SUPER HEERO
Human Energy Efficiency Retrofitting Optimisation

D2.5 – LESSONS LEARNT FROM SUPER-HEERO PILOTS: PLANNING, FINANCING AND MONITORING THE ENERGY EFFICIENCY MEASURES

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Terms, definitions and abbreviated terms

TABLE EXAMPLE			
Acronym	**Definition**	**Acronym**	Definition
AHU	Air Handling Unit	GHG	Greenhouse Gas
BIPV	Building-Integrated Photovoltaic	HVAC	Heating, Ventilation, Air Conditioning
CAAS	Cooling as a Service	LAAS	Lighting as a Service
CHP	Combined Heat and Power	LED	Light-Emitting Diode
COP	Coefficient of Performance	LV	Low Voltage
D	Document	M	Month
EAAS	Energy as a Service	MV	Medium Voltage
EE	Energy Efficiency	NPV	Net Present Value
EPC	Energy Performance Contract	PAAS	Product as a Service
ESCO	Energy Service Company	PV	Photovoltaic
ESG	Environmental, Social and Governance	SBP	Simple Payback Period
EU	European Unioni	VFD	Variable Frequency Drive
EV	Electric vehicle	WP	Work Package

1. Executive Summary

This document represents the Super-Heero project handbook corresponding to D2.5, where all the process developed and implemented for the energy efficiency in small and medium supermarkets is described. Starting from the main aim of the project to provide a replicable financial scheme to favour the definition and installation of solutions that could improve the energy efficiency of the supermarkets, a five-steps process has been outlined and centred on an innovative financial scheme.

The access to the necessary funding for the implementation of energy efficiency measures has been recognized from the beginning as the key for the small/medium supermarket sector to reduce energy consumptions and become more sustainable, towards the achievement of wider goals set by UN2030 Agenda and European Green Deal.

In this view, having faced some difficulties during the journey, especially concerning the not always easy stakeholders' engagement process, a financial model has been developed based on the interconnection between the main economic schemes identified as more effective in this framework: i) Energy Performance Contracts (EPC), ii) product as a service model for technology providers engagement, iii) community-based crowdfunding/cooperative initiatives. The result is a hybrid approach coupling the crowdfunding to an EPC, or Service or leasing model, connecting it to incentives and territorial initiatives, where present.

Beside the focus on the developed and adopted innovative financial model, this handbook presents the five-steps methodology outlined during the project with a summary of all the knowledge gained and lessons learned throughout Super-Heero. The process, that starts with the discovery and audits, and it is followed by technical design and business plan, marketing and advertising campaign, fundraising via the crowd, and that culminates with the implementation and monitoring phase, is the result of many challenges faced and satisfactions obtained during the past three years.

As one of the main results of the project, together with the innovative financial model, the portfolio of ad-hoc energy efficiency measures for supermarkets and the strategy for the replicability of the financial scheme at regional and national level, the methodology developed during Super-Heero has been implemented in four demo pilots. In Italy NaturaSì – Padova 2 Via Parini embraced the model and implemented PV panels on the rooftop of the supermarket, while in Spain DIA Almansa has financed the installation of eight renovation measures and DIA Arriaga is in a decisional phase concerning the financing of seven energy efficiency solutions proposed in the energy audit. Furthermore, at the end of the project, another Italian supermarket, NaturaSì – Pordenone Via Ungaresca, joined Super-Heero following the positive experience of the first Italian pilot in Padova and decided to finance and install PV system in its shop. The involvement of all the pilots and in particular the last one, that was interested in the project without being directly involved by the consortium, proves the effectiveness of Super-Heero methodology and its future success in engaging small/medium supermarkets favouring their energy efficiency process.

2. Introduction

During the past three years, Super-Heero project focused on the energy efficiency in small/medium scale supermarkets, with the aim to develop an innovative collaborative and scalable financial scheme to provide the supermarkets the necessary fundings for the implementation of energy efficiency strategies. Relying on three main financial instruments (EPC, product-service models for technology providers engagement and community-based crowdfunding/cooperative initiatives), the project intended to favour the installation of EE solutions that can not only bring direct economic and environmental savings for the supermarkets, but also to the final customer, the engaged ESCOs and utilities, and technology providers. In this sense, Super-Heero had the ambition to support the actors involved in the process in diversified ways: customers engaged in crowdfunding/lending campaigns with discounts and energy-related prizes, ESCOs with reduced expected investment so they can find efficiency investment more attractive, and technology providers with innovative business models based on circular economy principles that could help them to capitalise in a transition and economic opportunity.

2.1. Purpose of the document

The present document has been conceived to be intended as a comprehensive, easy understandable and publicly available guide of our journey through the Super-Heero project. Beside the experience with the pilots, both in Italy and Spain, this handbook includes an overview of all the topics covered, the challenges faced during these three years and the results obtained. All the Super-Heero process, that led to the engagement and identification of supermarkets involved to test a methodology for the successful implementation of energy efficiency measures, was laboriously developed as a series of steps. In every step we learned some lessons that have been collected and included in this document to pave the way for future similar experiences related to energy efficiency in the supermarkets. The “discovery & audits” and the “technical design & business plan” are the first actions foreseen by Super-Heero methodology, as they have been considered fundamental to set the energy baseline of a supermarket and to propose the best EE solutions that can be implemented. In this framework, the main indications for a high-level design have been summarised in this document, including a brief description of every measure, the technical activities to be put in place for their implementation and the identification of renovation packages based on baseline conditions and renovation depth. The main financial measures suitable for the EE interventions in the supermarkets have also been presented, highlighting that, for what has been learned during the project, there are no optimal financial solutions, but every supermarket should decide its tailored financing scheme based on different factors (e.g. the type of EE measure identified) and boundary conditions. In this sense, the Italian pilot experience has been described, where the crowdlending has been found to be the most viable solution to finance the interventions. All the aspects related to the “stakeholders’ engagement (e.g. technical providers), marketing and advertising campaign” deserved an extensive

deepening, as they covered a big part of the project and required great effort from the partners involved. The communication with the supermarkets involved people with different roles and not much time to dedicate to these activities, so it hasn't been an easy task and a series of useful findings in this context are indicated in this handbook and should be considered for future works. Another important section was dedicated to the "implementation" of the EE measures: the pilots. They are the protagonists of an extensive part of the handbook, from their identification and involvement, including the issues encountered and mistakes made, to the definition of the most promising energy efficiency solutions, the analysis of the best financial scheme, the selection of the technology providers to be involved in the implementation process and the proper installation of the selected measures.

2.2. Structure of the document

Following the scope of this document and the contents that worth to be highlighted for the purpose, the handbook was structure in 8 main chapters subdivided in several sections:

- Chapter 1 with the executive summary of the handbook
- Chapter 2 presents the introduction to the document
- Chapter 3 provides a brief presentation of the project and its results, pointing out the main barriers encountered and the solutions found in the overall process
- Chapter 4 indicates the main guidelines for the energy efficiency in the supermarkets, including the description of the most effective identified measures, their technical design and the financial solutions to be adopted the technology providers to be involved for their implementation
- Chapter 5 presents the construction of Super-Heero ecosystem with a focus on the stakeholders' engagement process
- Chapter 6 provides a description of the Italian and Spanish pilots, highlighting how they have been shaped during the project, with also a focus on the potential future sites that can adopt the Super-Heero methodology
- Chapter 7 indicates a foreseeable replication plan
- Chapter 8 presents the conclusions, wrapping up the main concepts exposed through this guidebook

3. Understanding SUPER-HEERO: Project formation, Implementation and Management

3.1. Matching ambition to feasibility/reality

Super-Heero after three years has arrived at a very interesting point – a crowdlending platform has been developed and validated with the first pilot involving non-project partners (a member of the technology provider network and franchise-owned supermarket supported by the brand). In simple terms, **the project went commercial / live / real world**.

It was not always obvious to arrive to this point.

MAIN BARRIERS

- ✓ The consortium **did not have a work program long enough**
- ✓ There was **no partner** with the multi-disciplinary skillsets required **to develop and launch a financially regulated crowdlending platform**
- ✓ There were **no supermarkets directly in the consortium**
- ✓ Letters of supports were sent, but they were non-binding, so **the supermarkets were free to say "no thank you"** to actual implementation with Super-Heero and many did
- ✓ Our **eventual financial model was not directly in the proposal** upon submission but developed within the project

SOLUTIONS

- ✓ Add as a consortium partner an **existing crowdlending partner that offered a white-label solution** as part of their business strategy
- ✓ We could **customize to our needs the engine they already had**, not having to learn and pass through the regulatory aspects associated with being a financial intermediary between a crowd and project developer
- ✓ To capture the interest of supermarkets we **invested in initiatives** important to them, we **offered free energy audits** and we used the municipal local government for one pilot as a lever.

3.1.1. Overarching Lessons learned

1

The proposal suggested **concepts that are too aggressive for the two-year work program**, and which required deep commitment from Supermarket chains (who are conservative and careful). Furthermore, it indicated donations directly from the cash register, linking to supermarket fidelity programs, eventually getting through to food and grocery product suppliers. **All such concepts are valid, but they will take time and multiple iterations of the approach** such that supermarkets gain confidence and trust to try variations of the base model.

2

Risks happens. In shaping a project, risk seems like a far off, low probability concept documented as a formality. This project learned directly instead that risk happens as **the project passed through the Covid period, energy price fluctuations surrounding the Ukraine War and banking crisis**. Each event had both positive and negative consequences. **Covid** created delays but reinforced the role of supermarkets as a social hub / key node in communities. **The war** created risk aversion but made people sharply aware of raising energy prices / energy security. **The banking crisis** raised interest rates but makes the value proposition of not going to banks (crowdlending) more attractive.

3

Super-Heero works! The two pilot campaigns implemented in the super-heero.com crowdlending platform were fully funded and engaged approximately 100 overall investors. Relations were strengthened between a brand and a franchise owner. New connections were made between the store locations and the local municipality. The advertising and marketing department of the supermarket embraced the approach and widely distributed the campaigns on there communication channels. Two iterations helped us improve our processes and have given confidence on all sides of the ecosystem to keep developing new projects.

4. Energy efficiency in supermarkets: the focus of the project

4.1. Energy usage in supermarkets

The supermarkets are one of the retail sectors that consumes more, with the highest final energy consumption in the range between 320 and 800 kWh/m^2/y. The main impacts on energy balance are related to products refrigeration (covering a share of consumptions between 29% and 48%), space heating/cooling (in the range between 9% and 13%) and lighting (share between 23% and 27%), followed by the use, where present, of kitchen, offices and internal logistics, in the range of 4%-5% each[1].

Six main key impacting factors on energy consumption have been identified as target areas where to intervene to enhance the energy efficiency in supermarkets:

- overall energy management;
- energy supply;
- heating, ventilation, air conditioning;
- lighting;
- product refrigeration;
- other areas.

[1] Data taken from different sources (Kolotroni 2019, SME EnergyCheckUp, Supersmart projects)

4.2. Guidelines for high-level design in key areas

The adoption of energy efficiency measures in supermarkets follows a general approach that includes five steps, starting from the improvement of energy management together with device operation and maintenance. Once the first step is completed it is possible to act on the energy demand, reducing it through the optimisation of the existing system, focusing then on the increase of energy conversion efficiency. The fourth step is related to the potential increase of energy self-production from renewables or cogeneration to cover the residual energy demand. The last action is the monitoring of the performance of the devices and systems, also considering the evaluation of further activities for a continuous improvement.

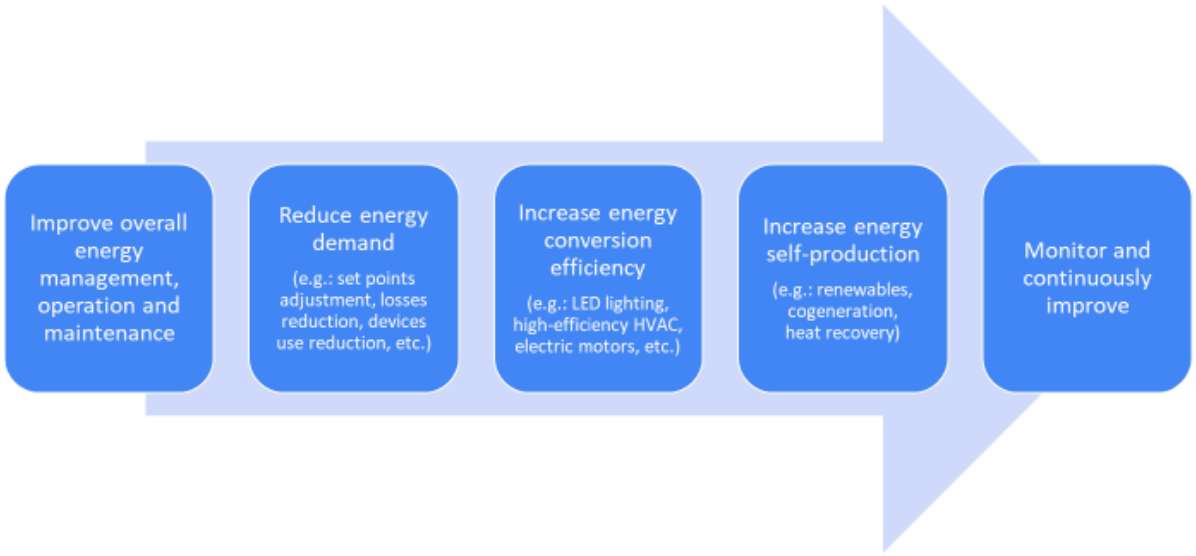

Figure 4.1 - Methodological approach for the adoption of Energy Efficiency measures

4.2.1. Overall energy management

Energy management plays a key role in the overall optimization and potential reduction of the energy consumptions of the supermarkets, including the adoption of energy management systems and of the most suitable operation and maintenance routines to ensure that all energy-related devices work at highest possible efficiency. The main measures identified to improve energy efficiency in this field are:

A.1 energy audit and implementation of an energy management system:
analyses the energy consumptions, also evaluating energy flows in the facility and identifying opportunities for energy efficiency as well as reduction of environmental impacts.

A.2 monitoring of electricity consumption at main switchboards:
does not require investment and it serves to identify bad practices/operations that cause anomalous and unnecessary energy consumptions.

A.3 metering systems:
Require additional investment and provide real-time data for specific lines, areas or pieces of equipment depending the monitoring and measurement plan. This allows better understanding of energy consumption and ensures direct / immediate ownership of data.

A.4 artificial intelligence for smart electric load management:
can take the form of specific technologies that collect hundreds of thousands of real time data points, aggregate and combine them, cataloguing a building specific operating behaviour and optimising energy flows across time.

A.5 microclimate design and simulation using nature-based solutions:
as vegetation for shading, can be beneficial for several purposes, as to reduce urban heat islanding, lower the demand on cooling system, improve comfort etc.

A.6 building and urban area dynamic energy simulation
can be performed through various software environments and it is used to assess the energetic performance of building systems and urban areas

A.7 asset management software
facilitates fleet-wide assessment and reporting and/or Environmental, Social and Governance (ESG) assessment and reporting

A.8 regular maintenance of energy users
is fundamental to ensure the correct operation of the device, particularly refrigeration systems, HVAC systems and lighting systems, maximising its level of energy efficiency and reducing energy consumptions.

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1.1.1. Energy supply

The increased use of renewable or more sustainable sources towards a higher level of energy efficiency and sustainability is at core of the energy supply optimisation.

The main measures identified to improve energy efficiency in this field are:

B.1 rooftop photovoltaic plant:
allows to convert solar radiation into electric power covering part of the electricity needs of the supermarket with self-production.

B.2 building-integrated photovoltaic modules:
represent both a structural solution and a technology to generate energy, as skylights, structural windows, façade cladding, double façades and photovoltaic walkaways elements.

B.3 photovoltaic modules on parking lots:
can be installed on supermarkets' shelters that have the double purposes of shading vehicles and self-producing electricity for the nearby supermarket and EVs charging.

B.4 micro-wind power production system:
are typically based on a small vertical-axis turbine installed on the building rooftop in order to produce power from the wind kinetic energy.

B.5 solar thermal for hot water production:
allows the supermarket to self-produce water for several purposes (e.g. toilets for clients and for employees, space heating)

B.6 cogeneration/trigeneration:
are technical solutions for the simultaneous production of heat and electric power (cogeneration – CHP) and cooling (trigeneration), from a single source using a single device in proximity of the final users.

B.7 reactive power compensation system:
allow the clients of power utilities to absorb reactive power up to a certain amount, generally by imposing a minimum value of 0.9 to the power factor (the ratio between the actual load and the apparent load absorbed by an electricity user)

B.8 waste-to-energy solutions:
Can be used to transform packaging and food waste into energy, saving energy costs, reducing waste disposal costs and changing life-cycle carbon emissions

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1.1.2. Heating, ventilation, air conditioning

This category includes systems adopted for the production, distribution and release into the supermarket indoor environment of the thermal energy needed to guarantee the comfort for applicants in all seasons of the year. The devices covered by this category include boilers, heat pumps, chillers, air handling units for ventilation. Indeed, the typical configuration in a supermarket foresees that heat/cold are produced at centralized level and then distributed in the building with ventilation systems. However, small supermarkets may also be equipped with separate systems for heating and cooling, or standalone systems like split-type air conditioners.

The main measures identified to improve energy efficiency in this filed are:

C.1 improvement of building envelope thermal insulation:
brings variable benefits depending on the characteristics of the building in the baseline situation, its location and climate conditions, with savings up to 50% of the energy demand

C.2 high-efficiency reversible heat pumps:
can be used to replace outdated equipment used for producing heat and cold for space heating and cooling purposes, reaching average COP values higher than 3, up to 5 depending on the type of heat source/sink that they exploit.

C.3 condensing gas-fired boilers for heat production:
can be used to replace old boiler leading to a fuel saving up to 20-30% compared to the baseline situation, with even higher economic savings in case fuel switching from diesel to natural gas is carried out.

C.4 biomass boilers for heat production:
presents high environmental and economic benefits, since GHG emissions are considered zero and the price of biomass per unit of energy input is much lower than that of diesel and lower also than for natural gas.

C.5 heat recovery from products' refrigeration systems:
in the form of air at 30-50°C within the supermarket building is particularly of interest, since during winter, supermarkets are characterised by contemporary space heating needs and products' cooling needs, and the range of temperatures of the two heat streams is compatible.

C.6 air handling units with integrated heat recovery system:
control the temperature and humidity of the air which is fed to the indoor environment, as the traditional air handling units (AHUs) devices, but the addition of a section allows to exchange heat between the extracted air and the supplied air avoiding most of energy loss.

C.7 free cooling and evaporative cooling:
are both solutions used to cool the indoor environment. The free cooling exploits external air without using the available cooling equipment, while the evaporative cooling supply cooling air through direct or indirect water evaporation

C.8 high-efficiency motors and VFD control in ventilation systems:

allow a flexible operation to the fans through the whole range of ventilation rates and with proportional variation of the absorbed power.

C.9 high-efficiency pumping systems:

allow significant electricity savings replacing electric motors and control of the water pumping through VFD in the pumps used to distribute the hot/refrigerated water in the supermarket.

C.10 smart control of HVAC systems:

acquiring data from sensors for monitoring temperature, humidity and other (e.g.: carbon monoxide concentration) installed in the supermarket, can provide significant benefits in terms of energy consumptions.

C.11 improvement of air-tightness:

to minimise the energy losses related to the frequent opening of doors due to the entrance and exit of customers, concerns the replacement of entrances with single doors with a vestibule entrance located between two doors.

C.12 air curtain at building entrance:

is another possibility to reduce the air exchange between the indoor and the outdoor environment at the supermarket entrance. This can be performed by installing an air blower facing downwards on the entrance (between the two doors if the previous measure is implemented).

C.13 low-flow aerators on toilet water:

installed both for clients and for staff, is a water and energy saving measure. Indeed, since it is applied both to cold and hot water taps, it allows a reduction of energy consumption for sanitary hot water production, typically carried out through electric or natural gas-fired boilers.

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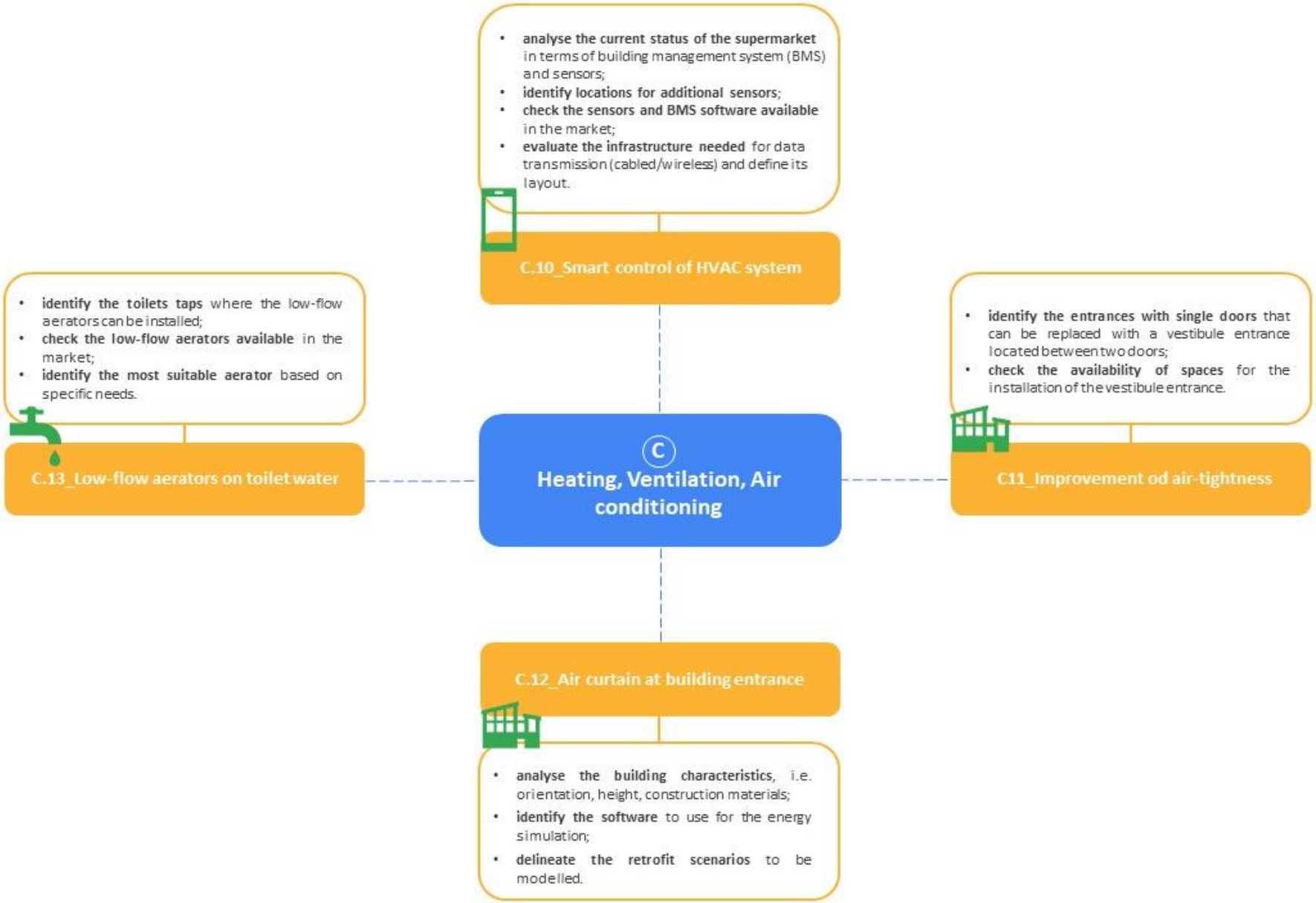
C
Heating, Ventilation, Air conditioning
C.10_Smart control of HVAC system
analyse the current status of the supermarket in terms of building management system (BMS) and sensors;
identify locations for additional sensors;
check the sensors and BMS software available in the market;
evaluate the infrastructure needed for data transmission (cabled/wireless) and define its layout.
C.13_Low-flow aerators on toilet water
identify the toilets taps where the low-flow aerators can be installed;
check the low-flow aerators available in the market;
identify the most suitable aerator based on specific needs.
C11_Improvement od air-tightness
identify the entrances with single doors that can be replaced with a vestibule entrance located between two doors;
check the availability of spaces for the installation of the vestibule entrance.
C.12_Air curtain at building entrance
analyse the building characteristics, i.e. orientation, height, construction materials;
identify the software to use for the energy simulation;
delineate the retrofit scenarios to be modelled.

1.1.3. Lighting

Lighting is responsible for a relevant share of the energy consumptions of the supermarket, especially if carried out with other technologies than LEDs. Lamps in supermarkets are typically used for the whole opening period in order to ensure the desired visibility of products, whereas in external areas they are always used during the night, also for security reasons.

The main opportunities for improvement identified for this field are:

D.1 LED lighting of indoor/outdoor spaces:
is a consolidated measure for high-efficiency already implemented in most of the supermarkets. It is recommended to install this solution where not yet implemented in order to reduce power absorption for lighting while improving visual comfort in the supermarket.

D.2 solar-powered lighting poles in outdoor areas:
are solutions equipped with an integrated photovoltaic module and battery to self-produce and store the electricity required for the lighting pole.

D.3 natural lighting sensors in highly fenestrated areas:
maximise the use of daylight as an alternative to electric lighting. The solution consists in installing on the lamps closer to the windows a natural lighting sensor that reduces the luminous flux provided by the lamps, according to the amount of available natural lighting.

D.4 timers on indoor lighting systems:
should be installed on all lighting systems except for those needed for safety and security reasons, in order to switch off (or reduce the luminous flux of) all non-required lighting systems and avoid the corresponding power absorption.

D.5 movement sensors:
are recommended to be installed in areas like warehouses, changing rooms, toilets, in order to avoid lamps remaining switched on when nobody is in the room.

D.6 smart control of lighting systems in indoor/outdoor areas:
is an integrated approach to lighting implemented into a dedicated software, which could receive inputs from the different sensors located across the building (natural lighting, presence, etc.) and consequently optimize the lighting level in the different areas of the supermarket.

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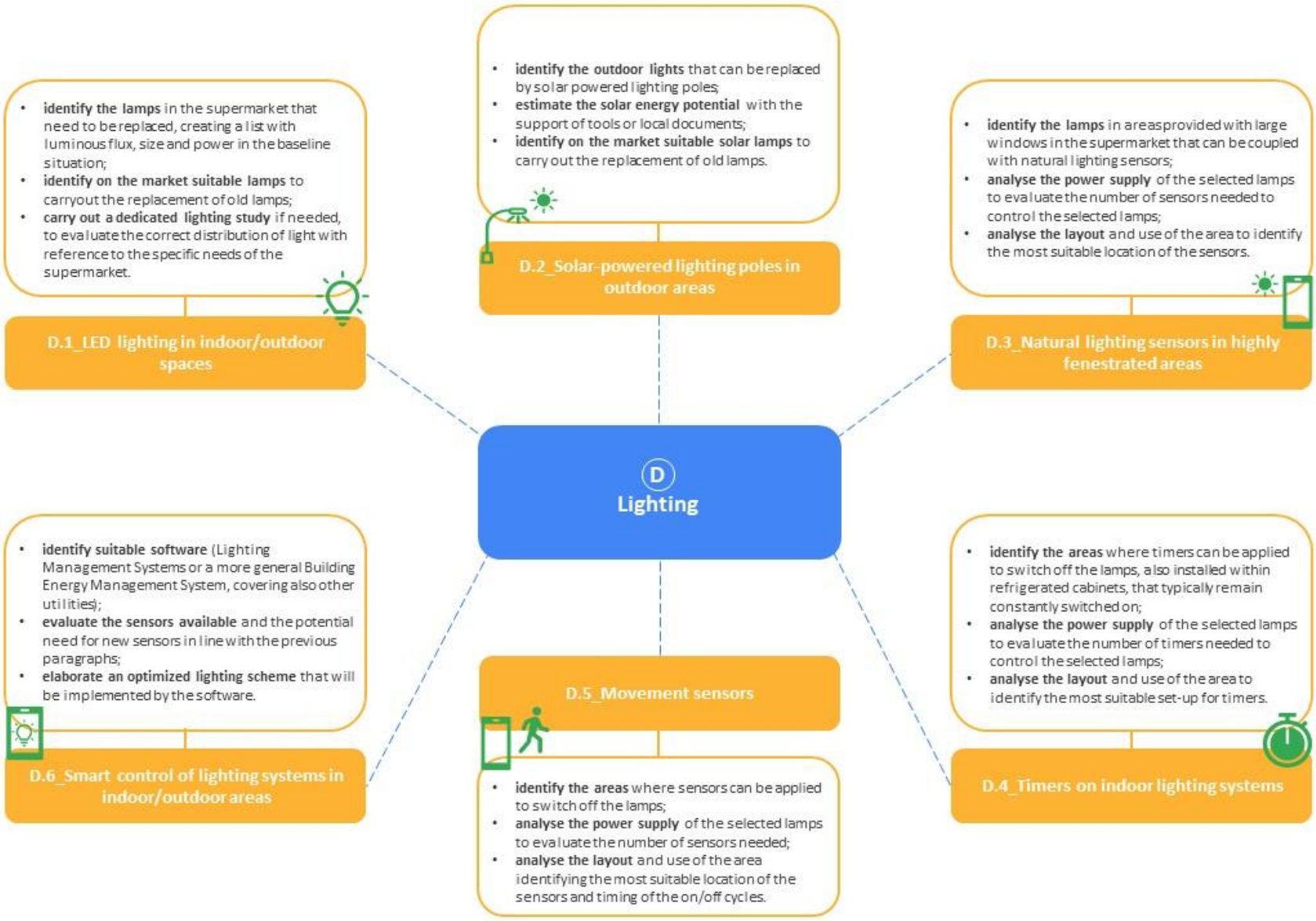


1.1.4. Products' refrigeration

The refrigeration of the food products, both in cabinets and freezers in the sale area and in the refrigerated storage areas in warehouses are responsible for the largest share of energy consumptions in the supermarket. This is strongly related with the need to maintain the quality of products in line with the applicable laws. Cabinets, freezers and cold storage rooms are the devices included on the demand side, while the refrigerators systems (compressors, evaporators and condensers), that may be centralized or standalone, are on the supply side.

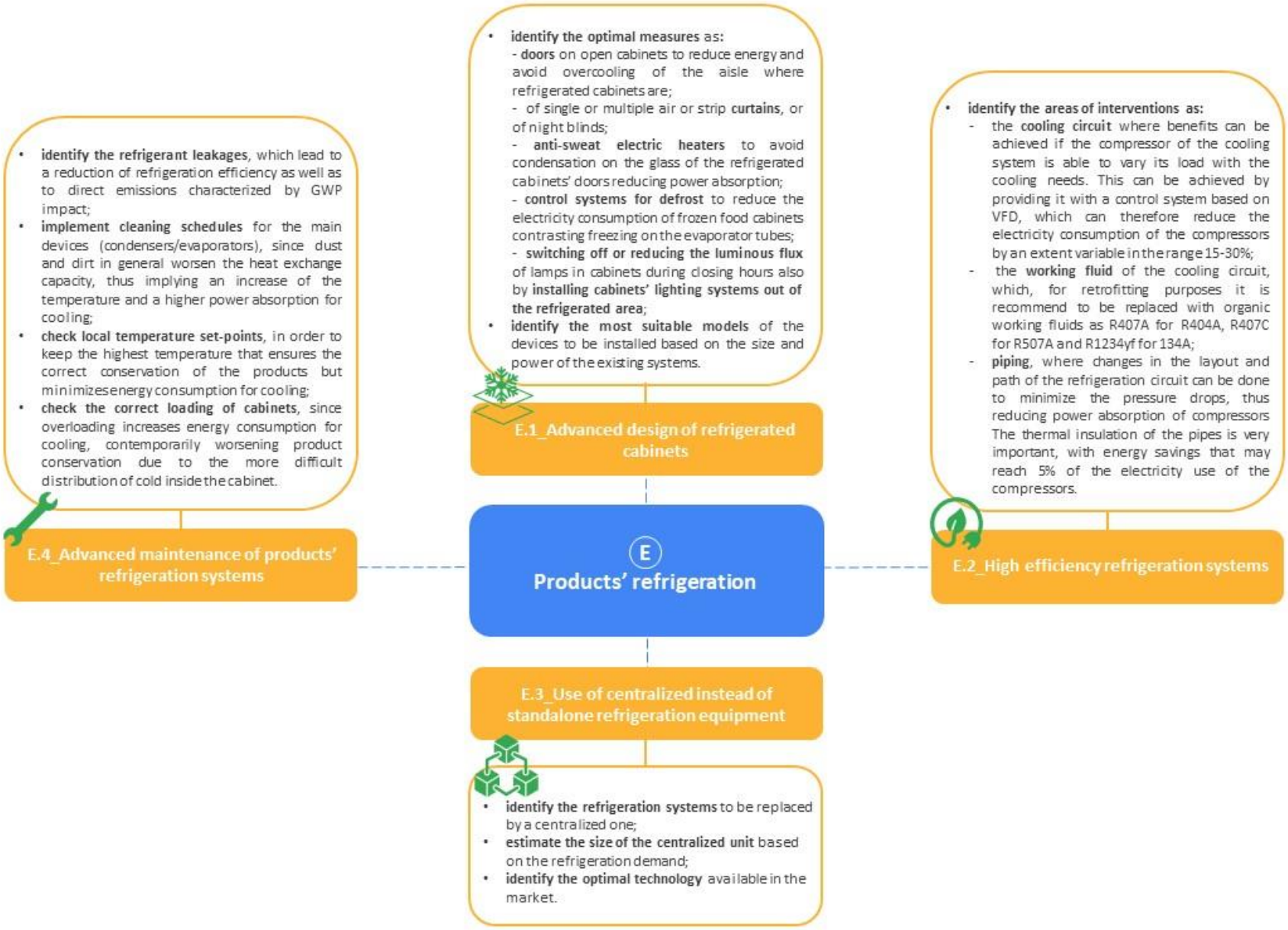
The main opportunities for improvement identified for this field are:

E.1 advanced design of refrigerated cabinets:
can be obtained through several solutions (e.g. installation of doors, curtains, anti-sweat electric heaters), that deal with the minimization of energy losses from doors.

E.2 high-efficiency refrigeration systems:
can reduce the energy consumption of the refrigerated cabinets through several solutions as the intervention on cooling circuit and on working fluid of the cooling circuit.

E.3 use of centralized instead of standalone refrigerating equipment:
The solution consists of a single remote outdoor unit (that includes the air-cooled condenser and the compressors of the refrigerating cycle) and many indoor units (that include the evaporators, located in the refrigerated spaces), connected through insulated pipes, where refrigerant fluid flows. It is characterised by higher efficiency than standalone refrigerators

E.4 advanced maintenance of products refrigeration systems:
allows to keep the best operating conditions in terms of efficiency and minimization of power absorption.


identify the optimal measures as:
- doors on open cabinets to reduce energy and avoid overcooling of the aisle where refrigerated cabinets are;
- of single or multiple air or strip curtains, or of night blinds;
- anti-sweat electric heaters to avoid condensation on the glass of the refrigerated cabinets' doors reducing power absorption;
- control systems for defrost to reduce the electricity consumption of frozen food cabinets contrasting freezing on the evaporator tubes;
- switching off or reducing the luminous flux of lamps in cabinets during closing hours also by installing cabinets' lighting systems out of the refrigerated area;
identify the most suitable models of the devices to be installed based on the size and power of the existing systems.
E.1_Advanced design of refrigerated cabinets
identify the areas of interventions as:
- the cooling circuit where benefits can be achieved if the compressor of the cooling system is able to vary its load with the cooling needs. This can be achieved by providing it with a control system based on VFD, which can therefore reduce the electricity consumption of the compressors by an extent variable in the range 15-30%;
- the working fluid of the cooling circuit, which, for retrofitting purposes it is recommend to be replaced with organic working fluids as R407A for R404A, R407C for R507A and R1234yf for 134A;
- piping, where changes in the layout and path of the refrigeration circuit can be done to minimize the pressure drops, thus reducing power absorption of compressors The thermal insulation of the pipes is very important, with energy savings that may reach 5% of the electricity use of the compressors.
E.2_High efficiency refrigeration systems
identify the refrigerant leakages, which lead to a reduction of refrigeration efficiency as well as to direct emissions characterized by GWP impact;
implement cleaning schedules for the main devices (condensers/evaporators), since dust and dirt in general worsen the heat exchange capacity, thus implying an increase of the temperature and a higher power absorption for cooling;
check local temperature set-points, in order to keep the highest temperature that ensures the correct conservation of the products but minimizesenergy consumption for cooling;
check the correct loading of cabinets, since overloading increases energy consumption for cooling, contemporarily worsening product conservation due to the more difficult distribution of cold inside the cabinet.
E.4_Advanced maintenance of products' refrigeration systems
E
Products' refrigeration
E.3_Use of centralized instead of standalone refrigeration equipment
identify the refrigeration systems to be replaced by a centralized one;
estimate the size of the centralized unit based on the refrigeration demand;
identify the optimal technology available in the market.

1.1.5. Other areas

This category includes all types of energy users not included in the previous categories, such as offices, warehouses' logistic equipment, lifts, etc.

The main opportunities for improvement identified for this field are:

F.1 retrofitting of lifts:
includes several opportunities for the reduction of energy consumption, as installation of VFD on electric motors and regenerative drives.
F.2 retrofitting of internal logistic equipment:
is focused on the different types of forklifts used in supermarkets' warehouse covering the whole cycle from the discharge of goods from trucks to the storage and subsequent positioning on the supermarkets' shelves.
F.3 retrofitting of office equipment:
represents a potential solution for the improvement of energy efficiency of the supermarket, although having a limited impact on the overall energy balance of the building.


• install VFD on electric motors, provided with auto-standby device, to allow a controlled start and operation of motors, car movement and comfort for passengers, but also a reduction of power absorption at partial load and during standby;
• install regenerative drives that accumulate energy during the braking phase to be used in the next operational cycle instead of dissipating it through braking resistors;
• optimize the counter-balance system, which reduces the load of the drive system, thus allowing a reduction of motors' size and of electricity consumption;
• switch the cabin lighting to LED lamps, and couple them with use of sensors to switch lighting off when the elevator is not in use;
• minimize the ventilation rate (if available) when the lift is not in use.
F.1_Retrofitting of lifts
• lower electricity consumption per hour and unit of payload/distance;
• install high-efficiency batteries over the whole charge/discharge cycle;
• introduce regenerative drives that accumulate energy during the braking phase instead of dissipating it;
• install smart chargers optimizing load management and avoiding idle power absorption when forklifts are not plugged or are plugged but charging is completed.
F.2_Retrofitting of internal logistic equipment
F
Other areas
• switch to LED lamps;
• use high efficiency heating and cooling systems;
• use computers, monitors and printers with low energy consumption;
• use shared printers and limit as much as possible printing;
• elaborate guidelines for employees aimed at the correct management of office devices during and at the end of the work activities (e.g.: switching off lighting and HVAC systems, computers, devices chargers, etc.);
• adopt good "green procurement" practices, i.e. minimizing the total cost over the devices' lifetime (purchase plus energy consumption and maintenance during operation) rather than purchasing the model that ensures the lowest initial cost.
F.3_Retrofitting of office equipment

SPOT ON ENERGY COMMUNITIES

Energy communities **incentivize the production, storage and use of renewable and more sustainable energy at the local level** between members of the community. Energy communities are defined in two separate laws of the Clean Energy Package, the revised Renewable Energy Directive (EU) 2018/2001 which sets the framework for 'renewable energy communities' covering renewable energy and the revised Internal Electricity Market Directive (EU) 2019/944 which introduces new roles and responsibilities for 'citizen energy communities' in the energy system covering all types of electricity. Such communities are a relatively new development and they interesting for supermarkets as:

1) they **provide a new way to connect supermarkets, their clientele**, and **local area residents/businesses**;
2) there are **incentives surrounding the formation and implementation of energy communities** which can improve the return of investment of renovation measures;

THE SITUATION IN SPAIN

In Spain, a focus country for Super-Heero. a national policy on energy communities has not yet been issued but collective self-consumption is possible.

THE SITUATION IN ITALY

Italy, one **focus country for Super-Heero**, has recently published interesting incentives for Energy Communities. There are two types: **a) jointly acting renewable self-consumers AND b) renewable energy communities.**

a) are **final energy users that are located in the same building or apartment block** (e.g. condominium) where shared walls are present;
b) are instead **a legal entity whose members are located in the same piece of the distribution grid** (below the same MV/LV substation) and whose primary business is not the production of energy.

A Ministerial Decree dated 16 September 2020 introduced an **incentive of 100 euro/MWh for the electricity that jointly acting renewable self-consumers** and an **incentive of 110 euro/MWh for the electricity that members of a renewable energy community share**. This incentive is granted for 20 years. Jointly self-consumed or shared electricity is, for each

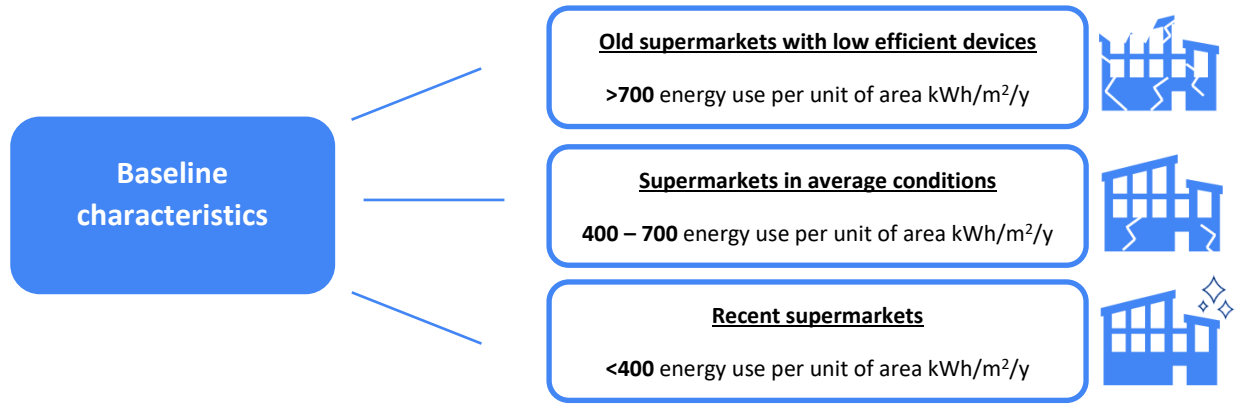
1.2. Potential EE measures

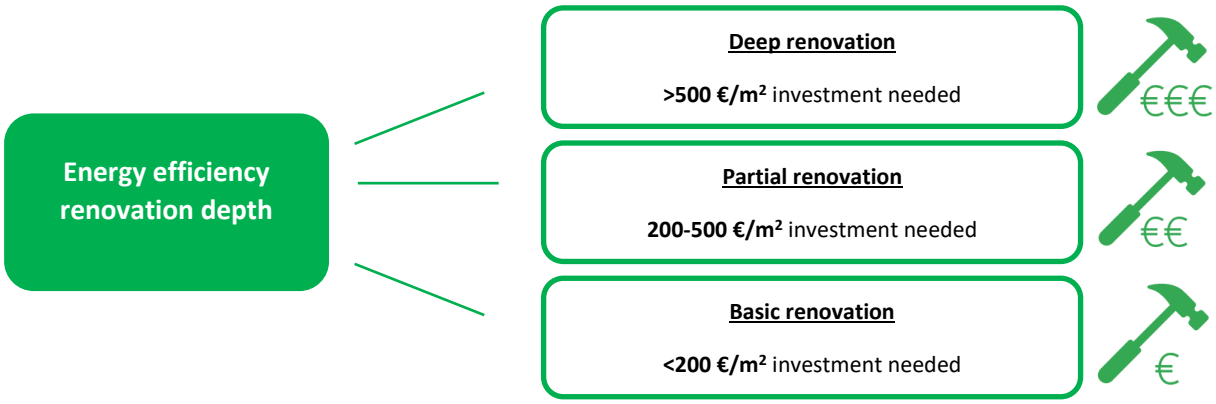
A series of renovation measures to energy efficiency in supermarkets have been identified selecting the most suitable solutions based on the baseline characteristics and boundary conditions common to most of the supermarkets. The catalogue of measures previously outlined served as basis to define 18 renovation packages with their technical and financial performance in terms of achievable energy savings, investment needed, payback time.

1.2.1. Renovation packages based on baseline conditions and renovation depth

The supermarkets have been categorized considering:

- their baseline characteristics in terms of energy efficiency (old, average conditions and recent supermarkets)
- their reference climate conditions (Northern or Southern Europe)
- the depth of energy efficiency renovation (deep, partial and basic renovation).





From the matching of these different categories 18 renovation packages have been identified, first considering the depth of the renovation and the baseline conditions of the supermarkets and then transposing them in Northern and Southern Europe. For each renovation package, a set of energy efficiency measures were selected among the most suitable energy efficiency solutions. Furthermore, potential energy savings, investment needed with its pay-back, and achievable cost savings were calculated considering a 400 m^2 supermarket (medium-small, which is representative of many of the supermarkets targeted by the SUPER-HEERO project) and then transposed into specific indicators per unit of area by dividing the values calculated for the reference supermarket by its floor area.

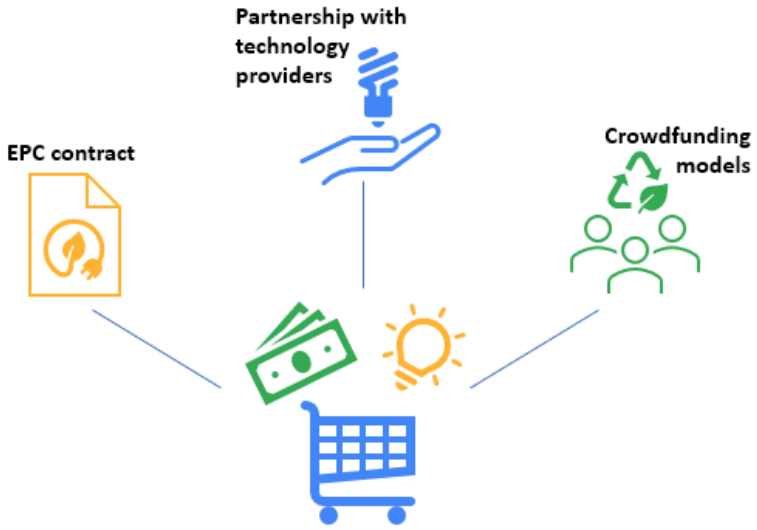
	Categories	Measures	Energy Savings kWh/m2/y	Budget Needed €/m2	Economic Savings €/m2/y	Pay-Back Time y
Package 4a		LED lighting HVAC fine-tuning Cogeneration High-eff. refrigeration Envelope insulation	249.2	506.3	103.0	4.9
Package 4b		LED lighting HVAC fine-tuning Photovoltaic High-eff. refrigeration Envelope insulation	279.2	493.8	61.4	8.0
Package 5a		LED lighting HVAC fine-tuning Cogeneration High-eff. refrigeration	149.2	406.3	88.0	4.6
Package 5b		LED lighting HVAC fine-tuning Photovoltaic High-eff. refrigeration	245.8	418.8	56.4	7.4
Package 6a		LED lighting HVAC fine-tuning Cogeneration	82.5	281.3	78.0	3.6
Package 6b		LED lighting HVAC fine-tuning Photovoltaic	82.5	131.3	31.9	4.1

	Categories	Measures	Energy Savings kWh/m2/y	Budget Needed €/m2	Economic Savings €/m2/y	Pay-Back Time y
Package 7a		LED lighting Heat recovery from refr. Smart load manag.	112.5	78.8	16.9	4.7
Package 7b		LED lighting Solar thermal Smart load manag.	59.2	41.3	8.9	4.6
Package 8a		LED lighting Heat recovery from refr. Smart load manag.	112.5	78.8	16.9	4.7
Package 8b		LED lighting Solar thermal Smart load manag.	59.2	41.3	8.9	4.6
Package 9a		LED lighting Smart load manag.	45.8	28.8	6.9	4.2
Package 9b		LED lighting Smart load manag.	45.8	28.8	6.9	4.2

The values presented in the Tables above may varies of approx. ±50% when transposed to different supermarkets in various locations. This because the investments needed are not tailored on a specific site or supermarket size and they are assumed to not vary significantly with the location. Furthermore, some assumptions were made on energy prices, considering electricity prices on the basis of Eurostat data.

1.3. Financial measures

The main financial schemes developed during SUPER-HEERO to favour the implementation of energy efficiency measures in supermarkets are:

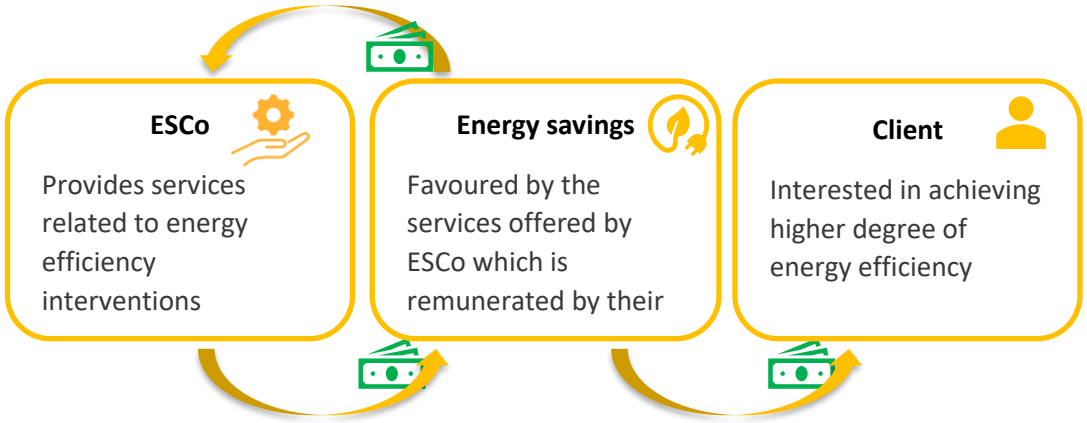


These schemes, already known as business financing options, were studied to be adapted for their application to the real supermarkets' private property framework, minimizing their drawbacks.

C.2.2. Energy Performance Contracting (EPC)

WHAT IS AN EPC?

EU Directive 2006/32/EC definition: "*a contractual arrangement between the beneficiary and the provider (normally an ESCo) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement*". This type of contract is mainly used in the public sector (public buildings in particular)



EPC PROS

- ✓ **Costs** for the interventions are **sustained by ESCo** and not by the client
- ✓ **Risks and costs** associated with unforeseen contingencies are reduced and **assumed by ESCo**
- ✓ **Energy costs are reduced**
- ✓ The client will be the owner of all the installations at the end of the contract, gaining big cost savings, as **no more costs will be allocated**

EPC CONS

- ✓ The **client does not own the new installations** during the contract, as they belong to ESCo
- ✓ The contracts can have a **quite long lifetime** (2-20 years) based on the implemented measures
- ✓ **Initial savings for the client are lower** than they could be if the investment is made directly by the client

EPC IN THE SUPERMARKETS

- **The most suitable ESCo model/EPC scheme** should be studied considering the targeted energy economic savings, based on preliminary energy assessments of the supermarket, its energy bills/demand, and the most techno-economically viable and profitable measures to be implemented
- **ESCo guarantees** to the supermarket the achievable energy savings that, if not met, the payment to the ESCo gets reduced proportionally or even more than proportionally, according to the specific contract clauses
- **ESCo is responsible** for any underperformance of the energy efficiency measures as well as for Design and Construction, Operation and Maintenance (O&M), Measure and Verification (M&V) process and First Aid in case of malfunctioning or failure of the installed equipment

MAIN BARRIERS

- ✓ Existence of more advantageous and widespread financing models to achieve the same objectives in the private sector
- ✓ Complexity of EPC process

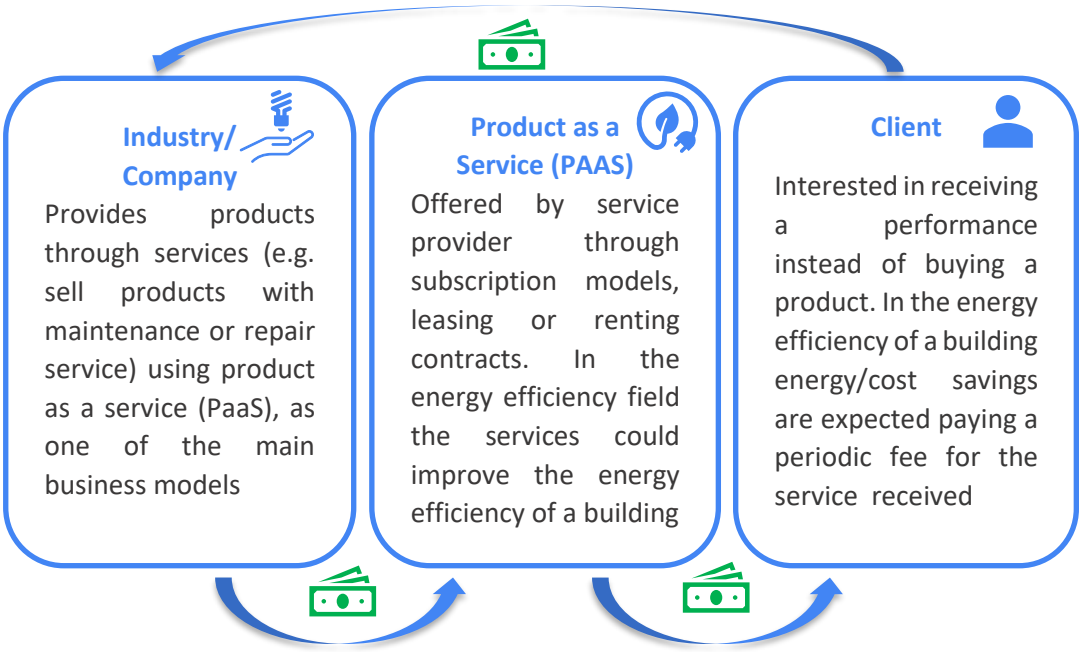
SUITABILITY WITH LEGAL AND FISCAL SYSTEM

- ✓ Existence EPC model is compliant with European and, in particular, with both Italian and Spanish legal and fiscal systems

1.3.1. Partnership with technology providers (Servitization)

WHAT IS THE SERVITIZATION?

Servitization refers to industries offering their products through the services they provide, not just selling the product itself. It is indicated by the Industrial Marketing Management as: "*the transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic*".



PAAS PROS

- ✓ A periodic fee is foreseen for the provision of the service, so **no capital expenditures** are required
- ✓ The customers have the **flexibility** to tailor the subscription periodic fees to their needs (e.g. downgrade/upgrade it)
- ✓ Customer is intended of mere utilizer of a product **focused on the benefits** that will be delivered

PAAS CONS

- ✓ The proposed services **can be expensive**, including a series of benefits that can be of no interest for the customers. In this case, the consumers can be more oriented to directly buy the product only.

PAAS IN THE SUPERMARKETS

- **Cooling as a service (CAAS)**: service company installs technologies for refrigeration, overseeing all operational costs, maintenance and electricity consumed. Supermarket pays for the cooling service and not for the infrastructure based on the consumptions from cooling.
- **Lighting as a service (LAAS):** technology provider offers the substitution of old lighting with LED lighting including the installation of timers and movement sensors.
- **Energy as a service (EAAS):** service provider (Energy Service Provider) offers services as energy advice, energy management and energy asset installation keeping the ownership of the systems. Supermarket can obtain lower price electric energy, energy savings, emissions reduction.
- **Technology leasing:** supermarket has the possibility to buy equipment through periodic fee payments over their lifespan, with the possibility to upgrade or replace them avoiding the management of products disposal and their maintenance.

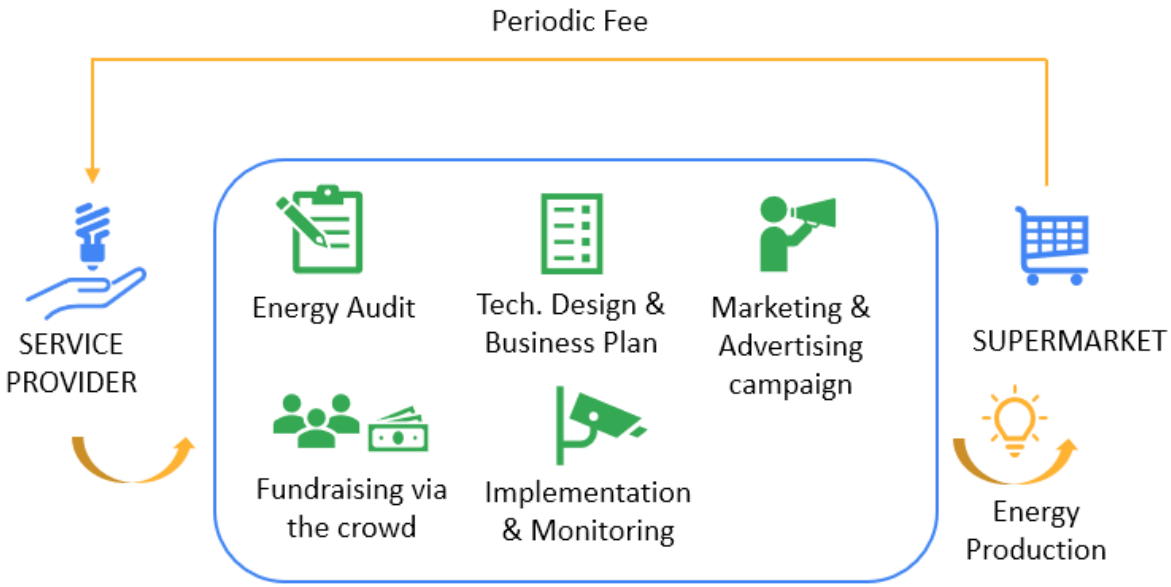
SUPERHEERO AS A SERVICE

5-STEP PROCESS

1 Discovery & Audits
2 Technical Design & Business Plan
3 Marketing & Advertising Campaign
4 Fundraising via the Crowd
5 Implementation & Monitoring

Payment:
over a specified period based on a business plan

Contract type:
- Rental: ESCO maintain the property
- Sale: Supermarket has the property



MAIN BARRIERS

- ✓ Difficulty in changing standard procedures (e.g. "turnkey" contracts financed with supermarket own funds) toward innovative schemes
- ✓ Resistance to models that foreseen consumption without possession
- ✓ Difficulty in maintaining the system

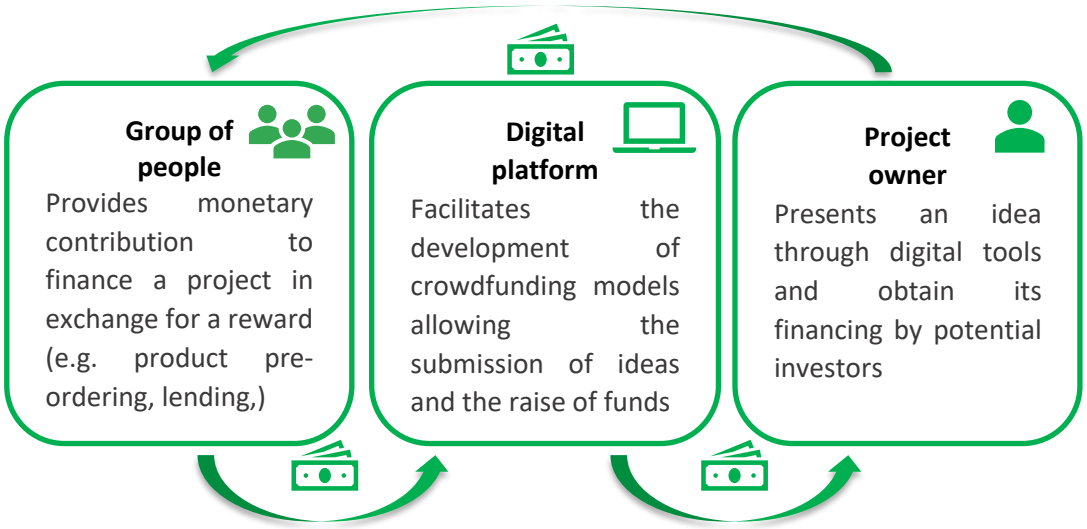
SUITABILITY WITH LEGAL AND FISCAL SYSTEM

- ✓ Partnership with technology providers models is compliant with European and, in particular, with both Italian and Spanish legal and fiscal systems. This type of contract is ruled by private law and its legal and fiscal management is the responsibility of the parties to the contract

1.3.2. Crowdfunding models

WHAT IS CROWDFUNDING MODEL?

It is defined as a capital collecting practice, that, by collecting a small amount of money from a large group of people, generally via internet, it enables projects and start-ups to be financed. In return investors can be rewarded with monetary or non-monetary rewards.



CROWDFUNDING PROS

- ✓ **Great flexibility** in raising money from a variety of investors bases and for a wide range of purposes
- ✓ **Financial risk is spread** over a larger number of people compared to a more classical financing scheme
- ✓ **Secure and easy to use service** provided by the crowdfunding online platforms (e.g. all-or-nothing funding model: if the target is not reached everybody can gets money back)

CROWDFUNDING CONS

- ✓ **No guarantees** in reaching the target
- ✓ **Big amount of time, resources** and in some cases, additional costs (e.g. equity crowdfunding where administrative costs may increase with each issue of shares)
- ✓ **Risk of fraudulent platforms**
- ✓ Potential risk of **replication of ideas/projects** by competitors, once they are online

CROWDFUNDING IN THE SUPERMARKETS

CLASSIC SCHEMES

- **Lending-based scheme**: supermarket is the promoter of the energy efficiency (EE) project, that will generate value in terms of energy savings, proposed to the crowd through an online platform, where investors can underwrite the bonds offered in return for interests, as financial reward
- **Equity-based scheme:** supermarket promotes an EE project, usually undertaken by an ESCO, and investors buy equity shares of the commercial activity with a financial reward based on its performance, in the form of dividends or surplus generated by selling the stock
- **Donation-based scheme:** supermarket acts as promoter of EE project through an online platform, where the customers are donors and may be rewarded by the perceived benefit of the project produced by accomplishing its goal
- **Rounding technique:** supermarket presents an EE project to be financed by the capital that can be collected through a voluntary round-up of customers' bills. A great adhesion is required, as the amount paid by the customers are very little
- **Sponsor products:** supermarket proposes an EE project an get the financial resources from the sales of specific products which part of the price is devoted to finance the project, that can be developed by the supermarket or through an ESCO

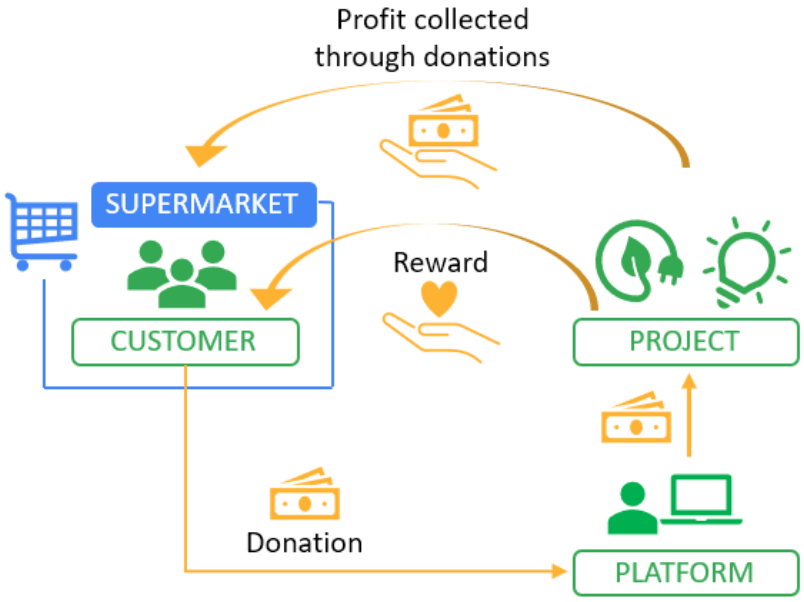
CROWDFUNDING IN SUPERHEERO

SUPERHEERO PORTAL

Ener2Crowd, an Italian company specialised in launching crowdfunding campaigns has developed a specific Super-Heero portal, from where the crowdfunding campaigns handled through the project can be launched and managed.

https://www.super-heero.com

1. Subscribe
2. Create your wallet
3. Recharge your wallet
4. Invest In SUPERHEERO projects
5. Monitor your investments
6. Wait for the conclusion



MAIN BARRIERS

- ✓ Lack of common regulation and existence of diverging licensing requirements across EU.
- ✓ Detriment of a Union-wide crowdfunding market, as the regimes promoted are tailored to local markets features and needs.
- ✓ Diffidence in adopting this type of scheme as it is still perceived as expensive with little engagement potential.

SUITABILITY WITH LEGAL AND FISCAL SYSTEM

- ✓ Crowdfunding schemes are compliant with European and, in particular, with both Italian and Spanish legal and fiscal systems.
- ✓ European regulation EU 2020/1503 is the main legal framework in Spain (complemented by Law 5/2015), and in Italy (together with Banking Law 2016, Innovations of the Consob regulation and Diritto 24, 2015).
- ✓ It is important to highlight that, even if crowdfunding schemes are legal in Spain, the Super-Heero platform is not available yet because it doesn't have the permits required.

3.5.2. Understanding/developing our model – combination of financing schemes

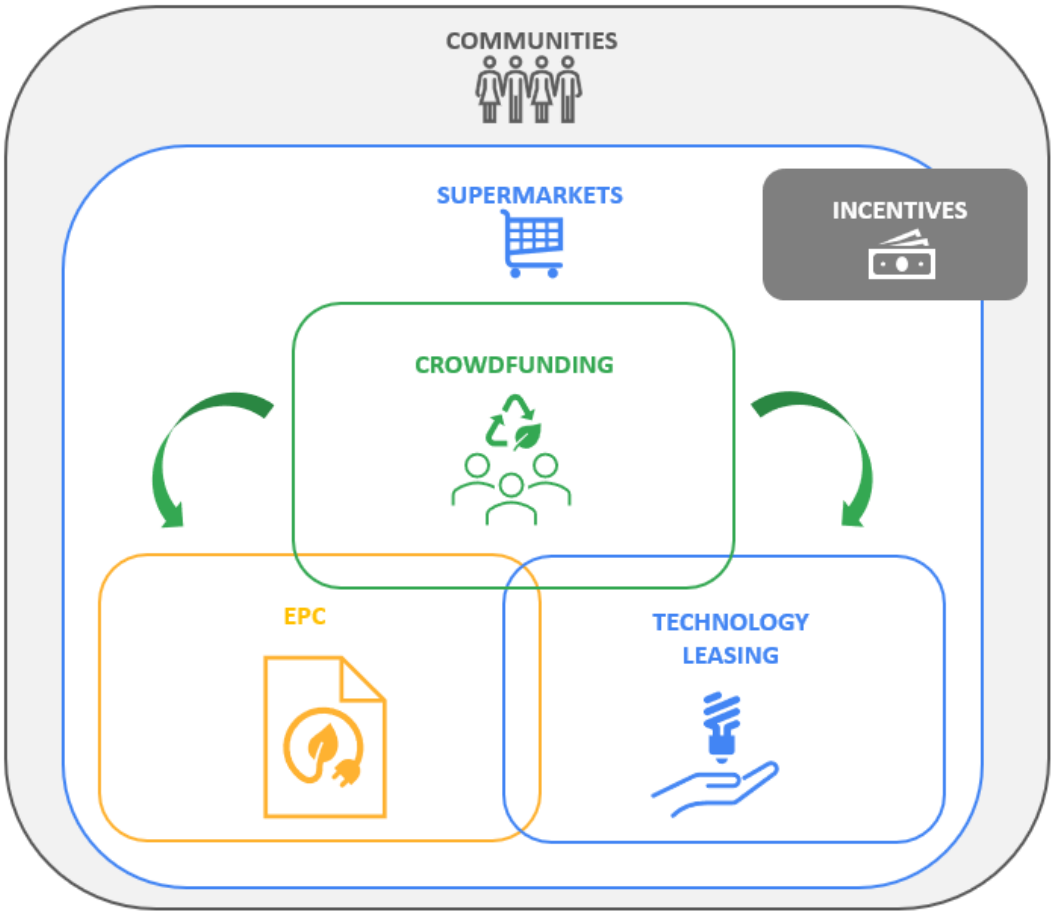
Our vision at project onset was to work within those three innovative financing schemes (Energy performance contracts, technology leasing and crowdlending), each connecting to humans. **Our final model became a hybrid of these three approaches** – to use crowdlending in a blended finance approach to offer an energy performance contract and leveraging technology leasing as appropriate to lower upfront costs. **A hybrid approach became the preferred solution** because although energy performance contracts are still relatively not utilized (and can be considered innovative as a result) – it is not clear how they can then engage people in a way that will be adopted / is market driven. The same for leasing options.

After having the first data available from the pilot projects, it was clear that there was no optimal financial solution or combination of schemes for all the supermarkets. On the contrary, each supermarket will decide its ideal financing scheme based on several factors, such as the implemented technologies and the generated savings, the brand-image, the corporate structure or their relation with their clients.

WHAT IS SUPER-HEERO INNOVATIVE FINANCIAL SCHEME(S)?

The model developed during the project is based on the interconnection between the main financial schemes identified in this framework and it is articulated in four steps:

- Engage people **offering some part of a project on the crowd**, using a blended finance approach
- **Couple the crowdfunding approach** to an EPC, or Service or leasing model
- **Connect this finance approach to incentives** where present
- Connect this model **to territorial initiatives**



SUPER-HEERO INNOVATIVE FINANCIAL SCHEME(S) PROS FOR THE SUEPERMARKETS

- ✓ **Intersection of different financial schemes** is most interesting and flexible
- ✓ **No unique solution**
- ✓ **Targeted solution for supermarkets**, that will have, together with the communities, their own story
- ✓ Aggregation of several intervention measures **offering a holistic turnkey service to the final client with low or no initial investment**
- ✓ **Access to a portfolio of services and innovative technologies** through project partner network

To facilitate the adoption of a tailor-made and optimal combination of schemes by each supermarket, a simple **Financial Analysis Tool for EE Interventions** was developed, even if this tool was not envisioned at the beginning of the Super-Heero project. This tool allows to estimate how the cash flow of a project varies according to the funding sources and the financing schemes applied. The initial inputs to the model are the full cost of the selected package of measures and the estimated annual economic savings.

Having developed this tool, it has been used as a way of approaching supermarkets to explain each of the financing solutions studied in Super-Heero. Thus, supermarkets have had a better understanding of the potential benefits and disadvantages of each scheme not only qualitatively, but also quantitatively.

Overall, the tool has been very well received. The contacted stakeholders who were shown the tool (not only supermarkets, but also from other sectors such as shopping malls), have positively valued the availability of such a tool as a first vision for the go/no-go of the project, which was its main goal. Additionally, they have considered that the tool has potential for growth, as it could eventually be used internally by their teams for the complete valuation of projects.

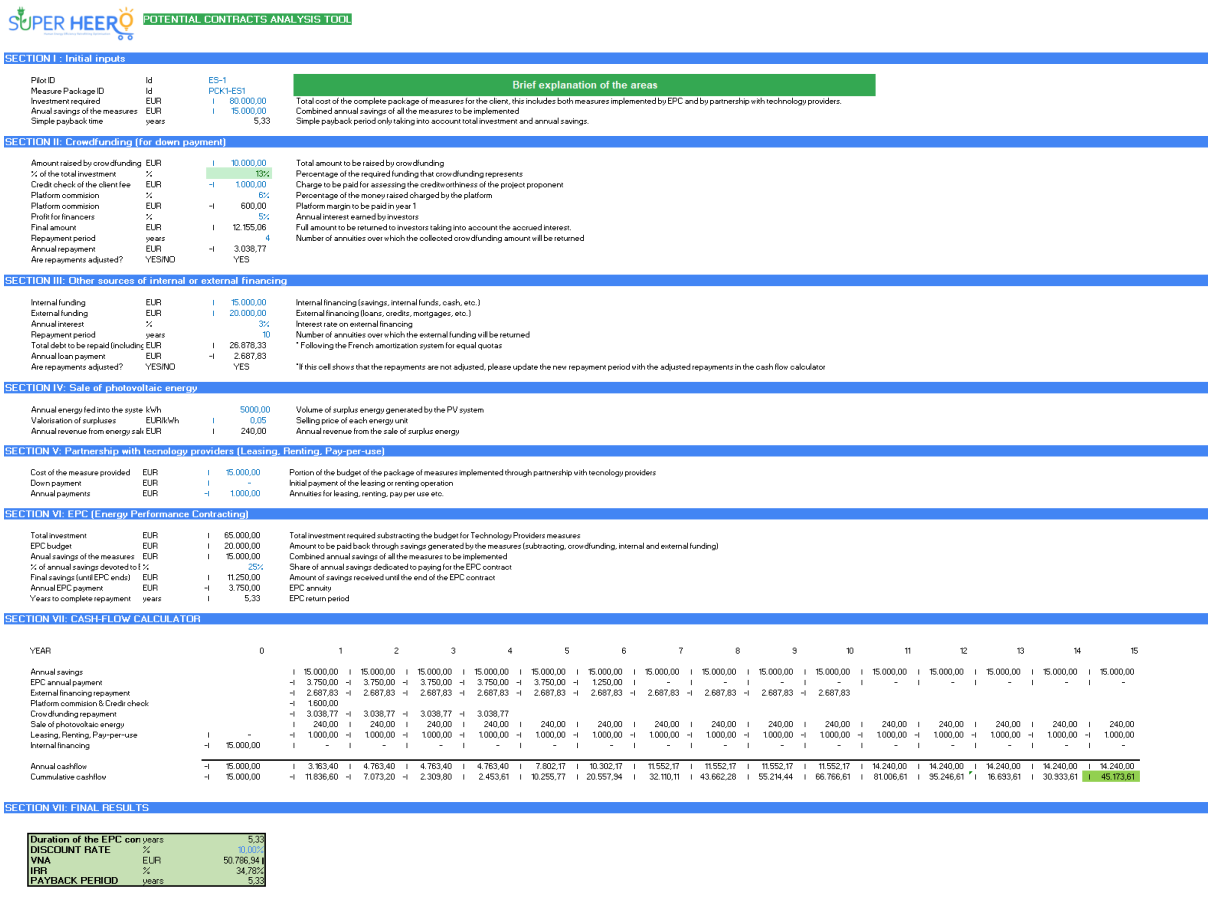


Figure 2 – Super-Heero Financial Analysis Tool for EE interventions

3.5.2. Lessons learned on the Innovative Financing Scheme

1

The most viable market need / pain point / unique value proposition was to use crowdlending, especially in Italy, to provide bridge financing for project developers – and in doing so to offer citizens the opportunity to participate in projects and share in the benefits. Indirect approaches, donations by the supermarket or ESCO thanks to an EE intervention, always seemed forced / not on target. Inviting people to directly participate and to create around that a community of investors has instead been the final selected approach.

2

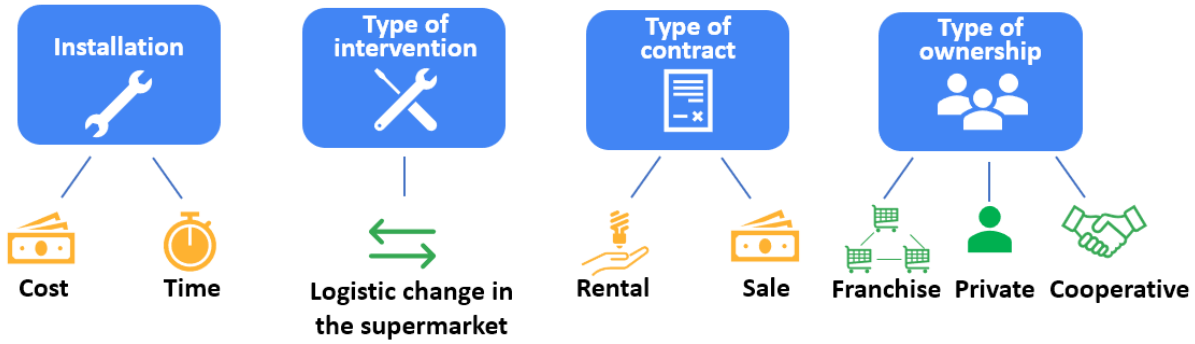
There is no generalised optimal financial solution. The payback time, whatever technology will be adopted is essential, but for the package to work, you really have to do a project tailored to each supermarket that takes into account financial - technical but also marketing (the type of customer existing in that shop etc) or corporate structure (franchise owner? directly managed by the chain?) elements.

3

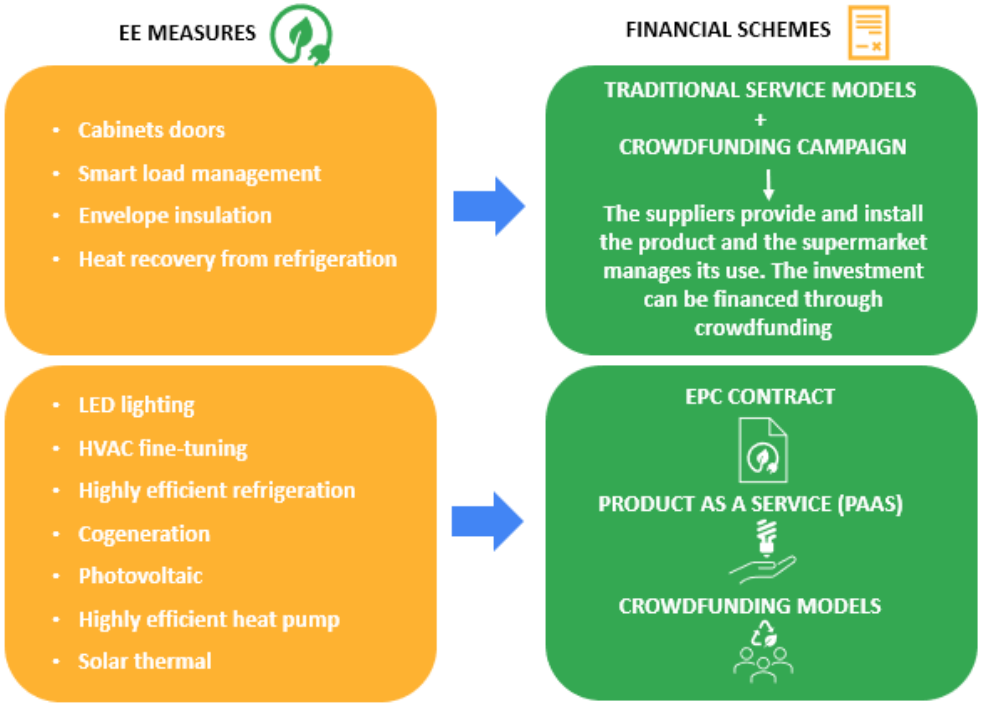
In Spain the crowdfunding has not been perceived as an ideal solution for supermarkets. The Spanish chains involved in the Super-Heero project have conveyed how critical is to reach their customer base. Instead of perceiving it as a marketing opportunity, they believe that such a message can be counterproductive and have a potentially negative effect.

1.4. How can the EE measures can be installed in the supermarkets? - Technology Providers

The main aspects that supermarkets can evaluate to choose a technology provider are:



The type of contract and so the financial measures that should be adopted to implement the EE solutions needed by a supermarket depend also on the type of technology considered. In this sense there are financial measures that can be better adapted to certain EE measures than others. In the following an overview of the most commonly EE solutions needed by supermarkets is presented together with the best related financial measures that should be discussed with the technology providers.



3.5.2. The Technology Providers in SUPERHEERO

An engagement strategy, following both bottom-up and top-down approach, has been carried out to involve technology companies. Concerning the top-down approach different channels were used, as emails, social networks, SUPER-HEERO web page and targeted workshops. For this purpose, a promotional brochure was designed with specific information from the project, together with an ad hoc engagement letter to formalise the partnership. The programme was focused on:

From this activity a list of approx. 50 eligible technology providers was obtained, but only 2 of them positively responded of which 1, Energia Europa actually joined the project. This happened before the Super-Heero platform / ecosystem was launched.

The bottom-up approach was used when the pilots' activities have been identified and consolidated and there was the need and opportunity to directly work with several companies to implement the EE measures. At the end of the project, considering the technology providers who have been directly involved in the project pilots, as deepened in D2.3, 5 can be considered as Super-Heero Certified partners who will deliberately expand the approach and program:

- Greentime Hub: https://www.greentimehub.com/
- Brainbox AI: https://brainboxai.com/en/
- Energia Europa SPA: https://www.energia-europa.com/
- Onyx Solar Energy: https://onyxsolar.com/
- GFP Consulting: https://gfpconsulting.it/

3.5.2. Lessons Learned in setting up the technology partner program

1

There is an **opportunity area in capacitation for technology providers in PAAS models**, especially for small and medium companies. In the research that has been done for technology providers most of the local providers follow traditional business models and for them **to introduce new models it is necessary to make a business case study**.

2

Technology providers **want to be considered partners in the project if they participate in the pilots**. For them, sharing their information it wasn´t attractive without the possibility of an implementation of their equipment.
The best approach was to **promote them as free marketing**, however for that the only partner that respond this was very curious in specific numbers such as:

- Estimation of number of decision makers we are going to reach out with the catalogue.
- How many supermarkets we have in our portfolio.
- Average timelapse of an intervention.
- Type of payment if crowdfund is used.

3

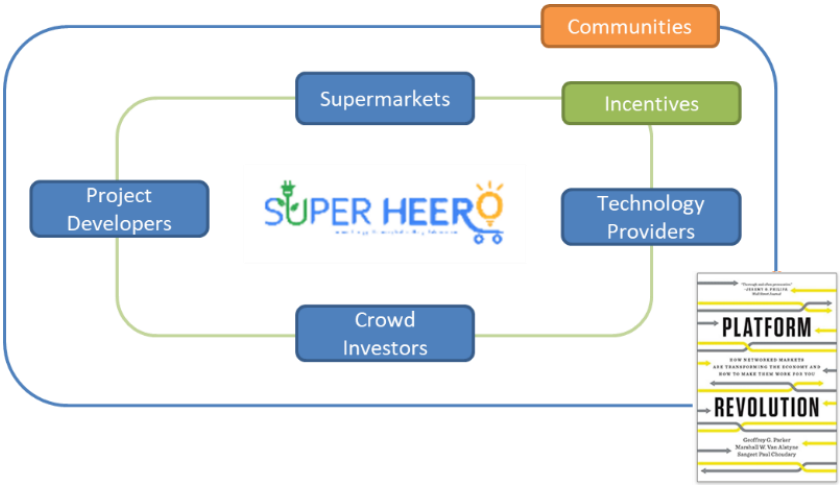
Once it was established the participation of the technology providers, **they wanted a meeting with project manager** to talk about future implementation, but **there has never been answer from the PM weakening the interest in being part of the project**. Technology providers are almost always commercial figures mainly interested in selling, so it is understandable that they look for reliable data and are afraid to lose time and money.

4

It can be a risk to attract technology and service providers if there are not yet projects and supermarkets. They will soon lose interest in the approach, and it is not possible to involve many providers when there are small number of projects in the ecosystem. **Engaging providers directly involved in first projects, excite them about the concept and idea**, make them advocates for the approach and then formally bring them into the technology provider program, **it is a successful approach**. This has been coupled also to several providers with whom consortium partners already have relationships and that have the patience to allow the ecosystem to build across time.

5. Ecosystem construct

5.2. Build a multi-sided ecosystem and its business model



The key factors to construct a multilateral framework are strategic awareness, ignition method, and patience. Super-Heero is a multi-sided platform with network effects. The primary sides in this platform are supermarkets, investors, ESCOs, technology & service providers and communities. The key transaction is the innovative financing of EE interventions via blended financing schemes that involve in part crowdlending**. Network effects imply that attainment of critical mass on any side has impact on the other sides**. More supermarkets attract more technology providers. More investors attract more supermarkets and also more ESCOs. Various strategies exist for igniting and maintaining a multi-sided platform business model. Most ecosystems fail. Several lessons were learned with respect to setting up the Super-Heero ecosystem and are outlined in the following.

3.5.2. Lessons Learnt

1

Create a contained example (micro-experiment) of the full business model, testing that, and using it to attract other sides

2

Create confidence that the actors, platform and brand will not go away with the completion of the EU project. Business plans on EE interventions are likely 5-7 years in duration, so interventions must make sense outside of the EU project and the actors involved must have trust that the activities are commercial / viable / sound outside of R&D.

3

Have the patience to invest the time and share the vision with each side of the platform and recognise the need to subsidise the first transactions

4

Use levers and investing in relationship. The role of Comune di Padova was essential to attracting first interest to the Super-Heero project. **Supermarkets are hubs of business activity** – they have very little time / attention span for new ideas and R&D concepts – until you break into key relationships and decision circles within these organizations. We arrived at such opportunities in part via the organizational culture of select supermarkets, the influence of the local municipality and direct investment into initiatives of the supermarket outside of the scope of the Super-Heero project.

3.2. Stakeholders' engagement

5.5.2. The importance of process

It is crucial for a successful stakeholder engagement that the people who can potentially be involved in the project have a clear idea of how it can work for them, being also able to explain it to others. This emerges especially when a corporate communication director attended one of our workshops and wanted to bring the idea forward to management for consideration. This person asked, "But how does it work for me? Can you give me the steps? Do you have an example? I get the idea, but I can't explain it to anyone else." This concept of "how is the idea made actionable?" was a consistent question across project events and capacity building sessions. The accompanying infographic was made to support such meetings and events. The ability to package and communicate the project pilot activity in Padova at the end of the project have been a great help, triggering additional projects, as it was for Pordenone supermarket that joined Super-Heero in the very end. It has also been the case for the consortium, only by applying the model to have some of the lessons learned become apparent.

3.5.2. Understanding and communicating roles

A project like Super-Heero assembles multiple stakeholders across a minimum set of 5 roles. The conditions of any particular project will determine if other roles are present, e.g. if it is a franchise or brand owned shop, if the building is rented or owned, if incentives are leveraged or not, if third party investors are required to support the blended finance model, if the local community engages or not and so on. Having a flexible model and approach that adapts to the technical requirements and social objectives of each project makes it powerful – but it also can make it difficult to explain as each stakeholder sees their part (or is comfortable with their part) and potentially not the others. Within various stakeholder types, there are various levels of profiles (energy manager, contracting, advertising, management). The model has multiple chances to be killed and careful curation is required.

Role	Description
Project Proponent	Project developer – signs contracts between all sides (supermarket – technology providers – crowd)
Project Owner	Either the Brand Owner or Franchise Owner
Brand Owner	Owns the brand
Franchise Owner	Owns the location business under the terms of the brand
Building Owner	Owns the building
Facilitator	Identifies the potential EE measures and connects the supermarket with an ESCO
Service & Product Suppliers	Works with proponent + owners to provide products and/or services
Super-Heero Crowdlending Platform	Interface between Crowd and Proponent
Crowd investor (70%)	Participates in crowdlending campaign
Local Government (Municipality)	Supports, sponsors, puts under umbrella of energy transitions

Challenge – aligning all around common understanding – takes time
Challenge – contract types – who bills who – who owns what – who does what
Challenge – misperceptions of risk

Trust

3.5.2. Tuning information and its delivery

At one workshop, a participant highlighted exactly what we did at an in-store event. “Ms. Rossi came to the store in a hurry to buy milk and you engaged her with two years of knowledge development in Super-Heero! That wasn’t going to work.” The franchise owner also sharply rejected our first marketing attempts for the campaign when he saw too much information on a poster to hang in the shop “Where does it say – “Do you want to invest in PV?” - We only need that.” The following figure shows how our advertisement was reshaped to be better focused on delivery the needed details.

3.5.2. From knowledge to infographics and capacity building materials

Overall, we struggled a bit in condensing knowledge from reports (knowledge development work) into sound bites and infographics. Workshops amongst other researchers were more comfortable because one has 15 minutes and a set of slides to support a talking argument. To capture interest (marketing) one has to condense that into a few seconds of attention. For this purpose, storyboards were developed to support delivering the concept. In the accompanying image, Federica sees information in the shop, asks the cashier, discovers online, invest and later shares her experience with the cashier on a future shopping trip.

3.5.2. Offer psychology

Working with technology providers shaping several pilots, we realized that all businesses have their secret sauce on selling / triggering decisions. Even for something as routine as a simple PV system, its production can be modelled differently, its lifespan modelled differently, % self-consumption modelled differently and so on. We fell in the trap of being fully transparent and allowing decision makers to co-design the model with is. Perhaps this approach will eventually be a winning strategy but we did find that we keep getting compared to "other offers" and competing on very narrow aspects optimized in the community of PV installations. This can be fine, but these stakeholders are missing the point on the value proposition of Super-Heero (no bank, fast, hands free, good publicity, connections to shoppers, something innovative in the store and also for staff). One provider stressed the importance of not leading with how much they will make if they do take action, but on how much they will spend if they don't take action. We continue to learn about how to price that and the first pilot exit survey data across 35 investors will give us first indications. We hope to have a second pilot completed to report about and this data will be precious.

3.5.2. Lessons Learnt in building and managing the ecosystem

1

People need to understand how a project like Super-Heero works for them, so a clear and easy-to-understand communication campaign is fundamental to explain the steps of the process the stakeholders engaged can be involved in

2

It is important to have a clear understanding of the various roles of the stakeholders involved and to make them non-threatening/normal. Aligning stakeholders takes time. Within various stakeholder types, there are several levels of profiles (energy manager, contracting, advertising, management).

3

We experienced what sales, **marketing and advertising people likely know or deal with routinely**. There is a sales funnel. People have to move through that across time. **Each stakeholder will need different key messages that are important to them**. Likely we learned that as Super-Heero transitions to replication activities, more attention and **specifically skilled people are needed** on that.

4

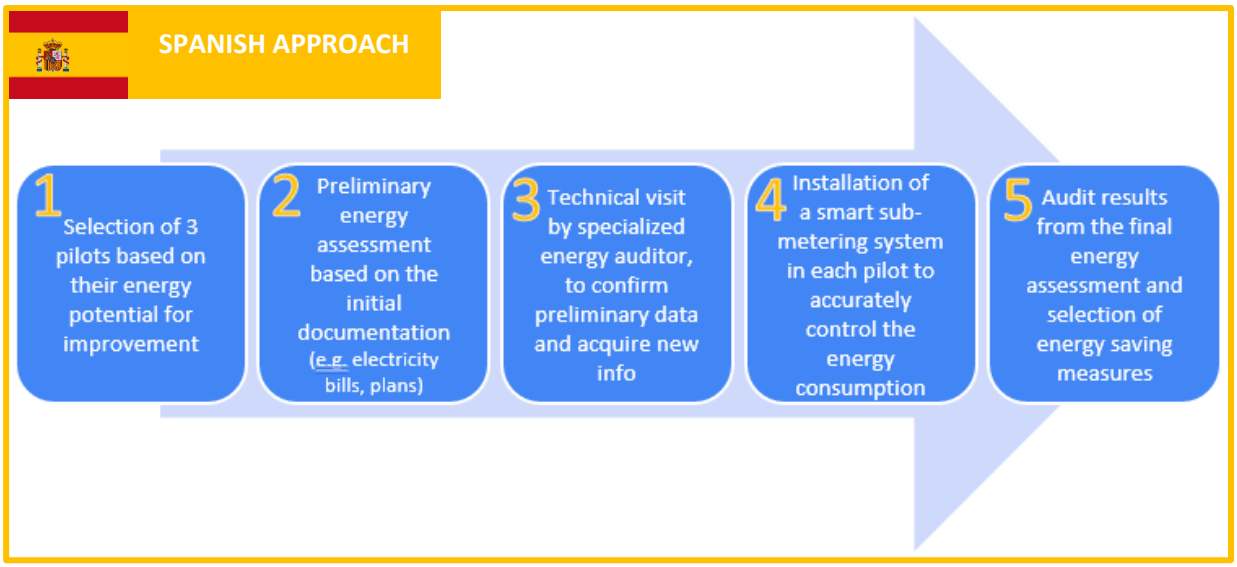
Sharp key messages and professionally prepared graphics are crucial. For knowledge transfer (use of knowledge), one has to break apart what people need to know, to provide a menu that allows a user to find themselves (amidst the process and range of roles), and to provide the information in the shortest and most clear way possible with references as appropriate. FAQs became an important part of webinar delivery.

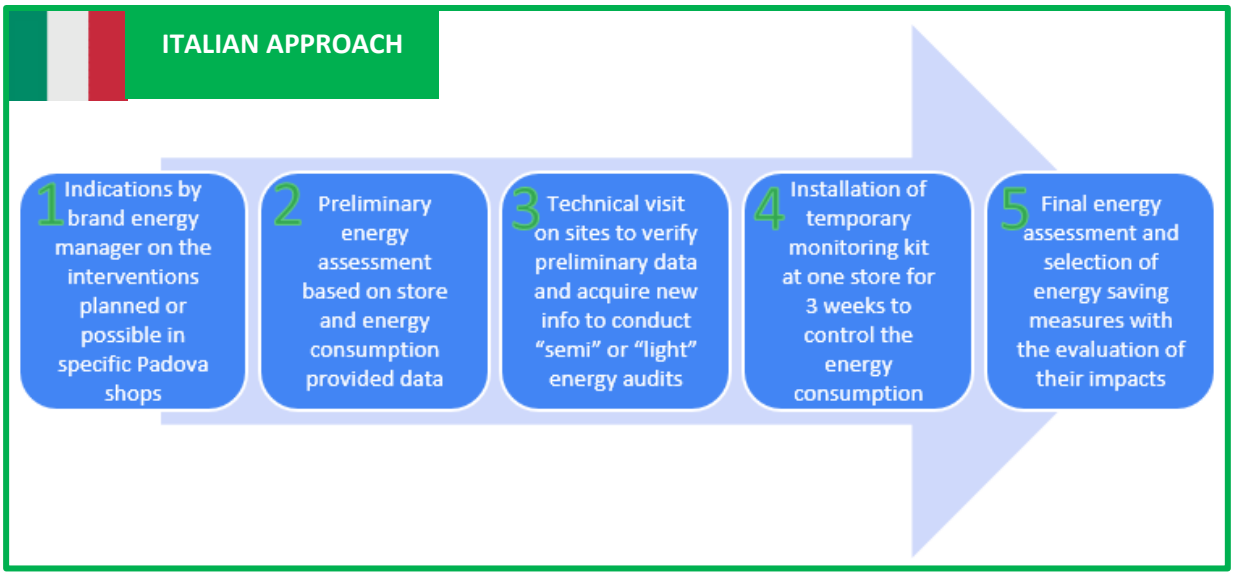
5

Various secret sauces can work, as all businesses have some, but one needs to have a check that is cooking

6. Shaping pilots

Two different approaches were followed in Spain and Italy to identify the appropriate measures to be implemented in the supermarkets, considering the diverse needs of the commercial buildings. In Spain the energy efficiency gaps had to be analysed and defined to propose specific interventions, while in Italy the supermarkets already identified their needs, and the study was mainly focused on the financing schemes to be activated and on the local engagement.





The experience gained in this framework allowed to increase the knowledge in the broad scale pilot development, providing also more indications about stakeholders' engagement. The learnings in this context are summarised in different sections in the followings.

3.5.2. Understanding supermarket management climates

It was not easy to get an audience with decision makers in supermarket chains. Moreover, staff at all levels are used to getting sold to/are fast to state they are not in the decision-making chain and cannot help you. They get calls/spammed all the time and everyone wants to sell them the next something because of the scaling potential of supermarkets. We were told on several occasions that we got an audience because it was the first time in a long period that they actually heard a new idea – so they became curious and gave us an opportunity to pitch.

3.5.2. Tuning information and its delivery

Supermarket chains have robust organizational structures. Governance, energy managers, technicians, corporate social responsibility, marketing and advertising, contracting and so on. The marketing department takes a different interest in the concept than does the energy management department. Energy managers and technicians were more interested in what new technologies we offered or how they stacked up, while marketing/advertising were more interested in the social aspects. This seems obvious, but on occasion we were guilty of delivering our standard pitch to all stakeholders in the same way. It is also the case that human nature seems to object to anything new. Each of these stakeholders within a brand have a unique set of objections that eventually have to be mastered. Contracting can be difficult. Some organizations simply do not do this or that by organizational policy which can stifle innovation.

3.5.2. Understanding supermarket typologies

There are different typologies of supermarkets (urban, periphery, outer ring) and those may be old, semi-modern or new. Super-Heero can start with an energy audit to design a comprehensive solution or Super-Heero may simply be a tool to add onto something the supermarket was already doing. Supermarkets may have habitual technology providers (a specific LED has been selected for architectural purposes/interior design) or help may be wanted to navigate the field of technological options. The flexibility of the approach is a benefit in that it can adapt to most of any scenario but at the same time, stakeholders want to find a fixed point in their mind to make concrete what Super-Heero is for them.

Supermarket Typologies

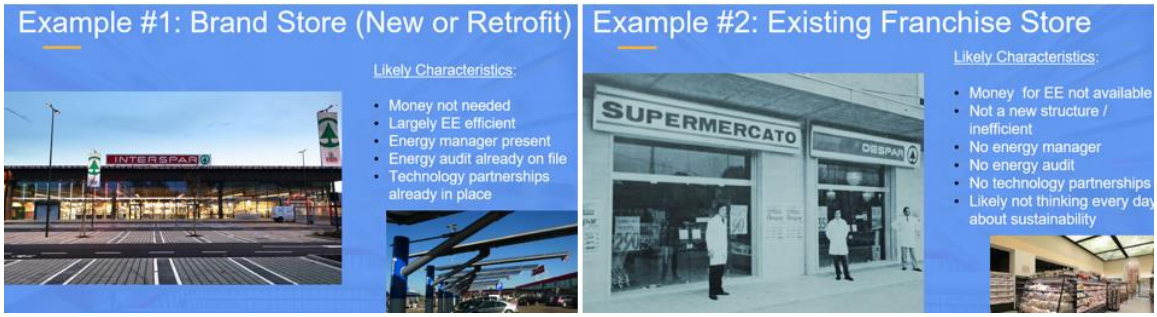
Urban Boutiques | Periphery medium size stores | Outer ring large stores

Old – Middle Age - New

Franchise Owned / Brand Owned / Co-Owned

3.5.2. Understanding supermarket governance

The three governance structure typologies of supermarket are Brand, Cooperatives and Franchising. Franchising may involve co-ownership scenarios and the ownership percentage can impact split incentives or accessibility to various support programs. Franchising can also be for a specific period of time which impacts contracts that may extend beyond the current licensing period. Brands, Cooperatives and franchises likely want different things: brands seem more interested in community positioning and the social aspects. Their energy management programs are likely more mature, and financing is not a problem. Cooperatives are in the position of wanting to offer some beneficial aspect to their members, although they do not always have all the information needed for project implementation and cannot make the decision themselves. Franchise locations seem very busy as entrepreneurs, stores may not be recently renovated, and they are likely not as well equipped to secure financing or expert in energy management programs. This is not always the case as some entrepreneurs are very sharp and wealthy.



3.5.2. Framing the core value proposition correctly

Super-Heero gives clients, staff and other stakeholders the opportunity to invest in energy efficiency measures. All EE interventions have a return of investment. Using the Super-Heero approach, that benefit is spread across more people as opposed to the benefit being centralized under one or two investors. Some supermarket stakeholders couldn't make this mental switch and instead always saw first that we are asking shoppers for money/trying to take something from them.

3.5.2. The ups and downs of incentives

Incentives, especially for franchise owners, can be a powerful tool to supplement the Super-Heero value proposition. In specific, the ESCO/project developer/proponent helps the franchise owner with the incentive, it can be a good door opener/provide the driver for a marketing campaign. This technique was utilized to shape one pilot activity. Unfortunately, the incentive ran out of funding in a few hours and before paperwork was finalized between the brand and franchise owner. This had the reverse impact that what Super-Heero sets out to do – we created friction between the brand and franchise owner and some level of distrust on innovation and incentives and it was also incredibly time intensive for the Super-Heero people involved and resulted in nothing.

3.5.2. The importance of velocity

Our first pilot developed over years. This was too long and frustrated all sides. When the supermarket was ready, we were not (platform availability). When we were ready, the supermarket was not (change in governance structure). Contracting also took more than a month with many iterations and lessons learned on how to put everything in place on both sides. We very much look forward to future iterations to see how much faster/efficient we can become.

3.5.2. The importance of reusable content

It was wonderful to have customized content for every aspect of the first pilot, but to scale up and speed up the process, templates, standard posters, standard procedures and so on will be required.

3.5.2. The importance of capacity building

The most important content for capacity building relates to how to do Super-Heero customized to different stakeholders. Brand owners, franchise owners, crowd investors – how does Super-Heero work for me? How does crowdlending work? How do blended financing campaigns work? How are the contracts setup? Once established, a secondary ring of supporting materials is appropriate: understanding energy bills and energy audits, designing intervention measures, building reward programs, connecting to the community. Once established, a third ring of materials are appropriate, which related to the papers and results of the Super-Heero project. This thinking has driven the design of the capacity building section of our project website. Capacity building also relates to our technology partner providers.

3.5.2. Strategy for workshops

We implemented many workshops and webinars were getting audience has always been a challenge. Online marketing resulted largely non effective, while phone calls and reminders have typically yielded better results and personal relationships have been essential in attracting participation. At one event such a moderator one by one made each supermarket representative speak and this broke the ice for follow on conversations.

3.5.2. Modelling energy prices

There have been a lot of discussions on energy prices. Values during the shaping of the pilot have ranged from 170-410 euro/MWh. The values modelled in a business plan deeply impact the financial performance of the intervention. One common practice is to base an assessment on the past year of energy bills. 2022 was however likely an aberration. Current prices as Super-Heero comes to a close are around 290 euro/MWh. Our financial model for contracting has used a fixed energy price to establish the instalment payment and our approach was to agree on a value with the supermarket and build around that. Future evolutions of our model may include strategies to share the risk and reward surrounding energy prices.

3.5.2. Protective clauses

Surveys, visits, audits, design and quotations take work and have costs, but clients may not hesitate to ask for more and more. One common practice is that work product can be delivered, but if the job does not go forward, that some modest value is agreed upon for invoicing.

3.5.2. Lesson Learned in developing potential projects

1

Supermarkets have different approaches to energy management. Some are very structured, planned and budgeted across the next 5 years and others are not. Some are technically advanced while others are not.

2

The supermarket sector is big and scaling in one brand along can be years of work. The approach does not need to work for all supermarkets. **The key is to find the ones where probability of success is highest, target those**, and the others may come around later after the early adopters.

3

We learned to **set the expectation immediately that there is no unique solution for Super-Heero projects.** This flexible approach can be uncomfortable at first for some stakeholders, that need to have a concrete idea of what Super-Heero is for them, so we understood that it is better to share that this is a normal reaction and deal with the topic from different directions as people work through it.

4

It is important to discover the governance of any particular location via deliberate questioning and adjusting the value proposition to scenario at hand, as there can be various dynamics between franchise owners and brands. In this framework **it is important to stay neutral and to be careful in what is said** so that Super-Heero is not used for any leverage, purpose or discussion it shouldn't be used for (e.g. he said, she said, etc).

5

Super Heero can be a tool to sensitize franchise owners to sustainability aspects or to support brand owners in reaching franchise owners from a third-party perspective. We learned that this is distinctly part of our value proposition.

6

It is important to stress that **crowdlending concepts, energy communities and bottom-up movements are becoming the new normal**. To be partnered with the existing Ener2Crowd greenvestor community, which has open 10.000 wallets, was a great resource.

7

Incentive mechanism can't be controlled and if it runs out of funding this can have a bad impact on the relation with the stakeholders involved and be very time consuming. We **did learn to do better in setting expectations.**

8

Lack of velocity in business kills opportunities

9

It is important that in the process the correct balance of **generic vs. customized templates** (contracting, end of campaign certificate, in shop posters, gadgets, webinar content..) **will become routine**.

10

It is not fundamental to provide all materials to master any given technology, but **it is appropriate to understand how to frame the consideration of various technologies and services** with respect to goodness of fit against various supermarket typologies, general payback times, magnitude of investment, etc.

11

During workshops **inviting our targeted stakeholders to speak was one way to increase participation**. We also discovered that when the workshop was part of a larger thematic event (in this case hosted by the municipality) with a program of other interesting speakers (in this case the municipality releasing parts of its sustainability roadmap), that this yielded good results. We also learned that **having an experienced moderator can be a great boost**

6.2. NaturaSì Padova 2 – Ponte San Nicolò

LOCATION Via G. Parini 2/b, Padua, Italy

SIZE 290 m^2 shopping area

CONDITION Recently renovated

LAYOUT Ground floor urban supermarket

DESCRIPTION

NaturaSì Padova 2 is a medium size urban supermarket that occupies the ground floor of a three-storey building with also other different activities inside. The building has a rooftop where the HVAC units from the supermarket are installed, but where there is also availability for PV installation, which is one of the potential measures that, together with the implementation of a monitoring system, the brand is most interested in. The supermarket is a new shop location recently renovated with all best available technologies installed and with modest energy consumption. The implementation of PV panels is an opportunity, not only to cover the sop electricity consumptions and save energy, but also to be part of an energy community scenario created together with the commercial activities present in the vicinity, as the auto dealership on the adjacent side of the street that has available roof space.

3.5.2. Energy system – Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	71,488

Electricity share of energy consumption (%)	Total energy consumption (kWh/year)
100	71,488

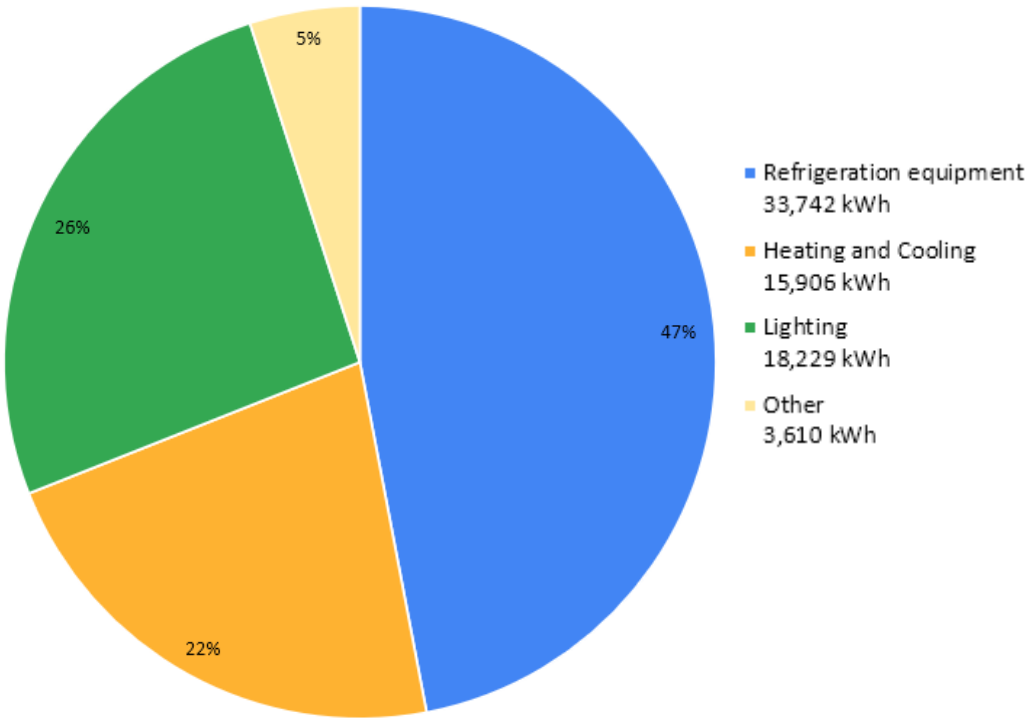
ECONOMIC DATA

Annual electricity expenditure (€)	Total energy expenditure (€)
12,715	12,715

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
17,514

DESTINATION OF CONSUMED ENERGY



6.5.2. Pilot history

Four pilots were developed in parallel in Padova. At one time, the idea was to join together four shops in one crowd campaign giving a collective teamwork feeling to the involved shop managers. Eventually the four shops became one shop. One store was closed and its lighting systems and refrigeration systems were moved into another shop where older systems were present and where we had intended to intervene. This left two shops, both potential PV installations. One PV installation was lost when the office space above the supermarket was rented and the new renter was given access to the roof. This left one project still viable and this was the project finally implemented.

3.5.2. Identified renovation measures

PV PLANT

Installation of 23.8 kWp photovoltaic plant	
Area of action	**Total investment required (€)**
Renewable energy production	41,500 (approx. 1600 €/kWp)
Annual energy savings (kWh/year)	**Simple Payback Period (years)**
23,418	5.1
Share in total energy consumption (%)	**GHG emissions avoided annually ($kgCO_2$/year)**
32 (2020 Total Consumptions)	6,908 (0.295 $kgCO_2$/kWh)
Economic savings (€)	**Lifespan of the measure (years)**
7,025	25

3.5.2. Technology provider

The pilot was designed in collaboration with Renantis (formerly Falck Renewables) and their associated installer Greentime Hub. Renantis is a large enterprise active in the space and expert on financing renewable energy projects. A partnership with Renantis boosted credibility and provides the capacity to handle large-scale projects (groups of supermarkets).

3.5.2. Pilot Governance

The shop transitioned from brand ownership to franchise ownership at the beginning of 2023. The pilot provided the opportunity to work with both the brand and a franchise owner. It took time to bring everyone around the same table as, although Super-Heero was something familiar to the people directly involved, it was not to the team finally engaged and everyone had busy schedules.

3.5.2. Pilot Capacity Building

The franchise team was introduced to the idea by the brand energy manager. We then worked with both the brand energy manager and franchise team to design and implement the campaign. Both were part of webinars and a workshop in Padova announcing the upcoming pilot activity. Working through the contracting process provided multiple opportunities to discuss aspects of the approach and idea. At first, perhaps there was doubt or scepticism about the idea and if it would actually work. At campaign conclusion, the ownership team mentioned they may license another shop and if they do, Super-Heero is one of the first things they want to do.

3.5.2. Hedging risk

The franchise license in the case of this shop has a duration of three years which is then assessed and carried forward if agreeable to all parties. The EPC contract has a duration of seven years (length determined to ensure the instalment payment resulted in savings from the current energy bill). This created the need to develop clauses within the contract for what happens if shop ownership is transitioned. Contracting was initially thought to be done with the brand (Super-Heero as a brand initiative and until transition: the brand was intending to carry out this measure with the project). The electricity however is paid by the shop, and they are owners of the POD (point of delivery). Contracting eventually was conducted with the shop directly (franchise owners). To ensure their engagement, it was required to include clauses that protected the franchise owners in the event that energy prices would drop, the instalment payments would be higher than the value of the energy produced and then they would transition out of the contract at the end of their license period not recovering the payments invested into the system and not yet remunerated.

3.5.2. Financing plan

The project had a cost of 40k euro. As a rule of thumb, crowdlending should cover up to 70% of the project costs. To send a joint message, it was agreed that the project would be financed 5k from the brand, 5k by the franchise ownership team and 30k from the crowd. The brand and franchise ownership team would make their investments directly into the Super-Heero platform at an interest rate lower than that given to the investors (3%).

3.5.2. Crowdlending campaign

The crowdlending campaign opened on 5 April and concluded 26 April. The campaign was deliberately structured to be open for two weeks to the local area, one week at the regional level and then at the national level until closeout. The minimum investment was set at 100 euro to make it accessible to most everyone and the maximum investment was set to 5000 euro to prevent a small set of investors to close out the campaign before additional people could be involved. Investments were mostly clustered within the first few days of each opening (5 April, 19 April and 26 April). An evening aperitivo in the shop was utilized to kick-off the campaign on 5 April. Weekly webinars were utilized to provide potential investors the opportunity to ask questions. In the store, a large poster (rollup) remained on display together with promotional posters attached to the door and along several windows, and small postcards available at the cash register to be handed to individuals asking about the event. Interest rates were set at 7% local with shop card, 6% regional with shop card and then national at 6% for cardholders and 5% for non-cardholders. Information was sent to those who inquired about how to obtain a card. From Padova Municipality, local investors were offered free tickets to Anime Verdi 2023 (Open Gardens Day) matching the theme of sustainability and offering a bonus to locals. The campaign was also marketed as making possible the planting of four trees in the Comune di Padova tree planting program.

In total, 35 investors participated in the campaign. Over half of the investors contributed 500 euro or less (20 investors) for a total of 4799 euro. The rest of the investors (15) contributed the other 35.256 euro. The campaign resulted in 5 new investors for a total investment of 13.500 euro. 30 of the investors came from the existing Ener2Crowd investment community primarily in Veneto and holding shop cards. Specific marketing campaigns were released to the Ener2Crowd investment community within their platform and the campaigns were cross-linked on both the Super-Heero crowdlending platform and Ener2Crowd crowdlending platform. In total, shop cardholders and non-cardholders were approximately evenly split: 19 investors did not have the card and 16 investors did. On the 26th of April (after 3 weeks), the campaign was at 26.000 euro when it opened at the national level. It then closed in two hours once open and promoted by an email in the Ener2Crowd platform. Immediately following closure of the campaign, we received several messages from people still wanting to invest.

They had yet to sign up and missed it. Indeed, those registered in the platform (and likely having invested in previous project) have already made the commitment and mental transition to crowdvesting and are more likely to move faster. An exit survey with the 35 investors is in progress and will be included in a separate deliverable contribution related to customer feedback.

Investitori Via Parini Naturasi Aprile 2023				
Numero Investitore	Importo Investito	Tasso d'Interesse	Provenienza	
1	150.00 €	5.00	Campania / Casapulla	
2	150.00 €	6.00	Campania / Santa Maria la Fossa	
3	3,000.00 €	5.00	Emilia-Romagna / Castelfranco Emilia	NUOVO INVESTITORE
4	1,000.00 €	5.00	Emilia-Romagna / Ostellato	
5	100.00 €	6.00	Friuli-Venezia Giulia / Moimacco	
6	100.00 €	6.00	Lazio / Frosinone	
7	500.00 €	5.00	Lazio / Sacrofano	
8	2,500.00 €	6.00	Liguria / Pietra Ligure	
9	450.00 €	5.00	Lombardia / Castano Primo	
10	500.00 €	5.00	Lombardia / Gussago	
11	100.00 €	5.00	Lombardia / Mantova	
12	200.00 €	5.00	Lombardia / Milano	
13	100.00 €	6.00	Lombardia / Paderno Dugnano	
14	1,042.60 €	6.00	Lombardia / Pavia	
15	100.00 €	6.00	Piemonte / Ovada	
16	1,500.00 €	5.00	Piemonte / Settimo Torinese	
17	1,349.52 €	5.00	Piemonte / Settimo Torinese	
18	1,500.00 €	6.00	Piemonte / Torino	NUOVO INVESTITORE
19	100.00 €	5.00	Puglia / Massafra	
20	200.00 €	5.00	Sicilia / Caltanissetta	
21	5,000.00 €	6.00	Toscana / Cascina	
22	100.00 €	5.00	Toscana / Montopoli in Val d'Arno	
23	499.00 €	6.00	Veneto / Mestrino	NUOVO INVESTITORE
24	4,500.00 €	7.00	Veneto / Noventa Padovana	NUOVO INVESTITORE
25	1,533.57 €	6.00	Veneto / Noventa Padovana	
26	4,000.00 €	6.00	Veneto / Padova	NUOVO INVESTITORE
27	250.00 €	6.00	Veneto / Pieve di Soligo	
28	1,000.00 €	5.00	Veneto / Riese Pio X	
29	400.00 €	5.00	Veneto / San Dona' di Piave	
30	5,000.00 €	5.00	Veneto / Treviso	
31	1,100.00 €	6.00	Veneto / Trichiana	
32	1,231.00 €	5.00	Veneto / Venezia	
33	200.00 €	6.00	Veneto / Verona	
34	100.00 €	5.00	Veneto / Verona	
35	500.00 €	5.00	Veneto / Volpago del Montello	

TOTALE **40,055.69 €**

Number of Investors	35	Regional Investors	13
Mean interest rate	5.49	Regional Investors	20313 euro
Weighted interest rate	5.68	New Investors	5
New cardholders triggered	2	New Investors	13499 euro

3.5.2. Process/Timelines and coordination

Teaser, announcement webinar, in-store aperitivo, graphic design work, making corrections in the portal, answering investor questions, providing materials to the Super-Heero Project communication team (LinkedIn and Twitter), the franchise owner communication team (Facebook and Instagram), the brand communication department (newsletter), and Padova Municipality – a lot seemed to happen all at once. We worked our way through all these aspects but it is clear that processes, control points, and planning measures that align all stakeholders so they know what to expect, be informed in advance and require less curation, will be better managed in the future based on this experience.

3.5.2. Marketing to local sustainability nodes

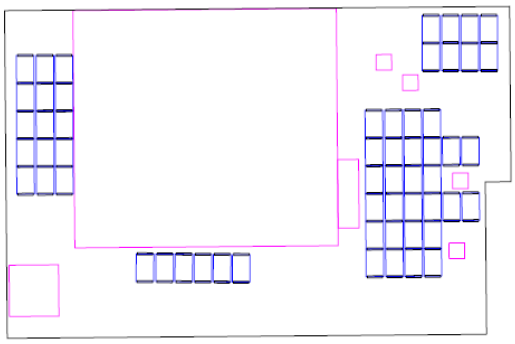
For us, the campaign was omnipresent, for most people however, it likely wasn't as mass marketing is required to reach public audiences. Indeed, we received several comments from other Padova stakeholders "how is it possible you did something like that in our community and I didn't know anything about it – why did you keep it secret?" In discussing the work we did and limited success we had to get local people attending our webinar series (weekly at 2100), one very good feedback point was "well, did you go visit and promote this with FENICE – the Green Energy Park located in Padova which is dedicated to innovation in sustainability to include investments? They likely have outreach to people that want to do what you are doing as opposed to trying to convince people one by one on the street who may have no interest." This was a great point and will be carried forward in the strategy to make campaigns in any new local area – what associations, energy communities or other sustainability nodes are already in place who may want to align with and support our campaign? We didn't arrive to this level of thinking on the first pilot.

3.5.2. Implementation of the intervention

SYSTEM DESIGN	**Roof slope angle (°)**	**Azimuth (°)**
	0	14.74
	Power installed (kWp)	**Inclination of the modules (°)**
	23.8	5
PV MODULES	**Producer**	**Number of modules**
	Trina Solar	56
	Type of PV cells	**Number of PV cells**

	Monocrystalline	126
	Max power (Wp)	
	425	
INVERTER	**AC nominal power (kW)**	**Number of MPPT channels**
	24	2
	Nominal voltage (V)	
	650	

SYSTEM LAYOUT



INSTALLATION

INFO ON THE PV SYSTEM IMPLEMENTATION

- **Timings: 5-19 May 2023**
- **Final installed capacity: 25 kWp / Trina Solar / Zucchetti Inverter**
- **Actors involved: R2M Solution, Greentime Hub, Naturasi**
- **Criticalities: Due to demand, a long wait for connection to the grid is foreseen. In the interim, the system is set to auto-consumption only mode. Sharing production data has not met our expectations. The Zucchetti App has given problems from various types of devices and has criticalities related to multiple stakeholders accessing data. We have installed a supplementary meter.**
- **Tips: The mounting structure/system has been well appreciated. The inauguration ceremony inviting the local mayor and shop participants was well appreciated.**

Figure 6.1 - Certificate of participation to Super-Heero for Naturasì Padova2, as part of the outcomes in the promotional campaign of the project

3.5.2. Performance

The accompanying image shows the total production of the installed PV system for the month of June. In total, 3.427 kWh were produced.

The annual simulated production value is as follows. It will be watched closely to see how actual production comes in versus the simulated values.

ENERGY SIMULATIONS		Ta (°C)	EEff (MWh)	EGrid (MWh)
	Annual production	169.29	24.88	23.42

Ta = Average temperature; EEff = Global production including system losses; EGrid = Global energy injected into the grid

3.5.2. Lessons learned

3.5.2.

1

The most important aspect for the franchise owner in this particular installation was to **have zero risks in the process**. From his perspective, if they "lose" one euro than the approach was not going to be interesting. For this reason, it was essential to have a mechanism and business plan such that **the annual payment is less than the value of the energy produced**. This is a common practice but given split interests of a temporary franchise and a permanent brand – guarantees were required.

2

There are **some aspects** of the contract/offer proposed that can be **considered too risky for project developers** and may have not been appreciated by the franchise owners as this first pilot was heavily subsidized, such as:

- The **pilot was at zero/near zero profit** for all the stakeholders involved (the implementing professionals)
- The **approach is not only about sustainability** but about connection to the customers (great opportunity to invest in that via reward programs)
- The brand guaranteed that the **franchise owner won't lose money** (e.g. if energy prices drop, the difference will be paid by the brand)
- **R2M assumes all the risks** being responsible for all interactions with the installers, maintenance, operation, insurance, etc.

3

Franchise owners are busy and may not consider the energy costs when they take a shop. Perhaps they lack understanding on how **energy prices are determined**. In this sense, they can be confused about the energy prices communicated by the energy companies and the ones modeled / detected (e.g. including distribution costs and taxes). It can be important to **show infographics/schemes/examples about these topics** to increase the franchise owners' awareness.

4

A **long duration for the crowdlending campaign was nice** as in press releases afterwards reporters communicated that it closed out way in advance

5

The lever of having the Ener2Crowd investment community (already established) with us **has proven to be an excellent accelerator** and our pilot project brings additional value to Ener2Crowd. It is a win-win. Perhaps **with much more intense work and over a longer duration we could have closed the campaign locally**, but it would be inefficient. That work can now be dedicated to the next project and the signal sent is that if you do not move/act, then the campaign will close without you (scarcity).

6

The results of this first Super-Heero crowdlending campaign **provided confidence and knowledge on all sides for the next campaign.**

7

Several aspects needed to be taken care of (e.g. communications on social networks, workshops, graphic design, development of promotional material and campaign) and sometimes we would have liked to dedicate more effort coordinating some activities, but we couldn't get ahead of the wave. In learning our first project – everything seemed to move very quickly once launched.

6.3. NaturaSì Pordenone

LOCATION — Via Ungaresca 26, Pordenone, Italy

SIZE — 1020m^2 shopping area

CONDITION — Modern / relatively new

LAYOUT — Ground floor urban supermarket

DESCRIPTION

NaturaSì Via Ungaresca 26 in Pordenone is a medium size supermarket in the urban periphery of Pordenone. Pordenone is the main comune of Pordenone province of northeast Italy in the Friuli Venezia Giulia region. It has a population of approximately 55,000 persons and two Naturasi store locations are present in the city area. The roof is an excellent site for PV with little to no shading and few obstructions on the roof. This particular store location has a SiRiarica EV column. SiRicarica is a joint venture that used equity crowdfunding for the installation of EV columns at Naturasi store locations in partnership with DRIWE and Garage Italia. PV and EV on sight enable a very visible commitment to sustainability and allow for joint communication campaigns related to renewable energy and the energy transition / electrification. Naturasi has had the intention to install PV at this location for a period of time and upon the success of the first pilot, this waiting project was identified as a next opportunity. A site visit for the installation of PV was conducted along with a review of the annual energy consumption for its design. An energy audit was not desired / carried out given that the store is relatively new and only the PV project was requested as an intervention measure.

3.5.2. Energy system - Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	195,421
Electricity share of energy consumption (%)	**Total energy consumption (kWh/year)**
100	195,421

ECONOMIC DATA

Annual electricity expenditure (2022) (€)	Total energy expenditure (2022) (€)
80,326	80,326

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
48,074

DESTINATION OF CONSUMED ENERGY

Energy distribution per usage type (lighting / refrigeration / etc.) not measured for this pilot (project already on the books supported)

3.5.2. Identified renovation measures

PV PLANT

Installation of 82.88 kWp photovoltaic plant	
Area of action	**Total investment required (€)**
Renewable energy production	95,638
Annual energy savings (kWh/year)	**Simple Payback Period (years)**

	90,216	4
	Share in total energy consumption (%)	**GHG emissions avoided annually ($kgCO_2$/year)**
	46 (2022 Total Consumptions)	26,613 (0.295 $kgCO_2$/kWh)
	Economic savings (€)	**Lifespan of the measure (years)**
	22,254 (at 0.25 €/kWh)	25

3.5.2. Roles for project development and implementation

R2M Solution acts as project proponent. For this project, R2M establishes the contractual relationship with the crowd (for collecting funds), pays suppliers (use of funds) and issues the contract to the supermarket (for recovery and redistribution of funds). Greentime Hub was selected and serves as technology supplier and installer. The contractual type utilized is that of leasing (Noleggio Operativo) meaning that R2M owns the PV system until transfer at contract conclusion. Permission for the use of the roof was required and attained (Naturasi is renting the location). Naturasi has the relationship / contract / POD with the grid for energy supply.

3.5.2. Pilot Governance

This location is brand owned. It is operated by a shop manager who is directly staff of Naturasi and who is supported by the centralized corporate energy manager and corporate marketing department. R2M as project proponent is delivering "Super Heero as a Service" to this location.

3.5.2. Financing plan

A blended financing plan was utilized as shown in the accompanying table. The amounts were tuned to leave the majority of the project to the crowd, for the brand and proponent to both participate and to attain an installment payment schedule attractive to all sides. The maximum percent participation for the crowd as a rule of thumb by the platform operator (Ener2Crowd) is70%.

Tot Capex		**95,638 €**
Naturasì	20,000 €	21%
R2M	15,638 €	16%
Crowd	60,000 €	63%

3.5.2. Crowdlending Campaign Design & Process

Super-Heero a NaturaSì Pordenone

As a second iteration, the process was more efficient and improved. Seeing the results of the first campaign, it was possible to involve more stakeholders/decision makers in the second campaign. Improved processes included:

- Development of a project factsheet to circulate both internally and externally to coordinate and disseminate campaign details
- Use of a group emailing list so that everyone was informed of decisions related to the campaign and key moments during the campaign (opening, in-store event, webinars, opening at regional and national levels, closure)
- Improved use and development of the rewards program. In this case the campaign featured
    - In-store coupon for investors (expense of Naturasi)
    - Charge at EV column for investors (expense of Naturasi / SiRicarica)
    - 0.5% interest rate bonus for new investors (expense of R2M)
    - 0.5% interest rate bonus for referrals to new investors (expense of R2M)
- Use of local support consulting company for communication boost + linkage to municipality

Dates for the campaign were:

9 June	Opening for local investors (Provincia)
23 June	Opening at the regional level
30 June	Opening at the national level

With respect to marketing & advertising

- 10 June in-store campaign launch with snacks, Q&A
- Continuous coverage on Naturasi Facebook
- Announcements via Naturasi newsletters
- Promotion on Super-Heero and project partner social media feeds
- Delivery of factsheet to municipality and sustainability nodes
- Weekly webinars
- Cross posting on Ener2Crowd platform
- Newsletter / email delivery to Ener2Crowd Investors

Images from in-store launch event

3.5.2. Results of the Crowdlending campaign

The campaign opened on 9 June and closed on Sunday 2 July. In total, it was open for 23 days and raised €60.383.80 from 64 crowdvestors / participants. The accompanying table shows data related to the portfolio of investors.

Investitori Naturasi Pordenone Giugno 2023						
Numero Investitore	Importo Investito	Tasso d'Interesse	Provenienza		ETA'	GENERE
1	350.00 €	5.00	Campania / Napoli		48	M
2	100.00 €	6.00	Campania / San Vitaliano		40	M
3	500.00 €	5.00	Emilia-Romagna / Albinea		55	M
4	200.00 €	5.00	Emilia-Romagna / Bertinoro		42	M
5	500.00 €	5.00	Emilia-Romagna / Bologna		37	M
6	100.00 €	6.00	Emilia-Romagna / Bologna		55	M
7	150.00 €	5.00	Emilia-Romagna / Cento		51	M
8	1,000.00 €	6.00	Emilia-Romagna / Forlì		65	M
9	2,000.00 €	5.00	Emilia-Romagna / Gatteo		66	M
10	150.00 €	5.00	Emilia-Romagna / Imola		27	M
11	5,000.00 €	6.50	Emilia-Romagna / Parma	NUOVO INVESTITORE	53	M
12	1,000.00 €	5.50	Emilia-Romagna / Poggio Renatico	NUOVO INVESTITORE	70	M
13	585.00 €	6.00	Emilia-Romagna / Ravenna		36	F
14	100.00 €	6.00	Friuli-Venezia Giulia / Moimacco		34	M
15	200.00 €	6.00	Friuli-Venezia Giulia / Trieste		49	M
16	100.00 €	5.00	Lazio / Roma		31	M
17	5,000.00 €	6.50	Lazio / Roma	CODICE AMICO	40	M
18	300.00 €	6.00	Lazio / Roma		42	M
19	5,000.00 €	6.50	Lazio / Roma	NUOVO INVESTITORE	44	F
20	5,000.00 €	5.00	Liguria / Genova		39	M
21	2,314.54 €	6.00	Liguria / Pieve Ligure		56	M
22	100.00 €	5.00	Lombardia / Bergamo		35	M
23	1,000.00 €	6.00	Lombardia / Bergamo		34	M
24	100.00 €	5.00	Lombardia / Cologno al Serio		39	M
25	156.11 €	6.00	Lombardia / Como		42	M
26	413.54 €	5.00	Lombardia / Concorezzo		41	F
27	1,000.00 €	5.00	Lombardia / Lodi		31	M
28	100.00 €	5.00	Lombardia / Lodi		44	M
29	100.00 €	5.00	Lombardia / Mantova		42	M
30	1,100.00 €	5.00	Lombardia / Milano		61	F
31	800.00 €	6.00	Lombardia / Milano		57	M
32	100.00 €	5.00	Lombardia / Milano		45	M
33	750.00 €	5.00	Lombardia / Milano		35	M
34	5,000.00 €	6.00	Lombardia / Ornago		63	F
35	350.00 €	5.00	Lombardia / Palazzo Pignano		35	M
36	333.00 €	6.00	Lombardia / Pavia		66	F
37	2,000.00 €	6.00	Lombardia / Pavia		51	M
38	200.00 €	5.00	Lombardia / Suello		41	F
39	250.00 €	5.00	Lombardia / Suello		43	M
40	300.00 €	5.00	Lombardia / Ternate		43	M
41	500.00 €	5.00	Piemonte / Borgofranco d'Ivrea		54	M
42	100.00 €	5.00	Piemonte / Costigliole d'Asti		43	M
43	100.00 €	6.00	Piemonte / Ovada		64	M
44	679.89 €	5.00	Piemonte / Settimo Torinese		37	F
45	1,000.00 €	5.00	Piemonte / Settimo Torinese		61	M
46	550.21 €	5.00	Piemonte / Settimo Torinese		37	F
47	500.00 €	6.00	Piemonte / Torino		55	F
48	400.00 €	5.00	Puglia / Alberobello		65	M
49	100.00 €	5.00	Puglia / Cerignola		44	M
50	4,000.00 €	6.00	Puglia / Corato		43	M
51	100.00 €	5.00	Puglia / Molfetta		42	M
52	500.00 €	5.00	Sardegna / Cagliari		36	M
53	100.00 €	5.00	Sicilia / Catania		27	M
54	100.00 €	5.00	Toscana / Livorno		40	M
55	100.00 €	5.00	Toscana / Ponsacco		35	M
56	500.00 €	5.00	Toscana / Pontedera		33	M
57	152.51 €	5.00	Toscana / Rufina		36	M
58	300.00 €	5.00	Trentino-Alto Adige / Dro		41	M
59	499.00 €	7.50	Veneto / Padova	NUOVO INVESTITORE	34	M
60	200.00 €	5.00	Veneto / Pianiga		49	M
61	150.00 €	6.00	Veneto / Pieve di Soligo		50	M
62	200.00 €	5.00	Veneto / San Dona' di Piave		41	M
63	5,000.00 €	5.00	Veneto / Treviso		47	M
64	750.00 €	5.00	Veneto / Volpago del Montello		55	F

TOTALE **60,383.80 €**

Number of Investors	**64**
Mean Interest Rate	5.40
Weighted Interest Rate	5.7
Average Age	45
Number Male	53
Number Female	11
% Women	21%

Cardholders Naturasi	**22**
Cardholders Naturasi	34237 euro
Regional Investors	8
Regional Investors	7100 euro
New Investors	**4**
New Investors	11499 euro

From the campaign, the following observations are made:

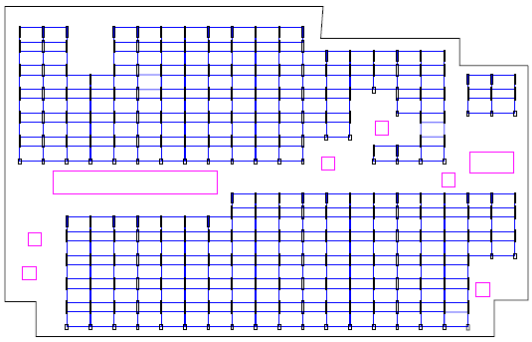
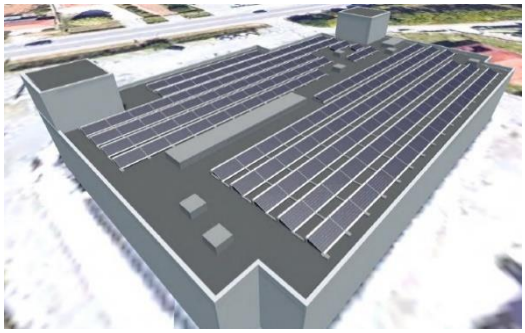
- The project is funded across 64 investors and this is a success
- Although we worked for local engagement / participation, the campaign only reached approximately 12k euro before opening nationally
- The campaign signed up four new investors, one with referral bonus
- 22 Naturasi cardholders participated vs. 42 non-card holders

In this campaign, in-store coupons and rewards were included. Now that this gate has been passed through, the next iterative step is to consider after-campaign conversion. For the 42 non-cardholders, is there an opportunity to invite them into the brand? During the campaign process, is it to work harder on encouraging non-cardholders to sign up for the card? Another iterative step is to consider a change in strategy related to marketing & advertising and the rewards program. In this second campaign, postcards were also made available in one other store location (in Udine, a nearby city). Perhaps that triggered an investment or prepared people from that shop to think about a possible next campaign in their area. For rewards, the in-store coupon is available in this campaign only for the Pordenone shops. With 60 investors and a 5 euro coupon (300 euro total potential cost), would those coupons bring more value if extended to any naturasi inviting the participating investors from anywhere to come into the shop?

3.5.2. Implementation of the intervention

Installation at Pordenone will occur directly after Super Heero project closure and reporting. One can follow the updates / see the end result at www.super-heero.com, via the newsletter or social media feeds. It will be well published. System characteristics are shown in the following table.

SYSTEM DESIGN	**Roof slope angle (°)**	**Azimuth (°)**
	0	-33.94
	Power installed (kWp)	**Inclination of the modules (°)**
	82.88	15
PV MODULES	**Producer**	**Number of modules**
	Trina Solar	195
	Type of PV cells	**Number of PV cells**
	Monocrystalline	126
	Max power	

	(Wp)	
	425	
INVERTER	**AC nominal power (kW)**	**Number of MPPT channels**
	80	8
	Nominal voltage (V)	
	600	
SYSTEM LAYOUT		
INSTALLATION	SCHEDULED LATE JULY / EARLY AUGUST 2023	

3.5.2. Performance

Simulated performance is as follows. The system will be monitored once installed.

		Ta (°C)	EEff (MWh)	EGrid (MWh)
ENERGY SIMULATIONS	**Annual production**	**174.81**	**94.42**	**90.22**

Ta = Average temperature; EEff = Global production including system losses; EGrid = Global energy injected into the grid

3.5.2. Lessons learned

1

For a successful design & implementation of a crowdlending campaign **it is very helpful to create one email address or distro where all people involved can be updated, kept current and engaged** on making the campaign fruitful. This also brings to an improved coordination of all the process. A project factsheet for distribution was also a best practice.

2

The campaign can target different stakeholders (new investors, local participants, store staff members, cardholders, non-cardholders with the intent to have them signup for the card, persons with EV, …). Each targeted stakeholder type is requires / is an opportunity and challenge for different marketing / advertising / rewards.

3

The second iteration of the Super Heero process (and with the same brand and technology provider team) was much quicker, more efficient and implemented with additional confidence. Now validated, the model can be replicated quickly across additional stores. Continuing PV installations is easiest (already done) but the next ambition is to target and implement other EE measures and then to expand to additional supermarket brands.

4

The rewards program was much improved (store bonuses of coupon and recharge and platform bonuses to new investors and referrals). Despite this, attracting local participants and recruiting new investors takes time, requires effort and has cost. People need multiple touches, proof, deadlines and a push. It has been essential the partnering to Ener2Crowd's existing investor base but a next level of success will be present when local participation is higher and a critical mass of Super-Heero investors are attained and more efficient ways of attracting them realized.

3.3. DIA Almansa

LOCATION C. de Almansa, 75, 79, Madrid,

SIZE 1,486 m^2 shopping area

CONDITION Recently partially

LAYOUT Ground floor urban supermarket

DESCRIPTION

DIA Almansa is a medium size urban supermarket that occupies the ground floor of a residential building in the city of Madrid. It has been recently partially refurbished, but there are still some sections that can be improved. In this view, one of the most effective energies saving interventions can affect the HVAC system, as nowadays the supermarket presents a very high seasonal power consumption, during the hottest and coldest months, for the climatization. Furthermore, the absence of doors on the refrigerators causes the overwork of the air conditioning units during heating periods to mitigate the cold expelled into the room. It is also interesting to highlight that at present DIA Almansa is totally dependent on the electricity grid for the needed power.

3.5.2. Energy system – Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	413,822

Electricity share of energy consumption (%)	Total energy consumption (kWh/year)
100	413,822

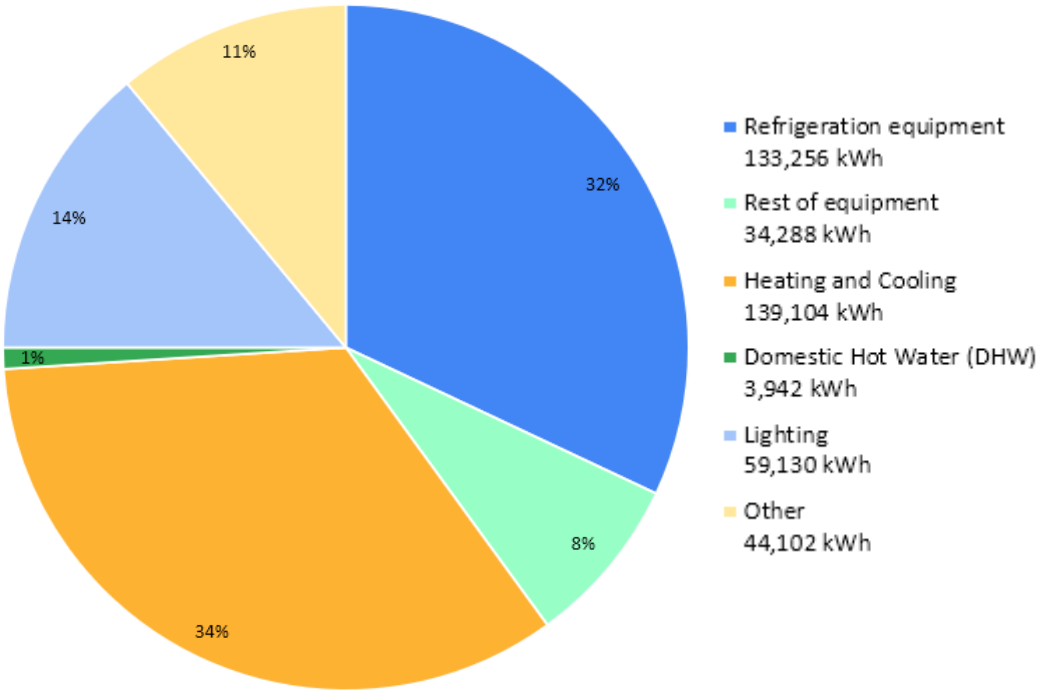
ECONOMIC DATA

Annual electricity expenditure (€)	Total energy expenditure (€)
43,498	43,498

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
169,667

DESTINATION OF CONSUMED ENERGY



3.5.2. Identified renovation measures

Although the number of potential energy efficiency measures identified was higher, the energy audit prepared recommended the implementation of the 8 measures with a payback period of less than 10 years.

Nº	Measure	Savings			Invest.	SPB	Emissions	NPV
		kWh / year	% Total	€ / year	€	year	kg CO_2 / year	€
M1	Consumption monitoring system	20.691	5,00%	5.173	8.000	**1,5**	5.173	52.073
M2	Condensation heat recovery	11.555	2,79%	2.889	9.000	**3,1**	2.889	24.572
M3	Installation of doors on walls	27.889	6,74%	6.972	12.506	**1,8**	6.972	255.807
M4	Replacement of existing chillers	32.730	7,91%	8.183	29.200	**3,6**	8.183	285.763
M5	Climate equipment sectorization	27.821	6,72%	6.955	8.250	**1,2**	6.955	72.510
M6	Improved BMS system	13.910	3,36%	3.478	5.600	**1,6**	3.478	34.788
M7	Freecooling air conditioners installation	25.402	6,14%	6.350	5.493	**0,9**	6.350	68.235
M8	Adjustment of temperature	30.845	7,45%	7.711	0	**0,0**	7.711	296.681
TOTAL		**185.279**	**44,8%**	**46.320**	**77.887**	**1,7**	**46.320**	**460.071**

3.5.2. Financing measures

As one of the main supermarket chains in Spain, DIA has its own staff dedicated exclusively to energy, and also has an annual budget line dedicated to investments in energy efficiency.

In this case, despite the suggestions made for financing these measures through any scheme or combination of schemes recommended by the Super-Heero project (i.e., EPC, agreements with technology providers or crowdlending), they decided to implement some of these measure with their own internal resources.

3.5.2. Implementation of the interventions

DIA implemented some of these measures, together with others. The measures that were implemented can be grouped into 4 different categories: refrigeration plants, refrigeration walls, freezer cabinets, and air conditioning.

3.5.2. Performance

Although the Super-Heero team did not have access to the performance of the measures implemented, DIA team stated that savings corresponding to more than 50% of consumption have been achieved.

3.5.2. Lessons learned

1

Working with large supermarket chains takes time. Decision-making is complex, and many departments are involved, often with different interests. **Instead of involving all teams in general meetings, it is much more effective to focus on specific departments, capturing everyone's interest but separately**. It is essential to have an allied person in the supermarket, who serves to maintain interest within the internal supermarket team and prevent the project from freezing.

2

It is important to produce and offer viable technical solutions. **The visits of the technicians during the audits are a fundamental element to identify all those areas where improvements can be made**. In addition, presenting updated data, with current energy prices and possible offers from providers, helps to attract interest.

3

Thanks to the study, **the supermarkets identified measures that were of real interest to them**. Even though they installed the measures on their own (and not with the Super-Heero schemes), they achieved savings for more than 50% of consumption. **These results could act as an incentive for future energy efficiency projects** in other DIA stores.

4

Refrigeration equipment and HVAC systems are key for supermarkets, not only because of their high energy consumption, but also because they are needed to maintain fresh products and comfort for the customers.

3.3. DIA Arriaga

LOCATION C. de Santurce, 2, Madrid, Spain

SIZE 899 m^2 shopping area

CONDITION Recentlv refurbished

LAYOUT Single floor urban supermarket

DESCRIPTION

DIA Arriaga is a medium size urban supermarket that occupies a single floor warehouse with a gable roof in Madrid. It has been recently partially refurbished with the replacement of lighting and other equipment, but there are still some areas that can be renovated. In this view a photovoltaic plant for self-consumption can be installed on the available roof, as up to now the supermarket relies on the electricity grid to receive the needed power. Furthermore, the roof is poor insulated and built with black slate, so this causes an intensive energy consumption especially during the summer months. The high consumptions related to climatization are also generated by the overwork of the air conditioning units during heating periods, due to the absence of doors on the refrigerators, to mitigate the cold expelled into the room.

3.5.2. Energy system – Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	327,761

Electricity share of energy consumption (%)	Total energy consumption (kWh/year)
100	327,761

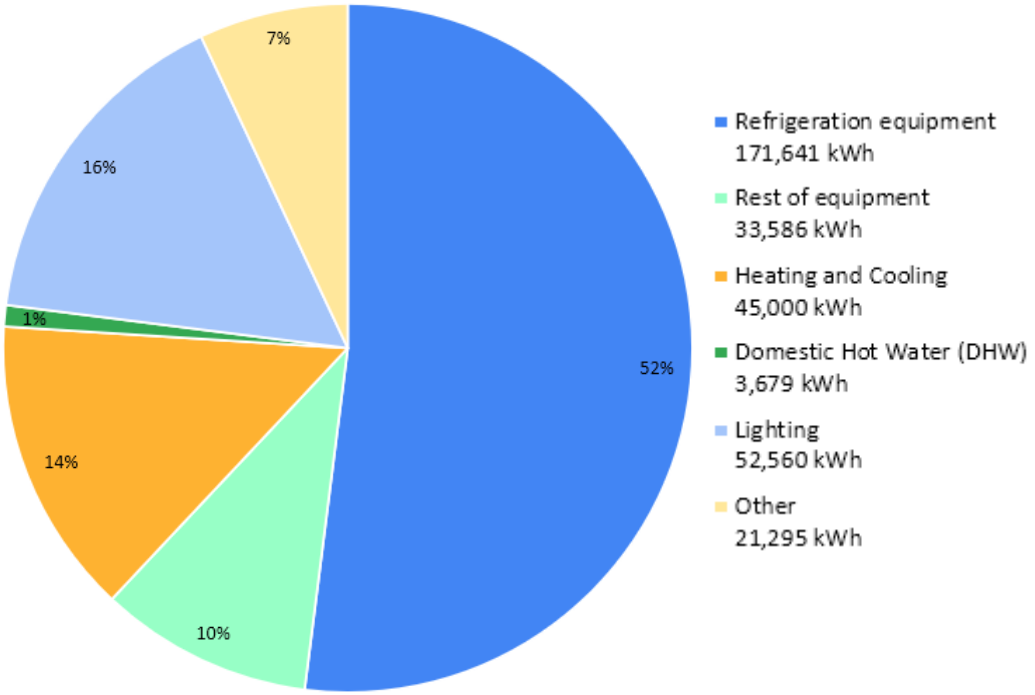
ECONOMIC DATA

Annual electricity expenditure (€)	Total energy expenditure (€)
81,940	81,940

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
81,940

DESTINATION OF CONSUMED ENERGY



3.5.2. Identified renovation measures

Nº	Measure	Savings			Invest.	SPB	Emissions	NPV
		kWh / year	% Total	€ / year	€	year	kg CO_2 / year	€
M1	Consumption monitoring system	16.388	5,0%	4.097	9.000	**2,2**	4.097	38.593
M2	Freecooling air conditioners installation	20.160	6,2%	5.040	10.000	**2,0**	5.040	48.542
M3	Installation of doors on walls	31.536	9,6%	7.884	12.219	**1,5**	7.884	291.172
M4	Replacement of existing chillers	32.730	7,91%	8.183	29.200	**3,6**	8.183	285.763
M5	Improved roof insulation	11.880	3,6%	2.970	17.400	**5,9**	2.970	96.955
M6	Adjustment of temperature	3.312	1,0%	828	0	**0,0**	828	9.609
M7	Rooftop PV system	45.665	13,9%	11.416	40.000	**3,5**	11.416	399.430
TOTAL		**145.722**	**44,5%**	**36.431**	**106.389**	**2,9**	**36.431**	**316.938**

3.5.2. Financing measures and implementation

At present none of these measures has been financed or implemented yet.

3.3. OTHER POTENTIAL FUTURE IMPLEMENTATIONS

Apart from the Italian and Spanish pilots described in the previous sections, where the foreseen energy saving measures have been totally or partially implemented at present, several other supermarkets have been considered and analysed during the project. The energy assessment of those buildings was performed, and financial contracts/schemes were suggested, but in the end unfortunately, for different reasons, the process was stopped for those case-studies, and they have been lost as project pilots. Nevertheless, even if in the framework of SUPER-HEERO those supermarkets didn't finalize their journey towards sustainability, they remain interesting case-studies for the potential future implementation of energy efficiency interventions as an easy follow-up of the project, considering that energy audits were already carried out and that ad hoc energy saving measures were identified. The most promising potential future pilots, briefly described in the following sections, are: Coviran Virgen del Monte (Spain), NaturaSì Padova 1 and NaturaSì Padova 2 (Italy).

3.5.2. COVIRÁN Virgen del Monte

LOCATION C. Virgen del Monte, s/n, Granada, Spain

SIZE 1,250 m^2 shopping area

CONDITION Not recently refurbished

LAYOUT Single floor urban supermarket

DESCRIPTION

Covirán Virgen del Monte is a medium size urban supermarket that fully occupies the single floor of a medium-sized warehouse in the outskirts of the city of Granada. The energy consumptions in the supermarket are relatively balanced with a slight peak during summer months, when climatic condition of the building is necessary and there is higher consumption of air conditioning. Furthermore, during the heating season an overwork of the conditioning system has been detected, due to cold losses for the absence of doors on most of the refrigeration equipment. It is also important to underline that Covirán at present only receives the needed power from its connection to the electricity grid

3.5.2. Energy system - Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	354,196

Electricity share of energy consumption (%)	Total energy consumption (kWh/year)
100	354,196

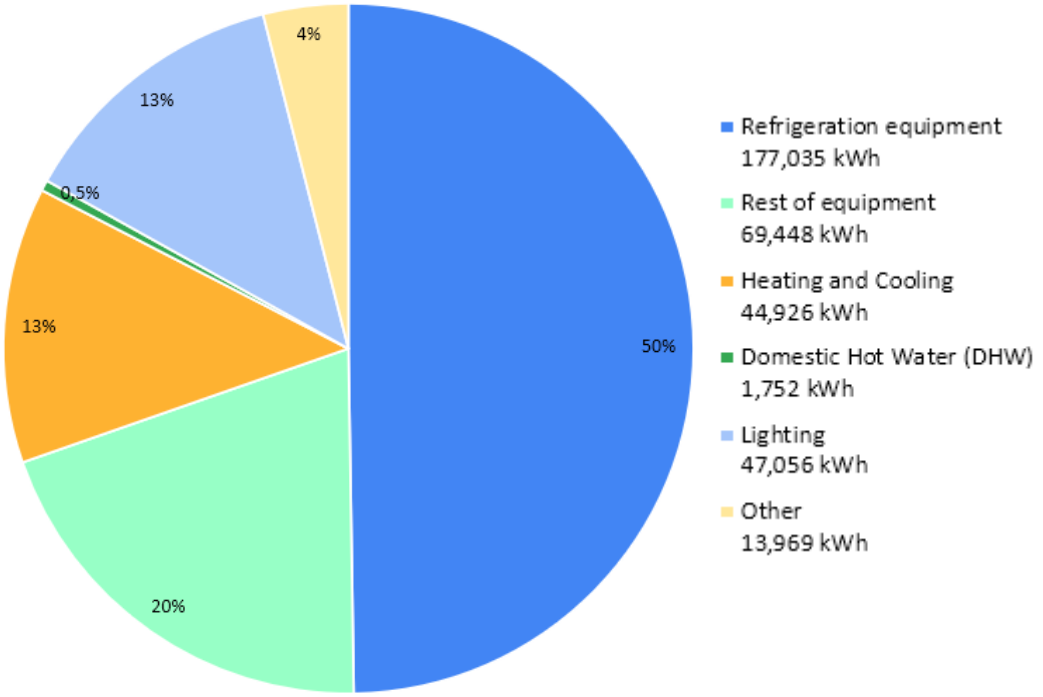
ECONOMIC DATA

Annual electricity expenditure (€)	Total energy expenditure (€)
88,549	88,549

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
88,549

DESTINATION OF CONSUMED ENERGY



3.5.2. Identified and selected renovation measures

	Investment required (€)	Energy savings (kWh/year)	Economic savings (€/year)	Simple payback (years)
ENERGY CONSUMPTION MONITORING SYSTEM	5,800	17,710	4,427	1.3
	This measure was already implemented during the project before the rest of the measures to obtain the baseline consumption with better accuracy			
INSTALLATION OF DOORS ON REFRIGERATORS	12,506	41,706	10,427	1.2
HVAC TEMPERATURE CAPS (Setting T limits)	0	13,232	3,309	0
TOTAL	18,306	72,648	18,163	~ 1

3.5.2. Blockers during the project

MAIN BARRIERS

- ✓ The **difficulty in establishing contacts and arranging meetings** with Covirán slowed down all the process since the beginning
- ✓ The **negotiations with Covirán were delayed** due to installation of sub-meters, that happened few months later than expected (due to space restrictions when installing the devices, which required special smaller devices that were not in stock), and a long monitoring period, as they wanted to have a complete picture of the consumptions before selecting the measures and starting to discuss the models to be implemented for their installation and financing
- ✓ Covirán **wasn't convinced in using SUPER-HEERO financial scheme**, preferring other models they are more used to (e.g. Circular economy)

3.5.2. NaturaSì Padova 1 – Volturno

LOCATION — Via Volturno 1, Padua, Italy

SIZE — 488 m^2 shopping area

CONDITION — New supermarket

LAYOUT — Single floor urban supermarket

DESCRIPTION

NaturaSì Padova 1 – Volturno is a medium size urban supermarket that occupies the ground floor a two-storey building. The supermarket is completely new with all the best equipment already installed. Nevertheless, there is still room for sustainable renovation, considering the potential implementation of a PV system on the rooftop of the building, as well as a smart metering system in the electrical cabinet of the shop. Furthemore, it is worth to underline that the store location has an EV column installed by the NaturaSì joint venture SiRicarica with DRIWE and Garage Italia, so, in this view, potential strategies coupling PV, e-mobility and charging rewards could be considered

4.5.2. Energy system - Baseline

ENERGY CONSUMPTION

Energy sources	Electricity consumption (kWh/year)
Electricity	159,887

Electricity share of energy consumption (%)	Total energy consumption (kWh/year)
100	159,887

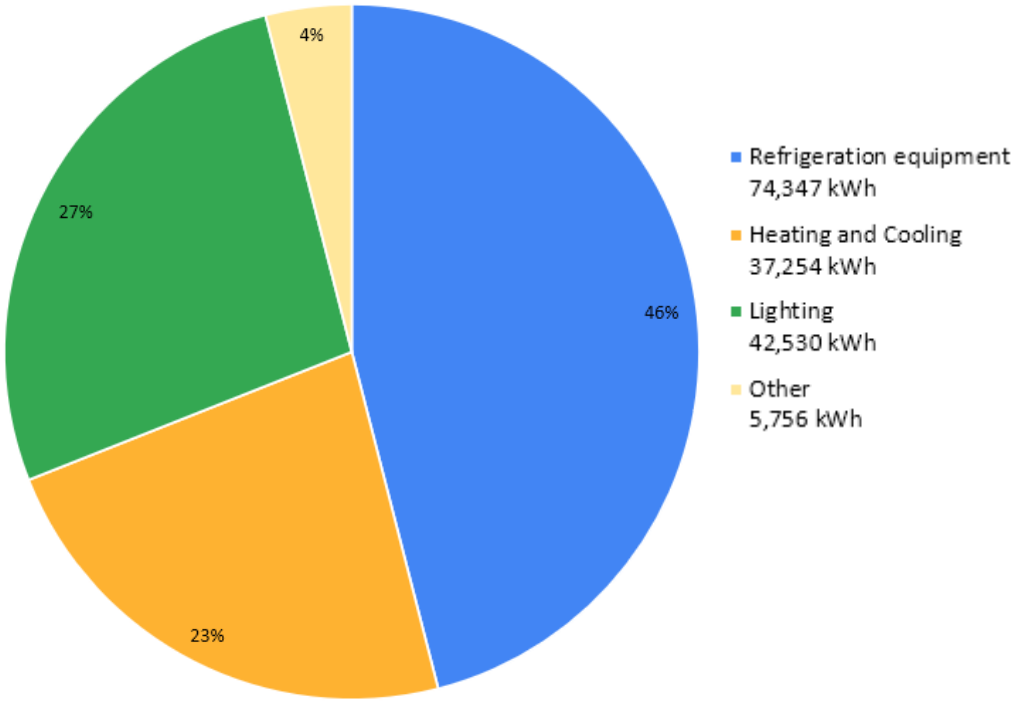
ECONOMIC DATA

Annual electricity expenditure (€)	Total energy expenditure (€)
33,164	33,164

GHG EMISSIONS

Total GHG emissions (kgCO2/year)
39,172

DESTINATION OF CONSUMED ENERGY



3.5.2. Identified and selected renovation measures

	Investment required (€)	Energy savings (kWh/year)	Economic savings (€/year)	Simple payback (years)
INSTALLATION OF PV PLANT (35 kWp)	**56,500** (approx. 1,500 €/kWp)	**37,500**	**11,250** (approx. 0,30 €/kWp)	**5**
	Possibility to install up to 40 kWp pending final conditions on site/ability to move some existing equipment on various parts of the roof			

3.5.2. Blockers during the project

MAIN BARRIERS

- ✓ Issues were encountered as it **was difficult to receive the access to the roof/permission from the building owner**. This was mainly because the building owner provided the office above NaturaSì to have first access to the roof, as part of a new tenant agreement (incentive to incoming renter).

7. Replication Analysis

The replication potential into other sectors than supermarkets for the innovative technical and financial tools developed in Super-Heero has been studied with outputs in D4.7. The tools included in the analysis are energy performance contracts, product-as-a-service, crowdfunding, and energy efficiency renovation packages, whereas the target sectors include hotel and accommodation services, retail stores and shopping centres, energy communities, banks and other financial services, transport services, and other services to the public.

The study has started from a summary of the innovative technical and financial tools developed in Super-Heero for energy efficiency in supermarkets, and from the identification of other sectors with suitable energy uses, ownership structure, business models and encountered barriers for the replication of Super-Heero tools. Then, the potential matching between replication sectors and available tools has been analysed and to conclude general guidelines are presented for the enhancement of corporate energy efficiency culture, focused on end-users/customers behaviour.

The results obtained for the replication of the Super-Heero tools are summarized in the figure below.

TOOLS ANALYSED	EPC contract	Product-as-a-service	Crowdfunding models	Renovation packages
SECTORS ANALYSED	REPLICATION POTENTIAL			
Hotel and accommodation services	HIGH	HIGH	HIGH	HIGH
Retail stores and shopping centres	HIGH	HIGH	HIGH	HIGH
Energy communities	HIGH	HIGH	HIGH	HIGH
Banks and other financial services	LOW	HIGH	LOW	HIGH
Transport services	LOW	HIGH	HIGH	LOW
Other services to the public	HIGH	HIGH	HIGH	HIGH

- **Energy performance contracts** show a high potential for replication in all the identified sectors, where they contribute to overcome barriers related to access to finance for energy efficiency investments, except for the banking/financial sector where funding is generally not a key issue and in the transport sector where this contractual arrangement is not fully applicable to the whole range of technical solutions;
- **Product-as-a-service solutions** have a high potential in all the selected sectors, since they allow overcoming the barrier related to the lack of technical knowledge that generally characterizes all the analysed sectors, at least at site level (since for large companies or chains of stores, energy managers or technical experts can be present at corporate level and not for each site);
- **Crowdfunding** has a high replication potential in all sectors, except for the banking/financial one, where funding energy efficiency solutions is not a key barrier, with particularly good results potentially applicable to sectors like energy communities (that are by definition a citizen-driven initiative) or local transport and other services to public (where citizens might be more willing to invest to improve the sustainability of the service they directly receive);
- **Renovation packages** have a high potential for replication in all the selected sectors (except for the transport sector where this technical approach is not fully applicable to all solutions) due to the wide range of solutions that could be implemented and could benefit of an integrated approach shaped according to good engineering practices in order to obtain better financial performances.

8. Conclusions

This handbook summarised the journey through Super-Heero project, presenting all the knowledge acquired in its main phases and highlighting the lessons learned at each stage. For this purpose, being conceived as a compendium of all the activities performed in the project, it also included an overview of topics more deepened in other reports previously submitted.

Starting from the definition of a catalogue of energy efficiency measures that can be implemented in small and medium supermarkets in different sectors, a focus has been dedicated to defining 18 renovation packages, that include a series of cases based on the baseline conditions, the climate zone and the depth of interventions to be implemented. Once the main energy efficiency solutions and potential renovation case studies have been presented, the three more effective financial schemes to funding them have been outlined with their characteristics, pros and cons concerning their use in the supermarket sector. In this framework the final innovative financial model developed during the project was presented, as an interconnection of the more standard funding schemes. The process, through bottom up and top-down approach, for the identification of the stakeholders, especially technology providers that will be directly involved in the implementation of energy efficiency solutions, has been also explained with all the challenges and goals achieved.

Furthermore, the description of the proper four pilots involved in Super-Heero, two in Italy and two in Spain, has been outlined with a deep presentation of the energy characteristics of the supermarkets, the renovation measures proposed and chosen, the marketing campaign and strategies adopted, the business model used and, only for the Italian case studies, the proper implementation of the solutions identified. Finally, the analysis of the replication potential of the main tools studied during the project has been performed for other sectors than supermarkets, outlining a high replicability for most of the tools in many of the frameworks analysed.

The road that led to the conclusion of the project was full of barriers and challenges, especially at the beginning, concerning the engagement of the pilots and their related managers, but thanks to persistence during these three years, the project found its key to succeed. Super-Heero represents now an innovative model with its five-step approach and its new financing scheme that also embraces the social aspects through the engagement of supermarkets' community. The success of the process is confirmed by the last Italian pilot, NaturaSì Pordenone, that joined the project due to the effective campaign and positive experience of NaturaSì Padova 2. In this second iteration all the process has been smoother, more streamlined and worked better, setting fruitful pillars for future engagement of supermarkets interested in energy efficiency and sustainability.