



Strategy and planning of the EU multi-city replication programme

D5.2



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Executive summary

The aim of this report is to describe the overall scope and strategy of the DREEAM replication programme. The DREEAM replication programme aims to support 15 cities/housing associations in scaling up their energy renovation programme by applying the DREEAM approach and tools.

The user-led piloting on a large scale means the DREEAM approach can prove itself in different settings and demonstrate its replicability within economic, social and legal limitations. The programme is divided into two services which have been developed to address the two key phases of the building owners' decision-making process. Both the building stock investment strategy (service 1) and the multi-building renovation study (service 2) are structured on data-driven tools that have been developed within the DREEAM project: the DREEAM tool (service 2) and a custom-investment planning model (service 1).

This report outlines the concept and process of the replication services as well as the additional value delivered to the housing associations/cities with these analyses.

Table 1. Overview of replication services' process

Service 1 – Building stock investment strategy	Service 2 – Multi-building energy renovation study
Data collection & collation	Building assessment
Building assessment	Data acquisition and registration
Renovation packages	Technology database
Investment pathways	ECM Analysis and renovation packages definition

In the first phase of the DREEAM project, a country selection exercise was executed in order to identify the target EU countries where the DREEAM approach would be relevant. In order to promote the replication programme to a large audience and ensure that target groups were informed about this opportunity, an integrated strategy has been followed, combining different means of communication.

The application of different approaches led to a different level of participation to the programme; most building owners that expressed interest in the services were reached through DREEAM partners or met in small workshops. Based on these first results, the strategy has been adapted to improve its impact on the market and stimulate wider awareness of the programme.

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1 Introduction

1.1 Background

The aim of the DREEAM project is to develop and demonstrate a replicable approach for multi-building energy renovation that can reduce the net energy demand by up to 75%. Current renovation approaches do not use an integrated perspective and usually take place on a single-building basis without taking into account the potential benefits of scaling up and long-term planning. DREEAM supports the building owners' decision-making process before, during and after renovation by using advanced analytical tools and applying an integrated approach considering technical, financial and social factors.

The DREEAM project focuses on Nearly Zero-Energy Buildings (NZEB) renovation projects of institutional building owners like social and public housing associations. The large portfolios of these organisations and their single ownership structure enable both EU-wide replication and a high energy saving potential. Through the "EU multi-city replication programme", the project will implement the DREEAM approach in 15 cities or housing associations across Europe, facilitating widespread market uptake of project results and tools.

1.2 Task 5.2

The task 5.2 aims to develop and promote the replication programme for EU cities and housing associations to perform a feasibility scan for multi-buildings NZE renovations. The DREEAM replication programme offers 15 "vouchers" to cities and housing associations, consisting of a package of staff capacity and direct costs that Bax & Company and Exeleria allocate for validating/applying the DREEAM approach to third party sites. Bax & Company is responsible for planning and implementing the replication programme, as well as for the interaction with key stakeholders. Secondly, Bax & Company provides investment planning advice and recommendations. Exeleria performs the technical analysis to identify optimal options for multi-building renovations including a cost-benefit study. Promotion of the EU multi-city replication programme is supported by DREEAM partners and network organisations.

2 DREEAM replication programme

DREEAM aims to develop and demonstrate a systematic approach to design and implement cost-effective multi-building renovation solutions achieving up to 75% total energy demand reduction and a high return of investments.

The scale of projects considered is very common for building owners such as social and public housing associations, who own and/or manage thousands of units with high potential for energy performance improvements. This market segment covers 12% of the total European housing stock and accounts for 2.25B m² floor area [1]. By targeting this sector, DREEAM ensures high replicability and effective scalability of its multi-building renovation approach at European level [2].

Through the replication programme, DREEAM works with 15 housing companies/cities to initiate the DREEAM approach in their building stock and support their long-term sustainability ambitions.

The objective of the DREEAM replication programme is twofold: on one side, to validate the DREEAM approach in different European regions through the scale of in-project replication testing and demonstrate replicability under different circumstances (social, institutional, technical and economical) through feasibility studies; on the other side, to create a strong link with decision-makers in the housing sector to be used as an entry point of the DREEAM solutions for widespread uptake at EU level.

2.1 The challenge

European average renovation rate in the single owner housing sector is still low (1,5%)[1] and 80% of European renovations do not target energy performance improvements because of building owners' lack of interest and ambition in achieving high sustainability targets.

However, following the EU [Energy Efficiency Directive](#), housing providers are now subject to regional and national renovation policies, setting minimum energy efficiency targets they have to achieve [3]. Consequently, current renovation ambitions are usually defined by policies, do not look at long-term ambitions and take place at a complex level without applying an integrated approach. Viable strategies and plans for large-scale building renovation are still missing as well as decision-making tools with an integrated perspective of cost-benefit evaluation encompassing complete renovation measures. Additionally, building owners usually lack the expertise for the development of long-term investment pathways which realistically link the

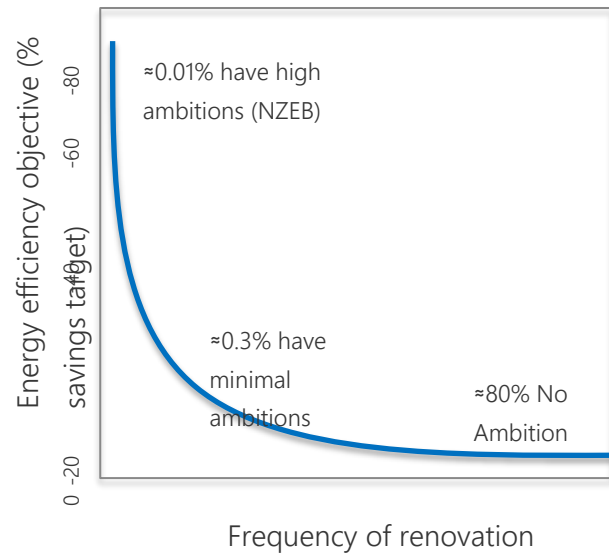


Figure 1. Dependency of renovation on energy efficiency objectives

financial capacity with the renovation measures to be implemented in a way that enables the accomplishment of the established targets.

2.2 Integrated approach at scale: the added value

Renovation programmes often start developing renovation solutions for specific buildings or follow a lifetime component replacement procedure without considering the benefits of integrated renovation at scale. Building owners usually adopt a single-technology approach to optimise their investments, without strategically planning their renovation (Figure 2).

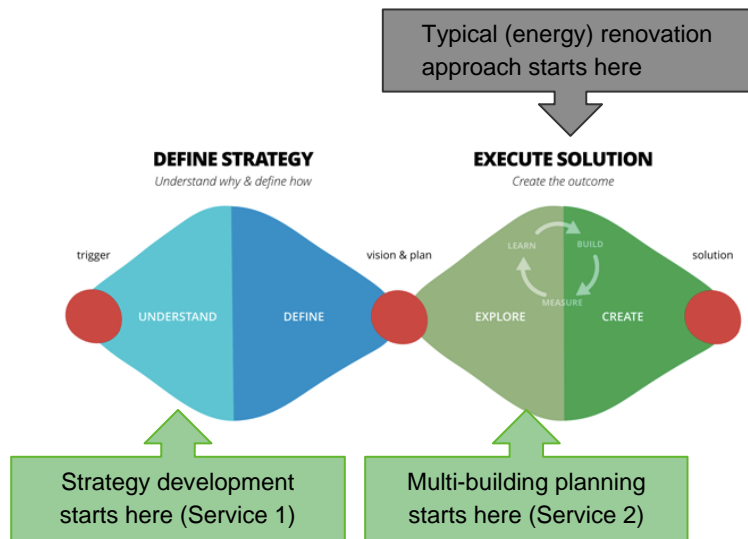


Figure 2. Energy renovation decision process

DREEAM partners have identified two key moments in the BOs' decision-making process when the DREEAM approach provides an added value to the business-as-usual practices:

- 1) Strategy definition: the building owners' decision process should start from long-term ambitions for developing their investment strategy at portfolio level;
- 2) Exploration of renovation solutions: before executing the multi-building renovations, solutions should be selected based on the optimal combination of measures between those explored which realise the benefits of scale;

This generates the benefits of scale in terms of not only energy efficiency gains and cost-effectiveness but also renewable energy integration, upscaling investments and access to funding:

The DREEAM replication services have been developed to address the above challenges and support cities and housing associations in scaling up their renovation programmes. The replication services target the two phases previously identified by:

- 1) supporting strategic decision making for more ambitious investment strategies (service 1)
- 2) designing optimal solutions for multi-building renovation (service 2).

3 The services

The EU-supported Project DREEAM offers 15 selected housing providers and cities capacity support (20-25 days of work of the DREEAM team) free of charge to enhance return of investment in energy efficiency renovation. The support is provided through a voucher programme where each voucher entails the delivery of one of the two available services delivering data-driven analyses based on the DREEAM approach: the building stock investment strategy (service 1) and the multi-building energy renovation study (service 2).

The state-of-the-art process informs decision-makers on financial, technical and energy elements of integrated programme development.

Candidates are owners/managers of large portfolios and/or annual budgets allocated to energy efficiency renovation.

3.1 Building stock investment strategy – Service 1

The DREEAM project partner Bax & Company is responsible for delivering the building stock investment strategy service. The study outlines alternative renovation strategies, by analysing the building stock, designing simplified renovation options and planning investment pathways (based on building characteristics, typical renovation options for building archetypes, cost/benefit results and financing options).

The best-suited candidates are expected to manage >5,000 dwellings and have high sustainable investment ambitions over the coming 5 years.

Process

The data-driven study is carried out in 4 phases, allowing the city or housing provider to tailor the analysis according to their needs.

1. **Data collection and collation:** a comprehensive dataset is built for this analysis, combining information from technical and financial datasets shared by the housing association/city.
2. **Building stock assessment:** based on the crosscutting dataset built from operational, technical and financial data points at a dwelling level, the current status of the building portfolio is assessed and visualized. A building's archetype and construction period are key elements used for classifying the portfolio in target groups which share similar technical characteristics and energy consumption. Properties are mapped and building clusters are geographically analysed, as well as the distribution of the energy performance and components specifications. The visualisation of the portfolio analysis through an energy efficiency lens, using graphs and maps, enables the identification and prioritisation of opportunities for renovation (Figure 3).
3. **Renovation packages design:** for each target group, consisting of buildings from the same archetype and construction period, standard renovation packages are designed to link investments with potential energy savings. Renovation packages are built as a combination of measures that lead to a certain improvement of the energy performance which is reflected not only in a higher EPC label but also in energy and CO2 savings. Shallow and deep retrofit options are priced and modelled based on energy efficiency and CO2 targets, financial constraints and operational concerns. According to the availability

of pricing data and technical preferences, renovation packages are designed with the housing associations' information or using academic and public studies.

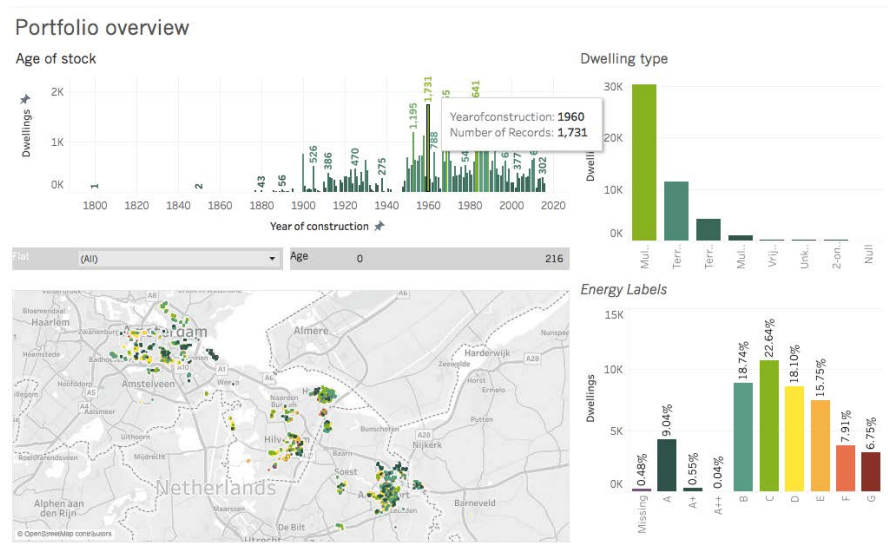


Figure 3. Example of visualisation of portfolio characteristics

4. **Investment pathways analysis:** before proceeding with the development of alternative potential investment strategies, the business-as-usual approach is projected to evaluate its capacity to achieve the policy targets across different timelines. Once the gap is identified, alternative renovation and investment pathways are developed to reach the selected long-term ambitions by using a custom investment planning model. Proposed renovation and financial strategies to achieve policy goals optimise each of the different factors considered including:

- Technological combinations given building energy renovation rules;
- Return of investment and investment capacity of the building owner;
- Location and typology priorities within the stock to achieve economies of scale.

The projections are based on the discussion with the portfolio managers about the typical decision rules for investment planning currently in use and regional/national relevant regulations and policy targets. Through this step, it is possible to initially identify opportunities for large-scale renovation of multiple buildings with similar needs where economies of scale can be achieved.

The process is expected to take between 1 and 3 months and the DREEM team will dedicate 20-25 days to prepare a study on the building stock investment strategy, including several meetings (up to 2 of them on site).

City / housing provider expected input and effort

Building stock database: dwelling-related data to be shared in Excel or csv format. A lack of energy data does not preclude participation. In that case, national statistics and public data will be used.

Policy/background information: renovation and energy policies at both a local and national level, housing provider programme and targets, current sustainable /renovation investment practices and strategy.

Effort: the city or building provider is expected to dedicate the time required to provide data follow-up on the process and assign a contact person to facilitate collaboration. Meetings between both parties should include relevant decision-makers from the city or housing provider side.

3.2 Multi-building energy renovation strategy – Service 2

The DREEAM project partner Exeleria is responsible for the delivery of the multi-building energy renovation study (service 2). This service offers a design study to identify the optimal combination of technologies out of the thousands available to deliver the highest energy reduction for a group of buildings, based on the building owner's set of economic, technical and social criteria. The study is based on the DREEAM tool, developed by Chalmers and Exeleria, which provides housing providers with deep insight into innovative low-carbon technologies enabling cost-effective reduction of energy consumption on a multi-building scale.

The best-suited candidates should either have already identified a group of buildings for renovation (2 or more buildings, ideally over 50 dwellings), but not yet reviewed renovation options, or have performed energy efficiency renovations in the past whose information can be shared with Exeleria and be used for the modelling.

Process

The data-driven analysis is carried out in 4 steps, allowing the city or housing provider to make an informed decision about renovation alternatives:

1. **Building assessment:** analysis of applicable regulations and identification of the building's set point. Key indicators are used to define the main objectives defining the optimisation function (ROI, primary energy reduction rate, comfort level, etc).
2. **Data acquisition and registration:** analysis of the building's energy current conditions, including an accuracy description of the use cases, stocktaking of energy consumption and evaluation of anomalies of buildings' performance. All buildings' aspects are assessed and clustered in target groups.
3. **Technology database:** the DREEAM project has developed a complete and detailed list of technologies for energy retrofitting of each component of the building. Based on the DREEAM SOTA database, two main tasks are carried out in this phase:
 - SOTA database update and adaptations to BO market updating material and labour costs and including local renovation solutions;
 - Discussion with BO about preferred, must-have, and infeasible renovation solutions to narrow in scope.
4. **ECM Analysis and renovation packages definition:** the DREEAM optimisation tool is used to automatically simulate thousands of combinations of pre-selected renovation solutions from the SOTA list. The tool calculations identify the optimal solutions from different viewpoints:
 - Energy and economic analysis of packages: energy demand calculations performed by the tool according to the standards "EN ISO 13790:2008", energy performance of buildings, calculation of energy use for space heating and cooling based on "EN 15316", calculation of system energy requirements and system efficiencies.
 - Payback, savings, etc

- Technical analysis of integration and installation aspects

The energy and economic analysis of packages are also based in the normative of each country.

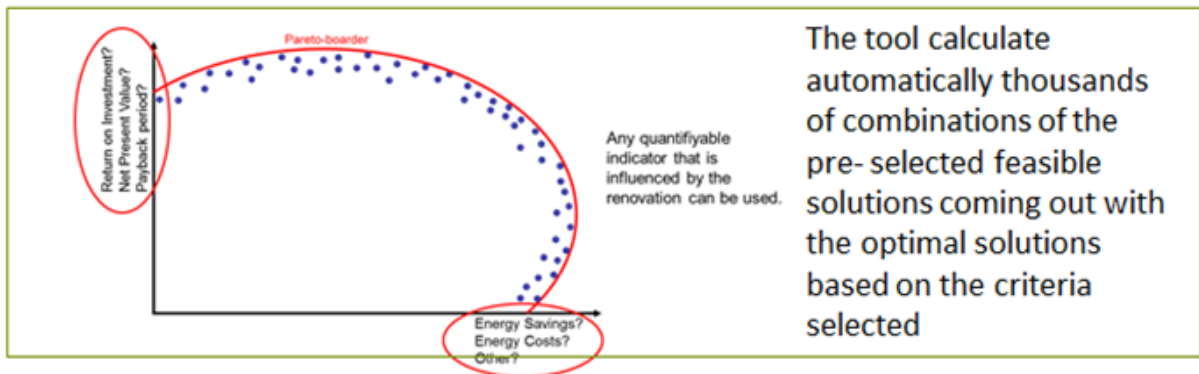


Figure 4. DREEM tool optimisation chart

The reports combine technical, energy and financial aspects resulting in an informed discussion between relevant decision-makers (CEO, CFO, CTO and COO). The results are provided in English.

The process is expected to take between 1 and 3 months. The DREEM team is expected to dedicate 20-25 days to prepare a study on the energy renovation design, including several meetings (up to 2 of them on site). Figure 5 summarises the methodology followed for the delivery of the service 2.

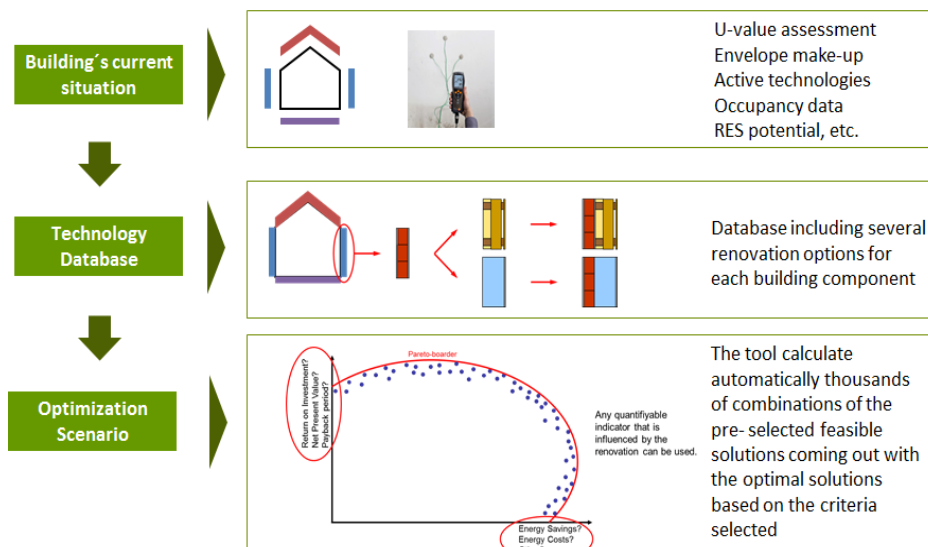


Figure 5. Multi-building renovation study process overview

City / housing provider expected inputs and efforts

The city or building provider is expected to dedicate the time needed to provide data and follow-up on the process and assign a contact person to facilitate collaboration. Meetings between both parties should include relevant decision-makers from the city or housing provider side.

In order to benefit from the service, the city or housing owner needs to have and be willing to share the following information:

- Building-related data: Construction characteristics, technical drawings, energy consumption data and bills, and operational patterns;
- Information about past renovations.

The data provided is only for internal use by the DREEAM partners and will not be used or shared for other purposes.

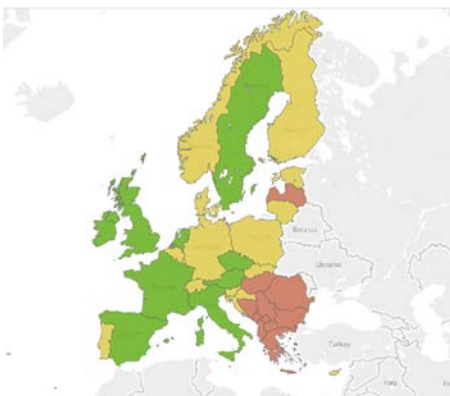
4 Market strategy

4.1 Identifying priority countries for the replication programme

The country selection exercise executed in May 2016 resulted in scoring (high, medium, low) of perceived relevance of the DREEAM approach in various EU countries based on the assessment of a number of key criteria defined along with the DREEAM partners: size of social housing sector, passive energy improvement potential, investment capacity, policy ambition and feasibility of execution in the DREEAM project. Score system is explained in the Annex I.

Aspect	Indicator
Size of social housing stock	% of social housing over total stock
Energy improvement potential	Average U-values in W/m ² K
Investment potential	Housing costs as % of household income
Policies and legislation	Sustainability ambitions and openness of energy markets (ACER score)
Implementation feasibility	Ability of DREEAM to engage with & deliver

Table 2. List of key indicators used in the country selection exercise



The DREEAM replication has focused on 9 high scoring countries (green) and identified partners with appropriate capacity in medium-size countries (yellow).

Countries in green typically have a large public housing sector and high scores on investment potential, potential energy gains and supportive policies. A second group of countries in yellow show potential in energy gains, investment potential and favourable policies.

Based on the results of the analysis, the countries with highest attractiveness and most interesting for the replication of the DREEAM approach are the Netherlands, Italy, France, United Kingdom, Spain, Sweden, Austria, Ireland and Czech Republic (Table 3).

Annex I contains a comprehensive table with the overview of the country-specific scores by indicator of all countries considered.

In the first phase of the project, Bax & Company facilitated several expert panels to understand different markets and test feasibility. During these sessions, feasibility and interest of the social housing sector in such analyses were proven in the UK, the Netherlands but not in Spain, where both Bax & Company and Exeleria have interacted with several building owners.

Country	Social housing stock	Passive energy efficiency potential	Investment potential	Policy & legislation	Implementation feasibility	DREEAM attractiveness
Netherlands	3	3	2	2,5	3	2,7
Italy	2	3	3	2,5	3	2,7
France	3	2	3	2	3	2,6
United Kingdom	3	2	2	3	3	2,6
Spain	1	3	3	2,5	3	2,5
Sweden	3	1	2	3	3	2,4
Austria	3	1	3	3	2	2,4
Ireland	2	3	3	2	2	2,4
Czech Republic	3	2	2	2,5	2	2,3

Table 3. Targeted markets for the DREEAM replication service.

4.2 Market approach and promotion

From 2016, Bax & Company has worked to launch and promote the DREEAM replication programme in different EU countries. In order to reach out to a large audience, different means of communication have been used. In particular, a three-pronged approach has been followed to ensure that all target groups are informed about the opportunity to benefit from the services offered by the DREEAM project. Firstly, Bax & Company and Exeleria have got in contact with several housing associations through individual introductions by DREEAM partners. Secondly, Bax & Company has participated and facilitated various broader communication/dissemination events such as workshops in target countries, in collaboration with different DREEAM partners:

- DREEAM workshop in Warsaw (PO) organised by the DREEAM partner NAPE (April 4/5th 2016): at this event, Bax & Company and Exeleria presented the concept offer to representatives of Polish cities interested in large-scale deep renovation of their building stock;
- EURHONET topic group meeting “Sustainable construction” in Bremen (DE) (February 16-17th 2017);
- EURHONET “Sustainable building group” meeting in Calais (FR) (June 20th 2017): Exeleria presented the replication programme to the EURHONET members attending the event;
- EURHONET event in Turin (IT) (October 25th 2017): Bax & Company, along with DREEAM partner BO ATER Treviso, Chalmers and EURHONET have facilitated an interactive session regarding the

opportunities of European collaborations and promoted the DREEAM replication service among the attendees.

Thirdly, network organisations such as EURHONET and EFL have supported the promotion of the replication programme among their networks using their internal newsletters as well as inviting DREEAM partners (e.g. Bax&Company, Exeleria) to topic group events, e.g. the ones listed above and the energy efficiency workshop in Essen, organised by EFL and ISTA (DE) (April 25th 2018), where the DREEAM approach was presented to a number of housing associations, a construction company and the organisation IWO.

4.3 Lessons learned and strategy improvement

In the period between 2016 and 2018 about 50 housing providers have been informed about the opportunity to be involved in the replication programme and benefitting from the delivery of its services. As described in section 4.2, a three-pronged strategy has been followed to engage with a large number of BOs at EU level.

From the first two years of promotion of the DREEAM replication programme, Bax & Company has analysed the results achieved and evaluated which communication means have been proved to be the most effective. Based on this assessment, the market strategy has been adjusted and improved in order to attract more interest and reach out to the relevant organisations.

Feedback

The results obtained from the execution of the approach described in 4.2 are:

- Individual introductions based on a preselection of interested organisations, led to low levels of follow-up work, and high level of participation (75%);
- Workshops have resulted in relatively high interest, medium levels of follow-up work and medium levels of participation (10-25% of participants);
- Presentations at conferences/events led to modest interest, high level of follow-up work and low levels of participation.

Promoting the DREEAM replication services through platforms such as EURHONET and EFL have not led to relevant responses, in spite of their good network of contacts.

On-boarding process

The main differences between on-boarding processes are:

- Follow-up from personal introductions typically were video conferences and/or meetings with appropriate client teams typically over a period of 1-2 months;
- Follow-up from workshops typically includes; individual e-mails and individual calls to participants who indicated interest;
- Follow-up from conferences includes; individual e-mails and individual calls to all participants.

Strategy improvements

Different routes to market have been explored and tested in the service development phase. Based on the response obtained and the services delivered, an individual introduction based on preselection of organisations, chosen for their sustainability ambitions and size, was the most effective and successful way to engage with housing providers and to offer the DREEAM services.

Because of the low expression of interest collected through the promotion of the “voucher programme” via platforms such as EURHONET and EFL, new ways will be implemented to get access to targeted countries based on the collaboration with local organisations/DREEAM partners.

DREEAM partners Bax & Company and Exeleria will interact with selected country-markets by participating in targeted events and cooperating with specific organisations to identify housing providers and cities with potential interest in the services. Additionally, DREEAM partners will further support the replication programme by promoting it among their networks and by sharing those contacts relevant for the programme.

Over Q1 and Q2 of 2018, Bax & Company has collaborated with a group of students from EADA University (Barcelona, ES) to design the “Building Owners’ Journey”, a detailed delivery process for meeting the BO’s expectations and needs. A number of housing associations were contacted and interviewed to better understand which are the most relevant aspects to be addressed within the replication services. Based on the answers and feedback received, additional key performance parameters have been included in the analysis (e.g the total cost of living, etc.) to align results with the BOs’ expectations and requirements.

5 Planning

5.1 Replication programme timeline

During the first phase of the DREEAM project (2016), Exeleria and Bax & Company have focused their effort on the development of the services’ concept and on piloting the related tools in 2 DREEAM BOs’ sites (Pfp, ATER Treviso). The beta version of the investment planning model used in the portfolio investment strategy service (service 1) was available since early 2017 while the development and demonstration of the DREEAM tool required more time. The beta version of the DREEAM tool to be implemented in the replication programme was available since late 2017/early 2018.

In parallel, the DREEAM replication programme was launched at a number of events and widely promoted at an EU level, following the approach described in section 4.2.

After developing and validating the value of the replication services, over the last two years of the project Bax & Company and Exeleria will focus on delivering the services to housing associations and cities in targeted countries in order to ensure large-scale replication of the DREEAM approach and results.

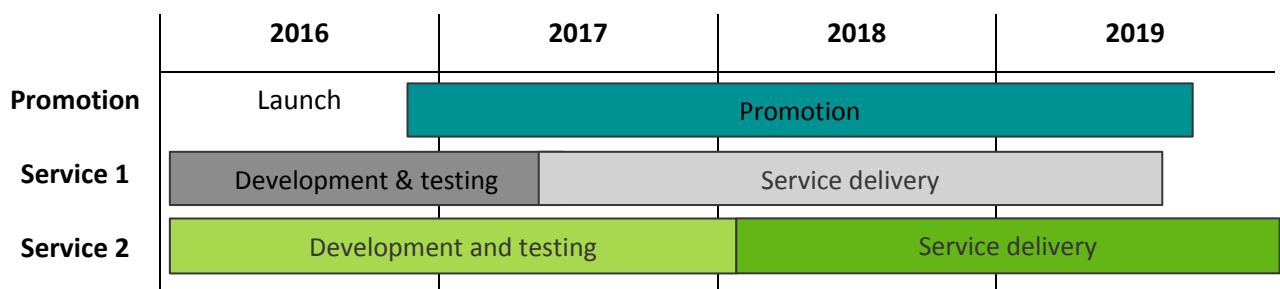


Figure 6. Replication programme timeline

5.2 Foreseen work plan

The process for the delivery of one service is expected to take between 1 and 3 months. The DREEAM team dedicates 20-25 days to carry out the multi-building energy renovation study or the building stock investment strategy analysis, including several meetings (up to 2 of them on site).

This deliverable 5.2 “Strategy and planning of the replication programme” has been written in Q2-Q3 of 2018 when the building stock investment strategy service has already been delivered to 2 housing associations and is in process of being completed for 4 others. As previously mentioned, the operational version of the DREEAM tool was made available at the end of 2017 and, consequently, the multi-building energy renovation study has not yet been completely delivered to a third party outside the DREEAM consortium. However, promotion of the replication programme and engagement with a number of housing associations around Europe has already gathered the interest of several organisations and follow-up work has been already done to set up the collaborations with the BOs.

Table 4 outlines the foreseen delivery plan of the replication service until the end of the project, ensuring that Bax & Company and Exeleria will deliver the DREEAM services to 15 housing associations or cities.

Table 4. Replication service foreseen delivery plan.

Year	Timeline	Service 1 - BaxCo	Service 2 – Exeleria
2018	Q3: Jul-Sept	2	1
	Q4: Oct-Dec	2	2
2019	Q1: Jan-Mar	1	2
	Q2: Apr-Jun	0/1	2
	Q3: Jul-Sept	-	0/1
End of the project		Target for service 2: 7/8	Target for service 1: 7/8

5.3 Service 1 process plan

The delivery of the building stock investment strategy service to 2 housing associations proved that it can be effectively delivered within the capacity and time allocated by the voucher (20-25 days of work) by DREEAM. The preparation phase for setting up the collaboration between Bax & Company and the BO took between 1 and 3 months. In particular, data collection and collation are usually processes that can last anywhere from 5 days to over 2 months, depending on the structure of the housing associations/city and on the quality of the asset management system. Large housing providers and cities usually have to combine multiple datasets from different data sources. Indeed, data availability and quality strictly depend on case-specific factors such as the asset management system, age of the stock, previous renovations, type of contract with the tenants and monitoring of the dwellings.

Furthermore, understanding organisational setting, priorities, renovation practices and long-term ambition require the engagement and discussion with board level managers, in particular the financial, sustainability and asset managers, hence, a greater effort for involving the right representatives.

Table 5 outlines the process plan for the delivery of the building stock investment strategy service, detailing the time allocated at each phase, the effort and input required from the BO, the main insights and outputs.

Table 5. Service 1 process description

Process	Step 0 – before analysis	Step 1	Step 2	Step 3
	Preparation phase + data collection	Building stock assessment	Renovation solutions	Pathways analysis
Insights	Ambitions & expectations of the BO	Availability and quality of data Overview of portfolio	Renovation approaches (Cost of component replacement, energy savings)	Investment strategies to achieve policy targets – better value for money option
Outputs	Formal confirmation of the BOs Dataset transferred Project implementation plan defined	Cleaned dataset Stock overview	Renovation packages	Final Report Online Tableau dashboard
Communication	1 -2 calls	Conference call/ meeting with sustainability, financial, asset and IT managers	Conference call	Final conference call / meeting
Days allocated	1	8	8	8
Requirements	<u>Input</u> <ul style="list-style-type: none"> Export of asset data: general, technical, financial in readable format <u>Involvement</u> <ul style="list-style-type: none"> Key contact person Support from organization/team Time to collect the required data point – depends on the organisation management system and settlings 	<u>Input</u> <ul style="list-style-type: none"> Relevant policy documents or policy targets Renovation packages for dwelling types <u>Involvement</u> <ul style="list-style-type: none"> Asset manager, Sustainability manager, Finance manager, data manager Internal discussion on policies, possible investment alternatives 1 or 2 1-hour conference calls or meeting	<u>Input</u> <ul style="list-style-type: none"> Renovation packages for dwelling types updated <u>Involvement</u> <ul style="list-style-type: none"> Asset manager, Sustainability manager, Finance manager, data guy Internal discussion on policies, possible investment alternatives 1 or 2 1-hour conference calls	<u>Input</u> <ul style="list-style-type: none"> Next steps for client <u>Involvement</u> Sustainability manager, Internal discussion on policies, possible investment alternatives 1-h conference call for presentation final results or

5.4 Service 2 process plan

From the testing of the DREEM tool and performance of the multi-building energy renovation study to the ATER Treviso case, it was proved that the related replication service can be effectively delivered with the capacity and within the time allocated to the voucher (20-25 days of work) by DREEM.

The data acquisition phase is usually the one that requires more effort from the BO; drawings of buildings and technical information are sometimes incomplete or missing, requiring Exeleria to collect additional measurements on site. In the first 2 phases, Exeleria needs to engage with and receive inputs from the asset manager, facility manager and maintenance team. Board-level representatives such as the financial manager or the director are usually involved at a later stage of the delivery process when renovation options are proposed and need to be linked with the financial capacity.

Table 6 outlines the process plan for the delivery of the multi-building energy renovation study, detailing the time allocated to each phase, the effort and input required from the BO, the main insights and outputs.

Table 6. Service 2 process description.

Process	Step 1	Step 2	Step 3	Step 4
	Building assessment	Data acquisition & registration	Technology database	ECM analysis & renovation packages
Insights	Regulations analysis Establishment of building energy set point performance for each use case.	Historical data collection Field data collection & indoor conditions Collection of technical data for each use case	Feasibility of renovation options BOs preferences Country-specific technology scan	Use case analysis: <ul style="list-style-type: none"> • Energy consumption distribution • Operational evaluation • Indoor conditions Renovation packages design and optimisation
Outputs	Main regulations resume for each use case Building energy set point report	Use case description & definition Fill out data sheets	Updated SOTA list based on case-specific preferences and viability	Energy current behaviour ECMs assessment Set of ECMs, prioritization and roadmap – report 3 scenarios: previous energy renovations, potential renovations with BO's requirements, potential renovations without constraints
Communication	Conference call	Site visit (if required)	Conference call	Meeting
Days allocated	5	5	5	10

6 Conclusions

The aim of this deliverable is to outline the strategy and planning of the DREEAM “EU multi-city replication programme”. This report describes the concept and scope of the two replication services offered within the project duration to 15 cities or housing associations across Europe: the building stock investment strategy and the multi-building energy renovation study. The services have been developed based on two key phases in the building owners’ decision-making process where DREEAM approach can deliver an added value and unlock the benefits of scale.

Additionally, a market strategy has been developed in order to reach out to relevant organisations in the identified target countries and raise awareness around the DREEAM replication programme opportunities. Different approaches and communication means have been used, leading to a different level of response and interest. Based on the feedback received from large-scale promotion of the programme and service delivery, improvements have been integrated in the market approach and service process to ensure the achievement of the established targets. Planning of the replication programme has been developed accordingly.

7 Annex I: Country selector

Country	Social housing stock	Passive energy efficiency potential	Investment potential	Policy & legislation	Implementation feasibility	DREEM attractiveness
Netherlands	3	3	2	2,5	3	2,7
Italy	2	3	3	2,5	3	2,7
France	3	2	3	2	3	2,6
United Kingdom	3	2	2	3	3	2,6
Spain	1	3	3	2,5	3	2,5
Sweden	3	1	2	3	3	2,4
Austria	3	1	3	3	2	2,4
Ireland	2	3	3	2	2	2,4
Czech Republic	3	2	2	2,5	2	2,3
Germany	1	2	2	2,5	3	2,1
Belgium	2	2	2	2,5	2	2,1
Denmark	3	1	1	2	3	2,0
Portugal	1	3	3	2	1	2,0
Slovenia	2	2	3	2	1	2,0
Switzerland	2	2	2	2	2	2,0
Finland	2	1	3	2,5	1	1,9
Poland	2	1	2	1,5	3	1,9
Norway	2	1	2	3	1	1,8
Malta	2	3	3	1	0	1,8
Luxembourg	1	2	3	2	1	1,8
Cyprus	1	3	3	1,5	0	1,7
Estonia	1	1	3	2	1	1,6
Lithuania	1	1	3	2	1	1,6
Croatia	1	2	3	1	1	1,6
Slovakia	1	2	2	2	1	1,6
Greece	1	3	1	1,5	1	1,5
Bulgaria	1	2	2	2	0	1,4
Hungary	1	2	2	1	1	1,4

Romania	1	2	2	1	1	1,4
Latvia	1	1	2	1,5	1	1,3
Kosovo	1	2	2	1	0	1,2
Serbia	1	2	2	1	0	1,2
Bosnia and Herzegovina	1	2	2	1	0	1,2
Montenegro	1	2	2	1	0	1,2
Albania	1	2	1	1	0	1,0
Macedonia	1	2	1	1	0	1,0

Social housing stock: % of social housing over total housing stock [4][5][6]

- >15% = 3
- 5-15% = 2
- <5% = 1

Passive energy efficiency potential: housing quality improvement potential - average U-values in W/m²K [7]

- 0,32-1,28 = 1
- 1,28-2,24 = 2
- 2,24-3,2 = 3

Investment potential: housing costs as percentage of household income [8]

- <21% = 3
- 21-31% = 2
- >31% = 1

Policy and legislation: average between sustainability policy ambitions (energy consumption-target difference)

- 1-14% = 3
- -12 to 1% = 2
- <-12% = 1

and openness of energy markets (ACER score)

- >6.2=3
- 4-6.2=2
- <4=1

Implementation feasibility: ability of DREEAM to engage with/deliver replication

- Existing networks= 3
- Potential network connections= 2
- No networks= 1
- No interest= 0

DREEAM attractiveness: average of all scores.

8 References

[1] Housing Europe, CECODHAS, 2015. www.housingeurope.eu

[2] As stated in the report “Market insights from the social, public and cooperative housing”, 2014.

[3] Cash, “Financing energy efficient renovations of social housing”, March 2012

[4] <http://www.housingeurope.eu/resource-124/social-housing-in-europe>

[5] <http://www.entranze.enerdata.eu/window-cU-values.html#/share-of-owner-occupied-dwellings-in-residential-stock.html>

[6] http://www.europarl.europa.eu/RegData/etudes/note/join/2013/492469/IPOL-EMPL_NT%282013%29492469_EN.pdf

[7] <http://www.entranze.enerdata.eu/window-cU-values.html#/window-cU-values.html>

[8] Housing Europe, The State of Housing in the EU 2015, 2016. A Housing Europe Review.

<http://www.housingeurope.eu/resource-468/the-state-of-housing-in-the-eu-2015>

[9] http://www.acer.europa.eu/en/electricity/market%20monitoring/documents_public/ipa%20final%20report.pdf