SHAPES

SOCIAL HOUSING ACTIVE ENERGY POVERTY PRACTICES

List of participants

Participant No.	Participant organisation name	Country
1 (Coordinator)	Lancey Energy Storage	FR
2	ATC per la casa del Piemonte Centrale	IT
3	Carbery Housing Association	IE
4	Centre International de Formation Européenne	FR
5	Cork city council	IE
6	Delta EE	UK
7	Universidade Nova de Lisboa	PT
8	Fédération Habitat et Humanisme	FR
9	Gebalis	PT
10	Instituto de Ciências Sociais, University of Lisbon	PT
11	Leeds Beckett University	UK
12	Next Energy Consumer	IT
13	Odit-e	FR
14	Servelect srl	RO
15	Universitatea Babes Bolyai	RO
16	Universitatea Tehnica Cluj-Napoca	RO

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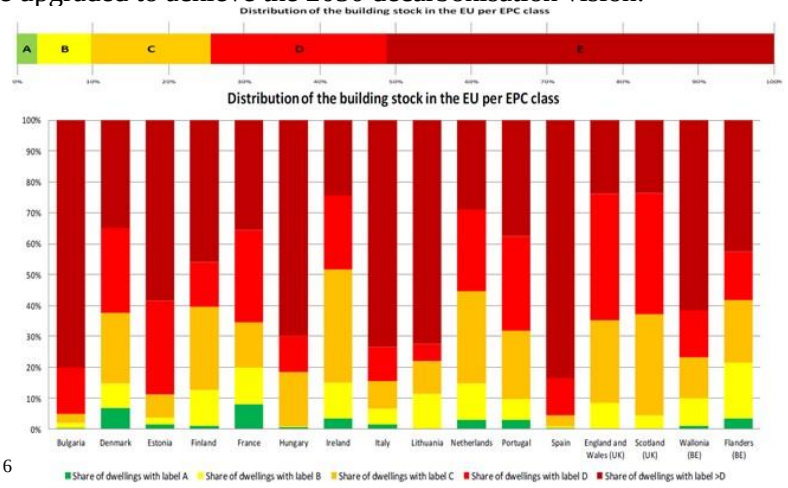
1. Excellence

1.1. Objectives

Energy poverty is a major societal challenge which affects some 54 million European citizens and has a direct impact on health and wellbeing[1]. High energy prices, low income levels, poor envelope insulation (affecting summer AND winter indoor temperatures), damp, and unhealthy housing, lack of instruction on how to use energy are all factors responsible for rising levels of energy poverty and weak indoor comfort. Energy prices have risen significantly in most countries over the last decade and this movement should even be pursued with the rise of carbon taxes to reach the carbon neutrality objectives. Into addition and combined with the recent economic and financial crisis, the current pandemic and the poor energy performance of Europe's housing stock and of the eastern Europe district heating systems, has contributed to the renewed concern about energy poverty in Europe[2]. The COVID outbreak has exacerbated the risk of energy poverty. The lockdowns decided in most EU countries forced millions of people to stay home, to work and to study from home. The quality of housing and continuous supply of energy became crucial to overcome the lockdown. Government and utilities introduced measures to ensure access to electricity and gas such as price freeze or disconnection bans[3]. This unprecedented period showed how important it is to have good quality home and energy access. However, it also revealed how strong social inequalities are. The SHAPES project aims to address such social housing and energy inequalities by offering retrofit measures (including both energy efficiency savings, and renewable energies) that will improve the comfort of social housing tenants, as well as reduce the CO_2 emissions of the housing sector and reduce the energy bills of the residents. Inequalities related to the energy transition are a second dimension that SHAPES will address. Most EU countries have introduced energy transition policies. However, not all citizens are able to benefit from them as in many EU countries, renewable energy sources and energy efficiency policies are financed thanks to a tax levied on the energy bills of all consumers, the most vulnerable families are particularly affected, in particular, when they live in inefficient dwellings and have to consume more energy to reach, usually, a low level of comfort.

By developing new effective, attractive financial models to fund retrofit and renewable energy measures in the social housing sector, the project aims to tackle such unequal sharing of burden and benefits.

According to the third Pan-European report on energy poverty published by the European Energy Poverty Observatory in June 2020[4], the highest number of energy poor households is to be found in the social housing sector. 40% of the EU population live in flats and this percentage is higher among people on low incomes. However as shown in the graph below, the energy performance of the building stock in Europe is rather low, which makes them hard and expensive to heat or cool, especially for vulnerable households. Under the European Green Deal[5], the EU is preparing a Renovation Wave to improve the quality of housing thanks to retrofitting measures and to help decarbonise the building stock thanks to the implementation of renewable energies. As shown below, 97% of EU buildings need to be upgraded to achieve the 2050 decarbonisation vision:



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[1] https://ec.europa.eu/energy/news/energy-poverty-may-affect-nearly-11-eu-population_en?redir=1
[2] http://bpie.eu/publication/97-of-buildings-in-the-eu-need-to-be-upgraded/
[3] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/20-06/epov_third_report_final_v2_compressed.pdf
[4]https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/2006/epov_third_report_final_v2_compressed.pdf
[5] https://ec.europa.eu/info/sites/info/files/european-green-deal-communication_en.pdf
[6] http://bpie.eu/publication/97-of-buildings-in-the-eu-need-to-be-upgraded/

As shown in most National Energy and Climate plans, renewable energy and energy efficiency measures can contribute to addressing climate change but also energy poverty. SHAPES' hypothesis is that both measures may help generate energy savings, reduce energy bills, improve disposable income as well as comfort and finally reduce social inequalities. This includes ensuring that every individual - whether they own a roof or have access to a roof - can participate in the electricity market on a more equal footing.

According to the figures transmitted quarterly by electricity and natural gas suppliers, 672,400 interventions for unpaid bills (supply interruptions and power cuts) were recorded in 2019 in a country like France. This is 17% more than in 2018.[7] However, as seen in the recent analysis of the National Energy and Climate Plans[8], most EU countries still do not identify and quantify the vulnerable energy consumers and therefore do not properly target measures to combat energy poverty.

The European Committee of the Regions adopted an opinion which makes several proposals, including better definition of energy poverty at European level, targeted investments in energy efficiency, a review of the single market to ensure low energy prices for households, and time-bound targets in order to eliminate energy poverty.

Several events like the 11th Citizens Energy Forum[9] and previous EU funded projects provided key inputs on the identification of households concerned by energy poverty, on how to achieve a fair and inclusive energy transition for all, and how discussing consumers' role within the changing energy market, as well as on their capacity to benefit from new technologies. Other questions have been debated regarding sustainable finance of the energy efficiency and of the renewable energy production. On the other hand, some research has been led on how to ensure that vulnerable consumers can save energy and enjoy the benefits brought by a more efficient and flexible energy market (e.g. see H2020 FinSH project[10]).

Within the SHAPES project, we intend to propose, validate, and deploy an innovative and massive approach of social buildings renovation. This approach starts with a social and in-situ energy diagnosis in close relation with the social landlord. Then, a standardized renovation package is designed, including photovoltaics equipment. This package has a simple objective: the retrofit must be self-financed, in the view of requiring zero investment by the social landlord. Thus, social housing tenants and other building occupants can participate in and benefit from the energy transition. To do so the key objectives are:

Obj#1: Develop a toolkit (easily transferable over EU countries) to identify, involve and engage the households.

Into addition of concretely establishing the needs of the social housing tenants and to adjust the technical and financial proposed solutions, SHAPES will bring a quantitative characterization of the summer and winter energy poverty in the social housing of the 5 represented countries. Therefore, it will bring understanding of the energy practices and needs of energetic poor households in social housing at 3 different levels:

- City level – to be distinguished from the national information on energy poverty (which is already available) to analyse the exogenous drivers of summer and winter energy poverty in specific local contexts where the buildings diagnosed in this project are located. Data will be collected on climate, state of the local economy, infrastructures, electricity prices, local welfare support and compared with national statistics to design the profile of energy poverty in the given local contexts in the social housing sector.
- Building level - energy diagnosis will be realized for 7% of the total 45,000 dwellings managed by social landlords of the consortium (i.e. 3500 dwellings).
- Household level - energy profiling will be realized through the energy diagnosis and characterization of energy practices and needs thanks to a sample of semi-directed interviews with 50 households per country The sample will be identified based on the statistical categories defined locally and the energy profiles.

The optimal solutions on the technical and financial aspects will be adjusted based on these results. However, the long-term success of such changes will only be reached if households show a high acceptance and adaptation ability. Thus, they need to get a social and educational support to behavioural changes, incentivized by the consortium. By improving the quality of local comprehension, the diagnosis will help identifying the acceptance

[7] https://onpe.org/sites/default/files/onpe_tableau_de_bord_2020_v2.pdf
[8] https://www.energypoverty.eu/sites/default/files/downloads/observatory-documents/20-06/epov_third_report_final_v2_compressed.pdf
[9] https://ec.europa.eu/info/events/11th-citizens-energy-forum-2019-sep-12_en
[10] https://ec.europa.eu/energy/intelligent/projects/en/projects/finsh

and readiness of households to change. On this basis, dedicated social activities and training sessions will help motivate households to adopt adequate energy consumption behaviour.

Lessons will be drawn from the SHAPES diagnosis methodology based on the combination of social and energy diagnosis. This will result into the development of a toolkit enhancing the relevance of such mixed diagnoses on the following aspects:

- the drivers of summer and winter energy poverty in social housing
- the influence of specific local contexts
- the characterization of households' energy practices
- the households' energy poverty experiences, perceptions and needs.
- The toolkit will be discussed with other European partners involved in several initiatives (like EmpowerMed[11], assist2gether[12]) in connection with the European Energy Poverty Observatory (EPOV). In the next section 1.3 of the proposal, the list of initiatives connected to SHAPES is fully detailed.

Obj#1: Quantitative features	Markers of success	Timing
Statistical overview of winter and summer energy poverty in local contexts	Collection, reception, and treatment of exploitable data. Exploitation of new data with existing reports at national levels (EPOV), local level (assist2gether, ACHIEVE, FinSH) and household level	M6
Technical characterization of social housing dwellings (3,500 energy diagnosis with an average of 3 people per dwelling, i.e. 10,500 residents)	3,500 energy diagnosis will be realised with smart meter collection of data and analysis. A first phase of data collection over 12 months will be ensured, a second one could be added with additional dwellings.	M15
Energy profiling for 1,000 dwellings (with an average of 3 people per dwelling, i.e. 3,000 residents in total)	Based on 1,000 dwellings equipped with temperature sensor kits, implementation ensured by social landlords and partners.	M15
Qualitative energy consumption behaviour and needs of energy poor households	Based on 50 interviews per country with identified households in energy poverty.	M18
Combining statistical, technical and social data to identify the needs of energy poor households	Energy diagnosis and Social diagnosis will contribute to identify energy and social needs of poor households at both levels. The elaboration of the toolkit discussed with SHAPES stakeholders and debated with other identified projects will ease such a process and transferability.	M36
Trainings of social mediators within the stakeholders (one representative per local relevant stakeholder)	Six monthly trainings offered to one representative from each relevant local stakeholder at the end of which they will be able to properly understand and identify the specific needs of tenants in local households.	M18
Local Social Housing Energy Committees (SHEC) (one per locality)	4 meetings of the SHEC, gathering the social mediators trained in the project (and other representatives of the stakeholders) and the representatives of the tenants.	M36

Obj#2: Experiment technical solutions defined by the outputs of the Obj#1

For this objective, the SHAPES stakeholders are asked to design the low carbon solutions to be deployed, based on the outputs of social and energy diagnosis realised, in conjunction with social landlords. Those solutions will be required to bring a high potential in terms of energy savings as well as onsite generation of solar electricity. It is worth noting that according to the Directive of the European Parliament and of the council amending Directive 2012/27/EU on energy efficiency[13], such an approach automatically leads to an advantage for electrical solutions over other energy sources. Thus, the SHAPES consortium will focus on different solutions using electricity as

[11] https://www.empowermed.eu/

[12] https://www.assist2gether.eu/documenti/risultati/vulnerable_consumers_and_fuel_poverty_report.pdf

[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJ.L_.2018.328.01.0210.01.ENG

final energy (like PV panels only or PV + storage + heating) with a positive impact for both vulnerable households and CO2 emissions. The role of the marketplace manager of SHAPES will first consist in preparing the necessary description of the solutions towards the potential investors and then in obtaining their agreement to invest in a project or a group of projects. Finally, it is expected from the SHAPES project to launch the implementations of some of the solution and validate all assumptions (i.e. mainly on financial aspects) within the time frame of the project. This will contribute to develop a model adjusted to social landlords' technical and financial capacities as well as to the needs of the households exposed to energy poverty. Moreover, in order to ensure that the technical solutions bring the positive impacts expected on households exposed to energy poverty, the social support activities will help bring the appropriate knowledge to the households so that they can adjust their energy consumption behaviour to the new solutions offered and gain direct benefits of comfort and lower costs from them.

Obj#2: Quantitative features	Markers of success	Timing
Identification/ranking of retrofit projects for 3,500 dwellings (i.e. 10,500 residents)	2 diagnoses phases of minimum 12 months will be organised over the project duration (M1 to M15 then M16 to M31). 3,500 energy diagnosis realised over the project duration and capacity of scaling up the approach towards other dwellings managed by social landlords of the consortium (plus additional social landlords targeted as stakeholders for the communication)	M15
Realisation of a project (or group of projects)	A retrofit project (if possible, a group of retrofit projects) will be defined and proposed to the investors according to Obj#1 outputs and identification of dwellings typology and households' needs where an electric solution would be simple to implement, The marker of success is to obtain the validation of a third-party payer to launch the retrofit project, which will validate the overall methodology and approach.	M30
Measurement of the behavioural change at the households and social landlords' level	The implementation of a new electric solution will be monitored at different levels (energy efficiency, energy production and onsite self-consumption) to ensure the expected impact on households and social landlords (better comfort, no added fees or increase in fixed charges or electricity bills for households). Specific metrics will be determined (e.g. energy consumption in kWh/m2/year, yearly bill, self-consumption and self-production ratio etc.) to ensure the right tendency of households to benefit from the new solution without paying an additional cent.	M36

Obj#3: Design and validate alternative business models adapted to the proposed solutions and countries

The SHAPES project aims to alleviate energy poverty, based on a series of business model that addresses the needs of energy-poor households, incorporating non-financial support initiatives and having this financed by a third party. Indeed, third party funding has been identified as a key to unlock the mass retrofits and energy efficiency improvements for residential households. A critical part of the success will be the focus on a business model that meets the economic and social needs of the energy poor. This focus will also be put on understanding how and why investors would consider financing at scale projects. SHAPES is aiming to have no additional funding needed by social housing providers. Therefore, all existing funds or public helps for retrofits will be considered, in addition to the third-party payers mobilization. Furthermore, the business models will have to be adjusted to the results brought in by the social diagnosis so that the financial solutions offered can be attractive for both the social landlords and the energy vulnerable tenants. This is essential to guarantee a positive impact on mitigating energy poverty. In complement, the social support activities will help households understand better how the deployed solutions can help them increasing their disposable income if they better their consumption habits.

The focus on the 5 different regions will help to define the specific financial and non-financial impacts of the alternative business models to be investigated. We will consider a wider applicability and scalability across EU by implementing the business models.

The design of alternative new business models will benefit from the outputs of previous funded EU projects Assist2gether and will access to the database while defining the financing[14].

Obj#3: Quantitative features	Markers of success	Timing
Definite needs of stakeholder mapped	A comprehensive mapping of stakeholders of parties interested in energy poverty asset projects	M6
Quantified model of economic and social benefits of the proposed solution in a view of facilitating potential funding arrangements	Economic model and value proposition that can be discussed with investors/ funders and other stakeholders	M12
Business model canvas design, tested & iterated with investors	Accepted and validated interest of the business models by the potential investors	M18
Investment strategy plan & validation with funded projects	Investors willing to fund the proposed solutions	M24

Obj#4: Promote and communicate the achievements of the project

- Facilitate communication, dialogue and ensuring media presence as well as public visibility of SHAPES.
- Organize and coordinate the participation of CSA partners to key events and the dialogue with national and European initiatives in additional topics.
- Organize an annual workshop/conference for communicating the results and the achievements.

Obj# 4: Quantitative features	Markers of success	Timing
Workshops and events: Presentation of the SHAPES project and achievements, national and EU synergies with other projects	Synergies and collaborations between the projects H2020-LC-SC3-EE-2020-2 and topic LC-SC3-EC-2-2018-2019; Participation of partners in national and/or EU initiatives on energy poverty topic: list provided in the section 1.3.	M12 M24 M36
Mapping: list of relevant stakeholders (mainly social landlords and public authorities) to communicate	Communication of the results and the achievements from the project. Work done in the communication, dissemination work package.	M12
Targeting vulnerable households	The material (motivation and training video) will be delivered during the working sessions with the tenants, but also beyond with a free access on the internet (YouTube or Dailymotion), with the support of all consortium partners.	M36
Targeting junior researchers and students	Raising awareness about energy poverty issues among junior researchers (PhD students, young researchers) from the engineering studies and social sciences fields	M10 M20 M30

1.2. Relation to the work programme of the Energy Efficiency Call for Proposals

Letters of Support have been provided and compiled in a dedicated file on the submission platform. We received several supports from funds managers and banks, clusters on energy, building efficiency and energy poverty and energy transition topics, energy providers and associated engineering offices and academics.

Work programme	CSA approach	Related Obj
Specific challenge of the call		
Although roots of this phenomenon lie mainly in low	The project workflow will organise a large social and energy diagnosis on a dwellings sample defined according to the typology	Obj#1

[14] https://www.assist2gether.eu/documenti/risultati/vulnerable_consumers_and_fuel_poverty_report.pdf

incomes and poor thermal efficiency of buildings, energy efficiency measures at the household level and increased use of renewable energy are key tools in addressing energy poverty and can bring energy savings, leading to lower fuel costs and improved living conditions. The issue is in part exacerbated by a lack of sufficient knowledge on how to identify energy poor households…..Energy Efficiency Obligation Schemes can also be used to promote social aims, such as tackling energy poverty. The obligated parties….and effectively address it by fulfilling in this way the energy efficiency obligation. Building the capacity of the obligated parties is needed to spread such schemes across the EU.	of those managed by social landlords in the consortium. The SHAPES partners will be able to define an appropriate solution composed of PV panels for the renewable energy production + efficient heating tools (heat pumps or electric heaters) if needed. The idea is to avoid any upfront cost to allow a large access to these efficient tools, which are usually distributed with a top down approach, because of their innovative and costly character. Involving a third-party payer to invest into the equipment and production asset means the definition of a RoI (return on investment) with a clear request to avoid any extra fees to the social landlord and the tenants compared to the previous electric bill and managing the risk of solvency of the project. Identification of energy-poor households will also be defined based on the output of the energy profiling task managed in the energy diagnosis and validated with interviews realised to understand their specific needs, and identifying the risk profile of the operation for the investors. As a function of this profiling, several options can be considered with public funds or national incentives to do so. Dedicated WPs (WP1 diagnosis, WP3 technical solution definition, WP4 alternative business model development) are in line to prepare such report to be presented to the marketplace.	Obj#2 Obj#3 Obj#4
Scope of the call		
Actions should contribute to actively alleviating energy poverty and developing a better understanding of the types and needs of energy poor households and how to identify them, taking into account gender differences where relevant, building on any existing initiatives such as the European Energy Poverty Observatory. *Facilitate behaviour change and implementation of low-cost energy efficiency measures tailored for energy poor households (e.g. provision of information and advice, energy efficiency ……);*	To meet this scope, the project is based on 2 different key actions: Social diagnosis: SHAPES first aims to characterize the summer and winter energy poverty in the social housing and to better understand the energy practices and needs of energy poor households in social housing at 3 different levels (Local, building and households). The energy diagnosis will create pathways with the social diagnosis by highlighting the energy profile which will be key to prepare and define an appropriate and efficient electric solution. This one will be deployed and funded by a third-party payer which will contribute to give access to efficient, local and green heating solutions avoiding any upfront cost of investment by these households Social support activities will benefit to the households by being involved at the beginning of the project and solution definition leading to a better understanding of the energy efficiency at home. Training sessions, information done in conjunction with social landlords will help motivate adequate behaviour change.	Obj#1 Obj#2
Support the set-up of financial and non-financial support schemes for energy efficiency and/or small-scale renewable energy investments for energy poor households	To answer this scope of the call, the project intends to enrol third-party payers (identified as stakeholders) and manage a marketplace. A bottom-up approach will be validated thanks to the participation of funds manager as stakeholders. While defining a solution, costs analysis and revenue streams and risks analysis will be performed to ensure the project solvency and the active participation of stakeholders to invest. This approach means finding the	Obj#3 Obj#4

Develop, test and disseminate innovative schemes for energy efficiency/RES investments established by utilities or other obligated parties under Art.7	appropriate way to avoid any upfront cost to unlock access to new efficient tools (which is the main pain point for these kind of households) and avoid additional expenses within the rent or charges costs with the social landlord. Within the frame of the project, thanks to the information already shared within the consortium by social landlords and to the analysis done on an existing project on retrofit actions on heating tools, the result shows that a French investor (ENERFI[15]) is ready to participate in the market place as soon as a potential solar plant of 30 kW_{peak} of PV installation can be installed, with an acceptable RoI. Dissemination activities will support the actions of the project. To coordinate and support them and increase the participation of stakeholders, the SHAPES project is based on a flexible and agile management structure: ● A core group composed of the members of the consortium, representing social landlords, academics, technical partners already involved in different projects related to energy poverty. ● The consortium will collaborate with ongoing projects where partners are already involved in, plus creation of a link to other key initiatives identified to facilitate synergies between activities.	

1.3. Concept and methodology

Building renovation is a priority for post-crisis recovery plans, whether at national level, the EU or the world[16]. This urgency can be explained by its contribution to mitigating energy poverty in a context of increasing vulnerabilities[17], by its rapidly mobilizable economic potential and its key role for climate policies and social actions.

While European proposals for recovery plans abound, the task now is to identify the most effective levers in a bottom-up approach, for combining economic recovery with the rise of the market for comprehensive, high-performance renovation, which is a prerequisite for putting all Member States on a convergent path with the European low-carbon strategy, and ensuring a fair and inclusive transition for all.

Such approach is proposed in the SHAPES project with the aim to be transferable over European countries, addressing households' energy vulnerabilities and answering key topics of the current European Green Deal:

- Supplying clean, affordable, and secure energy with Energy savings and efficient tools, building, and renovating in an energy and resource efficient way with building renovation programs identified in the marketplace
- Increasing the EU's Climate ambition for 2030 and 2050 with the reduction of $C0_2$ emissions,
- and leaving no one behind (just and fair transition) for a better, higher and more sustainable impact regarding these objectives.

SHAPES will aim at understanding the local causes of summer and winter energy poverty of social housing tenants within the local contexts considered in the 5 partner countries. In addition to this first step, a qualitative approach based on semi-directed interviews with social housing tenants will help identifying the energy consumption behaviour of energy poor households in their homes. Combined with the technical energy characteristics of the buildings and energy profiling, the social diagnosis will help define adequate social and technical solutions to decrease their consumption and/or improve their comfort. Moreover, involving social housing tenants and

[15] https://www.enerfi.fr/

[16] https://www.iea.org/news/iea-offers-world-governments-a-sustainable-recovery-plan-to-boost-economic-growth-create-millions-of-jobs-and-put-emissions-into-structural-decline

[17] https://www.novethic.fr/actualite/energie/transition-energetique/isr-rse/grand-debat-national-les-donnees-cles-sur-la-contribution-des-menages-a-la-transition-energetique-146800.html

providing them with social support will help them accept potential changes in their building's environment and adjust their behaviour to the technical solutions implemented.

Adopting a comprehensive social approach

Starting from a social and energy diagnosis within social landlords and social housing tenants, collected data will provide key information to engage with households and to dimension and propose a state of the art of efficient electric solution (photovoltaics + electric heating tools). Involving households from the beginning of the project to understand their needs will help the consortium developing the required support activities for them. Thus, households will be proposed to take part into the decision-making process, to validate the proposed retrofit strategy and to adopt the adequate behaviour to leverage the most the new equipment installed hereafter. SHAPES will ensure that residents of the buildings to be retrofitted will benefit from these solutions, with a positive impact on their global expenditure, their indoor comfort and well-being as well as on energy savings.

The production asset (PV panels) and associated efficient tools (heat pump or electric heaters with embedded storage capacity and AI tools) will be standardized to reduce their initial investment of the retrofit.

Then, SHAPES wants to demonstrate that the revenue stream of the "as a service" offer could be sufficient to motivate a third-party investor, to find a financial mechanism to pay as much as possible of the retrofit cost without impacting the disposable income of the households (of course, different public incentives for low income households should be taken into consideration as part of the financing roundtables).

Energy as-a-Service (EaaS) business models are recent: the core idea is that the customers pay a recurring fee to access to an energy service. Potentially, this service can be proposed without upfront capital investment nor entry fees. SHAPES aims to adapt this approach to the households we are focussing on. Thus, the financial partners will be asked to fined tune the retrofit with other funds (public funds, Renewable Energy Obligation etc.) in order to maximize the gains on the energy bill for the tenants. The customer (i.e. the tenant and/or social landlord) benefits from what other EaaS approaches have proved in terms of technology access:

- no direct electricity payments
- no expensive upgrades for electrical equipment or software, or device management,
- full leverage from the services that the devices and the technology can provide (i.e. lighting, heating, grid balance etc.).

The technical and financial solutions developed within SHAPES should both support the retrofitting and energy transition strategy of the social landlords by providing them innovative solutions and contribute to the mitigation of energy vulnerabilities of the residents living in the buildings targeted.

Social diagnosis: context and challenges

Energy poverty is a well-known phenomenon in Europe. Most countries have available data on energy poverty itself when they have defined it (France and Ireland) or provide information on incomes, electricity prices and housing stock that can help understand the causes of energy poverty. SHAPES aims to analyse the causes of energy poverty in the social housing sector at local level. Collecting data in specific local contexts will the first challenge of the social diagnosis, that the methodology below will address.Whereas winter energy is discussed and publicized in most European countries, summer energy poverty is less known and less observed. Obtaining quantitative data on this aspect will be the second challenge. However, if quantitative data are not available, the consortium will ask the households living in the buildings studied to qualify their living conditions in the summer (see below). Communication tools and trusted third parties should help reach out households both for the interview and for the social activities the consortium proposed (WP2).

Social Diagnosis: methodology

The social diagnosis will 1. explore and qualify summer and winter energy poverty in social housing in specific local contexts, 2. characterize energy vulnerable households' practices, attitudes, perceptions and acceptance of change and 3. point out the potential gaps between the technical energy data collected at buildings' level and the reality of the energy consumption behaviour and needs in the home so that the solutions provided by SHAPES can be adapted to the real situation of the residents. To reach these objectives, a three-tier methodological approach is developed:

1) Collection of statistical data

The first step of the social diagnosis is based on the collection of statistical data at local level. Data such as the geographical location, the climate, the socio-economic environment (local labour market, local welfare support), energy prices, infrastructures, local housing stock and policy will help analyse the exogenous drivers of summer and energy poverty locally.

2) Analysis of the causes of energy poverty

The second step is to determine the endogenous drivers of summer and winter energy poverty at households' level. It will be based on available data and will be complemented by a survey targeting the households living in the buildings that are going to be the subject of the energy diagnosis. This will be done in the form of a questionnaire that will be sent out to households living in the buildings studied to collect households' data. The questionnaire is an adequate research tool to collect factual data based on "closed questions" and on questions that require simple inputs. The questions will be organised around the 4 indicators developed by EPOV (inability to pay, inability to keep home warm, high share of energy expenditure in income, low share of energy expenditure in income) as well as on socio-demographic characteristics, housing quality characteristics (such as damp, drafty windows and doors), electric appliances of the home and inability to keep cold in summer. To have some chance of success the survey needs first to be presented and explained to the households at an early stage. Early communication is a key if we expect a 33% return rate. Confidentiality and anonymity will be guaranteed. The data collected will be used only for the purpose of SHAPES. The output of this second step will be a statistical characterization of the endogenous dimensions of summer and winter energy poverty at households' level. This qualification of the households will contribute to elaborating the energy profiling (task 1.3 of WP1).

3) Identification of the vulnerable households' practices

The combination of the first step of the social diagnosis with the energy diagnosis at buildings' level and energy profiling at buildings' and households' level will contribute to identify categories of energy vulnerable households. Based on this identification a sample of 50 interviewees per country representative of the categories of energy vulnerable households identified in task 1.3 will be interviewed. Semi-directed interviews of around 90 minutes each are an adequate research methodology when the aim is to capture and explore qualitative information on the practices, experiences, behaviour, values, opinions, and perceptions of individuals. It allows for a free exchange with the interviewee while orienting the discussion towards the issues structured in the interview guideline. A common guideline will be used in all countries. A coding system will be put in place and shared so that the interview analysis is made easier by all academic partners. The participation in a face to face interview is voluntary, the consent of the interviewee will be collected before starting the interview. The place of the interview must be convenient to the households: it can be in their home if they wish to, in an office provided by the social landlords if they prefer or in a neutral place like a café or a community room if they feel more at ease. When accepted by the interviewees, the interview will be recorded and transcribed. Confidentiality and anonymity will be guaranteed.

The information collected will be used only for the purpose of SHAPES and will aim to cover the following issues:

the energy consumption behaviour of different members of households, the energy expenditure, the decisions and priorities set, their perceptions of the energy issues they face, their needs to stop struggling with energy bills, their coping strategies, their understanding of the energy transition and their readiness to accept technological and financial changes.

The result of the whole process will aim to get an in-depth understanding of their energy practices, behaviours and lived experiences of energy poverty in winter and in summer and how they are framed by their personal social, economic and cultural contexts. The activities of the WP2 social support, will need such feedback to define on which dimension to act to bring in the expected behaviour change to reduce the energy vulnerabilities.

It will also help characterize the factors explaining their acceptance or lack of acceptance of any technological and financial changes that could occur to reduce their energy bills and/or improve their quality of life, health and comfort. Individual energy practices are framed by social and personal norms, values, culture and needs that may vary and overdetermine or underdetermine energy poverty.

And finally, it will contribute to identifying the possible gaps between the quantitative data and the real-life energy burdens (such as over or underconsumption and the reasons behind) and consolidate and detail the social and energy factors behind each energy profile. By understanding the possible gaps between data and reality as well as energy burdens and needs of the households, SHAPES will be able to adjust social support activities (WP2),

technical solutions to be applied to mitigate energy poverty (WP3) and the financial models that need to be used to allow the investment and positive impacts on energy poor households (WP4).

The lessons drawn from the whole process will result in the elaboration of toolkit that could be scaled up at EU level for further retrofitting projects. In synthesis, the social diagnosis will also bring a qualitative estimation of the risk level, as well as a set of actions to reduce this risk.

Energy Diagnosis: context and challenges

The business model relies on a third-party payer to invest in a production asset (such as PV panels and potentially nonproduction assets like a storage capacity and a new efficient heating system). Therefore, an attractive and secured Return on Investment (RoI) for these investors must be secured. To define a RoI on a production asset like an installation of PV panels in self-consumption, some key elements are necessary:

- Dimension of the asset, Capacity of production
- Initial cost of installation, Maintenance cost
- Direct and indirect revenue streams (i.e. selling cost of electricity, feed-in tariff)
- Ratio of self-consumption
- Local & national incentives for PVs in self-consumption, Cost of use of the local distribution grid

The first step in designing a solar PV system is to characterize the total power and energy consumption of all loads to be supplied by the solar PV system in self-consumption. Those parameters are precisely some of the expected elements of the energy diagnosis phase. Beside the PV system definition as a key phase of the SHAPES project, different scenarios will be considered according to the typology of the building, of the current heating system, and of potential retrofit projects. Thus, a mapping of dwellings suitable (or not) for the method is defined below:

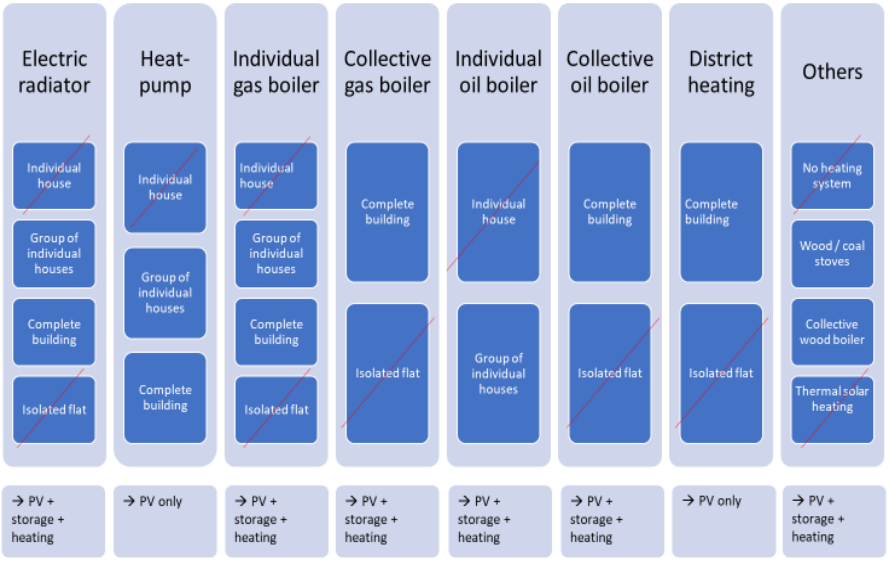

Figure 1: typology of dwellings as a function of their initial heating systems. The dwellings red-crossed are excluded from the SHAPES selection process.

The energy diagnosis starts by filling a pre-diagnosis form by the social landlords' teams themselves, as shown on Fig 1. Among the decision criteria can be counted the presence of smart meter / monitoring solutions, the ease of carrying out a renovation project of retrofit (e.g. an isolated flat within a building will be systematically excluded). In case of absence of a smart meter or of a monitoring solution, it can be decided to deploy a diagnosis station.

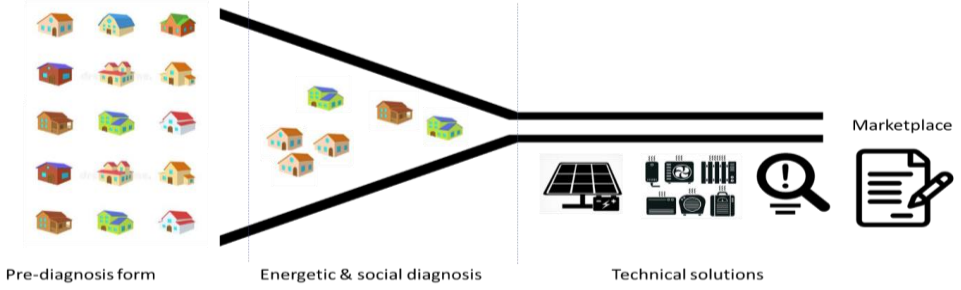

Figure 2: methodology of selection of dwellings and energy diagnosis to fill the marketplace of retrofit projects

Social landlords participating in the SHAPES project manage more than 45,000 different dwellings over France, Italy, Romania, Ireland and Portugal. The different types of dwellings have been identified: 66% of them are flats within buildings, 32% are semi-detached houses and 2% are detached houses.

50% of them are equipped with a smart meter. 19% have a primary electric heating system, 75% gas system, 1% oil system, and 4% have a solid fuel system.

According to these figures and due to the fact that an energy diagnosis cannot be performed for each dwelling, a sample of 3,500 have been defined (taking into consideration of pre-identified projects which cannot enter within the frame of the project) as defined:

- ✓ France – 1,600 of dwellings - 90% smart meter - 15% Electricity - 67% gas – 2% oil
- ✓ Romania - 800 dwellings - 0% smart meter - 63% Electricity - 14%gas – 23% solid fuel
- ✓ Italy - 600 dwellings - 90% smart meter - 95% gas – 1% gas – 4% solid fuel
- ✓ Ireland - 100 dwellings - 0% smart meter- 39% Oil, 60% gas, 1% solid fuel
- ✓ Portugal - 400 dwellings - 60% smart meter- 85% Electricity - 10% fireplace, 5%gas

Partners will realise 3,500 energy diagnosis (2,500 with smart meters and 1,000 without) and will be able to identify buildings with households at risk of energy poverty, and then to realise around 250 interviews with these identified households for the social diagnosis. Technical partners will manage the diagnoses at households (Odit-e and Servelect) and buildings level (Lancey).

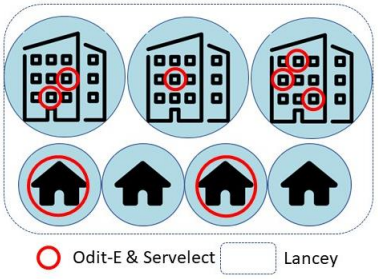

Figure 3: Overall breakdown of SHAPES energy diagnosis

Energy diagnosis will be realised thanks to the smart meters available in France, Italy, Portugal. In Romania and Ireland, as the smart meters are not deployed, a specific kit of temperature sensor [18] will be deployed for 1,000 dwellings. These "plug and Play" kits will be sourced and installed by the maintenance teams of the social landlords. All data will then be collected on a quarterly basis and will be centralized on the Lancey dedicated IT server.Odit-e will analyse households in regard to their sensibility to external conditions, along with various social and technical data that could be collected, with the objective to create profiles that are representative to certain types of households, sharing similarities. FCT NOVA will support this work in Portugal thanks to previous obtained results and published and FCT Nova[19],[20].

[18] https://www.logtag-recorders.com/es/hardware/utrix-16/

[19] Gouveia, J.P., Seixas, J., Long, G. (2018). Mining households' energy data to disclose fuel poverty: Lessons for Southern Europe. Journal of Cleaner Production 178, 534-550. https://doi.org/10.1016/j.jclepro.2018.01.021

[20] Gouveia, J.P., Seixas, J. (2016). Unraveling electricity consumption profiles in households through clusters: Combining smart meters and door-to-door surveys. Energy and Buildings. 116, 666–676.

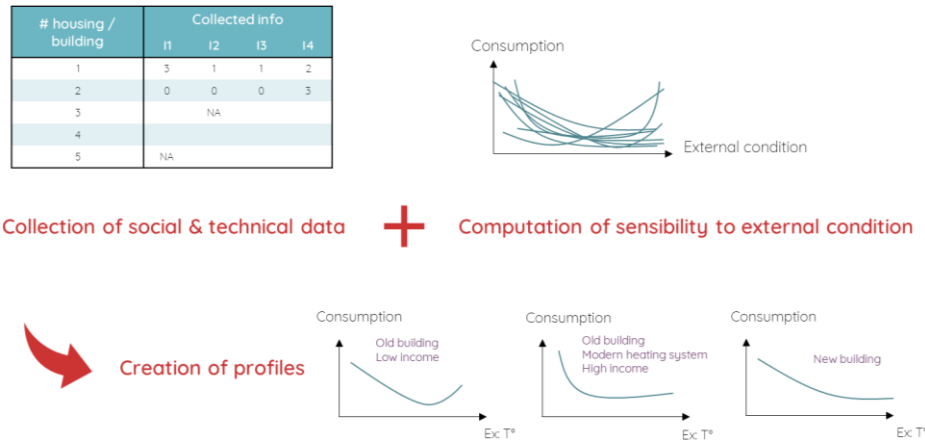

Figure 4: Energy profiling process

These profiles will be further analysed during the social analysis, with help of a series of interviews. Once the profiles have been created and understood, new households can be easily profiled, allowing to quickly determine the most appropriate solution.

In order to compute the sensitivity to external conditions in Ireland and Romania, where consumption data are already known as a difficultly, a specific data collection kit will be deployed in the households, measuring inside temperature. Another type of profiling will be done here, where the internal temperature is analysed regarding the external conditions. We plan to deploy 4000 kits for some 1000 households. Some available kits could also be deployed in other countries according to the mapping of first retrofit projects to be launched.

Diagnosis phase without smart meter available

In case of absence of smart meter and monitoring solution for the consumption of electricity and / or of the existing heating system, it is proposed to install a dedicated monitoring station composed of a set of interior temperature sensors and a fluid sensor for either gas or oil to be installed at the boiler level. The data are collected and treated over a year of building use by Lancey server.

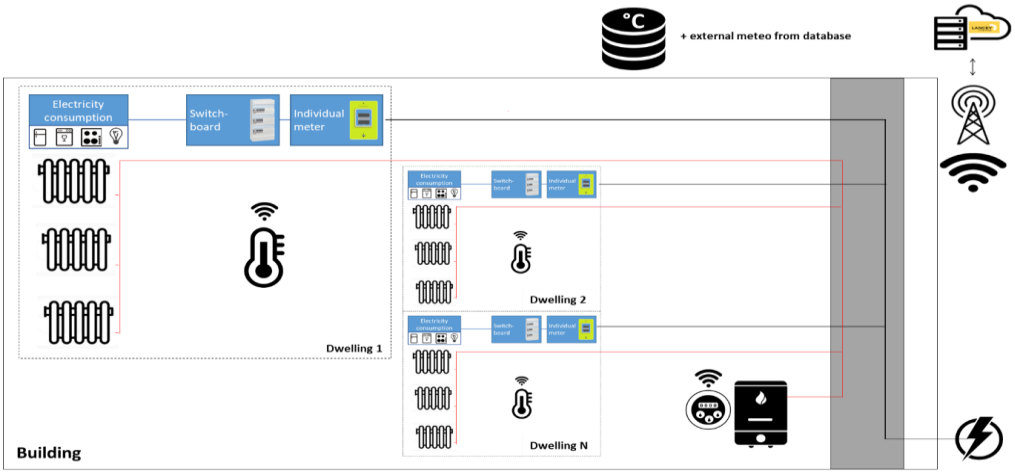

Figure 5: monitoring station with no smart meter available

Data to be obtained are the same as for the consumption profiles: internal temperatures should be measured during a year, with a 30-minute sampling rate. The internal temperature will be processed by Odit-e together with the consumption data, to build a sensibility of the building to the external conditions. The obtained profiles, although not comparable to the profiles obtained with consumption data, will still be informative about the household's energy consumption patterns.

All raw data will be collected on a quarterly basis by maintenance teams of social landlords and then transferred to Lancey tools with the aim to provide the global possible renovation modelling and define potential technical solutions for the retrofit project (PV panels + heat pump; PV panels + high performance electric heaters; other solutions).

It is worth noticing that available data coming from previous analysis done on identified buildings will be also incorporated in the different tools, ensuring a fine tuning of the building energy signature.

Data to be obtained and shared with Lancey, Odit-e, FCT Nova, Leeds University, UTC and Servelect:

Consumption profiles, for a year, with a 30-minute sampling rate.

- The basic consumptions (watches, consumption heel)
- Seasonal consumption trends (consumption heels / max. & min. power)
- Average energy (i.e. load range)
- The maximum powers called up in a relatively short time step
- Loads that can be driven during the day
- Calculation of several home electricity usage

Size the PV modules and Matching consumption and production

Different size of PV modules will produce different amount of power. To find out the sizing of PV module, the total peak watt produced is needed. The peak watt produced depends on the size of the PV module and climate of site location.

Optimization through exposure, Optimization by the peak power of the installation, Optimization by tilting to recover more energy in winter, Optimization through orientation to smooth production during the day and gain power (morning, evening), Optimization through consumption, Optimization of the installation by reducing consumption, Optimization of the installation by controlling consumption loads, Optimization through physical storage (battery)

Finally, the number of required PV panels is defined for the system with the aim to cover 100% of the electricity demand.

The anonymous raw data collected, consisting in smart-meters' timeseries of households' electricity and/or natural gas consumption, will be combined with the information about the tenants' demographics (number of occupants, age, income and others) and geolocation (coordinates and altitude) of the houses. Geolocation will enable to establish:

- The climate zone, with a yearly profile of external temperature.
- The yearly profile of expected solar irradiance and PV output; the effect of retrofitting the house with PV arrays can be weighed using PVGIS predictions.
- Prediction at point 2. can be made sharper if the orientation and slope of the roof is known.

A Machine Learning tool will be used to extract information from the above data and metadata. Normalizing with respect to the effect of climate on heating, ventilation and air-conditioning demand, the highest source of domestic energy demand (more than 60% of the EU households' consumption is due to space heating) will enable comparable evaluation of energy poverty in houses located in regions far away from each other.

The tool just outlined will be based on Principal Component Analysis, a well suited method to decompose the matrix, built with the energy consumption time series, into modes (principal components), each one explaining a percentage of the dataset's variance. This will allow to find out the leading factors contributing to the energy demand patterns, and to selectively turn these factors ON/OFF to model what the system is/would be with/without them. This approach will lead to a sharp assessment of energy poverty and to a rigorous, quantitatively supported retrofit strategy.

Lancey will compile all data at a macro scale level defining the first inputs of the complete solution to be deployed for a retrofit project.

<u>Pathways between social and energy diagnoses</u>

The added value of the diagnosis phase lies in the combination of technical and social diagnosis to identify the causes of summer and winter energy poverty at the level of buildings of social landlords and of energy-poor (i.e. hard to reach) households. The diagnosis is based on the technical characterization of the buildings and the socio-economic profiles of households with their energy consumption patterns. The comparison between the technical data and the energy and social profiles of households should help identify the gaps between data and the needs of households in order to figure out what technical and financial solutions (WP3 and WP4) would be best adapted. On the other hand, this comparison will allow to determine what kind of social support (WP2) can be brought to the households to adjust their energy behaviour to the new technologies.

<u>Personal data and regulation</u>

The combination of the technical and social diagnosis aims to target as accurately as possible the households suffering from summer and winter energy poverty to bring them solutions to mitigate it. The relevance of both social and energy diagnosis will partly result from the availability and accuracy of the data the analysis will be based on. Beyond the technical solutions planned to be implemented to enhance this availability and accuracy (such as sensors, surveys), the legal aspect of this collection and process is of major importance and has been fully considered in the preparation of this proposal.

Some of the data will be statistical data on each studied area such as in the first step of the social diagnosis or will be external data such as weather. There is no restriction regarding the analysis of such data.

The focus will be on the management of the personal data collected during both diagnoses in order to comply with legal provisions at European and national levels. The dedicated task in the "Management" work package (WP6) will design a framework to ensure the approach is GDPR compliant, and is following a specific, explicit, and legitimate purpose and the collection, analysis, and data's life cycle are fair, lawful, and transparent. The consent will be the base for the lawfulness of the SHAPES approach.

Technical solution definition

The energy diagnoses will bring complete and detailed information of the building and energy profile of tenants where an electric heating solution could be deployed. Main solutions will be analysed at each project level and presented to social landlords and households for a first discussion, before a presentation to the marketplace stakeholders, acting all as potential investors.

Lancey as a solution provider has already various data of return of experience of its own solution in terms of efficiency and cost and according to the retrofit work to be done. In order to standardize both work of definition of the technical solution as well as the equipment to be installed later into the process, different solutions are selected within SHAPES project:

- Installation of photovoltaics panel in self-consumption (i.e. the existing heating system, ventilation etc. is kept). This configuration will be selected for buildings with performing installations (district heating, heat pump, last generation gas boiler).
- Installation of PV panels and of Lancey electric heating systems including battery storage or not. This configuration will be preferred in retrofit of electric heating systems and when there is no central hot water circuit (or an obsolete one)
- Installation of PV panels and of a central heat pump (low or high temperature depending on the hot water circuit typology). This configuration will be preferred for buildings with a collective gas or oil boiler.

It is worth noticed that marginal additional works (e.g. electricity compliancy updates, ventilation replacement, metering systems) will be occasionally proceed. Some of these works are compulsory, some others can have an important impact on the comfort. Nevertheless, as their cost is comparatively small, compared to the replacement cost of the heating system, they are not considered in the different hypothesis and use-cases described into this document.

The three technical solutions will be systematically presented to the marketplace in the form of a report with advantages and drawbacks for each solution. Items like revenue streams, efficiency, cost of the solution, cost of implementation, maintenance costs, simplicity of installation, insurances will lead the discussion to calculate the expected RoI for investors.

A case study is presented as an example (detailed in the next paragraph) to pre-validate the methodology. This use case is based on real project equipped with Lancey solution for a French landlord.

Alternative business models and marketplace

Using the technical and social diagnoses will be critical in assessing and finding a business model that will attract third party investors and funding. The WP4 "alternative business models" will summarise a clear map of all stakeholders having an interest in a proposition for households in energy poverty, with other energy actors and financing institutions. The different needs of each financial stakeholder will have to be fulfilled by the results of the social and technical diagnosis. The objective is to allow a financial proposal for each social building or group of social dwellings. This will include a deep dive into the needs of financing organisations (e.g. hurdle rates, risks, volumes, etc) by interviews, forums, events and discussions. Issues such as the following ones will be considered:

- Publicly funded revolving funds

- Blended financing (cross border and public-private finance)
- EIB and other multilateral institutions (as funders and advisers)
- Public and private credit enhancement schemes
- Impact and ethical investor funds
- Next-generation EU funds and national funds developed to foster the green recovery
- Additional revenue streams (e.g. feed-in tariffs, white certificates[21], grants).

An assessment of existing business models targeting energy- A precise assessment of existing commercial offers aiming to help fuel poor households and financed energy efficiency business models will be conducted. This will include EaaS business models in Europe (figure 6), which are mostly in pilot stages of commercialisation or are deployed only for a restricted number of technical configurations (e.g. district heating or large dimension boiler).

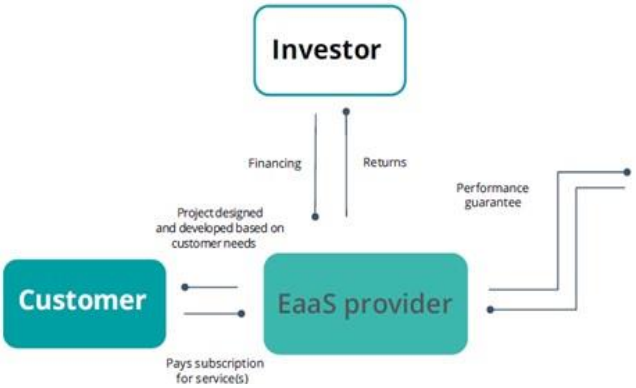

Figure 6: EaaS Business model scheme

Thus, gaps to market will be identified by comparing these business models and barriers to uptake in a view of simplifying the access of such approaches for the retrofit of social housing. On the other hand, this analysis will be used to complete the risk assessment analysis for the financial stakeholders.

The figure below gives some indicative assessment of high-level funded energy business models present in Europe. The review of the different business models and commercial approaches is done using a business model canvas approach to get quantitative (sales, customer numbers, pricing) and qualitative analysis (proposition to customer, soft factor benefits).

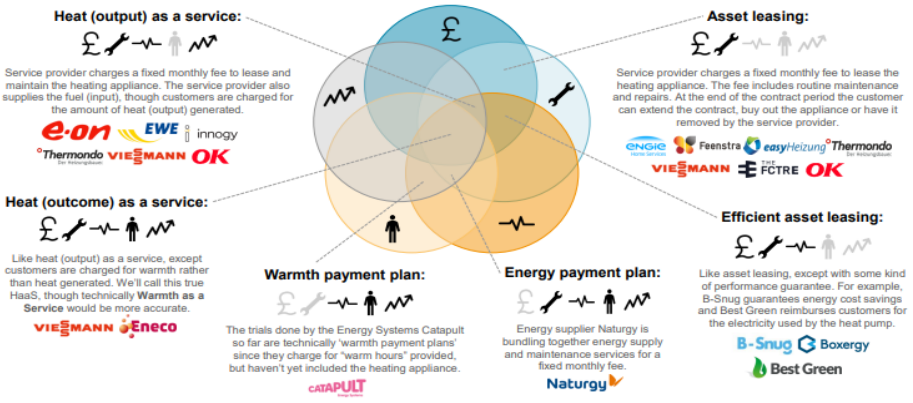

Figure 7: Examples of service-based business models in Europe (source Delta EE)

In parallel, we will consider the social and technical diagnosis to build a technical and financial model that builds out costs to funders and value to the customer of our proposed solution.

WP2 "Social support activities" will be a key differentiator of SHAPES project. Indeed, each retrofit case will incorporate social support actions in order to reduce the identified risk factors. This support actions, added with the complementary funds, are aimed to bring an acceptable level of risk for each renovation project. Thus, SHAPES specific objectives of bringing new options for fuel poor through technical, social and financial support initiatives are given to be successfully fulfilled.

As mentioned earlier, SHAPES approach will also consider public incentives and support mechanisms available in the 5 identified countries. A method will be proposed at the end of the project on how the model could be transferred to other European countries, as this may be a consideration for financial institutions. SHAPES project aims to build a fair, sustainable, profitable, replicable, and scalable business model by compiling the stakeholder needs (i.e. financial fundamentals, risk factors etc.). As an example, the cost recoup (e.g. monthly in an EaaS

[21] https://en.wikipedia.org/wiki/White_certificates

proposition) is already identified as a key barrier, considering on the other hand that changing the rent for the tenant can be very challenging. Business models such as North Star Solar[22] in the UK may provide useful learnings.

The assessment of how suitable revenue can be generated, with the risk and benefits clearly articulated to potential funders will be realized for each typology of retrofit projects. Some additional funding sources for SHAPES pilots are expected to be found using existing database such as the one developed in Assist2gether (Figure 8) and previous work in the WP4. It is already identified that those complementary resources will be required for some group of dwellings with highly vulnerable households.

	Discount on electric bill		Discount on gas bill		Financial support for energy		Take up of energy efficient measures		Purchasing card for primary goods (welfare / social system)	Others
	Energy poverty	General	Energy poverty	General	Energy poverty	General	Energy poverty	General		
Italy		X IC		X IC			X* **	X* **	X	Yes
Spain		X IC			X*	X*	X*	X	X*	
UK		X IC		X IC	X	X IC	X	X		Yes
Poland					X	X*	X * **	X	X	Yes
Belgium	X PC		X PC		X PC		X PC	X		
Finland						X			X SS	Yes

* Regional measure

** Not stable on the long run

IC Income Criteria

PC Protected Consumers - For Belgium protected consumers are people who are entitled to the social maximum prices for energy. (electricity and natural gas) – for further explanation refer to the link http://www.energiesparen.be/sociaal/beschermd/wie

SS Social System - monthly cash payments

Figure 8: Existing financial measures from the Assist2gether database

This proposed business model will be proposed to different stakeholders (investors and fund managers) in a marketplace and feedbacks and iterative comments from them will be compiled to fine tune the final proposal. The marketplace will be electronic areas that provides material to investors in a way that they can easily understand and consume information. A central part of this process consists in developing a detailed investment strategy document that can be tested with potential funders. This will likely need to be country specific, considering legal frameworks and regulation and will be validated in the communication events, with investors, and with pilot project Task Forces in the chosen countries. Replicability to other markets will be covered in these workshops.

Use case and test of the methodology with a stakeholder (fund manager)

The use case is based on the installation of PV panels and electric heaters Lancey Capella with embedded storage batteries (i.e. the core product of Lancey solutions) on 2 buildings managed by a social landlord in France. The dwellings are already equipped with a previous generation of Lancey connected devices since 2018. The energy diagnosis described in SHAPES approach has been done based on the treatment of the aggregated data collected by the heating systems and the smart meters.

[22] https://www.solarpowerportal.co.uk/news/north_star_solar_pr_to_deliver_solar_plus_storage_to_22000_homes_2612

Figure 9: localisation of dwellings

Study of the photovoltaic fields

The group is composed of different buildings, with 2 different orientations. Thus, 2 cases will be evaluated to cover the entire potential of photovoltaic fields:

L2 – East/West and L10 – South/North.

The available surface shows it is possible to install 9.6kW$_{peak}$ on both building, i.e. 2.4kW$_{peak}$ per dwelling.

Self-consumption ratio calculation

Example of consumption for a 70 square meter flat with 4 rooms:

- Peak period: 3427 kWh/year
- Off-peak period: 3158 kWh/year

To optimise the self-consumption ratio, it appears that it can be interesting to consider a 2nd case, with a smaller PV installation with 1.2kW$_{peak}$ per dwelling.

Estimation of the energy gains compared to existing heating systems (considering real data including the least favourable cases)

- Over 57 dwellings, 19 have been deeply studied, 17 have shown some gains with an average of 34%.
- 2 dwellings have shown some losses (thermal report effect).
- It represents an average of 20% of the total electricity consumption.

Once the study of the photovoltaic field is done, the estimated rate of self-consumption and estimated gains versus the previous heating system with 3 different scenarios, key metrics per dwelling could be calculated:

		Scenario 1	Scenario 2	Scenario 3	
		1,2 kWc – standalone PV	1,2 kWc – Lancey wihout storage	2,4 kWc – Lancey 2 batteries	
	Initial consumption		8 230		kWh/year
	Consumption after retrofit (with Lancey)	-	6 500	6 500	kWh/year
	Produced energy	1 200		2 400	kWh/year
	Self-consumed energy (with Lancey)	1 190		2 280	kWh/year
	Surplus	10		120	kWh/year
	Energy consumed from the grid	7 040	5 310	4 220	kWh/year
Gains on heating	Gains on consumption	-	1 730	1 730	kWh/year
	Financial gains	-	272	272	€/year
Gains generated by the battery	Gains on consumption	-	-	-	kWh/year
	Financial gains	-	-	55	€/year
Gains generated by the PV	Gains on consumption	1 190		2 280	kWh/year
	Financial gains	214		465	€/year
TOTAL GAINS / dwelling		214	486	737	€/year
		1190	2920	4010	kWh/year
TOTAL GAINS for 57 dwellings		12 200	15 718	42 000	€/year

Figure 10: summary of the 3 different retrofit scenarios proposed for the example case study

The first result is a gain on consumption for the tenants: 33% of gain on the heating side and 20% of gain on the overall electric bill.

	1,2 kWc – standalone PV	1,2 kWc – Lancey wihout storage	2,4 kWc – Lancey 2 batteries
Total cost Lancey	- €	175 000,00 €	247 000,00 €
Total cost PV	118 000,00 €	118 000,00 €	210 000,00 €
Total cost retrofit	118 000,00 €	293 000,00 €	457 000,00 €
Cost PV / dwelling	2 070,00 €	2 070,00 €	3 684,00 €
Cost retrofit / dwelling	2070,00 €	5140,00 €	8020,00 €
Self-consump. Subsid.	6 156,00 €	6 156,00 €	10 944,00 €
Installation subsidy	0,00 €	39 800,00 €	39 800,00 €
Total gains / year	12 200,00 €	15 718,00 €	42 000,00 €
ROI (years)	9,0	7,5	8,0

Figure 11: main financials elements for the 3 possible retrofit scenarios

The different scenarios define a RoI from 8 to 16 years, without any technical optimization or hardware standardization. The lesson learnt is that it is possible to define an interesting RoI for investors on the production asset (PV only). The scenario 3 shows that PV + Storage capacity and efficient heating tools are more expensive in terms of CAPEX but the RoI remains very low compared to the total lifetime of the asset. This scenario confirms that investors could also take into consideration non-production asset in the frame of a retrofit project (as some do with investment in farm shed + PV installation).

ENERFI, a French fund manager (and Stakeholder of the project) has pre-validated the obtained results and confirming the interest to go further:

"Once the feasibility has been established, we need, as owners or investor of the future power plant, to be sure that we are investing in a performing and insurable asset. As such, we have requirements regarding the chosen hardware (modules from a Tier 1 manufacturer, extended inverter warranty to 20 years, integration system under ETN/ATec/DTA). Beyond these technical considerations, self-consumption projects also require attention regarding the solvency of the debtor and the legal framework chosen (we are familiar with these two points which can jeopardise feasibility). Finally, the time required to obtain administrative authorisations and the EPC service provider's work schedule will have to be considered to determine the time required to bring the project into service."

Thanks to the subsidies for self-consumption installations and despite the fact the electricity feed-in tariff is constantly decreasing, the current system still provides an acceptable return. On the long-term perspectives, the cost reduction of PV panel costs and the continued rise in grid supplied electricity will reinforce this postulate. The tendency will be studied during the 36 months of the project.

<u>Social support to ensure the long-term impact of the inclusive solutions deployed and financed to households with energy poverty</u>

Our premise is that the challenges faced by tenants in social housing with respect to their living standards, including to the improper attainment of their energy needs, originate well beyond their financial status – generally the main criterion for accessing social housing. Poor families are often trapped in a vicious circle which fosters feelings of powerlessness, limited social support networks, poor awareness of existing support schemes, and a general feeling of distrust in the stakeholders involved in providing basic goods and services associated with a reasonable level of well-being. Energy poverty is particularly challenging because it may involve, most often, the interaction with private supply companies, which are profit-oriented, whereas their social involvement may be marginal or missing altogether, depending on their business strategy and culture. Based on the identified needs on the market related to energy poverty, these shortfalls may/should be compensated either by the State (national or local entities, or both) through market regulation or targeted programs, or by third-party entities like NGOs, which provide social services. These arrangements may vary from country to country, depending on their national and local legislative and administrative frameworks or on varying social arrangements. To add another layer of interaction relevant to the case study, social housing governance system, the power of and the interaction with the social landlord is yet another component of relevance.

Through WP2, our project aims to address these challenges by implementing activities aiming at increasing the awareness on the specific challenges faced by tenants in social housing with respect to preventing and alleviating

energy poverty. We generate a series of tasks aimed at raising awareness both at the level of the relevant stakeholders involved in the access of these households to energy services and of the tenants. We thus aim to build long-term dynamics, beyond the duration of the project, leading to better communication between the stakeholders and the tenants and an increased feeling of empowerment on the tenants' side in order to foster their own involvement in understanding and addressing the drivers of energy poverty in their households and in their buildings, by providing the necessary skills to understand the problem(s) generating energy poverty in their household, having a basic understanding of the solution(s), and knowing who and how to contact in order to address the problem(s).

Deployment and impact assessment

In the time frame of the project (36 months), it seems realistic to put on the market place several projects. Social landlords have provided their roadmap for retrofit projects and thanks to the first identification of dwellings and primary heating system we will focus our efforts on some identified dwellings. Energy diagnosis will be realised at the very beginning of the project and by one year we will be able to propose an efficient solution to the investors. At the same time social activities of the project will fine tune the required identification of risks and contingency plans to avoid them (like solvency of the project). Social landlords will be asked to validate a global organisation for the management of the production asset and public procurement could be launched as soon as the marketplace sent the first agreement.

The task related to the impact assessment will be fed by all project activities, and the objective is to identify and define the operational framework to maximize the use of the results and outcomes of the project and monitor the impact at technical side.

The task will include the following activities:

- Collection and analysis of Key Exploitable Results (KERs), such as:
  - ✓ Increase synergies and collaborations between the different identified communities (research/academic, social landlords, national agencies…)
  - ✓ Promote cross-thematic collaborations
  - ✓ Transfer information to the political leadership and funding agencies
  - ✓ Popular science/technical seminars and papers for attracting interest from the public (including in the school system) etc.
- Assess the usability of the KERs beyond the context of the project and identify the most suitable approaches.
- Assess the technical performance of the deployed solution thanks to the monitoring tools installed (API, Energy Management System) and the manager of the production asset.
- Assess the impact on the energy poverty situations (overall energy/cost performance, comfort, empowerment, energy savings, disposable income)
- Assess the impact on environmental and climate issues (CO2 emissions, air quality, building performance)

This task will include dedicated work sessions and questionnaires within the consortium. The activity will be divided in two parts:

- Impact assessment of the project for partners of the consortium
- Impact assessment of the solution deployed for social landlords and households.

Existing projects intertwined with SHAPES

The activities and actions proposed in SHAPES build upon previous experiences, gaps and critical lessons drawn from other relevant nationally and internationally funded projects. All the ongoing projects will be considered for joining efforts on communication and organisation of events.

Project name	Objectives	Valuable inputs for SHAPES	Funding (European, national….)
EuroPACE	The concept of EuroPACE is inspired by the success of a financing model called PACE, launched in California in 2008.	Ongoing project. Alternative business models, impact assessment of the investment.	H2020
ASTER	Stimulate the uptake of social technologies for social housing	Funding issues of solar technology and alternative company model.	ELENA is a joint initiative by the EIB and the European Commission
Energiesprong	Aim to decarbonise the use of energy for heating, hot water and electrical appliances	Combination of technical and financial solutions can help reduce households' energy bills.	Transition Zero (H2020), (InterregNWE) national funds.
POWERTY	Aim to deploy renewable energy targeting vulnerable populations,	Started at the beginning of 2020.	Interreg Europe
EmpowerMed	Aim to make energy transition more inclusive and to improve ways to involve energy poor households	Ongoing. Importance of capacity building of actors and households, of creating large partnerships and of adjusting solutions to real needs	H2020
Achieve	Develop the energy consumption and bill saving potential of households on low income	Training energy advisors should focus more on the ability to communicate than on the technical issues.	Intelligent Energy Europe
SocialWatt	Support obligated parties under Article 7 of the Energy Efficiency Directive to develop, adopt, test and spread innovative energy poverty schemes across Europe	Ongoing. Training of social workers and teams of energy companies to better address energy poor households' needs.	H2020
FinSH	Promote energy efficient equipment and retrofit. Develop financial tools and on-going support for energy poor households and social housing staff	Financial tools are not enough and should be accompanied with enhanced social schemes to improve the efficiency of the retrofit programme.	Intelligent energy Europe
Assist2gether	Actively engage vulnerable consumers in the energy market	Provision of in-depth analysis of energy poverty, Training of home energy advisors.	H2020
LIGAR	1st territorial high-resolution mapping of thermal poverty in Portugal using the Energy Poverty Vulnerability Index (EPVI)[1]	FCT NOVA and ICS collaborated with the National Energy Agency, ADENE, to deliver the LIGAR project.	Nationally Funded by the Portuguese gov.
STEP	Develop training material targeting consumer organisations to bring adequate advice to vulnerable consumers	Ongoing. Training material will be developed and could be discussed with SHAPES so that SHAPES avoid reproducing any material already existing	H2020
REDWOLF	Rethink Electricity Distribution Without Load Following. The project will increase renewables' usage and reduce carbon emissions for homes with photovoltaic solar panels that do not have gas.	Ongoing. Dissemination of SHAPES results within the scientific research and professional bodies community,	Interreg North West Europe
ENABLE	Interactions between individual and collective energy choices and the regulatory, technological and investment prerequisites of the EU transition pillar. Social acceptability of energy transitions	All public deliverables are made available to discuss key topics like identification of individual and collective energy choices, increase the participation of households in the acceptability of energy transitions, technologic and economic factors.	H2020
SMEmPower Efficiency,	To empower the SMEs to increase their energy efficiency in both buildings and industries.	Universities and companies from the consortium, which are in contact with social landlords.	H2020

[1] Horta, A., Gouveia, J. P., Schmidt, L., Sousa, J. C., Palma, P., Simões, S. (2019) Energy poverty in Portugal: combining vulnerability mapping with household interviews. Energy & Buildings, 203. doi: https://doi.org/10.1016/j.enbuild.2019.109423

Overall methodology

The SHAPES approach is based on four keys objectives and a set of obstacles to overcome are:

- Lack of appropriate financing and lack of investment capacities for households exposed to energy poverty.

The consortium and stakeholders believe that a call for external third-party payer to invest in production asset is attractive even for smaller projects than PV farms. Based on a use-case scenario presented by Lancey to a fund manager, the approach has been validated as realistic (even if there is a need to go deeper in the details of costs and revenue streams to be presented to the marketplace). The "as a service" offer will also be encouraged and the organisation of the management of such production asset needs to be defined with the social landlords to avoid any increase of charges or electricity bills to the tenants. By enlarging discussions with stakeholders, the consortium will be able to fine tune the approach with the different typology of buildings, existing heating systems and associated risks of solvency of the project as well as energy burdens and needs of households.

The consortium will be engaged in ensuring the realisation of the energy diagnosis (dwellings + macro scale) and in parallel the social diagnosis with identified households. The added value lies in the combination of technical and social diagnoses to identify the causes of summer and winter energy poverty at the level of buildings of social landlords and of energy-poor households.
The identified obstacles to these key actions are:

- Difficulty to engage energy-poor households

The proposed approach is to set up an early communication and information about the project shared with the tenants by the social landlords, ensure an early involvement in the project through survey and interviews, understanding their needs and explaining how the project will try to meet them, involving trusted third parties to contact households and involve them in the energy committees and training sessions planned within the scope of this project.
Assumptions to overcome the obstacle:

- Early information and discussions with the households (thanks to the semi-directed interviews and the social support activities proposed) can help mobilise the households
- Households need to see what they will gain from the project (better comfort, decreased energy bills)
- Households need to make sure that there will be as little disturbance on their daily life as possible through the project
- A network of trusted partners within the social landlord teams (employees and voluntary workers) will have to be mobilised

- Difficulty to collect energy poverty data at local and households' levels

When local statistical data are not available, more general data will be collected and conclusions might be drawn on this basis to explain the causes of summer and winter energy poverty.
Potential direct contacts with some local service departments (energy, social, housing, environment) can be organised to complement the research and when data are not available, a survey in the form of a short questionnaire will be sent out to households living in the buildings targeted by SHAPES. The questionnaire could also be coupled with the planned interviews and supported by the communication done by social landlords to these identified households.
Assumptions to overcome the obstacle:

- Disaggregated data are rarely available at local level, but local contacts and survey may help draw conclusions on the local specificities of energy poverty
- Even if the survey does not result in a large representative number of answers, combined with existing local data and contacts locally, the consortium should contribute to improving existing data on local energy poverty in the respective towns studied.

The comparison between the technical data and the energy and social profiles of households will help identify the gaps between quantitative data and the qualitative needs of households in order to figure out what kind of social support can be offered to the households to adjust their energy behaviour to the new technologies implemented. These actions are detailed in the WP2. Considering the data collected and analysed for the diagnoses, there is no obstacle to overcome here in the production of content for training sessions and specific communication tools. An active need for communication and close cooperation in and out of the consortium is required for a long-time avoiding overlapping with existing results.

While the diagnosis phase will provide key inputs for the solution to be presented to social landlords and potentially deployed, an obstacle could interfere in the decision process.

Lancey as a current solution provider to social landlords in France, will present its solution but will also prepare the retrofit project description considering another existing solution (heatpump) delivered by other companies.

These two solutions are complementary in retrofit projects according to the existing heating system and building internal organisation. As the solution does not provide the same guarantee in terms of energy efficacy and efficiency versus cost of implementation, and could not be installed in the same case of retrofit projects, we do consider them equally and will be presented in each report for the social landlords and the marketplace to choose in perfect and honest conditions.

- Difficulty to reach an attractive RoI for investors

Targeting the fuel poor has a bigger social impact but finances can be restricted or harder to obtain because of risk levels associated with ongoing revenue and payment sources. For example, if a tenant has control over energy payments, it can be challenging to get the tenant to change the amount or way they pay, unless a social housing organisation can take a lead role. Levels of ROI for investors is a challenge, given the typically low and longterm benefits on energy efficiency measures, in terms of financial cost savings. Some work has been conducted to identify the volumes needed to do large scale domestic retrofit in order to get attractive and viable interest rates from lenders. We will build on this work, combining it with the unique insight from the social and technical diagnosis.

- Difficulty to reach 10,000 consumers

An ambitious communication and dissemination plan will be defined to increase the visibility of SHAPES project, facilitate efficient knowledge exchange and finally to support dissemination of guidelines and good practises towards a very large audience. In part, workshops and conferences will be organized during the project to increase the visibility of the project and to facilitate dialogue and cooperation with ongoing other identified national and EU initiatives. These key events will be organized on a 6-month basis starting at M12. A kick-off for the consortium will take place in Grenoble with the presence of some stakeholders (Tenerrdis (energy transition cluster) and industrial chair Hope as key actors in France with additional networks). The specific objectives of the annual conference meetings are as follows:

- Annual conference 1: Presentation of the SHAPES project and presentation to other projects H2020-LC-SC3-EE-2020-2 and topic LC-SC3-EC-2-2018-2019 projects contributing to the energy poverty topic.
- Annual conference 2: Presentation of the mid-term results version of the SHAPES project with social and energy diagnoses done.
- Annual conference 3: Presentation of the results of the project and provide a forward-looking vision of the project.

Workshops will be organised with the achievement of results transferable to the large different communities (social landlords, national authorities, fund managers, academics, energy providers and aggregators…).

SHAPES will: i) Identify key events (Conferences, regional/national/EU meetings, etc.) to present the results of the project and ii) Stimulate regional/national/EU meetings to gather research initiatives, funders, policy makers and companies in order to exchange knowledge and best practises as well as align research aims and resources when applicable in collaboration with current European observatory and active stakeholders, finally iii) SHAPES will post online motivation and training videos to reach out a broader audience going beyond the households involved in the project.

Gender dimension

The gender-energy nexus is a key success factor for this project. If most energy policy are gender-blind[23], SHAPES will not consider the households as a homogenous entity but will distinguish energy practices between the members of the households. Women within households have a role to play as energy consumers, energy producers and energy decision-makers. The daily energy practices and routines of both men and women are shaped by norms and institutions and influence their energy vulnerability which will be addressed in the present project[24]. According to

[23] Clancy and Röhr 2003, Clancy et al. 2017, Fraune 2016, Wiliarty 2011
[24] Petrova, Simcock 2019

an EIGE report published in 2016, women face a higher risk of income poverty because women are more likely to work part time (32% for women against 8% for men)[25]. The pension gap is even worse with women getting 40% lower pension than men. The COVID-19 may have worsened the situation of women. A Eurofound survey emphasized that the employment gap between men and women may deteriorate in Europe. Whereas 24% of women reported financial difficulties due to the health crisis, only 22% of men reported the same. The gap is even wider between women and men with children. In that case 32% of women declared financial difficulties and 29% of men[26]. In WP1, the social diagnosis will look for a balance in gender, marital status, age to understand who, in a household, experiences energy poverty the most and why. WP2 will aim at involving women in all the social support activities developed and organised. Specific activities may be dedicated to empowering women so that they can adjust their consumption behaviour to the new technologies implemented. The uptake of new technologies within the home and the energy consumption behaviour are influenced by the agency of women which will be addressed in WP3. The drivers motivating women to adopt new energy technologies can be different from those of men, and this difference needs to be clearly identified in WP1 so that WP2 and WP3 can adopt adequate measures to involve women and meet their specific expectations. Different perceptions and motivations must be taken into consideration while deploying the project[27]. Finally, the leadership of the work packages of SHAPES are equally shared among women and men.

2. Impact

2.1. Expected impacts

Energy poverty is a distinct form of income poverty with a range of adverse consequences for people's health and well-being, such as respiratory and heart disease or mental problems, exacerbated by low/high temperatures (winter/summer) and stress from unpaid energy bills, or failure at school for the children concerned. In fact, energy poverty has an indirect impact on many policy areas, including health, the environment and economic activity and productivity. Tackling energy poverty has the potential to bring many individual as well as collective benefits, such as reduced government spending on health, lower air pollution and CO2 emissions, greater comfort and well-being, energy savings, improved disposable income, less tight household budgets, less stressful struggle related to the payment of energy bills and increased economic activity.

In the global context of clean energy transition, SHAPES' ambition is to allow social landlords to retrofit their buildings (with installation of renewable energies) so that energy transition-related technologies can help address households' energy vulnerabilities. This will help both social landlords and tenants to access efficient, clean and local energy solutions for heating (aiming towards zero CAPEX for social landlords and no domino effect on the rent cost for households). The postulate behind SHAPES is that he telecommunication world can bring a source of inspiration on both business model and access to state-of-the-art technology. Indeed, the telecommunication industry has been disrupted by the decentralized character of mobile devices or internet use as well as by offers proposed as a service offer. On the other hand, new technologies like domestic electricity storage (batteries) and accessible local production (especially with the huge decreasing cost of PV panels) will assist local consumers become prosumers (energy producers & consumers) and gain control over their own energy consumption. Helping vulnerable energy consumers become prosumers means that SHAPES will create virtuous circles, in terms of social activities, trainings, and education sessions to empower households to become active players of their energy use. The proposed creation of building energy committees is expected to create the participatory framework necessary to involve residents in the decision-making process to design SHAPES' technical and financial solutions. The specific design of the technical solutions of SHAPES and the associated investment plans in local energy in social housing sector will bring an unprecedented access to clean energy at low cost. At the contrary, current offers for prosumers are usually either from the high-tech (Tesla Powerwall, Sonnen) either off-grid oriented (and rustic). Into addition, by empowering social housing tenants exposed to energy poverty, SHAPES outputs will also bring significant positive contributions to tackle some of the global challenges described by the European Green Deal as well as to mitigate energy poverty, thus aiming at leaving "no one behind".

[25] https://eige.europa.eu/about/documents-registry/consolidated-annual-activity-report-eige-2016
[26] https://www.precarite-energie.org/wp-content/uploads/2020/07/epov-2020.pdf
[27] https://www.sciencedirect.com/science/article/pii/S2214629619306632?via%3Dihub

Figure 12: SHAPES in the European Green Deal and the United sustainable goals

SHAPES also aims to contribute to the UN Sustainable Development Goals such as affordable and clean energy (7), the climate action (13) and CO2 emissions but also to contribute good health and well-being (3) and economic growth (8).

An initial mapping of expected impact described in the work program are described below:

- **Primary energy savings triggered by the project**

The Primary Energy Factor (PEF) is a measure of how many units of primary energy are needed to get the unit of final energy to your house. The European Commission stated that the 2.1 factor should apply over the Member States[28] for electricity conversion.

The Primary Energy used by a house is calculated by adding up the total of the different energy types used by the house, each multiplied by the PEF for that energy type.

SHAPES project will lead to a decrease in the use of primary energy sources as we intend to deploy the installation of PV panels as an electric production asset in retrofit projects.

According to the use case detailed in the excellence section Table 10 and 11, p. 18 (and reminded below), the current technical solution deployed brings several positive metrics to be considered in terms of energy savings. The configuration Scenario 3 (i.e. the most ambitions) is considered for simplicity reason. This retrofit solution (PV panels + energy storage capacity + Capella heaters) lead to an energy saving of an average of 4010 kWh.

		Scenario 3 of retrofit	
		2,4 kWc – Lancey 2 batteries	
	Initial heating consumption	8230	kWh/year
	Consumption after retrofit (with Lancey)	6 500	kWh/year
	Produced energy	2 400	kWh/year
	Self-consumed energy (with Lancey)	2 280	kWh/year
	Surplus	120	kWh/year
	Energy consumed from the grid	4 220	kWh/year
Gains on heating	Gains on consumption	1 730	kWh/year
	Financial gains	272	€/year
Gains generated by the battery	Gains on consumption	-	kWh/year
	Financial gains	55	€/year
Gains generated by the PV	Gains on consumption	2 280	kWh/year
	Financial gains	465	€/year
TOTAL GAINS / dwelling		737	€/year
		4010	kWh/year
TOTAL GAINS for 57 dwellings		42 000	€/year

	Scenario 3 - 2,4 kWc + Lancey 2 batteries
Total cost Lancey	247 000,00 €
Total cost PV	210 000,00 €
Total cost retrofit	457 000,00 €
Cost PV / dwelling	3 684,00 €
Cost retrofit / dwelling	8020,00 €
Self-consump. Subsid.	10 944,00 €
Installation subsidy	39 800,00 €
Total gains / year	42 000,00 €
ROI (years)	8,0

Figure 13 : key metric of the selected scenario applied to the example use case

Considering the current applicable PEF of the EU Commission of 2,1, we obtain the following results:
4010 * 2.1= **8420 kWh of primary energy saving per dwelling**.

The SHAPES project will bring an energy diagnosis for 3500 dwellings. Considering all these identified dwellings would be equivalent to the ones given into the example, the retrofit with a Lancey electric solution would represent a savings of up to **29,5 GWh** the primary energy saving. This number is of course an estimation based on the example of this submission. It is worth noticed that the savings in primary energy will depend on the initial situation

[28] https://www.connaissancedesenergies.org/sites/default/files/pdf-actualites/directive%20du%2011%20d%C3%A9cembre%202018%20modifiant%20la%20directive%202012%2027%20relative%20%C3%A0%20l%E2%80%99efficacit%C3%A9%20%C3%A9nerg%C3%A9tique.pdf

of the building before retrofit (in particular the heating system). Thus, the exact number of the potential savings can be calculated only after finishing the energetical diagnosis of WP1.

Market opportunity

Key insights of the BPIE (Buildings Performance Institute Europe) shows that there is a real need in the refurbishing market: 97% of buildings in the EU need to be upgraded to achieve the 2050 EU objectives.

Age of the EU buildings stock. 3% of the buildings, that mean those built after 2010 are considered efficient. And 75% are considered as inefficient[29].

"*From our perspective it's clear that if we want to go to a decarbonised economy by 2050, the heating sector will have to make a very important contribution*," said Robert Nuij, an official in the European Commission's energy directorate. "*One of the flagships of the new Commission will be an action on building renovation*".

Social landlords have been identified by public authorities as key actors within each country recovery plans with a huge funding opportunity for retrofitting their own buildings. As stated above, so many dwellings need the public incentive and help to gain energy efficiency and efficacy. As shown below, each country represented by the consortium can manage access to identified public incentives.

Table 1: Overview of main public instruments identified that support energy renovations[30]

Member State	Sectors covered	Measure Type: Grants/ Subsidies	Measure Type: Loans/Soft Loans	Measure Type: Tax Exemption/ Reduction	Number of measures	Notable Examples
FRANCE (FR)	Residential	■	■	■	6	1) Energy Transition Tax Credit (CITE) 2) Social Housing eco-loan 3) Energy Saving Certificates
	Commercial	■	■	■	3	
	Public	■	■	■	4	
ITALY (IT)	Residential	■	■	■	5	1) Ecobonus 2017 tax deduction scheme 2) Renewable Energy for Heating and Cooling and Small Interventions Increasing Energy Efficiency Support Scheme (Conto Termico 2.0)
	Commercial	■	■	■	3	
	Public	■	■	■	4	
IRELAND (IE)	Residential	■			5	1) Better Energy Homes (Residential Retrofit) 2) Warmer Homes Scheme (Low Income Housing Programme)
	Commercial					
	Public					
PORTUGAL (PT)	Residential	■	■	■	6	1) Energy Efficiency National Fund 2) 1 Direito
	Commercial	■	■	■	3	
	Public	■	■	■	3	
ROMANIA (RO)	Residential	■	■		2	1) National Programme for Improvement of Energy Performance in Apartment Blocks
	Commercial					
	Public					
UNITED KINGDOM (UK)	Residential	■	■	■	7	1) Energy Efficiency Loan Scheme (SALIX) 2) Energy Company Obligation (ECO)
	Commercial	■			1	
	Public		■		1	

The alternative business model will consider these incentives to manage the risks of dealing with households on energy poverty and to decrease the cost of the production asset to be installed.

It seems realistic than in the 5 countries of the consortium we can consider the renovation of 700 000 dwellings a year (more than 100 000 have been renovated in France in 2019 instead of the planned 500 000).

With such an accessible market 35% could be considered eligible to the SHAPES current solutions (PV, PV+heatpumps, PV+heaters). This would lead to some 250 000 dwellings to be retrofitted before 2025.

- **Investments in sustainable energy triggered by the project**

Within the time frame of the project, the objective is to engage the retrofit of minimum 1 500 dwellings by M30 of the project.

Postulating that 100% of the 3500 dwellings to be studied during the 36 months of SHAPES, would be retrofitted, that would represent an approximative 8020€ * 3500 = 26 250 000 € of potential investment in PV production assets. Those assets would present a calculated RoI on less than 10 years (i.e. rather short compared to the expected 25 years of total lifetime of a PV power plant).

Considering that 1 million euros invested into the building leads to the creation of 16 jobs[31],[32] those 3500 renovations would lead to the creation of 420 jobs.

[29] Source EU Buildong stock observatory

[30] https://publications.jrc.ec.europa.eu/repository/bitstream/JRC117816/accelerating_energy_renovation_investments_in_buildings.pdf

[31] Commission Européenne (2016) « Privilégier l'efficacité énergétique: consommer mieux, polluer moins » ; Bruxelles, le 30/11/ 2016

[32] Perrier, Quirion (2016) « La transition énergétique est-elle favorable aux branches à fort contenu en emploi ? Une approche input-output pour la France », FAERE WP 2016.09 / Quirion (2013) « L'effet net sur l'emploi de la transition énergétique en France : Une analyse input-output du scénario négaWatt » CIRED No 46-2013

In the 5 years following the SHAPES project, the objective is that 260 000 dwellings (representing 1% of the total dwellings of the 26 million of Housing Europe association[33]) can be refurbished following the diagnosis, funding and retrofitting method of the project. Considering the same hypothesis of investment cost per dwellings, that would represent a total investment 1,9 billion euros and the potential creation of 31 200 jobs.

- **Economies realized by the households after SHAPES retrofit**

The mean economy realised per dwellings (considering the same example) is about 737 € per year as shown in Table. The postulate is that 50% of these savings are kept for the tenants, the other 50% being the source of revenues for the investors.

Thus, considering the complete retrofit of the 3500 dwellings targeted within and following SHAPES project, that would bring an impressive 750 000 € of savings each year (to be compared with the total budget of SHAPES, which is below 2 000 000 €).

- **Renewable energy production triggered**

This will contribute to the production of 1705 kWh per dwelling (average produced energy), and for the 3500 dwellings, it goes up to 5 967 500 kWh per year of local and clean energy produced.

- **Contributions to policy development and to best practice development on energy poverty**

After developing adequate tools to address collectively energy poverty in its multidimensional nature, the next step of SHAPES is to inform policy makers and promote synergies between different policy sectors such as housing policy, energy and energy transition policy and social policies. Considering the complexity of the drivers of energy poverty, SHAPES will promote a holistic approach of the phenomenon at all levels of the policy decision-making process: local actors, national and European policy makers. The members of the consortium together with the stakeholders have developed a lot of contacts with stakeholders at all these levels and will act as interface to promote synergies among them by relying on the results obtained within SHAPES.

    - metricss:
        - More than 10 events organised at local level
        - 6 events organised at national level (meaning with the participation of national public authorities like Misison Plan Bâtiment durable in France)
        - 5 events organised at EU level
        - And 150 institutional followers on SHAPES social media

- **Involvement of at least 5.000 consumers per million Euro of EU funding**

The project will scale up the number of households with interviews (350 households), the energy diagnosis realised in 3500 dwellings (with an average of 3 people each i.e; 10500), the communication ensured by social landlords, training sessions and enrolment in the technical solution definition and alternative business models. A large dissemination and communication strategy will help the 16 partners of the consortium to share SHAPES results with a larger audience composed of additional European social landlords, Observatory on energy poverty, public authorities which could lever the SHAPES impact on networking and decisions.

- **Reduction of greenhouse gases emissions (in tCO2-eq/year) and/or air pollutants (in kg/year)**

The electric solutions deployed in the SHAPES project (and beyond) will have an environmental benefits and results from a decrease in local air pollution (dust, benzo(a)pyrene) and carbon dioxide (CO_2) emissions which lead to climate change. According to analyses by experts from Building Performance Institute Europe (BPIE), the improved energy efficiency of buildings and heating systems, air pollution resulting from the so-called low-stack emission, i.e. burning solid fuels in inefficient household furnaces, will also drop significantly. Comprehensive thermal modernisation, preferably combined with a replacement of local heat sources and, in certain cases, with a ban on coal burning, will greatly reduce the demand for energy from low efficiency furnaces and, in turn, limit the emission of harmful substances.

- **Support schemes established for energy efficiency and/or small-scale renewable energy investments and to be sustained beyond the period of EU-support**

Addressing the missing link between social, housing, technical and financial stakeholders.

[33] [3]https://www.housingeurope.eu/

Energy poverty is a multidimensional phenomenon at the crossroads of many drivers and policies. However, a cross-cut energy poverty policy does not exist. Energy poverty is often addressed in silo, either by social policies (financial support to energy bills), or housing policies (retrofit measures) or energy-related policy (social energy tariffs, promotion of switching suppliers). Investors or tech companies are often reluctant to tackle energy poverty issues because of the lack of sustainable business models and because they do not exactly know the realities are behind the concept of energy poverty. SHAPES will demonstrate that working together allows to develop adequate tools for social actors, for technical actors as well as for investors to address energy poverty in the social housing sector. By contributing to the visibility and importance of such synergies, SHAPES will consolidate European collaborations among this group of stakeholders to promote further projects.

- **Raising awareness among students and junior researchers**

Based on its network of universities and higher education institutions and on its network of stakeholders, SHAPES will also aim to attract young talents and to raise awareness of young students both in social sciences studies and in engineering studies on the energy poverty issue and the added value they could bring to address the multiple drivers of energy poverty. Initiatives in France have already been launched thanks to the energy poverty student initiative of HOPE. SHAPES will cooperate with such network to show that energy poverty is a key challenge and that innovative approach is required. Universities and schools training future social workers, architects, energy engineers, policy developers and political decision-makers will be targeted. Moreover, internship contracts or short-term scientific missions will be offered by the academics of the consortium to junior researchers. Under the supervision of the academics of the consortium, young researchers will oversee the Irish and Italian case study..

  - Indicators:
    - Number of events with students
    - Number of students' participants
    - Number of participants in students' challenge
    - Number of internships/missions provided by the consortium
    - Number of followers on SHAPES' social media

- **Empowering energy consumers and encouraging energy behaviour change of households**.

SHAPES aims to empower energy consumers to become actors of their own energy choices and behaviour. This will be achieved through social activities, education and training sessions. The introduction of "building energy committee" in each building targeted by the project will help residents to be part of the decision-making process regarding the technical solutions offered and the social activities needed. The participants can then have a multiplier effect among tenants to explain the project and motivate them to be part of the education and training sessions organised by the consortium. The latter will help raise the awareness of social housing tenants about the energy system, foster empowerment towards self-decision-making on energy matters and contribute to behavioural change regarding their energy consumption or perceptions of efficiency. Motivation and training videos will represent a privileged tool to target households who are not living in the buildings involved in the project.

  - Indicators:
    - Number of participants in the "building energy committee"
    - Number of participants in the education and training sessions
    - Number of views of the motivation and training videos

- **Involving social landlords in the management of decentralised energy assets to ensure a positive impact on the energy bills of the tenants (see indicator above).**

The success of SHAPES is based on the involvement of social landlords in the management of a new production asset and in the way they can pass on the costs of the energy used to their tenants living in the building equipped or in a group of buildings. This is what new regulations on energy communities or collective self-consumption allow. However, this requires social landlords to play a new role in the management of an autonomous and decentralised energy production asset because they need to ensure that this result in a positive impact on the energy bill of their tenants. SHAPES is aware of this paradigm shift for social landlords and trainings will be organised and provided to social landlords' staff so that they can in turn communicate better with the tenants and support them to optimize the positive impacts of the investment made in retrofit and energy production system. The solutions implemented will be all the more accepted by the tenants if they can direct benefits from the new energy system. Moreover, reaching the expected energy savings and energy bill reduction expected is strongly based on the combination of changes in energy management on the side of the social landlords, and energy consumption behaviour changes of the tenants.

  - Indicators:

- Number of training sessions organised for social landlords' staff
- Number of social landlords' staff participating in the training sessions

To put the whole matter:

Project Performance Indicator	**Quantification**		**Measurement unit**
	within project duration	5 years after project ends	
Primary energy savings triggered by the project	up to 12,6	up to 2189,5	GWh/year
Investments in sustainable energy triggered by the project	11,5	1 950	million EUR
Renewable energy production triggered	3,6	624	GWh/year
Contributions to policy development and to best practice development on energy poverty	First realizations of social houses retrofit with zero investment remaining	Generalization of the investment scheme within retrofit operations of social housing in Europe	Number of retrofit of dwellings per year
Support schemes established for energy efficiency and/or small-scale renewable energy investments and to be sustained beyond the period of EU-support	3 500 social support and energy trainings	260 000 social support actions and energy trainings	Number of social support and energy training
Involvement of at least 5.000 consumers per million Euro of EU funding	With the carrying out of 3500 energy diagnosis in dwellings (i;e; 10500 households members), the social support activities (trainings & working sessions) plus the information provided by social landlords within their communities and planed workshop towards additional social landlords	780 000 dwellings (i.e. 3% of the EU social houses) could be diagnosed in the 5 years following SHAPES, in a view of retrofitting 260 000 social dwelling (1% of the EU social park) As a reminder 54 million of Europeans are suffering from fuel poverty.	Number of households
Reduction of greenhouse gases emissions (in tCO2-eq/year) and/or air pollutants (in kg/year)	4 830,9	309 715	in tCO2-eq/year
aaMarket stakeholders (professionals) with increased skills / capability / competencies on energy issues	40	80	Fund managers, social landlords, national authorities, energy suppliers
Stakeholders reached through media and events	50	100	Fund managers, social landlords, national authorities, energy suppliers, academics
People who changed their behaviour towards sustainable energy production or consumption	10 000	10 000	Number of households
Organisations participated in SHAPES activities about energy behaviour change	5 social landlords	250	
Building renovations triggered by the project	1500	260 000	
Jobs created	180	31 200	

No increase / stabilizing the energy bills of the tenants	Minus 30% of energy bills	35% of the energy bills	% (Comparing energy bills before and after the implementation of the solution)
Additional number of indoor thermal comfort hours	750 000	130 millions	number of comfort hours/year
Young talents recruited	5	5	internship contracts/short missions signed

2.2. Measures to maximise impact

a) Dissemination and exploitation of results

SHAPES project is impact oriented and includes strategic dissemination and exploitation goals that will be established during the project at various levels to address multiple target stakeholders and agency levels.

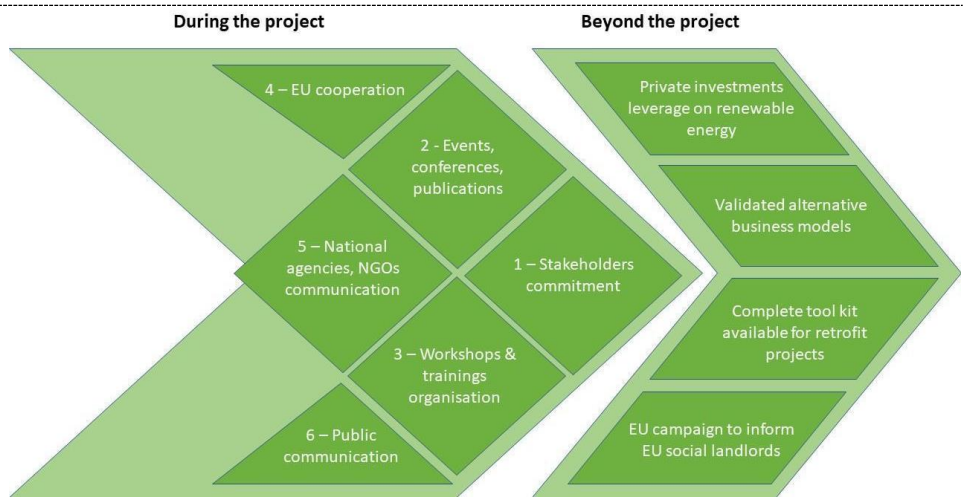

Figure 14: SHAPES project overall dissemination and exploitation strategy during and after the project lifetime

Actions will include:

- Making available the information generated through the project to all interested organisations (academic communities, national agencies, NGOs, Public at large).
- Informing decision makers/investors about the project important outcomes.
- Using the most significant outcomes of the project as a reference point for the deployment of retrofit projects and efficient heating solutions with a bottom up approach.

During the project, different communities will be targeted: academic communities, European social landlords, fund managers specialising in clean energy infrastructure investments, Regions / Towns and energy agencies and the citizens. The Stakeholder Committee will actively support the consortium in this task.

The following activities on dissemination and further exploitation of the project's results will be carried out:

1	Obtain and maintain stakeholders 'commitment	Resp. Lancey and Delta EE
2	Participation in major technical and social events	Resp. All partners
3	Organize workshops to present the SHAPES outcomes	Resp. Lancey, Delta EE, CIFE, UBB
4	Strengthen European collaborations and identify potential cross interactions between energy efficient buildings, artificial intelligence, energy market, public/private investors	Resp. NEC, ICS, FCT NOVA
5 &6	Communication towards the national energy and building agencies, NGOs, the Commission, the broad public and households	Resp. NEC

The consortium will plan activities to support this strategy, such as workshops or participation in scientific events. **Table 4** gives the timeline for key dissemination tools and materials to be prepared progressively with the results available and to be sent through traditional communication channels such as the project website, conferences as well as through social media. All these dissemination materials will include the H2020 acknowledgements. Lancey, NEC, CIFE and Delta EE will lead these activities with the active support of the partners.

Table 2: Timeline for SHAPES key dissemination tools and channels

SHAPES		Project Year 1												Project Year 2												Project Year 3											
Materials and events	**Main resp.**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Project website	Lancey			✓																																	
Leaflets	Lancey						✓												✓						✓						✓						
Posters	CIFE											✓					✓							✓				✓								✓	
Press release	All parnters	✓																	✓																		✓
dissemination video	CIFE / UBB						✓												✓																✓	
Trainings	All parnters						✓												✓							✓										✓
Papers and articles	All parnters						✓						✓						✓						✓					✓						✓
Workshops	Lancey & CIFE												✓						✓						✓					✓						✓
Participation to events	All parnters																																				
Public deliverables	Lancey			✓							✓							✓	✓							✓					✓						✓

Initial plans for Dissemination and Exploitation

The initial plans for Dissemination and Exploitation are presented below (Table 5 and Table 6). It will be validated at the project start and updated at M18 and finalised at M36. The dissemination activities are well tailored to target different communities and to obtain useful feedback. Moreover, workshops and training sessions will be organized over the duration of the project to present the SHAPES social, technical, and financial outputs and to obtain the commitment of the different targeted communities and stakeholders.

Table 3: SHAPES initial dissemination plan

Partner	National level									European level							
	Public authorities	Housing & energy poverty observatories	Academic community	Fund managers	Social landlords	Private companies	NGOs	Households in Energy precarity	Citizens	Public authorities	EU energy poverty observatory	Academic community	Fund managers	Social landlords	Private companies	NGOs	Citizens
LANCEY	x	x		x	x	x	x		x	x	x		x	x	x	x	x
ATC	x			x				x	x	x			x				x
CHA	x	x	x	x	x		x	x	x	x	x	x	x	x		x	
CIFE	x	x	x		x	x	x	x	x	x	x	x		x		x	x
CCC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
DELTA-EE		x		x		x	x		x		x		x		x	x	x
FCT NOVA	x		x				x		x			x					
HH	x	x	x	x	x	x		x	x	x	x		x	x	x	x	x
GEBALIS	x	x	x		x		x	x	x								
ICS	x	x	x						x	x	x						
Leeds			x			x						x			x		
NEC	x	x	x	x	x	x	x			x	x	x	x	x	x	x	
ODIT-E						x				x					x		
SERVELECT	x			x	x	x	x	x							x	x	
UBB	x	x	x			x	x	x		x	x	x			x		
UTC	x	x	x	x	x		x	x	x	x	x	x	x		x	x	x

The SHAPES consortium brings together Social landlords, Municipalities, European universities, and SMEs strongly involved in energy poverty studies, energy technologies, market analysis, funds management with the aim to design new approaches to mitigate energy poverty. This consortium represents the key actors of the value chain. **During the SHAPES project, they will combine their knowledge and expertise to develop an innovative and pragmatic tool kit for social landlords, to provide efficient energy solutions to households exposed to energy poverty (avoiding the necessary upfront costs and negative impacts on rent and bills), and to facilitate behaviour change for them to become real actor with energy consumption and optimisation.**

The initial exploitation plan will be validated at project start and will be reviewed at regular intervals and finalised at M36. Each local partner will ensure the methods, tools and solutions developed within the project are communicated and exploited within their local stakeholders and cities in a relevant and appropriate manner.

Table 4: SHAPES initial individual exploitation plan

Partner	Individual exploitation plan - Key Exploitable Results (KERs)
LANCEY	Communicate the SHAPES outputs in different pitch sessions and key business events. Increase R&I in areas today by organising workshops around legal issues, social acceptance, implementation research, etc Contribute to the growth of confidence required to support the investments needed for the deployment of solution validated by the bottom up approach of the SHAPES project

	Demonstrate political and social awareness of the usefulness of such approach as an essential tool for a decarbonised energy system fighting fuel poverty at the same time. Gain visibility for Lancey as a key actor in retrofit projects heating solution, increase the turnover with licencing the manufacturing and installations of efficient and relevant energetic solutions over Europe.
ATC	Share knowledge on fuel poverty with principal stakeholders (Region and Municipalities). This will have a strong impact on Regional Policies in terms of welfare management; Involve tenant associations and social welfare associations in initiatives related to fuel poverty contributing to ease the conflict between social housing companies and tenants in dealing with consumption matters. Increase transparency and provide an approach for Housing Agencies leading to significant equity discussions with tenants and their understanding of the equity impacts; Dissemination of SHAPE results with Professional bodies (Energy Managers, Engineers, Architects) involved in retrofitting and energy saving projects through online and conference events. Promote the use of the SHAPE approach and delivered solutions to Energy Service Companies operating in conjunction with ATC del Piemonte Centrale in retrofitting schemes for social housing.
CHA	Disseminate to public in County Cork through Skibbereen Climate Action Networks; Work with Cork Centre for Architectural Studies in UCC to all Ireland architectural community; Disseminate to social housing bodies in Ireland (through ICSH); to community organisations in Cork City and County (through PPN; Work with AIB and other Irish financial institutions to validate SHAPE models and with Housing Agency (IrishGovernment) to promote to other social housing bodies.
CIFE	Sharing knowledge with the academic community on the drivers of energy poverty in social housing by contributing to academic papers, workshops, briefing notes. Sharing knowledge on the importance of combining technical, financial and social approach to mitigate energy poverty in the context of energy transition within the academic community but also beyond (energy providers, NGOs, social workers). Participating in exchanges with other European research projects to give visibility to SHAPES approach (ENGAGER, EmpowerMed, POWERTY). Disseminating the toolkit and applying it to further research on energy poverty
CCC	Developed knowledge on key energy poverty drivers and household characteristics to further improve the selection criteria of properties for deep energy efficiency retrofitting; Contribute to local and national energy poverty mitigation action plans and climate action plans in Ireland; Promote the use of the SHAPE approach and delivered solutions to more effectively target properties for deep Energy Efficiency retrofitting in Ireland (Public and private).
DELTA- EE	Gain visibility in the current Delta EE markets and communicate the SHAPES outputs in different papers, key business events and social networks.
FCT NOVA	Leveraging the impact of previous developed work combining smart meters and surveys for energy poverty groups identification; Increased knowledge on key energy poverty drivers and household characteristics to further improve their existing high-resolution spatial scale multidimensional composite index, that allows EP mapping and characterization at a detailed level in Portugal. Contributions to local and national energy poverty mitigation action plans in the Portuguese context. Increase the SHAPE approach and delivered solutions to the national Portuguese context for effective energy poverty reduction. Key research and innovation provider for strengthening capabilities and support further R&D of the Portuguese ecosystem while creating synergies with other ongoing related projects with Portuguese agents. Dissemination of SHAPE within the international scientific community, through academic papers, proceedings, books, and conferences and events.
HH	Sharing experiences and diagnosis about Energy Poverty across EU countries to understand each other and the proposed solutions. The technical AND social approaches should lead to better address the most suitable solutions, to detect innovative or implement proven solutions.
GEBALIS	Share knowledge on fuel poverty with principal stakeholders in Portugal); Dissemination of SHAPE results with Professional bodies (Energy Managers, Engineers) involved in retrofitting and energy saving projects through online and conference events. Promote the use of the SHAPE approach and delivered solutions to Energy Service Companies operating in conjunction with Gebalis in retrofitting schemes for social housing

ICS	Exploitation of the results of the project in further research projects on (1) energy poverty drivers within specific contexts and (2) social acceptance and engagement of energy poor households with the technical solutions developed by the project. Exploitation of the results of the project by providing support to policy makers in the design of policies to fight energy poverty. Communicate the project results to non-academic audiences, including decision makers, national and local authorities and citizens, knowledge about the project results with national and international scientific networks, such as the European Sociological Association, the Energy & Society Network, the European Association for the Study of Science and Technology, the Portuguese Sociological Association by participating in scientific events where these networks regularly meet.
LEEDS	Production of scientific (peer reviewed paper/conference proceeding) dissemination about quantitatively diagnosing fuel poverty using landlord information in combination with remote sensing and GIS data; synergy with LBU activities for existing projects on energy and buildings;
NEC	Communicate the SHAPES outputs in different EU events towards relevant stakeholders and at policy levels; Gaining leadership at NEC level.
ODIT-E	Exploitation: Adapt and integrate metering data analytics into a global tool offering sustainable solutions for reducing fuel poverty; Adopt new business models with relevant partnerships to propose a comprehensive offer. Increase Odit-e visibility by promoting the offer and demonstrated SHAPES results towards DSO via technical papers at CIRED forums.
SERVELECT	Promote and deliver an improved package of energy management service for the local public authorities; Replicate the pilot sites actions from the project in several other local communities where Servelect is currently providing energy management services.
UBB	Sharing knowledge with the academic community on the drivers of energy poverty in social housing by contributing to academic papers, workshops. Disseminate knowledge on the importance of combining technical, financial and social approach to mitigate energy poverty in the context of energy transition within the academic community. Disseminating the toolkit and applying it to further research on energy poverty;
UTC	Develop and deliver instruction sessions on energy poverty, integrated in the nZEB, Energy Management, Energy Audit packages of post-graduate courses; Develop a white paper for the roadmap to be followed by the local communities and social landlords in reducing the fuel poverty; exploit the results of the project in relation with the other partners in several ongoing Horizon 2020 projects in which UTC is involved.

Strategy for knowledge management and protection

A consortium agreement will be negotiated and signed by all the parties in order to inter alia specify the terms and conditions pertaining to ownership, access rights, exploitation of background and results and dissemination of results, in compliance with the grant agreement and Regulation n°1290/2013 of December 11th, 2013. The consortium agreement will be based on the DESCA Horizon 2020 Model Consortium Agreement with the necessary adaptations considering the specific context and the parties involved in the project.

b) Communication activities

The objective of the communication activities in the SHAPES project is to reach out to society and show the impact and benefits of the project. The communication plan is designed to facilitate the targeted communities (academic communities, social landlords, national agencies, NGOs, fund managers and households) to assess, understand, accept and adopt the new knowledge generated by SHAPES.

- **Visual identity:** The strategic branding of the project will be ensured as soon as the project starts with the design of an original visual identity, including the project logo and its own visual chart as well as official project templates, a number of attractive documents both in traditional as well as in digital form.
- **Public website:** Creation, operation, and maintenance of the project website for generating public awareness about the project activities. The website traffic is monitored through detailed analytics such as the possible impacts of the participation to a major event or the contact of the persons that have been interested in participating in the project "stakeholder" session. All communication documents will be made available. The site will be maintained and updated on a regular basis and will remain active for at least 4 years after the completion of the project for supporting the project impact. In addition, each consortium member will have a dedicated section to the project in their own organization website.

- **Social media tools:** Presence in professional social networks (such as LinkedIn, Twitter, Research Gate) will be set-up in order to maximize the visibility of the published results and partners organization/participation of European events, and also to monitor the feedback (number and type of followers, comments regarding the project activities). The existing social network channels of the consortium members will be widely exploited to maximise the impact of SHAPES for different audiences

The table below summarizes the events selected by the consortium in 2021 to inform and reach out the targeted communities.

Targets	Key events
Public authorities and Observatories	Sustainable Energy Week (EU); Citizens' Energy Forum (EU); ENLIT Europe (EU); ENGAGER; Energy Poverty Observatory; Network of Energy and Climate Regional Agencies Conference. Irish Department of Housing and Planning; Local Government bodies; Sustainable Energy Authority of Ireland, National Housing Agency Cork County Council Housing Strategic Policy Committee; Presentation and information with Regione Piemonte, French national energy poverty observatory.
Academic & Research communities	eceee Summer Study energy efficiency. Energy and Society Conference. Annual Conference of the Portuguese Association of Energy Economics. CIRED international conference on electricity distribution. Roundtables and workshops on energy management and energy efficiency in buildings organized in Romania (around 2 per year), European Sociological Association conferences, European Association for the Study of Science and Technology conferences.
Funds Manager	ICSH Housing Association Finance Conference 2021,2022,2023. Periodical workshops organized by the regional EU funding agencies - ADRs in Romania
Social landlords	Irish Council for Social Housing, Annual Conference 2021,2022,2023 Workshop at Federcasa meeting Eurhonet, Federcasa, Housing Europe. Public local authorities, which are the largest social landlords in Romania, Proposal of a workshop with Union Sociale de l'Habitat in France
NGOs	Renovate Europe, IGBC Seminars, Energy Action Ireland, Cork Environment Forum Seminar, Sustainable Energy Communities Events, RAPPEL events in France, Rexel Foundation, Schneider Electric Foundation, G-INP foundation (chaire HOPE), Cluster Tenerrdis
Professional bodies	Royal Institut of Architects of Ireland, Ordine degli Architetti della Provincia di Torino and CNA, Royal Institute of Qauntity Surveyours. Romanian Society of Energy Auditors and Energy Managers - SAMER.ro; AAECR; OAER; ESCOROM, ADEME (FR), CSTB (FR)
Citizens	Annual event of the European Researchers Night

3. Implementation

3.1 Work plan – work packages, deliverables

To meet the goals and the requested impacts, the project is structured into 5 Work Packages and one additional dedicated to management covering a project time of three years (***Figure 13***).
WP1 will be dedicated to combine a social and an energy diagnosis. WP2 will focus on social activities allowing the participation of households in the design of the solutions to be deployed and their empowerment as actors of the energy market. The objectives of WP3 is to ensure the appropriate definition of the solution and its implementation. WP4 is on the development and validation of alternative business models, WP5 will ensure the dissemination strategies to communicate the results of the project. Finally, the coordination team will secure the allocation and coordination of all resources (human and financial) to reach the project objectives within the pre-defined contractual and time frames, including: project progress monitoring, costs follow-up, contractual and administrative and management of a Stakeholders committee with complementary interest to the project.

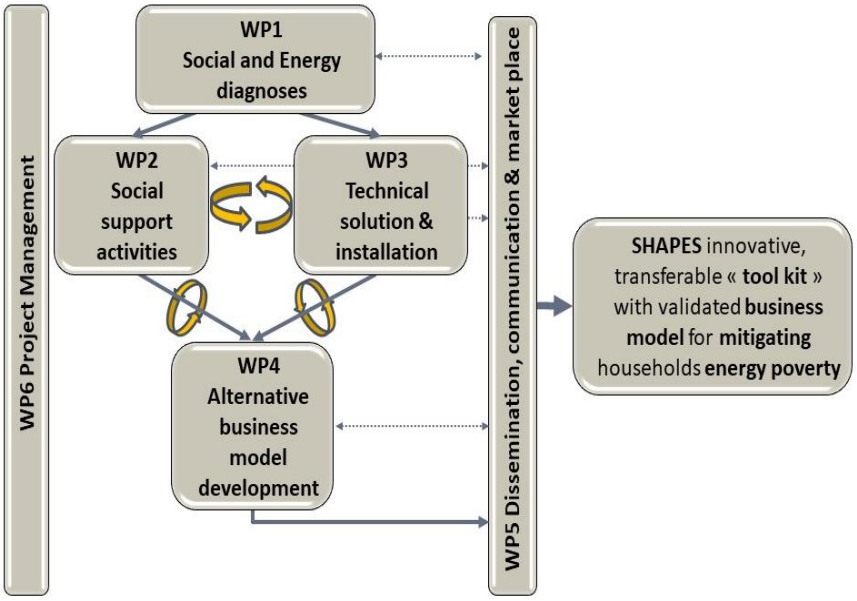

Figure 15: SHAPES project work plan

Timing of the different WPs

		Start month	End month	Year 1												Year 2												Year 3											
				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
WP1	**Social and energy diagnosis**																																						
T1.1	Understanding summer and winter energy poverty in social housing within specific local contexts	1	6																																				
T1.2	Energy diagnosis at buildings' level	1	30																																				
T1.3	Households profiling	1	30																																				
T1.4	Understanding energy experiences of social housing tenants	10	33																																				
WP2	**Social support activities**																																						
T2.1	Building an ecosystem of social support to mitigate energy poverty in social housing buildings	1	12																																				
T2.2	Training community mediators specialized in energy poverty	12	18																																				
T2.3	Setting up the Social Housing Energy Committee	18	36																																				
T2.4	Education for sustainable knowledge-based involvement	18	36																																				
T2.5	Developing technical and technological education programmes	18	36																																				
WP3	**Technical solutions and installation**																																						
T3.1	Defining the appropriate solution (dimensioning)	10	30																																				
T3.2	Implementation	20	35																																				
T3.3	Analysis of results	24	36																																				
WP4	**Alternative business models development**																																						
T4.1	Stakeholders mapping	1	6																																				
T4.2	Understanding investor needs	1	18																																				
T4.3	Gap analysis on existing business models	6	18																																				
T4.4	Model the technical and social solution	6	18																																				
T4.5	Business model design	12	18																																				
WP5	**Dissemination, Communication and marketplace**																																						
T5.1	Communication , dissemination and market place activities	1	36																																				
T5.2	Annual conferences and key events general organisation	6	36																																				
WP6	**Project and data management**																																						
T6.1	Strategic decision making	1	36																																				
T6.2	Operational management	1	36																																				
T6.3	Impact assessment monitoring	12	36																																				
T6.4	Personal data management for the diagnosis phase	1	30																																				

Figure 16: GANTT Chart

List of work packages

WP N°	WP Title	Leader	Person Months	Start Month	End Month

1	Social and energy diagnoses	CIFE	87.5	1	33
2	Social support activities	BBU	32.5	1	36
3	Technical solutions and installation	LANCEY	15.5	10	36
4	Alternative Business Model development	DELTA-EE	15,5	1	18
5	Dissemination, communication and marketplace	NEC	25.5	1	36
6	Project and data management	LANCEY	40	1	36
			216.5		

SHAPES work packages description

WP number	1						Lead beneficiary				CIFE					
WP title	Social and Energy diagnoses															
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	DELTA-EE	FCTNOVA	HH	GEBALIS	ICS	LEEDS	NEC	ODIT-E	SERVELECT	UBB	UTC
PM per participant	10	7	2	12	6	0	5	3	7	9	1	0	9	7	9	1.5
Start month	M1						End month				M33					

Objectives: The goal of WP is to develop a common diagnosis toolkit that could be scaled up EU-wide based on the combined results of social and energy diagnoses and a comparative diagnosis carried out in 5 European countries. i) combine a social and an energy diagnosis to carry out an in-depth socio-economic and energy analysis of both winter and summer energy poverty at local, building and households' levels, ii) determine categories of energy poor profiles based on technical and socio-economic data, iii) to understand the users' energy consumption behaviour needs and willingness to adopt the technologies proposed by the project, iv) characterize gaps between the technical data and the reality of the tenants, so that solutions developed can be adjusted to the building and living conditions of the households.

Task 1.1: - Understanding summer & winter energy poverty in social housing within specific local contexts – From M1 to M6

Task leader: CIFE - Participants: Social landlords, FCT Nova, ICS, UBB

General statistical overview of the specificities of summer and winter energy poverty in social housing in specific local contexts examined in the project:

- Determine the exogenous drivers of summer and energy poverty of social housing tenants in specific local contexts (climate, socio-economic environment, geographical location, infrastructures, energy prices etc.) based on available data
- Elaborate the endogenous dimensions of winter and summer energy vulnerabilities at households' level (socio-economic and demographic characteristics, equipment of the home, inability to pay, inability to keep home warm, high share of energy expenditure in income, low share of energy expenditure in income and inability to keep cool in summer) based on a survey sent out to the households living in the buildings studied.
- Characterize statistical energy poor households' profiles that will contribute to energy profiling of task 1.3

Specific roles of the partners: CIFE will provide and discuss the criteria to be used with other participants and contribute to energy poor households' characterization in France.

FCT-NOVA and ICS will contribute to energy poor households' characterization in Portugal.
UBB will contribute to energy poor households' characterization in Romania.
Under the supervision of CIFE, internship contracts or short-term scientific missions will be offered to young researchers in Ireland and Italy to carry out task 1.1 in both countries.
The social landlords in each country will share existing data on their buildings and households' profiles and share the contacts of the households to whom the questionnaire will be sent out.
Relationship to other tasks: *Task 1.1 is related to task 1.3 and 1.4*

Task 1.2: - Energy diagnosis at buildings' level – From M1 to M30
Task leader: Lancey – Participants: FCT Nova, Odit-e, Leeds, Servelec, UTC
Carry out an energy diagnosis in a sample of 3,500 buildings identified thanks to the pre-diagnosis form to characterize the buildings with households at risk of energy poverty.
Diagnosis starts by filling a pre-diagnosis form by the social landlords' teams themselves. Among the decision criteria can be counted the presence of smart meter / monitoring solutions, the ease of carrying out a renovation project of retrofit. In case of absence of a smart meter or of a monitoring solution, it can be decided to deploy a diagnosis station.
Collection of data: Consumption profiles, for a year, with a 30-minute sampling rate to obtain a building load profile thanks to computational analysis.
Specific roles of the partners: Lancey will ensure overall diagnoses of buildings at a macro level (meaning at retrofit project level). The partners mentioned above will collect data in their respective country and install the data loggers where necessary
Relationship to other tasks: *Task 1.2 is directly related to task 1.3*

Task 1.3: - Households profiling – from M6 to M30
Task leader: Odit-e – Participants: Servelec, FCT Nova
The objective is to elaborate households profiling to complement and fine tune the findings of task 1.1 and 1.2 at household' level and to provide a sample of representative categories energy poor household to be interviewed in task 1.4. A profiling will be performed per country studied. In countries where no smart meter is installed, SHAPES will nstall measurement kits. In that case, data collection, processing and analysis will take more time compared to buildings equipped with smart meters.
Data collection:
- Consumption measurements for electricity, gas, heating (for households or buildings)
- Outside temperatures and meteorological data
- In case there is no smart meter for the different energy vectors supplying the household (wood-heated household for instance), a temperature sensor will be temporarily set up
- These data should be collected for a period long enough to cover both winter and summer, with a sampling time of 30 minutes

Data processing:
- With smart metering data: computation of the consumption sensibility to external conditions.
- Without smart metering data: installation of measurement kits, computation of the internal temperature sensibility to external conditions

Profiling:
The sensibilities, social data and building types will then be analysed and clustered to obtained various profiles that are each representative of certain types of households, sharing similar sensibility to external conditions as well as similar social & building data.
Sample selection:
A sample of households, chosen to be representative of all profiles, will be delivered to task 1.4, where a deepen analysis will be performed: each of the profiles will be better understood by analysing the sample.
Specific roles of the participants: Odit-e will analyse the collected data in order to create the profiles, which will be discussed with FCT NOVA and Servelect in order to acknowledge from the specificities of each country, before proceeding to the sample selection.
Relationship to other tasks**:** Task 1.3 will take the data produced by tasks 1.1 and 1.2 as inputs in order to create profiles, that will be better understood in task 1.4 thanks to a deep qualitative analysis of a selected sample.

Task 1.4: Understanding energy experiences of social housing tenants – From M10 to M33
Task leader: CIFE – Participants: ICS, UBB, FCT-Nova, all social landlords

The objective is to analyse in-depth the practices, behaviours, perceptions and needs of the profiles of energy poor households created in task 1.3 in order to identify potential gaps between the quantitative data collected in task 1.1, 1.2 and 1.3 and the real-life energy burdens of energy vulnerable social housing tenants and to ensure that the social, technical and financial solutions offered by SHAPES don't miss their target. A representative sample of 50 households per country is going to be interviewed based on semi-directed interviews of around 90 minutes each. To be efficient, task 1.4 will start as soon as task 1.3 provides the first profiles

Specific roles of the partners: CIFE is going to provide and discuss the interview guideline, panel selection criteria and analytical framework with other participants and to carry out the interviews and analysis in France. FCT -NOVA and ICS will carry out the interviews and analysis in Portugal ; BBU will carry out the interviews and analysis in Romania. Under the supervision of CIFE, internship contracts or short-term scientific missions will be offered to young researchers in Ireland and Italy to carry out task 1.4 in both countries.

The social landlords will play a key role in identifying the households to be interviewed and to establish the contacts with them. The academics, as neutral actors, carry out the interviews and produce a report per country and a common comparative one.

Relationship to other tasks: Combined with task 1.1, 1.2 and 1.3, task 1.4 as well as WP2, WP3 and WP4.

Deliverables

D1.1: statistical overview of energy poverty in each country- M6
D1.2: Technical characterization of the building - M30
D1.3: Households profiling – M14
D1.4: Social diagnosis – M20
D1.4: Gaps analysis between energy and social diagnosis- M32
D1.5: European Diagnosis tool kit - M33

WP number	2						Lead beneficiary				UBB					
WP title	Social Support activities															
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	DELTA-EE	FCTNOVA	HH	GEBALIS	ICS	LEEDS	NEC	ODIT-E	SERVELECT	UBB	UTC
Person/month per participant	0.5	2	2	5	2	0	4.5	1	2	3.5	0	0	0.5	0	8.5	1
Start month	M1						End month				M36					

Objectives: To build a sustainable, value-based approach along three main areas of intervention: the households, the institutional/organizational stakeholders, and the social landlords. Each of these will play a role in the subsequent tasks, through which we aim to 1) to foster efficient support mechanisms dedicated to households to help them improve their living standards in relation to energy consumption and efficiency, 2) to promote cooperation between the different stakeholders (tenants, social landlords and institutional/organizational stakeholders, 3) to empower households with full knowledge of the energy market.

Task 2.1: Building an ecosystem of social support to mitigate energy poverty in social housing buildings
from M1 to M12

Task leader: UBB Participants: CIFE, Instituto de Ciências Sociais

The purpose of this task is to identify all relevant stakeholders involved in ensuring the access of the targeted households to energy services, information and support in each local context covered by the consortium. Within this activity we aim to use network analysis techniques in order to identify how the stakeholders interact, the strength of the links, which links function and which not to address energy poverty.

Mapping the relevant stakeholders on the access to energy services of social housing households topic.-The

envisaged stakeholders will include local and central authorities, energy providers, NGOs, landlords, experts, and tenants' associations (this list is indicative and we expect to have variations from one local context to another). This will lay the foundation of the "social housing energy committee", developed in task 2.3.

Conduct a network analysis. Based on the mapping done in A2.1.1 and by using scientific techniques specific to network analysis, in this activity we will identify the interaction patterns among stakeholders, the intensity of the relations generated, the most relevant and influential stakeholders, as well as marginal(ized) stakeholders. This activity also holds important comparative potential, as it will give a good image of the variation across Europe not only in terms of social housing arrangements, but also with respect to the quality in the energy services offered to social housing households, with respect to the functionality of the market, and to the interplay between state, private, and civil society stakeholders within the broader context shaped by national and local legislation and by the cultural and social backgrounds.

Specific roles of the participants: UBB will provide the methodology and a model of network analysis. The academic partners (CIFE, ICS) will assist UBB in conducting the analysis. The stakeholders identified will continuously be addressed within the dissemination activities in WP5.

Task 2.2: Training community mediators specialized in energy poverty From M12-M18

Task Leader: UBB Participants: CHA, Cork City Council, ATC, CHA, HH**,** ICS

Based on the outcomes results of task 2.1, the aim of this task is to equip representatives of the stakeholders involved in the access to energy services of the social housing households with the set of skills and knowledge necessary to understand the dynamics which shape the condition of tenants living in such households. At the end of the training, the representatives of the stakeholders should be able to understand the main dimensions of energy poverty, its drivers and its symptoms, the role and position each of their entities holds in the network of stakeholders, as well as ways to efficiently communicate with tenants and with other entities about the issues these households face with respect to energy access. These representatives trained will then take on the role of mediators between their entity and the social households, will act as multipliers among the tenants and become part of the Social Housing Energy Community described in task 2.3.

Developing training material for community mediators. In developing the training materials, the project team will communicate with stakeholders of other Horizon 2020 projects, such a STEP and SocialWatt to share existing knowledge and develop adequate training materials within SHAPES, a kit will be created and adapted to the social housing energy poverty aspects. The speakers will be experts (academics, researchers, practitioners) that will address the multiple facets of energy poverty for providing a holistic image of the phenomena and will highlight the nexus between energy poverty and social houses / social tenants. It represent six monthly trainings for a group comprised of at least one person delegated by each entity identified in task 2.1 as a relevant stakeholder in understanding what energy poverty means and how vulnerable consumer problems can be addressed.

- Training on the interaction of stakeholders
- Training on what energy poverty is, its drivers and its symptoms
- Training on how to communicate with members of energy poor households
- Training on how to provide sustainable social support by enhancing the role of each relevant stakeholder
- Training on how to provide effective technical assistance
- Conclusions, synthesis, future steps in working with energy poor households

Specific roles of the participants: Under UBB coordination, the participants will provide speakers and inputs related to the content of the trainings and of the training kit.

Relationship to other tasks: Task 2.2 is based on the mapping activity and network analysis. In task 2.1. It lays the ground for the functioning of the committees under task 2.3 and in providing proper content for T2.4 and 2.5.

Task 2.3: Setting up the Social Housing Energy Committee (SHEC) from M18-M36
Task leader: UBB Participants: all

Based on the results of task 2.1, in each consortium partner country and for each local context included in the analysis, a Social Housing Energy Committee (SHEC) will be formed gathering the representatives of the relevant stakeholders and of representatives of the tenants. The purpose of the SHEC is to foster continuous communication among tenants and stakeholders, to identify, comprehend, and address the energy issues of the social housing households by designing consumer centered solutions. We construct the SHEC in a way that will ensure its functioning beyond the span of the project.

Meetings of the SHEC – 4 meetings per year

Specific roles of the participants: Under UBB coordination, the landlords will organize the meetings. Consortium members will participate as observers to the SHEC.

Relationship to other tasks: Task 2.3 is based on the data collected in task 2.1. The activity of the SHEC will rely on the findings of WP1. The participants to the SHEC will be the persons trained as community mediators in task 2.2. The SHEC will assist in the definition and implementation of the technical solutions in WP3.

Task 2.4: Education for sustainable knowledge-based involvement-from M18 to M36

Task leader: UBB Participants: All

Under this task we aim to create content aimed at building sustainable social support mechanisms and deliver the content in the form of working sessions with tenants in selected energy poor households in the social housing buildings included in the sample. An important component of the working materials will address the tenants' rights and obligation in relation to each stakeholder: either in relation to public entities (as "tax payers" or "citizens"), in relation to private entities based on contracts, in relation to their landlords or utility providers.

As part of this series of activities, tenants will become familiarized the basic language needed to understand a contract, the information on a utility bill, or with procedures, such as how to file a request or a petition to the landlord or to a public or private institution. Moreover, they will be informed about the available support schemes (national or local) and the application procedures. The workshop will help raise the awareness of social housing tenants about the energy system, foster empowerment towards self-decision-making on energy matters and contribute to behavioral change regarding their energy consumption or perceptions of efficiency.

Design of print and video information materials material by the consortium partners with the assistance of the Social Housing Energy Committee. The content will be designed in accordance with the findings of WP1 and task 2.1 in WP2 and will include practical information that will help tenants adjust their consumption behavior to the technical and financial solutions provided in WP3 and WP4 and better position themselves in the interaction with the authorities and energy suppliers.

Selection of participants to the working session

Working session on education for sustainable knowledge-based involvement with tenants in selected households living in energy poor households in social housing buildings

Distribution of materials to all the tenants, reaching 10.000 households

Relationship to other tasks:The design of the information material and its distribution will be assisted by the Social Housing Energy Committee in task 2.3. The contents of the working session will be adjusted to the needs of households identified in WP1 and to the qualified knowledge of stakeholders identified in task 2.1.

Task 2.5: Developing technical and technological education programmes From M18-36

Task leader: UTCN Participants: Lancey, Delta EE, Servelect, Odit-e, FCT Nova

The aim is to create content aimed at providing a basic level of technical and technological knowledge and deliver the content in the form of working sessions with tenants in selected energy poor households in the social housing buildings included in the sample. An important component of the working materials aims to familiarize household members with the basic energy equipment in their apartments and the role walls, building material, insulation, or windows play in the degree of the household's and building's energy efficiency.

Design of workshop materials by the consortium partners with the assistance of the Social Housing Energy Committee. The content will be designed in accordance to the findings of WP1 and task 2.1 in WP2 and will include practical information on the main elements of their household with an impact over energy consumption, basic technical skills regarding the equipment and basic intervention skills.

Selection of participants to the working session

Working session on technical and technological education with tenants in selected households living in energy poor households in social housing buildings.

Distribution of materials to all tenants, reaching 10.000 households.

Relationship to other tasks: The design of the workshop activities will be developed by the consortium partners, with the input of the SHECs. the contents of the workshop will be adjusted to the needs of households identified in WP1 and to the qualified knowledge of stakeholders identified in task 2.1 and the technical solutions WP3.

Deliverables

D2.1 Map of stakeholders at the level of each local context included in the analysis (Month 4)

D2.2 Research report of the network analysis (covering all local contexts) (Month 12)
D2.3 Setup of the Social Housing Energy Committee (Month 12)
D2.4 Training kit for community mediators (Month 12)
D2.5 Community mediators trained (Month 18)
D2.6 Report on the activity of each SHEC (Month 36)
D2.7 Information material on involvement mechanisms (Month 24)
D2.8 Information material on basic technical and technological dimensions of the tenants' households (M24)

WP number	3						Lead beneficiary				LANCEY					
WP title	Technical solution and installation															
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	DELTA-EE	FCTNOVA	HH	GEBALIS	ICS	LEEDS	NEC	ODIT-E	SERVELECT	UBB	UTC
Person/month per participant	6	0.5	0.5	0.5	0.5	0	0.5	0.5	0.5	0.5	1	0	2	1	0.5	1
Start month	M10						End month				M36					

Objectives: i) ensure the appropriate definition of the solution to be installed and funded on the marketplace. ii) install the funded solution and iii) monitor all key metrics to analyse the expected performances.

Task 3.1: Defining the appropriate solution (dimensioning) – from M10 to M30
Task leader: Lancey – Participant: All
Thanks to the pre identification of dwellings realised at the beginning of the project, to the energy diagnosis at households level and building level, and to the additional inputs on the implementation of buildings and existing heating system, a solution could be defined and potentially deployed.
We will focus on 3 electric solutions, one with PV installation and sizing, a storage capacity and efficient heaters: a second one with PV installation and heat pumps and a last one with PV installation only. A complete identification of costs for the setup and maintenance would be presented, additionally, all revenue streams will also be analysed and presented to social landlords as first validation and the households (in WP2) and as a key input for the WP4.
Specific roles of the participants: Social landlords and solution provider will validate the choice of the solution to be implemented.
***Relationship to other tasks*:** tasks from WP1 and 2 will help designing the solution. The definition will be the key input for tasks of WP4.

Task 3.2: Installation- from M20 to M30
Task leader: Lancey
Organisation and follow up of the installation of the solution.

Task 3.3: Analysis of results- from M24 to M36
Several tools like Energy Management System (embedded in the Capella heaters), API on smartphone, involvement of households towards social landlords to share data like electricity bills will provide enough information to monitor the positive impact of the solution. Lancey in conjunction with social landlords will ensure such collection and analysis of data regarding the performance of the new heating system or production asset.
Relationship to other tasks: the deployed solution will be closely monitored to ensure feeding the task T6.3 impact assessment and monitoring.

Deliverables

D3.1: Definition of the first solution (Lancey; M18)
D3.2: Installation of the solution (Lancey; M30)
D3.3: Analysis of results (Lancey; M36)

WP number	4						Lead beneficiary				Delta-EE					
WP title	Alternative Business Model development															
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	**DELTA-EE**	FCTNOVA	HH	GEBALIS	ICS	LEEDS	NEC	ODIT-E	SERVELECT	UBB	UTC
Person/month per participant	5	0.5	0.5	0.5	0.5	**6.5**	0	0.5	0.5	0	0	0	0	0.5	0	0
Start month	M1						End month				M18					

Objectives
The goal of WP is to design a business model with associated financing detail that supports social landlords across Europe to fund retrofit energy efficiency measures in their properties.

Task 4.1: Stakeholder mapping - from M1 to M6
Task leader: Delta-EE Participants: All partners
The aim of this task is to identify and clearly map all stakeholders, their roles and the need identified in previous work packages. The following approach will be adopted:

- **Review the customer, policy and technical needs,** with the technical solution identified in WP1-3 highlighting any differences between different countries. Collate and review existing research in the area via additional desk-based research and some interviews.
- Map the stakeholders, their roles and their needs. Conduct additional research with financiers if required here, if needed before Task 2.3

Specific roles of the participants: Delta-EE will work with the WP leads from WP 1-3 in collation of these. Assessment is carried out across the EU Member States. The summary stakeholder map will be distributed WP leads to check and validate the map.
Relationship to other tasks: This task is the central starting point to build and see how the relevant parties' role will play out in the business model, and where the key interactions and challenges are.

Task 4.2: Understanding investor needs from M1 to M18
Task leader: Delta-EE Participants: Lancey, CIFE
This package will analyse and understand **and document investors and their needs in this area.** This will consist in, categorising investor types, describing their needs and drivers for investments in energy efficiency. It will also include mapping how investors consume and understand information, including details on deal flow and timescales in relevant project. The output of this is a clear needs summary of investors.
Specific roles of the participants: Exploration of funding sources will be led by Delta-EE but Delta-EE will rely on the networks and connections of all the partners, encouraging and engaging actively with investor stakeholders. This task will explore what financial institutions may participate in the proposed financing vehicle. Amongst others, public-private partnerships and private financing models will be explored while taking into account specific local/national market conditions.
Relationship to other tasks: This map is important to understand and get insights into how investors will view and process the technical solution and therefore the likelihood to funding a solution in the future, in the timescales of this project and beyond.

Task 4.3: Gap analysis on existing business models from M6 to M18
Task leader: Delta-EE Participants: CIFE, Lancey

This task will review the business models already present in the market, focusing on the role on financing targeting social housing

Specific roles of the participants: Delta-EE will develop some criteria to assess business models, e.g. take up, volume of finance deployed, number of projects etc. Using this, we will collate and document the key existing models, by which energy poor households are targeted across Europe (but also further afield if there are interesting applications). From this, we will be able to highlight the key barriers and issues for targeting the development of a successful business model. This work will be subdivided into the following steps:

- Review **existing asset-financing business models** structure and high level success, presented across Europe. This task is based on research complemented with a number of interviews with players across Europe
- Outline the different business models present or in development that cover technical solutions (WP3). These business models may only cover part of the technical solution
- Understand and validate the gaps in existing business models covering the technical solutions, with indicative sense checking with investor stakeholders

Relationship to other tasks: This work is dependent on a high-level understanding of WP3. However, it is critical to be completed before Task 4.4 as the gap will indicate the areas via which the new business models needs to improve on.

Task 4.4: Model the technical and social solution from M6 to M18

Task leader: Delta-EE Participants: All

The aim of this task is to model the **economic and social value of the proposed technical solution.** This will **take the costs of solution, and model the value to** stakeholders in terms of impact on energy savings, costs of energy savings, including any incentives or income values possible, as described in earlier WPs (e.g. savings from behavioural changes and social support). Where needed, additional desk-based research on incentive policies will be carried out, again focusing on 5 core regions, with an assessment for potential value across Europe. Lancey would provide the costs of the technical solutions, CIFE and BBU the social initiatives that would be taken. From this Delta-ee will construct and validate a model which shows the potential savings to the tenant and other stakeholders. Delta-EE will provide an important role in validating for an investor user, including the format and usability of the generated findings for investors.

Relationship to other tasks: This clearly links to the tasks in WP1 & 3 and form the financial case and value proposition of the business model to be presented to investors. The output of this will form a starting point to identify the amount of funding (per install, and for a group of installs) that will be sought from investors. This model will be a template that can be refined based on feedback from investors to pinpoint areas in the technical and social support where costs would need to be changed to make this attractive enough for investors.

Task 4.5 Business model design from M12 to M18

Task leader: Delta -EE Participants: All

The output of this will be a business model design (e.g. in the format of a detailed business model canvas) that focuses on a workable solution for investors, building on all the task in this WP.

It will be accompanied by a document that summarises and communicates this business model, plus regional variances, for investors for WP5 and other communication work

Delta -EE will design a workable applicable business model together, based on our gap analysis and iteratively testing this and with a clear supporting document that can be distributed and understood by potential investors. These two documents will be reviewed by the consortium to check technical and social claims, and to feed into investor testing. Exploration of type of funds will be conducted as an area to test and understand.

Relationship to other tasks: This task is the critical output for WP 5 to test and learn with investors as to what type of business model and returns will be workable.

Deliverables

D4.1: Stakeholder map (Delta-EE; M6)
D4.2: Funding needs report (Delta-EE; M18)
D4.3: Economic model (Delta-EE; M18)
D4.4: Business model design for investors (Delta-EE; M18)

WP number	5						Lead beneficiary			NEC					
WP title	Dissemination, Communication and Marketplace														
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	DELTA-EE	FCTNOVA	HH	GEBALIS	ICS	LEEDS	**NEC**	ODIT-E	SERVELECT	UBB	UTC
Person/month per participant	6	1	0.5	3	2	2.5	1	0	1	0.5	1	**4.5**	0.5	0.5	0.5	1
Start month	M1						End month				M36					

Objectives

- Communicate, stimulate dialogue and ensuring media presence and public visibility of SHAPES
- Organize and coordinate the participation of this CSA partners in key events and the dialogue with regional, national and EU initiatives.
- Organize annual conferences for communicating the results and the achievements of the SHAPES project.

Task 5.1: Communication, dissemination and marketplace activities

Task leader: NEC - Participants: All partners

The objectives of this task will be to develop and implement an appropriate dissemination strategy and materials to communicate on the results of the SHAPES CSA initiative. The activities aim at:

- Create the project visual identity and publish the public dissemination materials via the project website
- Designing and circulation of all templates for external communication by the partners ensuring that no confidential information is communicated.
- Informing all partners of related events and conferences and participate to the most relevant ones;
- Raise policy makers and scientific awareness via the use of social networks (Twitter, Facebook, LinkedIn) to spread the project results into the outside world
- Create and populate the marketplace to get Stakeholders onboard

Specific roles of the participants: All partners will creatively seek opportunities to disseminate the project results through their existing distribution channels. NEC and Lancey will set up and run the project website and prepare most of the dissemination materials and will manage the dissemination tools.

Relationship to other tasks: Task 5.1 is related to WP1, 2, 3 and 4

Task 5.2: Key events general organisation - from M6 to M36

Task leader: Lancey - Participants: UBB, CIFE, Delta-EE, FCT NOVA

Additionally to the task T5.1, the SHAPES Project will ensure the organisation (or co-organisation) of workshops and events in three different topics:,

- Social workshops: co-organised with Chaire Hope and Tenerrdis in France (M12/24/36), co-organised with the Romanian Society of Energy Auditors and Energy Managers (M18), co-organised with EAPN Portugal (M24), co-organised with Irish Department of Housing and Planning (M36), co-organised with Regione Piemonte (M36) co-organised with the EU projects EmpowerMed M18, with POWERTY M26
- Technical workshops (co-organised with Chaire Hope and Tenerrdis in France (M12/24/36)
- Marketplace workshops (M12/18)

Contributions of SHAPES to European events:

- European events: contributions of SHAPES to the EU Sustainable Energy Week (EUSEW) in Brussels; REDay of Renovate Europe; International Social Housing Festival; Annual Conference of the EU Energy Poverty Observatory

All these workshops could be organised jointly with ongoing initiatives (stated in the Excellence part) or could be done on SHAPES initiative only according to the messages to be spread and targeted communication channels described in the section 2.3 and 2.4.

Specific roles of the participants: Lancey, UBB, CIFE, UBB and Delta EE will design the workshop framework, organize the workshop (flyer, information on homepage…). The project partners will support defining the agenda.

Relationship to other tasks: The workshop agenda are based on the input from WP1, 2, 3 and 4.

Deliverables
D5.1: Project website and social network account (Lancey; M2)
D5.2: Initial dissemination plan (Lancey; M12)
D5.3: Workshop reports (Lancey, CIFE, Delta-EE M18, 29, 36)
D5.4: Final dissemination plan (Lancey; M36)

WP number	6						Lead beneficiary				LANCEY					
WP title	Project and data management															
Participant	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Participant Short Name	LANCEY	ATC	CHA	CIFE	CCC	DELTA-EE	FCTNOVA	HH	GEBALIS	ICS	LEEDS	NEC	ODIT-E	SERVELECT	UBB	UTC
Person/month per participant	10	2	1.5	1.5	2	1.5	1.5	1.5	2	1.5	1.5	1	7.5	1.5	2	1.5
Start month	M1						End month				M36					

Objectives: This WP aims to:
- Define and maintain the decisional and operational framework within which the project strategy is decided and implemented;
- Inform all beneficiaries on how the activities are monitored and controlled, and how the results are assessed and reported throughout the project life cycle.
- Ensure the impact monitoring of the project at partners and households' level.
- Ensure the global management of personal data for the diagnostic phase

Task 6.1: Strategic decision making – from M1 to M36
Task leader: LANCEY – Participant: All partners
The work is carried out by the Project General Assembly (PGA), which is chaired by the project Coordinator and involves one representative per partner with equal decision power. On a day-to-day basis, the PGA tasks include but are not limited to:
- Set the priorities by articulating and assessing the project actions and progresses towards its achievements.
- Establish consensus within the consortium over intended outcomes/results.
- Adapt decision strategies to internal and external circumstances change.
- Organize and attend PGA monthly meetings via audio/video conference and two F2F meetings per year where strategic decisions will be taken.

During the implementation of this task, it is expected to verify the proper alignment of resources and actions towards the project's objectives.
Specific roles of the participants: Lancey will lead this task and chair the PGA and all partners will participate in any strategic decision making.
***Relationship to other tasks*:** In order to turn the high strategy into more operational planning and action items, the PGA gives clear indications to the task T6.2 that will put in place the necessary actions to execute the decisions.

Task 6.2: Operational management - from M1 to M36
Task leader: LANCEY – Participants: All partners
This task deals with the general project management activities such as organization of meetings, reporting, facilitating communication and coordination processes and tools as well as the financial management of the project and interface to the Commission. The operational procedures will be summarized in the Project Handbook to all actors in the project so as to facilitate effective and efficient contribution and reporting while complying with the contractual framework and best management practices. Efficient monitoring will in particular be subject of this task: Cost and progress reporting; Coordination, preparation of progress meetings and planning of activities;

Planning and monitoring of the outputs; Coordination between the management actors, management boards and the general assembly; Overall legal, contractual, ethical, financial and administrative management; Update the internal and external risks register and implement their mitigation measures.

Task 6.3 Impact assessment and monitoring - from M6 to M36
Task leader: LANCEY – Participant: All partners
Identify and define the operational framework to maximize the use of the results and outcomes of the project and monitor the impact of the solution deployed during the project.

- Collection and analysis of Key Exploitable Results (KERs), such as:
  - Increase synergies and collaborations between the different identified communities (research/academic, social landlords, national agencies…)
  - Promote cross-thematic collaborations
  - Transfer information to the political leadership and funding agencies
  - Popular science seminars and white papers for attracting interest from the public (including teachers and pupils in the school system) etc.
- Assess the usability of the KERs beyond the context of the project and identify the most suitable approaches;
- Assess the performance of the deployed solution thanks to the monitoring tools installed (API, Energy Management System) and the inputs of the production asset manager.

This task will include dedicated work sessions and questionnaires with the consortium. Additionally, social landlords will provide information on energy efficiency of the solution at households' level. Another items which will be monitored is the consumption of energy versus the previous bills. The conclusions of these work sessions will be presented in deliverables D6.2 and D6.3 and will be divided in two parts with the impact assessment of the project towards all partners and impact assessment of the solution deployed towards social landlords and households.
Relationship to other tasks: This task is linked with WPs 1.2.3 and 4 outputs to clode the loop and validate the efficiency of the methodology.

Task 6.4: Personal data management for the diagnosis phase - from M1 to M30
Task leader: Odit-e – Participants: ATC, CCC, Gebalis, UBB
Both diagnoses carried out in the WP1 will require the analysis of personal data. A state of the art of existing regulations at European and national levels needs to be carried out to make the realisation of SHAPES diagnoses compliant with the regulatory framework.
The required personal data preliminarily identified is the following:
Social housing data shared by landlords ,Surveys sent to the households to collect household's level data,Smart metering data for electricity, gas, and heating, Building characteristics, Data loggers to be installed by Landlords for collection such as internal temperature.
The lawfulness of this collection, analysis and of the data's life cycle in SHAPES will be based on the consent of households. This task will consist in the design of a common framework to address personal data regulation within SHAPES' diagnoses. A set of documents, fitting the varied regulations to benefit from households' consent will be edited, translated, and proposed on the project website to be signed electronically and managed. This work will be based on desk research and discussions with social landlords, DSOs and energy companies.
Specific roles of the participants: Exchange of experiences with social landlords and SHAPES stakeholders in the energy sector. All social landlords will contribute to the edition of the set of documents to be provided to households to signature to ensure the proposed approach is GDPR compliant and the provided information make the approach fair and transparent.
Relationship to other tasks: This task is closely linked to the activities within WP1

Deliverables
D6.1 Project handbook (Lancey; M2)
D6.2 Impact assessment#1 (Lancey; M18)
D6.3 Personal data framework (Odit-e; M30)
D6.4 Impact assessment final version (Lancey; M36)
* WP6 deliverables also include the submission of the contractual periodic reports to the Commission at the end of each period

Table 5: SHAPES list of deliverables

D N°	Deliverable name	WP	Leader	Type	Diss. Level	Deliv. M
D1.1	Statistical overview of energy poverty in each country	WP1	CIFE	R	PU	6
D1.2	Technical characterization of the buildings	WP1	LANCEY	R	PU	30
D1.3	Households profiling	WP1	ODIT-E	R	PU	14
D1.4	Social diagnosis	WP1	CIFE	R	PU	20
D1.5	Gaps analysis between energy and social diagnosis	WP1	CIFE	R	PU	32
D1.6	European diagnostic tool kit	WP1	CIFE	R	PU	33
D2.1	Map of stakeholders at the level of each local context included in the analysis	WP2	UBB	R	PU	4
D2.2	Research report of the network analysis (covering all local contexts)	WP2	UBB	R	CO	12
D2.3	Setup of the Social Housing Energy Committee	WP2	UBB	R	CO	12
D2.4	Training kit for community mediators	WP2	UBB	R	PU	12
D2.5	Community mediators trained	WP2	UBB	R	PU	18
D2.6	Report on the activity of each SHEC	WP2	UBB	R	PU	36
D2.7	Information material on involvement mechanisms	WP2	UBB	R	PU	24
D2.8	Information material on basic technical and technological dimensions of the tenants' households	WP2	UTC	R	PU	24
D3.1	Definition of the first solution	WP3	LANCEY	R	CO	18
D3.2	Installation of the solution	WP3	LANCEY	R	CO	30
D3.3	Analysis of results	WP3	LANCEY	R	CO	36
D4.1	Stakeholder map	WP4	DELTA-EE	R	CO	6
D4.2	Funding needs report	WP4	DELTA-EE	R	CO	18
D4.3	Economic model	WP4	DELTA-EE	R	CO	18
D4.4	Business model design for investors	WP4	DELTA-EE	R	CO	18
D5.1	Project website and social network account	WP5	LANCEY	R	PU	2
D5.2	Initial dissemination plan	WP5	LANCEY	R	CO	12
D5.3	Workshop reports	WP5	Lancey, CIFE, Delta-EE	R	PU	18,29, 36
D5.4	Final dissemination plan	WP5	LANCEY	R	CO	36
D6.1	Project handbook	WP6	LANCEY	R	CO	2
D6.2	Impact assessment#1	WP6	LANCEY	R	CO	18
D6.3	Personal data framework	WP6	ODIT-E	R	CO	30
D6.4	Impact assessment final version	WP6	LANCEY	R	CO	36

3.2 Management structure and procedures

a) Organizational structure and decision-making mechanisms

The SHAPES consortium is composed by 16 partners bound by the terms and conditions of the Grant Agreement and its annexes (GA), The Consortium Agreement and its annexes (CA).

The profile of the consortium features 5 SMEs, 5 Universities and 1 Institute, 5 social landlords (city council, agency, association…), each with a specific culture and working modes. Consequently, meeting the objectives requires a continuous management down to the task level driven by both internal and external risk assessment and monitoring. The decision-making structure has been designed in order to avoid multi-layer decision processes thus ensuring transparency and consensus while allowing formal and binding decisions for the strategic driving and the resolution of conflicts whenever needed (***Figure 15*** **and** ***Figure 16***).

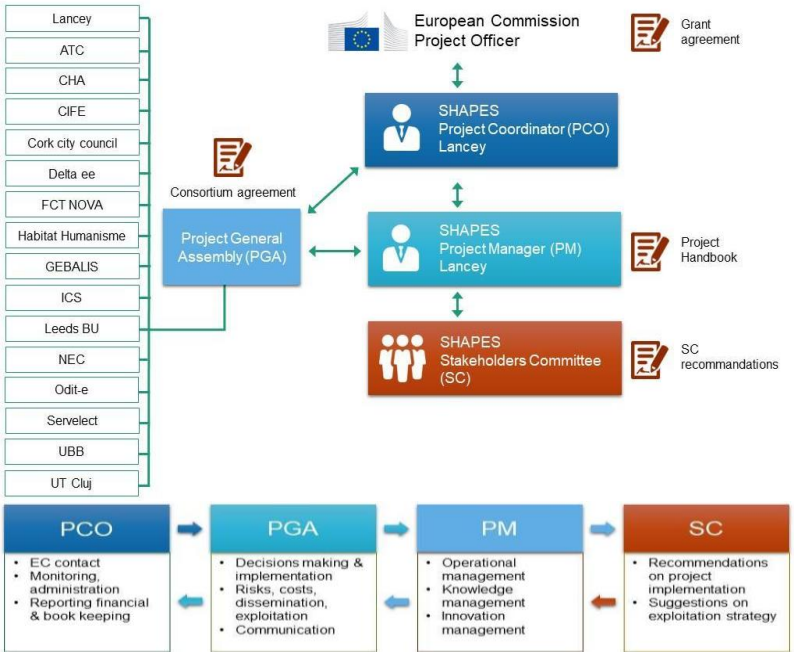

Figure 17: SHAPES project schematic view of the overall organization of the project

Project Coordinator (PCO): Lancey represented by Raphaël Meyer.

The coordinator acts according to the binding provisions of the H2020 participation rules and the GA, and implemented according to the detailed procedures of "WP6: Project management" which will be formally stipulated and accepted by the Beneficiaries signing the CA. This includes the project overall monitoring, the relations with the Commission, the project administration, the due reporting and the financial responsibility and bookkeeping.

Project Managers (PM): Lancey represented by Olivier GUERARD

The PM provide the beneficiaries with a professional managerial capacity to lead the actual implementation of the high-level strategic decisions of the project general assembly (PGA) on a day-to-day basis. The PM will be in close contact with all WP leaders to foster interactions between them. The PM will make available all the information needed for decisions concerning the implementation of the project. The PM is in charge of encouraging professional management up to the project success and must keep archives for as long as stipulated in the GA. The PM is in charge of the Project Handbook preparation and is responsible for the proper implementation of the procedures.

Project General Assembly (PGA)

The Project General Assembly (PGA) is chaired by the PCO and involves one representative for each Beneficiary[34] with one vote each. The PGA members take all decisions concerning the project strategy, the budget and costs issues, the dissemination, exploitation and IPR as well as the legally binding actions in the legitimate interests of their respective institutions and their collective commitments based on the joint and several liabilities fixed by the GA. Only the PGA has the authority to alter the project work plan significantly. The PGA meets on a quarterly basis via conference call meetings to assess the relevant deliverables, the achievements against the success indicators, the evolution of the internal and external risks (Table 3.2b), the dissemination and communication activities so far and the efforts and budget consumption. The PGA can invite any external expert with consultative power provided no beneficiary objects.

Stakeholders Committee (SC)

The Stakeholders Committee (SC) will play the role of an ecosystem for providing inputs for running the project. The SC will provide feedback in order to help align the SHAPES project results and the expectations of the different communities (Academic, Funds manager, National agencies, Social landlords, Public). Additionally, the SC will contribute to reaching a considerable visibility of the project results at the European level. The SC is already composed at this stage of European or national organizations summarized below:

[34] If a member cannot attend the PGA meeting, he or she can be represented by a member of his or her working team

The list is not final yet and will keep on evolving during the project implementation and new interested members will be recruited during the SHAPES project.

b) Methods for monitoring and reporting

Management tool

All actors involved in the project will use an Internet-based tool specially designed for the management of H2020 European projects such as Project Netboard[35]. This tool is dedicated to the administrative, financial and legal coordination and operational management. This is a secured collaborative platform for guiding management of European projects. The system offers templates and protocols for project activities and finances monitoring and reporting. Concerning the knowledge management, the system includes a private domain enabling structured sharing of resources, collaborative work on documents in many different formats, and archiving. Additional facilities are the shared agenda, the forums on any topics of interest to the consortium or activities as well as news broadcasting.

Reporting

The PM will coordinate the generation and submission of the project reports to the Commission. This concerns especially the detailed Periodic Reports which are generated according to the GA schedule, together with the Deliverables that were completed during the past period. Besides the technical reporting, the PCO will also prepare for the Commission a consolidated overview of the project budgetary situation, based on the cost statements provided by each individual project partner. Milestone reviews will serve to critically assess the progress of the project, the update of internal and external risks and the outlook for the result exploitation compared to the project work plan.

Meetings

- **PGA:** 2 Face-to-face meetings per year and quarterly meetings organized by the PCO (by web conferences).
- **SC:** 3 sessions annexed to the project PGA meetings (face-to-face or by web conferences), organized by the PCO to obtain external feedback.
- **PM:** The PM, if necessary, might organize additional meetings, Face-to-face or web conferences.

c) Innovation management addressed in the management structure and work plan

The project management structure is designed to allow both internal and external opportunities monitoring and follow-up. Internal opportunities monitoring through the activities progress assessment is performed by the PM. During each consortium meeting, the PM will present external information related to project results and potential impacts. During these meetings, innovation sessions will be meant to elaborate and update a clear view of the external environment linked to project results. These sessions will focus on fostering internal and external communication towards defined targets to strengthen the expected impacts of the project in the exploitation prospective.

The milestones are defined in the table below:

Table 6: List of milestones

MS N°	Milestone name	Related WP	Related OBJ	Due date	Means of verification
MS1	Households commitment and consent to social and energy diagnoses	1	1	M14 M20 M30	Number of accepted access to the dwelling, access to information on electric bills, commitment to the households' survey, number of interviews accepted by households. Deliverables D1.2, 1.3, 1.4
MS2	Training material for community mediator	12	1	M12	Training kit for community mediators available Deliverable D2.4
MS3	Launch of the training sessions to households	2	1	M18	Information material on involvement mechanisms and on basic technical and technological dimension. Deliverable D2.5, 2.7
MS4	Definition of the first technical solution to be deployed	3	1, 2	M18	D3.1
MS5	Definition of the first project to the marketplace	1,2,3,4	1,2,3,4	M18	Launch of the marketplace: Number of active stakeholders (D4.3 And D4.4.)

[35] The tools are documented at http://www.projectnetboard.com/en

MS6	Stakeholder commitment to participate to the external workshops	1,2,3,4,5	1,2,3,4	M18 M36	Participation of stakeholders (fund managers, Energy services provider, academics, clusters and social landlords) to workshops. D5.3,
MS7	Installation of the funded solution	1,3,4,5	1,2,3,4	M30	D4.4, D3.2
MS8	Midterm review meeting	All	All	M18	Review report

The critical risks for implementation are defined in the table below:

Table 7: Critical risks for implementation.

Description of risk	WP involved	Prob.	Impact	Proposed risk-mitigation measures
COVID-19	All	Low	High	When possible use of webinars for meeting or phone or other digital technologies to reach out households (when they are equipped)
Insufficient number of attendees to the SHAPES workshops	1,2 and 5	Low	High	Every SHAPES partner is involved in EU projects and national/European networks. A larger communication strategy will be implemented
Social landlord commitment to energy and social diagnosis	1, 2, 3, 4 and 5	Low	High	Social landlords have been fully integrated and heard in the design of the proposal. Each partner has already been involved in different initiatives at national and EU level and the network is already large and ready to help.
Low return rate for the diagnosis survey	1,2	High	Medium	The low return rate should be compensated by complementary data collected locally through local contacts
Negative impact of the business model on the income of the households	4	Low	High	Design the financial model and management of the production asset to ensure that there will not be any negative impact on the disposable income of the tenants.
Issue to reach an attractive RoI	1.3 and 4	Low	High	The financial aspects have been validated on a real use case. In case of not reaching an acceptable RoI for investors, several mitigation measures could be: merge retrofit projects at social landlord to lever the tools of the solution; find an appropriate solution to call additional sources of funds from public side to decrease the risks.
Lack of acceptance of the technologies provided	1,2 and 3	High	High	Early involvement of households in the decision-making process (WP2) and specific needs of households (WP1) considered in the design of the technical solutions
Low energy savings reached	3 and 4	Medium	High	Adjustment of the technical solutions to the buildings' and households' characterization, training and education dedicated to households to ensure energy behaviour change.

3.3 Consortium as a whole

The SHAPES consortium is a strong and complementary partnership of social landlords, academic partners, energy solution providers, and a market analysis consulting firm involved in energy poverty issue. The overall consortium is made of 16 partners coming from 6 European countries (Figure below).
The workplan is clearly defined so that each partner has a precise role and does not work in parallel to the others. Many interactions have been planned and will allow a collaborative approach to address different key targets

All partners will be involved in reaching the 4 different objectives of the project.
Lancey, CIFE, NEC, Delta-EE and Servelect will identify and will obtain stakeholders commitment on both topics (social and technical, financial). NEC, CIFE, and all academic partners will harmonise the SHAPES project with the current on-going programmes (EU & national). Finally, NEC, CIFE, Delta-EE and Lancey will develop and implement an appropriate dissemination strategy and materials to communicate on the social, technical, and financial results of the project.

3.4 Resources to be committed

The total requested EC contribution is **1 997 190 €**. The budget per partner is presented in the table below.

Participant	Effort (PM)	Personnel cost (€)	Other Direct cost (€)	Indirect costs (€)	TOTAL costs (€)	Requested EC contribution (€)
P01 - LANCEY	37	210 900	80 000	72 725	363 625	**363 625**
P02 - ATC	13	55 900	15 000	17 725	88 625	**88 625**
P03 - CHA	7	37 525	21 400	14 731	73 656	**73 656**
P04 - CIFE	22,5	128 250	82 000	52 563	262 813	**262 813**
P05 - CCC	13	69 689	23 000	23 172	115 861	**115 861**
P06 - DELTA EE	10,5	56 287	29 000	21 322	106 609	**106 609**
P07 - FCT NOVA	12,5	58 450	10 000	17 113	85 563	**85 563**
P08 - HH	6,5	34 470	15 000	12 367	61 837	**61 837**
P09-GEBALIS	13	60 788	15 000	18 947	94 735	**94 735**
P10-ICS	16	84 720	13 000	24 430	122 150	**122 150**
P11-LEEDS	4,5	24 123	13 000	9 281	46 404	**46 404**
P12-NEC	5,5	23 650	13 000	9 163	45 813	**45 813**
P13-ODIT-E	19,5	111 150	13 000	31 038	155 188	**155 188**
P14-Servelect	10,5	23 100	136 000	39 775	198 875	**198 875**
P15-UBB	20,5	71 750	28 000	24 938	124 688	**124 688**
P16 - UTC	5	33 600	7 000	10 150	50 750	**50 750**

Table 8: Summary of staff effort

Participants	WP1	WP2	WP3	WP4	WP5	WP6		
P01 - LANCEY	9,5	0,5	**6**	5	6	**10**	**37**	**17%**
P02 - ATC	7	2	0,5	0,5	1	2	**13**	**6%**
P03 - CHA	2	2	0,5	0,5	0,5	1,5	**7**	**3%**
P04 - CIFE	**12**	5	0,5	0,5	3	1,5	**22,5**	**10%**
P05 - CCC	6	2	0,5	0,5	2	2	**13**	**6%**
P06 - DELTA EE	0	0	0	**6,5**	2,5	1,5	**10,5**	**5%**
P07 - FCT NOVA	5	4,5	0,5	0	1	1,5	**12,5**	**6%**
P08 - HH	3	1	0,5	0,5	0	1,5	**6,5**	**3%**
P09-GEBALIS	7	2	0,5	0,5	1	2	**13**	**6%**
P10-ICS	9	3,5	0,5	0,5	1	1,5	**16**	**7%**
P11-LEEDS	1	0	1	0	1	1,5	**4,5**	**2%**
P12-NEC	0	0	0	0	**4,5**	1	**5,5**	**3%**
P13-ODIT-E	9	0,5	2	0	0,5	7,5	**19,5**	**9%**
P14-Servelect	7	0	1	0,5	0,5	1,5	**10,5**	**5%**
P15-UBB	8,5	**8,5**	0,5	0	1	2	**20,5**	**9%**
P16 - UTC	1	1	1	0	0,5	1,5	**5**	**2%**
	87	**32,5**	**15,5**	**15,5**	**26**	**40**	**216,5**	
	40%	**15%**	**7%**	**7%**	**12%**	**18%**		

- **Efforts:** The average continuous efforts per month deployed in the project are **6** equivalent full-time persons for one year charged to the EC contribution (see Table 3.4.a).
- **Personnel costs (including indirect cost): 1 355 439** € equivalent to 68 % of the total costs of the project.
- **Other direct costs: 513 400** €, equivalent to 26 % of the total costs of the project (see Table 3.4.b).

"Other direct cost" items (travel, equipment, other goods and services)

1 - LANCEY	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, events, kits installation
Other goods and services	67000	Workshops organization (40k€), temperature sensors (16k€) and communication tools (11k€)
Total	80000	
2 - ATC	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, conferences
Other goods and services	2000	Communication tools for households
Total	15000	
3 - CHA	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, conferences, kits installation
Other goods and services	8400	Communication printings for households (2k€) and kits (6,4k€)
Total	21400	
4 - CIFE	**Cost (€)**	**Justification**
Travel	20000	CSA project meetings, interviews, workshops, conferences
Other goods and services	62000	Workshops organization (50k€), videos & communication tools (12k€)
Total	82000	
5 - CCC	**Cost (€)**	**Justification**
Travel	10000	CSA project meetings, workshops, conferences, kits installation
Other goods and services	13000	Kits (10k€), communication printings (3k€)
Total	23000	
6 – DELTA-EE	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, marketplace
Other goods and services	16000	Workshops organization (12k€), communication tools (4k€)
Total	29000	
7 – FCT NOVA	**Cost (€)**	**Justification**
Travel	10000	CSA project meetings, workshops, conferences
Total	10000	
8 - HH	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops
Other goods and services	2000	Communication printings (2k€)
Total	15000	
9 - GEBALIS	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops
Other goods and services	2000	Communication printings (2k€)
Total	15000	
10 - ICS	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, interviews, workshops, conference
Total	13000	
11 - LEEDS	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops
Total	13000	
12 -NEC	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, events and conferences

Total	13000	
13 – ODIT-E	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, workshops, conferences
Total	13000	
14 – SERVELECT	**Cost (€)**	**Justification**
Travel	8000	CSA project meetings, workshops, kits installation
Other goods and services	128000	Kits for 800 dwellings
Total	136000	
15 - UBB	**Cost (€)**	**Justification**
Travel	13000	CSA project meetings, trainings sessions, interviews, workshops
Other goods and services	15000	Workshops, trainings organization
Total	28000	
16 - UTC	**Cost (€)**	**Justification**
Travel	5000	CSA project meetings, workshops
Other goods and services	2000	Communication printings (2k€) in link with Servelect
Total	7000	