

TIMEPAC

Academy

Session 10:45-12:00

Transformation of EPC data and other data into a
Renovation Passport for the deep renovation of the
building - case study residential building

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24/5/2024



REPUBLIC OF SLOVENIA
MINISTRY OF THE ENVIRONMENT,
CLIMATE AND ENERGY



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Institute for
Sustainable Energy and
Resources Availability

Overview of session

- Introduction on the renovation passport - where do we start from
- The renovation passport in the recast EPBD 2024
- Example residential buildings: apartment building and single family house

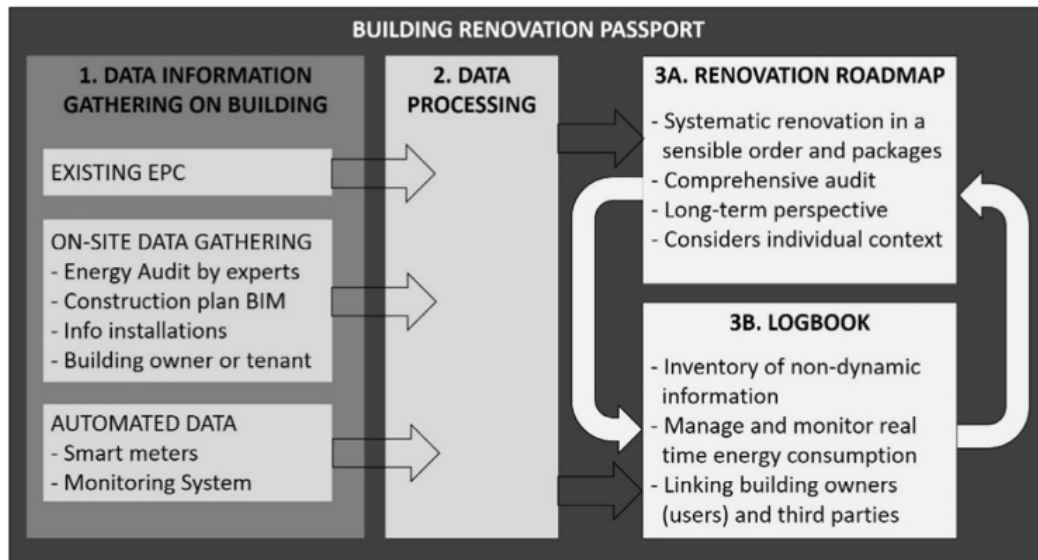
Focus on building renovation: EPBD 2010, amendend 2018

- The **energy performance certificate (EPC)** contains **recommendations for improving building energy efficiency**, but these are often not specific enough and their implementation is unclear during the 10-year validity period of an EPC.
- In contrast, the **building renovation passport (BRP) including renovation roadmap is tailored to a building. It specifies the necessary measures to improve the energy efficiency of a building in the right order** to avoid lock-in effects. User-friendly information and the link to financing are important elements.

BRP according to amending Directive (EU) 2018/844

EU level: Introduced by amending Directive (EU) 2018/844 and detailed by BPIE technical study: Building Renovation Passport (BRP)

National level: Elements of BRP are part of **subsidy schemes** in several EU Member States. Related processes: **energy audits** and **energy advisory**



Country	Short description
France	BRP contains more specific recommendations than the EPC but is also based on default data to keep cost low.
Germany	Mainly for single family houses; several meetings with the building owner; Renovation Roadmap includes also other adaptations which are not energy-related.
Belgium Walloon region	Renovation Roadmap based on a detailed energy audit and the elaboration of specific measures; they are organised in packages, and the whole package must be implemented to get the subsidy.

European Commission, Directorate-General for Energy, Volt, J., Fabbri, M., Zuhair, S., et al., Technical study on the possible introduction of optional building renovation passports: final report, Wouters, P. (editor), Publications Office, 2020, <https://data.europa.eu/doi/10.2833/760324>

What is the difference between EPC and BRP (according to amending Directive (EU) 2018/844?)

	Characteristics of the mandatory Energy Performance Certificate (EPC)	Characteristics of the voluntary Building Renovation Passport (BRP)
Building specific	Yes, but not mandatory; for existing buildings: can be based on default values	Yes - it is important for the economic assessment of improvement measures
User specific metered energy consumption	No - based on a given calculation method and standard user behaviour/standard user profile	Yes - it is important for the economic assessment of improvement measures
On-site visit	Not mandatory, depends on the regulatory framework and the purpose of the EPC	Yes - because reliable information about the actual condition must be available
Format of recommendations	Can be general; often not specified	Format is specified by the operator of the voluntary scheme
Tracking the implementation of recommendations	Not mandatory; sometimes possible through the EPC database if it allows for versioning of EPCs of a building, and recommendations are represented by defined data fields	Not mandatory; possible if planned by the operator of the scheme; several possibilities, for example through the EPC database
Purpose	Comparison of buildings in terms of energy performance regardless of user behavior	Initiating and facilitating the renovation of buildings; takes user behaviour into account

Challenge: EPC according to outdated EPBD and RP according to recast EPBD 2024

EPC validity is 10 years: that means that in 2024, EPCs are on the market according to Directive 2010/31/EU and EPCs according to amending Directive (EU) 2018/844.

Challenges:

- Quality issues
- Simplified approach based on default values
- Might not reflect the actual status of the building

Nevertheless, EPCs can provide valuable information about the building.

In practice, a new EPC about the actual status of the building is necessary.

Recast EPBD 2024, Article 2 Definitions

(19) **‘renovation passport’** means a tailored roadmap for the deep renovation of a specific building in a maximum number of steps that will significantly improve its energy performance;

(20) **‘deep renovation’** means a renovation which is in line with the ‘energy efficiency first’ principle, which focuses on essential building elements and which transforms a building or building unit:

(a) before 1 January 2030, into a nearly zero-energy building;

(b) from 1 January 2030, into a zero-emission building;

Recast EPBD 2024, Article 2 Definitions

(2) **‘zero-emission building’** means a building with a very high energy performance, as determined in accordance with Annex I, requiring zero or a very low amount of energy, producing zero on-site carbon emissions from fossil fuels and producing zero or a very low amount of operational greenhouse gas emissions, in accordance with Article 11;

(3) **‘nearly zero-energy building’** means a building with a very high energy performance, as determined in accordance with Annex I, which is no worse than the 2023 cost-optimal level reported by Member States pursuant to Article 6(2) and where the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or energy from renewable sources produced nearby;

Recast EPBD 2024, Article 2 Definitions

(30) **‘energy performance certificate’** means a certificate, recognised by a Member State or by a legal person designated by it, which indicates the energy performance of a building or building unit, calculated in accordance with a methodology adopted pursuant to Article 4 (and Annex I);

(41) **‘digital building logbook’** means a common repository for all relevant building data, including data related to energy performance such as energy performance certificates, renovation passports and smart readiness indicators, as well as data related to the life-cycle GWP, which facilitates informed decision making and information sharing within the construction sector, and among building owners and occupants, financial institutions and public bodies;


Recast EPBD 2024, Article 19 Energy performance certificates on «recommendations » (excerpt)

5. The energy performance certificate shall include recommendations for the cost-effective improvement of the energy performance and the reduction of operational greenhouse gases emissions and the improvement of indoor environmental quality of a building or building unit, unless the building or building unit already achieves at least energy performance class A.

7. The recommendations included in the energy performance certificate shall be technically feasible for the specific building and shall provide an estimate for the energy savings and the reduction of operational greenhouse gas emissions.

8. The recommendations shall include an assessment of whether the heating systems, ventilation systems, air-conditioning systems and domestic hot-water systems can be adapted to operate at more efficient temperature settings, such as low temperature emitters for water based heating systems, including the required design of thermal power output and temperature and flow requirements.

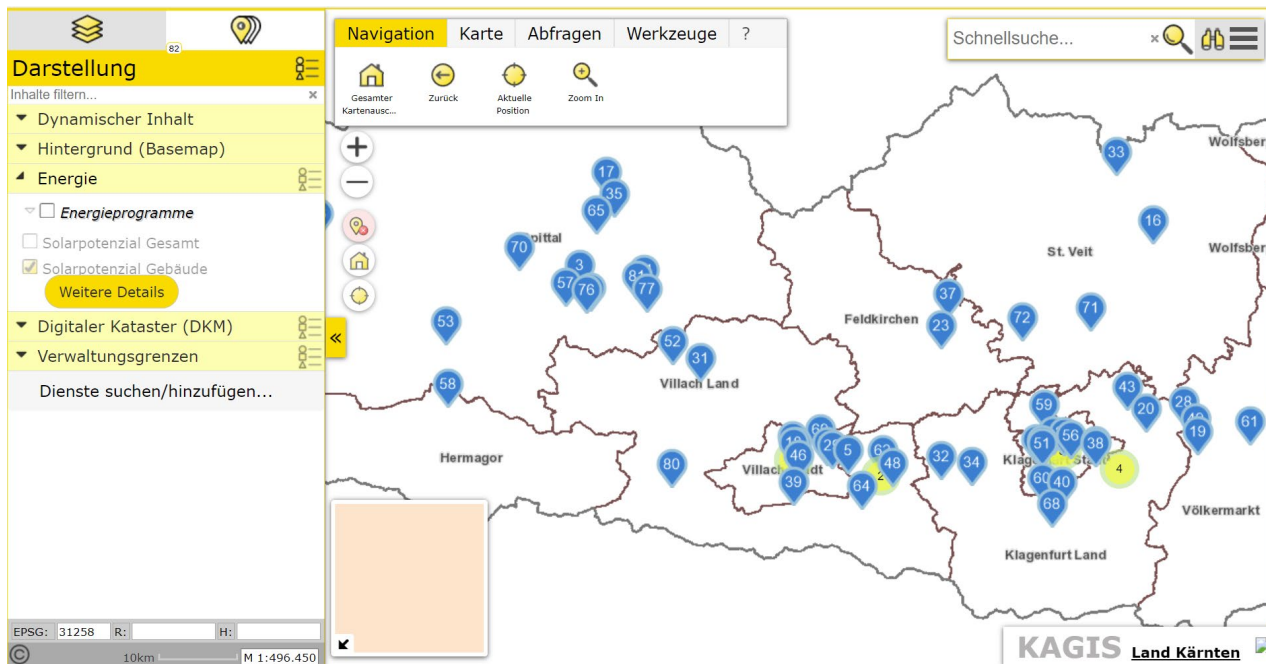
9. The recommendations shall include an assessment of the remaining lifespan of the heating system or air-conditioning system.

12. Certification for single-family houses may be based on the assessment of another representative building of similar design and size with a similar actual energy performance quality if such correspondence can be guaranteed by the expert issuing the energy performance certificate.  Not a realistic option anymore

What is the difference between EPC and RP according to recast EPBD 2024?

	Characteristics of the mandatory Energy Performance Certificate (EPC)	Characteristics of the voluntary Renovation Passport (RP)
Building specific	Yes, but still exemption possible for single family houses (although not realistic)	Yes - it is important for the economic assessment of improvement measures
User specific metered energy consumption	No - based on a given calculation method and standard user behaviour/standard user profile	Yes - it is important for the economic assessment of improvement measures
On-site visit	Yes - because reliable information about the actual condition must be available	Yes - because reliable information about the actual condition must be available
Format of recommendations	Not specified, but more detailed description To achieve improvement; no specification of “in one go”, “staged”, no roadmap	Specified; must not contradict EPC recommendations Refers to targets of deep renovation
Purpose / Motivation	Comparison of buildings in terms of energy performance regardless of user behavior Proof of achieving defined energy performance requirements	Initiating and facilitating the renovation of buildings; takes user behaviour into account → Closely linked with energy advice service (energy audit according to EED can be used as a basis)

Renovation advice as part of the One-Stop-Shop as required by the recast EPBD 2024 – how can this be organised



Example GIS Carinthia - find an energy advisor close to your home

Administration/energy agency: ideally in charge of energy spatial planning, EPC, energy advice, energy audit; in practice often different administrative units

Energy advisors: ideally the ones who also issue EPC and do energy audits, it is a matter of professional licenses and training

Advertisement of the service, e.g. to tie it to funding (subsidised loans and grants)

Residential building – motivations for a renovation passport – request for renovation advice service

Single family house

- High energy cost - how to reduce
- Problems, e.g. with moisture and mould, damages
- Constructed in the 1970ies, next generation takes over - what can be done in general
- Building was purchased at low price due to backlog in maintenance and repair - what can be done in general

Apartment building

- Available funding for phasing out fossil fuels
- High energy cost
- Improvement/repair requests by owners/tenants (e.g. failure of individual heating systems, moisture, leaky windows)

(In practice, usually a combination of the three issues)

The energy advice process for a single family house and an apartment building differs. Renovation passport schemes will also differ to a certain extent.

Energy advice service for a single family house – two possible processes (existing and new)

Ask the building owner for the energy bills, drawings, pictures, EPC (if available), etc. prior to the site visit.

On-site meeting with the owner: discuss about user behavior, identify the needs of the building owner, clarify issues with indoor climate and air quality, and heavy rain.

Inspect/audit the house:

- Envelope: walls, windows, upper/lower ceiling, roof, basement
- Heating / cooling / ventilation system: generation, distribution, dissipation, automation
- On-site renewable energy generation
- Identify deviation of status quo from plans, especially number of m², to identify the correct reference area

Identify renovation measures and bring them in the correct order to avoid lock-in effects: Improving the building envelope before changing the TBS.

Do some estimations on indicators such as heating energy need, heating energy use without and with considering the measures and how this related with the requirements of funding schemes.

Write protocol, handover to owner and upload to database of authority.

NEW: Do a renovation roadmap and an EPC to prove that nZEB and ZEB targets will be achieved

Access the digital building logbook for (up to date) information prior to the site visit



Update the information in the digital building logbook, create the RP and the EPC to prove that nZEB and ZEB targets will be achieved

Energy advice service for an apartment building – two possible processes (existing and new)

Ask the property manager for drawings, pictures, EPC, exemplary energy bills (if available) etc. prior to the meeting. In case not much information is provided, the energy advisor gets information from GIS and other publicly accessible information.

Clarify the motivation for the energy advice prior to the meeting with the owners; what are the needs? User behavior is less relevant because tenants of apartments change.

On-site meeting with the owners/tenants: discuss about the options by tackling:

- Envelope: walls, windows, upper/lower ceiling, roof, basement
- Heating / cooling / ventilation system: generation, distribution, dissipation, automation
- On-site renewable energy generation

Explain the impact of the improved building envelope on investment and operating cost of heating and cooling systems, and district heating tariffs.

Suggest to commission a renovation roadmap to elaborate on possible measures in more detail.

Write protocol, handover to owner and upload to database of authority.

On behalf of the owners, the property manager commissions the development of a renovation roadmap.

A site visit and data survey takes place. Calculations are done on indicators such as heating energy need, heating energy use without and with considering the measures and how this related with the requirements of funding schemes.

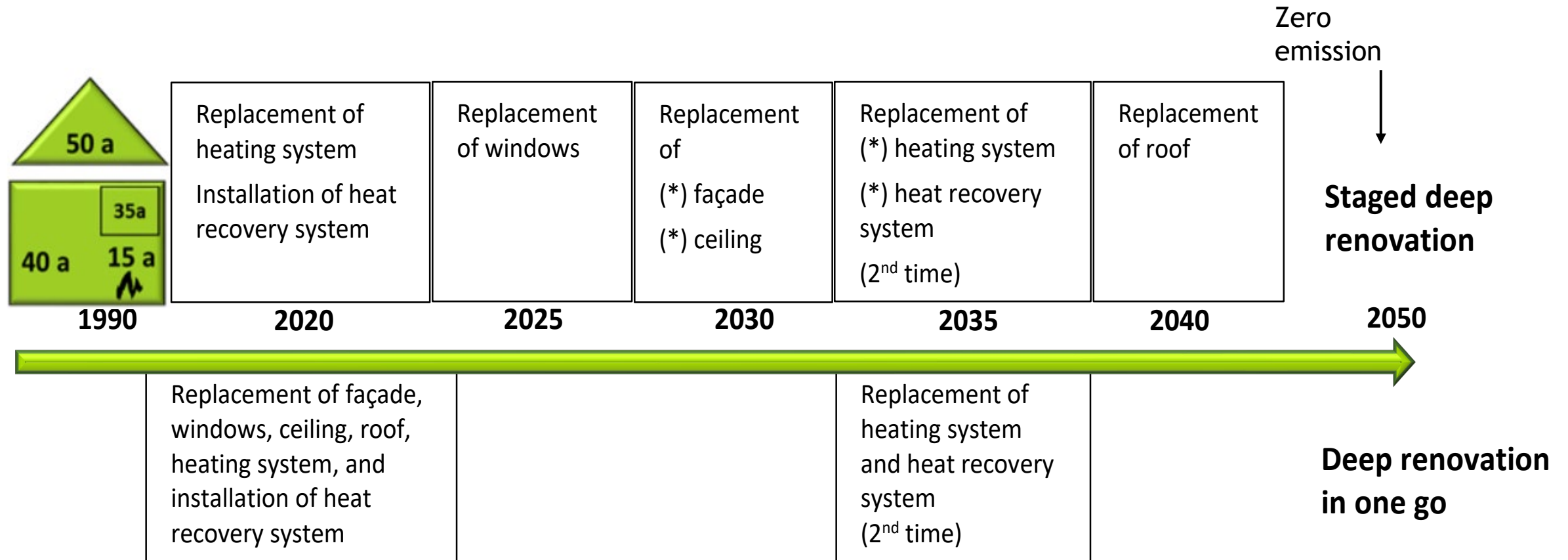
The renovation roadmap is developed and an EPC is done to prove that nZEB and ZEB targets will be achieved.

Access the digital building logbook for (up to date) information prior to the site visit



Update the information in the digital building logbook, create the RP and the EPC to prove that nZEB and ZEB targets will be achieved

Step-wise renovation apartment building: based on lifetime of components; maintenance and repair plan



Different motivation for EPC and RP, but the same input data needed for analysis

ANNEX I Common general framework for the calculation of the energy performance of buildings (referred to in Article 4) (excerpt):

4. The methodology shall be laid down taking into consideration at least the following aspects:

(a) the following actual thermal characteristics of the building including its internal partitions:

- (i) thermal capacity;
- (ii) insulation;
- (iii) passive heating;
- (iv) cooling elements;
- (v) thermal bridges;

(b) heating installation and domestic hot-water supply, including their insulation characteristics;

(c) capacity of installed on-site renewable energy generation and energy storage;

(d) air-conditioning installations;

(e) natural and mechanical ventilation which may include air-tightness and heat recovery;

(f) built-in lighting installation (mainly in the non-residential sector);

(g) the design, positioning and orientation of the building, including outdoor climate;

(h) passive solar systems and solar protection;

(i) indoor climatic conditions, including the designed indoor climate;

(j) internal loads;

(k) building automation and control systems and their capabilities to monitor, control and optimise energy performance.

5. The positive influence of the following aspects shall be taken into account:

(a) local solar exposure conditions, active solar systems and other heating and electricity systems on the basis of energy from renewable sources;

(b) electricity produced by cogeneration;

(c) district or block heating and cooling systems;

(d) natural lighting;

(e) electrical storage systems;

(f) thermal storage systems

ANNEX V Template for energy performance certificates (referred to in Article 19 Energy performance certificates)

1. On its front page, the energy performance certificate shall display at least the following elements:

- (a) the energy performance class;
- (b) the calculated annual primary energy use in kWh/(m².y);
- (c) the calculated annual final energy use in kWh/(m².y);
- (d) renewable energy produced on-site in % of energy use;
- (e) operational greenhouse gas emissions (kgCO₂/(m².y)), and the value of the life-cycle GWP, if available.

The energy performance certificate shall also display the following elements:

- (a) the calculated annual primary and final energy consumption in kWh or MWh;
- (b) renewable energy production in kWh or MWh; main energy carrier and type of renewable energy source;
- (c) the calculated energy needs in kWh/(m².y);
- (d) a yes/no indication whether the building has a capacity to react to external signals and adjust the energy consumption;
- (e) a yes/no indication whether the heat distribution system inside the building is capable to work at low or more efficient temperature levels, where applicable;
- (f) the contact information of the relevant one-stop shop for renovation advice.

These EPC indicators are less important for us as they are different depending on the EPC version.

Most important is the building data needed to calculate the indicators → input data, quality checked.

The same input data is used for EPC and RP

HOTTGENROTH SOFTWARE ETU Lizenz: Susanne Geissler SERA -KNr.A17992-

Brunn am Gebirge Datenerfassung, OIB RL201! OIB-Richtlinie 6 (2019)
Ist-Zustand Datenerfassung Bestand/Sanierung | Wohngebäude mit zehn und mehr Nutzungseinheiten

Projektverwaltung
Projekt
Gebäude
Bauteile
Anlage
Ergebnisse

Berechnung
Wohngebäude Nichtwohngebäude
Neubau Bestand
10 oder mehr Nutzungseinheiten

OIB-Richtlinie 6:
Ausgabe 2007
Ausgabe 2011
Ausgabe 2015
Ausgabe 2019

Randbedingungen / Grenzwerte:
Frei - individuelle Energieberatung
Standard - OIB-Richtlinie 6

Art des Projekts:
Energieausweiserstellung / allgemeine Energieberatung
Beratungsprotokoll für Sanierungskonzept

OIB-RL 6 - Optionen

Gebäudeerfassung
CAD-Erfassung (HottCAD)
Detaillierte Erfassung
Erfassungs-Assistent

Gebäudeprofil Duo 3D PLUS
Frage zum Programmablauf
Bitte beantworten:
Jetzt auf die Projektart "Beratungsprotokoll für Sanierungskonzept" umschalten?
Hierzu wird das Projekt kopiert, das aktuelle Projekt steht weiterhin zur Verfügung.
Ja Nein

Switch between EPC and renovation roadmap

Building Lower Austria



OIB-Richtlinie 6 (2019)

Bestand/Sanierung | Wohngebäude mit zehn und mehr Nutzungseinheiten

- Projekte
 - Projektverwaltung
- Projekt
 - Projektdaten
 - EB-Optionen
 - Fotos / Pläne
 - Notizen
- Gebäude
 - Gebäudeinfo
 - Parameter
- Bauteile
 - U-Werte
 - Ergebnisse
- Anlage
 - Anlagentechnik
- Ergebnisse
 - Übersicht / Ausgabe
 - Diagramme
 - Variantenvergleich
 - Wirtschaftlichkeit

U-Werte Ergebnisse

Bauteil Wand gegen Außenluft

2   90°



Außenwand (Sueden) 2., 3., 5. OG 90°

Geometrie Fläche 502,79 m²

1 x 58,60 m x 8,58 m = 502,79 m²

vom vorherigen Bauteil abziehen
 nicht zur Hüllfläche
 nicht zur OI3-Indikatoren-Berechnung

Eigenschaften U-Wert 1,22 W/m²K

fertiges Bauteil aus  Katalog
 oder Schichtaufbau  erfassen

Reduktionsfaktor 1,00
 Korr. Flächenheizung 1,00

Absorptionsgrad *
 Emissionsgrad *
 * für die detaillierte Berechnung der solaren Gewinne opaker Bauteile

unbeh. Glasvorbau TWD

Nr	K	A	Bauteilbezeichnung	Bez	Fläche	U-Wert
1	DA	□ S	Flachdach 1960 nach OIB		650,46	0,55
2	WA	↓ S	Außenwand (Sueden) 2., 3., 5. OG		502,79	1,22
3	FA	↓ S	Fenster 2,12*1,40; 2., 3., 5. OG		178,08	1,80
4	FA	↓ S	Fenster 3,33*2,62; 1., 4. OG		235,56	1,80
5	FA	↓ S	Fenster 2,22*2,62; 1., 4. OG		157,04	1,80
6	WA	← W	Außenwand, Stirnwand Westen		133,65	1,22
7	WA	↑ N	Außenwand, Eingang Norden		859,08	1,22
8	FA	↑ N	Fenster 95*65, 1., 3., 4. OG		18,52	1,80
9	FA	↑ N	Fenster 1,95*0,65; 1., 3., 4. OG		38,02	1,80
10	FA	↑ N	Eingangstür		52,65	1,80
11	FA	↑ N	Fenster 1,95*1,25; 5. OG		25,32	1,80
12	FA	↑ N	Fenster 0,95*0,65; 2., 5. OG		12,35	1,80
13	WA	→ O	Außenwand, Stirnwand Osten		133,65	1,22
14	DA	□ O	Decken gegen Außenluft 2., 3., 5. OG		175,80	1,40
15	WK	□ O	Erdgeschoßdecke		296,46	1,40
16	DA	□ O	Decke gegen Außenluft 2., 5. OG		351,60	1,40
17	DA	□ O	Decke gegen Außenluft 1. OG gegen unbeheizt		178,20	1,40
18	BE	□	Nebengebäude		264,00	1,40
19	DA	□	Flachdach Nebengebäude		264,00	0,55
20	WK	→ O	Wand gegen Garage		66,00	1,22
21	WA	↓ S	Nebengebäude Wand gegen Außenluft		36,00	1,22
22	TA	↓ S	Terassentür		3,20	1,80
23	FA	↓ S	Fenster Nebengebäude 0,9*1,5		1,35	1,80
24	FA	↓ S	Fenster Nebengebäude 3*1,5		4,50	1,80
25	FA	↓ S	Fenster Nebengebäude 0,8*2		1,60	1,80
26	WA	← W	Nebengebäude Wand gegen Außenluft		66,00	1,22
27	FA	← W	Fenster Nebengebäude 3*2		6,00	1,80
28	FA	← W	Fenster Nebengebäude 0,9*1,5		12,15	1,80

General building parameters

User profile

Building envelope

Technical building systems

Results

Übersicht / Ausgabe | Diagramme | Variantenvergleich | Wirtschaftlichkeit

Ergebnisse - Ist-Zustand Datenerfassung - ■ Ist ■ Variante

Übersicht

Heizwärmebedarf	145,4 kWh/m ²	<div style="width: 100%; height: 15px; background-color: red;"></div>
Wasserwärmebedarf	10,2 kWh/m ²	<div style="width: 10%; height: 15px; background-color: red;"></div>
Anlagenverluste (inkl. Hilfsenergie)	22,0 kWh/m ²	<div style="width: 20%; height: 15px; background-color: red;"></div>
Endenergie (inkl. Hilfsenergie)	200,4 kWh/m ²	<div style="width: 100%; height: 15px; background-color: red;"></div>
Primärenergie (nicht erneuerbarer Anteil)	73,3 kWh/m ²	<div style="width: 30%; height: 15px; background-color: red;"></div>
CO ₂ -Emission	15,717 kg/m ²	<div style="width: 100%; height: 15px; background-color: red;"></div>

BGF = 3 077 m²

Bewertung (HWB)

OIB-RL 6

D

Übersicht | Klasse | Kennzahlen | Verluste | Brennstoff | Emission | Bilanz

Ausgabe: Schnittstelle ZEUS

auswählen

Drucken

Schnittstelle zur ZEUS Online-Datenbank für Energieausweise für die Bundesländer Burgenland, Kärnten, Niederösterreich, Salzburg und Steiermark.

hinzufügen / entfernen

WURKSEA
 Wiener unabhängiges
 Kontrollgremium
 für Energieausweise
 Energieausweis-
 datenbank
 der Stadt Wien

Neue Variante:
Neue Sanierungs-Variante auf Basis der Daten des aktuellen Projekts anlegen

Variante anlegen

Interface to EPC database

Different type of calculation results:
Overview (Übersicht), Rating (Klasse), Indicators (Kennzahlen), Losses (Verluste), Fuel (Brennstoff), Emissions, Balance

Create Renovation project based on EPC project and compare variants and perform economic assessment

Development of renovation variants based on the EPC

Status quo

Renovation variant (green)

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Building Lower Austria OIB-Richtlinie 6 (2019) Bestand/Sanierung | Wohngebäude mit zehn und mehr Nutzungseinheiten

Beratungsprotokoll Sanierungskonzept

Sanierung U-Werte Ergebnisse

Bauteil Wand gegen Außenluft

13 90°

Außenwand, Stirnwand Osten 90°

Bauteil aus Ist-Zustand

Maßnahme Info

Dämmung + PV

Bauteil austauschen
oder
Schichtaufbau erfassen

Dämmung cm W/mK

U-Wert 0,20 W/m²K

Kosten

133,65 m² x € / m² = €

133,65 m² x € / m² = €*

* darin enthaltene Kosten nur für Energieeinsparung

Nr	K	A	Bauteilbezeichnung	Bez	Fläche	U-Wert	U-Wert	Sanierungsmaßnahme
1	DA	□	Flachdach 1960 nach OIB		650,46	0,55		
2	WA	↓	Außenwand (Sueden) 2., 3., 5. OG		324,00	1,22		
3	FA	↓	Fenster 2,12*1,40; 2., 3., 5. OG		178,08	1,80		
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6	WA	←	Außenwand, Stirnwand Westen		133,65	1,22	0,20	Dämmung + PV
7	WA	↑	Außenwand, Eingang Norden		715,00	1,22		
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14	DA	□	Decken gegen Außenluft 2., 3., 5. OG		175,80	1,40		
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28	FA	←	Fenster Nebengebäude 0,9*1,5		12,15	1,80		

Standard Assistent Dämmung Austausch

Verluste: Dach Wand -13% Fenster Keller

Gesamtbauerteilung: [Bar chart showing energy loss distribution]

Flächenelemente Bauteilübersicht Bauteildetails

qh - Ist 145,4 kWh/m² Variante 137,1 kWh/m² -6 %

Kosten 0 € 0 €

Creating the Building Renovation Passport (according to Directive (EU) 2018/844

Ergebnisse - San Gap, PV Dach, Heizg, ohne L WRG

OIB-Richtlinie 6	Aktuell	Anforderung
Heizwärmebedarf HWB _{ex}	28,1	kWh/m ² a
Referenz-Heizwärmebedarf HWB _{ref,RX}	23,2	40,9 kWh/m ² a
End-/Lieferenergiebedarf E/LEB _{ex}	69,0	87,5 kWh/m ² a

Ausgabe: Renovierungsausweis gemäß OIB-Richtlinie 6

1. Change from renovation concept (a defined variant) to EPC mode

2. Choose „Ausgabe“ and from there „Renovierungsausweis“

Example province of Salzburg – Energy Advice office

Status quo of building

Renovation roadmap for the building

Targeted improved status of building

Renovation measures

Cost information for renovation measures

Comments on grants/subsidies

Cost comparison

Technical data

Explanations what to consider

Energieberatungsprotokoll Sanierungskonzept
EB 202 -0009

Objekt
Bestandsgesamtheit (Sanierung)
Wohngebäude mit einer oder zwei Nutzungseinheiten
Energieberatung 16
2020 Salzburg
Bezugsfläche: 190 m²
Bruttogrundfläche: 192 m²

Energieberatung Salzburg
www.salzburger-energieberatung.at
Max. Energieberater:
Telefon: 0049 7143 37 18
E-Mail: office@energieberater.com

Bestandsgesamtheit
Kategorie: I (EUB)
Kategorie: II (EUB)
Kategorie: III (EUB)

Sanierungskonzept
Kategorie: I (EUB)
Kategorie: II (EUB)
Kategorie: III (EUB)

Beachtliche Maßnahmen
Kategorie: I (EUB)
Kategorie: II (EUB)
Kategorie: III (EUB)

Klimarelevanz

Das im Sanierungsprotokoll angeführte kostenorientierte Vorgehenskonzept zielt auf die Nachhaltigkeitsanforderungen der EU in der Erklärung der Mindestanforderungen für die Gebäude-Renovierung ab.

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Beratungswunsch

- Bestandsgesamtheit
- Gebäude (Dämmung, Fenster)
- Wärmeerzeugung (Heizung/Wärmepumpe)
- Förderungen allgemein

Detaillierte Energieverbrauchsdaten: Raumheizung = 25.000 kWh/a, Strom = 3.500 kWh/a

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Beratungsergebnis

Beachtliche Maßnahmen 4,500

- Luft-Wasser Wärmepumpe: Gebäude-Heizlast 25 kW
- Pufferspeicher mit Frischwasserzirkul. 1.000 Liter
- Hydraulischer Abgleich des Wärmeabgabesystems. Radiatoren +0/30 °C

Schätzkosten in € 18.000

Maßnahmen zur Erfüllung des Sanierungskonzepts

- Dämmung der obersten Geschosdecke: 30 cm
- Dämmung der Kellerdecke: 10 cm
- Fenster: U_W-Wert: 0,8 W/(m²·K)
- Hauptheizlast: 0,8 W/(m²·K)
- Dämmung der Fassade: 22 cm
- Kontrollföhlung
- Luft-Wasser Wärmepumpe: Gebäude-Heizlast 6 kW
- PV-Anlage: 3 kW

Detaillierte technische Daten sind dem Anhang „Technische Beschreibung“ zu entnehmen.

Die Umsetzung der empfohlenen Maßnahmen basiert auf den Anforderungen an die Energieeffizienz (siehe „Beratungsbedingungen im Anhang“), sowie den bautechnischen Vorgaben und sollte möglichst in einem Schritt erfolgen. Abweichungen zu diesem Ziel widersprechen sich mit **Präsenzrechner**.

Hinweis:
Zur Gewährleistung der erforderlichen Gesamtenergieeffizienz sind in der Umsetzung der Maßnahmen durch beteiligte Unternehmen die Qualitätskriterien gemäß Anhang heranzuziehen.

Die im Sanierungsprotokoll angeführten Fachempfehlungen (z.B. Flächen, Leistungen) wurden anhand einer Grobschätzung ermittelt und ersetzen weder ein Energieaudit noch eine detaillierte Planung und bautechnische Fachberatung.

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Kommentar zum Beratungsergebnis
Anforderungen gem. ÖBERG 10a, Landes-Baurecht nicht eingehalten:
HWB_W = 45 kWh/(m²·a) | Anforderung: 38 kWh/(m²·a)
Kommentar Berater/Berater: Textdatei unbegrenzt

Förderinfo
mögliche Förderungen für die „Beachtlichen Maßnahmen“:
Kommentar Berater/Berater: Textdatei unbegrenzt

mögliche Förderungen für die „Empfohlenen Gesamtkonzept“:
Kommentar Berater/Berater: Textdatei unbegrenzt

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Varianten: Vollkostenvergleich

Variante 1

Maßnahme	U-Wert	Fläche	U-Wert	Fläche	U-Wert	Fläche
Obere Geschosdecke	1,30	36	0,12	36	30	36
Kellerdecke	1,21	36	0,18	36	12	36
Fenster	1,11	31	0,8	31	31	31
Fassade	0,2	537	0,8	537	537	537
Außenwand	1,4	208	0,13	223	22	22

Variante 2

Variante 3

Anmerkungen
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Varianten: Technische Beschreibung

Gebäudehülle	Variante 1		Variante 2		Variante 3	
	U-Wert	Fläche	U-Wert	Fläche	U-Wert	Fläche
Obere Geschosdecke	1,30	36	0,12	36	30	36
Kellerdecke	1,21	36	0,18	36	12	36
Fenster	1,11	31	0,8	31	31	31
Fassade	0,2	537	0,8	537	537	537
Außenwand	1,4	208	0,13	223	22	22

Gebäudetechnik

	Ökoeffizient	Luft/Wasser Wärmepumpe	Luft/Wasser Wärmepumpe
Gebäude-Heizlast	23,8 kW	6,2 kW	23,8 kW
Stationäre Heizleistung	23,8 kW	-	-
Wärmepumpe	kein Speicher	Pufferspeicher 1.000 l	Pufferspeicher 1.000 l
Wärmepumpe	7000 °C	4000 °C	7000 °C
Wärmepumpe	Radialpumpe	Radialpumpe	Radialpumpe
Wärmepumpe/Heizung	Speicher 300 Liter	Wärmepumpe	Wärmepumpe
Luft/Wasser	14 m ²	14 m ²	14 m ²
Platzbedarf	3 kW	-	-

Energiebedarf / Energieertrag

	30,41 kWh/a	333 kWh/a	13.277 kWh/a
Raumheizung (HEB)	30,41 kWh/a	333 kWh/a	13.277 kWh/a
Wärmepumpe (HEB)	3.200 kWh/a	333 kWh/a	1.400 kWh/a
PV-Durch-Ertrag	-	2.700 kWh/a	-
Gesamtertrag	-	-	-

Klimarelevanz

	21.260 kWh/a	-2.184 kWh/a	21.260 kWh/a
Primärenergie	21.260 kWh/a	-2.184 kWh/a	21.260 kWh/a
CO ₂ -Emission	12.988 kg/a	-1.402 kg/a	12.988 kg/a
Klimarelevanz-Indikator	314	-3	333

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Hinweise und Textbausteine

Geplante Maßnahmen

Dämmung der obersten Geschosdecke

- Die eine Dampfsperre nötig ist, hängt vom Aufbau und Zustand (insb. der Luftdichtheit) der Deckenkonstruktion und des geplanten Aufbaus der Dämmebene auf der kalten Seite ab. Die Konstruktionsfolge sollte zur Vermeidung von Kondensatschäden innen (Raumseite, unten) immer dampfspeicher als oben (Dachtraum) sein.
- Luftdicke Abdichtung von Durchführungen (Kabel, Leitungen, ...) und der Dachbojenstiege.
- Dämmung von Wärmebrücken (Lagebrücke, Giebelwand, Treppenhof, Fußboden, ...)
- Vermeidung nicht brechen Dämmstoffe im Bereich der Putzöffnungen von Kaminen.
- Abklärung möglicher Feuchtschutzmaßnahmen und zusätzlicher Fragen mit dem Professionsin-

Die Bewilligungs- bzw. Mitbewilligungspflicht sollte immer vor Umsetzung der Maßnahmen mit der zuständigen Baubehörde abgeklärt werden (Prüfung, Brandschutz, Nutzfläche, ...).

Erneuerung der Fenster

- Gesamt-U-Wert des Fensters (U_W, Glas und Rahmen): 0,8 W/(m²·K)
- Rechenart: Fenestermatrix im Sinne der ÖNORM EN10263 (innen-externsicht, außen-sichtungsricht, Wärmeeintragung der Fenesterrückseite)
- Abstimmung der Antriebsart mit der Außenwand (Dämmstrecke, Dämmung der Laibungs-)
- Außengliedende Sonnenschutz zur Vermeidung sommerlicher Überwärmung.
- Nach dem Fenestertausch muss das Lüftungssystem an die dichtere Gebäudehülle angepasst werden (vermeint Stößlüften).
- Die Bewilligungs- bzw. Mitbewilligungspflicht sollte immer vor Umsetzung der Maßnahmen mit der zuständigen Baubehörde abgeklärt werden (Erscheinungsbild, Anordnung, ...).

Erneuerung der Haustüre

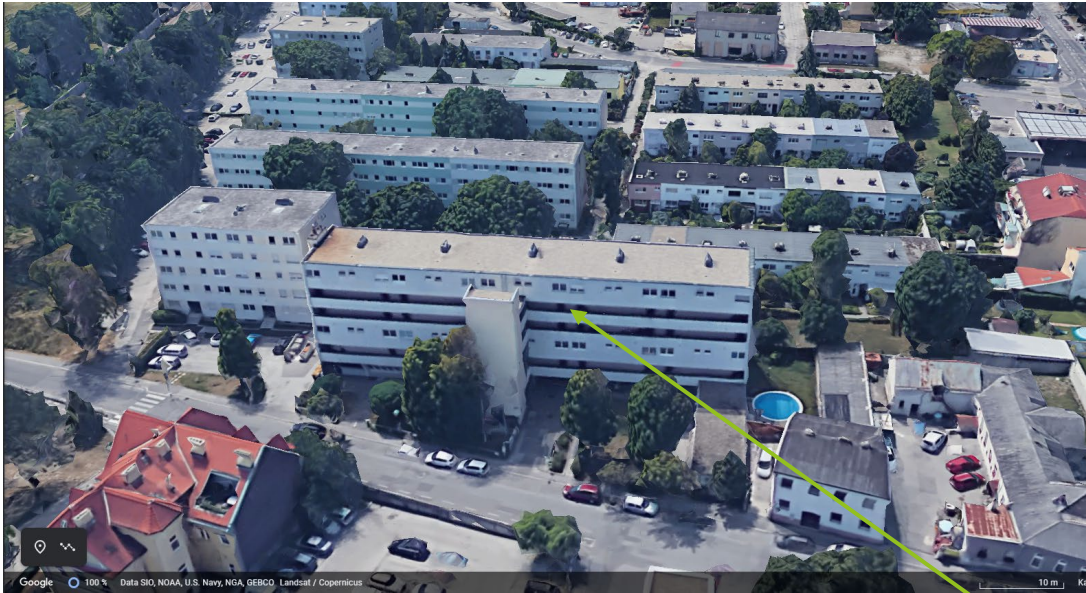
- Die Gesamtwärmeleitfähigkeit (U-Wert) der Haustüre sollte mit 0,8 W/(m²·K) berechnet.
- Wichtig: Anmerkungen siehe „Erneuerung der Fenster“

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Tools: Ecotech and ETU

Apartment building

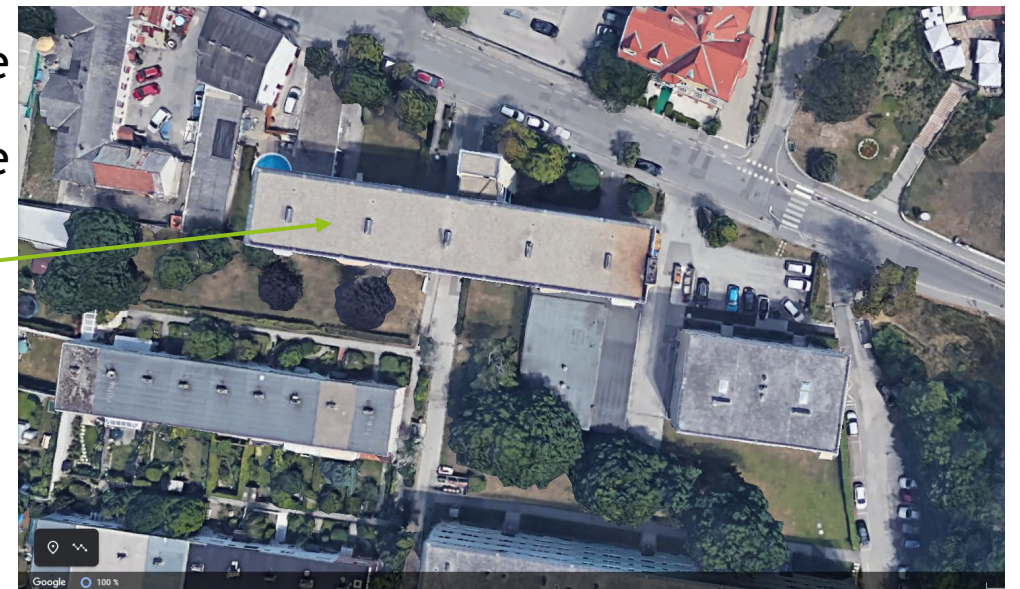
Constructed in 1969; 3,077 m²; co-ownership; apartments from 1st floor, different use on ground floor. Single measures were implemented now and then; change of heating system from oil boiler to district heating (biomass) around 2005. No insulation, high connection load. Issues with individual exchange of windows. A deep renovation is being considered using a prefabricated energy efficient façade.



North facade

South facade

Top view



Apartment building



North facade



South facade

Apartment building



Passage



District heating station

Data used in the assessment process

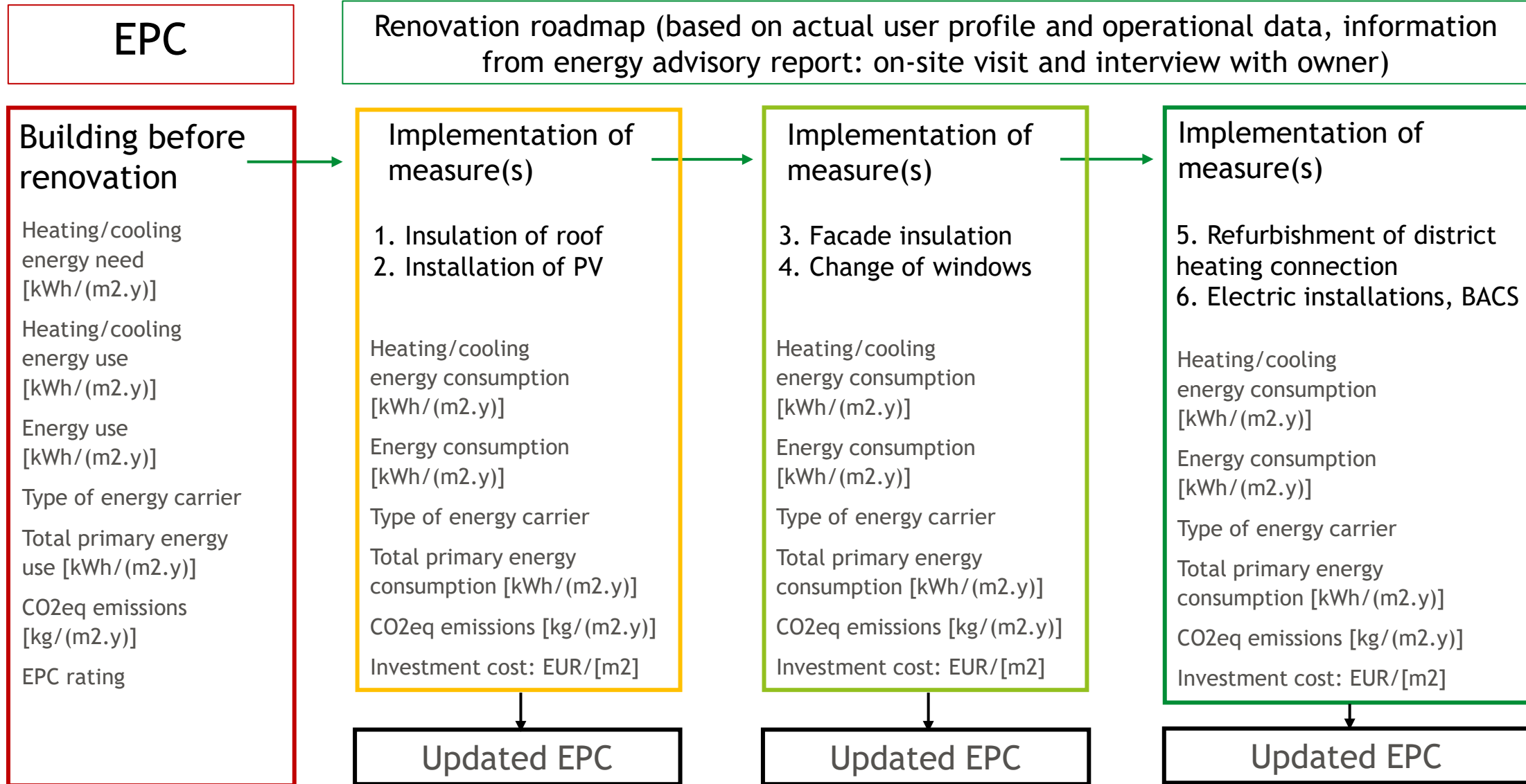
Type of data used	Source of information	Comment
Architectural model	Created for TIMEPAC	BIM not yet usual procedure for residential buildings
Energy related building data	EPC, technical reports and documentations received from owners, EPC issuers, designers/engineers	EPC is only accessible for owner and EPC issuer
General building information	Interview with owner	Alternative source of information: facility management company
Renewable energy potential data, district heating / cooling potential data	Interview with owner, GIS, zoning plan / urban development plan	No link between zoning plan and EPC database
Energy consumption (operational data)	Not available for multi-unit residential buildings	Only for individual apartments if users agree; or aggregated data from grid operator, in theory

The digital building logbook with up to date building data will be a great support.
The exact description and definition of the data fields is necessary.

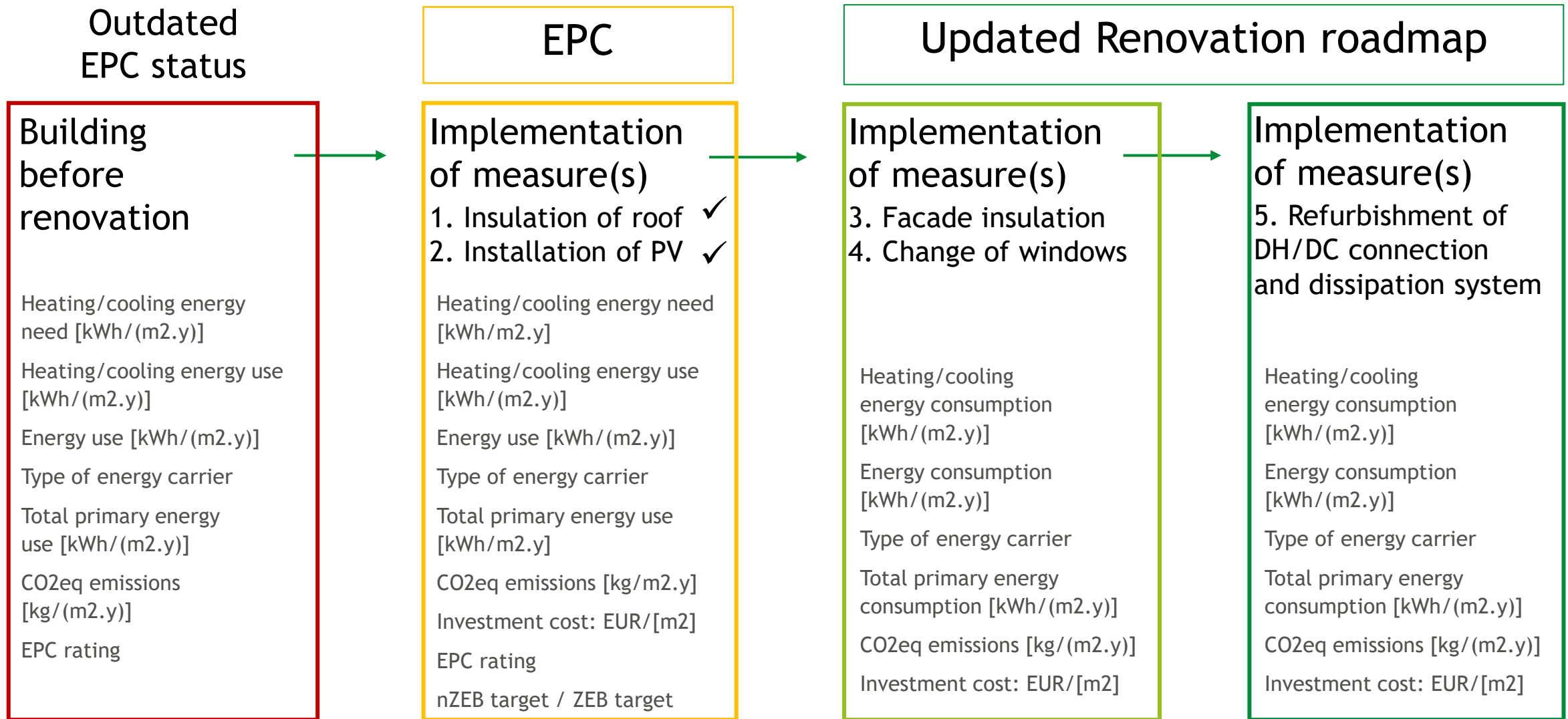
Renovation roadmap

TIMEPAC Code	Renovation roadmap: measures in the correct sequence	Timing of renovation measures and avoiding of possible Lock-in effects
AT-09	<p>Building level:</p> <p><u>(1) Block of measures:</u></p> <p>North and south façade: Prefabricated Curtain wall, e.g. “GAP façade”, including windows</p> <p>West and east façade: GAP façade with integrated PV panels in the upper third of the façade</p> <p>Renovation and insulation of roof</p> <p>Installation of PV system on the roof</p> <p><u>(2) Block of measures:</u></p> <p>Reduction of water supply and return temperature of the heating system</p> <p>Low-temperature heat delivery system (panel heating)</p> <p>Individual room control with optimisation function</p> <p>District level:</p> <p>Decarbonisation of district heating</p>	<p>All measures of Block (1) are implemented prior to Block (2). Insulation measures must be checked regarding fire safety requirements.</p> <p>The sequence within Block of measures (1) depends on the maintenance and repair plan of the facility manager.</p> <p>The renovation roadmap must be agreed with owners. Individual replacement of windows must be stopped.</p> <p>When planning the individual measures, the following interactions with other measures must be considered:</p> <p>Insulation of the façade requires a watertight connection to the flat roof.</p> <p>The renovation of the flat roof must take into account the installation of a PV system.</p> <p>The PV system is installed after the renovation of the flat roof.</p>

Starting point = EPC | conventional or created by BIM | in terms of building data and energy performance. Renovation Roadmaps are drawn up taking into account additional data such as from on-site visits and energy bills. Example of building specific renovation roadmap:



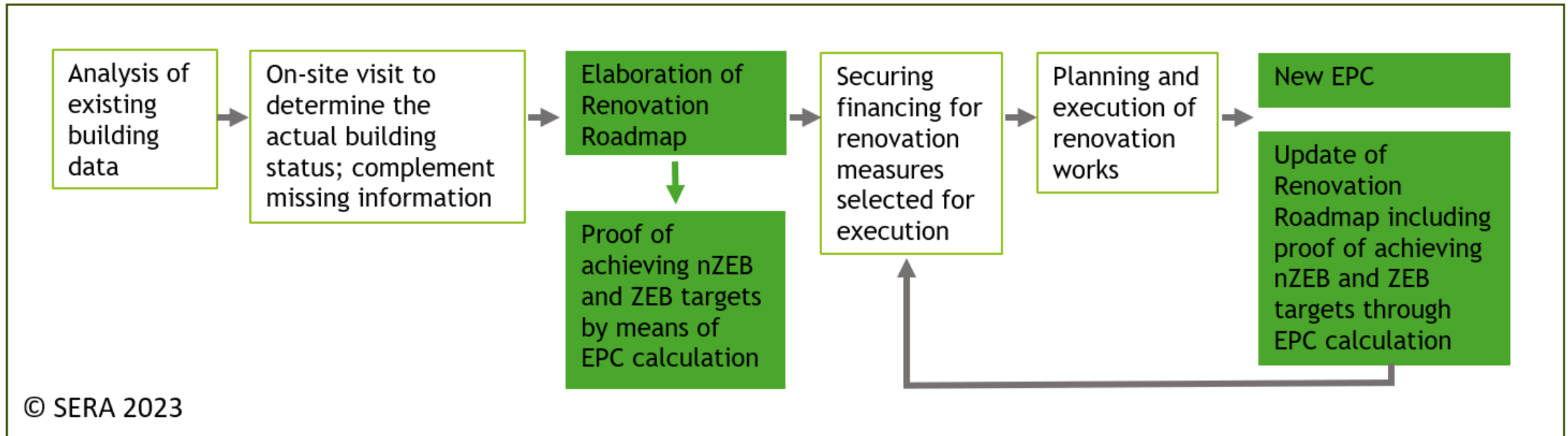
Measures of a renovation stage are implemented, and an update of the EPC is made. The previous EPC status is “outdated”, the current EPC provides the input into the updated Renovation Roadmap. Ensures that technological and regulatory changes are properly addressed
Example of building specific updated renovation roadmap:



A possible workflow for implementing the RP

Minimum scope of renovation passport according to Article 12 recast EPBD 2024

Useful scope in view of market needs (actual status of building), and the National Building Renovation Plan as part of the National Energy and Climate Plan



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RP according to recast EPBD 2024

- **Mandatory RP scheme** based on common framework according to EPBD Annex.
- **Voluntary use**, unless the Member State decides to make it mandatory.
- Measures to ensure that building renovation passports are affordable.
- **Option to allow the RP to be drawn up and issued jointly with the EPC. In this case the renovation passport shall substitute the EPC recommendations.**
- **Digital RP** suitable for printing, by a **qualified or certified expert**, following an **on-site visit**.
- Explain to the building owner **the best steps to transform the building** into a zero-emission building well before 2050.
- Member States to provide a **digital tool** for preparing and updating the RP.
- RP to be uploaded to the **national EPC database**.
- RP to be stored in, or can be accessed via, the **digital building logbook**, when established.

Annex sets mandatory and optional requirements

Mandatory:

- **Information on the current energy performance of the building;**
- A graphical representation or graphical representations of the roadmap and its steps for a staged deep renovation;
- Information on relevant national requirements such as minimum energy performance requirements for buildings, minimum energy performance standards and rules in the Member State on the phase-out of fossil-fuel used in buildings for heating and cooling, including application dates;
- A succinct explanation on the optimal sequencing of steps;
- Information about each step, including:
 - The name and description of the renovation measures for the step, including relevant options for the technologies, techniques and materials to be used;
 - The estimated energy savings in primary and final energy consumption, in kWh and in percentage improvement compared to the energy consumption prior to the step;
 - The estimated reduction of operational greenhouse gas emissions;
 - The estimated savings on the energy bill, clearly indicating the assumptions on energy costs used for the calculation;
 - **The estimated energy performance class of the energy performance certificate to be achieved following completion of the step;**
- Information about a **potential connection to an efficient district heating and cooling system;**
- The share of individual or collective generation and self-consumption of **renewable energy** estimated to be achieved after the renovation;
- General information on available options for **improving construction products' circularity and for reducing their whole lifecycle greenhouse gas emissions**, as well **as wider benefits related to health and comfort, indoor environmental quality and the improved adaptive capacity of the building to climate change;**
- Information on available funding and relevant weblinks to the sources of such **funding;**
- Information on **technical advice and advisory services**, including contact details and weblinks to one-stop-shops.

Example | Renovation passport in the province Salzburg, Austria | The path towards Nearly Zero Energy Building

Essentially, the recommendations in the EPC are replaced by the specific renovation passport. The implementation of a measure is linked to the updating of the EPC and to the updating of the renovation passport. Thus, by means of comparisons, the measures and the indicators can be tracked.

EPC existing buildings

EPC renovation roadmap

EPC renovation plan

EPC renovation completion

Measures of renovation roadmap partly implemented

Tracking the implementation of renovation measures with the EPC database

EPC existing building

EPC renovation roadmap

Those measures implemented are not included any longer

EPC renovation plan

EPC renovation completion

Measures of renovation roadmap partly implemented

EPC existing building

Automatic check: Is the renovation roadmap available? Will requirements be achieved?

Renovation roadmaps for residential buildings – conclusion (1)

What is the right level of detail considering cost of the RP - specify the level of detail of the renovation roadmap and communicate accordingly to avoid wrong expectations.

Data collection is time consuming and costly - how to make use of the digital building logbook to avoid repeated data collection.

A tool is necessary. Measures are selected from the tool with the data in the background. Descriptions of interactions are included in the software tool and are activated when a measure is selected; to be considered in the renovation plan.

The renovation roadmap is not a renovation plan but should make the link to implementing renovation measures.

The sequence of measures in the renovation roadmap is done by the EPC/RP issuer based on the available information.

The roadmap is uploaded to the EPC database and made accessible to the owner/property manager of the building to consider it for future planning.

Renovation roadmaps for residential buildings – conclusion (2)

Single-family house:

Current process of energy advice can be used/extended to match with RP. The energy advice protocol can be used to generate the renovation roadmap.

Apartment block:

Current process of energy advice can be used to decide if a renovation roadmap should be commissioned. Cost for elaborating the renovation roadmap depends on the complexity of the building.

Different RP schemes for single family houses and apartment blocks needed.

**If you would like more information,
please visit www.timepac.eu or contact us at
office@sera.global**

Thanks for your attention!