X-tendo

INTRODUCTORY REPORTS

EPC DATABASES

MARCH 2021

ENERGY PERFORMANCE CERTIFICATE (EPC) DATABASES STORE ALL EPCS AND UNDERLYING DATA. THEY ARE AN IMPORTANT TOOL FOR PUBLIC AUTHORITIES TO SOURCE BUILDING STOCK INFORMATION AND CHECK COMPLIANCE WITH THE NATIONAL ASSESSMENT METHODOLOGY. IMPROVING EPC DATABASES INCLUDES HOW TO SET THEM UP, HOW TO GATHER THE DATA, HOW TO ESTABLISH THE INTEROPERABILITY OF DIFFERENT DATABASES, AND HOW TO USE DATA AND EXTRACT RELEVANT INSIGHTS. FINALLY, QUALITY ASSURANCE PROCESSES AND DATA VERIFICATION ARE KEY TO ENSURE THE RELIABILITY AND ACCURACY OF THE INFORMATION STORED IN THE DATABASE.

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WHY WE DEVELOPED THIS FEATURE

EPC databases have, so far, been voluntary for Member States. Most Member States have now set up databases, but the approaches vary from country to country. While some countries only collect the input data about the building (in part extracted from an XML file[1], for example), others go further and perform the EPC calculation within the registry. Some Member States store the detailed input data required to generate the EPC, while others collect a PDF copy of the certificate but no data. In all cases, it is highly relevant to store all EPC data and, preferably, to provide authorised stakeholders with easy access to relevant information.

The database has different potential uses, such as data mining for country/sector reports, interoperability with other databases and publication of market-relevant information, to different stakeholders: building owners, construction companies, real estate actors, public authorities, etc. Because quality assurance of the EPC databases can contribute significantly to improving trust in EPCs, the X-tendo project has developed a methodology for implementing quality assurance routines.

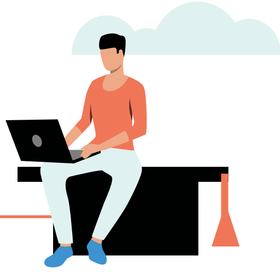
SCOPE OF APPLICATION

The methodology can be applied to any EPC database, national or regional. The main condition is that the EPC data is automatically accessible through an appropriate file format (for example, XML). EPCs in a PDF format do not allow the data to be automatically read.

Building typology	New and existing buildings • Residential (single-family, multi-family) • Non-residential (offices) • Public (education, health, heritage)
Tenure	Owner-occupied, unoccupied, co-operative, private rental, public rental
Property status	Renting, selling, buying – new built and renovation

[1] https://epbd-ca.eu/ca-outcomes/outcomes-2015-2018/book-2018/ct/certification-control-system-and-quality-update

LEVEL OF EXPERTISE, SKILLS AND TRAINING



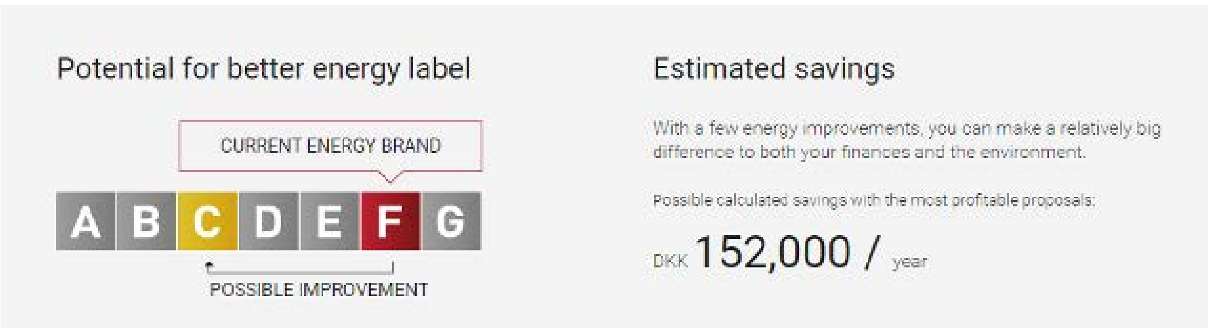
The automatic verification checks should be performed by experts with a good knowledge of IT and big-database handling and statistical analysis skills.

	Fundamental awareness (basic knowledge)	**Novice** (limited experience)	**Intermediate** (practical application)	**Advanced** (applied theory)	**Expert** (recognised authority)
EPC databases					✓

GOOD PRACTICES

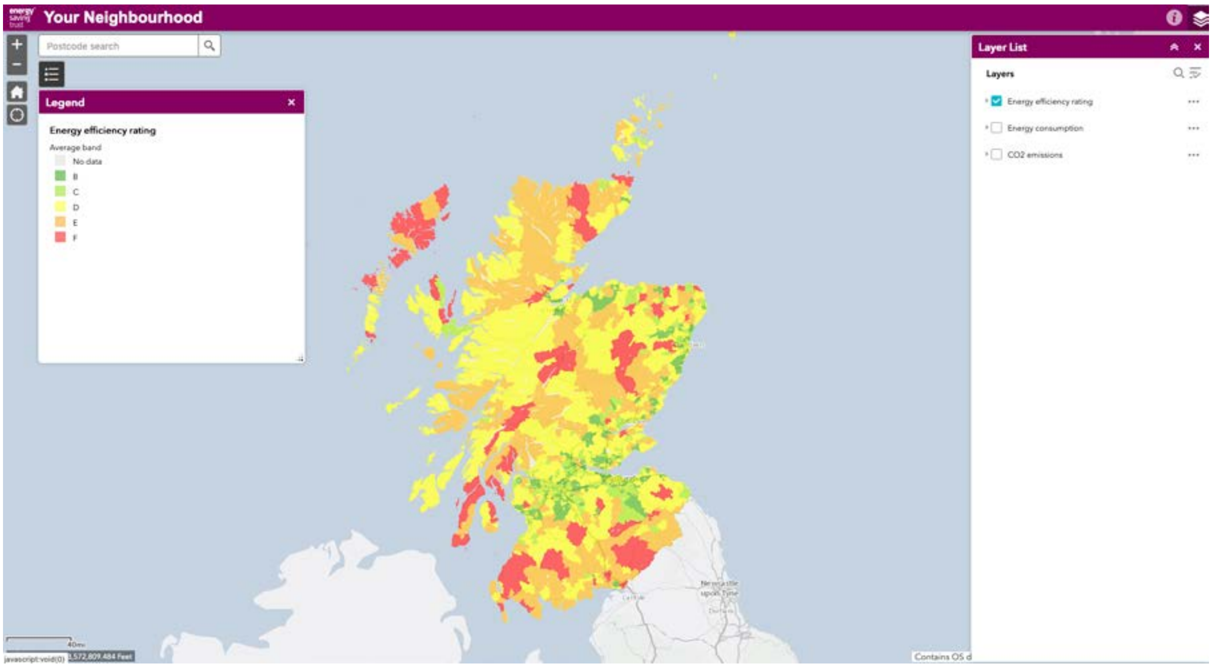
In **Denmark**, the Danish Energy Agency (DEA) is responsible for storing the EPCs, implementing quality assurance routines and managing interoperability with other databases. The Danish EPC database can be considered innovative as it makes the building-related data publicly available through a digital platform and offers the possibility for end-users to compare their EPC rating with neighbours and get automated renovation suggestions, including indicative energy savings and payback times (see Figure 1).

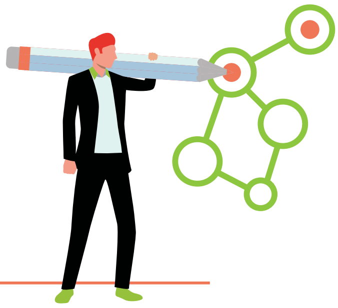
Figure 1 - Extract from the public Sparenergi.dk website, powered by building-related databases



The Energy Saving Trust manages the EPC database which comprises more than 50% of dwellings **in Scotland**. The database became a powerful instrument for public authorities, and it is being used to identify and target homes where renovation support is most urgently needed (see Figure 2). The comprehensive EPC data has been integral to the development of several information resources, which are used to assist the work of local authorities and the Scottish government, as well as advise homeowners on how to improve the energy performance of their homes. The innovative programmes enabled by this EPC database include, among others, Home Energy Scotland, Home Energy Check and Large-Scale Data Analysis: Home Analytics.

Figure 2 - Map of EPC data (source: Energy Saving Trust, Local Homes Portal)



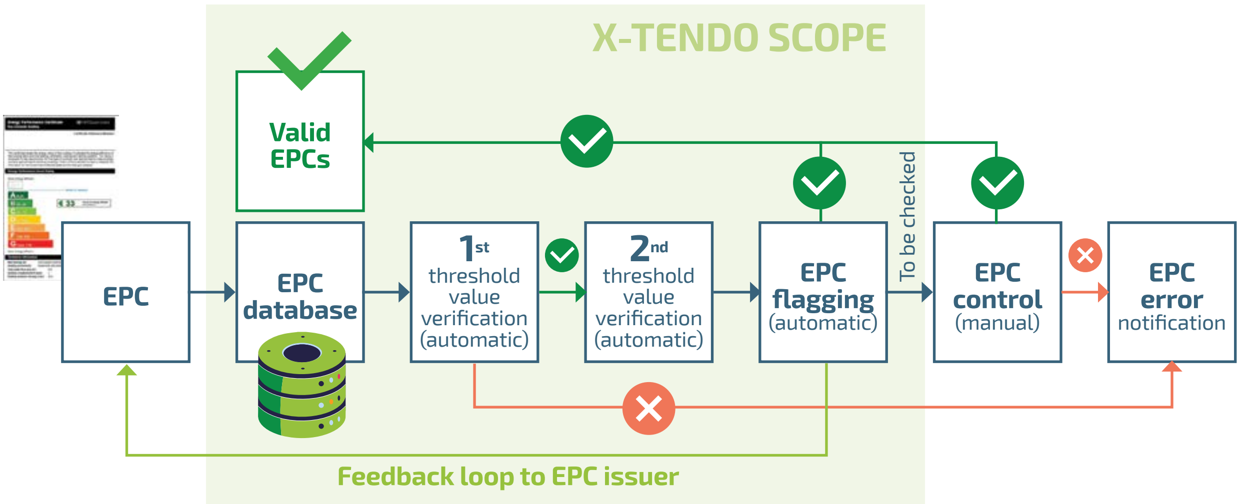


METHODS AND ASPECTS INCLUDED

The proposed EPC database methodology consists of a four-step approach (see Figure 3), starting right after the EPC is logged in the database:

1. First check: "gross" threshold value check
2. Second check: "narrow" threshold value check
3. EPC flagging: indication of inconsistencies per EPC
4. Feedback loop to energy auditor: identify and indicate commonly made mistakes, and communicate to energy auditor training courses.

Figure 3 - Quality control of EPC databases



The approach of manually controlling and correcting (if necessary) the EPC is not part of the scope of this methodology. The manual control means that a person (possibly someone with certified skills, from the EPC database responsible authority) should check and control the selected EPC and decide if the EPC is valid (or not valid). If the EPC is not valid, other steps are necessary, such as notifying the energy auditor who issued the EPC. In general, for all EPCs verified, a verification protocol is generated with warnings about identified inconsistences. This means it is also part of the methodology to clearly define the possible fault categories and potentially the different levels of their gravity: very serious, serious or less serious faults.

From a long-term perspective, the interaction loop with energy auditors is an important aspect. By reducing the repetition of mistakes in the EPC issuing process, it increases the quality of EPCs before they enter the database. In this context, it is important to clearly communicate the quality assurance results to energy auditors in a structured way, contributing to their training and skills development. We will also elaborate a concept on how to apply the results from the EPC database quality control to an education process for energy auditors/consultants.

HOW WE WILL IMPLEMENT IT

The first action required for the successful implementation of the EPC database methodology is programming the code that will perform the verification checks. An automatised interface between the national EPC database and the core code is developed, allowing the extraction of the EPC data; this interface and the data format will be country specific. Country-specific indicators will also be developed, in addition to cross-cutting ones, and "narrow" threshold values, especially related to different building types, will also be country specific. Certain national adaptations are being developed:

- Italy: this method represents the "second level quality checks" in the national database. A risk-based identification of risky EPCs will be carried out, aiming at reporting to the regions which collect EPCs in regional EPC databases.
- Greece: the scope will include the risk- based selection of the EPC.
- Denmark: the scope will include preparing a learning cycle for energy consultants based on the results from the EPC quality assurance.

OVERALL EVALUATION

LESSONS LEARNT

- Providing an EPC quality control and assurance routine is important so that EPC data in readable for computer systems and accessible to users.
- Storing PDF documents is not sufficient.

PREREQUISITES

- EPC database set up, and machine-readable EPCs.
- Python language knowledge.

REPLICATION

- The method is replicable to other countries. Country-specific adaptations, such as choice of parameters to be checked, are necessary.

PROS

- Code structure can be easily adapted to specific countries.

CONS

- An interface between the national database and the code must be implemented. This interface allows inputting EPC information into the core code.
- If needed, the code can be translated to other programming languages.

RISKS

- The code may become obsolete if the necessary conditions are not met.

RECOMMENDATIONS

- Organise the EPC database in a structure that allows easy and automatic data extraction.

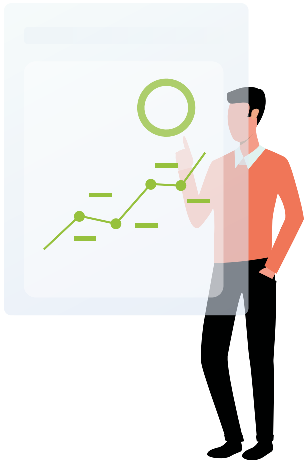
NEXT STEPS

- Test the methodology with the implementing partners.
- Identify other countries that would like to test the code.

COMPLEXITY

- The complexity is connected to the expert's programming knowledge. Python experts should not have many difficulties to execute the code and provide quality assurance checks.

COMPLIANCE WITH CROSS-CUTTING CRITERIA



QUALITY AND RELIABILITY OF EPCS

After performing the EPC database quality assurance, the results would be presented to the energy auditors responsible for issuing the EPCs. This creates a learning cycle, ensuring that insights from the quality assurance in the EPC database are fed back to the auditors, leading to a lower failure rate in the medium term.

USER-FRIENDLINESS

The methodology is described in an understandable diagram flow. However, the relevance of this indicator is estimated as intermediate, because the initial target group is the experts at the EPC database authority. In the long term, the easy use of the database will encourage all stakeholders to access the information, improving the quality of the construction sector.

CONSISTENCY WITH STANDARDS

The methodology is evaluated with real existing EPC databases. The extent to which ISO 9001 standards can be applied in the development and application process would be checked.

ECONOMIC AND POLITICAL FEASIBILITY

A rough estimate of the costs of implementing different options for the feature at a later stage is necessary to ensure it is economically acceptable. Public bodies in Member States need quality compliance methods and this feature would support this.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 845958.