



DATA-DRIVEN DECISION-SUPPORT TO INCREASE ENERGY
EFFICIENCY THROUGH RENOVATION IN EUROPEAN
BUILDING STOCK

D7.5 – Final Joint Strategy on Planning and Management of Energy Efficiency Measures on Different levels of Decision Making

[WP7 – Practical Integration on Governance and Local Policies]



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About the project

The EERAdata project will develop and test a decision-support tool to help local administrations in the collection and processing of their building and demographic data towards an assessment and prioritisation of Energy Efficiency measures in planning, renovating and constructing buildings.

While EU policy assigns a primary role to Energy Efficiency (EE), the lack of a holistic understanding of the impact of EE investments has hindered its integration in the policy-making process. Coordination between demand and supply side of energy policy is not targeted, and there is need to gather the evidence on the benefits of EE in ecological and socio-economic terms as well as on its interactions with the broader policy context and energy market.



Project's goals

The project aims to develop:

- Guidelines and roadmaps for the advancement of the clean energy transition
- Joint thematic studies and analyses reports on territorial needs and decarbonisation pathways
- A fully developed and tested decision-support tool to help local administrations in the collection and processing of their building and demographic data towards an assessment and prioritization of EE measures in planning, renovating and constructing buildings



Table of contents

DATA-DRIVEN DECISION-SUPPORT TO INCREASE ENERGY EFFICIENCY THROUGH RENOVATION IN EUROPEAN BUILDING STOCK.....	1
Disclaimer	2
<u>EXECUTIVE SUMMARY</u>	<u>5</u>
<u>LIST OF FIGURES</u>	<u>5</u>
<u>1. INTRODUCTION</u>	<u>6</u>
<u>2. PRACTICAL GUIDE ON THE APPLICATION OF THE DECISION SUPPORT TOOL ...</u>	<u>6</u>
2.1. RENOVATION STRATEGIES	7
<u>3. CONCLUSION</u>	<u>11</u>
<u>REFERENCES</u>	<u>11</u>



Executive summary

The EERAdata project conducted research and developed a decision support tool (DST) for calculating the impact of building renovations on energy efficiency (EE). This deliverable, D7.5 – *Final Joint Strategy on Planning and Management of Energy Efficiency Measures on Different Levels of Decision Making* simply describes a brief practical guide on the use of the DST i.e., how users on different levels of decision-making can use the tool.

This report presents a description of the practical guide developed as a webpage on the EERAdata website and provides a description how the DST can be used to support decision-making in a typical renovation process as well as multiple renovation cases where decisions will be made on whether the tool should be used and how the tool will be used. The user journey through the DST is also described, through a flowchart, from data collection and input to data analysis and output for users on different levels of decision-making (standard and expert).

List of figures

Figure 1 Typical renovation process with DST involved. Adapted from: Chyslovska, 2021	7
Figure 2 Flowchart showing different user journeys.....	10



1. Introduction

The EERAdata project has conducted research and developed a decision support tool (DST) for calculating the impact of building renovations on energy efficiency (EE). The intended purpose of this tool is to accelerate the implementation of the Energy Efficiency first principle across Europe. This will be achieved by helping European policymakers assess the impacts of investment in energy efficiency-based renovations and prioritise energy efficiency in buildings. As of the preparation of this deliverable (M30), the project has gathered, sorted, and inspected various kinds of data formats in order to provide the most detailed information on the building stock of the project's frontrunner municipalities: The City of Copenhagen (COP), the Municipality of Velenje (MOV) and the Andalusian Energy Agency (AEA).

This deliverable, D7.5 – *Final Joint Strategy on Planning and Management of Energy Efficiency Measures on Different Levels of Decision Making*, involves the development of a practical guide for European policymakers to incorporate energy efficiency into new building and renovation policies through the application of the DST developed by EERAdata. A guide has been developed, based on use of the DST, which helps in planning and management of energy efficiency measures on different levels of decision-making.

The purpose of this report is to provide context to the practical guide developed on the use of the decision support tool. The rest of this report is structured as follows. Section 2 contains a description of the guide for the decision support tool, showing the journey through the DST for two different user levels. Section 3 concludes the report.

2. Practical Guide on the Application of the Decision Support Tool

The EERAdata project has developed a decision support tool (DST) for calculating the impact of building renovations on energy efficiency. A webpage has been developed which provides a description how the DST can be used to support decision-making in a typical renovation process (shown in figure 1) and provides a multiple renovation cases where decisions will be made on whether the tool should be used and how the tool will be used. The user journey through the DST is also described, through a flowchart, from data collection and input to data analysis and output for users on different levels of decision-making (standard and expert). The flowchart, which is on the EERAdata website, is an interactive tool through which insight can be gained into different elements of the tool by clicking on each box.

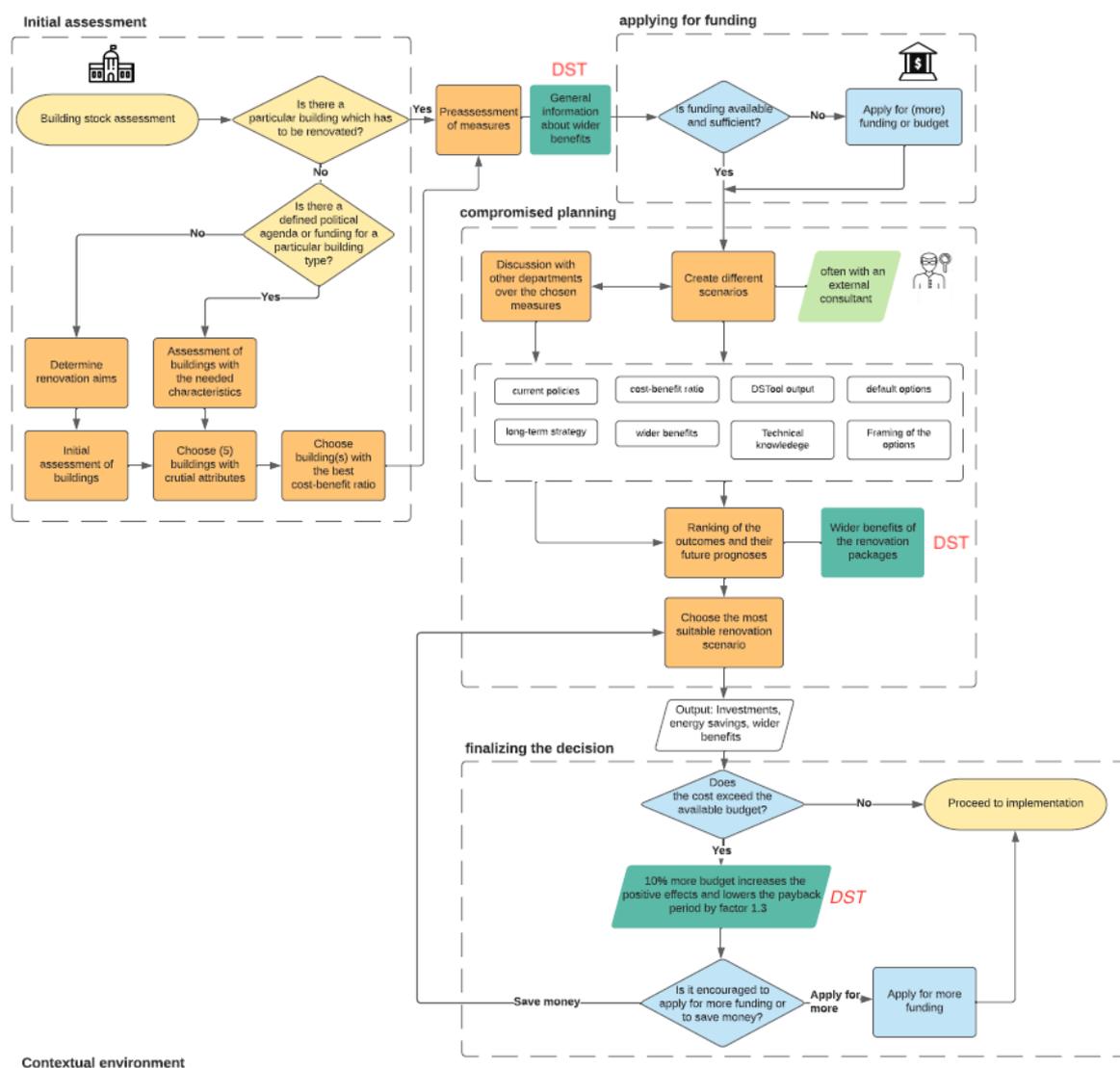


Figure 1 Typical renovation process with DST involved. **Adapted from: Chyslovska, 2021**

2.1. Renovation Strategies

There are a number of different renovation strategies in which the decision to apply the DST can be analysed. These scenarios are typical renovation cases adapted from the partner municipalities of the EERAdata project and represent user stories which can occur for any building manager, owner, government department or municipality. They include strategies for an emergency renovation scenario, scheduled maintenance renovation scenario, long-term deep renovation scenario and a building renovation business case scenario.

2.1.1. Emergency renovation

Description: this renovation plan fixes current and unavoidable damages, failures and errors, it is an emergency plan.

Planning Horizon: extremely short term, emergency, no political decision needed

Budget: fixed



EERAdata DST needed: No

2.1.2. Scheduled Maintenance Renovation

Description: preventive governance model with a fixed budget every year. Buildings get checked every 4 years and their condition gets assessed. The buildings and their constructive and technical condition need to fulfil certain criteria. If this is not fulfilled, they get refurbished and, in some cases, also modernised. There is specific thresholds for specific building types on how bad the condition of a building can get until it gets refurbished. Buildings like the city hall or schools have a special position for example and get renovated faster and on a better standard than others. Other criteria could be the amount of people working in the building, the location, political agendas, social focus points, etc. There is no political approval (by the city council) needed, the decision is solely based on technical assessment, key figures, renovation goals and predefined criteria.

Planning Horizon: 10-year maintenance plan, with 4-year building assessment cycles.

Budget: High budget, but with no political approval needed.

EERAdata DST Required: Building assessment, preassessment, and supporting building selection.

2.1.3. Long-term Deep Renovation Strategy

Description: Deployment of profound energy efficiency and renovation measures. Every project is individual and undergoes an individual assessment, planning, and financing process. This is the renovation plan which includes major projects with high costs and comprehensive measures. All projects are recommended by the city-owned property department. A preassessment process defines the measures and depth of implementation as well as the related costs. One main indicator here is cost. The lower the cost with a higher efficiency or impact, the better the chances of getting the political approval for implementation. For this type of project, a political decision is always needed to get the budget granted. After this, the measures are planned in detail. An example program is the renovation of schools within a given city.

Planning Horizon: Unlimited. Program needs to be accelerated and extended.

Budget: High, requiring political approval

EERAdata DST Required: Yes, in the following ways:

- Fast and rough assessment based on mostly defaults: Support for preassessment, rough estimate of cost and impact of measures on particular buildings. Ranking of renovation potential based on the social and environmental impact and payback periods due to batch processing of several buildings that are of interest for the planning entity. Thus, the DST supports with selecting the right project building or buildings. Scenario building, with different layers of measures, cost, and efficiency.



- Detailed and project-specific analysis for one project/building: The input data is mostly project specific, the tool assesses the building, the planned measures and their specific impact, e.g., on the improvement of indoor climate, embedded energy, the environment, local economy, etc. It gives profound insights on the benefit by cost invested and will serve as an indicator on the amount and extend of the implemented measures (and will be a strong argument to increase the measures and their depth). By the help of the DST a more energy efficient, a healthier and more future proof building will be created.

2.1.4. Business Case: Building Renovation

Description: The city government asks all departments to save on administrative budget every year by 2% in order to make the administration more efficient. The building sector with high energy and maintenance costs plays a major role in these plans. Here, significant budget can be saved with cost-efficient measures. Every employer can propose solutions that will become these business cases. The implementation of a BMS system or the integration of more efficient heating setting or even renovation measures can deliver long-term savings by creating multiple benefits as a bonus to the financial improvement. Due to the clear focus on saving money, the projects in this plan are almost only placed on financial indicators, of which the payback time is the most important one. All business cases need to be accepted by the economic department of the city and the political level will formally agree with this decision. The DST will help to create business cases by assessing multiple options for interventions in the building stock and their impact and benefits. It furthermore serves as a calculation tool for a holistic payback rate, incorporating socio-economic benefits which will reduce the payback times of certain projects. Like in renovation plan 3 also here the implementation in a rough, estimation based and later as a detailed, impact assessment tool is planned. EERAdata might also help to extend the range of business cases and the number of indicators which lead to the acceptance of project proposals. Most measures are technology driven, which means integrating one technical solution in more buildings

Planning Horizon: 1 year, following the approval of the city planning committee.

Budget: Open. The goal currently is to save 2% of the yearly administrative budget with projects. The maximum payback time for proposal acceptance is six years.

EERAdata DST: Yes, in the following roles:

- Rough assessment of business case idea, based on mostly defaults: a first estimation of the payback time, including socio-economic and environmental factors.
- Detailed and project specific analysis for the business case: details impact assessment of business case. Integrating all modules of the EERAdata DST. Provides insights and scenarios for the deployment of the measures which are planned in the business case



In the cases where the DST is applied, the flowchart in figure 2 below shows the journeys for two different types of users - standard and expert.

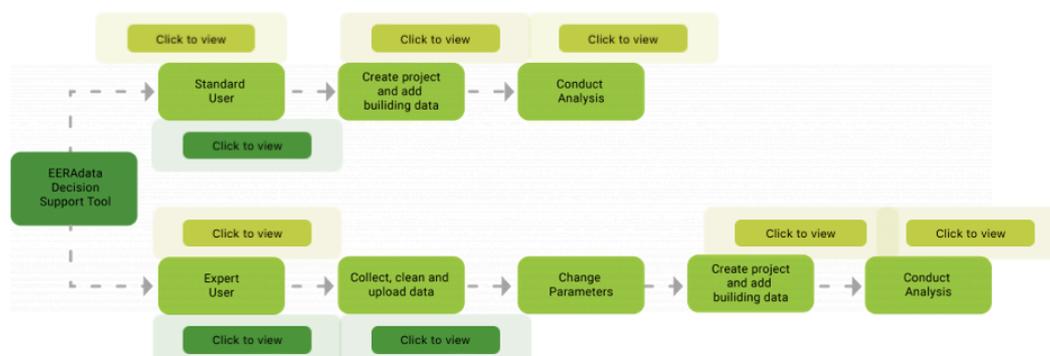


Figure 2 Flowchart showing different user journeys

The Standard User Journey

The standard user can be described as one which does not have or require extensive technical knowledge and data to use the full functionality of the tool. As such, this user does not possess access to the entirety of the tool’s architecture. This user can be a building owner, or city planner. The standard user only has access to the *Projects* tab in the DST. This allows the user to be able to create a renovation project and add details to that project. Within the projects tab, the standard user can add and edit building data, add the calculation units needed for the renovation project, and add renovation options to the project. It is important to note here that each building, once added to the project is copied into it, with all its properties and becomes independent of the general building stock stored in the application’s database. This means that calculations are made on the copies of the building properties and not on its actual parameters. The user can then conduct analysis by running the calculations to determine the impact of the proposed renovation action(s).

The Expert User Journey

The expert user on the other hand, possesses and requires extensive technical knowledge to operate the different parts of the tool and understand more detailed outputs after analysis is conducted. This user can be a building manager, researcher, technical analyst in addition to being an owner or government level decision-maker. The expert user has access to the *Projects*, *Buildings*, *Parameters*, and *Processing* tabs of the DST. This means that the user can add and edit building and projects data directly stored in the application’s database. The expert user can do this in two ways - by adding data directly and by uploading data through the prescribed data template. Before data is added to the tool, it is important for it to first be cleaned and made ready for use in the DST. Data should be cleaned to sort out issues such as incorrect data types, data gaps, irrelevant, and duplicate data. This can be done based on the guidelines developed by the EERAdata project in D4.5. Following this, data can be added directly into the tool or can be uploaded through the prescribed data template



which can be downloaded from the tool. Like the standard user, the expert user can then create a project, add buildings, add calculation units, add renovation options, and then conduct analysis by running calculations.

3. Conclusion

This deliverable has provided a brief description of user journey through the DST from data collection and input to data analysis for the different types of users. This has been done through a webpage on the EERAdata website. The page can be accessed here: <https://eeradata-project.eu/practical-guide-on-the-eeradata-decision-support-tool-use/>.

References

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