Austria: most of the data is included in both the EPC database and the EPC report. General data (building owner and number of floors) is included only in EPC database while building construction products' data (such as thickness of the material) is included only in the EPC report. There are differences in the energy assessment depending on the use of a building. For instance, data regarding lighting in a building is only considered in the energy assessment for non-residential buildings.
- Belgium: there is data which is included in the EPC database and in the EPC report. The data concerns general building data (e.g. construction year, owner, building use), energy data, and recommendations. It is noted that the EPC methodology is constantly improved. Since January 2019, the data input refers to a typical existing residential building.
- Finland: all the data provided in the EPC report is also included in the EPC database.
- Germany: there is few data which is both registered in the EPC database and mentioned in the EPC report. This concerns general data (building use, EPC registry number, and address).
- Greece: the EPC database contains general data (such as the building address, owner(s), building ownership status and building use, building history (construction year, renovation years) and calculation outputs as they are displayed on the EPC report. In addition, the XML file is also registered in the EPC database. Lighting and ventilation data is considered only for non-residential buildings. Domestic Hot Water data is taken into account for residential buildings and specific non-residential uses (such as hotels, hospitals, etc.).
- Spain: the XML file is registered in the regional databases (19 databases, one per region). Data related to the building envelope and recommendations are included only on the EPC report. Lighting and ventilation data is considered only for non-residential buildings.

3. BUILDING RENOVATION PASSPORT (BRP)

As set in art. 19a of the EPBD[3], a building renovation passport *"… is complementary to the energy performance certificates, in order to provide a long-term, step-by-step renovation roadmap for a specific building based on quality criteria, following an energy audit, and outlining relevant measures and renovations that could improve the energy performance.*"

The EC's Renovation Wave Strategy[4] in addition states "*As foreseen by the EPBD, Building Renovation Passports will provide a clear roadmap for staged renovation over the lifetime of a building, helping owners and investors plan the best timing and scope for interventions.*"

There is no universally agreed definition of a building renovation passport and its meaning and purpose overlaps with other instruments. There are schemes and initiatives that share some characteristics and objectives with the BRP, including one-stop-shops, energy performance certificates, energy audit frameworks and online renovation advice tools.

3.1. Current Initiatives

Based on the Technical study on the possible introduction of optional building renovation passports commissioned by the EC in 2020[5] there is a variety of schemes and initiatives that have similar characteristics and objectives as the BRP, including one-stop-shops, energy performance certificates, energy audit frameworks and online renovation advice tools. Table 5 presents an overview of the schemes and initiatives available in the ePANACEA partners' countries and the REB members' countries.

Table 5: Overview of the schemes and initiatives existing in the selected countries[5]

Country	Name of the initiative	Start year	Conceptual basis
Belgium	EPC+	2019	The EPC+, is an EPC equipped with a renovation roadmap, includes recommendations for various elements that accompany a thorough renovation (airtightness, ventilation etc.), and provides a selection of technical information to avoid lock-in effects.
France	Ma Rénov	2017	A one-stop-shop supporting energy renovation of private homes.
France	Oktave	2016	A one-stop-shop offering personalised support on technical, financial and administrative aspects of low-energy renovation projects.
France	Passeport Efficacité Energétique	2012	A BRP concept developed by a group of building specialists and professionals. The P2E web application is used by the expert to develop a very simple diagnosis of the building and outlines a set

[3] EPBD 2018/844/EU

[4] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives {SWD(2020) 550 final}

[5] European Commission, "Final report – Technical study on the possible introduction of optional building renovation passports", 2020

Country	Name of the initiative	Start year	Conceptual basis
			of "performance combinations" that would allow that specific building to become a low-energy building.
France	Passeport Energie Habitat	2015	A renovation roadmap concept in the region of Angers Loire Métropole. The roadmap shows the energy performance level and quality of different components and provides tailored recommendations.
France	Picardie Pass Rénovation	2013	A one-stop-shop for homeowners. The model provides the homeowner with a single point of contact, an on-site energy audit, and recommendations of how to optimise energy savings, integrated financial solutions and post-installation checks.
Germany	Energieberatung	n/a	A compilation of German public support schemes focusing on energy audits and checks, for residential and non-residential buildings.
Germany	HeizCheck	2004	A private online renovation advice instrument providing a first building check based on user-inserted data.
Germany	Individueller Sanierungsfahrplan für Wohngebäude (iSFP)	2017	The federal renovation roadmap has been designed to be a user-friendly tool that includes both short- and long-term renovation measures and suggests ways to avoid lock-in effects. The roadmap targets the highest efficiency level that is technically and economically feasible.
Germany	Sanierungsfahrplan BW	2013	The regional roadmap is an evolution of the rather simple energy audit scheme ("Energiesparcheck"), and is based on an on-site audit of the building. The instrument widens the idea of an energy audit by integrating a personalised and long-term perspective as well as a lifecycle approach.
IJmond and Zuid-Kennemerland (the Netherlands)	Huizenaanpak	2014	A Dutch one-stop-shop model that helps building owners to plan, implement and finance their energy renovation.
Ireland	Building Energy Rating Certificate	2011	The national EPC framework, which comprises a public database and innovative features.
Portugal	Certificação Energética dos	2007	The national EPC framework, which comprises a public database and innovative features. The data is, for example, used to evaluate the renovation needs, support the process of loan

Country	Name of the initiative	Start year	Conceptual basis
	Edifícios		applications and monitor progress of the financing programme.
Tipperary (Ireland)	SuperHomes	2015	A one-stop-shop which supports homeowners with all aspects of the energy renovation process. The customer journey comprises financial guidance, selecting the best energy saving measures, and finding the right contractors.
UK	Home Energy Masterplan	2009	The private model offers a "masterplan" for the homeowner to reduce energy consumption. The plan is based on a detailed on-site survey. Each renovation option includes a cost-benefit analysis, including energy use and cost, environmental impact and comfort.

Up to now there are 33 schemes identified; many of them (15) exist in the ePANACEA and REB countries (BE, FR, DE, NL, IE, PT, and UK). Specifically, there are 5 cases which include one-stop-shops; 3 from France (Ma Rénov, Oktave, and Picardie Pass Rénovation), one from the Netherlands (Huizenaanpak) and one from Ireland (SuperHomes). An energy audit framework is developed in 3 cases in Germany (Energieberatung, Individueller Sanierungsfahrplan für Wohngebäude, Sanierungsfahrplan BW) and in 1 case in the UK (Home Energy Masterplan). In Belgium, Ireland, Portugal and France there are schemes with EPC characteristics (Woningpas & EPC+, Building Energy Rating Certificate, Certificação Energética dos Edifícios, Passeport Energie Habitat respectively). In addition, only two online renovation advice tools are identified in Germany (HeizCheck) and France (Passeport Efficacité Energétique).

Among those, the initiatives from Belgium Flanders (EPC+), Germany (iSFP), France (P2E), and Denmark (BetterHome) have been analysed in iBRoad project. An integrated BRP concept has been developed which is suitable for different national conditions. The iBRoad's Individual Building Renovation Roadmap for single-family houses looks at the building as a whole, and provides a customised renovation plan over a long-term period (5-30 years). This roadmap lifts the renovation barriers and makes it possible to improve a building's energy efficiency gradually, taking into account the occupants' needs and specific situation (e.g., financial situation, composition of the household, etc.).

The most successful BRPs have combined the renovation advice with financial support, legal requirements and/or communication campaigns. The review shows that the BRP should be integrated with, and reinforced by other elements (e.g. simple access/use, financial support, communication) in order to be effective.[6]

3.2. Potential links between the EPC and the BRP

Based on the replies from the online survey, an important factor to consider is that both the BRP and the EPC should be issued by a qualified expert. Customised measures for the specific building are a key element for both BRPs and EPCs as it is also shown in Figure 3. The estimation of investment costs per renovation measure/combination of renovation measures is the third

[6] European Commission, "Final report – Technical study on the possible introduction of optional building renovation passports", 2020

characteristic which is considered by the respondents important for BRPs. Additionally, outlining the final energy saving after implementation of each renovation measure/combination of measures is important to be included in the EPC.

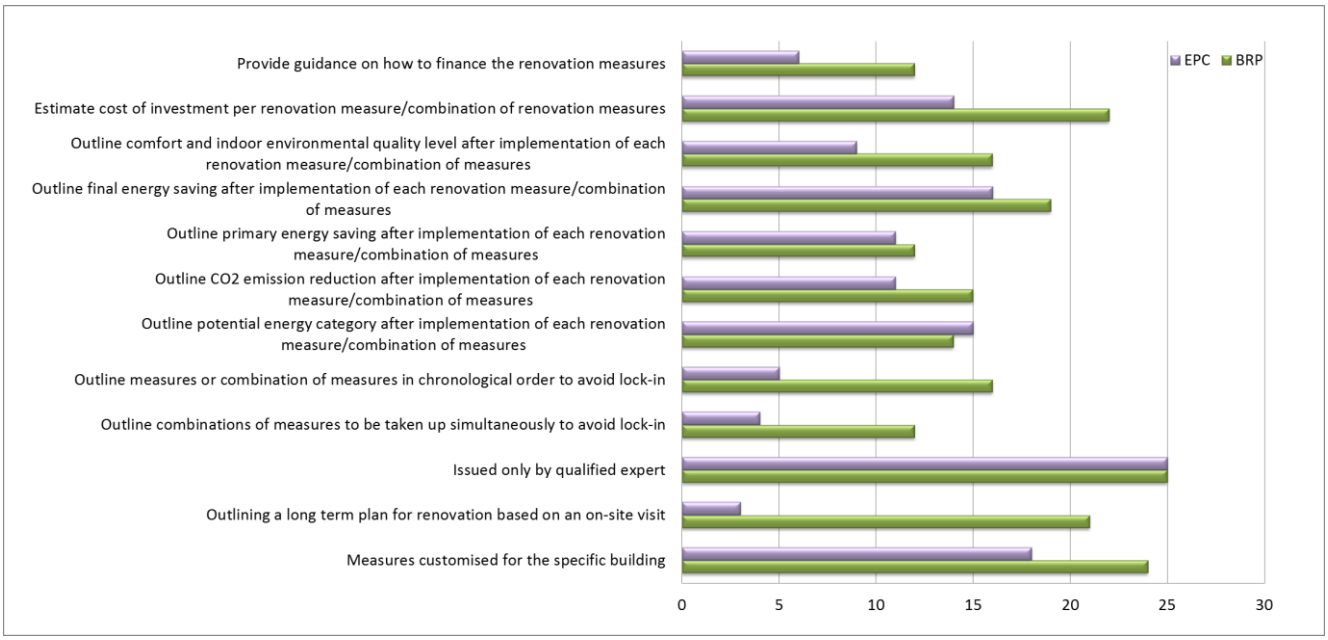

Figure 3: Important characteristics for a BRP and to be included in the EPC

The most preferable option as regards the potential link of the EPC with the BRP is that the EPC automatically feeds the BRP. Also, the integration of combinations of renovation measures from the BRP into the EPC, referring to a long-term perspective in a chronological order, can be an option. The BRP automatically feeding the EPC and the integration of a hyperlink to the EPC into the BRP are also possible links (Figure 4).

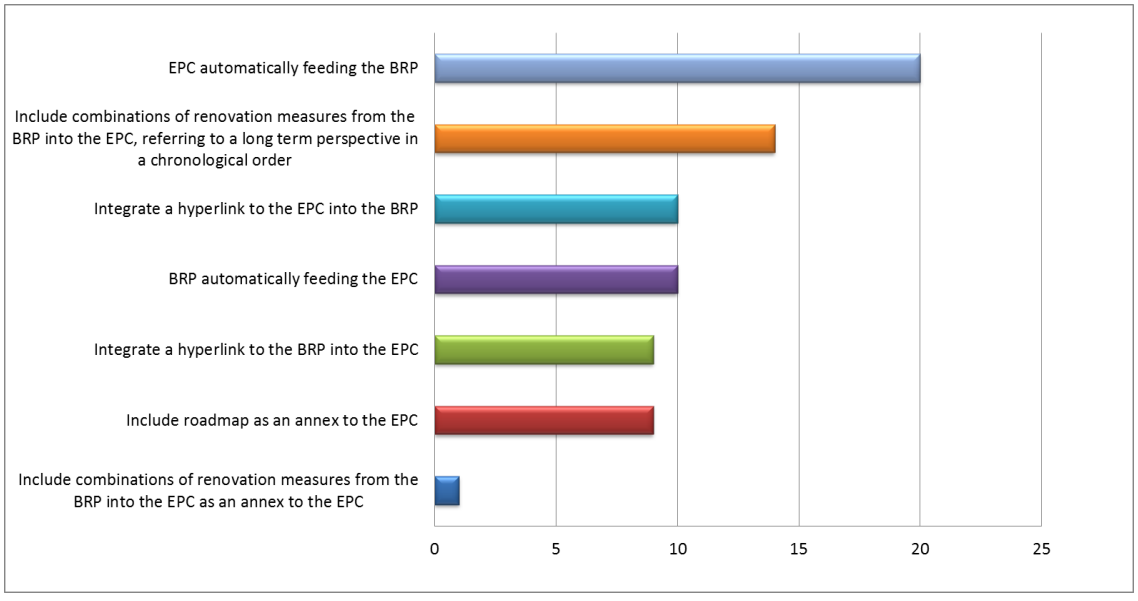

Figure 4: Potential links between EPC and BRP

4. DIGITAL BUILDING LOGBOOK (DBL)

The EC's Renovation Wave Strategy[7] states "*Deep renovation is not always achievable in one go. It is therefore important to create better conditions for staged renovation. The Commission will introduce Digital Building Logbooks that will integrate all building related data provided by the upcoming Building Renovation Passports, Smart Readiness Indicators, Level(s) and EPCs to ensure compatibility and integration of data throughout the renovation journey.*"

In addition, according to EC Study on the Development of a European Union Framework for Digital Building Logbooks[8], a possible definition for the digital building logbook can be as follows:

"A digital building logbook is a common repository for all relevant building data. It facilitates transparency, trust, informed decision making and information sharing within the construction sector, among building owners and occupants, financial institutions and public authorities.

A digital building logbook is a dynamic tool that allows a variety of data, information and documents to be recorded, accessed, enriched and organised under specific categories. It represents a record of major events and changes over a building's lifecycle, such as change of ownership, tenure or use, maintenance, refurbishment and other interventions. As such, it can include administrative documents, plans, description of the land, the building and its surrounding, technical systems, traceability and characteristics of construction materials, performance data such as operational energy use, indoor environmental quality, smart building potential and lifecycle emissions, as well as links to building ratings and certificates. As a result, it also enables circularity in the built environment.

Some types of data stored in the logbook have a more static nature while others, such as data coming from smart meters and intelligent devices, are dynamic and need to be automatically and regularly updated. A digital building logbook is a safe instrument giving control to users of their data and the access of third parties, respecting the fundamental right to protection of personal data. Data may be stored within the logbook and/or hosted in a different location to which the logbook acts as a gateway."

Digital Building Logbooks will therefore serve as repositories for data on individual buildings and facilitate information sharing within the construction sector, and between building owners and tenants, financial institutions and public authorities.

4.1. Current Initiatives

Current initiatives identified in the ePANACEA and REB countries show that there is a variety in terms of maturity level and status of DBLs. In the following table an overview of the initiatives is presented.

[7] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A Renovation Wave for Europe - greening our buildings, creating jobs, improving lives {SWD(2020) 550 final}

[8] European Commission, "Study on the Development of a European Union Framework for Digital Building Logbooks – FINAL REPORT", 2020

Table 6: Overview of the current DBL initiatives of the surveyed countries (Source: "Building Logbook – State of Play", European Commission, 2020)

Country	Name of the initiative	Maturity level[1]	Mandatory/Voluntary
Belgium	Dossier d' intervention ultérieure	In place	Mandatory
Finland	Building Passport GBC	Under development	n/a
Finland	Ilmastoviisaat Taloyhtiöt	Under development	n/a
Finland	Real estate service manual	In place	Mandatory
Flanders	Woningpas	In place	Mandatory
Germany	Eigenheim Manager	In place	Voluntary
Germany	Gëbaudepass	In place	Voluntary
Germany	Hausakte	In place	Voluntary
Germany	ImmoPass	Discontinued	n/a
Germany	QDF Hausakte	In place	Mandatory
Greece	Electronic building ID	In place	Mandatory
Italy	Fascicolo del Fabbricato	In place	Mandatory
Portugal	Livro de obra	In place	Mandatory
Spain	Libro del Edificio	In place	Mandatory
Spain	PAS E	Under development	Voluntary
UK	CIBSE TM31	In place	Mandatory
UK	Home Information Pack	Discontinued	n/a

[1] Under development: initiatives that are planned to be implemented or not yet operational; In place: initiatives currently operative; Discontinued: initiatives no longer in place

According to Report 2 of the study on the development of a European Union framework for buildings' digital logbook[9] there are 34 building logbook initiatives; of which 25 occur in ePANACEA and REB member countries (BE, FI, FR, DE, GR, IT, PT, ES, NL, and UK). In particular, as shown in Figure 5, there are different maturity levels among the initiatives. Fourteen (14) DBLs (56%) in 9 countries (BE, FI, DE, GR, IT, PT, ES, NL, and UK) are currently operative, while there are 5 initiatives in France which are in pilot phase. In FI, ES and NL there are 2, 1, and 1 DBLs respectively which are under development. Due to various barriers (e.g. cost implications, administrative burdens), Home Information Pack (UK) and ImmoPass (DE) are no longer in use.

The majority of the DBLs are currently in operation 9 of them are mandatory and only 5 are voluntary.

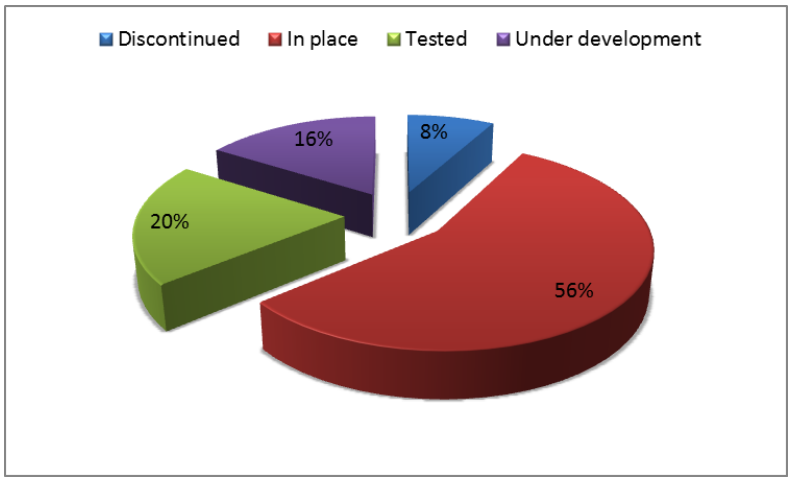

Figure 5: Maturity level of the DBLs (Source: "Building Logbook – State of Play", European Commission, 2020)

Relevant initiatives from Belgium Flanders (Woningpas), France (P2E) and Denmark (BetterHome) were analysed in the iBRoad project. An integrated DBL concept was developed suitable for different national conditions. The iBRoad's Logbook for single-family houses is a repository of information on aspects like energy consumption and production, executed maintenance and building plans, useful for home-owners and occupants, for energy auditors and contractors, as well as policy makers.

4.2. Potential links between the DBL and the EPC

Based on the replies by 29 respondents from 16 countries, the most important information to include in the DBL is the EPC report itself. Building descriptions and characteristics (e.g. age, construction type, walls, windows, roof, etc.) as well as the equipment included in the building (for heating, cooling, control of interior environment) and data/certifications on their maintenance also constitute important data to be included in a DBL. Based on the DBL definition, information on previous works and renovation potential (such as a BRP) is a key element and this is also captured from the replies as shown in Figure 6. Equally important is considered the featuring in the DBL of building consumption data.

[9] European Commission, "Building Logbook – STATE OF PLAY", 2020

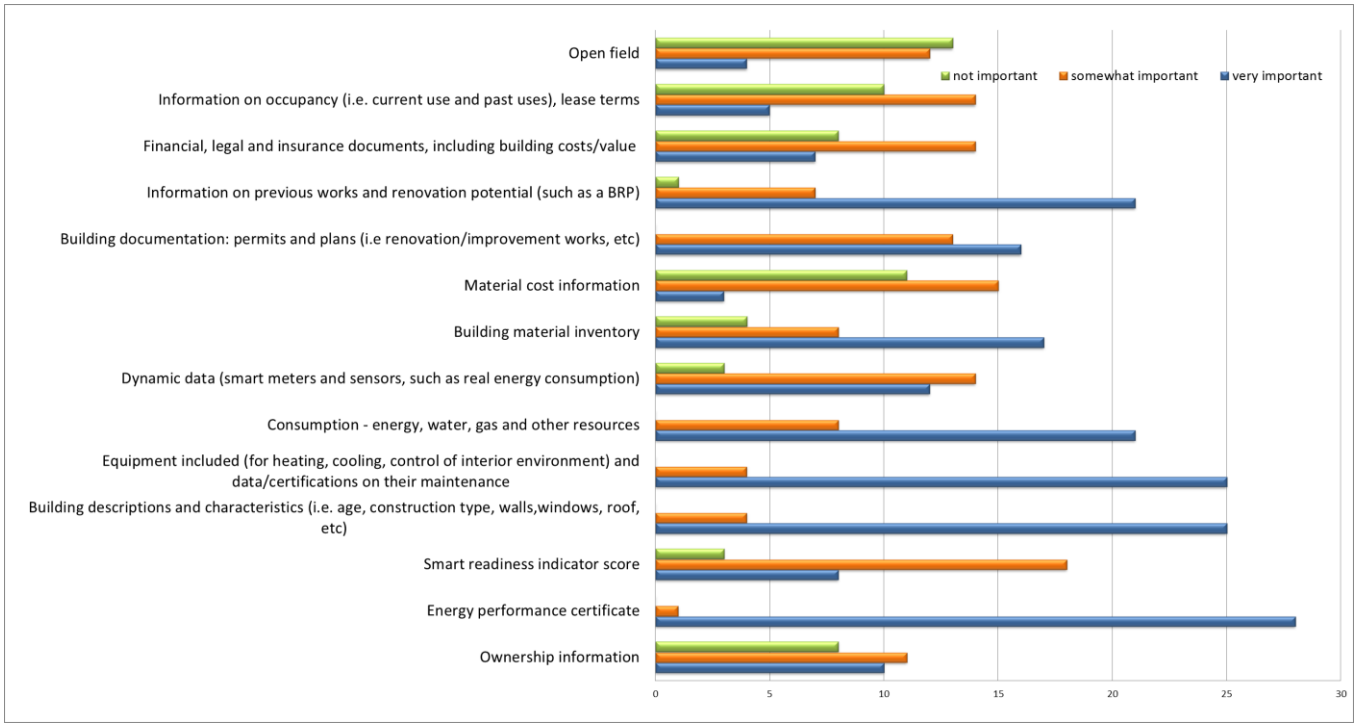

Figure 6: Data importance for a DBL

As regards functionalities to be included in a DBL, respondents consider the renovation roadmap to be the most important. Additionally, they have identified the information of energy performance as important characteristic. Predictive maintenance and alerts should also be considered in the development of a DBL (Figure 7).

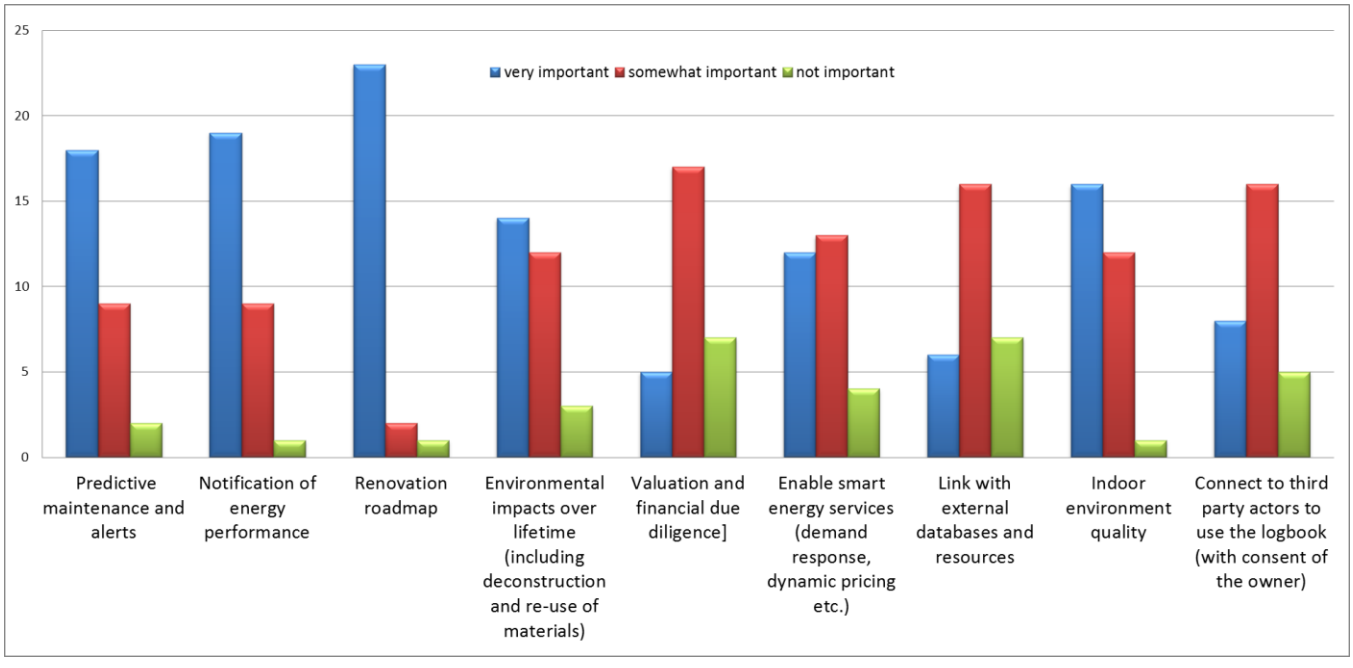

Figure 7: Functionalities considered important to include in the DBL.

Building experts who are qualified and have all the data and the expertise to analyse and handle building related data are considered by respondents the dominant potential source of information in a DBL. Building owners could also provide specific data, while an EPC database could constitute an important data source for a DBL (Figure 8).

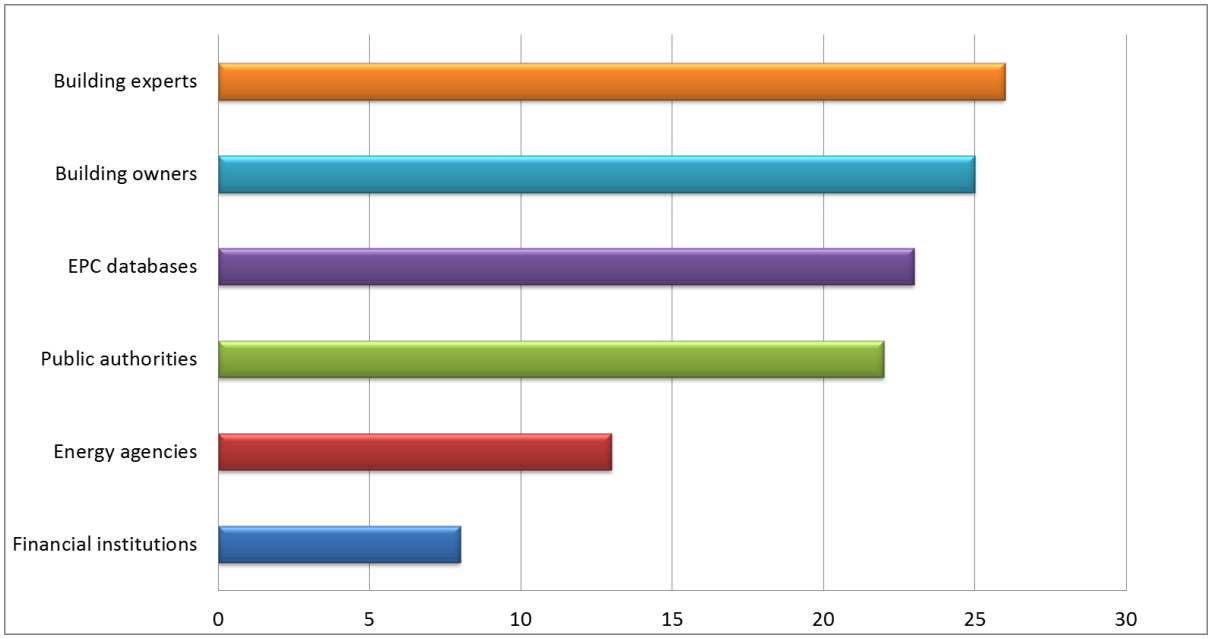

Figure 8: Potential sources of information in a DBL

The type of data a building owner/user could provide includes, among which energy bills, building plans/construction materials, usage patterns and energy renovation actions (planned or undertaken) (Figure 9).

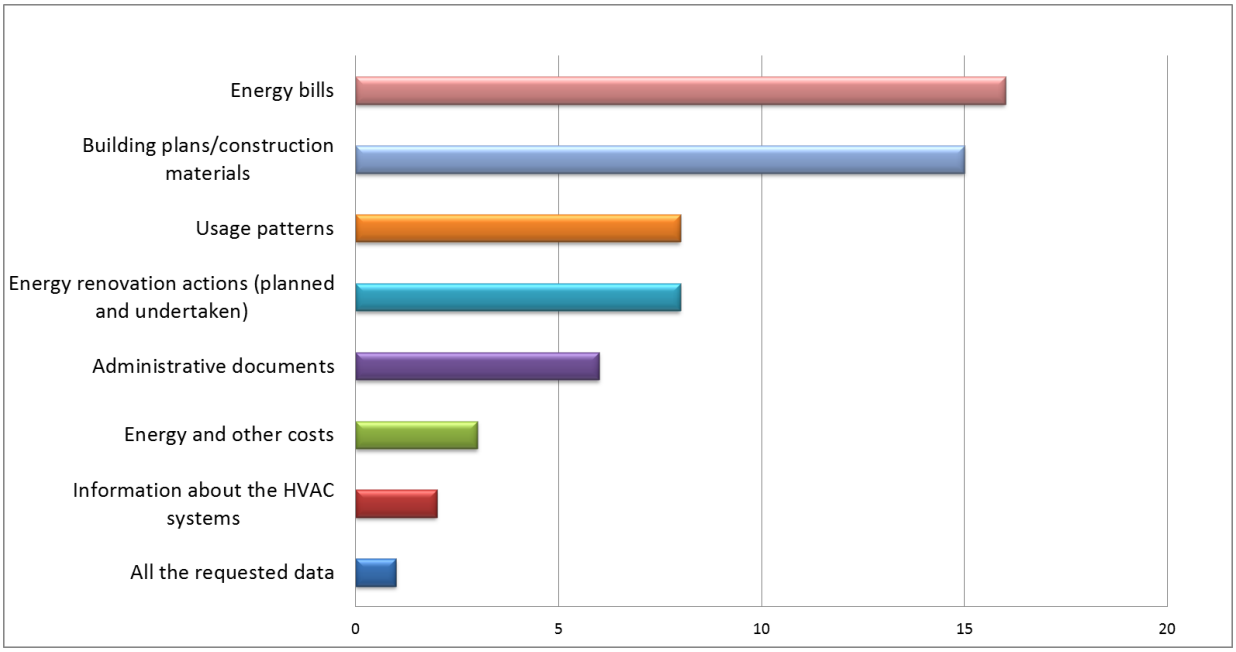

Figure 9: Data potentially provided by the building owner

Accessibility (i.e. who has access and in what level) is an important issue; as seen in Figure 10, the building owner should have full access to the data related to their building. Third parties (e.g. building professionals, energy assessors) should have limited access while for public authorities the opinions are divided between full and limited access.

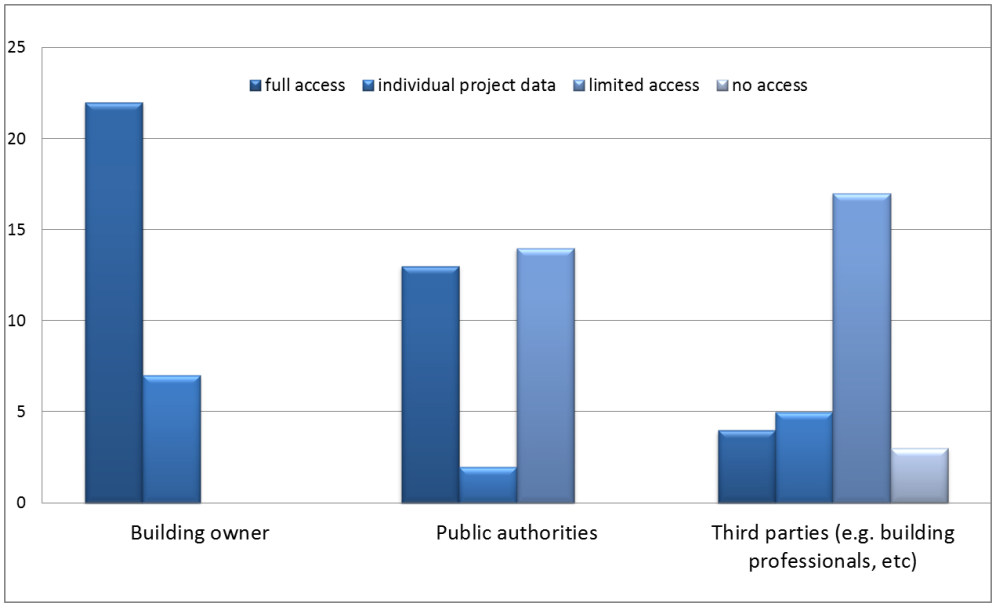

Figure 10: Data accessibility

The logbook is a dynamic tool; hence, updates are needed. According to the respondents, every time the building undergoes intervention works the logbook should be updated. Also, when the building use/type or ownership changes, the logbook should be updated (Figure 11).

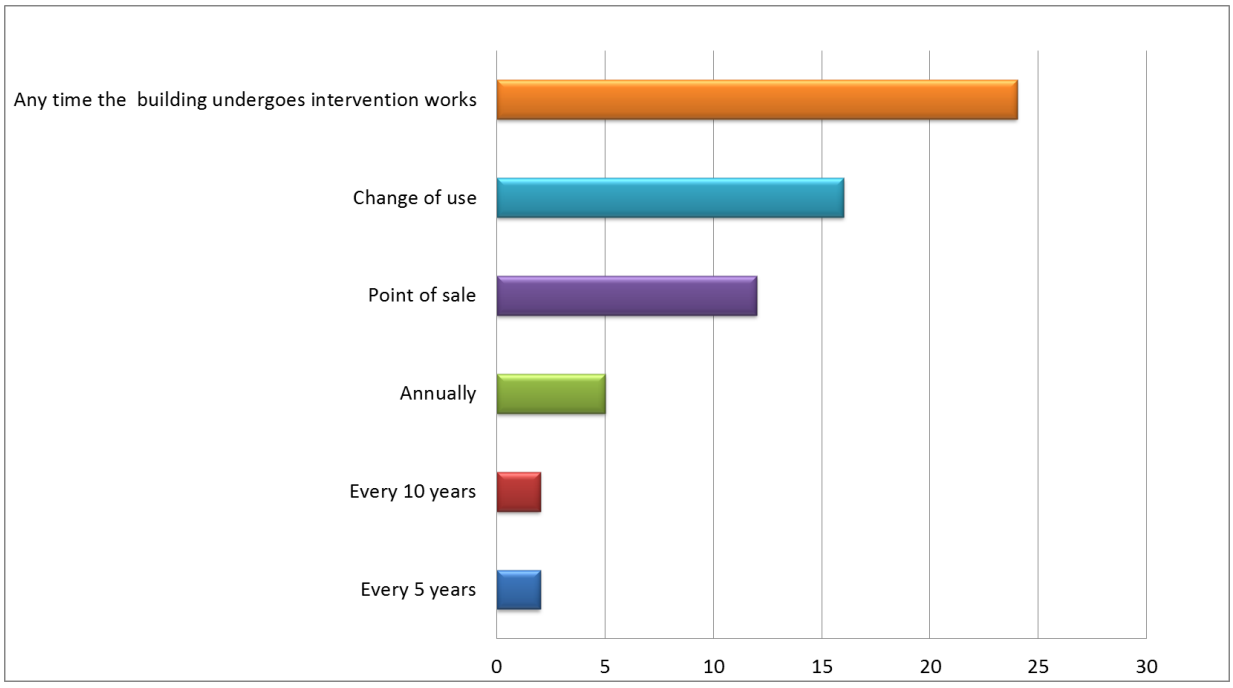

Figure 11: DBL update period

Random surveys/audits seem to be the most favourable way of data quality assurance. Other procedures which are proposed are input data control and range analysis (Figure 12).

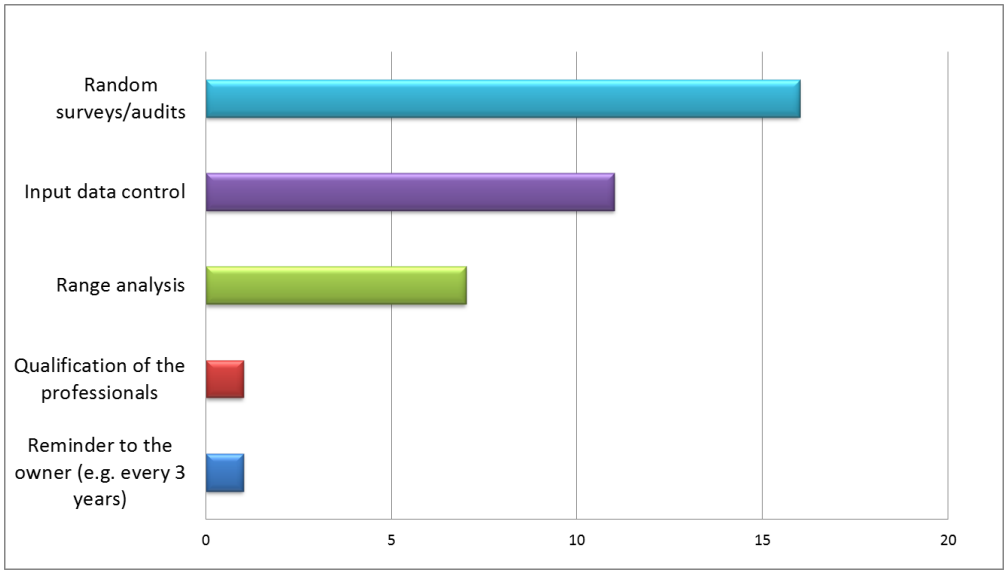

Figure 12: Potential ways to assure quality of the DBL

The most important benefits that the DBL should provide are the access to information and better decision-making (Figure 13). In addition, operation, use and maintenance issues are important to be provided in a logbook.

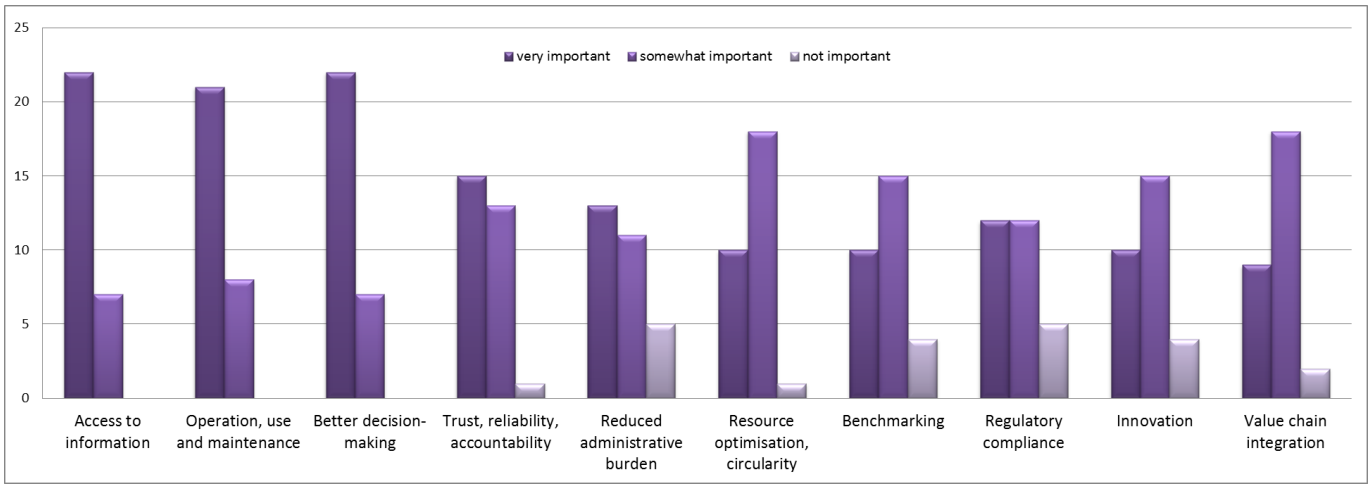

Figure 13: Important key benefits that a DBL should provide

All respondents believe that a successful DBL should have a clear scope/purpose. It should be user-friendly because the building owner (general public) has no technical expertise and needs simple and easy access to the DBL. There should also be an option to develop a DBL for different building types (Figure 14).

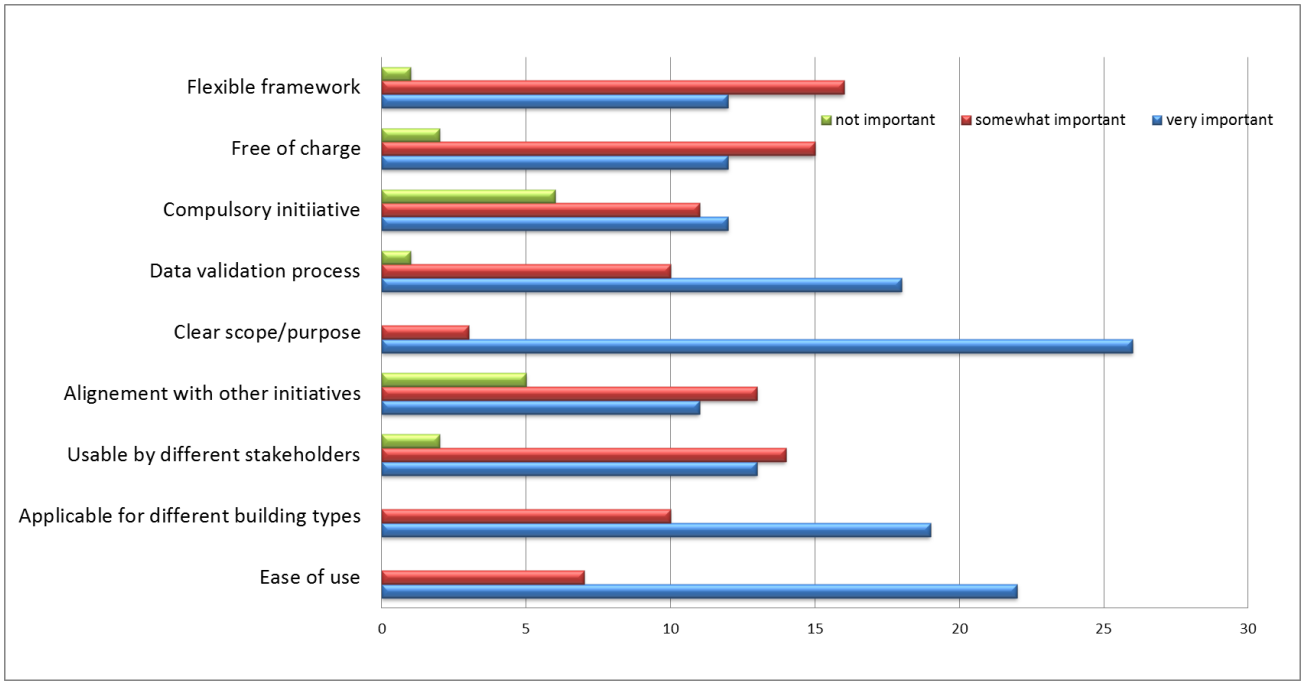

Figure 14: Important characteristics for the development of a successful DBL

Lack of motivation to update the contents is the most important barrier identified for the development of a DBL. There are many instruments which are relevant for buildings and the lack of synergies and consistency among the different tools is another barrier. If benefits are not clearly identified so that the user feels confident to use it, this may be a deterrent factor, too (Figure 15).

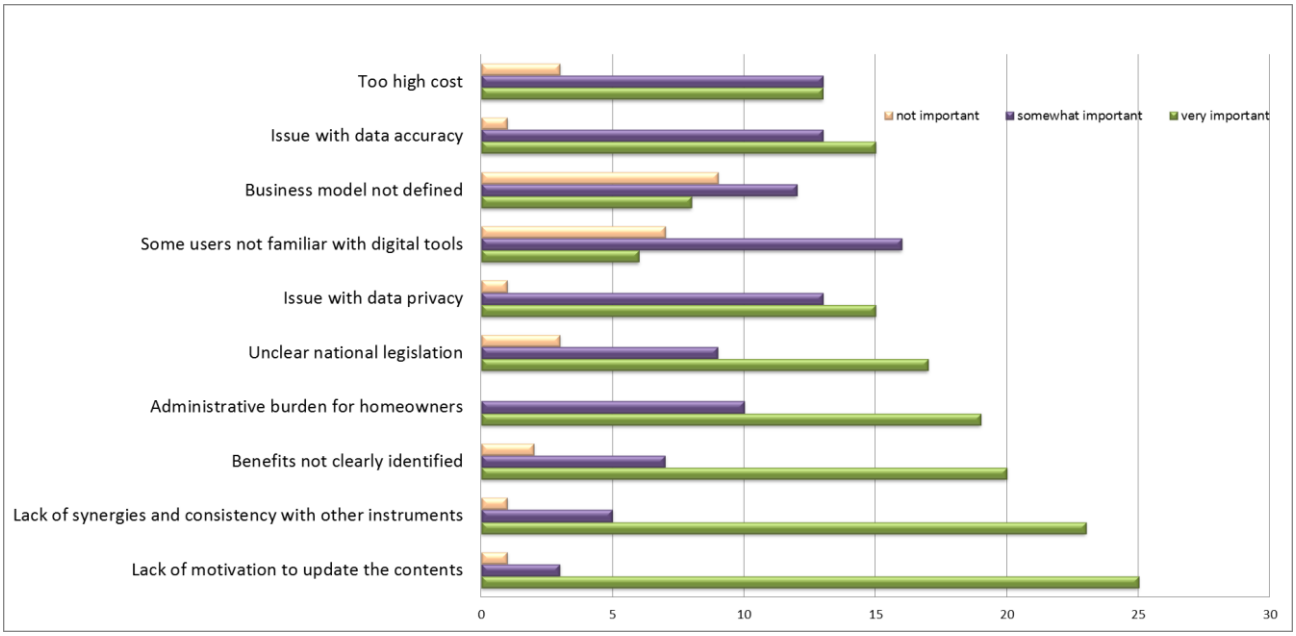

Figure 15: Important barriers to the development of a DBL

Finally, the most preferable option as regards to the potential link of the EPC with the BRP is that the EPC automatically feeds the DBL. The second option is the opposite approach; the DBL automatically feeding the EPC. A common registry could also constitute an approach on how to link the EPC to a DBL (Figure 16).

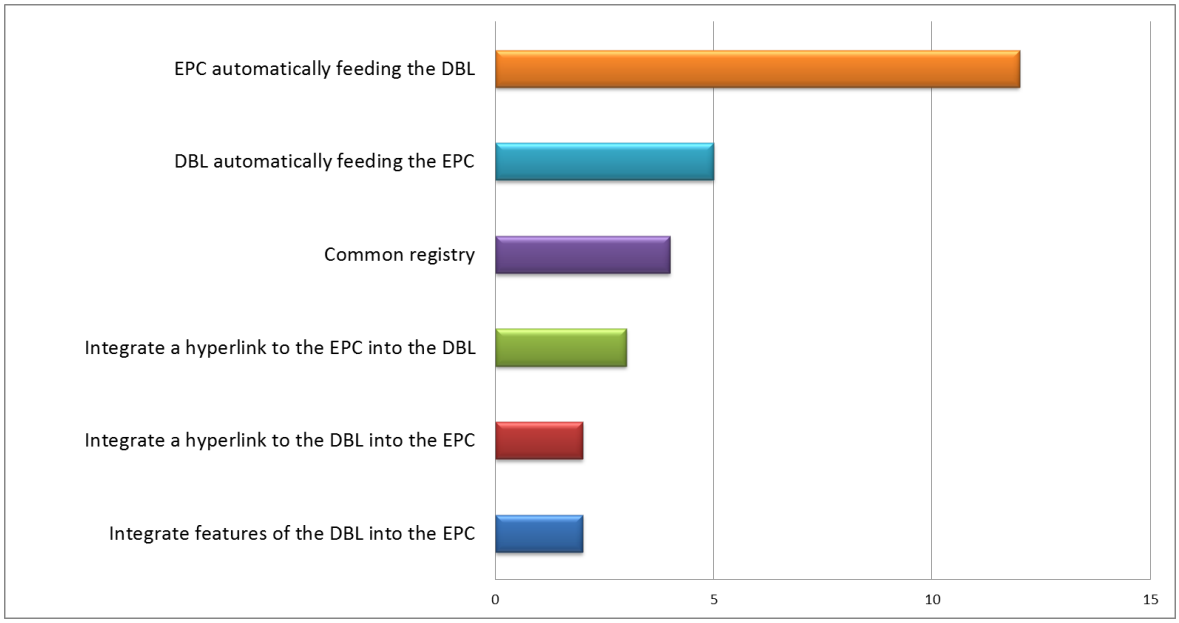

Figure 16: EPC potential links to a DBL

5. CONCLUSIONS

In the ePANACEA project there is a large coverage in terms of EU Members States (EU27+ UK and Norway). The analysis in the current report is based on the responses from online surveys and questionnaires covering 16 countries (AT, BE, HR, EE, FI, DE, GR, IE, IT, NO, PL, PT, RO, SK, ES, UK) as well as literature analysis.

As regards the EPC Database, the majority of the surveyed countries either have a national or a regional database (apart from NO, SK). Important stakeholders such as public authorities, EPC assessors and building owners have access to the database; however, there are limitations on the data publicity due to data protection and privacy.

Half of the EPC databases interoperate with other databases (such as Building Register) which could contribute to the development of other registers (such as DBL and BRP).

Regarding GR and ES it can be said that all data is stored in the EPC database since the XML file itself is registered in the database. In AT, BE and FI part of the data, which is provided in the EPC report, is also included in the database. On the other hand, only general building data is included in the database in DE.

Both BRP and EPCs should be issued by qualified experts.

EPC data that is important to be included in the DBL are building descriptions, characteristics and electromechanical installations. The renovation roadmap is important to be included as functionality in a DBL and building experts are the main source of information in a DBL. Energy bills, and building plans/construction materials could be provided by the building owner/user who is proposed to have full access to the logbook. Any time the building undergoes intervention works, the logbook should be updated. In order to assure data quality, random surveys/audits are considered to be most suitable. Access to information and better informed decision-making are the most important key benefits for the logbook, while the DBL should have clear scope/purpose to be successful. The development of a DBL should provide motivations to the users to update the contents/data.

A general conclusion to be drawn from the above analysis is that the EPC should preferably automatically feed both the BRP and the DBL.

This report represents a first attempt to review existing initiatives of BRPs and DBLs and to identify potential links of these schemes to EPCs. Further analysis is needed in order to develop clearer and more tangible solutions; both BRPs and DBLs are evolving, developing and become more popular. An update of this report will be developed in 2023.

6. REFERENCES

6.1. List of figures

6.2. List of tables

6.3. Other References

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7. ANNEXES

Annex 1

First Section of the survey questionnaire

	Country name
Do you have an EPC database? (Yes/No)	
If yes, please answer below (row 4-9)	
Is it Regional or National?	
Is it Regional or National?	
Who owns it?	
Who manages it?	
How many EPC are issued annually (in average)?	
Is it user friendly (feedback needed from the database manager, if possible)?	
What is the usage of the EPC data (e.g. statistical reasons, benchmarking)? Please specify	
EPC database access: Who has access to the EPC database (e.g. Building owners/users, EPC auditors, Building professionals). Please specify.	
Open source data: Are the data open (e.g. For public buildings, commercial buildings, residential buildings)? (Yes/No)	
If yes, please specify	
Does the EPC database link with other national/regional databases (e.g. Land registry)? (Yes/No)	
If yes, please specify	

Second Section of the survey questionnaire

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Building	Building performance	Air tightness	1/h
Building	Building performance	EPC rating	
Building	Energy performance	Electricity consumption	kWh/m²
Building	Energy performance	Final energy consumption for cooling (not renewable)	kWh/m²
Building	Energy performance	Final energy consumption for cooling (renewable)	kWh/m²
Building	Energy performance	Final energy consumption for DHW (not renewable)	kWh/m²
Building	Energy performance	Final energy consumption for DHW (renewable)	kWh/m²
Building	Energy performance	Final energy consumption for heating (not renewable)	kWh/m²
Building	Energy performance	Final energy consumption for heating (renewable)	kWh/m²
Building	Energy performance	Final energy consumption for lighting (not renewable)	kWh/m²
Building	Energy performance	Final energy consumption for lighting (renewable)	kWh/m²
Building	Energy performance	Final energy consumption for mechanical ventilation (not renewable)	kWh/m²
Building	Energy performance	Final energy consumption for mechanical ventilation (renewable)	kWh/m²
Building	Energy performance	Primary energy consumption for cooling	kWh/m²
Building	Energy performance	Primary energy consumption for DHW	kWh/m²
Building	Energy performance	Primary energy consumption for heating	kWh/m²
Building	Energy performance	Primary energy consumption for lighting	kWh/m²
Building	Energy performance	Primary energy consumption for mechanical ventilation	kWh/m²
Building	Energy performance	Renewable energy consumption	kWh/m²
Building	Energy performance	Total CO2 emission (heating, cooling, DHW, etc.)	$kgCO_2/m^2$
Building	Energy performance	Transport primary energy consumption (not renewable)	kWh/m²
Building	Energy performance	Transport primary energy consumption (renewable)	kWh/m²

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Building	Energy performance	Transport system efficiency	%
Building	Energy performance	Transport systems are considered/exist	
Building	Energy performance indicator	Primary energy conversion factor for energy carrier i	
Building	Financial data	Annual electricity cost	€
Building	Financial data	Annual gas cost	€
Building	Financial data	Annual maintenance charges	€
Building	Financial data	Annual oil cost	€
Building	Financial data	Annual rent/ property tax	€
Building	Financial data	Annual water cost	€
Building	Financial data	Building costs	€
Building	Financial data	Property value	€
Building	Financial data	Property yield	€
Building	Financial data	Valuation conducted by	
Building	Financial data	Valuation date	
Building	Financial data	Valuation document	
Building	Financial data	Valuation method	
Building	General Data	Accessibility for people with disabilities	
Building	General Data	Address	
Building	General Data	Altitude	m
Building	General Data	Building ID (cadatral identification)	
Building	General Data	Building owner	
Building	General Data	Building state (renovated/new)	
Building	General Data	Building use	

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Building	General Data	Climatic zone	
Building	General Data	Construction type related to thermal capacity	
Building	General Data	Construction year	
Building	General Data	District heating access	
Building	General Data	EPC registry number	
Building	General Data	Global solar radiation on horizontal plane	W/m²
Building	General Data	Renovation year	
Building	Geometry	Building envelope construction	
Building	Geometry	Gross building area	m²
Building	Geometry	Heated floor area	m²
Building	Geometry	Heated floor volume	m3
Building	Geometry	Number of external sides/walls (e.g All sides=detached, 2 sides=semi detached)	
Building	Geometry	Number of floors	
Building	Geometry	Orientation	degree
Building	IEQ	Outdoor air quality	
Building	IEQ	Particular matter (2.5, 10)	µg/m³
Building	Recommendations	Emission CO2 reduction	kgCO2/m²
Building	Recommendations	Energy efficient measures (text)	
Building	Recommendations	Initial investment cost	€
Building	Recommendations	Potential buidling energy category	
Building	Recommendations	Primary energy saving	kWh/m² or €/kWh
Building	Recommendations	Simple payback period	yrs

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Envelope	External walls	Coefficient of total linear thermal transmittance, Ψ	W/(m*K)
Envelope	External walls	Insulation thermal conductivity	W/(m*K)
Envelope	External walls	Insulation thickness	m
Envelope	External walls	Insulation type	
Envelope	External walls	Layer material (for n layers)	
Envelope	External walls	Layer thermal conductivity (for n layers)	W/(m*K)
Envelope	External walls	Layer thickness (for n layers)	m
Envelope	External walls	Surface area	m²
Envelope	External walls	U-value	W/(m²K)
Envelope	Floor in contact with the ground	Insulation thickness	m
Envelope	Floor in contact with the ground	Surface area	m²
Envelope	Floor in contact with the ground	U-value	W/(m²K)
Envelope	Roof	Insulation thickness	m
Envelope	Roof	Surface area	m²
Envelope	Roof	U-value	W/(m²K)
Envelope	Windows	g-Value	-
Envelope	Windows	Sun protection (Shading)	
Envelope	Windows	Surface area	m²
Envelope	Windows	U-value (window)	W/(m²K)
Envelope	Windows	Windows orientation	
Envelope	Windows	Frame factor	
Envelope	Windows	U-value (frame)	W/(m²K)
Envelope	Windows	U-value (glazing)	W/(m²K)

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Renewables	PV and/or Solar thermal	Certificate/warranty	
Renewables	PV and/or Solar thermal	Date of installation	
Renewables	PV and/or Solar thermal	Date of latest inspection	
Renewables	PV and/or Solar thermal	Manual	
Renewables	PV of electricity generation	Exported energy	kWh/yr
Renewables	PV of electricity generation	Installed capacity	kW
Renewables	PV of electricity generation	Equivalent solar Area/net heated area Ratio	
Renewables	Solar thermal	Installed capacity	kW
Storage & Connectivity	Electric vehicle charging	EV charging capacity - Number of charging spaces	
Storage & Connectivity	Electric vehicle charging	EV Charging Grid balancing	
Storage & Connectivity	Electric vehicle charging	EV charging information and connectivity	
Storage & Connectivity	Electricity	Storage of locally generated energy	
Storage & Connectivity	Monitoring and control	Smart Grid Integration	
Technical Building Systems	Appliances	Electricity consumption (excl. space heating)	kWh/m²
Technical building systems	Appliances	Installed capacity	kW
Technical Building Systems	Cooling system	Certificate/warranty	
Technical Building Systems	Cooling system	Cooled area	m²
Technical Building Systems	Cooling system	Cooled bruto-volume	m²

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Technical Building Systems	Cooling system	Cooling emission control	
Technical Building Systems	Cooling system	Cooling system efficiency	%
Technical Building Systems	Cooling system	Date of installation	
Technical Building Systems	Cooling system	Date of last inspection	
Technical Building Systems	Cooling system	Fuel type	
Technical Building Systems	Cooling system	Generator control for cooling	
Technical Building Systems	Cooling system	Manual	
Technical Building Systems	Cooling system	Nominal electrical power	kW
Technical Building Systems	Cooling system	Number of units installed	
Technical Building Systems	DHW	Construction year	
Technical Building Systems	DHW	DHW certificate/warranty	
Technical Building Systems	DHW	DHW manual	
Technical Building Systems	DHW	DHW service present	
Technical Building Systems	DHW	DHW system efficiency	%
Technical Building Systems	DHW	Expected lifetime	

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Technical Building Systems	DHW	Fuel type	
Technical Building Systems	DHW	Pipework insulation	
Technical Building Systems	DHW	Storage	
Technical Building Systems	Heating system	Central heating pump age	
Technical Building Systems	Heating system	Certificate/warranty	
Technical Building Systems	Heating system	Date of installation	
Technical Building Systems	Heating system	Date of last inspection	
Technical Building Systems	Heating system	Fuel type	
Technical Building Systems	Heating system	Heat emission control	
Technical Building Systems	Heating system	Heat generation	
Technical Building Systems	Heating system	Heat supply temperature	°C
Technical Building Systems	Heating system	Heating system efficiency	%
Technical Building Systems	Heating system	Indoor temperature	°C
Technical Building Systems	Heating system	Main heat delivery system	
Technical Building Systems	Heating system	Manual	

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Technical Building Systems	Heating system	Nominal electrical power	kW
Technical Building Systems	Heating system	Nominal thermal power	kW
Technical Building Systems	Heating system	Norm outdoor temperature	°C
Technical Building Systems	Heating system	Number of units installed	
Technical Building Systems	Heating system	Operational thermal efficiency of the space heating system	%
Technical Building Systems	Lighting system	Control system	
Technical Building Systems	Lighting system	Lighting system efficiency	%
Technical Building Systems	Lighting system	Lamp type	
Technical Building Systems	Lighting system	Lightning is considered	
Technical Building Systems	Lighting system	Total power	kW
Technical building systems	Monitoring and control	Interaction between TBS and/or BACS	
Technical Building Systems	Ventilation	Air flow control at the room level	
Technical Building Systems	Ventilation	Certificate/warranty	
Technical Building Systems	Ventilation	Date of installation	
Technical Building Systems	Ventilation	Date of last inspection	

Input (output) Data (level 1)	Input (output) Data (level 2)	Data fields	Unit
Technical Building Systems	Ventilation	Filter type/class	
Technical Building Systems	Ventilation	Heat recovery efficiency	
Technical Building Systems	Ventilation	Manual	
Technical Building Systems	Ventilation	Mech Vent system efficiency	%
Technical Building Systems	Ventilation	Operational thermal efficiency of the heat recovery unit	
Technical Building Systems	Ventilation	Temperature of ventilation return air	°C
Technical Building Systems	Ventilation	Temperature of ventilation supply air	°C
Technical Building Systems	Ventilation	Ventilation air flow rate	m^3/h
Technical Building Systems	Ventilation	Ventilation Rate	$l/s/m^2$
Technical Building Systems	Ventilation	Mech Vent system present	
Technical Building Systems	Ventilation	Ventilation Type	

Annex 2

Full version of the online survey

Linking EPCs with Building Renovation Passport (BRP) and Digital Building Logbook (DBL)

The aim of this online questionnaire is to identify the stakeholders' potential needs, perceptions, thoughts and expectations regarding a possible link between the EPC and the Building Renovation Passport (BRP) / renovation roadmap, and/or the Digital Building Logbook (DBL).

"The Building Renovation Passport is considered as an instrument that can stimulate cost-effective renovation in the form of a "long-term, step-by-step deep renovation roadmap for a specific building based on quality criteria, following an energy audit, and outlining relevant measures and renovations that could improve the energy performance" (Source: "Final report – Technical study on the possible introduction of optional building renovation passports", European Commission, May 2020)

"A Digital Building Logbook is a common repository for all relevant building data. It facilitates transparency, trust, informed decision making and information sharing within the construction sector, among building owners and occupants, financial institutions and public authorities..." (Source: "Study on the Development of a European Union Framework for Digital Building Logbooks", European Commission, December 2020)

Thank you for your valuable feedback!

Please select which type of stakeholder describes you.*[10]

- Policy maker
- Enabler of EPC: certification body
- Multiplier of EPC: banks, real estate company, individuals
- Advisor for energy efficiency measures (EEMs): architects, engineers, etc
- Financer of EEMs: banks, ESCOs, individuals, etc
- Implementer of EEMs: craftsmen, installer, etc
- Other

In what country do you work? *

- Austria
- Belgium
- Bulgaria
- Croatia
- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland

[10] Questions with asterisk (*) are mandatory

- Italy
- Latvia
- Lithuania
- Luxemburg
- Malta
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- The Netherlands
- UK
- Other

EPC scheme national status

1. Has the country you work got an EPC database? (if no go to question nr15).*

- Yes
- No
- I don't know
- Other

2. Is the EPC database regional or national?

- Regional
- National
- Other

3. Who owns the EPC Database?

4. Who manages the EPC Database?

5. What is the usage of the EPC data (multiple choices if applicable)?

- Statistical reasons
- Benchmarking
- Policy decisions
- Funding programmes
- Other

6. Who has access to the EPC database (multiple choices if applicable)?

	individual data	project	full access	limited access	No access
Building owner					
Building managers					
EPC assessors					
Public authorities					
Building professionals					

7. Are the data classified as open access (e.g. For public buildings, commercial buildings, residential buildings)? (If yes, please specify in question 7a)

- Yes
- No
- Other

7a. Specify for which building categories the data are open access (multiple choices if applicable).

- Public buildings
- Commercial buildings
- Residential buildings

8. Does the EPC database link with other national/regional databases (e.g. Land registry)? (If yes, please specify in question 8a).

- Yes
- No
- Other

8a. Specify the EPC database links with other national/regional databases (e.g. Land registry).

9. Are EPCs mandatory? (If yes, please specify in question 9a)

- Yes
- No
- Other

9a. Specify in what cases the EPCs are mandatory (e.g. new/major renovation, sell/rent etc).

10. What is the period (years) of validity of an EPC?

11. Are recommendations included in the EPC? (if no go to question no13)
- Yes, they are mandatory
- Yes, they are optional
- No, they aren't included
- Other

12. Which of the following fields are included in the EPC recommendations (multiple choices if applicable)?
- Energy efficient measures (text)
- Initial investment cost (€)
- Primary energy saving (kWh/m² or €/kWh)
- Emission CO2 reduction (kgCO2/m²)
- Simple payback period (yrs)
- Potential building energy category
- Other

13. Is on-site visit mandatory for the EPC assessment?
- Yes
- No
- Other

14. Is EPC mandatory in the building/property advertisement?
- Yes, it is mandatory
- No, it isn't mandatory
- Other

EPC and BRP potential links

Please answer the following questions based on what you would expect from such an initiative.

15. Which of the following characteristics do you consider important for a BRP and to be included in the EPC? (up to 6 choices for each column)

	BRP	EPC
measures customised for the specific building		

outlining a long term plan for renovation		
issued only by qualified expert		
outline combinations of renovation measures that should be taken up simultaneously to avoid lock-in		
outline renovation measures or combination of measures in chronological order to avoid lock-in		
outline potential energy efficiency category after implementation of each renovation measure/combination of measures		
outline CO_2 emission reduction after implementation of each renovation measure/combination of measures		
outline primary energy saving after implementation of each renovation measure/combination of measures		
outline final energy saving after implementation of each renovation measure/combination of measures		
outline comfort and indoor environmental quality level after implementation of each renovation measure/combination of measures		
estimate height of investment per renovation measure/combination of renovation measures		

16. Are you aware of any BRPs in the country where you work? (If yes, please answer questions 16a, 16b, 16c)*

- Yes
- No
- Other

16a. Specify the BRPs you are aware of (and provide the relevant web links, if possible).

16b. Are they mandatory?

- Yes
- No
- I don't know
- Other

16c. Do they include an on-site visit?

- Yes

- No
- I don't know
- Other

17. How can the EPC links to a BRP?*

- Include combinations of renovations measures from the BRP into the EPC, referring to a long term perspective in a chronological order
- Integrate a hyperlink to the BRP into the EPC
- Integrate a hyperlink to the EPC into the BRP
- EPC automatically feeding the BRP
- BRP automatically feeding the EPC
- Include roadmap as an annex to the EPC
- Other

EPC and DBL potential links

Please answer the following questions based on what would you expect from such an initiative.

18. How important are the following data fields in a digital building logbook?*

	not important	somewhat important	very important
Ownership information			
Energy performance certificate			
Smart readiness indicator score			
Building descriptions and characteristics (i.e. age, construction type, walls ,windows, roof, etc)			
Equipment included (for heating, cooling, control of interior environment) and data/certifications on their maintenance			
Consumption - energy, water, gas and other resources			
Dynamic data (smart meters and sensors, such as real energy consumption)			
Building material inventory			

Material cost information			
Building documentation: permits and plans (i.e rental status, renovation/improvement works, etc)			
Information on previous works and renovation potential (such as a building renovation passport)			
Financial, legal and insurance documents, including building costs/value (annual rent, annual maintenance charges, property value, etc)			
Information on occupancy (i.e. current use and past uses), lease terms			
Open field			

19. How important are the following functionalities in a digital building logbook?*

	not important	**somewhat important**	**very important**
Predictive maintenance and alerts			
Notification of energy performance			
Renovation roadmap			
Environmental impacts over lifetime (including deconstruction and re-use of materials)			
Valuation and financial due diligence			
Enable smart energy services (demand response, dynamic pricing etc.)			
Link with external databases and resources (e.g. soil pollution, public transport, solar panel potential)			

20. What are the potential sources of information in a digital building logbook (multiple choices if applicable)?*

- Building owners
- Public authorities (land registry, town hall, energy agencies)
- EPC databases
- Building experts (architects, engineers, energy auditors, etc.)
- Financial institutions
- Energy agencies
- Other

20a. If building owners are potential sources of information, what data could they provide (e.g. building plans, bills etc)?

21. In your opinion, who should be responsible for data ownership and liability (e.g landlord/owner, public authority, professional body, etc)?*

22. Who should have access to the data?*

	individual project data	full access	limited access	No access
Building owner				
Public authorities				
Third parties (e.g. building professionals, etc)				

23. How often should the logbook be updated (multiple choices if applicable)?*

- Annually
- Point of sale
- Change of use
- Any time the building undergoes intervention works (envelope and equipment)
- Other

24. How should data quality assurance be handled, ensuring it is reliable and kept up to date (e.g. random audits and surveys, input data control, range analysis etc.)?*

25. What key benefits should the DBL provide?*

	not important	somewhat important	very important
Access to information			

Operation, use and maintenance			
Better decision-making			
Trust, reliability, accountability			
Reduced administrative burden			
Resource optimisation, circularity			
Benchmarking			
Regulatory compliance			
Innovation			
Value chain integration			

26. How important are the following characteristics for the development of a successful DBL?*

	not important	**somewhat important**	**very important**
Ease of use			
Applicable for different building types			
Usable by different stakeholders			
Alignment with other initiatives			
Clear scope/purpose			
Data validation process			
Compulsory initiative			
Free of charge			
Flexible framework			

27. How important are the following barriers to the development of a DBL?*

	not important	**somewhat important**	**very important**
Lack of motivation to update the contents			

Lack of synergies and consistency with other instruments			
Benefits not clearly identified			
Administrative burden for homeowners			
Unclear national legislation			
Issue with data privacy			
Some users not familiar with digital tools			
Business model not defined			
Issue with data accuracy			
Too high cost			

28. Are you aware of DBLs in the country you work? (If yes, please answer questions 28a, 28b, 28c, 28d))*

- Yes
- No
- Other

28a. Specify the DBLs you are aware of (and provide the relevant web links, if possible).

28b. Are they mandatory?

- Yes
- No
- I don't know
- Other

28c. Do they include an on-site visit?

- Yes
- No
- I don't know
- Other

28d. Could these be joined together in a single, joint logbook portal (in terms of data usage/interoperability)?

- Yes
- No
- Other

29. How can the EPC link to a DBL?*

- Integrate features of the DBL into the EPC
- Integrate a hyperlink to the DBL into the EPC
- Integrate a hyperlink to the EPC into the DBL
- EPC automatically feeding the DBL
- DBL automatically feeding the EPC
- Common registry
- Other

Short version of the online survey

Linking EPCs with Building Renovation Passport (BRP) and Digital Building Logbook (DBL)

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- Financer of EEMs: banks, ESCOs, individuals, etc
- Implementer of EEMs: craftsmen, installer, etc
- Other

In what country do you work? *

- Austria
- Belgium
- Bulgaria
- Croatia

- Cyprus
- Czech Republic
- Denmark
- Estonia
- Finland
- France
- Germany
- Greece
- Hungary
- Ireland
- Italy
- Latvia
- Lithuania
- Luxemburg
- Malta
- Norway
- Poland
- Portugal
- Romania
- Slovakia
- Slovenia
- Spain
- Sweden
- The Netherlands
- UK
- Other

EPC and BRP potential links

Please answer the following questions based on what would you expect from such an initiative.

I. Which of the following characteristics do you consider important for a BRP and to be included in the EPC? (up to 6 choices for each column)

	BRP	EPC
measures customised for the specific building		
outlining a long term plan for renovation		
issued only by qualified expert		
outline combinations of renovation measures that should be taken up simultaneously to avoid lock-in		

outline renovation measures or combination of measures in chronological order to avoid lock-in		
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outline primary energy saving after implementation of each renovation measure/combination of measures		
outline final energy saving after implementation of each renovation measure/combination of measures		
outline comfort and indoor environmental quality level after implementation of each renovation measure/combination of measures		
estimate height of investment per renovation measure/combination of renovation measures		

II. Are you aware of any BRPs in the country where you work? (If yes, please answer questions IIa, IIb, IIc)*

- Yes
- No
- Other

IIa. Specify the BRPs you are aware of (and provide the relevant web links, if possible).

IIb. Are they mandatory?

- Yes
- No
- I don't know
- Other

IIc. Do they include an on-site visit?

- Yes
- No
- I don't know
- Other

III. How can the EPC links to a BRP?*

- Include combinations of renovations measures from the BRP into the EPC, referring to a long term perspective in a chronological order
- Integrate a hyperlink to the BRP into the EPC
- Integrate a hyperlink to the EPC into the BRP
- EPC automatically feeding the BRP
- BRP automatically feeding the EPC
- Include roadmap as an annex to the EPC
- Other

EPC and DBL potential links

Please answer the following questions based on what would you expect from such an initiative.

IV. How important are the following data fields in a digital building logbook?*

	not important	somewhat important	very important
Ownership information			
Energy performance certificate			
Smart readiness indicator score			
Building descriptions and characteristics (i.e. age, construction type, walls,windows, roof, etc)			
Equipment included (for heating, cooling, control of interior environment) and data/certifications on their maintenance5			
Consumption - energy, water, gas and other resources			
Dynamic data (smart meters and sensors, such as real energy consumption)			
Building material inventory			
Material cost information			
Building documentation: permits and plans (i.e rental status, renovation/improvement works, etc)			

Information on previous works and renovation potential (such as a building renovation passport)			
Financial, legal and insurance documents, including building costs/value (annual rent, annual maintenance charges, property value, etc)			
Information on occupancy (i.e. current use and past uses), lease terms			
Open field			

V. How important are the following functionalities in a digital building logbook?*

	not important	**somewhat important**	**very important**
Predictive maintenance and alerts			
Notification of energy performance			
Renovation roadmap			
Environmental impacts over lifetime (including deconstruction and re-use of materials)			
Valuation and financial due diligence			
Enable smart energy services (demand response, dynamic pricing etc.)			
Link with external databases and resources (e.g. soil pollution, public transport, solar panel potential)			

VI. What are the potential sources of information in a digital building logbook (multiple choices if applicable)?*

- Building owners
- Public authorities (land registry, town hall, energy agencies)
- EPC databases
- Building experts (architects, engineers, energy auditors, etc.)
- Financial institutions

- Energy agencies
- Other

VIa. If building owners are potential sources of information, what data could they provide (e.g. building plans, bills etc)?

VII. In your opinion, who should be responsible for data ownership and liability (e.g landlord/owner, public authority, professional body, etc)?*

VIII. Who should have access to the data?*

	individual project data	full access	limited access	No access
Building owner				
Public authorities				
Third parties (e.g. building professionals, etc)				

IX. How often should the logbook be updated (multiple choices if applicable)?*

- Annually
- Point of sale
- Change of use
- Any time the building undergoes intervention works (envelope and equipment)
- Other

X. How should data quality assurance be handled, ensuring it is reliable and kept up to date (e.g. random audits and surveys, input data control, range analysis etc.)?*

XI. What key benefits should the DBL provide?*

	not important	somewhat important	very important
Access to information			
Operation, use and maintenance			
Better decision-making			
Trust, reliability, accountability			
Reduced administrative burden			

Resource optimisation, circularity			
Benchmarking			
Regulatory compliance			
Innovation			
Value chain integration			

XII. How important are the following characteristics for the development of a successful DBL?*

	not important	somewhat important	very important
Ease of use			
Applicable for different building types			
Usable by different stakeholders			
Alignement with other initiatives			
Clear scope/purpose			
Data validation process			
Compulsory initiiative			
Free of charge			
Flexible framework			

XIII. How important are the following barriers to the development of a DBL?*

	not important	somewhat important	very important
Lack of motivation to update the contents			
Lack of synergies and consistency with other instruments			
Benefits not clearly identified			
Administrative burden for homeowners			

Unclear national legislation			
Issue with data privacy			
Some users not familiar with digital tools			
Business model not defined			
Issue with data accuracy			
Too high cost			

XIV. Are you aware of DBLs in the country you work? (If yes, please answer questions XIVa, XIVb, XIVc, XIVd))*

- Yes
- No
- Other

XIVa. Specify the DBLs you are aware of (and provide the relevant web links, if possible).

XIVb. Are they mandatory?

- Yes
- No
- I don't know
- Other

XIVc. Do they include an on-site visit?

- Yes
- No
- I don't know
- Other

XIVd. Could these be joined together in a single, joint logbook portal (in terms of data usage/interoperability)?

- Yes
- No
- Other

XV. How can the EPC link to a DBL?*

- Integrate features of the DBL into the EPC

- Integrate a hyperlink to the DBL into the EPC
- Integrate a hyperlink to the EPC into the DBL
- EPC automatically feeding the DBL
- DBL automatically feeding the EPC
- Common registry
- Other