



# 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.

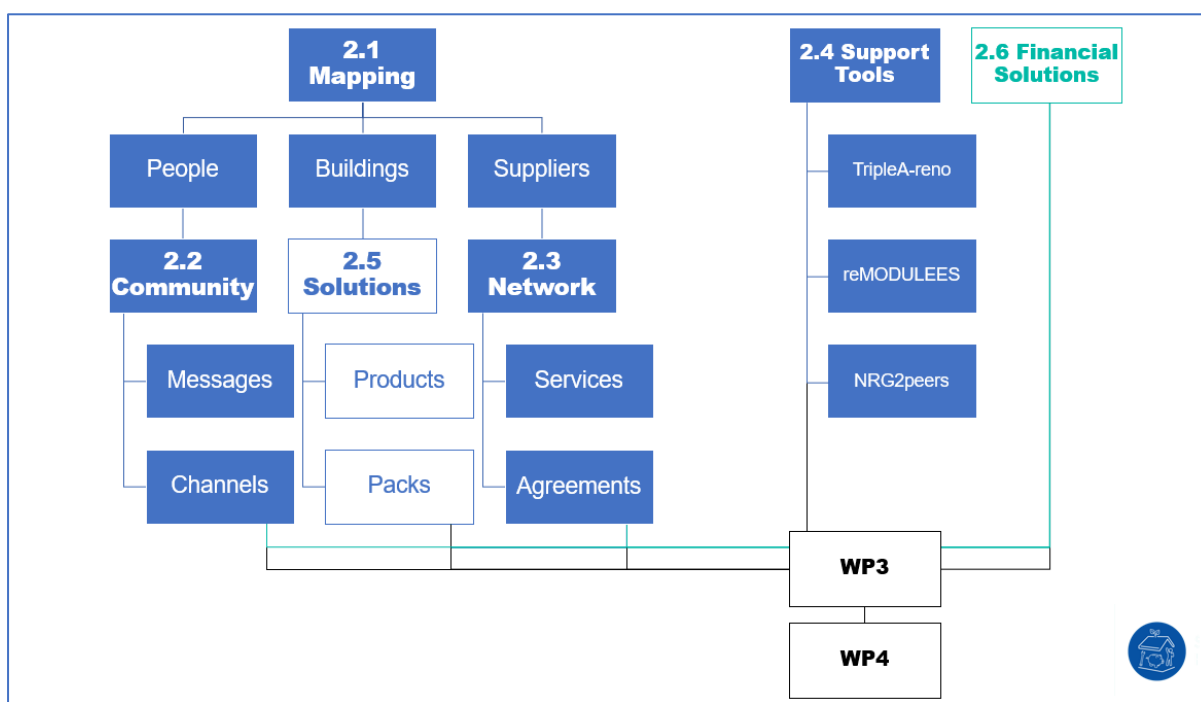


Figure 1.- WP2 activities workflow



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. The supply side means everyone who can be a single-point of contact in a one-stop-shop solution like manufacturers, service providers, contractors, architects, engineers, energy consultants, government etc.



## 2 Introduction

This deliverable deals with the establishment and deepening of the collaboration within the identified stakeholders related to the supply side so to increase trust and ensure sufficient quality on the services delivered.

The supply mapping in T2.1 is used as a starting point for T2.3, where Municipalities (in the two pilot and follower cities) and relevant local supply side players (e.g. professional associations, construction companies) will be involved in the design of the integrated home renovation services within their local specifics, for the identified target groups and target neighbourhoods (T2.2).

Protocols will be defined for establishing a dialogue on how to involve the supply side in the Citizen Hub service and to be followed in each pilot. Once the dialogue has been initiated, a participatory approach will be used to be able to agree on the way the different services and products are offered to homeowners. The negotiation will be preferably done through the associations of professionals or companies in each field.

Therefore, this report presents a first section with the pilot cities ecosystem of suppliers and the definition of a set of profiles with their capacities and services' sector or sub-sector. Then, the drivers, messages and channels (clustering associations) to be fit with them, and finally, the network of stakeholders is created under different collaboration strategies, and in line with the project training and validation programs and operational tools, so the OSS delivers trustable and qualified services.

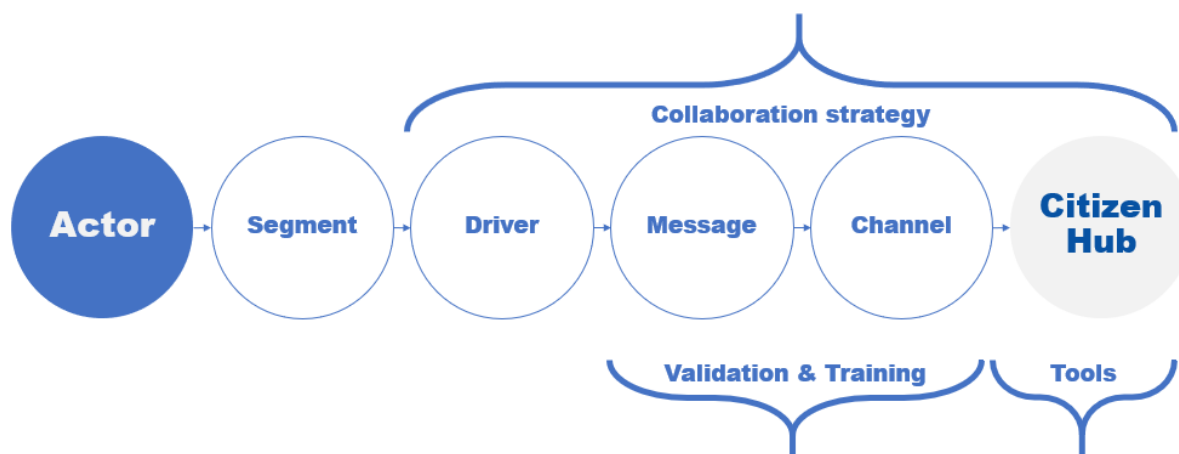


Figure 2.- Task 2.3 strategy: itineraries for building the supply network

The protocol for building the local supply side network can be found on the Annex 1, to be used by the follower cities, or any other interested city or region.

### 3 A background recap

According to the European Construction Sector Observatory, **energy efficiency is one of the main challenges facing construction sector** currently. Efficiency improvements in existing buildings and renovations are set to have the highest potential to stimulate demand if the many **current barriers** not only on the demand side but also **on the supply side** are addressed.

The construction supply side involves several actors, such as contractors, installers, architects, suppliers and producers of material, equipment and energy. The following graph shows conventional **actors involved in the traditional construction sector** beyond those on the demand side (building owners and occupants):

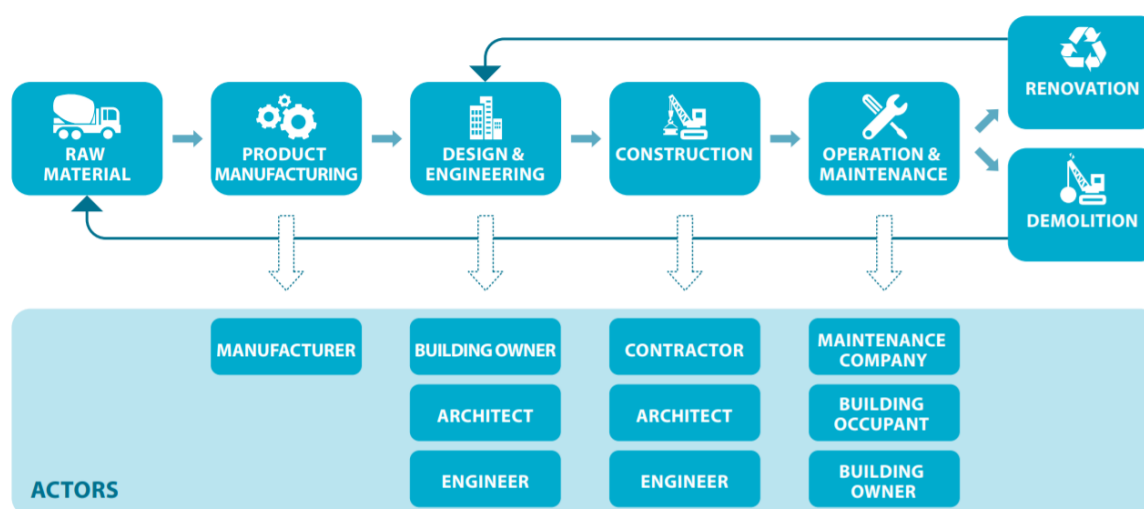


Figure 3.- High-level overview of the traditional construction sector (Source: BPIE)

The selection of actors depends on several parameters. For example, when retrofitting existing buildings, the supply side often involves technology suppliers and installers/contractors, with the latter often acting as gatekeepers between suppliers and demand.

It should also be noted that there are **other non-construction actors in the supply-side** (energy and ICT suppliers, financial sector, insurance companies, real estate agents, etc.) which may be directly or indirectly involved in the construction value chain. In certain types of work, **supply-side actors may work in an uncoordinated manner and with conflicting interests**<sup>1</sup>.

In terms of **barriers to home energy renovation** that directly affect supply-side actors, **supply-side fragmentation** has already been identified as one of the key ones in deliverable D2.2.- *Save the Homes guideline for long-term citizen engagement*. According to the findings of the SINFONIA<sup>2</sup> and STUNNING<sup>3</sup> research and innovation projects on business models for deep renovation of buildings, the barrier lies not only on fragmentation, but also on the **poor coordination within the supply-side** actors. The need to better coordinate the multitude of players on the supply side has also been identified during the testing of the OSS business models developed in the framework of INNOVATE<sup>4</sup>

<sup>1</sup> Driving transformational change in the construction value chain. Reaching the untapped potential. BPIE. 2016.

<sup>2</sup> SINFONIA – Low carbon cities for better living - <http://www.sinfonia-smartcities.eu/>

<sup>3</sup> SusTainable bUsiNess models for the deep renovation of buildiNGs - <https://www.stunning-project.eu/>

<sup>4</sup> INNOVATE – Setting up innovative energy efficiency service packages for home renovations - <http://www.financingbuildingrenovation.eu/>

project, as the market is too dispersed and there is **little or no connection between supply and demand**.

Another key point on the supply side in the European renovation sector is that it is **heavily dominated by SMEs**, which correspond to findings reported in *D2.1: StH demand & supply side mapping: Methodology & results from the 2 pilots*. Up to 95% of construction, architecture, and civil engineering firms in EU are micro-enterprises or SMEs<sup>5</sup>, with construction companies divided, in particular, as follows:

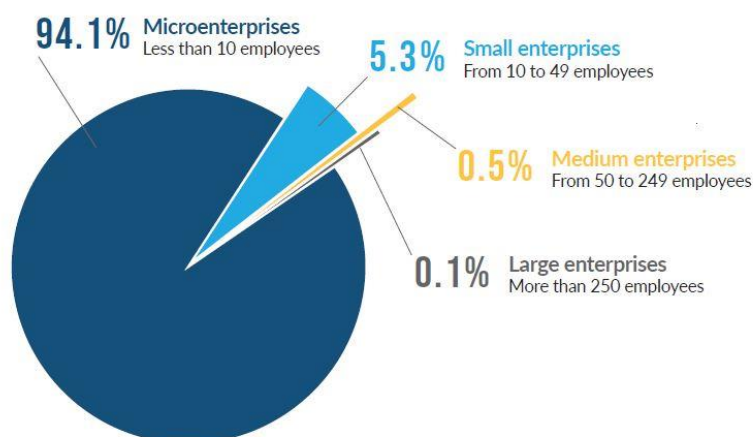


Figure 4.- European construction enterprises (Source: European Builders Confederation)

The construction sector is characterized by a **high number of micro-enterprises, mostly operating at the local level**. As shown, enterprises with less than nine employees represent over 94%, while large enterprises represent less than 1%. By way of fact, there are an estimated 3.4 million enterprises in the sector in Europe, with some 18 million workers<sup>6</sup>.

With regard to construction companies specifically involved in building renovation, an in-depth analysis carried out for both the Irish and Spanish markets in the framework of the TURNKEY RETROFIT project<sup>7</sup> highlighted the following supply-side issues:

- Before the 2007 construction sector economic crisis, **specialized companies in renovation works represented a small part of the market** (due to complex management processes with the communities of owners, the need of highly specialized personnel and much lower profit margins than those achieved with new construction).
- Due to the reduction and standstill of market from the economic crisis, **some construction companies expanded their services and created specialized departments for renovation**.
- Currently, the market has consolidated and grown in this way, although **not all construction companies are able to cope with this change**.

This sector is often dominated by a craftsman-based approach offering individual solutions, with micro-enterprises and SMEs promoting their own products or services with **little interest and capacity to undertake deep renovation**. They often lack not only time and resources, but also trained staff or training opportunities. This is a major problem common to SMEs in all sectors:

<sup>5</sup> [https://ec.europa.eu/growth/sectors/construction\\_en](https://ec.europa.eu/growth/sectors/construction_en)

<sup>6</sup> [https://www.ebc-construction.eu/wp-content/uploads/manifesto\\_EN\\_web.pdf](https://www.ebc-construction.eu/wp-content/uploads/manifesto_EN_web.pdf)

<sup>7</sup> TURNKEY RETROFIT - <https://www.turnkey-retrofit.eu/>

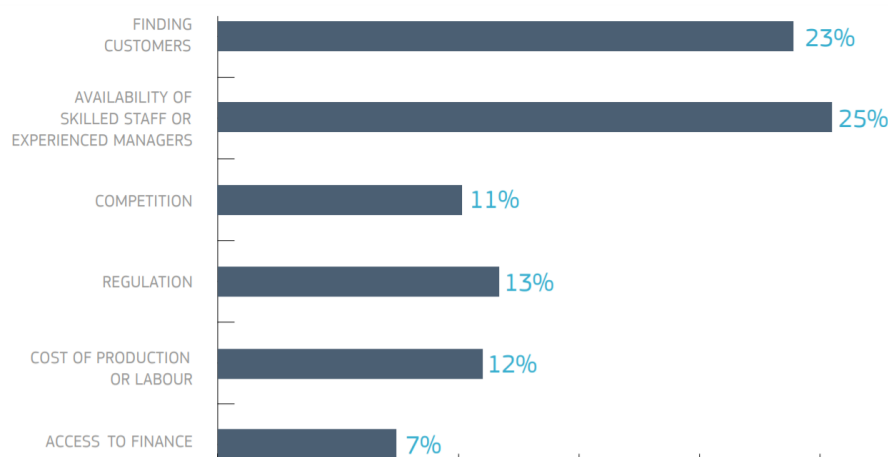


Figure 5.- EU-28 SMEs' most pressing problems in 2018 (Source: Annual Report on European SMEs 2018/2019)

The European Construction Sector Observatory identified **skills shortage as a supply side obstacle** in one of their last analytical reports<sup>8</sup> too. The lack of project management skills to coordinate complex renovation projects leads in some cases to delays or unnecessarily long construction times<sup>9</sup> and higher costs. This lack of know-how is also pointed out in a market analysis produced in the framework of the EuroPACE project<sup>10</sup>, with companies having a very low level of expertise, sometimes leading to design errors in the implementation of solutions, and without no guarantee of the quality of the works performed. This point is also related, in turn, to the small size of the predominant companies in the renovation market value chain, which are difficult to identify and reach for training purposes. All in all, **lack of skills and training** are identified as barriers to deep renovation on the supply side. Improving specialized training and making the sector more attractive, particularly for blue-collar workers, technical colleges and universities is identified as a solution.

In several of the business models proposed in the final publication of the previous mentioned STUNNING project, one of the needs identified was, in fact, the **generation of a network of skilled professionals and trained contractors**. One of the recommendations when setting up a new renovation service is to dedicate resources to the training and upskilling of contractors and installers (including digitalisation with a systemic approach to ensure overall performance: energy, comfort, etc.). In this sense, it is expected that the arrival of funds from the European Recovery and Resilience Plan will boost the **professionalisation of the building sector** with skilled and qualified labour, moving also towards new forms of employment.

It is a fact that, in addition to suffering from this lack of skilled labour, construction workers need to demonstrate **new skills related to digitalisation, the circular economy and energy efficiency**. Micro-enterprises and SMEs often lack experts able to deal with digital tools and thus face the digitalisation challenge on a bigger scale. Digital technologies, for example, will require the workforce to develop suitable skills. Although several strategies and programs have been developed to integrate the use and training of/in digital tools, and in particular BIM, **the ageing of the construction sector's**

<sup>8</sup> Improving energy and resource efficiency. Analytical Report. November 2018.

<sup>9</sup> In terms of time, and aside from the consequences of this skills shortage, the general shortage of skilled labour is reflected in cases such as Germany, where homeowners can wait up to 15 weeks for a contractor to be available to carry out renovation work (August 2021: <https://www.n-tv.de/wirtschaft/Kunden-warten-immer-laenger-auf-Handwerker-article22719681.html>).

<sup>10</sup> Developing, piloting and standardising on-tax financing for residential energy efficiency retrofits in European cities and regions – *Deliverable 2.2: EuroPACE Market Analysis*





**workforce may be a barrier for the integration of new skills in the industry.** The decrease in the number of young skilled workers in the sector also constitutes a threat for this sector<sup>11</sup>.

Innovation in this industry may also be considered as a challenge. Compared to others, the construction sector was, until relatively recently, characterized by a **low level of innovation** in the downstream, which can also be explained by the large number of micro-enterprises and SMEs making up the sector, mainly providing services in the on-site execution market segment<sup>8</sup>.

**Innovation can foster structural change** in the construction sector and a clear added value on a European scale. For example, ICT and technological instruments (to analyse existing buildings, support building services, support on-site execution or level up the building actors' competences) are expected to bring innovation opportunities for the construction value chain, which will not only lead to the emergence of **new market players** in the construction value chain, but will also occur within companies and at specific phases of the building life cycle:



Figure 6.- Potential new actors and innovation in the construction value chain (Source: BPIE)

As analysed in the aforementioned BPIE report on transformational change in the construction value chain, from which the above chart is drawn, also **other specific industrial innovation opportunities** (such as prefabricated systems for deep energy retrofitting of residential buildings, advanced insulation materials for building envelopes, or building automation and control technologies) will reduce the cost of deep energy retrofitting<sup>12</sup> and thus **impact existing and new supply-side actors** entering the construction value chain.

Other ideas outlined in several of the documentation already cited are the **development of partnerships between manufacturers**, as well as the development of cooperation clusters (including solution providers, contractors and SMEs, among others), as possible solutions to some of the above barriers, such as the poor coordination within the supply-side.

A more specific analysis of the supply side in the case of Spain and the Netherlands is presented below, partially based on comparative reports<sup>13</sup> developed in the framework of another European project on

<sup>11</sup> Improving the human capital basis. Analytical Report. European Construction Sector Observatory. March 2020.

<sup>12</sup> Although the rising cost of materials for renovation is becoming a supply-side issue that should also be noted as a barrier to increasing renovation rates (July 2021: <https://www.ebc-construction.eu/2021/07/12/ebc-press-release-rising-prices-of-construction-materials-are-disrupting-the-recovery-of-construction-smes-and-of-the-eu/>).

<sup>13</sup> *Building Market Briefs* - <https://cuesanalytics.eu/downloads/>



their respective construction sectors. They include data obtained through literature, statistical sources, standards, and norms, extensive surveys and in-depth market experts' interviews.

### Supply side in Spain

According to ILO<sup>14</sup> data, self-employees accounted for 16.45% of the Spanish labour market in 2018 (3.28 million self-employed workers affiliated to the Social Security system), about one point above the OECD average. In the specific case of self-employees in the construction sector, the average number of workers affiliated to Social Security during 2019 was 382,291 workers, representing 30.5% of the total number of workers in the sector affiliated to Social Security:

	2019	2018	variation
<b>Workers affiliated to Social Security</b>	<b>1,254,365</b>	<b>1,119,573</b>	<b>5.1%</b>
<b>General Regime</b>	<b>872,074</b>	<b>818,490</b>	<b>6.5%</b>
41. Construction of buildings	343,560	318,352	7.9%
42. Civil engineering	46,338	44,322	4.5%
43. Specialized construction activities	482,176	455,815	5.8%
<b>Self-employed</b>	<b>382,291</b>	<b>375,083</b>	<b>1.9%</b>
41. Construction of buildings	118,696	114,298	3.8%
42. Civil engineering	7,776	7,992	-2.7%
43. Specialized construction activities	255,819	252,794	1.2%

Table 1.- Evolution of workers affiliated to the Social Security System in 2018-2019 (Source: Ministry of Inclusion, Social Security and Migration. Annual averages)

With regard to SMEs, according to the "Portrait of SMEs 2019"<sup>15</sup>, a report published by the Ministry of Industry, Trade and Tourism, **99.9% of Spanish companies** (3,358,603 companies out of the 3,363,197 companies registered in Spain on 1 January 2019) were **SMEs**. 95.6% of them were micro-enterprises (0 to 9 employees), above the European average.

Analysing this data for **companies in the construction sector** (12.6% of the total number of companies on 1 January 2019), **95.9% of them were micro-companies** (from 0 to 9 employees), with 61.3% of them being in the micro-companies without employees' segment, above the rest of the sectors in Spain:

Companies by size	Industry	Construction	Services		Total
			Trade	Other	
<b>SMEs</b>	99.5%	99.9%	99.9%	99.9%	99.9%
<b>SME without employees</b>	36.4%	<b>61.3%</b>	49.5%	59.2%	56.0%
<b>SME with employees</b>	63.1%	<b>38.7%</b>	50.4%	40.7%	43.9%
<b>Micro-enterprises (1-9)</b>	48.2%	<b>34.6%</b>	47.1%	37.0%	39.6%
<b>Small enterprises (10-49)</b>	12.6%	<b>3.7%</b>	2.9%	3.1%	3.7%
<b>Medium-sized enterprises (50-249)</b>	2.3%	<b>0.3%</b>	0.4%	0.6%	0.6%
<b>Large enterprises</b>	0.5%	<b>&lt;0.1%</b>	0.1%	0.1%	0.1%
<b>TOTAL ENTERPRISES</b>	100.0%	100.0%	100.0%	100.0%	100.0%

Table 2.- Distribution of company size by sector (Source: Ministry of Inclusion, Social Security and Migration. Annual averages)

<sup>14</sup> International Labour Organization

<sup>15</sup> Retrato de la PYME – DIRCE a 1 de enero de 2019 - <http://www.ipyme.org/Publicaciones/Retrato-PYME-DIRCE-1-enero-2019.pdf>



One of the main barriers on the supply side in the construction sector in Spain is its high fragmentation. Approximately 80% of the turnover is generated by companies with less than 10 employees<sup>16</sup>.

Habitissimo's latest "Annual report on the renovation sector in Spain"<sup>17</sup> indicates that, in the residential sector, there is a new, more educated and informed customer profile that values the role and training of qualified technicians when it comes to acting on their home. This new customer profile is also more digitalised, which also contrasts with the very low adoption rates of ICT by SMEs in the construction sector. In Spain, it is the customer itself, in fact, who is being an essential lever to drive the digital transformation of this sector (digitalisation from the demand side). This report also reflects the high degree of atomisation of the sector in Spain, with 86.14% of the companies registered with the Social Security having less than 10 workers:

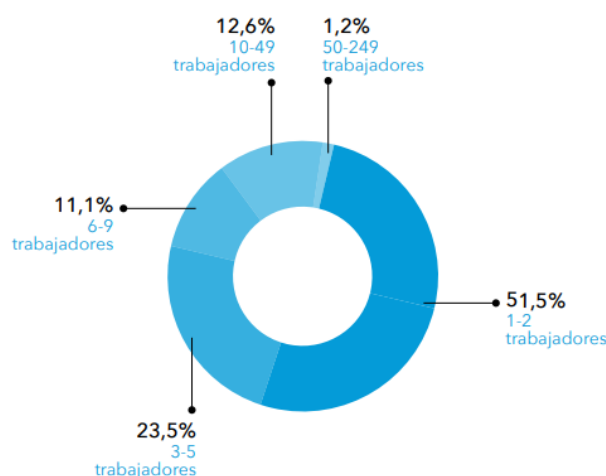


Figure 7.- Construction sector Spain. Company size (2020) (Source: Ministry of labour and Social Economy. Graphic designed by Habitissimo)

In general, the renovation sector had a bad reputation, which led to a lack of trust between the aforementioned construction professionals and homeowners. In fact, word of mouth still plays a significant role in the decision of individuals to hire a professional.

It is also worth highlighting the role of digitalisation in the sector in recent years. Although the smaller the size of companies, the lower their digitisation, the emerging of digital platforms in recent years seem to have generated a recovery of confidence on the part of homeowners.

### Supply side in The Netherlands

The majority of companies and also of the professionals of the main sectors of the building value chain in The Netherlands are small and medium sized companies up to 50 employees.

<sup>16</sup> Building Market Brief – Spain (2020)

<sup>17</sup> Informe anual sobre el sector de la reforma en España - 2020 - [https://procenter.habitissimo.es/wp-content/uploads/2021/03/informe\\_anual\\_ES\\_2020\\_.pdf](https://procenter.habitissimo.es/wp-content/uploads/2021/03/informe_anual_ES_2020_.pdf)



	Total	0 to 9	10 to 19	20 to 49	50 to 249	250 or +
<b>Number of enterprises</b>						
<b>Construction of buildings</b>	<b>66,526</b>	<b>65,115</b>	<b>744</b>	<b>432</b>	<b>214</b>	<b>21</b>
Development of building projects	4,482	4,417	40	18	7	-
Construction of residential and non-residential buildings	62,044	60,698	704	414	207	21
<b>Specialised construction activities</b>	<b>86,323</b>	<b>83,277</b>	<b>1,708</b>	<b>925</b>	<b>365</b>	<b>48</b>
Demolition and site preparation	5,683	5,370	161	109	42	1
Electrical, plumbing and other construction installation activities	19,712	18,115	846	483	225	43
Building completion and finishing	45,077	44,455	406	170	46	-
Other specialised construction activities	15,851	15,337	295	163	52	4
<b>Number of employees</b>						
<b>Construction of buildings</b>	<b>78,007</b>	<b>20,267</b>	<b>10,463</b>	<b>14,205</b>	<b>20,398</b>	<b>12,675</b>
Development of building projects	5,235	2,949	-	738	900	-
Construction of residential and non-residential buildings	72,771	17,318	-	13,467	19,497	-
<b>Specialised construction activities</b>	<b>168,864</b>	<b>38,459</b>	<b>23,989</b>	<b>29,126</b>	<b>35,732</b>	<b>41,559</b>
Demolition and site preparation	12,598	2,763	-	3,352	3,845	-
Electrical, plumbing and other construction installation activities	105,209	15,775	12,016	15,631	22,716	39,070
Building completion and finishing	27,825	13,154	-	5,131	3,965	-
Other specialised construction activities	23,232	6,766	-	5,012	5,205	-

Figure 8.- Number of enterprises and employees for planning and construction activities in the Netherlands (Source: Building Market Brief – The Netherlands (2018))

According to the report from which the above table is taken, the following interesting conclusions from supply side actors can be drawn from the Dutch construction sector:

- There is no regulation in terms of education and certifications in the construction sector market in the Netherlands: unlike other markets, craftsmen in The Netherlands do not need a mandatory professional education or certification. As a possible cause, due to a past policy to remove restrictions on professions, anyone can do any task with some exceptions (architects may be the exception in the construction sector; they need to have completed the architectural program and have undergone through two years of practice). This policy led to a larger role of umbrella organisations (Bouwend Nederland, Techniek Nederland, ...) to ensure training and quality assurance to the affiliated companies (nevertheless, it seems that they encounter difficulties to have their members following the energy efficiency training path).
- The power role of the architect is lower than in other markets. For partial retrofit<sup>18</sup>, they are most not involved in projects unless a critical in-depth problem appears. However, it is considered that they should take the lead in deep retrofit.
- The contractor has the most powerful role in most projects and have a central role in communication.

Regarding retrofitting, there is a systemic perspective of building technologies (stakeholders do not focus on a single technology but on the conception of them as a system). Building envelope elements are considered to present the biggest opportunities for improving energy performance by the supply side, particularly by architects, engineers, and planners.

<sup>18</sup> In the Netherlands, it is considered a *comprehensive retrofit* when either more than 25% of the surface skin is renovated/changed/enlarged or the *dormer* is completely new or renovated. In both of these instances, new buildings standards should be applied.





## 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 buildings<sup>19</sup>, 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.

¿A qué distancia de su domicilio profesional estaría dispuesto/a a desplazarse para ofrecer sus servicios? Puede marcar varias opciones:

140 respuestas



Figure 9.- Maximum distance to offer services

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.

<sup>19</sup> Covenant of Mayors figures: <https://www.covenantofmayors.eu/about/covenant-initiative/covenant-in-figures.html>





### 4.1.1 Activities, size & roles of the supply side

The outcomes of T2.1 is the basis where further studies are done to understand how supply side actors decide, plan and perform, and more in particular how this could affect their capacity to either provide NZEB-solutions or not.

In this section, we dig into the construction sector structure and composition to distil their capacities and define their scope of action and application. This is done through aggregation and generalization mechanisms by defining a set of profiles to get a first idea on our target supply objectives, drivers and opportunities to participate on the energy renovation business process.

#### A. Targeted Providers

The objective of defining supply side profiles is to design optimal and reliable offers improving trust and awareness of homeowners, reducing renovation decision making processes' costs and time, and mainstreaming innovative technical solutions adapted to the local context.

From D2.1 mapping 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):

Object (service provided)	Subject (providing a service)	Role (in the renovation process)
Walls (windows, shadows & insulation)	The informal	The facilitator
Roofs (insulation)	The professional	The reseller
Heating	The SME	The installer
Renewable energy sources	The big company	The all-in

Table 3.- Providers' segmentation matrix

Therefore, on 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. On the realization side, **grouping similar business models** (the 'bungler', the 'handyman; the young prepared 1P/SME, the experienced 1P/SME; the super specialized company, or the big all-in company) also facilitates the renovation process by clustering common capacities, and therefore, offering sets of offering mechanisms adapted to them, allowing e.g. for certifying training programs or triage/offering tools easing the clients decision-making process (increasing trust and mainstreaming innovative technical solutions). Finally, on the procedural side, **grouping the activities** performed or parts of the process covered helps building the whole customer journey, offering the appropriate service for each stage, according to the renovation works planned (reducing renovation processes' costs and time).



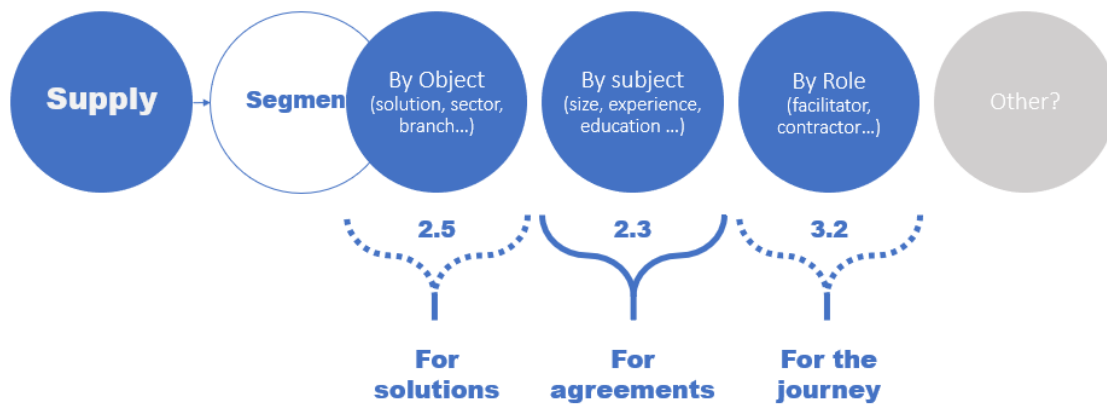


Figure 10.- Supply side segmentation purposes

This segmentation was enriched by the result of the StH dedicated questionnaires to professionals and contractors, distributed by IVE, whose results are presented related to next sub-sections.

A. For the solutions:

¿De qué tipo suelen ser las viviendas sobre las que trabaja?  
139 respuestas

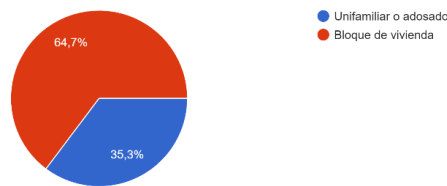


Figure 11.- Main **typology** of the buildings you work with (single family or multifamily buildings)

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.

¿En qué elementos de las viviendas suele detectar las mayores carencias/limitaciones?

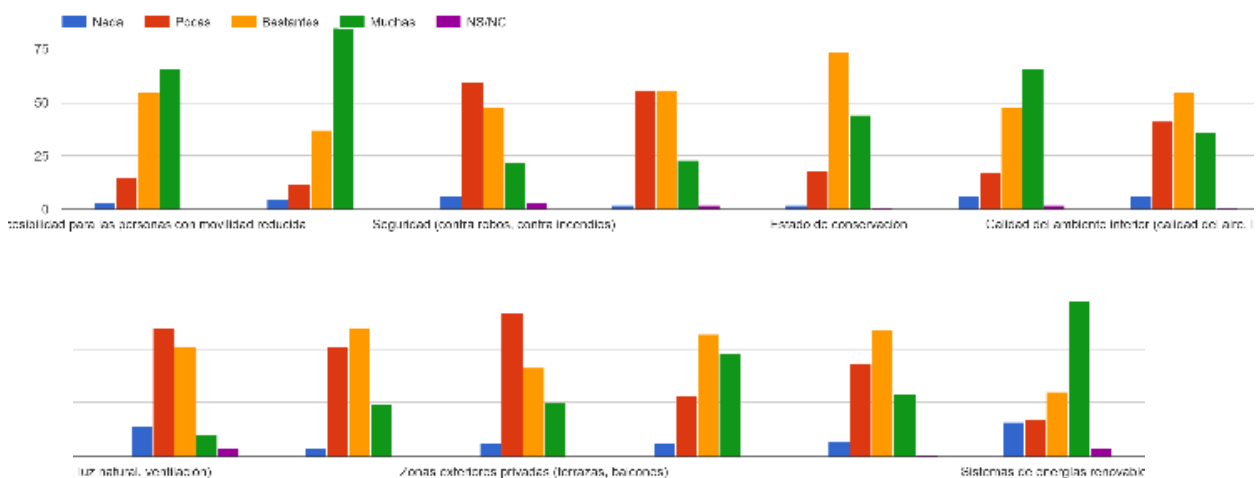


Figure 12.- **Recurrent topics** on renovation works (accessibility, insulation, security, aesthetics, conservation, thermal comfort, IEQ, location, display, common spaces, RES) – from 'not mentioned' to much 'mentioned'



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.

¿Sobre cuál de las siguientes partes de las viviendas suele ser necesario/prioritario intervenir?

Puede seleccionar varias opciones:

139 respuestas

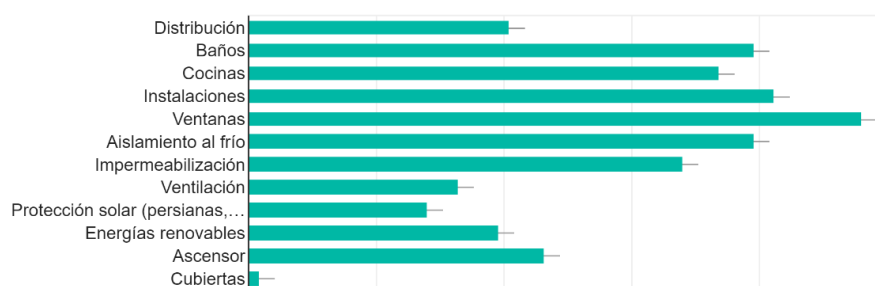


Figure 13.- Elements in worst shape (display, bathroom, kitchen, installations, windows, insulation, ventilation, solar protection, RES, elevator, roof)

**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**, further explored in T2.5.

#### B. For the capacities:

In the context of this deliverable, the relation between the OSS and the targeted suppliers is the focus, so the network creation through the establishment of attractive on-boarding/adhesion and offering/quotation mechanisms best fit with the supply side profiles as subjects. Solutions are studied and designed in T2.5, and stages and activities of the customer journey are analysed and designed in T3.2.

Mirroring the personas exercise carried out in D2.2 with demand side, we will build a set of fictional characters to represent the different supplier types that might use a certain strategy to offer their services. This approach should highlight their disposition to engage with the OSS collaboration strategies and use its mechanisms as a channel to get to potential clients.



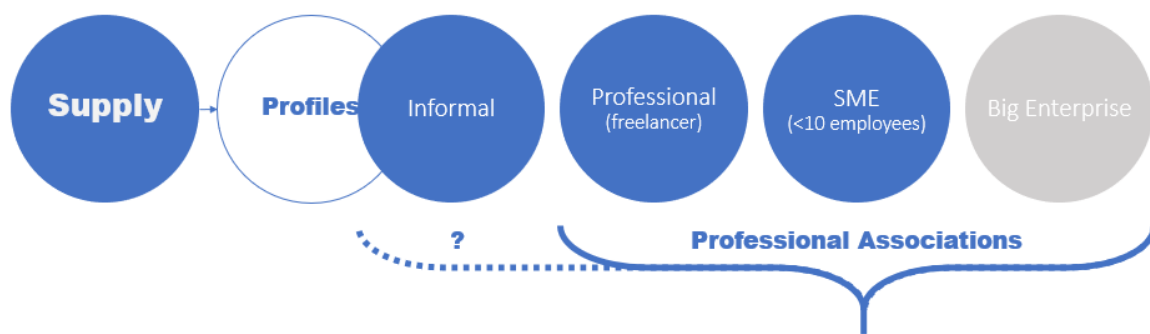


Figure 14.- Supply side profiles for Valencia pilot

According to D2.1, Spanish construction sector is characterized as a masculine, **freelancer** sector, where 80% of the residential renovation work (in terms of turnover) is carried out by **SMEs** with less than 20 employees. Also according to the EU definition of SME<sup>20</sup> almost 100% of Spanish business tissue is formed by SME, and therefore, the inclusion of bigger companies is not included in this work. On the other hand, construction sector is the main component of the **informal** or underground economy in Spain. According to a report by Visa Europe in 2013, it rated around the 30% of the activity. It is finally worth mentioning that most professionals and enterprises are associated to umbrella **associations** according to their sectorial activities, therefore, a valid and valued interlocutor can be found there (keeping in mind that those informal providers are not found within them).

This segmentation was enriched by the result of the StH dedicated questionnaires to professionals, distributed by IVE, whose results regarding market penetration are shown below:

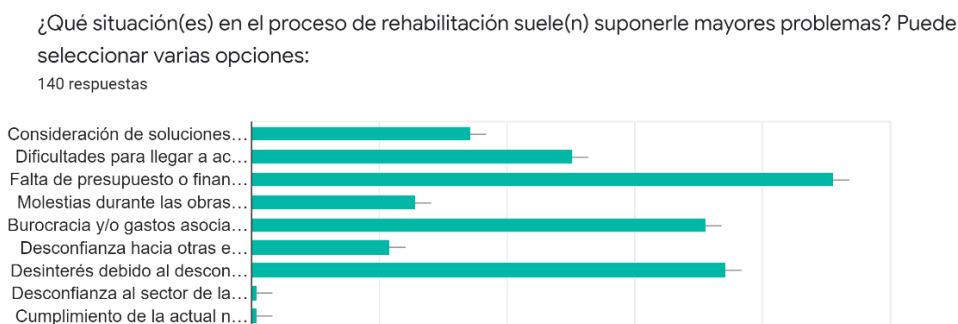


Figure 15.- Difficulties during renovation works (introducing innovation, collective agreements, lack of finance, works disturbances, bureaucracy, mistrust, unawareness, regulation)

Biggest problems with clients come from financial situations, **bureaucratic** situations, and lack of **knowledge about the benefits** of the solutions intending to implement.

<sup>20</sup> Annex I of Commission Regulation (EU) No. 651/2014



¿Cuál suele ser la razón por la que sus clientes acuden a usted? Puede seleccionar varias opciones:  
140 respuestas



Figure 16.- Why would your clients count on a professional? (is mandatory, recommended by friend, responsibility delegation, ensure better result)

Clients mostly go for a professional because of bureaucracy or by recommendation of a satisfied client. The other reasons point to the same considerations: delegation and hoping for a better result. Therefore, professional services need to focus on their capacity to ease the complexity of the renovation works and generate trust in their work and in the solutions they provide, thus, evidence reliability.

¿Cuál considera la mejor opción a la hora de publicar sus servicios? Puede seleccionar varias opciones:  
140 respuestas

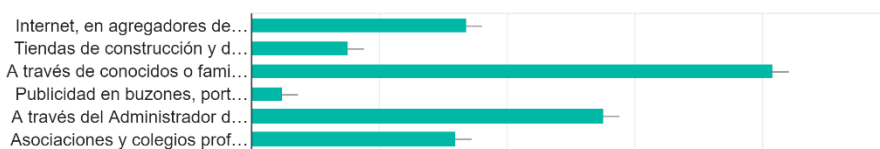
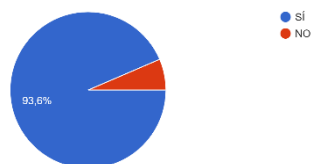


Figure 17.- How to get in touch with new clients (internet aggregators, DIY stores, friends & family, mailing, property administrators, colleges and associations registries)

Trust they try to deliver by building a personal bound with clients (or building administrators) to access their family and friends' networks and get recommended (or called again for another building). They usually associate with professional registries (being from official associations, public bodies or private initiatives), but show a great distrust on their effectiveness and transparency.

Durante la prestación del servicio, ¿informa a sus clientes periódicamente y/o al alcanzar ciertos hitos sobre la marcha de los trabajos?  
140 respuestas



Una vez finalizado el servicio prestado ¿ofrece algún mecanismo para recibir mensajes o evaluaciones de la experiencia? (agradecimientos y/o quejas)  
140 respuestas

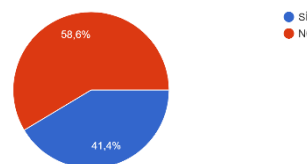


Figure 18.- Follow-up during works and once finished (do you inform about intermediate milestones? Do you offer feedback mechanisms?)

Interesting how almost all respondents show an interest in delivering information about the renovation process, mostly by phone call or messages (including photos), but then they lose interest when works are finished. Looks like trust building through clients' networks is short-termed approached and effort maintained just while work is ongoing.



¿Qué requisitos cree que debería cumplir la empresa o profesional inscrito en el registro?

115 respuestas



Figure 19.- **Requisites** for accessing an official Registry (legal, tax, no default, activity registry, insurance, knowledge and resources, arbitration system, experience, labour risks, accreditation, collegiation, university degree)

According to respondents, requisites for accessing a Registry are limited to the legal ones for exercise of their professions (mainly adequate training and certification), and show low interest in proofing expertise, but when asked about extra requisites, the respondents show interest in evaluating quality of the delivered works, and terms and prices accomplishment. This points out to the need to complement directories and familiar networks with mechanisms such as publishing **best practices** (work results or satisfaction surveys) or **specialized training**, which could build bigger networks and improve registries transparency and efficiency.

Profile	Characterization	Motivation	Opportunities	Probability of success	Objective	Drivers (Messages)
The informal 'bungler'	Size =1person AND p-age >40 AND legal entity =NULL AND recognition =low		Almost none	Low	activation	
The informal 'handyman'	Size =1person AND p-age >40 AND legal entity =NULL AND recognition =high	Secure work	Detected by SS or mouth to ear; when asking for a subsidy; when buying materials at DIY stores; in local social events: local dissemination campaigns addressing benefits and helping fulfilling requirements (lowering complexity)	Medium	activation	Status (recognition, validation, security)
Young prepared	Size <3person AND (p-age <40 OR E-age <5) AND e-level =high AND role =facilitator	Better work	When attending a training; when asking a product provider about a specific solution; when updating association data/quota; when processing subsidies or authorizations; when uploading documents or fulfilling requirements for finalizing administrative processes (authorizations, subsidies, certificates...)	Very High	renovation	Access (knowledge, resources, tools)
Experienced installer	Size <3person AND (p-age >40 OR E-age >5) AND role =installer	New service	When attending a product presentation; when updating association data/quota; when working for PS; when uploading documents or fulfilling requirements for finalizing administrative processes (certificates...)	High	renovation	Access (knowledge, resources, tools)
Settled (prepared & experienced) SME	Size >=3person AND (p-age >40 OR E-age >5) AND Size>€€	New locations	When attending a product presentation; when updating association data/quota; when working for PS; when uploading documents or fulfilling requirements for finalizing administrative processes (certificates...)	Medium	replication	Access (knowledge, resources, tools)
Big all-in company	Size >10person AND (p-age >40 OR E-age >5) AND Size>€€€ AND role =reseller	More work	Almost none	Low	Replication	Power (choose client, set solution)
...				?		Stuff (publicity, clients...)

Figure 20.- Supply side mapping and involvement

In summary, motivations and capacities are summarized within the different profiles so to assign drivers and opportunities for engaging in the OSS renovation services network and to exploit for the collaboration strategy design and implementation:

- **Informal workers** (1person shop aged more than 40 without any legal entity registered) see their activity as an extra income to their household and perceive the normalization of their activity as a losing game, where they have to pay for being allowed to deliver their service, which, not being





fully professional and unable to ensure results (clients need to trust in them) cannot be charged as professional ones. They can be successful within their small entourage due to these low rates but can only deal with not very complex solutions (because of expertise, means available and dangerousness, which is not covered for them). Their motivation for participating in the OSS initiative is driven by the possibility of **recognition, validation and specially security**, both in case of accident and in case of complaint for damages or unacceptable results. The opportunity to introduce them to a collaboration scheme (and activate them) can be found on the development of their **daily activities**, related to work (buying materials in non-professional stores), or not, when asking for subsidies (if they hide their activity, they have very low income and ask for subsidies) or just doing quotidian activities around their homes (attract attention through local campaigns in markets or fairs).

- **Freelancers** working alone or with an associate are distinguished in this work in two big segments, those young ones just starting their activity after a long training, usually focused on the facilitator role (designer, architects, engineers), and those who might not have that theoretical preparation but have many years of working experience, usually as installers. For them, the motivation is in **acquiring state of the art knowledge** and getting tools to provide a better work or a new service, on top of the one they are experts (e.g., from theory to real or from painting to isolating), so to **distinguish** from competitors. The opportunity to be exploited here is the moments on which they show interest on **news**: association training or solution presentation or updating subscriptions (communication channels of these associations are valuable resources to be capitalized). From the OSS point of view, they are catalysts of renovation since they enter citizens' homes and are trusted providers who can advise for better solutions or bigger (more beneficial) interventions.
- Settled professionals (both well-trained and long experienced) will usually work with employees and act as more or less **SMEs** and manage bigger projects or implement more complex solutions. They dominate their close entourage and motivation could rely on expanding their business into new locations by learning about out of their boundaries market conditions or **showcasing their work beyond their actual frontiers**. Opportunity to attract them is related to **finishing works'** bureaucracy: uploading documents or fulfilling requirements for finalizing administrative processes (authorizations, subsidies, certificates...). From OSS point of view, their participation is important as replicators of proven solutions in new locations and inspiration for new renovators.
- Big companies are usually operationally decentralized but strongly centralised managed, therefore, opportunities to on-board them are almost none and propose collaboration is a slow highly bureaucratic process. Nevertheless, among them, the so-called Do It Yourself stores might be a paradigmatic case whose business model, including more and more the installation service (locally driven and opening the door to local collaborations), can be profitable for **replication** matters of the selected renovation packs based on their existing products and local installers' training programs. The motivation, based on the encouraged competition between branches, is **easily getting more work**, by preparing 'sponsored' product sets responding to the OSS solutions requirements from their stock catalogue (thus somehow having the power to **choose the specific solution products** in exchange of the massive solution placement), at very competitive prices, and including the suitability study, the installation and the financing services (almost turnkey project), together with the 'official' proof of the promised benefits (solution factsheet exhibited and/or provided with the offered pack).

Needless to say, increase turnover, by getting more clients and bigger works (shared objectives with OSS) or free resources and publicity are the motivation and drivers to participate in the OSS service for all the profiles, and collaboration strategies will take it into account on each of the campaigns design.





## C. For the activities

From previous sub-section analysis, we observe quite a supply side effort on the formalization of the selected solutions and construction phases, but problems with the on-boarding (relying on familiar networks or untrusted directories) and evaluation phases (difficulties on highlighting benefits of proposed solutions or easing bureaucracy), and disinterest on the follow-up after work is finished.

This is to be studied during T3.2 customer journeys design, which does not need to be covered by a single provider: it is the role of the OSS to act as the glue and connection between all the activities and ease the touchpoints between actors, which is being analysed in T3.3 (business model design).

### 4.1.2 Collaboration strategy design

The main objective in this task is to establish or deepen a collaboration with the identified stakeholders related to the supply side, therefore protocols will be defined for establishing a dialogue on how to involve the supply side in the Citizen Hub service and to be followed in each pilot.

Once the dialogue has been initiated, a participatory approach will be used to be able to agree on the way the different services and products are offered to homeowners, 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) the local specific service will be designed for the identified target groups and target neighbourhoods (from T2.1). The negotiation will be preferably done through the associations of professionals or companies in each field.

The collaboration strategies are designed on the basis of the previous inquiry's outcomes to form efficient tailored campaigns that work on a local level including the most effective measures depending on the pilot context. The idea is to not be seen as a stand-alone measure, but a part of a long-term local strategy. The collaboration strategies design work is to be done in parallel with T6.4 for marketing materials and T3.5 for the staff Training Program, so local OSS deliver campaigns-aligned messages.

According to the itineraries' strategy adopted for this step, we need to define the collaboration strategy structure related to each category. Then, detected stakeholders and potential allies would be contacted in order to fine-tune campaigns and implement specific actions.

#### A. Targeted Providers

The objective of defining a supplier profile itinerary is to get the greatest impact from the collaboration strategy messages and channels.

According to the itineraries' strategy adopted for this step, we start defining the collaboration strategy structure related to each supply side profile, as defined per their capabilities, this is, relying on a **capacitation approach enabling them to either validate, improve or showcase** their capacities.

It is to be noted that this exercise is not intended to demonstrate unique driver or mechanism exclusive for one specific profile, but to pinpoint the best fitting combination, which, to a greater or lesser extent is also applicable to the other profiles. On the other hand, being the construction sector a conservative, reluctant to big changes and innovations sector, strategies will rely on already existing mechanisms, which are to be improved or evolved, according to targets need.



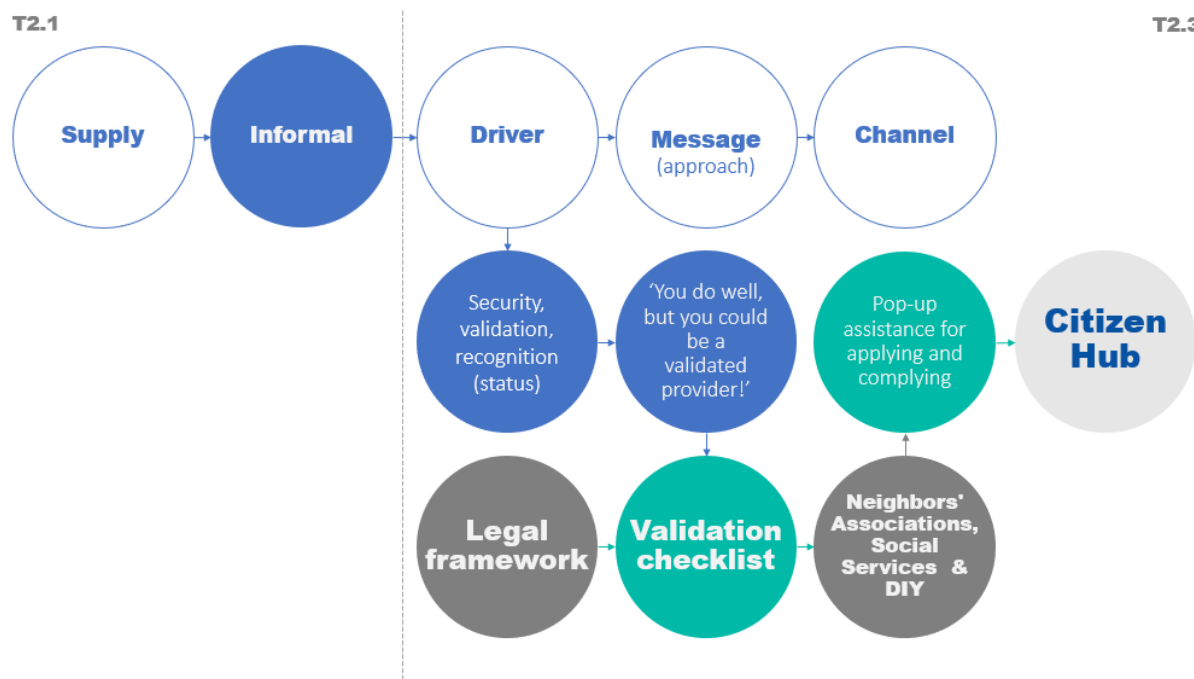


Figure 21.- Collaboration strategy itinerary according to supply side profile 'informal'

Informal workers (blue collars not legally established as professionals or companies) itinerary applies for upgrading their status, offering secure work and covered contingencies. Benefits of legal establishment should be very clearly explained and assistance for compliance needs to be provided: both drawbacks, costs and complexity coming from the legal framework have to be overcome through clear simple information and direct process, reducing bureaucratic jargon and apparent dead ends, in the form of a **validation checklist** easy to understand (examples with real figures, commitments and benefits) and aligned with OSS registry for contractors and suppliers. This can be delivered through **local field campaigns** on which the OSS administrative experts advise and appoint those profiles for proceed with the formalities in a very clear way, for which the collaboration of local rooted actors such as **neighbours' associations or social services** are valuable allies, in order to detect those recognized 'handymen' who could take the step of professionalization. Workshops or appointed interviews could be organized in the context of those organizations activities, disseminated through their usual channels, but also pop-up advisers' offices can visit **DIY stores**, where this profile usually stocks up. Being a validated supplier on the **Citizen Hub Registry** is a recognition and a status upgrader that can broaden their activity beyond the familiar circles.



Figure 22.- Collaboration strategy itinerary according to supply side profile 'professional'

Professional or freelancer (focusing on young inexperienced but trained professionals or untrained but long experienced installers) itinerary applies for the access to UpToDate state of the art content, training and tools in order to fine-tune offer and adapt to most demanded/impacting solutions, so to distinguish from competitors and deliver better work or new solution, meaning to specialize or extend the business, based on an accurate **training program** relying on the already designed **solution paths and factsheets** for whose dissemination and/or implementation should count on **professional associations**, necessary allies and not competitors, therefore needed to design the program and complement or feed (not collide) their own training offer. Not only belonging to the Citizen Hub Registry but be able to star in and rank higher by proving and specific knowledge and expertise. This means that **Registry should allow for ordering, filtering and comparing** according to (among other things) specific training or certification and overcome the transparency issues highlighted by surveyed professionals. In this context, associations are also the perfect interlocutor since they usually manage their own registries, and their functional experience and potential integration expectations are to be considered.



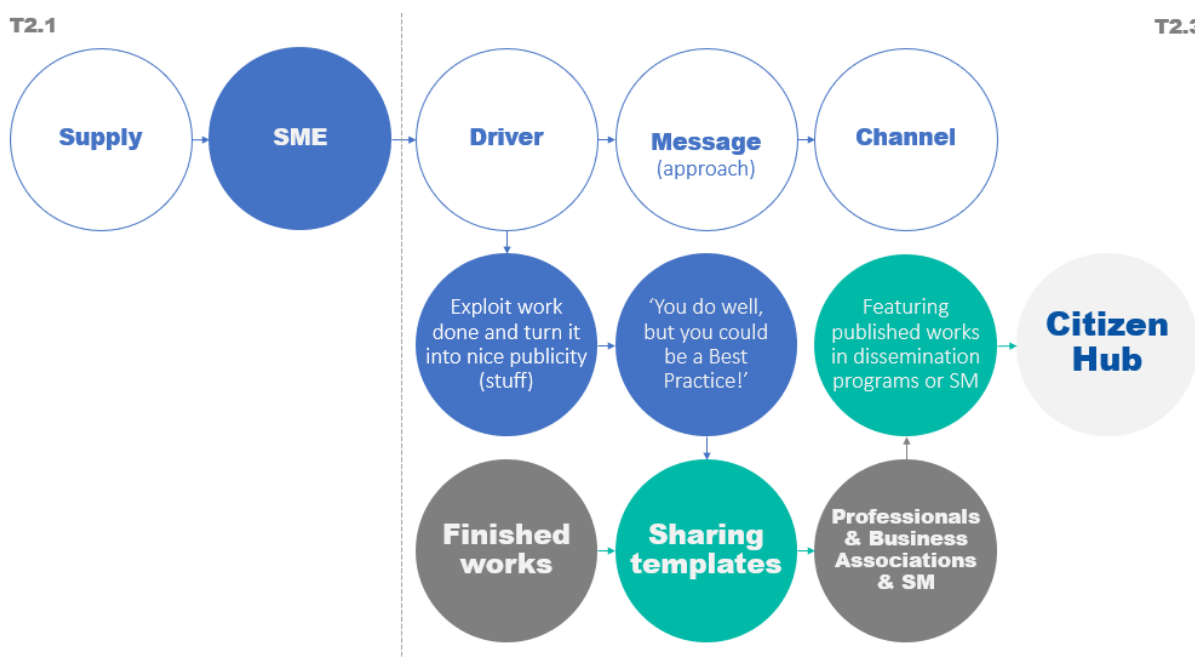


Figure 23.- Collaboration strategy itinerary according to supply side profile ‘SME’

SMEs (settled professionals both well-trained and long experienced) itinerary is again about access, this time to dissemination tools and showcasing resources, but applies also for tangible perks (stuff), such as free publicity and catalogue, based on **real results**. For doing so, **sharing templates** will be designed according to a showcase website aligned with actual trends in communication and content publishing, starring all the figures, components, videos, statements and images needed to appeal citizens and attract them into a certain supplier (and solution), as a **‘Best Practices around you’** inspiring tool, also source for periodic reporting and evaluation or paper publication. Professional and business **associations** are valuable allies here in terms of dissemination and encouraging channels, but also construction sector **influencers** are the objective of these fashionable best practices capsules which will be published through the Citizen hub virtual channels (social media)

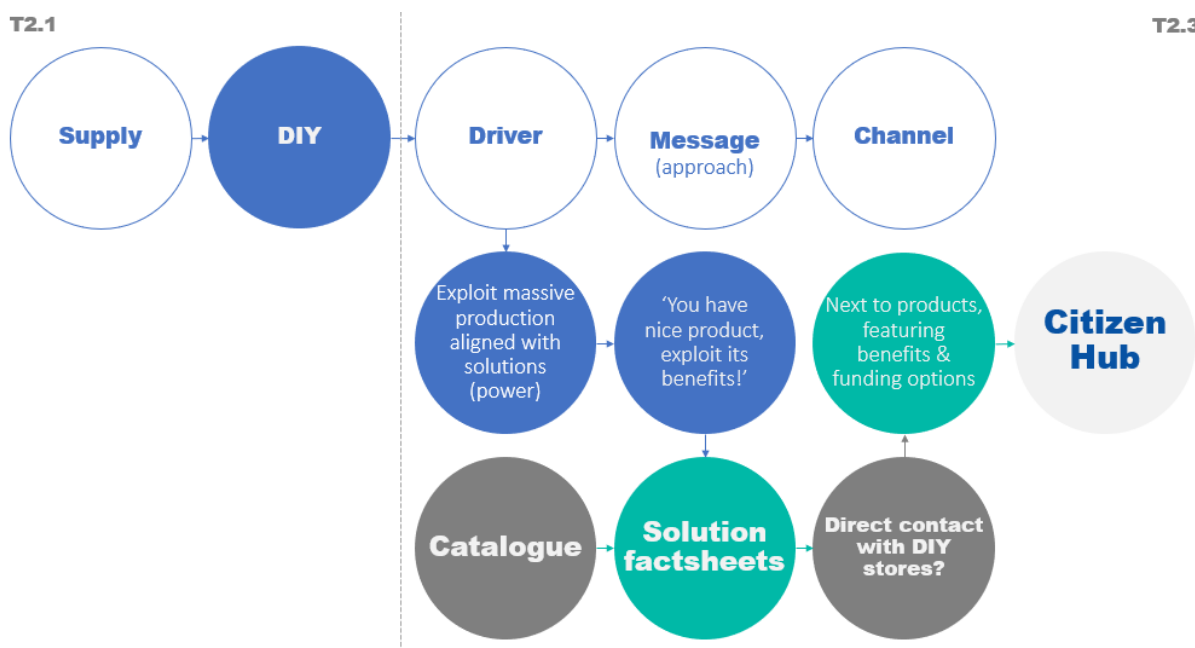


Figure 24.- Collaboration strategy itinerary according to supply side profile ‘DIY store’







Do It Yourself stores (DIY) itinerary is about power: their enormous organizational structure and resources allows them for stocking high amounts of specific products, which they massively sell under the low-prices paradigm. The challenge here is to **convince even just one of them** to stock and make immediately available the solution packs designed by the project, giving them the possibility to choose the specific products from their **catalogues** (the most beneficial for them, complying with the requirements) in exchange for the 'official' proof of the benefits – the **solution factsheet** related, changing the low-price paradigm into the quality one, thus adding new customer profile, and finally more work.

On the other hand, having these onboard is a way of advertising the OSS to both the supply and demand side (e.g. (1) contractors buying supplies being made aware of a DIY store's endorsement / sponsorship of the OSS or (2) customers looking for a new kitchen being made aware that, whilst replacing the kitchen they could also replace a window / add insulation, etc.)

#### A. Collaboration content

The itineraries from each driver, message and channel to the citizen Hub under the **capacitation** approach returns a set of materials to be created under WP3 design tasks and WP4 demonstration activities:

- 1) **Validation checklist** based on the legal framework (aligned with allies existing registries and eligibility criteria for subsidies and grants schemes or financial validation) in a simple, easy to understand language and visualization, with clear figures, drawbacks and benefits (i.e., with relatable examples)
- 2) **Solution factsheets** under a solution path according to most impacting possibilities on both the energy saving potential of the measure and the applicability/replicability of the measure in the geographical area to be implemented. This will be extracted from both IEE and EPC improvements measures reported on a typology and geographical basis.
- 3) **Templates and guidelines** for sharing content, mainly best practices, comply with bureaucratic processes, getting users' feedback/satisfaction level or offering quotations.

**Training** content based on them is to be designed in T3.5.

#### B. Collaboration strategy

The itineraries from each opportunity, message and channel to the Citizen Hub under the **capacitation** approach returns a set of products to be produced in WP3 design Tasks and WP4 demonstration activities:

- 1) **Field campaigns** for recruiting informal providers helping them to formalize their status and addressing them to the citizen hub to start running the professionalization path by accessing training and tools and optimize their potential.
- 2) Setting a professionals' **training programmes** addressed to suppliers interested in being starred in the Registries and aware of the most recommended solutions.
- 3) Implementing (and managing) a set of **on-line tools** aiming to facilitate the contact with actual and future customers: sortable, filterable and comparable suppliers Registry; fancy, catchy, colourful showcase/benchmark website, whose best practices factsheets can be shared via SM; or standardized quotation or feedback/rating follow-up tools.





### 4.1.3 Services 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.

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.

#### B. Targeted stakeholders

The objective of building a Supply side –Advisory Board is to get the greatest closeness to the local context from the providers' profiles' descriptions (fine-tuning) and implement better collaboration campaigns.

First part of this section is to involve local organizations and associations in touch with targeted providers, which have expertise in organizing and communicating with them, to understand how they decide, plan and think, so to learn how this could affect their choices related to NZEB-renovation business, to help defining the right approach techniques.

Therefore, the Sav€ 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 defined, and for this activity, and a set of activities are to be planned (in virtual environments if needed, due to COVID-19), in the context of the definition of the customer journey (T3.2) and the business models (T3.3), and the planning of onboarding activities to be implemented (T4.1).

On the other hand, the Financial Advisory Board is defined and implemented in the context of T2.6 activities.

And finally, once the dialogue has been initiated, a participatory approach will be used to be able to agree on the way the different services and products are offered to homeowners (T3.2), 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) the local specific service will be designed for the identified target groups and target neighbourhoods (from T2.1). The negotiation will be preferably done through the associations of professionals or companies in each field.

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 4.- Spanish Supply side AB





### C. Collaboration planning

The last step of the itinerary under the **capacitation** approach returns a set of activities to be performed in WP3 design Tasks and WP4 demonstration activities, with the involvement of the StHABs. Their role is capital to adapt research and desk work to operational field, so the preliminary **approaches are validated and improved** through iterative process and learning loops leading to the definition of the necessary collaboration agreements with the different the supply side actors. Therefore, activities foreseen are:

- 1) **Contact** candidates, from the ones who signed the Letters of support to others arisen from our mapping research
- 2) **Project presentation** on joint or separated meeting (according to each member spirit)
- 3) **Information retrieval** related to their interest or involvement on the designed itineraries
- 4) **Participation** on project piloting experiences
- 5) **Dissemination** of project initiatives and results
- 6) **Commitment** with the long-term Citizen hub operation



### 4.1.4. Summary

As a conclusion, all the actors, messages, channels, allies and activities are put **together** so to understand the next actions needed to perform, the resources to be committed, and contacts to be made, in the pilot field activities.



Figure 25.- Valencia supply side engagement ecosystem

## 4.2 Rotterdam - NL

In the Netherlands, there are more than 7 million residential buildings that need to be more energy efficient. The building environment is accountable for the production of about 1/5 of the total green gas emission in the country. A gross back-casting calculation leads to the necessary renovation of about 1000 buildings per day to achieve the climate goals by 2050.

In January 2021, Rotterdam had 315.565 buildings for 652 541 inhabitants. The density is 3994 addresses per km<sup>2</sup>. It is divided into 22 areas and 92 neighbourhoods.

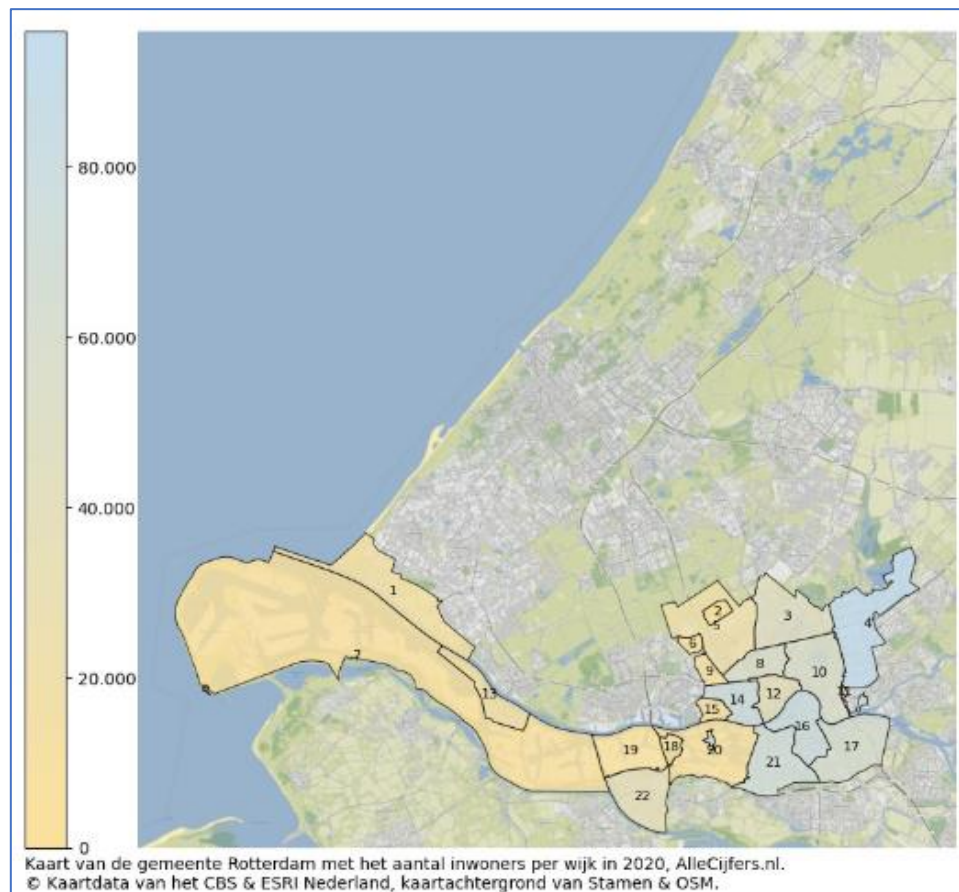


Figure 26.- Map of the municipality of Rotterdam and the division in areas

Rotterdam, harbour and city together, produces about 10 % of the Dutch CO<sub>2</sub> emissions. The city is only responsible for 1/10 of it. In Rotterdam, about 1/3 of the city's greenhouse gas emissions come from the built environment.

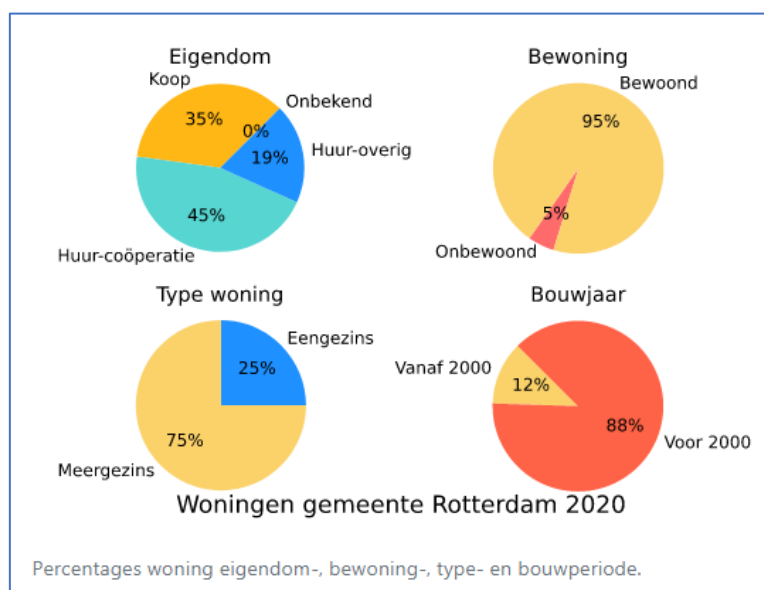


Figure 27.- Percentage of residential buildings according to ownership, occupation, types of building use and construction year<sup>21</sup>

In the last few years, the city has developed and tried out various instruments to support homeowners in the various stages of the customer journey. See for more information [HOME \(triple-a-interreg.eu\)](https://triple-a-interreg.eu). One main lesson learned is that most homeowners want to adopt and realise one measure at a time because they wish to experience first the full customer journey for one measure and by doing so to build up confidence. A good reason to choose for a staged renovation is to look for enough financing and to limit financial risks during the execution. That is the reason why the approach chosen for the Rotterdam pilot is a (minimal) one component measure strategy.

Furthermore, the outcome of the study on the so-called 'no-regret measures' to make building more energy efficient carried out by Bouwhulpgroep (report aardgasvrij Prinsenland/Het Lage land Mei 2021) is based on a **component renovation approach**. The component approach paves the way to organise a mobilisation approach independent from building typologies hence providing more flexibility for a wide adoption of measures. The Rotterdam pilots use the component renovation approach as a guideline and the related roadmaps provided by the 'no-regret measures' study helps determine the most adequate strategy from a technical viewpoint.

With the forthcoming of the Environment and Planning Act (de omgevingswet) the Dutch government wants to support the integration of solutions in all regulations and projects. This will create new opportunities implying more participation or empowerment of citizens in the decision-making process of such trajectories. The city of Rotterdam is already setting up new programmes and infrastructure for the implementation of this Act. The focus lies at a district and even neighbourhood level. At that level new programmes are initiated like *wijk aan zet* (district/neighbourhood on to action) which refers to local democracy and in particular the realisation of the *wijkhubs* (the neighbourhood hubs), physical local contact points in the neighbourhood, which is relevant to this project. The content of the *wijkhubs* varies accordingly the specific needs of each district/neighbourhood. There is clearly an opportunity to connect this initiative to the OSS citizen hub.

In the following paragraphs, the focus lies on the design of citizen hubs in Rotterdam. The exercise starts with an estimation of the supply side in Rotterdam to achieve the climate goals according to

<sup>21</sup> allecijfers.nl

both high and low economical conjuncture scenarios. After mapping the supply side size, activities and capacity, strategies on how to realise the citizen hub(s) based on the chosen approach (stages renovation based on 1 or 2 components) and collaboration strategies will be unveiled for the short, mid and long-term.

## 4.2.1 Activities, size & roles of the supply side

The aim of this paragraph is to characterize quantitatively the supply side. For that, utmost scenarios are described and translated to the Rotterdam situation.

### A. City Mapping

The insulation and renovation task in Rotterdam is enormous.

Dutch research agency TNO calculates that in order to achieve the climate goals in **Rotterdam up to 900 people are needed to be** working full time in the insulation sector.

In Rotterdam, there is a need to renovate over 50 houses per day during working days. Insulation is part of the renovation. On average, renovation concerns three components per home (for example roof insulation, floor insulation and installation). A renovation team consists of four people, in one year they can do 40 components. That means that for the renovation of fifty houses a workday, with an average of three components, we need 975 teams that are fully committed to this job, which stands for 3.900 jobs every year. This includes all the jobs that are needed for insulation.



Figure 28.- Prediction of number of jobs needed in Rotterdam in the insulation sector towards 2030

In Figure 28 the achievement of the climate goals in Rotterdam leads to utmost situations by a low and high economical conjuncture. The total estimated number of jobs needed lies between 500 and 1400 leading to an average of about 1000 jobs.



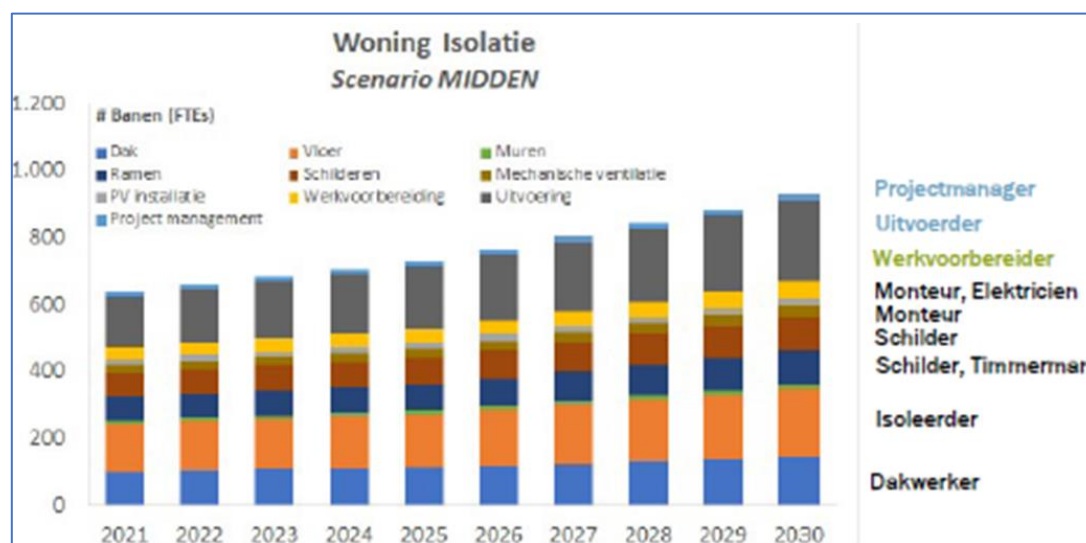


Figure 29.- Distribution of types of jobs needed to realise insulation activities following the average scenario

Looking at the medium scenario almost 700 people need in 2021 to focus on insulation in Rotterdam, see Figure 29. The colours represent the sort of insulation, like roof, windows, floor but also the hours for project management, work preparation and painting. In 2030 this number would increase to 900 full time jobs in the city of Rotterdam. For renovation we expect a same sort of number, which makes making the built environment more sustainable an interesting job opportunity. But there also lies the problem, because companies indicate that they encounter difficulties to find the right people to do the job. Especially for the more complicated tasks, such as insulating the outer wall where cavity wall insulation is not possible. Furthermore educational institutions in Rotterdam indicate that they have currently their main focus on new construction (not on renovation), and that also most students choose this direction. Working in the sector that makes existing buildings sustainable is not a popular course. Hence the problem of finding the right people for this job will only increase in the years to come.

In 2020 there have been more inhabitants of Rotterdam working in roof insulation (73 people), which is more than there were jobs in the city of Rotterdam (48 jobs). That means that almost half of the Rotterdam work at roof insulation have been carried out by companies that are established outside of Rotterdam.

When it comes to combining renovation and insulation and considering the necessary insulation level of the buildings, job opportunities are even more interesting than insulation alone. Bouwhulpgroep based their analyses on the need to renovate and insulate 50 residential buildings a day to achieve the climate goals in Rotterdam: in average 3 components per building need to be addressed. This means 39.000 components need to be yearly addressed in the city of Rotterdam. The realisation of 40 components can be carried out by a team of 4 FTE's (Full-Time-Employee). For the whole city, 975 teams will then be needed to fully realise the energy efficiency renovation target, which finally leads to the need of **3.900 FTE's per year**.

Looking at the types of **skills and jobs** that are needed, we see that for insulation works, specialised jobs are necessary, because of the various types of insulation that are needed in the process of making a house (more) sustainable. The types of jobs are as follows *in Dutch* (in English):

- *Dakwerker* (roof craftsman)
- *Isoleerder (dak, ramen, vloer, facade)* (insulation specialists)
- *PV-installateur* (PV panels installer)
- *Binnen en buiten schilder*





- *Timmerman* (carpenter)
- *Monteur* (mechanics)
- *Electricien* (electrician)
- *Werkvoorbereider* (work preparator)
- *Uitvoerder* (worker)
- *Projectmanager*

The skills that are needed are not only professional skills, but also **social skills**. Other than in new construction, you need to have social interaction with the homeowners. And be aware of the fact that you are working in their house, which means working clean and communicate with them. This makes quite a difference to the skills that are needed in the new building construction.

The needed skills are carpenters, installation experts, construction technique experts, glaziers, roofers, mechanics and electricians. But also, more general skills, such as:

- **Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.
- **Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- **Operation and Control** — Controlling operations of equipment or systems.
- **Speaking** — Talking to others to convey information effectively.

In the following paragraphs, the different pilots are described, and their **approaches** are analysed according to the needs of capacity, skills and foreseen collaboration to achieve the project target. The approaches for these pilots are intended to be complementary and cover most situations in the Rotterdam districts.

#### A. Pilot Prins-Alexander

Sixteen local suppliers have been identified as active and suitable for work in this area. They are specialized in roofing and roof constructions. Many of them are freelancers. Because the renovation task is rather challenging (1.000 houses a day needs to be renovated in the Netherlands, 50 per day in Rotterdam) we would like to use Sav€ the Homes to attract new businesses and students. Therefore, we will firstly focus on the so-called **apprenticeship** companies. In that way we are also able to educate people who are new in the business. Secondly, we will approach the businesses that are active in renovation and who are not a recognized apprenticeship companies. We will also discuss the possibilities of education on the job in their company. And thirdly, we are looking for companies that want to focus on renovation. We see chances in small construction companies, but we also investigate which sectors in terms of skills match well with work within Sav€ the homes. For example, previous research has shown that some of the skills and work culture between catering industry and construction are similar. And that it's relatively easy to retrain people from the catering industry into construction work.

Before we approach the apprenticeship companies, businesses that are active in renovation and possible new businesses, we map out how many man hours and skills are needed for the task. We do this in two different ways. The first is a prediction based on interviews with the insulation industry. Both man hours and skills are included in this model. This method has been discussed in the text hereabove.

The second way is specifically grafted onto the tasks within Sav€ the Homes. We will base the man hour and skills that are needed on the menu that the homeowners receive. This will be ready by July 2021.





## B. Pilot Hoogvliet

Hoogvliet is one of the 14 areas in Rotterdam where opportunities to accelerate degasification from natural gas have been identified. In Hoogvliet, the sewage pipes need to be renewed in the coming years. These works could be **combined** with the installation of district heating pipes to lower the overall construction costs. The area is also subject to restructuration plan in which many new residences are being and will be built. In order to keep the right balance in living values between the new and existing buildings, the focus of the city is to support homeowners to improve their (existing) houses.

In the area of Hoogvliet, there is no energy community known. There is also no other active initiative. It is an area completely new to experiment. Therefore, it is interesting to try out a new approach. In that area, we are sounding a possible Private-Public Partnership where the private partner will be free to experiment its concept aiming at creating more participation and providing full services to willing homeowners in collaboration with local entrepreneurs and businesses.

## C. Pilot Woonwijzerwinkel

[Woonwijzerwinkel](#) (WWW) is the energy counter of the Rijnmond region. City of Rotterdam is one of the 23 cities commissioning WWW. It is a one-stop-shop in which the counter functions as **intermediary** between contractors and other service suppliers and manufacturers.

In the pilot, WWW is contracted by the city of Rotterdam to propose service packages to homeowners. Rotterdam-wide, homeowners can get when contacting WWW aid starting with a tailor-made energy advice followed by supporting actions going from contracting, financing until realisation.

WWW has a pool of suppliers and pre-selected contractors (construction, installation, energy advice). Visitors can find the preselected companies through the link here-below:

[Vind een bedrijf bij jou in de buurt die partner zijn bij WoonWijzerWinkelWoonwijzerwinkel](#)

Furthermore, Innovation centre of sustainable building ICDUBO, which is a sister organisation [www.icdubo.nl](http://www.icdubo.nl) has more than 250 partners consisting of architects and energy consultants.

City of Rotterdam signposts WWW in all its communication activities.

## 4.2.2 Collaboration strategy design

In the paragraph, the aim is to describe the collaboration strategy followed to achieve the city goals and project targets. A distinction is made between the short-mid and the mid-long-term strategies.

### A. Short-midterm collaboration design

Commissioning WWW to provide more support to homeowners is one of our approach. WWW is commissioned by the city to extend their services to all the stages of the customer renovation journey starting from when homeowners are looking for support.

Another strategy is to support the Rotterdam energy cooperatives through the creation of a professionalised organisation: [Energie van Rotterdam](#) (EvR). It is a platform / association initiated by the 5 city largest energy cooperatives. Its aim is to provide capacity, expertise and services to the Rotterdam communities. Alex Energy, main actor in the Save the Homes pilot in Prins-Alexander, is among the 5 energy cooperative co-founders. EvR gets financial support from the municipality. It has been created mid 2021. In the pilot area Prins-Alexander, Alex Energy collaborates with Bouwhulpgroep, city of Rotterdam and other organisations. One of the aims is to create synergy leading to the setting up of a 'citizen hub', a digital and/or physical one-stop-shop.





A third strategy would be a Public Private Partnership. This pilot is still under construction. The aim is to have a service company acting as catalysator at a district level working closely with the city district organisation. The company at stake has already experience in providing a full-service to homeowners individually. At a district level, the challenge will be to identify opportunities and to use them to give an impulse to participation. The company can provide already a digital platform for local collaboration and for homeowners individually. The possibility to set up a physical one-stop-shop is being investigated.

#### B. Mid-long term strategy design

In Rotterdam and at a regional and country level, a shortage of craftsmen is foreseen and other workers needed in the energy transition. The climate goals of 2050 is achievable only if a development plan is set to prepare the future workers of this sector.

TNO research<sup>22</sup> on the Rotterdam case shows that in the energy transition the sector of building renovation should create many more jobs compared to electrical mobility and solar panels installation.

Without any additional efforts, a lack of well-trained professionals and a sufficient number of professionals working at the energy transition is unavoidable. For this reason, an energy transition Apprenticeship Agreement has been concluded with partners. In this agreement, three tracks of measures have been agreed on to train more skilled workers.

- From school to work (focusing on study choice and curricula)
- From work to work (retraining of skilled workers)
- Get working (assisting people on welfare to work in the energy transition)

The programme based on the Agreement (Het leerwerkakkoord) has succeeded to bring a chain network of organisations together and sets a concrete roadmap for education and training to prepare the future capacity and skills needed in the (sustainable) renovation sector.

### 4.2.3 Services network

This paragraph focuses on the services network needed to support the citizen hub in Rotterdam and to ensure collaboration in the short-, medium- and long-term.

The main services network identified is the network of companies pre-selected by the regional energy counter ([WWW](#)).

The project uses also the running programme 'the [apprenticeship agreement](#)' and the participating organisations, see hereabove 4.2.2.B. The companies that are committed to this agreement have the ambition to help educate people in their sector and also give newcomers in the sector a chance. There are also few big companies involved that focus on sustainability in the built environment. The twelve companies, signatories of the apprenticeship agreement for the energy transition in the built environment, are:

- [Bouwend Nederland](#) (on behalf of the construction sector)
- [OTIB](#) (on behalf of the installation sector)
- [WENB](#) (on behalve of the employers in the energy sector)
- [InstallatieWerk](#)
- [BOB-KOB](#) (education and training organisation)

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<sup>22</sup> Report on 'Banen in beeld, Rotterdamse energietransitie' TNO [2082] 2021, sept 3<sup>rd</sup>





- [Stedin](#) (net operator)
- [Engie Services West b.v.](#) (energy company)
- [Vattenfall](#) (energy company)
- [Woonstad Rotterdam](#) (social housing corporation)
- [Techniek College Rotterdam](#)
- [Hogeschool Rotterdam](#)
- [City of Rotterdam](#).

[Climate-KIC](#) supports the apprenticeship Agreement.

#### 4.1.4. Summary

The city of Rotterdam has set up the apprenticeship Agreement for the energy transition in the built environment which is the results of a collaboration at a city and regional level with 12 large and relevant players in that field.

The city of Rotterdam experiments with different approaches and strategies in 3 different cases:

1. Pilot Prins-Alexander: a community approach with the building up of a local craftsmen network.
2. Pilot Hoogvliet: a full service approach from the market at a district level, a service company as intermediary between homeowners and businesses.
3. Pilot Woonwijzerwinkel proposing support packages: a regional one-stop-shop to respond to request from the whole city.

Through these 3 complementary cases, the city of Rotterdam identifies a strategy fitting to the situation of a given district to actively mobilise homeowners (Hoogvliet), working together communities (Prins-Alexander) or being ready to support homeowners at any time (city wide, regional energy counter).

In order to mitigate the lack of capacity in the renovation sector, the apprenticeship Agreement is endorsed and signed by large companies/organisations and national and European umbrella organisations.





## 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 engagement strategies (whose definitive version can be found on Annex 1 – StH Document 3: Supply side involvement) 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 data collection and analysis, an engagement itinerary or approach for each supply side segment has been matched according to interviews and surveys' results, and a methodology for designing a proper long-term collaboration strategy and build an involved, durable supply side stakeholders' network adapted to the studied area is produced.

There is plenty of research methodologies to approach the engagement and community building problem for the establishment and survival of a new brand or service, based on the target population or demand segment, but work here is not addressed to theoretical subjects (or personas), but to practical real entities running business on which their subsistence depends, so interactions, contents, strategies and finally, agreements, have to rely on tangible short-term benefits consistent with the Citizen hub objectives. Therefore, the challenge is to stablish the full ecosystem of the renovation process in terms of supply by understanding their needs and expectations and thereafter offering the best fitting collaboration agreements.

In this context, the methodology here proposed in Annex 1 derives from both Valencia and Rotterdam experiments and aims at laying the foundations for the definition of a collaboration strategies based on the **knowledge of the chosen supply side segments** capacities and drivers, to find the approaching opportunities and best fit messages and channels. For a durable stakeholders' network settlement, is capital to **build on recognizable familiar mechanisms** helping the introduction of the Citizen Hub renovation services' offer and aiming at upgrading their capacities, and to **involve stakeholders** representing targeted suppliers and experts in communicating innovations or offering collaboration deals to them.

This methodology is complemented by parallel deliverables for solutions design (**D2.5**) and demand side community building (**D2.2**), together with protocols and supporting tools (**D2.4**) and financial mechanisms (**D2.6**), to be tested in **WP3** design tasks and **WP4** demonstrating activities.



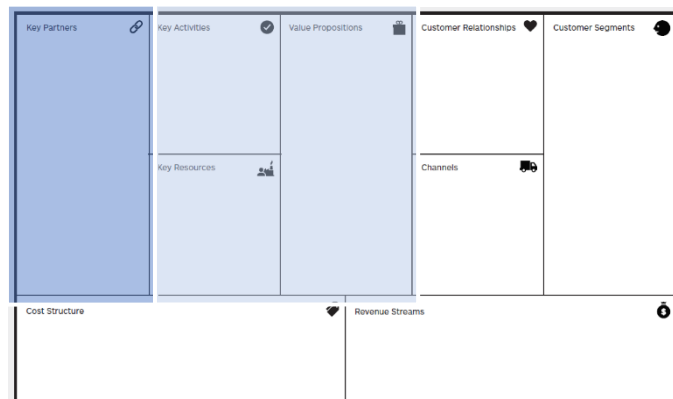


## Annex 1 – StH Document 3: Supply side involvement

This document will help your Municipality or Region define your local context supply side offer in order to design a proper long-term collaboration strategy and build an involved, durable stakeholders' network, 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 messages and channels. This document is completed with the corresponding spreadsheet file and both are available on the project web site.



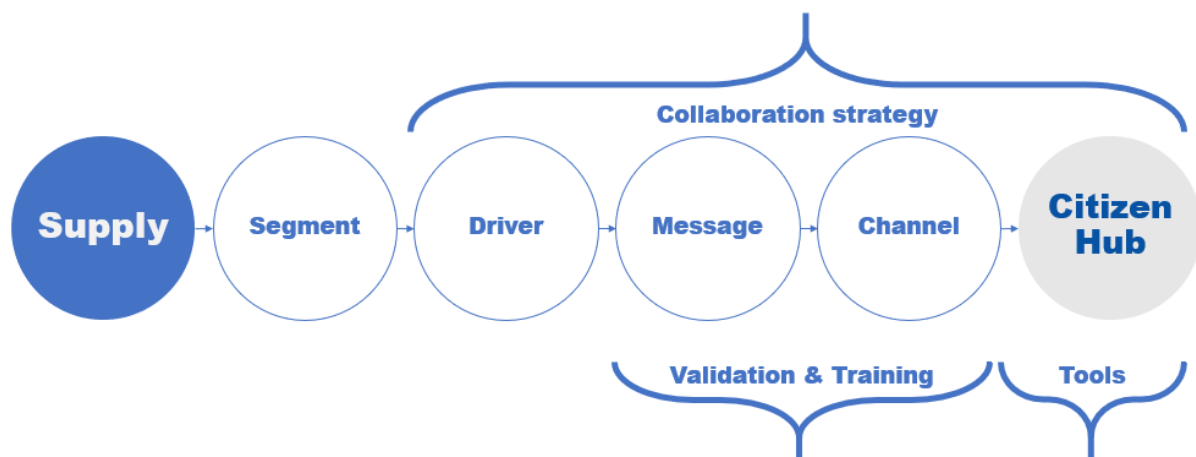




## StH - Itinerary methodology – checklist

### Introduction

First of all, keep in mind that this methodology aims to draft a set of itineraries for interaction and agreement with the previous task selected targets.



The objective is to design a collaboration strategy for the supply side profiles, by detecting potential opportunities to on-board, appropriate messages and best fitting channels, to get them to the Citizen Hub and find their most profitable renovation offer presentation. This is to be done without losing sight of the design of appropriate validation mechanisms and training programs.





### A. Activities, size & roles

Before starting this journey, have your Mapping tables at hand.

The objective of defining supply side profiles is to design optimal and reliable offers improving trust and awareness of homeowners, reducing renovation decision making processes' costs and time, and mainstreaming innovative technical solutions adapted to the local context.

First of all, think of the purpose of your profiling:

- Is it for better offer the selected technical solutions?
- Is it for better design affordable collaboration agreements between them and the Citizen Hub?
- Is it for better design the citizen Hub customer journey?

Now, think of the data sources available at your context level in order to know better your supply side 'business as usual' and expertise, and strengths, weaknesses, motivations or expectations (such as public accountability, construction sector reports data, massive surveys or scientific papers which might be analysed in order to extract information or statistical sources aggregating construction sector metrics):

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#### A. 1. Targeted suppliers' Solutions:

From your supply side mapping (based on the object of the service or product provided), note the sector or subsector of expertise (insulation, RES, heating system...) which you would attract into the citizen hub, to improve residential buildings energy performance, the solution type you would prefer to implement (change into..., addition of...) on which part of the building (roof, façade...), and the profile characterizing the specific sector/ sub-sector:

Sector/ sub-sector	Component	Solution type	Profile
To Solutions			To Capacities





### A. 2. Targeted suppliers' capacities:

Now, for each of your targeted supply side profiles, note the motivations (secure work, better work, more work...), opportunities (attending a training; asking about a specific solution; uploading documents...), objectives (activation, renovation, replication...), drivers (status, access, power, things) and opportunities of success (very low to very high):

Profile	Motivation	Opportunities	Objective	Driver	Success?
<b>To Campaign strategy design</b>					

### A. 3. Targeted suppliers' roles:

Finally, from the supply side mapping according to the role played on the renovation process (reseller, facilitator, installer, all-in...), note their strength or weakness (e.g., 5 to 1) on the different stages of the whole business experience (you can mention the specific functionality you refer to, in brackets), where they can help the citizen Hub (4-5), or the Citizen Hub can help them (1-2):

Role	On-boarding	Evaluation	Design	Construction	Follow-up
<b>To customer journey</b>					







## C. Services network

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.

### 2 Targeted stakeholders

The objective of building a Supply side –Advisory Board is to get the greatest closeness to the local context from the providers' profiles' descriptions (fine-tuning) and implement better collaboration campaigns.

First part of this section is to involve local organizations and associations in touch with targeted providers, which have expertise in organizing and communicating with them, to understand how they decide, plan and think, so to learn how this could affect their choices related to NZEB-renovation business, to help defining the right approach techniques. Therefore, the Sav€ the Homes **Advisory Boards** (StHAB) have a pivotal role in establishing sustainable networks to support the local eco-systems.

Think of your natural allies already detected in the Mapping activity and those who have arisen while thinking on potential channels to deliver your messages. Define their adscription (public or private), their team (grouping entities performing the same kind of activities, such as professionals – facilitators, installers...-, sectorial business associations...), and objective for contacting them (refine collaboration strategy, disseminate, join efforts...) and why (channelling assets):

Entity	Public/ Private	Team	Objective (channel)





### D. Summary

As a conclusion, all the detected messages and channels, are to be translated into allies, resources, products and services, and put together so to understand the next activities needed to perform, the contacts to be made, and the channels and relations to get, in the pilot field activities:

Messages & channels			
Offered by the Citizen Hub		Citizen Hub orbit	
Content (What?)	Strategy (How?)	External Resources (Based on...)	Allies (Through whom?)
<b>To Customer Journey &amp; Business Model</b>		<b>To Training, Materials &amp; Tools</b>	<b>To Contacts (ABs) &amp; Campaigns</b>

