



Save the Homes

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1 Executive Summary

The overall aim of **Sav€ the Homes** is to contribute to an increase of an annual renovation rate of > 5% by offering attractive OSS services to homeowners, managed and implemented by municipalities as being trustworthy entities for citizens. This is achieved by the implementation of OSS Citizen Hub concept, offering renovation offices, both as physical hubs and web-based virtual hubs at local level based on the concept of medium-sized cities and to maximize replicability, at national and EU level.

Sav€ the Homes will:

1. Offer a full customer journey in 5 steps:
 - Stop 0 Onboarding
 - Stop 1 Design: Social design by co-creation with the homeowners
 - Stop 2 Elaboration: Organizing the financing, purchasing of renovation kits and the preparations for the construction of the renovation works
 - Stop 3 Construction: Realization of proven quality in interaction with homeowners and a peer-to-peer Renovation Community, as part of the Citizen Hub
 - Stop 4 In-use: Monitoring of total performances in practice for ensuring sustainable quality of building and user experience
2. Create strong networks and trustworthy partnerships with local actors in the whole chain
3. Create locally developed and organized financing and investment pipelines

The integrated home renovation services will be established within already established OSS networks at the city (City of Rotterdam) and regional (Comunitat Valenciana) level in two EU countries, building upon existing energy targets and networks so far well established at the city levels where it brings a new method and mechanism on how to improve the existing interactions between the relevant organizations and stakeholders. It holistically connects renovation advisory, products and services, finance opportunities and legal advice with a building owner at a single point. By involving relevant EU umbrella organizations, the concept will be further promoted in other member states to come to a harmonized method applicable at EU level.

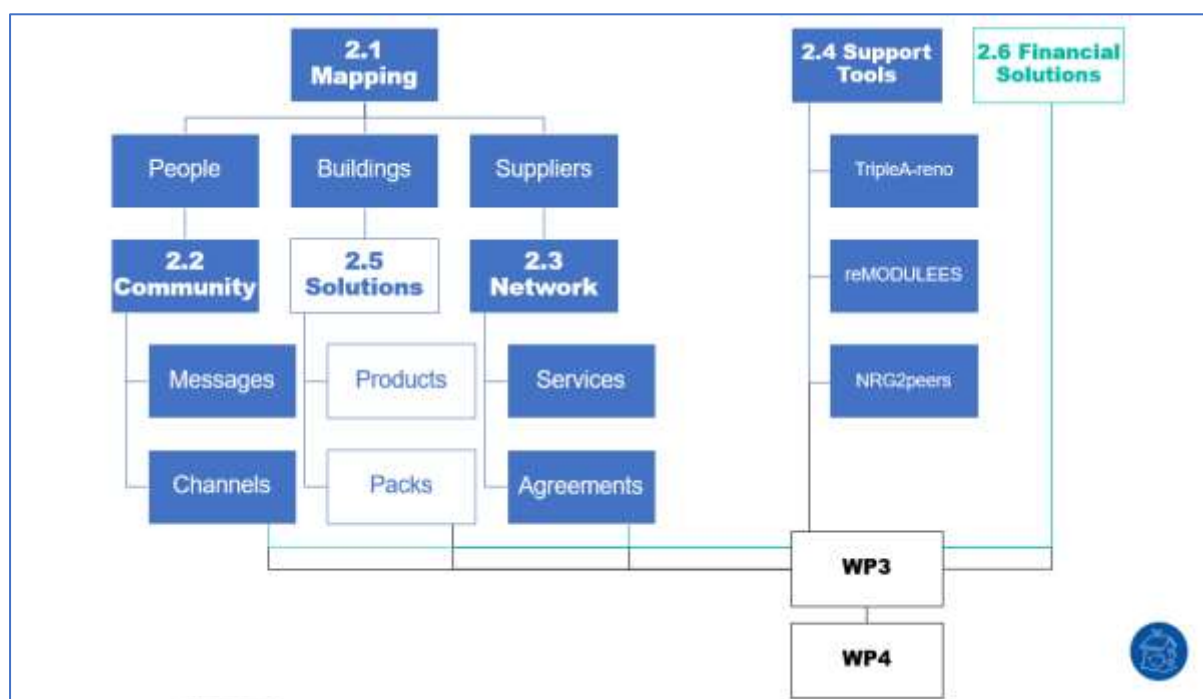


Figure 1.- WP2 activities workflow



The **WP2** objective is about mapping the demand and supply side as a foundation to build successful Citizen Hubs. The demand side aggregation helps understanding who the customers are, their pain points and motivational drivers for the renovation.

Supply side aggregation is fundamental to provide optimal offer, improve trust and awareness of homeowners, reduce renovation costs and time, and mainstream innovative technical solutions adapted to the local context, allowing for regional replicability and business risks reduction. As part of the Citizen Hub services, **energy retrofitting products and services will be clustered to reduce fragmentation of the renovation process**. To increase trust and ensure sufficient quality, these solutions will be verified to assess their applicability which can ease the decision making as also allows for a fair and reliable comparison between the solutions.



2 Introduction

This task includes the evaluation of the mapped offered market ready solutions by a three-step approach:

- 1) Verification of the mapped supply side: The outcomes of T2.1 is the basis to verify the quality of the mapped renovation solutions and services. This will allow the definition of the suitable renovation packages that could be offered to homeowners through the Citizen Hub model.
- 2) Renovation packages: The different suitable renovation packages (most energy efficient measures) will be chosen that answer the needs of the building segments in the pilot cities (outcomes of T2.1) as also identified buyer personas (answering the motivational drivers).
- 3) Creation of the Citizen Hub offer: Each pilot will design integrated solutions for home renovations in cooperation with the supply network and the negotiations reached there. The Citizen Hub offer therefore also includes the basic estimation of price and work plan (time schedule/span of accomplishing the renovation work for a specific renovation package). In the WP3, WP4 this offer is then detailed out for each pilot.

Therefore, this report presents a first section, based on D2.1, 2.2 and 2.3, with the pilot cities ecosystem of building stock needs and suppliers' sector or sub-sector. Then, the opportunities, messages and channels (clustering associations) to be fit with them, and finally, the solutions offer is created under different renovation strategies, for which information and/or training materials will be developed to be offered by the citizen hubs directly and/or through the support of diagnosis-design tools.

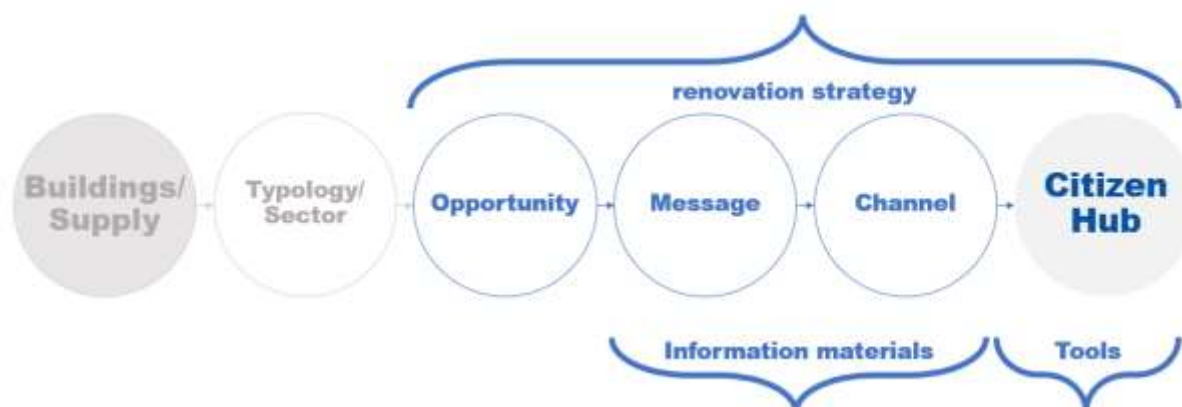


Figure 2.- Task 2.5 strategy: itineraries for building the Citizen Hub solutions offer

The protocol for defining the Citizen hub solutions offer can be found on the Annex 1, to be used by the follower cities, or any other interested city or region.

3 A brief recap on renovation solutions

Since energy renovation has become a priority in the context of EU residential buildings, many sectors have gained insight on the types of solutions to be offered, in terms of maximizing efficiency and impact.

Both research and market have developed their studies, and most of them agree on the need to package solutions for replication or impact matters. We depict it in 3 examples:

Market point of view: exploitation

The Spanish National Association of Energy Services Companies (Anese) has prepared a study to analyze some technological solutions, package them and facilitate their implementation in current buildings. According to them, *“Technological bundling is the grouping of solutions technology and energy saving measures that will be presented in a common way with the objective to convert them into a single and simplified solution, which will contribute to the renovation of the real estate park and the reduction of CO2 emissions”*. This, following principles below:

- Bundle different technological solutions
- find the technologies most suitable for each solution
- Optimize investments
- Maximize reduction of CO2 emissions
- Facilitate aids and current grants



Figure 3.- ANESE packages (I: focus on demand, II: focus on consumption)

Public Sector point of view: awareness

A 2015-2017 roadmap was established where several projects led by Barcelona City Council and others led by the entities of the Barcelona + Sustainable network.

One of these projects was “E4: Endollat al Estalvi i l’Eficiència Energètica”, where more than 40 members of the network have worked together to develop a Guide with the aim of offering citizens and professionals accessible information, free and useful when it comes to rehabilitating buildings, establishing comfort standards and defining criteria to promote energy saving and efficiency strategies in homes, retail stores, and offices.

The guide has been structured in a first introductory part, where objectives, criteria and concepts that help to read the second part, the files, which are structured in three chapters:

- The chapter on **health and comfort** exposes concepts and strategies to promote environmental quality inside the buildings.
- The chapter on **passive** measures (focus on demand)
- The chapter on **active** measures (focus on consumption)

In this case, measures are not bundled, and are available for free combination, since public sector is not considering the exploitation or achievement of any specific target, but the promotion of good practices. But on the other hand, it is interesting how they take each measure and **quantify benefits in 6 variables, relate with other measures (potential packages), and draft formalities and actors needed to implement them.**



Figure 4.- Barcelona Council Measures' definition

Research point of view: triggering

Research project AZALA-BI also studies potential solutions to climate energy context in relation to residential buildings renovation, with a focus on other drivers, such as conservation: which are the most **common pathologies** on the building Evaluation report (mandatory in Spain for each building older than 50)? and how can energy renovation profit that? Approach shared for example by the Spanish pilot.

Other projects, such as STUNNING have gained important insights from the analysis of the **sales of building materials and equipment** somehow related to energy renovations: trends of the sales of materials and equipment yield the following macro categories¹:

- Thermal insulation
- Glazing
- Heating solution
- Renewable Energy

¹ https://www.stunning-project.eu/fileadmin/user_upload/data_repository/WP4/D4.1_FINAL.pdf



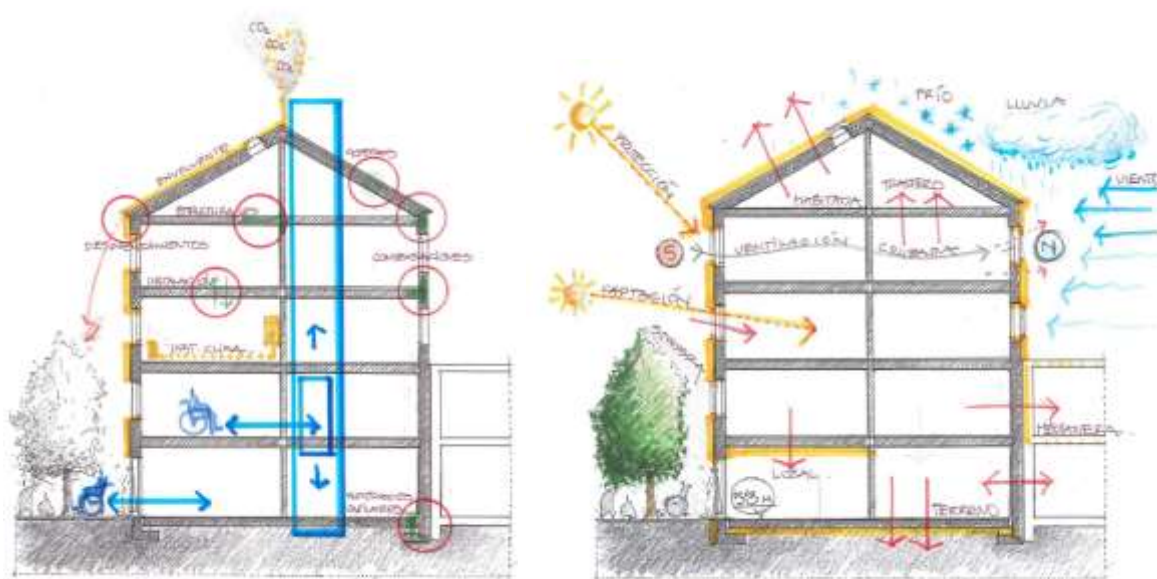


Figure 5.- AZALA-BI most common pathologies and deficiencies (L) and energy related solutions (R)

The first stage of STUNNING² was to review existing renovation examples and analyse the implemented renovation solutions, their performance, how they had been financed and the generated savings.

More than 60 different combinations of these solutions were identified in the STUNNING database. By clustering all heating systems together, as well as renewable energy systems, and retaining only the packages effectively combining a minimum of two solutions, six types of package appear as being the most frequently used.

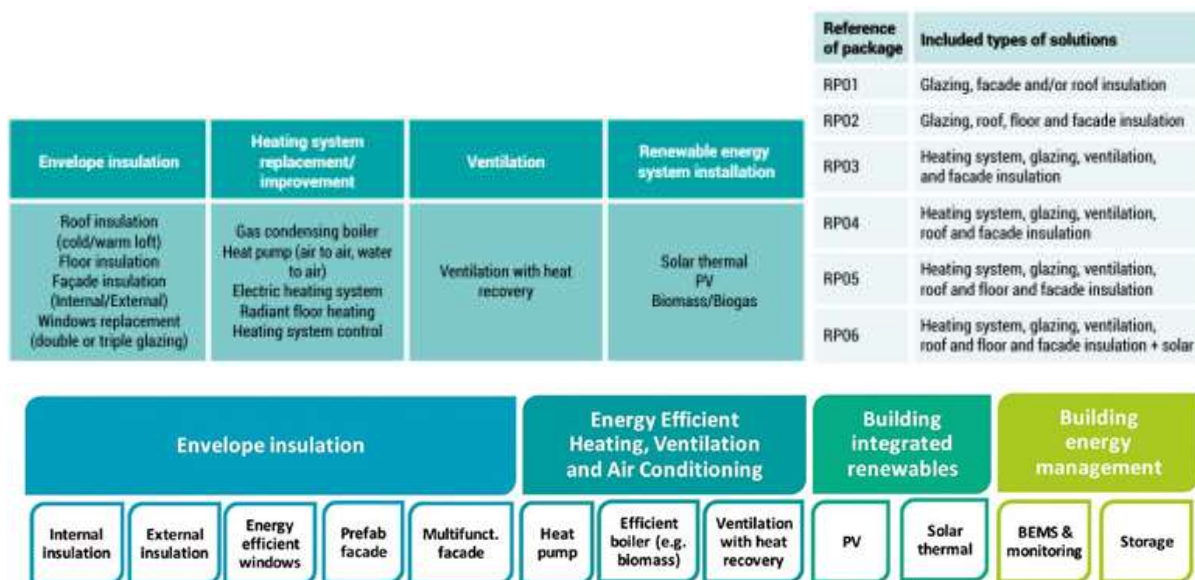


Figure 6.- STUNNING renovation solutions & packages

² <https://renovation-hub.eu/downloads/>

4 The pilot cities ecosystems

According to Objective 1 (to make home renovation easier, faster and more affordable for homeowners by designing an economically sustainable citizen-oriented OSS model, ‘Citizen Hub’, to be deployed by municipalities), the ‘Citizen Hub’ is an OSS model endorsed by a municipality, a trustworthy entity ensuring that the process is independent, transparent and of high quality for their citizens, and it is specifically focused on enhancing the homeowners’ experience throughout the home renovation journey.

Sav€ the Homes creates innovative ‘integrated home renovation services’ at the City of Rotterdam, the Netherlands, and Municipality of Valencia, Spain, and builds upon the existing climate targets set by the two cities (according to the initiative of Covenant of Mayors (CoM) for Climate & Energy, 15% of the mitigation actions and 9% of the adaptation actions proposed by cities in their Sustainable Energy and Climate Action Plans address residential buildings³, and therefore, their occupants, managers, owners or ‘regulators’).

But the project piloting experience is not addressing the whole city scope but a set of impacting targets, therefore, a methodological framework for identifying the relevant stakeholders was designed in T2.1, in order to focus efforts and efficiently design the communication strategies so to involve targeted citizens, maximize impacts achieved by intervening in the most needed buildings, and offer the best services and solutions for its realization. This deliverable deals with the supply side (network and products and services provided), while D2.2 deals with the demands side, and D2.5 deals with the solutions.

4.1 Comunitat Valenciana – ES

The geographical scope for this pilot experience will be local at first instance, and then regional, (as a replication phase). Therefore, cities involved are the City of Valencia (815,440 inhabitants) as front-runner and partner of the project, and the follower cities in the region: City of Elche (230,000 inhabitants), City of Gandía (74,000), Municipality of Onda (12,000 inhabitants) and City of Alcoi (59,000 inhabitants), supported by the Regional Government (all of them signed project Letters of Support), but in the supply side context, the geographical scope can be wider, since many medium to big business are not constrained to the municipal boundary of their location and can offer their knowledge, products and service beyond it, as shown in the questionnaire delivered to professionals on the overall exercise of their activities related to renovation works.

Therefore, we will use in this deliverable the provincial level (NUTS3) or the distance (influence area, buffers or isochron maps) approach, depending on the topics addressed.

4.1.1 Verification of the mapping

The outcomes of T2.1 is the basis to verify the quality of the mapped renovation solutions and services. This will allow the definition of the suitable renovation packages that could be offered to homeowners through the Citizen Hub model.

³ Covenant of Mayors figures: <https://www.covenantofmayors.eu/about/covenant-initiative/covenant-in-figures.html>



A. Targeted Buildings

The objective of targeting building typologies is to get the greatest impact with the promotion of energy renovation solutions

From D2.2 targeted building stock in Valencia pilot, focus is on residential building morphology (number of dwelling and relative position to neighbour buildings), combined with age, energy efficiency, quality or conservation status.

Edificio tipo	Categoría:	Características	Superficies (m ²)	
	Bloque de viviendas	N.º de viviendas	15	Fachada 1
	Zona climática: B3	N.º de viviendas por planta	1	Fachada 2
	Período de construcción: Entre 1960 y 1979	N.º de plantas	9	Medianera
		N.º de estancias	108	Cubierta plana
		N.º de baños	2	Cubierta inclinada
				Suelo en contacto con el terreno
				Suelo en contacto con recinto no habitable
				Suelo en contacto con el exterior

1. Tu edificio se corresponde con el tipo:



Edificio de viviendas

2. Sus características constructivas son:

Cubierta



Cubierta plana, forjado unidireccional viguetas pretensadas

Suelo



Forjado unidireccional de viguetas pretensadas

Fachada

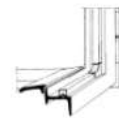


Muro capuchino, ladrillo y cámara de aire



Muro de ladrillo de una hoja revestido

Ventana



Marco metálico, vidrio monolítico, sin rotura de puente térmico

3. Selecciona las instalaciones más frecuentes en tu edificio:

Aire acondicionado frío calor y Calentador de Gas Natural

Agua caliente



Calentador de Gas Natural (rendimiento 0,8)

Calefacción



Equipo Split (Reversible)

Refrigeración



Equipo Split (Reversible)

Figure 7.- Targeted building characterization

On the energy side of the analysis, targeting **old (>50 years)** or **inefficient (>E)** buildings has the objective of achieving the biggest savings possible. On the realization side, **grouping similar buildings (MFH and AB - typology)** also facilitates the renovation process by clustering common needs, and therefore, offering sets of solutions types adapted to them, allowing e.g. for collective purchases (lowering prices) or administrative authorizations delivery, and easing the decision-making process.



Figure 8.- building stock typologies for Valencia pilot

Studies on residential building stock status and perception carried out by the Regional government⁴ and the StH dedicated questionnaires to final users, distributed by VCE and VRCP and whose results are available on D2.2, show:

- Important level of dissatisfaction with noise insulation and thermal comfort, which points out to **building envelope** (for other reasons different to energy efficiency, but still working as a driver for our purposes). Also the actual context of empowering solar self-consumption and energy communities rises concerns about the level of availability of **renewable energy resources** from the building.
- attention to **accessibility** and **aesthetic** aspects such as the views from the dwelling.
- notable amount of interest on kitchens and bathrooms (which might be used as a driver for **DHW technology update**)

From all above, solutions are classified considering a **components' approach** with two different forms of minimum classification:

- **Categories** as the group of measures applicable to the different areas of intervention in the building; in other words, the category indicates which component of the building is going to be modified or replaced (e.g. façade).
- **Classes** as entities that refer to the behaviour of a measure (e.g. external insulation). Starting from a class, a **measure** is created, representing an instance of the associated class having specifically determined characteristics (e.g. external insulation with 90mm layer of wood fibre board by Diffutherm).

Also according to TripleA-reno development, measures should include, in addition to the descriptive attributes, some measurable parameters, so we can choose a **renovation strategy**:

- The purpose of each strategy is to **sort** the measures or to eliminate some measures according to a well-defined criterion fitting a purpose (e.g. economical strategy sorts by parameter cost), thus, based on this order, the measure at the top of the list is the measure that best fits the chosen strategy.
- These strategies can be also used to plan the renovation in a **step-by-step approach** leading to the achievement of the chosen goals according to a med-term schedule which enables a more convenient programming of the renovation works (and costs).

⁴ <http://habitatge.gva.es/es/web/vivienda-y-calidad-en-la-edificacion/l-libre-blanc-de-l-habitatge-c.v>.

This is the base for the definition of tips, recommendations and solution packs.

B. Targeted population

The objective of targeting personas is to get the greatest effectiveness in the adoption of the promoted solutions

From D2.2 demand side targets in Valencia pilot, focus is on household composition (number of members and presence of children), combined with age, income or tenancy scheme.

On the composition of the household scope, targeting couples or mature singles, or families with children have the objective of increasing renovation rates at own homes, while targeting landlords or local heroes has the objective of replication in multiple houses, owned by themselves or by influencing their neighbours.



Figure 9.- demand side profiles for Valencia pilot

The result of massive studies on residential building stock status and perception carried out by the Regional government⁵ and the StH dedicated questionnaires to final users, distributed by VCE and VRCP, and whose results are available in D2.2, show:

- **adult (mature)**, slightly men over women, **owners** of the dwelling they are living in, which partially reinforces our preliminary profiles and could be used to help us focus or prioritize specific ones.
- interest on **comfort**, but also on **economic savings**.
- most common renovation in the whole building scope went for envelope components, which fits very well with the pilot assumptions for limiting energy demand (**roofs and external walls**).
- for dwelling level renovation, **aesthetics** arises, and most of the interventions are performed on visible elements with no need for neighbour's **approval** or major **administrative procedures** (also some of them are under **grant schemes** – kitchens and bathroom).
- Expenditure per dwelling remains mainly under **5.000€**, although a share of asked citizens were willing to pay up to **20.000€**.
- For the funding options, credits and financial schemes interest is still very low, and concerns are placed on a bigger amount for grants and subsidies or an official **combination between grants and financial** schemes. Grant do exist, but many of the respondent were not aware of the existence of such grant schemes.

In summary, perceptions, motivations, barriers were summarized within the different profiles so to assign wishes and opportunities for renovation to exploit for communication campaigns. For the definition of solutions, most interesting is that common to all the profiles, the opportunity to

⁵ <http://habitatge.gva.es/es/web/vivienda-y-calidad-en-la-edificacion/llibre-blanc-de-l-habitatge-c.v>.

introduce the renovation path is the moment when **things wear out or go wrong** or when **grants or advantageous financial schemes** are available (couples and matures singles and landlords).

Not to forget that **condominiums**, joint households in a residential multifamily building are a mix of all these profiles, and therefore motivations, drivers and opportunities are mixed and have to be sorted based on collective decisions. The role of the property administrator is capital for the success of the renovation in this context.

C. Targeted Providers

The objective of targeting supply side profiles is to ensure that proposed solutions are available on the local market.

From D2.3 profiling of construction sector, providers are to be targeted on the one hand according to the **object** of the service provided (sector and subsector activities), on the other hand, according to the **subject** providing the service (business size -number of employees and turnover-, age and qualification of the employees), and finally, according to the **role** they play on the renovation process (activity or part of the process solving).

Therefore, in this deliverable context, the focus is on the object provided. For the energy side of the analysis, **targeting energy efficiency related solutions' providers** (e.g.: Economic Activities Tax Registry codes, such as 501.3 Masonry and small construction work, 504.2 Plumbing installations, 504.1 Electrical installations, or 504.3 Hot and cold installations) has the objective of achieving the biggest savings possible.

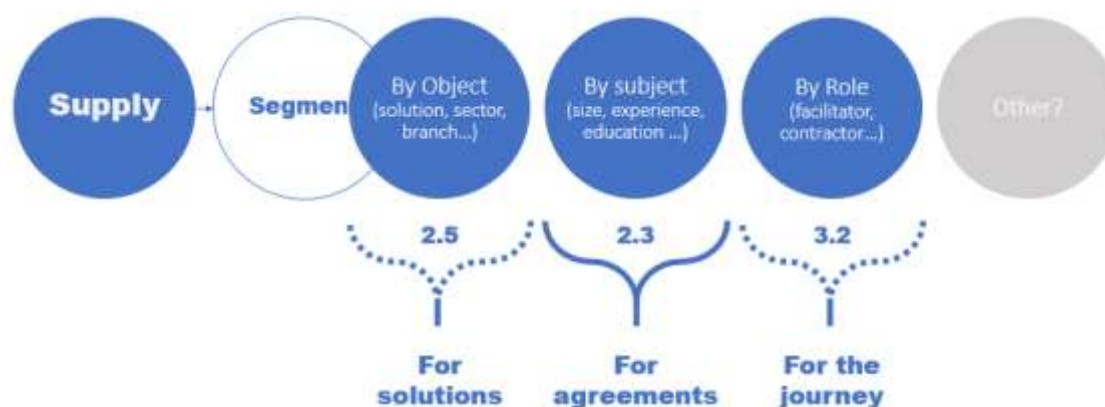


Figure 10.- Supply side segmentation purposes

The result of the StH dedicated questionnaires to professionals and contractors, distributed by IVE and whose results were presented in D2.3, showed that:

- From professionals we get a slightly different **typology** distribution than from the massive or the users' characterization. The focus of the pilot continues on the multifamily building but is interesting how professionals work more on single family houses than the real ratio of the typology, which could mean that those owners are more interested in professional services for renovating their homes.
- For the **recurrent topics**, we find an important concentration of renovation works on noise and thermal insulation, i.e., on building envelope, and also on renewable energy resources, which responds to users' dissatisfactions shown in D2.2. Maybe drawn by subsidies and grants (which exist for insulation and RES too), many works on accessibility are detected as well.
- **Elements in worst shape** detected by professionals include specifically windows, installations, insulation and waterproofing, but also a notable number of deficiencies on kitchens and bathrooms (which might be used as a driver for DHW technology update), or elevators and



accessibility (which might be used as a driver for sustainable neighbourhoods). All of it still in line with users' interests and public sector subsidies and grants.

Therefore, targeted suppliers scouted in WP4 activities should offer solutions on building envelope improvement and RES installations, but in combination with existing financial mechanisms, a focus can be done on **windows substitution, and equipment update or technologies upgrade**.

4.1.2 Renovation packages

The different suitable renovation packages (most energy efficient measures) are chosen answering the needs of the building segments in the pilot cities (outcomes of T2.1) as also identified buyer personas (answering the motivational drivers).

So, based on previous section, we will shape the kind of solutions to be promoted from the Citizen hub, in terms of a structured description allowing later on the set of a comparable Citizen Hub offer, including specific providers, commercial brands, financing options, etc...

D. Measures

In this section we will define the characterization of the types of measures to promote, in terms of qualitative attributes and quantitative variables, based on previous section findings.

From the analysis of targeted buildings, it is clear the interest of establishing the **component** on which the measure applies (category) and the **action** that the measure implies (class), both of the qualitative attributes. In order to sort or compare, it is also important to quantify some variables, which will be better defined according to the targeted population drivers.

Category		
Name	Description	Driver
Envelope	Building skin, potentially solving acoustic and/or thermal insulation, and aesthetics	comfort, health, savings, value
RES	New equipment in the generation side, for CO2 and EPnr savings	sustainability
Technology	New equipment in the consumption side, more efficient	sustainability, savings
Behaviour	Operation of the different 'smaller' systems, such as basic home automation, appliances or lightning can make a difference in comfort and consumption	Comfort, health, savings
...		
Class		
Name	Description	Driver
External addition	Application from the outside part of the living areas	Disruption
Element replacement	Changing one kind of element more or less independent from the envelope which involves minimum 'wet' works	Disruption, grants
System addition	Installation of local energy source taking advantage of local conditions	Disruption, grants
System replacement	Changing DHW and/or cooling/heating system for a more efficient one (Aerothermal heat pump)	Disruption, grants
Training	Learning some tips and tricks to lower consumption and gain comfort!	Disruption,
...		

Table 1.- Potential attributes according to targeted buildings analysis



Also, from the activities in the energy Office of Valencia (VCE), analysis of data show how behaviour and light training in operating appliances, ventilation or light is a cost-effective measure, even if they do not count for EPC certification.



Figure 11.- Consumption by service & economic efficiency by measure

From the analysis of the IEE data we see massive presence of injuries in the building envelope, so, even if it is not the most economic measure, it is one needed, and intervention in this component is the only one contributing to reducing energy demand. Therefore, according to the building stock characteristics, valuable (and accessible) variables are **energy demand** or time out of **thermal comfort**.



Figure 12.- Injuries from building evaluation: *envelope*

Also related to the targeted buildings, it is interesting to analyse previous years grants applications, which confirms our focus on multifamily buildings with more than 4 floors and turning 50 years old this and next decade (2010-2030), because it is clear that they intend to undertake a renovation, even if it is not initially focused on energy matters.



Figure 13.- Grant applications typologies: *AB.04*

Most interesting variable we can extract from here is the **cost**, or the available budget to undertake renovation works. Even if the driver is accessibility, these budget ranges give us an idea on the average

budgets which owners of these kind of buildings are ready to spend. This is important due to the actual (strong) subsidies offer, which we will see next.



Figure 14.- Grant applications budgets: accessibility → walls & roofs?

Also, it is to be noted that interventions on walls and roofs are not negligible. But the most important, and this is what we need to change (or absorb with the grants schemes), is the almost none interest in energy renovations. In fact, previous years schemes for accessibility and conservation works were completely spent, while energy grants were almost returned.

Actuación	2015	2016	2017	2018	2019	2020
Conservación	2.050.000 €	3.220.000 €	2.918.441 €	6.492.792 €	25.729.823 €	24.010.391 €
Accesibilidad	1.400.000 €	6.050.000 €	8.938.035 €	11.820.427 €		
Eficiencia energética	210.000 €	570.000 €	564.017 €	385.068 €	561.238 €	613.433 €
Total, ayudas económicas	3.660.000 €	9.840.000 €	12.420.493 €	18.698.287 €	26.291.061 €	24.623.824 €

Table 2.- Previous years grant schemes focus: *not energy*

We can link all the above with the previous section analysis of targeted population interests, so to define the variables driving them to undertake a renovation (focused on energy efficiency!). Those shall be **comfort**, **value** (economic savings or state revalorization), **simplification** (both of the works and the procedure to get to do the works – agreements, permits, etc..) and **cost** (per se, and counting on grants).

This translated into measurable (and accessible) variables (some already mentioned) such as time out of thermal comfort, energy consumption savings, authorizations needed, cost and cost including grants.



Variables		
Name	Description	Driver
Non-energy reno Cost	Cost of priority works for the user (conservation and/or accessibility), in €	Duty
Energy reno Cost	Cost of energy renovation works (needed to access grant scheme), in €	Savings, access to grants
Cost inc. funding	Final cost for user (energy and non-energy, discounting the grant)	Savings
Energy demand	Estimated energy needed to maintain the home in comfort conditions, depending on the thermal envelope, in kWh/m2y	Comfort, access to grants
Primary energy consumption (non-renewable)	Estimated energy consumed to maintain the home in comfort conditions, depending on the systems, in kWh/m2y (comparable variable not depending on energy source)	Savings, energy bills
CO2 emissions	Translation from PE,nr according to an energy factor	sustainability
Time out of comfort	Hours a year on which is impossible to maintain a home in comfort conditions, according to envelope and systems	Comfort
Number of formalities	Permits needed to undertake the renovation	Disruption, distrust
Number of contracts	Number of professionals needed to contract to design/perform the renovation works	Disruption, distrust
...		

Table 3.- Measurable (and accessible) variables

Finally, from the analysis of actual grant schemes (RD 853/2021), requirements for access are interesting to evaluate in order to check whether the proposed solutions will access the grant and overcome the barrier previously detected of the avoidance of energy renovations.

<ul style="list-style-type: none"> • 70% uso residencial • Acuerdo de la comunidad (mayoría simple) • Obligatoriedad de gestor o agente • Reducción de al menos un 30% en consumo de energía primaria no renovable, referida a la certificación energética • En zonas climáticas C, D y E, además de lo anterior, reducir la demanda energética anual global de calefacción y refrigeración de la vivienda unifamiliar o edificio, al menos: <ul style="list-style-type: none"> ○ En C un 25% ○ En D y E un 35% 													
<table border="1"> <thead> <tr> <th rowspan="2">Ahorro energético conseguido con la actuación</th> <th rowspan="2">Porcentaje máximo de la subvención del coste de la actuación</th> <th>Vivienda</th> </tr> <tr> <th>Cuantía máxima de la ayuda por vivienda (euros)</th> </tr> </thead> <tbody> <tr> <td>$30\% \leq \Delta C_{ep,nren} < 45\%$</td> <td>40</td> <td>6.300</td> </tr> <tr> <td>$45\% \leq \Delta C_{ep,nren} < 60\%$</td> <td>65</td> <td>11.600</td> </tr> <tr> <td>$\Delta C_{ep,nren} \geq 60\%$</td> <td>80</td> <td>18.800</td> </tr> </tbody> </table>	Ahorro energético conseguido con la actuación	Porcentaje máximo de la subvención del coste de la actuación	Vivienda	Cuantía máxima de la ayuda por vivienda (euros)	$30\% \leq \Delta C_{ep,nren} < 45\%$	40	6.300	$45\% \leq \Delta C_{ep,nren} < 60\%$	65	11.600	$\Delta C_{ep,nren} \geq 60\%$	80	18.800
Ahorro energético conseguido con la actuación			Porcentaje máximo de la subvención del coste de la actuación	Vivienda									
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$45\% \leq \Delta C_{ep,nren} < 60\%$	65	11.600											
$\Delta C_{ep,nren} \geq 60\%$	80	18.800											

Figure 15.- Requisites from EU grants

The requisites lay on the energy demand reduction and the energy saving. But granted the access to the funding, it applies to all the works, so the interest is to keep renovation budgets inside the accessibility and conservation ranges but including the energy works.



On the other hand, and as this scheme policy development, the Valencia Region regulates the figure and mandates the hiring of a renovation agent (in charge of delivering a turnkey product, including managing finances) or a renovation manager (in charge of assisting in all the steps of the renovation process, which could be the building administrator), in order to simplify the bureaucracy involved in the renovation of multifamily buildings. This translates into a reduction of **formalities** and **contracts** to be signed.

As a summary, we define the Valencian citizen Hub the renovation measures to promote as:

Measure	Attributes			Variables			
	Name	Class	Category	€/dwell	Energy	CO2	Comfort
rCV	Windows	Envelope	Window replacement	7.816 €	M	M	M
rAE_03	Walls	Envelope	External addition	7.019 €	H	H	H
rAE_02	Roof	Envelope	External addition	1.019 €	L	L	L
rAE_01	Floor	Envelope	External addition	759 €	L	L	L
BC_A	DHW HP	Technology	System replacement	1.705 €	M	M	M
BC_ACR	W/H/C HP	Technology	System replacement	11.583 €	H	H	H
rPV	PV panels	RES	System addition	4.185 €	H	H	L
w	Workshop	Behaviour	Training	0 €	L	L	M
...							
				Improvement:	Low	Medium	High

Table 4.- Solution definition scheme

These solutions descriptions are:

- **rCV: installation of high-performance windows**
 - openings complying with the element-level requirements established by DB-HE1 (Table 3.1.1.a-HE1 Thermal transmittance limit values and Table 3.1.3.a-HE1 Value air permeability limit of voids in the thermal envelope). Mobile shade elements are also included over the gaps that block radiation, meeting the requirements of Table 3.1.2.-HE 1 Limit value of the solar control parameter.
 - disassembly of carpentry, including frames and accessories without use. Balcony door 180x210cm composed of two leaves made with anodized aluminum profiles with breakage thermal bridge, together with all the elements and accessories that guarantee its correct functioning and tightness Finished in natural color to receive a glazing up to 26 mm.
 - 165x120cm window composed of 1 leaf tilt-and-turn and 1 folding leaf made with profiles of anodized aluminum with thermal break, together with with all the elements and accessories that guarantee its correct operation and tightness. finished in natural color to receive glazing up to 38mm.
 - Tilt-and-turn window 90x120cm composed of 1 leaf made with anodized aluminum profiles with breakage thermal bridge, together with all the elements and accessories that guarantee its correct functioning and tightness Finished in natural color to receive a glazing up to 38mm.
 - Double glazing for solar control, made up of a 6 mm thick colorless glass with low emissivity, 12 mm intermediate chamber and glass colorless monolithic 6 mm (6-12-6) with a thermal transmittance of 1.7 W/m²K and a solar factor of 0.44. Coating of horizontal walls with paint plastic for interiors with a matt finish, prior surface preparation and a diluted first coat with water.



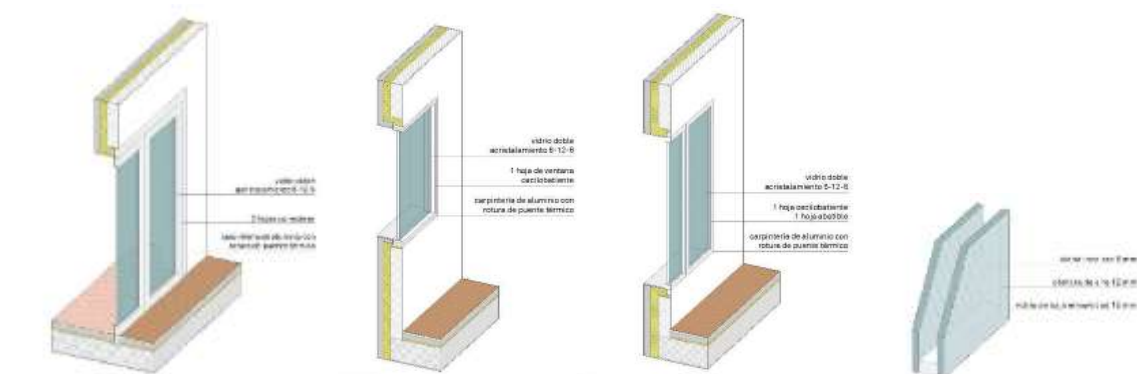


Figure 16.- rCV windows replacement

- **External insulation of building envelope (applies for rAE_01, rAE_02 and rAE_03)**

It ensures that the element-level requirements are met (Table 3.1.1.a-HE1 Limit values for thermal transmittance and Table 3.1.3.a-HE1 Limit value for air permeability of openings in the thermal envelope) and also the global parameters established by DB-HE 1 (Table 3.1.1.b-HE1 Klim limit value for private residential use and Table 3.1.2.-HE 1 Limit value of the solar control parameter), for the case of “Reforms in which are more than 25% of the total surface of the final thermal envelope of the building” according to the compactness value.

- **rAE:01:** Continuous false ceiling made of plasterboard 12.5 mm laminate, on a substructure. Thermal insulation of roof made by means of the projection of 30 mm of polyurethane foam (PUR) of closed cell with a thermal conductivity of 0.032 W/mK. Coating of vertical walls with paint plastic for interiors with a matt finish, prior surface preparation and a diluted first coat with water.
- **rAE_02:** Mechanical demolition of the Catalan roof with pneumatic hammer. Waterproofing of walkable flat roof with protection, by means of a monolayer membrane SBS modified bitumen bonded, with steel reinforcement. FP Nonwoven Polyester Felt (LBM-40-FP SBS) placed without adhering to the support and with the overlaps bonded by heat. Thermal insulation in traditional flat roofs passable with extruded polystyrene (XPS) of 30mm of thickness and a thermal conductivity of 0.34 W/mK, including fastening and cutting elements of the insulation. Insulating tile laid dry on membrane waterproofing on walkable inverted roofs, composed of a layer of extruded polystyrene (XPS) 40 mm thick with a thermal conductivity of 0.35 W/mK and finished with a top coat of concrete reinforced with 20 mm polypropylene fibers of thickness

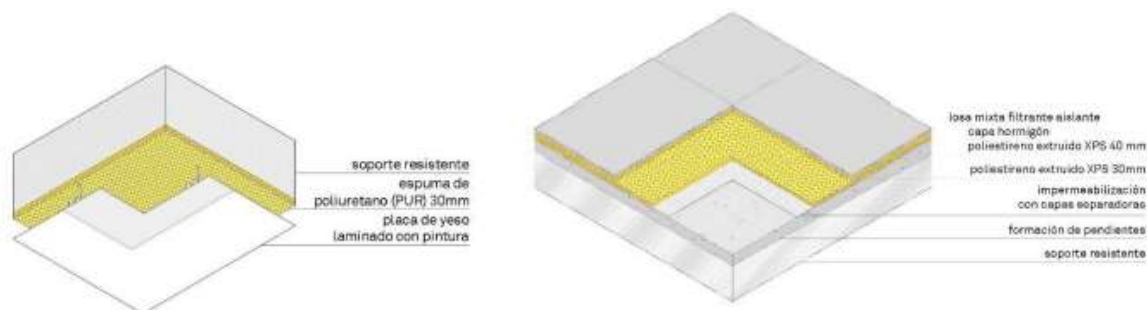


Figure 17.- rAE_01 & rAE_02 Floor and roof external insulation

- **rAE_03:** External Thermal Insulation System (SATE-ETICS) formed by a layer of thermal insulation based on Rigid extruded polystyrene (XPS) panels with a thickness of 40 mm and a thermal conductivity of 0.034 W/mK fixed to the support, a second layer of reinforcement and base of the finish formed by a fiberglass mesh glass embedded in 5 cm of mortar and a layer of waterproof and vapor permeable finish 1mm mineral render water with a smooth finish. External Thermal Insulation System (SATE-ETICS) formed by a layer of thermal insulation based on Rigid extruded polystyrene (XPS) panels with a thickness of 50 mm and a thermal conductivity of 0.034 W/mK fixed to the support, a second layer of reinforcement and base of the finish formed by a fiberglass mesh glass embedded in 5 cm of mortar and a layer of waterproof and vapor permeable finish. 1mm mineral render water with a smooth finish. Assembly and disassembly of metal facade scaffolding of prefabricated tubes

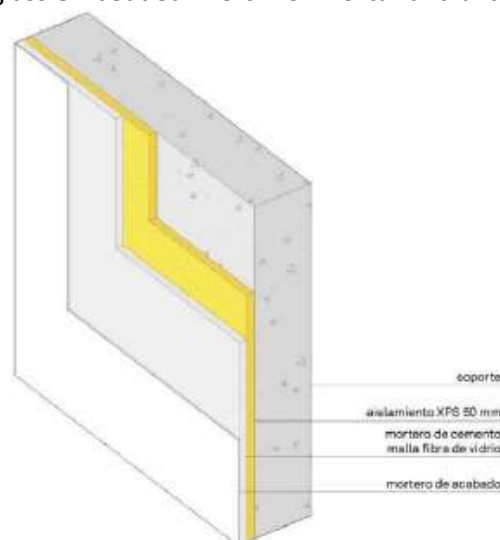


Figure 18.- rAE_03: ETICS insulation

- **BC_A: DHW aerothermal heat pump**

Replacement of the existing system for the DHW service by a predefined air-water heat pump, guaranteeing that the DB-HE 4 requirement is met. Aerothermal heat pump for the production of DHW with accumulator, SCOP 3.2, together with all the accessories for its correct operation.

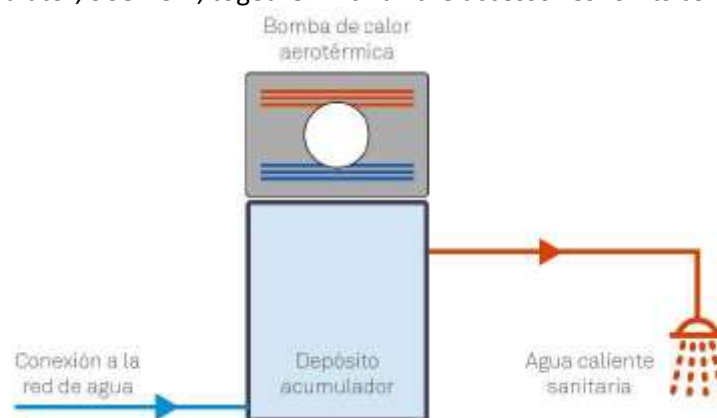


Figure 19.- BC_A: DHW aerothermal heat pump

- **BC_ACR: aerothermal heat pump**

Replacement of the existing systems for the DHW, heating (and cooling) services by a predefined air-water heat pump, guaranteeing that the DB-HE 4 requirement is met. Compact aerothermal heat pump system for air conditioning and domestic hot water, for outdoor or indoor mounting and wall installation, Includes all accessories and items for correct operation. Fan coils for water regulation with heat exchanger water-air, for placement on the floor/ceiling in each one of the air-conditioned rooms, made with two-pipe system, one-speed motor selectable, four-way valve and all elements necessary for its correct functioning. Visible channeling made with copper tube, 28 mm outer diameter, including clamping claws and with a 30% increase in the price of the tube in concept of joints, accessories and special parts

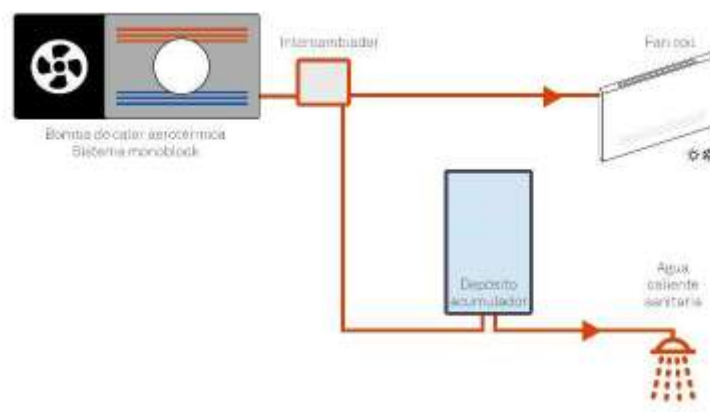


Figure 20.- BC_ACR: W/H/C aerothermal heat pump

- rPV: PV installation
Photovoltaic installation for electricity supply by means of panels at 45°. Set of photovoltaic panels with a power nominal 3 kWp per dwelling and an inverter. equipped installation for network connection. Galvanized steel structure for the support of the photovoltaic panels installed on a flat surface.

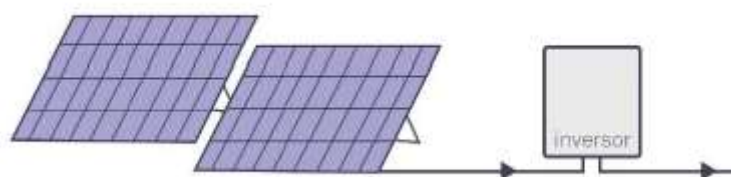


Figure 21.- rPV: PV installation

E. Scenarios

Nevertheless, from a step by step / non-regret point of view, acting measure by measure is perfectly fine and energy and comfort goals will at the end of the process be met, but, from the economic point of view, some objectives has to be meet in order to get the grant, so at least for that reason, combinations are designed with different criteria (or strategy), from initial cost point of view, comfort improvement, energy bill savings, sustainability, etc... according to their variables combinations.

There are five initial stages:

- Actions on the envelope + change of windows (rAE, including rAE_01, rAE_02, rAE_03 & rCV)
- Change of windows + heat pump for DHW (rCV+BC_A)
- Installation's replacement, i.e., heat pump installation for HDW, heating and cooling (BC_ACR)
- Complete plan of action, i.e., envelope + windows + installations (rAE+BC_ACR)
- Solar PV system (rPV)

With the aim to maximize the aid, other four initial stages are considered, based on the four previous ones, and combining them with solar PV system. In this way, they access the maximum subsidy for all cases.

Therefore, the 9 scenarios are summarized below:



Figure 22.- Renovation options

And results in:

		Attributes	Variables				
Measures	Strategy	Cost	With Grant	Energy	CO2	Comfort	
00	Do nothing	0,00	0	115,62	21,55	823	
02	rCV	Comfort/ Aesthetics	16.618,42	9.971,05	81,34	13,80	101
	rAE_01						
	rAE_02						
03	BC_ACR	Disruption	11.583,21	6.949,93	64,29	10,89	19
	rCV	Disruption/ Comfort	9.522,04	9.522,04	84,83	14,85	625
BC_A							
06	rPV	Emissions	4.185,17	2.511,10	79,66	15,46	823
007	rCV	True believers	26.055,02	7.255,02	30,06	6,44	8
	rAE_01						
	rAE_02						
	rAE_03						
09	02+07	Comfort/ Aesthetics	20.803.60	4.160.72	27,57	4,69	101
10	03+07	Disruption/ savings	15.768,38	3.153,67	25,88	4,80	19
12	05+07	Disruption/ Comfort/ savings	13.707,22	4.797,53	47,11	8,45	625
13	06+07	True believers	30.240.19	11.440,19	3,23	0,55	8

Table 5.- Scenario definition scheme



Figure 23.- Scenario 09: Thermal envelope renovation + Photovoltaic

4.1.3 The Citizen Hub offer

Now each pilot should design the integrated solutions for home renovations in cooperation with the supply network and the negotiations reached there. The Citizen Hub offer therefore also includes the basic estimation of price and work plan (time schedule/span of accomplishing the renovation work for a specific renovation package).

In the WP3, WP4 this offer is then detailed out for each pilot.

F. Network

As presented in other deliverables (D2.1 & D2.3), creating supply side networks is capital to root the collaboration strategies on the local context, and get to offer solutions available by trusted suppliers.

First part of this work is to involve local organizations and associations in touch with targeted providers. Therefore, the Save the Homes **Advisory Boards** (StHAB) have a pivotal role in establishing sustainable networks to support the local eco-systems. For this task, the Supply side Advisory Boards are to be contacted, in the context of the definition of the specific solutions that can be provided by them or their associates. So, professional associations as construction companies will be involved in the design of the integrated home renovation services, together with the municipalities (in the two pilot and follower cities) and relevant local players (e.g. professional associations, construction companies).

Supply side AB: Producers, suppliers, contractors etc. with good reputation and references on local level			
Property Managers	VRCP – Colegio de administradores de fincas	Business	Asociación Valenciana de Empresas del Sector Energético (AVAESEN)
	Consejo Valenciano de Colegios de Agentes de la Propiedad Inmobiliaria (API)		Asociación de empresas Promotoras de Valencia (APROVA)
	Asociación española de Gestores Públicos de Vivienda y suelo (AVS)		Federación Valenciana de Empresarios de la construcción (FEVEC)
Professionals	Colegio Oficial de Arquitectos de la Comunidad Valenciana (COACV)		Asociación de Promotores Inmobiliarios de la Provincia de Alicante (PROVIA)
	Colegio Territorial de arquitectos de Castellón (CTAC)		Plataforma Tecnológica Española de Construcción (PTEC)
	Colegio Oficial Ingenieros Industriales (IICV) - contacto VCE		ATECYR – Spanish Technical Association of Air Conditioning and Refrigeration
	COGITI - contacto VCE		SENSEDI – Best technologies for buildings
	Unión Profesional		SIBER – Ventilation systems

Table 6.- Spanish Supply side AB

G. Financial solutions

Even when many grants are available in Valencia region for residential building renovation, all the focus and interest from homeowners was on the conservation and accessibility works, coming from urgent situations. There is a lack of renovation culture in the area, and more if you look into the energy side of the renovation. In this context, grants for energy renovation were not spent, while other programs were insufficient.

On the other hand, private funding aligned with energy savings was inexistent, and even if a few products were on the market, targeting single family buildings, due to the easiness to get agreements.

New grants program from the EU Recovery funds are trying to overcome these issues by offering very high rates of direct funding (up to 80%), creating the renovation agent actor to manage all the process and simplifying the application by asking just for a responsibility statement for starting the works. But main achievement is the inclusion of the conservation and accessibility works in the eligible costs, so



by paying just a bit more, the building obtains their primordial objective, and the energy savings, as in the example below:



Figure 24.- Scenario 09 with accessibility costs included

There you see how accessibility cost were around 4.000€ per dwelling. Now, adding external insulation on the roof, floor and ETICS systems in the façade, changing windows and installing photovoltaic generation in the roof, the building gets their elevator, saves up to 76% energy and improves thermal comfort for around 6.000€ per dwelling.

H. Solution packs

Together with the work in demonstration buildings in WP4, solution packs will be defined as a combination of the whole itinerary:

- A. Targeted buildings
- B. Targeted personas
- C. Targeted providers
- D. Examples of measures
- E. scenarios
- F. Network
- G. Financial solutions

So Valencia energy Office can offer complete solution packs, and XALOC networks offices can also design and offer theirs.



4.2 Rotterdam - NL

The municipality of Rotterdam is the second largest municipality of The Netherlands. Also on the level of sustainability Rotterdam is a front runner. Rotterdam is a member of the Resilient Cities network⁶ where cities that are committed to building and investing in urban resilience come together. Within this network a broad range of solutions is regarded.

The last couple of years several initiatives were started in Rotterdam, mainly started as a **cooperative association**. These initiatives are bottom up and use the enthusiasm of volunteers. There are five initiatives active as of this moment, including Alex Energie. These five initiatives do not cover the whole of Rotterdam. There is an umbrella organisation in place called Energie van Rotterdam. This is a platform for energy cooperatives in Rotterdam. For collaboration, scaling up and greater social impact. Together they aim for maximum ownership for all Rotterdammers in the energy transition. The platform started with Alex Energie, Blijstroom, Delfshaven Energie Coöperatie, Wijkbedrijf De Middellander and Energie Coöperatie Rozenburg. One of the actions at this moment is to create large **solar roofs**, placed on public buildings, and use the revenues for the causes of the initiatives.

Alex Energie, as subcontractor of the Save the Homes program, is the obvious party to fill in the role of the HUB Alexander. They are **connected to the area**, they have ambitions to contribute to the energy transition, and they have people that can, and are willing to act. Therefore municipality of Rotterdam, BouwhulpGroep and Alex Energie are working towards strategies for solutions.

Three strategies for Rotterdam

For the HUB Alexander in Rotterdam, the municipality, Alex Energie and BouwhulpGroep have thought out **three strategies** to tackle the renovations currently necessary for the energy transition and climate goals of 2050.

- **Route A: *single measures (with a stacked possibility)***
Route A is the strategy where home-owners can ask for single measures done in their homes. When talking about single measures, an example is installing double glazed windows throughout the whole house. There is a possibility to **stack these single measures**. When, for example, you want double glazing in your homes, but also solar panels. This route can be done via the WoonWijzerWinkel, where they will ask prices with their suppliers for the different measures. This does not mean that you get one supplier to do the whole lot of measures, but for each measure a new supplier is asked to deliver. There is no oversight or overlap between the suppliers and measures done, it is all separate.
- **Route B: *collective measures in a component approach (integral)***
Route B is the strategy where home-owners can collectively choose to implement measures to improve their homes. For route A, we discussed the example of installing double glazed windows. Route B takes it one step further. Instead of only looking at the glazing, we look at the component façade, where the glazing is included. This covers an **integral home renovation**. We talk about multiple measures here, as there is also something to be said for the wall insulation, maintenance of the façade and painting. These multiple measures are no longer done via de WoonWijzerWinkel, they need to be executed in agreement with each other. These measures are best dealt with in a **collective**. This can be a building block of 10 row houses, but it can also be a collective of ten home-owners individually in the area that do not live next to each other, but want the same things done to their homes. The **advantage** of this collectiveness, is that it will be easier

⁶ <https://resilientcitiesnetwork.org/>



to get contractors involved, and the process of informing people, and organising a quotation can be spread over more people, and thus cheaper.

- **Route C: unique measures in a component approach (individual))(n=1)**
Route C is the strategy where home-owners can privately choose to implement measures to improve their homes specifically. This means that there is a large degree of **customization** according to what the home-owner wants and needs. For example, while house 1 may want to install double glazing and update the façade, house 2 perhaps already has double glazing but has a large problem with moisture in the cavity wall. Then, customization is necessary to solve the problems and offer an all-inclusive solution for the home-owner. This asks more in customer relations, designing and work execution. Hence this will be a more costly route.

4.2.1 Verification of the mapping

The outcome of T2.1 is the basis to verify the quality of the mapped renovation solutions and services. This will allow the definition of the suitable renovation packages that could be offered to homeowners through the Citizen HUB model.

A. Targeted Buildings

In deliverable 2.1 the market has already been described. The municipality had BouwhulpGroep make an oversight of Prinsenland and Het Lage Land, based on replicability. This division is based on the principles of Component Renovation as mentioned in deliverable 3.7.



Figure 25: potential of replicability Het Lage Land from prior study

Prinsenland and Het Lage Land districts comprise of respectively 5,131 and 5,870 homes. They are located in the Prins Alexander district, in the northeast of Rotterdam. 21% of the Lage Land consists of single-family homes and in Prinsenland this share is approximately 35%. The rest of the neighbourhoods consist of multi-family homes. There are approximately **11,000 homes in total**, more than 60% of which are (social) rental homes, the rest are owner-occupied homes. The municipality is looking for a way to facilitate sustainability in these two neighbourhoods. In the case of private stock in particular, this will not happen by itself, but initiative will have to be taken from outside (step 0 of the customer journey). In making the project more sustainable, the options for future maintenance are being looked at, and account is taken of the fact that the neighbourhoods will eventually be completely independent of natural gas, which is a program initiated by the Dutch government. That

means the municipality focuses in particular on making homes more sustainable and making the homes natural gas-free. Where possible, this should go hand in hand. The strategy that the municipality uses in most of Prinsenland and het Lage Land is to install a High Temperature (HT) (70 degrees) **heat district network** in suitable neighbourhoods, which will be lowered in temperature over time (50 degrees). The basic principle is that the homes in those neighbourhoods are made suitable for this purpose.

The ordening was about typologies, the focus lies at organizing and approaching the two districts differently. And what can be found out about replicability of solutions and process in this area.

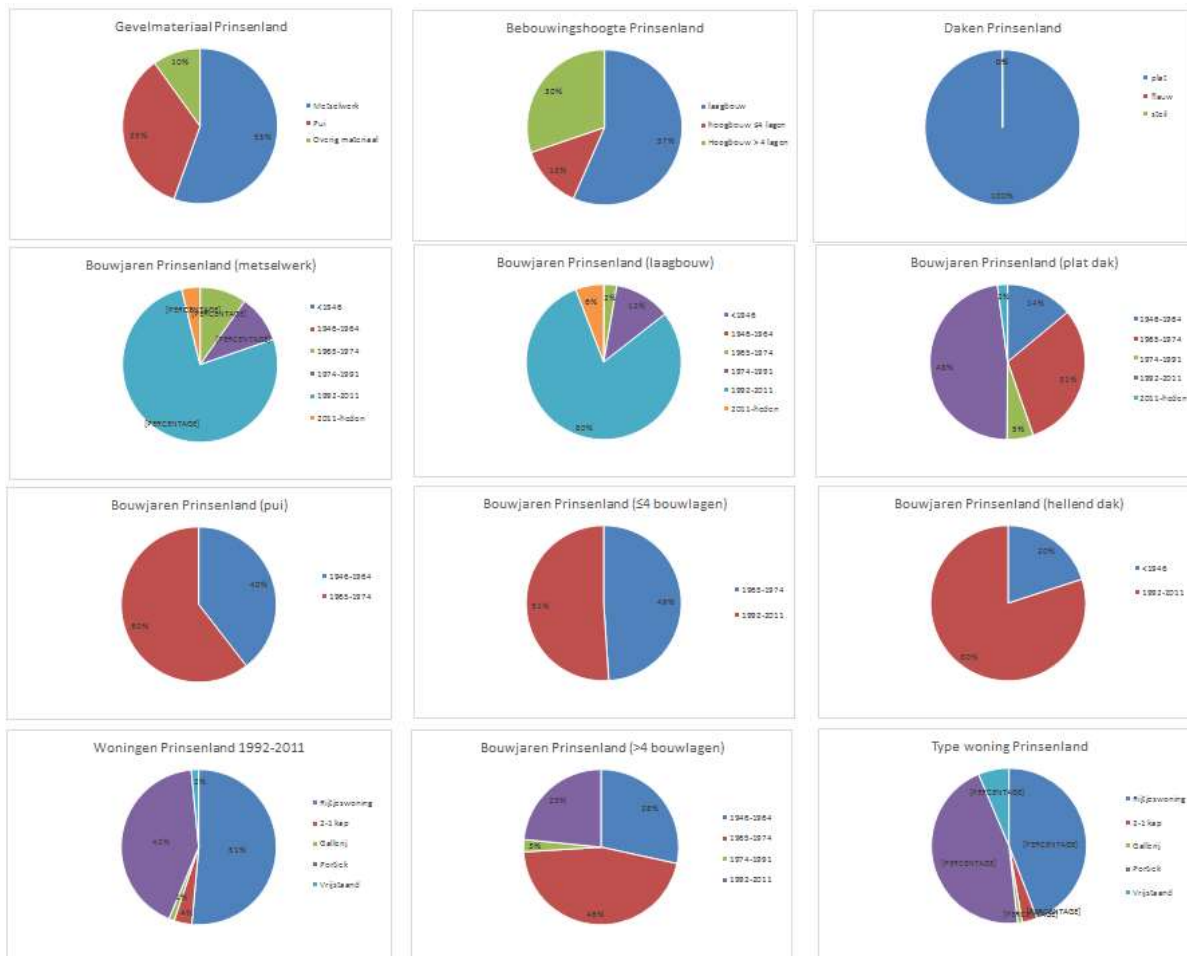


Figure 26.- Survey results

The houses are analysed by means of a survey of the neighbourhoods, whereby an image is formed of the **occurring housing types**. A classification is being drawn up for the homes in Lage Land and Prinsenland. This means documenting the existing housing types and dividing them into components. BouwhulpGroep has developed a typology that is applied in these two neighbourhoods (deliverable 3.7). This arrangement makes clear which buildings are comparable in appearance and original quality, so that solutions (measures) based on repetition can be applied there.

Since the focus of the Municipality of Rotterdam was on **single-family homes**, we focus on that, but we do not limit ourselves to just single-family homes. This has to do with the fact that certain component types are independent of the housing types. Flat roofs are found in both high-rise buildings and single-family homes. It is good to know how the structure is and there may be differences in the implementation for low-rise and high-rise buildings. We looked at logical arrangements that could



prompt the municipality of Rotterdam or Alex Energy to take a next step. In the next step, one should especially think of:

- organizing a **collective quotation**,
- preparing and improving by supplying a **concept design**,
- Or simply a **folder** with a front house in the mail for every resident, showing the possibilities, with an address for more information,
- And there are several other approaches in between.

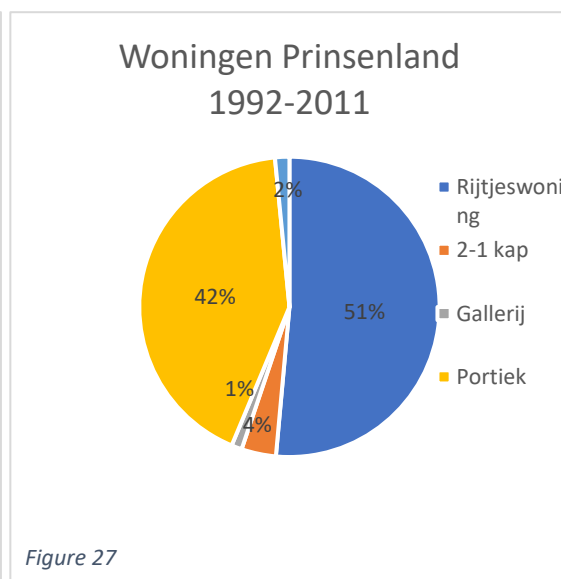
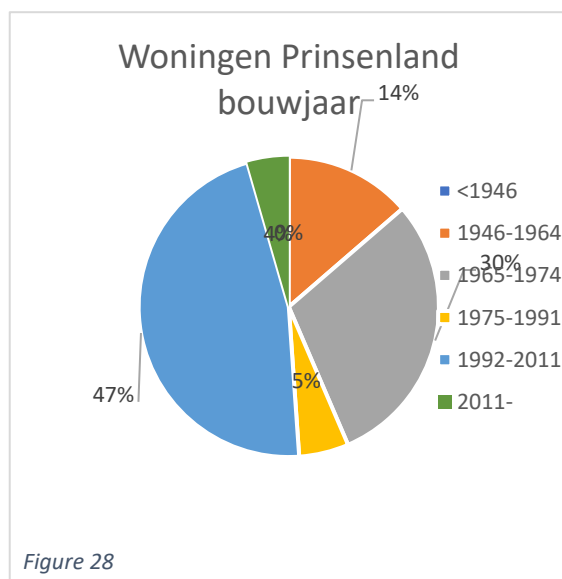
The second option could, for example, be a facade replacement, in three materials (plastic, wood and metal), with facade layout, and the required permit, which can be realized through an intermediary, individually via Route A, or collective with Route B.

Looking more closely to the building stock of Prinsenland, there are a total of 5131 homes in Prinsenland. A large part was built during restructuring, after 1992 (2622). The other part is from 1965-1974. Despite its location in the city, this makes Prinsenland a relatively **young neighbourhood** (see figure 11).

The houses after 1992 have an Rc value that is at least 2.5 m²K/W, because of the Building Decree that was valid since then. In addition, a number of these homes were even built after 1995, which means that the EPC (Energy Performance) is 1.4 or lower (also based on the Building Decree). This means that these homes are already suitable for medium-temperature district heating in their **basic quality**, without many additional adjustments. For these homes, however, the performance can be optimized with additional insulation.

Almost all houses built after 1992 in this district have a **flat roof**, so both the portico houses and terraced houses. This is a feature of this building period, because prior to that period pitched roofs were most common. Moreover, the flat roofs are now about **30 years old** and in need of replacement. An excellent opportunity to additionally insulate the roof.

Another example can be found in the houses from 1965-1974, which all have a flat roof, which is not in coherence with other areas, where again a pitched roof is to be expected. But this is an indicator for HUB Alexander to promote the measures with flat roofs, instead of pitched roofs. Seen from the year of construction, an Rc of 1.0 m²K/W is to be expected. They are mainly porches. Most homes are



expected to have had a roof replacement between 2000-2010, based on the expected service life⁷. Normally, insulation is then added up to Rc 2.5 m²K/W. If the roof is now replaced again, the insulation would be increased to the current new-build requirement (6.0 kW/m²). However, it is questionable when the next maintenance moment is. With maintenance performed between 2000-2010, the next moments will only be met after 2030.

Replicability



Figure 29: replicability on a facade level

Various **classifications** can be made for the neighbourhoods. Arrangements of solutions are based on year of construction and type, but mainly linked to parts of the houses (components) such as roof and facade. This arrangement enables the municipality to make its own choices regarding the approach of a neighbourhood, as mentioned above.

The energy transition is in need for a lot of renovated houses. On the scale of the Netherlands (7,8 million houses) and given a yearly addition of 65,000 new built homes, and an estimated need of 8,5 million homes, we can conclude that new built is just enough for the expansion of the stock. That implies that the rest of the homes need to stay, **90% of the houses** that stand here today, will still be in place in 2050. But all of this 90% need to have an (energy) renovation. Thus we have to renovate 7 million homes in 28 years, that is **1,000 homes a (working) day**. For Rotterdam this means 43 houses a day. To do so it is necessary to organise this as efficient as possible. Therefore the replicability is much needed.

B. Targeted population

In D2.2 in total, six personas have been created for Rotterdam:

- 1) **Busy, family, career:** This persona represents the young families which have settled down in the neighbourhood. These people see sustainability as something that the government should initiate. They might be somewhat interested in sustainability and the climate, however they prioritise convenient choices over sustainable choices. To get these people interested in home renovation, they have to be approached in a personal way. The prospect of a well organised and easy process will make them more interested, as well as the increase in comfort that can be realised by renovating their dwelling.
- 2) **Actively involved, aware:** This persona represents people who are already aware of the necessity of living more sustainable. It is not unlikely that these people already improved (parts of) their dwelling before coming in contact with StH/ the OSS. Often, these people are enthusiastic to tell others about the improvements that they did, this makes them perfect as 'local hero' or local ambassador. Important for this persona is factual and clear information and a high quality of work. They are willing to invest as long as they get a quality of advice and work that is up to their standards.
- 3) **On budget, socially involved:** This persona is very active in the neighbourhood. Sustainability is seen as a vague concept and something that is not their direct responsibility. Local heroes could help making them more aware of what benefits home improvement could bring them. Lack of affordable financing is a big barrier for them.

⁷ Assessment of the sustainability of flexible building, H. van Nunen, Ph.D. Eindhoven University of Technology 2010

- 4) **Young, keen to take action:** This persona represent starters who just bought their first dwelling. They are somewhat aware of the importance of sustainability, however their knowledge specific on sustainability of dwellings is limited as is their budget.
- 5) **Uninvolved, less informed:** This persona represent elderly people. The complexity of sustainability and quick innovations on the topic make that it is often a difficult concept for them to grasp. Therefore, they are not really aware of the importance and possibilities. Main barriers for these people regarding home renovation is that it will be a hassle or that it will cost them too much to be feasible on the short term.
- 6) **Outsider, little interest:** This persona represents immigrants who have been living in the target area for a while and feel a connection with the neighbourhood and the social network. Cultural differences and language barriers make it difficult to reach these people and make them aware of the benefits (and necessity) of home improvement.

More information on the targeted population can be found in deliverable 2.2: demand engagement.

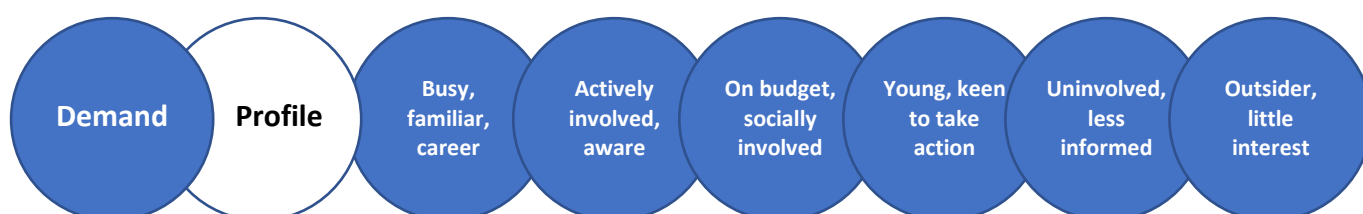


Figure 30: personas for Rotterdam

There is no apparent **link** between the housing type and persona's. This because the actual availability of living space depends on much more than just a persona. People tend to look for a home based on the space they (think) they need, money they can and will spend on a home, available facilities and qualities. These considerations will be made by each household. And so it is possible that in one row of houses all the persona's above occur, because based on their own indicators that is the best solutions. But persona's can help within targeting of solutions and measures. A '4) *young, keen to take action*' persona is more likely to think about a sustainable solution. An '5) *Uninvolved, less informed*' persona finds the aspect that the measures are finished within one day the most important quality. In both cases it can be the **same solution**, for example a high temperature Heat pump.



Figure 31: High temperature heat pump in Ikwoon

C. Targeted providers

The task of meeting the climate targets in 2050 with the built environment means quite a bit for employment in the construction industry, given the already tight labour market. The EIB (Economic Institute for Construction) outlines in its publication: “Election program against the light: the housing market⁸” the extra investment required to make existing homes with a certain label comply with the climate target. When you link this to the Energy Label database of RVO, the Netherlands Enterprise Agency (WON2018), you reach an additional investment of more than 10 billion euros if you spread this over a period of 30 years. The EIB publication: “Prospects for construction production and employment in 2021⁹” provides a picture of the expected employment in executive construction, broken down into new construction, maintenance & repair and renovation. When you convert these figures to housing construction and correct for the difference in labour productivity (the EIB maintains the same labour productivity for the three categories), you get an idea of what that extra environmental investment in existing construction can mean for employment. It follows from the calculations that an **additional 16,000 man-years** are required each year¹⁰. According to the EIB, without that extra environmental investment, 16,000 man-years would already have to be found. So this number is **doubled**.

One of the main barriers we are facing is the lack of (trusted) labor. Within the customer journey a lot of effort can be put in, but if there is nobody to execute the measures when citizens did go through all the effort of defining and choosing a solution, this causes a risk in the rust of the HUB. So it is key to get contractors and providers involved and to get them to stay involved.

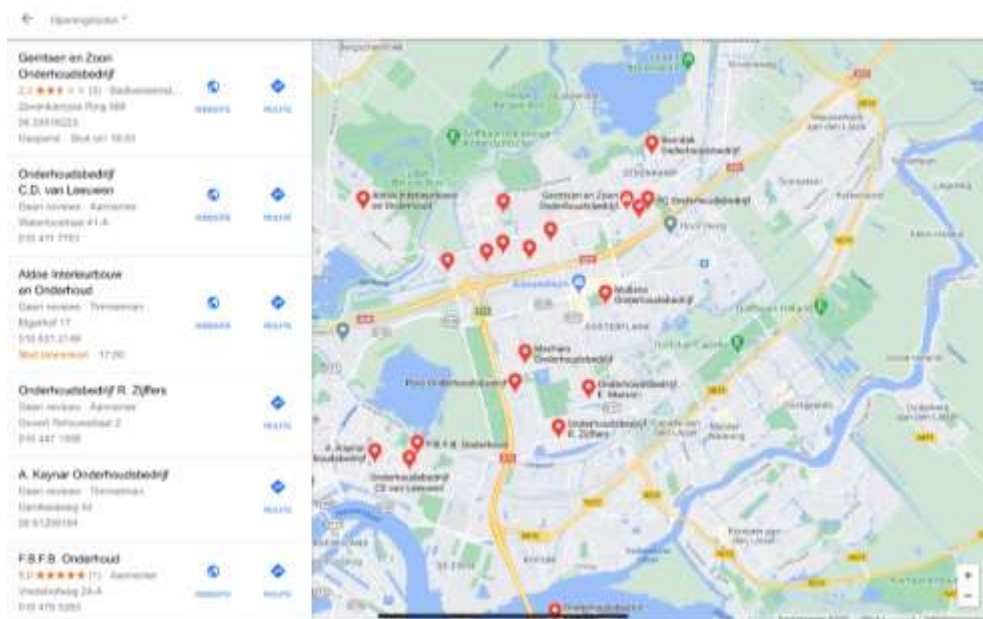


Figure 32: Local suppliers for Prins Alexander

⁸ https://www.eib.nl/pdf/Verkiezingsprogramma's_tegen_het_licht_-_de_woningmarkt.pdf

⁹ <https://www.eib.nl/publicaties/verwachtingen-bouwproductie-en-werkgelegenheid-2021/>

¹⁰ <https://www.ed.nl/eindhoven/verduurzaming-panden-in-de-knel-door-tekort-aan-handjes~a9526824/>



In Prins Alexander, there are currently 65 suppliers present that could work for HUB Alexander, but there are more. Currently, we are working on a list of 752 potential suppliers in the area, to see if they fit the profile for HUB Alexander and the competences they need to have.

However, just knowing which company's **could** do the job is not enough, it is about who **wants** to do the job. That means that the job has to be made as attractive as possible for them. For example by presenting larger batches of occupant (route B) that are all willing to renovate. Or an easy accessible route, that brings people with single measures directly to them (Route A). Or by taking a part of the customer journey like informing people of the available options.

Work development in Rotterdam

TNO wrote a report¹¹ on the current status of jobs, in connection with the Energy transition needed in Rotterdam. The municipality of Rotterdam wants insight into the number and type of jobs that will be created in Rotterdam in the coming years arises from investments in energy saving and sustainable energy, such as **insulation of homes**, the install solar panels and charging stations for electric vehicles. First, this knowledge is needed to ensure that the ambitions of the municipality, both in relation to the energy transition and beyond, are in line with the number of people available to perform the work. Second, this one helps to inform the Municipality of Rotterdam in striving for its goal that as many Rotterdammers as possible take advantage of the new jobs.

The report shows that in the optimistic high scenario this can rise to approximately 600-1,000 full-time jobs by 2030 in energy transition in Rotterdam. The vast majority of this increase in employment is generated by investments in home insulation, a small part by investments in solar panels while investments in charging station infrastructure locally only a very small employment effect. In their analysis, they also estimate the possible impact of technological and social innovation on employment growth. According to this estimate, social innovation in work processes in particular leads to a total saving of 67-172 full-time jobs.

Identifying groups of skills-based kinship jobs not only makes sense for the broad recruitment and training of (lateral) entrants. It also provides insight into the switching options and potential **development routes** for current professionals and future entrants into professions related to the energy transition. And with this possible for policy aimed at availability of sufficient staff to realize the energy transition and for policies that are lifelong facilitate development.

The young craftsman or professional woman who will start her career tomorrow with the renovation of existing homes is assured of **a lifetime of work**. All homes in our country must undergo a sustainable improvement sometime in the next 30 years, after which they are beautiful, sturdy, functional and CO2 neutral again. But who are these professionals, who will soon ring your doorbell to get started in your home? Where do they come from? How are they trained and what guarantee do you have that they will do everything right at your home the first time?

To train the renovation specialist of the future¹² in all these aspects, an extension of the current training¹³ program is necessary (See D3.6). Training courses are certainly open to this, but cannot do this alone. Collaboration with market parties, such as housing associations and construction companies (learn-work companies) that offer the opportunity to practice in practice, is necessary. In

¹¹ TNO 2021 Rapport Banen in Beeld Rotterdamse Energietransitie90, 3 september 2021

¹²<https://www.ed.nl/eindhoven/verduurzaming-panden-in-de-knel-door-tekort-aan-handjes~a9526824/>

¹³<https://www.cirkelstad.nl/wp3/wp-content/uploads/2021/10/TNO-2021-Rapport-Banen-in-beeld-Rotterdamse-energietransitie.pdf>



addition, it is of course also a question of financial resources to develop, promote and implement such an education programme. To this end, it is important that society is widely aware that well-trained and adequately trained renovation specialists are the precondition for making neighbourhoods more sustainable and that there is currently a major shortage of them.

4.2.2 Renovation Packages

At this moment there are four entities contributing to the HUB in Rotterdam. These entities work from the Save the Homes project. In the future, the HUB should be a self-supporting entity (as possible). But for now the services are delivered by these four:

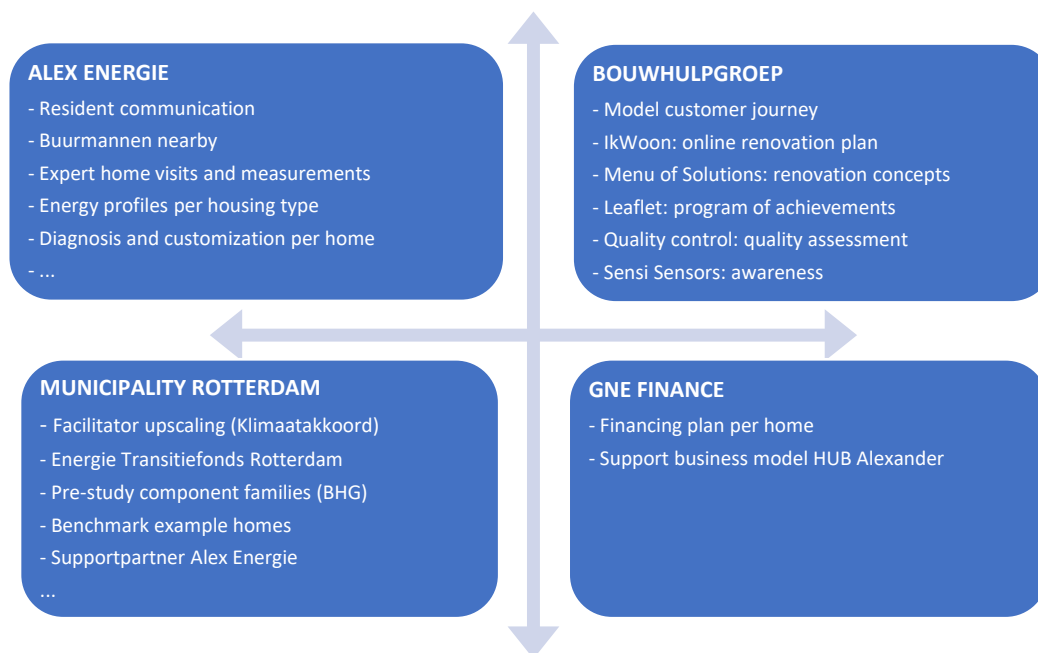


Figure 33.- Rotterdam HUB

Within Rotterdam we described a route to market (1) and a route to realisation (2). All these **functionalities** can be argued whether the HUB is responsible or not, and if the HUB is responsible is extra staff training needed? Therefore we will describe the steps needed and mention to what extent Alex Energy can provide those services or what is needed in staff training. In D3.7 these steps are mentioned and in d4.5 the risk are added. This is small summary.

Route to market: (Figure 34)

- *Alex Energy did a study of the sixteen houses*
- *The existing 65 + solutions are combined with the wishes of the home owners*
- *Leaflets with performances*
- *Inquiry and selection*
- *Implementation*

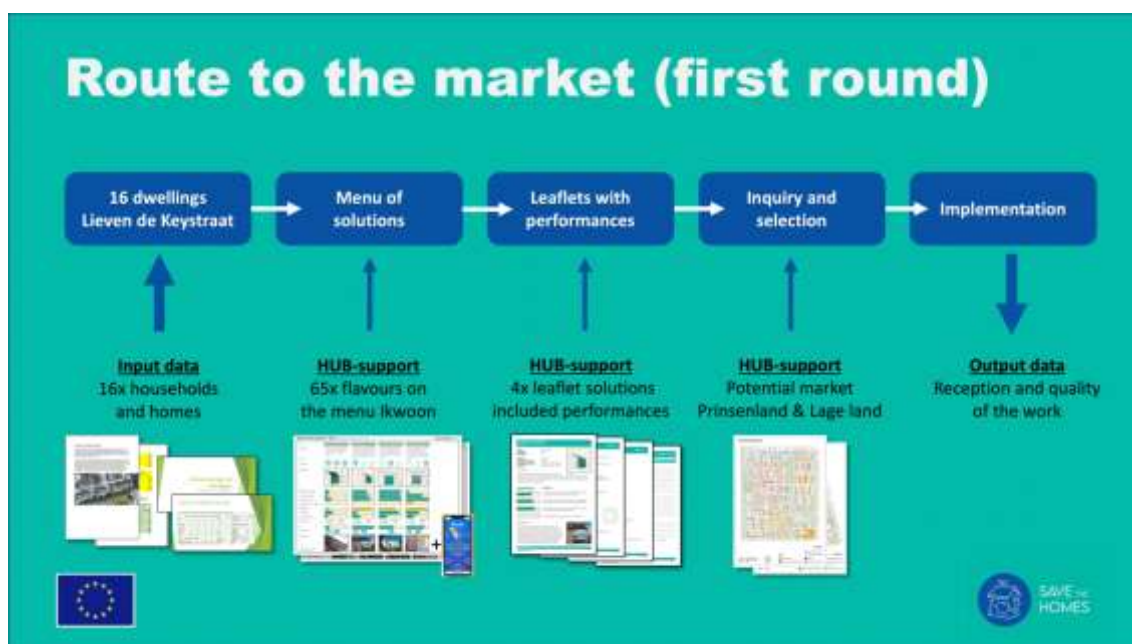


Figure 34: route to market

Route to realisation (Figure 35)

- Contacting local companies
- Selection
- Work and supervision
- Repetition

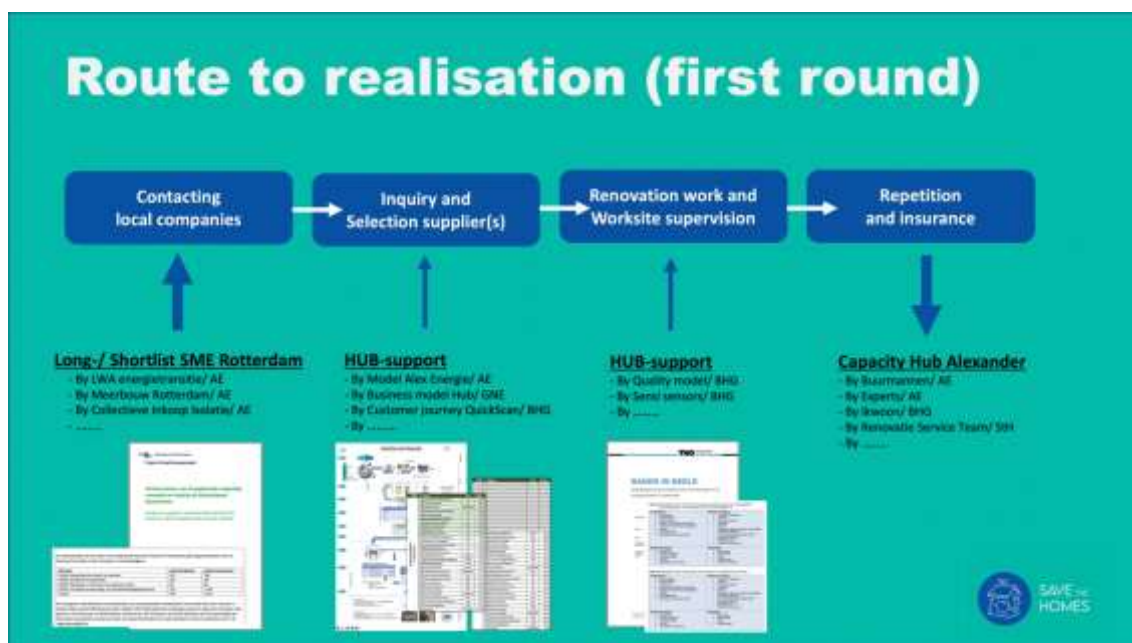


Figure 35: Route to realisation

Based on 40 years of renovation knowledge Bouwhulp made a list of solutions, divided on the level of a component. These can be put in use as renovation packages. But they are not all about energy. Some improvements are just aimed at better maintenance, more space or more comfort. Other solutions are aimed at circularity. But it is a way to open up towards packages.



D. Examples of measures for Prinseland

The municipality is on the way to scaling up sustainability. There will be tangible results, namely an image that shows the potential of the existing homes and how private individuals can choose from various solutions. On the basis of the established base map, you can then smartly **repeat** the required offer (Knowing what you want).

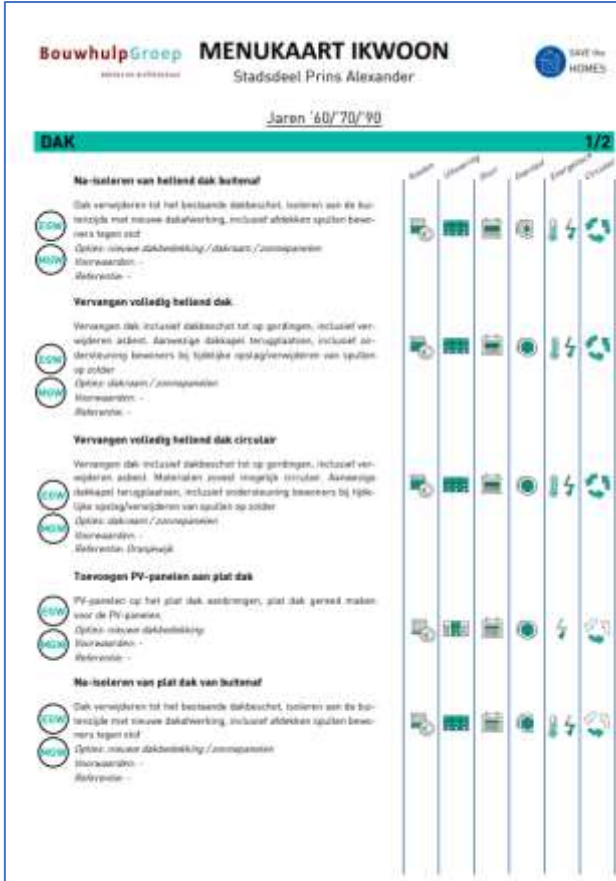
Therefore there were three instruments developed, and used in Save the Homes

- *Menu* (Figure 36)

The menu is structured on the level of the component, in the example the roof is shown. Furthermore the menu shows where the solutions (best) can be used, single family dwellings (EGW) or multifamily dwellings (MGW). Then a short description is given of the measure. What will be done to enhance the quality of the building. Besides that, six indicators are used to show the **quality** of the measures, which is depicted by icons

- *Concepts* (Figure 37)

A concept is a set of **combined measures**, that bring a certain solution. In this concept phase the combination of solutions that are fitting for their homes are presented and weighed next to each other.



Measure	EGW	MGW	Energy	Health	Quality	Cost	Time
Ma-teleren van bestaand dak buitenaf Dak verven/pleuren tot het bestaande dakbedeksel, buitenen aan de buitenzijde met nieuwe dakafwerking, inclusief afdekken spuiten bewoners tegen stof. Oploss.: nieuw dakbedekking / dakcoaten / zonnepanelen Stoerwaarden: - Referentie: -	EGW	MGW	+	+	+	+	+
Vervangen volledig bestaand dak Vervangen dak inclusief dakbedeksel tot op gerelinge, inclusief verwijderen afdak. Bestaand dakkapel terugplaatsen, inclusief ondersteuning bewoners bij tijdelijke opslag/verwijderen van spullen op zolder. Oploss.: dakcoaten / zonnepanelen Stoerwaarden: - Referentie: -	EGW	MGW	+	+	+	+	+
Vervangen volledig bestaand dak circulair Vervangen dak inclusief dakbedeksel tot op gerelinge, inclusief verwijderen afdak. Materialen zoveel mogelijk circulair. Daarnaast dakkapel terugplaatsen, inclusief ondersteuning bewoners bij tijdelijke opslag/verwijderen van spullen op zolder. Oploss.: dakcoaten / zonnepanelen Stoerwaarden: - Referentie: (Branjevoet)	EGW	MGW	+	+	+	+	+
Toevoegen PV-panelen aan plat dak PV-panelen op het plat dak aanbrengen, plat dak gereed maken voor de PV-panelen. Oploss.: nieuw dakbedekking Stoerwaarden: - Referentie: -	EGW	MGW	+	+	+	+	+
Ma-teleren van plat dak van buitenaf Dak verven/pleuren tot het bestaande dakbedeksel, buitenen aan de buitenzijde met nieuwe dakafwerking, inclusief afdekken spuiten bewoners tegen stof. Oploss.: nieuw dakbedekking / zonnepanelen Stoerwaarden: - Referentie: -	EGW	MGW	+	+	+	+	+

Figure 36.- example of the menu for the component Roof

- *Leaflet* (Figure 38)

The leaflet describes more into **detail** what is needed for a certain solution for example appearance, living & comfort, sustainability, use, nuisance and execution time and of course the impact on energy. But also more detailed information, like what kind of materials should be used (wood, aluminium or plastic), what insulation value (R_d w/m²K) is minimum, what details are crucial to the quality and need to be addressed by the contractor, what is asked in

the process before execution, during execution and after execution and what needs to be done by the contractor and what does the home owner do by themselves. There is no price given in the leaflet, so the contractor has to give one, doing all activities mentioned in the leaflet.

Instead of discussing with home owners that it is better for them to immediately renew the floor, facade and installation of the house because of the climate agreement, it works better to use other **reference points for renovation**. For example, using an attic enlargement to create more space for a child living at home by renewing the roof and (at the same time) making it more sustainable. It is more about using the **natural moments** in life to change the building.



Figure 37: Example of four roof concepts

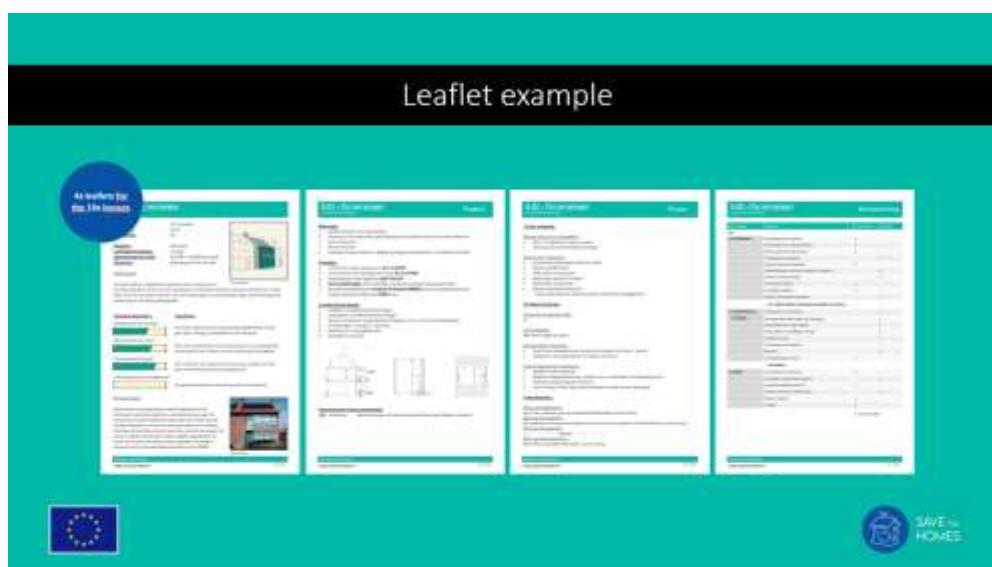


Figure 38: Example of leaflet of 1 solution

To give an impression of what these measures look like, and how they can combine with the A) Targeted buildings we will illustrate three examples. The quality that is mentioned in the menu,

concepts and leaflets can make the difference when reaching out to the persona's in part B). for Prinsenland:

- Façade replacement

Typology: 22 homes at Noorwitstraat 21 have a front.

Nature of the work: install a completely new facade, including well-insulating coating (min $U_g 1.0 \text{ W/Km}^2$). Hereby you replace the **entire facades**. This is only possible in homes that originally had a facade. With these elements, glass forms a large part of the facade, together with panel infills. To achieve sufficient insulation value here, HR++ glass or triple glazing and high-quality panel filling are required. In this case, the connection to fixed construction parts (for example, a masonry pier) requires attention. In particular, the position in the plane changes. Everything that sticks out more, this has to be designed.



- Flat roof renovation for homes after 1992

Typology: 146 homes at the Riet-Blom Mouritsstraat 3 e.o. have a flat roof.

Nature of the work: the roofs of the houses built after 1992 already have a basic insulation value of $2.5 \text{ m}^2\text{K/W}$. This is almost double what was prescribed in previous years. This means that there is less need for an increase in the insulation value here. On the other hand, a roof often easily offers the option of **adding extra insulation**. This depends on the construction of the current roof. You can choose to apply this as a warm roof above the current roofing, or if the roofing does need to be replaced, to add more material in addition to the current roofing. Many homes from this period also have a (masonry) roof edge that extends higher, which results in simpler detailing. The work can be combined with the installation of solar panels.



- Flat roof

Typology: 30 porch houses at Cornelis de Vriendtstraat 6 have a flat roof.

Nature of the work: renewal of the roof covering and the insulation layer, in combination with solar panels. There is supposed to be an insulation layer on the roof with new construction performance. If desired, this layer can serve to **accommodate ventilation pipes**. The work consists of removing the existing ballast layer, and preparing the sub-roof, applying insulation material and a slope layer, and a new EPDM roof covering, provided with ballast. Solar panels can be placed on this roof. As the height of the insulation increases, a new eaves detail must be applied.



E. Scenarios

Ambitions are good to have, but they must be feasible. As well in technique as in being able to pay for it. With the ETF (Energy Transition Fund) in Rotterdam the access to finance is easier. But still it is a large investment. That is why Component Renovation (D3.7 – chapter 3) could be one of the solutions of the energy transition. In bringing the level of the measure back from the whole building to just one or two components, a lot of barriers will fall away. A **limited scale** to operate, easier to pick a **moment**, more **similarity** between buildings, chances for **mass customisation** and so on.

At the same time, the component offers a greater degree of **repetition** than is possible on archetype. Thinking and organizing in components creates a platform on which a repetition in product, process and collaboration can be organized in the daily practice of renovation. Without putting pressure on the need for individual wishes and possibilities. This repetition then offers room for the necessary innovation for scaling up and increasing the impact through CO2 savings. Because the level of the component makes it possible to gradually apply better products through innovation as solutions for your home. After all, Component Renovation is based on step-by-step renovation. So at every step there is room for investment to opt for quality.

Besides that, every part of a building has its own **cycle**. A building part is put in place and will deteriorate. Some in 5 years, some in 15, others need 30 or even 60 years. But a building is made up out of a lot of products. And looking at one component (with some advice of a HUB) the right moment can be chosen for a renovation of a facade, roof or installation.

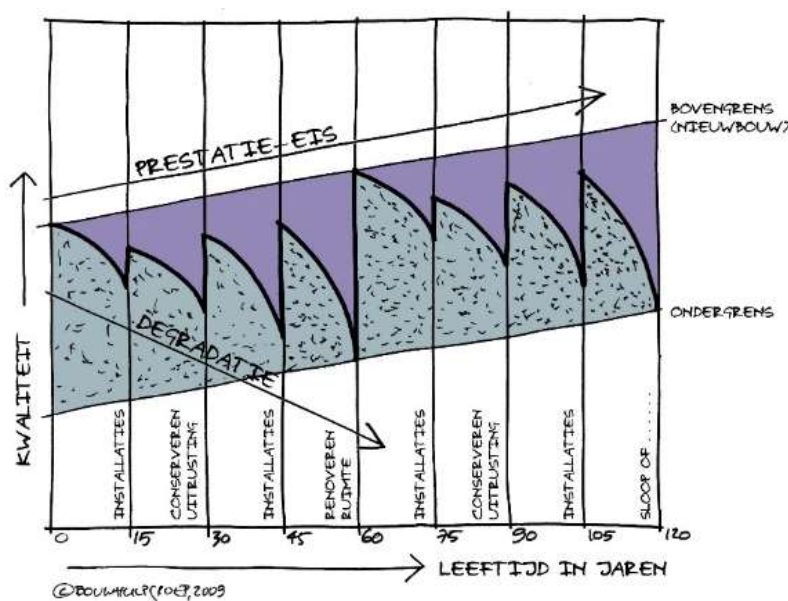


Figure 39: Rhythm of use and maintenance of a building throughout 120 years

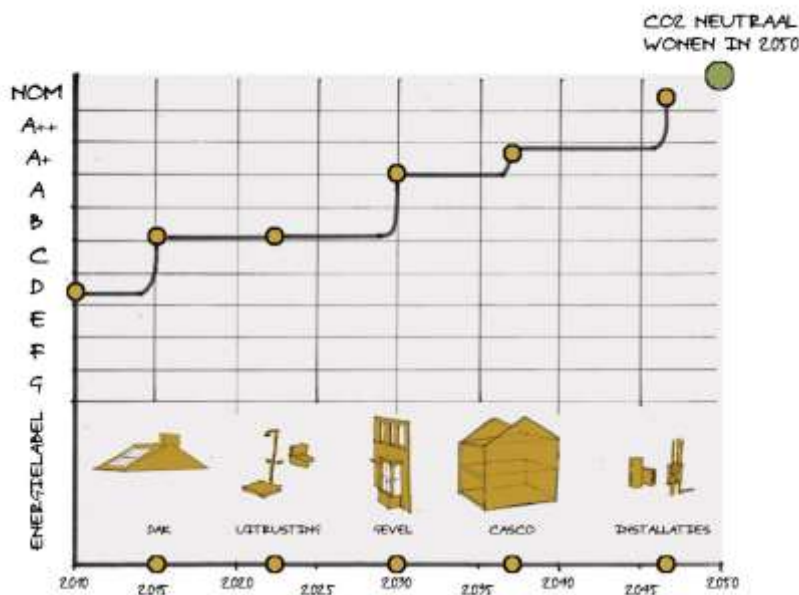


Figure 40: step-by-step renovation

Given the rhythm of a building, and the wishes people have at different moments, a **step-by step approach** could be well in place. But then a scenario (or route) is needed, that guides the citizen towards the end point. You need to know what to do know, but also what are the next steps. The HUB Alexander can discuss this with people, next to the advice they are getting know. This principle is already incorporated in the Ikwoon app, as you build your own renovation plan. But

4.2.3 The Citizen Hub offer

F. Network

As presented in the introduction, creating supply side networks is the last step of this Task and it builds on the rooting of the collaboration strategies (T6.4 marketing materials and T3.5 the staff Training Program) on the local context.

Demand				Supply								Intermediar																				
user	owner	Repr.		Facilities				Execution				Advice	Intermediar		Social		Institute															
user	owner-occupant	housing association	owner in condominium	investor	commercial rent	association of condominium owners	owners association	building manager	network operator	energy supplier	water supplier	data / internet provider	contractor	sub contractor	specialist	supplier	umbrella organisation	designer/architect	consultant	energy office	local initiatives (neighborhood)	subsidy provider	bank	health and welfare	housing immigrants Association	counseling welfare	green funds (loan)	municipality	education	certification	standard committee	social services

Figure 41: Overview of actors

According to the itineraries’ strategy adopted for this step, we need to get to the previously detected stakeholders and potential allies, that would be contacted in order to fine-tune campaigns and implement specific actions.

But there is not yet such an **organisation** or network in place. Figure 23 shows actors involved in the demand and supply side. Ideally, the HUB can combine these partners and stakeholder. For the Rotterdam case, this is a an ambition and has the attention. From the viewpoint of the HUB (to make a full cycle and use the feedback), from the social side of the municipality (trying to involve the supply

side into creating more jobs) and from the energy side of the government (creating a pool of skilled and trusted companies that can help the municipality to reach a sustainable Rotterdam).

G. Financial solutions

In Rotterdam at least the point of individual financing is solved (or made smaller). There already was a possibility for a loan, but that only was eligible for actual renovation measures, not for maintenance. And in most cases the renovation is a mix of maintenance and energy improvement. In 2021 the ETF (Energy Transition Funds) was introduced in Rotterdam. A **revolving fund** ranging from 2,500 to 65,000 euro (different products) that people can use when doing at least 1 energy measure and 1 home improvement. This makes sure that on the individual financing side the problem is diminished. Of course, people still have to be able to pay for the loan, but if a person wants to renovate and can pay for it, but does not have the money at this moment, a solutions is available.

Energy Funds (ETF) & Social Return of Investment

The ETF are energy transition loans for homeowners and landlords. The Energy Transition Loans are intended for energy-saving and home-improving measures. Inhabitants of Rotterdam with their own house (ground-bound, apartment or houseboat) can continue to live in their home more comfortably and with more pleasure. Owners who rent out their home(s) – a maximum of three – can also make use of the loan. All homes are located on Rotterdam territory. To be eligible for the loan, you must carry out at least one energy-saving measure and one home improvement measure, so in conclusion at least two measures. There is an exception for solar panels. The measures must be carried out by recognized contractors and/or installers. This means that they are affiliated with a trade association and/or have a quality mark. You request quotes from these recognized contractors and/or installers and send them along with your application. The municipality is not a bank. That is why the municipality is working together with the Stimulation Fund for Public Housing in Dutch Municipalities (SVn) for the Energy Transition Loans. If the municipality has approved your application, you go to SVn to take out the loan.

H. Solution packs

HUB Alexander is looking to **bring all prior activities** together:

- H. Targeted buildings
- I. Targeted personas
- J. Targeted providers
- K. Examples of measures
- L. scenarios
- M. Network
- N. Financial solutions

There is a huge **potential** to do so. Especially with the knowledge of the buildings in Prins Alexander. But an organisation is needed to get this up and running, HUB Alexander. At this moment, Alex Energie is starting with a pilot of 16 homes, but they want to grow and reach more people in the area. With the proof of results of 16 homes this can be done, and then be the HUB for whole Prins Alexander, just as the **goal** of Save the Home si.





5 The follower cities test

According to Objective 4 (To deliver real benefits to citizens and other stakeholders in two cities as a result of the Citizen Hubs operating locally), the objective is not only to provide the integrated renovation services to the specific homeowners groups identified in the two pilot cities (Rotterdam and Valencia) but also to demonstrate the potential of the Citizen Hub concept to all relevant stakeholders in other municipalities, to regain trust and interest in building renovations and to further expand the Citizen Hub business model.

So, in order to roll out the Citizen Hub concept on a wider scale (regional, national and European), the Citizen Hub models developed for Valencia (ES) and Eindhoven (NL) will be one-on-one assessed for the two follower cities, Sant Cugat (ES) and Ljubljana (SI), and the replication of highly transferable elements of the Citizen Hubs' models will be supported.

For this stage, follower cities will receive the draft methodology for designing the citizen hub solutions offer (whose definitive version can be found on Annex 1 – StH Document 5: Offer design) and assess its applicability in their context.

Sant Cugat – ES

(Fittingness in same country context)

The objective is to test the replication in the same country for Spanish pilot in Valencia and follower city Sant Cugat. The aim is to analyse all the benefits of having the structure and services developed in national language and based on national circumstances, legislation, culture and habits.

Sant Cugat Municipality is assessing the methodology and feedback will be reported during WP4 and WP5 activities for pilot experiences and replication and exploitation activities.

Ljubljana – SI

(Fittingness in different country context)

The objective is to test the replication between EU countries where the Citizen Hub mapping methodology and results for the Dutch city of Rotterdam will be replicated for the City of Ljubljana in Slovenia. The aim is to validate the effectiveness of the replication process between the different EU countries.

The city of Ljubljana is assessing the methodology and feedback will be reported during WP4 and WP5 activities for pilot experiences and replication and exploitation activities





6 Conclusions

Form D2.1 for demand and supply side mapping and segmentation, D2.2 demands side community building, D2.3 supply side networking, D2.4 supporting services, protocols and tools and D2.6 financial solutions analysis, this Deliverable 2.5 about the solutions design has been built quite straight forward:

- Targeted buildings already point at the type of solutions more impacting in terms of energy efficiency
- Targeted population points to the interests, so to refine the kind of solutions more accepted
- Targeted suppliers make those solutions available
- Existing mechanisms in terms of regulations, training, bureaucracy, financing, drive the fine-tune of the deployment strategy of the selected solutions
- Solutions can then be combined into packs
- And offered with or without contractor or facilitator assigned, depending on the customer needs and Hub network maturity.

Nevertheless, this work is still to be proofed on WP4 activities and validated on WP5 activities, to finally conform the Citizens Hub Solutions offer for the pilots and the Citizen Hub solutions offer design guide for potential replicators.





Annex 1 – StH Document 5: Offer design

This document will help your Municipality or Region define your local context solutions offer in order to continue designing your OSS service and implement your own Citizen Hub. It is structured as a series of tables to be filled, in a step-by-step process that will lead to the definition of your own solutions and scenarios. This document is completed with the corresponding spreadsheet file and both are available on the project web site.



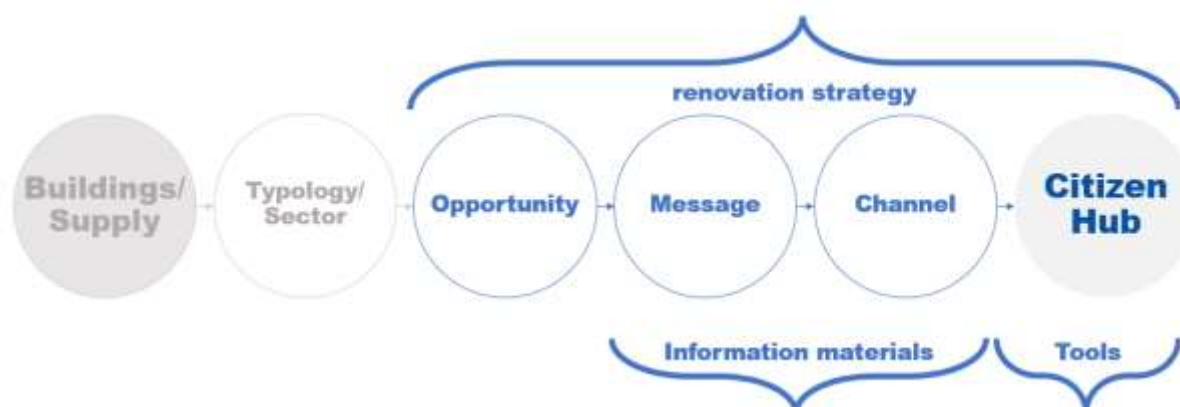


StH - Itinerary methodology – checklist

Introduction

This task will help you design your solutions offer by a three-step approach:

- 1) Verification of the mapping: The outcomes of T2.1, 2.2 and 2.3 are capital, so have them at hand
- 2) Renovation packages: most energy efficient measures will be chosen that answer the needs of the building segments in the pilot cities (outcomes of T2.1) as also identified buyer personas (answering the motivational drivers)
- 3) Creation of the Citizen Hub offer considering the supply networks and financial options



For each targeted sector we will focus on the characteristics (opportunities) and drivers (messages) to lead to an energy renovation solution (strategy), and how the citizen hub will use these solutions characteristics to promote them (channels, info, tools...)

1) Verification of the mapping outcomes

A. Targeted Buildings

The objective of targeting building typologies is to get the greatest impact with the promotion of energy renovation solutions

Remember how your targeted buildings are: _____

What are their opportunities for intervention and how can you translate those into an specific **action** (class) in to a building **component** (category). How would you describe the **solutions** (Measure)?

Building characteristic From D2.2 & 2.2	component (category)	Action (Class)	Solution (Measure)?

This is the base for the definition of tips, recommendations and **solutions**.

B. Targeted population

The objective of targeting personas is to get the greatest effectiveness in the adoption of the promoted solutions

Remember how your targeted population is: _____

What are their interests for intervention and how can you translate those into drivers and triggers you could pull according to their buildings’ needs (this is, the potential measures drafted in previous step)

Personas From D2.1 & 2.2	Interest	driver	Solution (Measure)? From A. Targeted buildings

This is the base for the definition of **strategies** to promote solution packs.

C. Targeted Providers

The objective of targeting supply side profiles is to ensure that proposed solutions are available on the local market.

Remember how your targeted suppliers are: _____

What are their capacities for offering products and services and how can you translate those into more or less complete packages (i.e., does it include the project, the permits, the maintenance...?) covering the whole requirements for implementing the measures drafted in previous steps

Sectors From D2.1 & 2.3	Capacities	Service offered	Solution (Measure)? From A. Targeted buildings

This is the base for the assessment of the **availability** of the selected solution packages



2) Renovation packages

Based on previous section, we will shape the kind of solutions to be promoted from the Citizen hub, in terms of a structured description allowing later on the set of a comparable Citizen Hub offer, including specific providers, commercial brands, financing options, etc...

D. Measures

In this section we will define the characterization of the types of measures to promote, in terms of qualitative attributes and quantitative variables.

From the analysis of targeted buildings, it is clear the interest of establishing the component on which the measure applies (category) and the action that the measure implies (class), both of **the qualitative attributes**.

Category (Component)		
Name From A) Targeted buildings	Description	Driver From B) Targeted population

Class (Action)		
Name From A) Targeted buildings	Description	Driver From B) Targeted population

In order to sort or compare, it is also important to **quantify some variables**, which will be better defined according to the targeted population drivers.

Variables		
Driver From B) Targeted population	Name	Description





As a summary, take the Solutions, name them, and characterize them according to the previously defined Classes and Categories (attributes), and their impact in the previously defined Variables:

Solution (Measure)	Attributes			Variables			
	Name	Class (Action)	Category (Component)	Var 1	Var 1	Var 3	...
Improvement: Low/ Medium/ High							

E. Scenarios

Now take into account that individual measures might not be enough to achieve some targets in terms of one or more variables (i.e., not saving enough to get a grant).

In this case, we might be in need to **combine** previous measures into different solution packs, defined as per the **promoted strategy** used to empower them:

Pack	Attributes		Variables			
	Measures	Strategy	Var 1	Var 1	Var 3	...
00		Do nothing (baseline, according to building type)			(Target!)	





3) The Citizen Hub offer

Now you should design the integrated solutions for home renovations in cooperation with the supply network and the negotiations reached there.

F. Network

As presented in other deliverables (D2.1 & D2.3), creating supply side networks is capital to root the collaboration strategies on the local context, and get to offer solutions available by trusted suppliers. Summarize below your best friend related to the solutions you are trying to promote. Be aware that access to some of these services might come with a target in some variables defined in E (e.g., minimum budget)

Actor From D2.1 & 2.3	Service offered From C) Targeted suppliers	Description	Variable (and target)?

G. Financial solutions

Finally, think of D2.6 and try to fit best financing options to your selected solutions. Take into account that some of these options can define targets needed in section E (e.g., minimum investment or savings achieved)

Financing option From D2.6	Service offered (loan/ grant)	Description	Variable (and target)?

H. Solution packs

Together with the work in demonstration buildings in WP4, solution packs will be defined as a combination of the whole itinerary:

- A. Targeted buildings
- B. Targeted personas
- C. Targeted providers
- D. Examples of measures
- E. scenarios
- F. Network
- G. Financial solutions

