



Recommendations for Toolkit Development

Low Energy Apartment Futures (LEAF)

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1 Introduction

The Low Energy Apartment Futures (LEAF) project is developing toolkits to help building owners retrofit multi-occupancy apartments. Drawing on background research carried out for the project on the context in each participating country, this report provides recommendations for the development of these toolkits.

It is stated in LEAF's Annex I that WP3 and WP4 will "develop a toolkit that will, overall, provide a comprehensive, step-by-step guide to retrofitting multi-occupancy buildings" (hereafter referred to as "*apartment blocks*"). In order to clarify the keystones of each toolkit, which undoubtedly will tend to overlap each other to some extent, the basic outlines will be repeated below.

Beginning with the WP3 it states that the **Technical Toolkit** will include the following resources:

- Details of EPC-driven improvement recommendations, together with additional improvement measures that may not be recognised by EPCs
- Indicative EPC ratings for different measures, both individually and as cumulative measures
- A software tool designed for multi-occupancy buildings, using EPCs as a basis and building on existing software developed by consortium leader Changeworks

The software should furthermore be able to:

- Assimilate information from EPCs in multiple dwellings in a single building
- Provide individual and whole-building recommendations on energy efficiency and renewable energy measures
- Include recommendations for reducing energy consumption in communal areas (e.g. heat loss from stairwells, reduction in lighting energy usage) and use of renewable energy technology in communal areas (e.g. solar PV to contribute towards communal lighting)
- Include accurate costs specific to that building type

Regarding the **Engagement Toolkit**, specified in WP4, it will include a step-by-step guide with:

- Template letters and maintenance/legal documents, planning applications, etc. for occupants to complete and give to other occupants, neighbours, planning departments, building managers, landlords, tenants, etc.
- Details of related legislation, costs and finance mechanisms, technical guidance and behavioural guidance
- Local and national links to further information, including advice and installer networks

2 Background Context

2.1 EPC Legislation, National Policies and Funding

A survey was carried out with LEAF project partners to gather background research from each country for the Report on Background Context Within Each Partner Country (D2.1). This shows that the systems for EPCs and the national policies for energy efficiency is largely similar in all partner countries. However, EPCs in the UK can only be made for single apartments. Hence there is no whole building approach which in turn is a problem since communal areas are not considered for calculating retrofitting measures. And since methods for calculating the EPCs differ from country to country, it makes comparisons of EPCs between countries even more challenging.

With the national policies for energy saving being based on the same EU directives it makes them quite similar. Most countries also provide some funding for energy retrofitting in order to reach the energy saving targets. One of the problems with the funding provided is that in some countries is difficult for apartment blocks to use them due to the multi-owner structure. In other countries, if not all, the funding schemes also change from time to time. This makes it difficult to stay updated and receive funding when the decision process within apartment blocks tends to be quite inefficient.

2.2 Barriers for Implementing Retrofitting Measures

We can conclude that the survey indicates similar barriers for implementing retrofitting actions in apartment blocks within all partner countries. In addition it seems that the apartment blocks are likely to perform worse in energy terms compared to other kinds of buildings. In summary the main problems are related to the following issues:

- Technical issues
- Agreement issues
- Financial issues
- Behaviour

The **technical issues** show many similarities and the weak points that can be highlighted are:

- Hard-to-treat wall constructions (bricks, stone and/or concrete)
- Windows
- Heating systems (individual, central or user controlled)
- Domestic hot water
- Old systems – bad performance
- Natural ventilation

Agreement and financial issues usually go hand in hand. There is a great problem in getting retrofitting actions implemented due to the lack of funds. Even maintenance work on communal areas is often hard to get done, which leads to a general poor condition of the whole building envelope. Since practice in most countries shows that it is a general

assembly that makes these decisions (often only once a year), it indicates that the overall slow processes related to agreement and financial issues are rooted in ineffective organisation.

Furthermore, the surveys indicate that residents of apartment blocks generally do not seem to know how important their **behaviour** is when it comes to saving energy. A lack of knowledge among residents is reported from all countries. Here is a list to highlight a few common problems reported from the partner countries related to behavioural issues:

- High indoor temperatures
- No individual control system (HU)
- Modern control systems – lack of understanding (UK)
- No economic gain in saving (SE)
- Modern water consuming appliances (AT)

2.3 Related Process Strategies

Among the project partners e7 in Austria and ALE-Lyon in France have developed processes for planning, implementation and evaluation of retrofitting measures. These models can be useful as inspiration when we develop the LEAF toolkits, see figure 1-3.

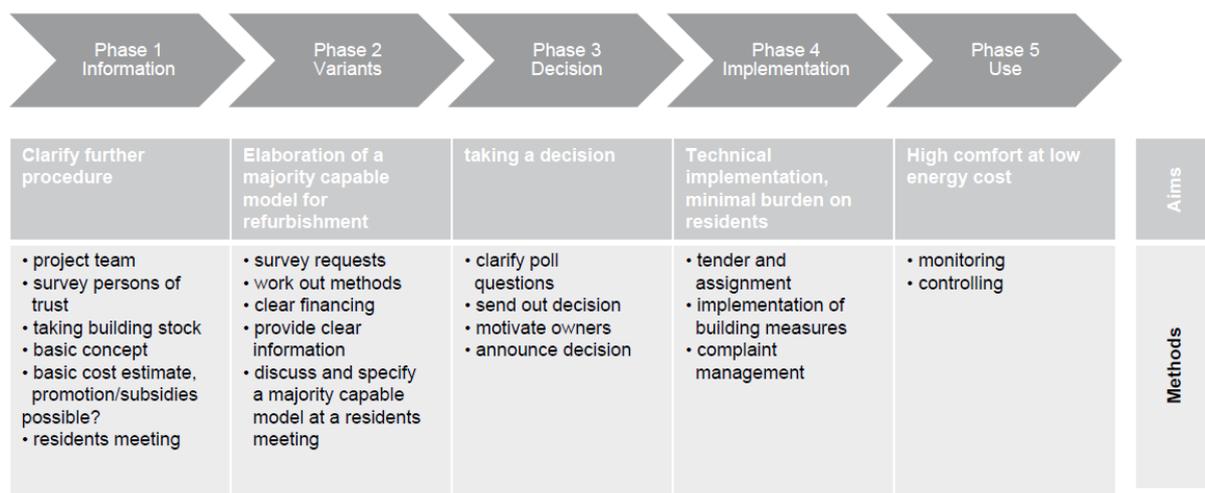


Figure 1: A process model developed by E7, Austrian project partner. This process shows the target, methods and steps.

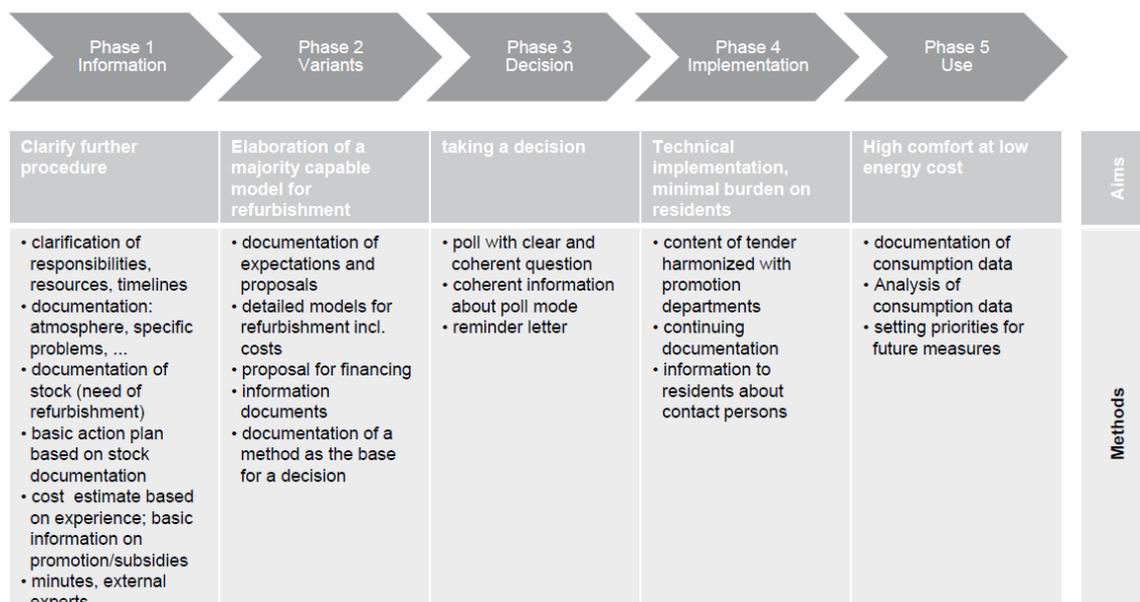


Figure 2: Parallel process developed by E7, Austrian project partner. This process shows the results and quality control process.

Year 1-2	Year 2-3	Year 3-4	Long term
Prepare the project	Thermal audit	Work	Monitor the building
Create a steering group among the owners.	Start the thermal audit.	Consult contractors with the help of the project manager.	Raise owner's awareness. The building changed. The owners should change the way the live in the building or the energy consumption objectives will not be achieved.
Look for advice and examples.	Raise owner's awareness for the general assembly where the conclusions of the thermal audit will be presented.	General assembly n°3: vote for the contractors.	Monitor energy consumption.
Making a diagnostic of the building, the financing etc.	General assembly n°2: energy thermal audit presentation.	Ask planning permissions.	
Prepare the thermal audit.	Raise owner's awareness for the general assembly where the project manager and the works will be discussed.	Search information about financing solution (this step can be done earlier too).	
Raise owner's awareness about the thermal audit: what is it, why is it necessary?	Consult contractors or project managers.	Check the works done.	
General assembly n°1: vote the thermal audit.	General assembly n°3: vote for project manager.	Negotiate the maintenance contract. As the building consumes less energy, the contracts with energy supplier or the maintenance company could be negotiated.	

Figure 3: Brief translation of the initiative from ALE-Lyon. The original in French can be found at: <http://ale-lyon.org/renocopro/>

3 Recommendations for The Toolkit Development

In order to overcome the barriers the toolkits should be flexible enough to reflect different models of decision-making in accordance with the different legal frameworks in each respective countries. In establishing recommendations for the development of the toolkits, it is necessary to take in to consideration what has been concluded in the study of existing initiatives, which can be found in the report on background context (D2.1). It is stated that in order to implement energy conservation the toolkits must consider the diversity of the apartment blocks in terms of physical building type, fuel use, geography, type of ownership, and the different stakeholders involved.

With the purpose of making useful toolkits and get occupants to decide on retrofitting measures it will be important to communicate with the occupants before, during and after the process. Here are some key aspects for the communication with occupants:

- To inform them on the multiple benefits of energy efficient measures
- To build upon the recommendations in Energy Performance Certificates and help translate this into practical action
- To involve them in the planning process
- To keep them updated with the implementation work
- To follow-up on their opinions on indoor air quality and bills
- The toolkits should, for the sake of clarity, also include a glossary in each language explaining the most frequent phrases and terms

3.1 Recommendations for the Technical Toolkit

The information and guidance of national EPC systems should be general, primarily addressing a broad audience rather than specific stakeholders. Organisations, legal systems and most other aspects that are to be considered in the process of decision-making varies from every country and situation, the toolkit needs to be flexible. As more detailed information can be acquired elsewhere, the following sub-contents should be included in the toolkit:

- Details of EPC-driven improvement recommendations, together with additional improvement measures that may not be recognised by EPCs
 - *The reasons and processes of using EPCs for retrofitting of buildings*
 - *Guidance on EPCs and the basic principles of energy analysis including main costs, subsidies and savings*
 - *Guidance notes and outlines of available retrofit technologies including requirements and applicability*
 - *Possible additional savings, including low-cost and no-cost measures*
 - *Contextual relevance: a list of similar good practice examples or initiatives*
- Indicative EPC ratings for different measures, both individually and as cumulative measures
 - *Indicative ratings for different measures in terms of, for example, saved CO₂, kWh or €/£*
- A software tool designed for apartment blocks, using EPCs as a basis and building on existing software developed by consortium leader Changeworks

3.2 Structure

In order to clarify the structure of the toolkit it has been proposed to be pictured as a three-step model. This can be seen as a *frame*, followed by *input* (introducing the software) and *output* (results) *phases*. While the frame is based on information material provided by the LEAF partners (see list above), the input (specifically the user interface and software) includes the following actions:

- An introduction to the toolkit
- Information on EPCs and possible measures
- Information on possible subsidies and grants

- Data capture sheets enabling input regarding:
 - *EPC results and recommended measures*
 - *(Whole building perspective for EPCs in the UK)*
 - *Information on common areas, lighting, stairways, lifts etc.*
 - *Actual user profiles*
 - *(Cost of measures)*

- Information on how to use less energy by *good user behaviour*
- Information on additional savings regarding common areas
- Cost estimations/expectations of recommended measures
- A comparison of personal usage to *standard user profile*

The output phase, which can be seen as the results that are provided to the user, is then combined and integrated with the actions embedded in the Engagement Toolkit. However, some key points will still **need further developing in WP3**:

- The issue of integrating the UK tool for extrapolating EPCs of single apartments to entire apartment blocks
- A general calculation method for common areas, lighting, stairways, lifts etc.
- The introduction of expected or calculated cost of possible measures

3.3 Recommendations for the Engagement Toolkit

Whilst WP3 develops the technical aspect of the support framework (technical guidance and software), WP4 provides the 'Engagement Toolkit' - guidance, resources and information required to retrofit apartment blocks, thus focusing on *key phases of project development*.

The different guidelines will consist of translated sub-sites containing specific national information adapted for the context in each partner country. The predominant target audience is suggested to be building managers and owners with specific interest or knowledge regarding refurbishment projects.

According to the Annex I DoW the outlines consist of:

- Planning legislation guidance

- Legal agreements
- Engaging tenants and owners
- Finance and funding
- Behavioural advice
 - Including no-cost and low-cost measures
- Further information and local networks
- Collation of toolkit and guidance

The structure of the titles above in terms of content and audience is included to some extent in the Annex I. It will however need further description and processing which will be thoroughly dealt with in WP4 and WP5. It is also recommended that the Engagement Toolkit incorporates ideas and drawn conclusions from similar models, e.g. e7 Markt Analyse GmbH and ALE Lyon.