

Exploring future scenarios for EPC enhancement:

Creating building Renovation Passports from data repositories

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TIMEPAC aims to modernize building certification practices according to the latest Energy Performance of Buildings Directive (EPBD) review. Through five future “Transversal Deployment Scenarios,” we enhance certification by integrating diverse data sources like operational data and renewable energy production. We also merge energy performance certificates with other assessment instruments like the Smart Readiness Indicator (SRI) and sustainability metrics. Our focus includes improving EPC reliability using BIM technologies during renovations and utilizing EPC databases for decision-making in large-scale renovation programmes.

In this scenario we created procedures to trace the evolution of building refurbishment. This involves utilizing different data sources such as BIM, EPC, energy audit reports, and operational data, among others.

The role of data repositories in staged renovation

The building Renovation Passport was introduced by amending Directive (EU) 2018/844, responding to the need of increasing the renovation rate. Ideally, building renovation is done in one go, but often, this is not possible due to a variety of reasons. The alternative approach is the staged renovation which is implemented over a certain period of time. In such a case, it is important to plan individual measures in the correct sequence to avoid lock in effects and thus ensure that the building improvement potential is fully realized. With the recast EPBD 2024 new provisions have been introduced.

Tracking the implementation of renovation measures is important because the up-to-date information about a building is necessary for tracing the transformation of the building stock as a whole, but also for certain services at building level such as real estate valuation or renovations financed by on-bill savings. In this regard, data repositories play an important role because there is the potential to improve data quality and thus acceptance on the market, and to reduce effort for data collection and thus cost.

Bridging EPC and BIM for enhanced Renovation Passports

The adoption of the Renovation Passport under the latest EPBD enhances the functionality of the EPC, serving as a potent instrument to boost the renovation rate and steering the building stock towards zero emissions by 2050. Whether integrated into or alongside future certifications, the passport tackles key challenges posed by the current EPC:

- **It is valid for ten years and includes recommendations for improving the energy performance of buildings. However, the actual implementation status of these measures remains unknown.**
- **The EPC bases its recommendations on a standard occupant profile, overlooking actual energy consumption data. As a result, estimating the costs and benefits of renovation measures becomes challenging.**
- **Moreover, it frequently oversimplifies assessments and relies on generalized input data, compromising the accuracy and efficacy of renovation decision-making.**

Data availability and quality are essential for reliable EPCs and effective renovation passports, ensuring that renovation measures are not only identified but also implemented at a reasonable cost. In this regard, TIMEPAC addresses the following aspects:

- **Generating Renovation Passports by integrating EPC data with BIM models, energy audit reports and other relevant data, including operational data.**
- **Tracking the implementation of renovation measures.**

TIMEPAC's vision, as shown in Figure 1, is to connect BIM databases with EPC databases. This seamless integration holds particular significance within the ongoing efforts to revise the EPBD. In this environment, each successive renovation of a building would be documented in the BIM models, allowing for the generation of updated EPCs from them. This way, the evolution of building renovations would be mirrored by corresponding updates to the series of BIM models.

We are currently encountering numerous challenges regarding EPC for existing buildings, which are expected to intensify with future requirements. Concerns regarding the potential cost of retroactively creating a BIM model for existing buildings can be alleviated, as demonstrated in the factsheet "Generating enhanced EPCs with BIM data".

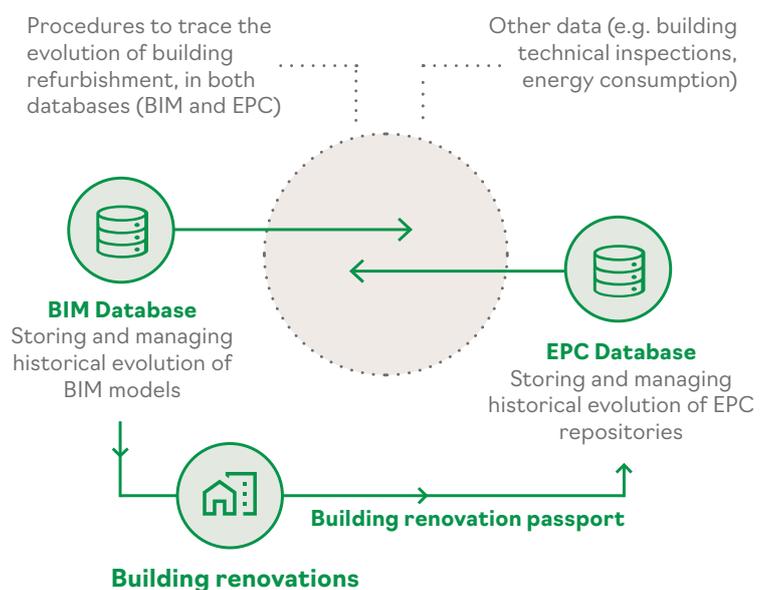


Figure 1: Overview of developing a Renovation Passport

Optimizing renovation passports: Insights and guidelines from TIMEPAC case studies

In TIMEPAC, we have developed renovation roadmaps that are tailored to specific buildings and represent the main element of the Renovation Passport, based on the software, databases and procedures available in each partner country. Their strengths and weaknesses were analysed with regard to utilization of databases and software tools, achieved building performance, and the tracking of renovation measure implementation.

Drawing insights from these case studies, we derived conclusions and formulated recommendations, resulting in a guideline outlining the optimal approach and considerations for efficiently developing effective passports.

The ideal schematic sequence of the workflow is shown in Figure 2.

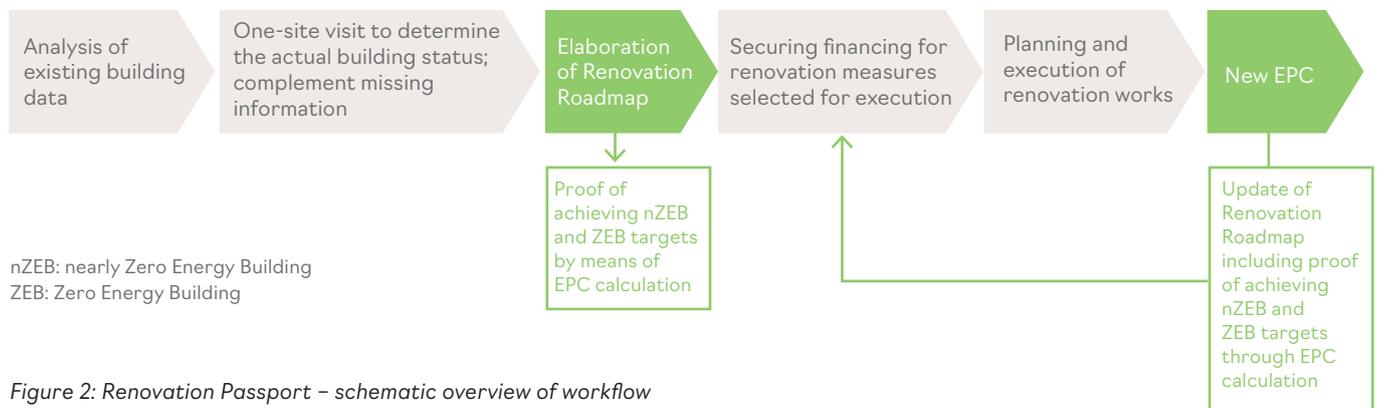


Figure 2: Renovation Passport – schematic overview of workflow

There are basically two ways to establish links between EPC and Renovation Passport, depending on the existing certification tools and procedures in a country or region:

1. Enhance existing EPC calculation software which already includes energy modelling and links to EPC databases, to be compatible with the passports.
2. Use other data sources to complement the certificate with real energy use, health, comfort, cost over time, and climate change adaptation can come from other sources.

Regarding building data, two main approaches for repositories were identified:

1. EPC database environment, which enables storing EPCs, renovation passports, and other building-related data in a dedicated account. This is the procedure currently in use in the Province of Salzburg, Austria.
2. BIM software offering, using Level 3 BIM, which allows for data storage in a centralized location, ensuring up-to-date information. An example of this is the CYPE BIMserver.center.

With regard to tracking the implementation of renovation measures, three options were identified:

1. EPC database, if versioning of EPCs and passports is feasible.
2. BIM-based workflow for logging changes to the building, leveraging the capabilities of BIM.
3. Energy audit reports, when an Energy Management System is in place.

Outcomes

The TIMEPAC guideline for generating Renovation Passport from data repositories is closely aligned with the recast EPBD 2024 and provides comprehensive guidance for transposing and implementation the scheme. It not only covers the essential requirements of

the EPBD but also delves into additional aspects crucial for enhancing the effectiveness of the passports, particularly concerning the practical implementation of improvement measures.

These include:

- **Ensure professionals have access to data repositories to keep the cost of renovation passports low.**
- **Provide easy access to operational data for professionals.**
- **Maintain up-to-date information on building status by tracking the implementation of renovation measures.**
- **Enable spatial referencing of information, including a link to regional/ municipal plans with data on spatial renewable energy potentials.**
- **Include a reference to the requirements of the EU-Taxonomy Regulation for financial information.**
- **Utilize quality-assured Level 3 BIM architectural models for quality control, checking the reference area and volume used for calculating indicators.**

**For more detailed information, please see the report
“Creating building renovation passports from data repositories –
Transversal Deployment Scenario 3”.**



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