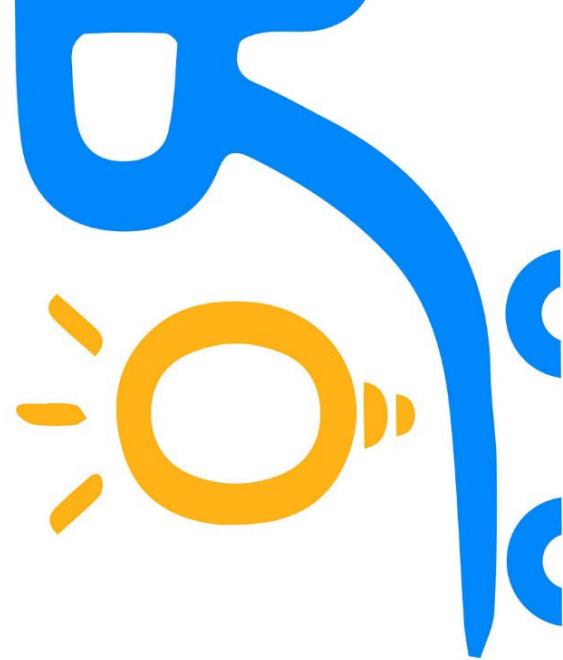




SUPER HEERO

Human Energy Efficiency Retrofitting Optimisation

FROM CONSUMER
TO CONSUMER-HEERO



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Why should I read this document??

The general objective for 2030 set by the European Union is to reduce greenhouse gas emissions by at least 40% compared to 1990 levels. To achieve this goal, a key measure is the improvement of energy performance in buildings, as the construction sector is one of the largest consumers of energy in Europe.

Therefore, it is important to introduce significant measures to promote energy efficiency and renewable energy sources that focus on commercial buildings and large-scale distribution operators.

As supermarkets account for an important share of energy consumption in the tertiary sector, in the last years they have been involved in projects related to process and product sustainability as a decisive step towards the achievement of the United Nations 2030 Agenda objectives and the European Green Deal.

It is crucial to understand that the sustainability actions introduced by supermarkets in recent years have been strongly promoted by citizens. People are requiring higher environmental standards: in products, commercial spaces, and services provided and this creates an opportunity for all of us as consumers, as we can also be part of the change.

The main idea of this document is to prepare the ground for understanding how supermarkets can implement energy efficiency interventions, why such interventions are important and how this project is contributing to the process. It provides you with basic knowledge about energy efficiency and helps you to understand some of the steps that supermarkets need to take when implementing different measures.

Let's start SUPER-LEARNING WITH SUPER-HEERO


OUR PROJECT

The SUPER-HEERO project aims at providing a replicable financial scheme for energy efficiency investment in small and medium supermarkets, based on stakeholder and community engagement.

The approach relies on three main instruments: engineered Energy Performance Contracts (EPC), product-service models for technology providers, engagement and community-based crowdfunding/cooperative initiatives.

ENERGY EFFICIENCY



A glowing lightbulb is placed inside a metal shopping cart. The background is a soft, out-of-focus green, suggesting foliage. The lightbulb is illuminated, casting a warm glow. The shopping cart has a red handle and a metal frame.

What are the options available for supermarkets to reduce the upfront investment?

As part of the SUPER-HEERO project, three main financial instruments are offered to supermarkets so they can implement energy efficiency measures with a reduction of the upfront costs.

Performance-based contracting for supermarket

The EPC financial instrument is characteristic by NEAR OR ZERO INITIAL COST for the supermarkets (also called “beneficiaries”), which are usually mostly financed by the ESCO (“supplier”) or a credit institution (“third party”) after consideration of the financial risks and the Return of Investment (ROI), among other factors.



Under an EPC arrangement an external organisation (ESCO) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment. Essentially the ESCO will not receive its payment unless the project delivers energy savings as expected. The approach is based on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO.



Technology providers are in charge to research, develop and deliver the best and most efficient technologies and equipment to the client, making them responsible to start the commercial and industrial pathway in the best scenario. As well, they are responsible of supplying tools to use the technology in the best way, prolonging their lifetime use and meet the goal of the equipment or technology use .

Technology leasing agreements

As part of SUPER-HEERO approach, alternative product-service models such as technology leasing and pay-per-service agreements will be developed and engineered to engage technology providers and reduce the upfront costs related to equipment and technology deployment. For a small/medium supermarket these equipment and technology related costs could represent up to 70% of the total investment required to achieve over 40% of energy savings.

Crowdfunding and cooperative-based consumers

The SUPER-HEERO Project merges the consumers interest and sensitivity for environmental aspects (climate change, energy savings, plastic-free, etc) with the desire of convenience. In fact, many supermarkets, especially at local level, are very sensitive to social and environmental responsibility and are looking for new ways of helping and supporting the local community by addressing social and environmental issues.



Propose a project that has environmental value and receive a rating to open the campaign.

Return principal and interest to investors easily and automatically via your wallet.




As can be seen in this diagram , the project in its implementation phase of innovative financial instruments starts with the development of pilot projects in Spain and Italy.

These projects are tailored to the specific characteristics of each supermarket, after carrying out energy audits.




**How does this process
look like for a supermarket?**


For each pilot project

 The Energy Efficiency measures undergo technical and financial analysis to assess the payback time of the investment required.



 In order to reduce financial risk, the project can be financed in different percentages and by multiple parties. It can be as high as 70% financed directly by the supermarket and the remaining 30% raised through crowdfunding.



 The energy efficiency projects, depending on the best combination that emerges from the technical and financial evaluations, are then placed on the SUPER-HEERO crowdfunding platform ready for the start of financial collection: this is our opportunity to participate as consumers!.

What is in for you?

As a consumer you could contribute through this instrument and can get some benefits as :



A shopping cart with a blue electrical plug inside, set against a background of orange flames.

Energy Efficiency measures in supermarkets

We understand that before you make the decision to be part of the change, you need to have more information about how supermarkets can take the lead and implement different measures that benefit the environment. Keep reading and learn about all you need to know!

The European Union has set the basis to boost the energy renovation of buildings towards the challenging 2030 objectives. Many programs are available, and others are yet to come to support the achievement of these objectives, either by financing research and development of innovative solutions or directly financing the investments.



Moreover, EU Countries are making their part to contribute to achieve the 2030 goals. The first step, carried out by all Countries, is the issuance of the National Energy and Climate Plan (NECP), containing the national strategies to reduce emissions and to meet the 2030 climate targets. Every Country will now have to implement the NECPs by revising their current legislation favouring and/or incentivising investments in the energy efficiency sector.

As a common factor in the EU policy framework, private buildings, residential and commercial, represent one of the most important objects to be involved in the renovation wave in order to meet with the 2030 goals.

In the SUPER-HEERO project, two pilot Countries have been selected, Italy and Spain, and they have already activated national and regional programs to boost the renovation process. To this end, different kinds of incentives are available for energy efficiency renovations and many financial schemes have already been developed but still need further exploration and implementation in real practice.

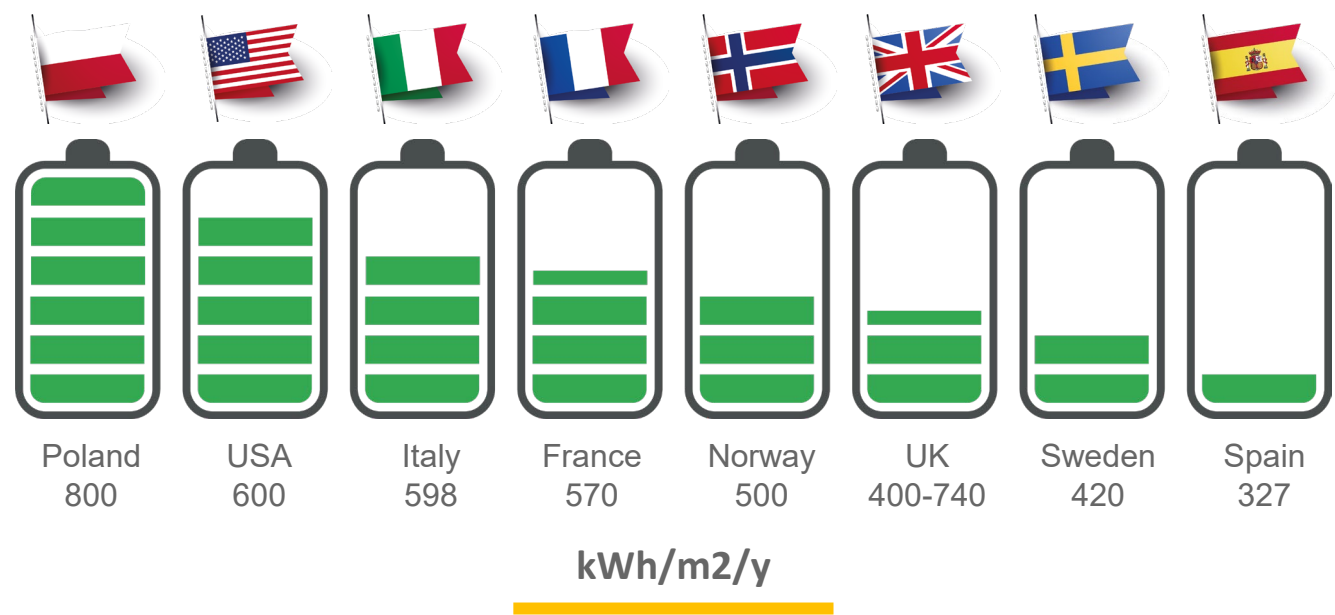
A modern building with a glass facade and a wind turbine in the background, with a shopping cart in the foreground.

**Why are Energy Efficiency
renovations needed?**



Supermarkets are one of the retail sectors with the highest energy consumption mainly due to refrigeration equipment and lighting ("Eficiencia Energética en Supermercados: Caso de Éxito SUPERSPAR", 2018). Hence, the potential for energy savings in a supermarket is high.

Data taken from different sources (Lindberg 2018, Kolokotroni 2019, SME EnergyCheckUp, Supersmart projects) show the following consumption in different countries :

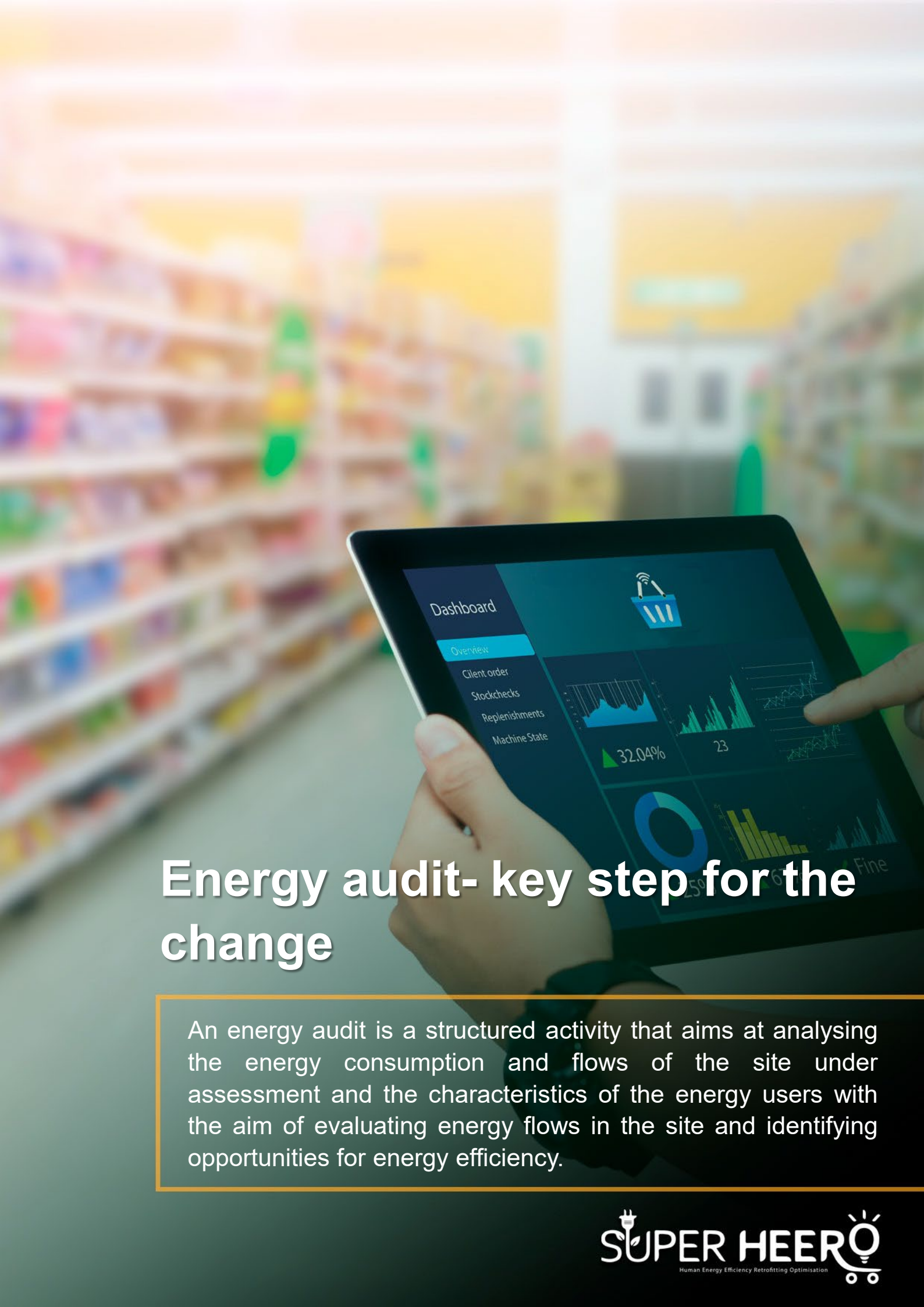


Did you know that...?

The control of temperature inside the SMS normally involves between 25% and 40% of the consumption of the installation ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017)

Refrigeration equipment such as refrigerators and chambers, have a consumption between 35% and 50% of the total, rising to 60% in logistics and storage facilities due to the permanent use of this equipment

Lighting accounts for between 15% and 30% of the total consumption of the facility, which is found in ceilings, shelves and displays.



Energy audit- key step for the change

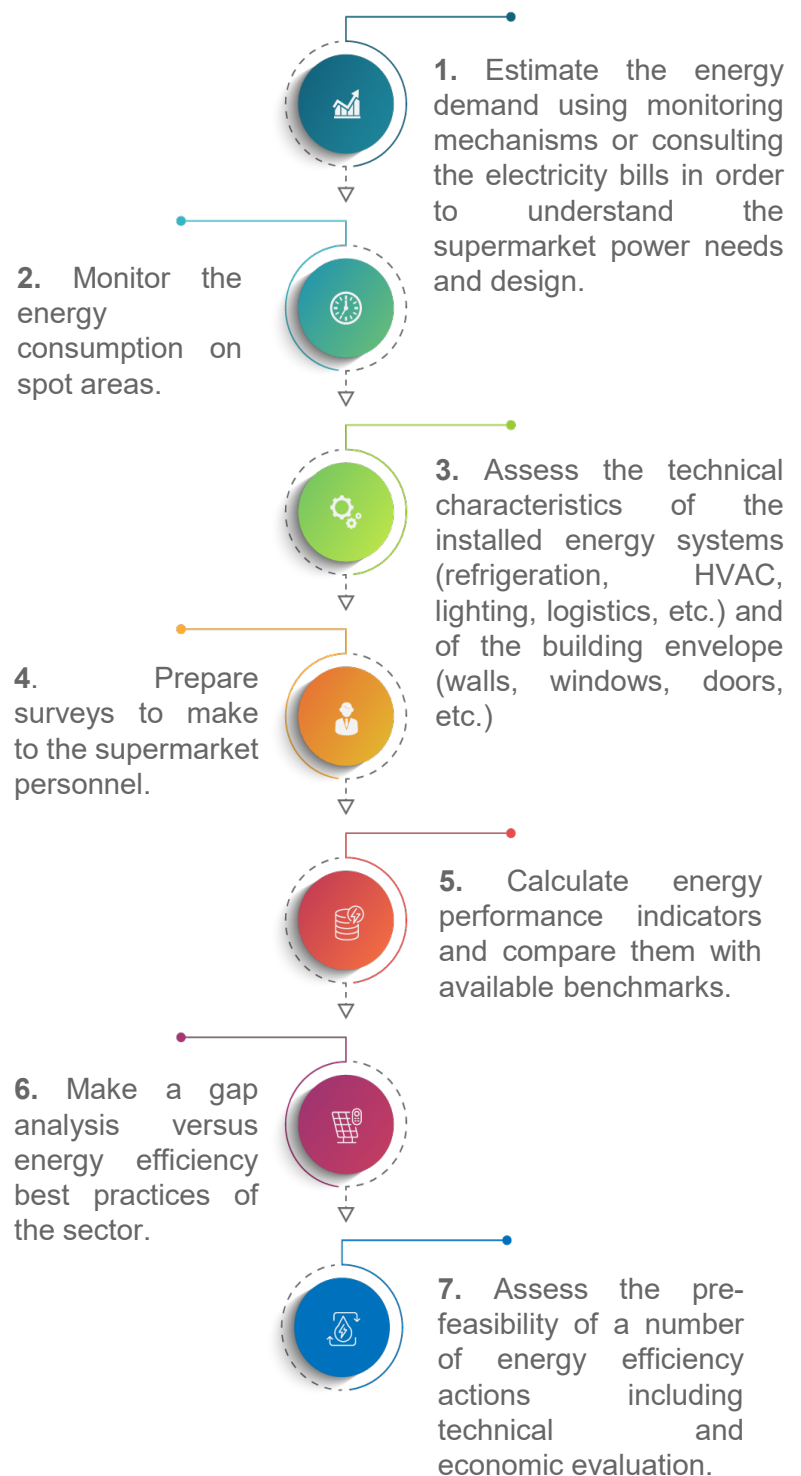
An energy audit is a structured activity that aims at analysing the energy consumption and flows of the site under assessment and the characteristics of the energy users with the aim of evaluating energy flows in the site and identifying opportunities for energy efficiency.

Large retail companies can be subject to the obligation to carry out an energy audit on some of their supermarkets, introduced by the EU Energy Efficiency Directive 2012/27/EU, whereas other companies may be willing to carry out such an analysis to identify opportunities for the reduction of their environmental impact and energy supply costs.

Steps for a high-level design of an energy audit:

In addition, the energy audit may be a starting point for the implementation of an energy management system, i.e. a set of procedures for the monitoring, management and continuous improvement of the conditions of the supermarket under the energy perspective.

The implementation of an energy management system, the appointment of an energy manager and the continuous adoption of energy-related good practices is then expected to keep the energy efficiency level as high as possible, thus achieving further improvements compared to the execution of an energy audit alone.





What kind of measures could be implemented ?



Overall Energy Management

Energy management plays a key role on the overall optimization and potential reduction of the energy consumptions of the supermarket; it includes the actions aimed at keeping consumption levels under control, monitoring included, as well as the adoption of energy management systems and of the most suitable operation and maintenance routines to ensure that all energy-related devices work at the highest possible efficiency, i.e. delivering the requested service with the minimum possible energy consumption. These activities are related to all areas and devices in the supermarket.

The main opportunities for improvement identified for this field are:









- ② energy audit and implementation of an energy management system.
- ② monitoring of electricity consumption at main switchboards.
- ② blockchain enabled smart meters.
- ② artificial intelligence for smart electric load management.
- ② microclimate design and simulation using nature-based solutions.
- ② building and urban area dynamic energy simulation.
- ② asset management software.
- ② regular maintenance of energy users.



Energy Supply

The optimization of energy supply of a supermarket is related to actions for the increase of the level of sustainability and energy efficiency of the site, thanks to changes in the energy mix towards the increased penetration of renewable or more sustainable sources than the purchase of electricity and fuels from the local grids.

The main opportunities for improvement identified for this field are:

-  rooftop photovoltaic plant;
-  building-integrated photovoltaic modules;
-  photovoltaic modules on parking lots;
-  micro-wind power production systems;
-  solar thermal for toilets' hot water production;
-  cogeneration/trigeneration;
-  reactive power compensation systems;
-  waste-to-energy solutions.



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.

The main opportunities for improvement identified for this field are:

- ⇅ improvement of building envelope thermal insulation.
- ⇅ high-efficiency reversible heat pumps.
- ⇅ condensing gas-fired boilers for heat production.
- ⇅ biomass boilers for heat production.
- ⇅ heat recovery from products' refrigeration systems.
- ⇅ air handling units with integrated heat recovery system.
- ⇅ free cooling and evaporative cooling.
- ⇅ high-efficiency motors and VFD control in ventilation systems.
- ⇅ high-efficiency pumping systems.
- ⇅ smart control of HVAC systems.
- ⇅ improvement of air-tightness.
- ⇅ air curtain at building entrance.
- ⇅ low-flow aerators on toilet water.



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:

- 💡 LED lighting of indoor/outdoor spaces.
- 💡 solar-powered lighting poles in outdoor areas.
- 💡 natural lighting sensors in highly-fenestrated areas.
- 💡 timers on indoor lighting systems.
- 💡 movement sensors.
- 💡 smart control of lighting systems in indoor/outdoor areas.







Product Refrigeration

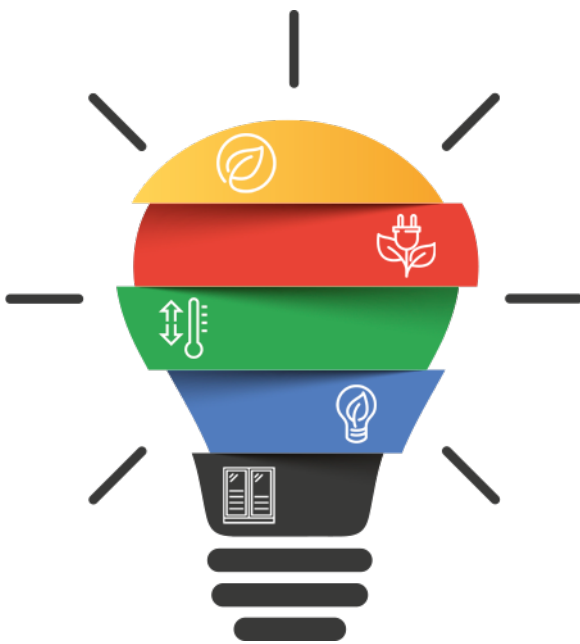
The refrigeration of the food products, both in cabinets and freezers in the sales area and in the refrigerated storage areas in warehouses are responsible for the largest share of energy consumptions in the supermarket.







Devices in this category include on the demand side the cabinets, freezers and cold storage rooms and on the supply side the refrigerators systems, composed of compressors, evaporators and condensers in line with the needs of the thermodynamic cycle applied for cooling.

The main opportunities for improvement identified for this field are:

-  advanced design of refrigerated cabinets.
-  high-efficiency refrigeration systems.
-  use of centralized instead of standalone refrigerating equipment.
-  advanced maintenance of products refrigeration systems.


As you have seen, there are many conventional solutions that could lead to energy savings, we can sum up some of them here:



-  Use of refrigerators and freezers fitted with doors
-  Heat recovering from other services
-  Free cooling
-  LED lighting
-  Implementation of an energy management system
-  Installation of photovoltaic modules

How can I know if a supermarket has any EE measure implemented?

It may be hard to identify many of these measures as a consumer, some of them could be more evident as Led lighting, refrigerators with doors, or the use of Photovoltaic panels. If you want to have this information, we encourage you to look for the sustainability plan of that store on the internet, or simply ask the staff!



Let's have a look at some numbers



To better understand the impact of implementing energy efficiency measures, we have included in the following tables the results in energy savings when making some renovations. You may note that there is a difference based on the geographical areas:

	Categories	Measures Included	Energy Savings kWh/m ² /y
Package 1a	Old supermarket Northern Europe Deep renovation	LED lighting , Cabinets doors HVAC fine-tuning, Cogeneration High-eff refrigeration, Envelope insulation.	290.8
Package 1b	Old supermarket Southern Europe Deep renovation	LED lighting, Cabinets doors HVAC fine-tuning, Photovoltaic, Cogeneration, High-eff refrigeration, Envelope insulation, High-eff heat	374.2
Package 2a	Old supermarket Northern Europe Partial renovation	LED lighting , Cabinets doors HVAC fine-tuning, Cogeneration High-eff refrigeration	190.8
Package 2b	Old supermarket Northern Europe Partial renovation	LED lighting, Cabinets doors HVAC fine-tuning, Photovoltaic High-eff refrigeration, High-eff heat pump.	307.5
Package 3a	Old supermarket Northern Europe Basic renovation	LED lighting , Cabinets doors HVAC fine-tuning	107.5
Package 3b	Old supermarket Northern Europe Basic renovation	LED lighting , Cabinets doors HVAC fine-tuning	107.5
Package 4a	Average supermarket Northern Europe Deep renovation	LED lighting, HVAC fine-tuning, Cogeneration, High-eff refrigeration, Envelope insulation.	249.2
Package 4b	Average supermarket Northern Europe Deep renovation	LED lighting, HVAC fine-tuning, Photovoltaic, High-eff refrigeration, Envelope insulation.	279.2



	Categories	Measures Included	Energy Savings kWh/m ² /y
Package 5a	Average supermarket Northern Europe Partial renovation	LED lighting, HVAC fine-tuning, Cogeneration, High-eff refrigeration	149.2
Package 5b	Average supermarket Southern Europe Partial renovation	LED lighting, HVAC fine-tuning, Photovoltaic, High-eff refrigeration	245.8
Package 6a	Average supermarket Northern Europe Basic renovation	LED lighting HVAC fine-tuning Cogeneration	82.5
Package 6b	Average supermarket Southern Europe Basic renovation	LED lighting HVAC fine-tuning Photovoltaic	82.5
Package 7a	New supermarket Northern Europe Deep renovation	LED lighting Heat recovery from refr. Smart load manag.	112.5
Package 7b	New supermarket Southern Europe Deep renovation	LED lighting Solar thermal Smart load manag.	59.2
Package 8a	New supermarket Northern Europe Partial renovation	LED lighting Heat recovery from refr. Smart load manag.	112.5
Package 8b	New supermarket Southern Europe Partial renovation	LED lighting Solar thermal Smart load manag.	59.2
Package 9a	New supermarket Northern Europe Basic renovation	LED lighting Smart load manag.	45.8
Package 9b	New supermarket Southern Europe Basic renovation	LED lighting Smart load manag.	45.8

A photograph of a family—a man, a woman, and a young girl—shopping in a large supermarket. The man is standing behind the woman, who is pushing a shopping cart filled with groceries. The girl is standing to the right, reaching up to a high shelf. The background shows long aisles with shelves stocked with various products. The lighting is bright, typical of a supermarket.

**SUPER-HEERO driving the
change**

Supermarkets can be considered, on one side, interesting buildings to drive energy renovation and to test innovative technologies and business models while, on the other, important actors to connect with the consumers



As for the first aspect, the SUPER-HEERO project is exploring the existing market opportunities for supermarkets to renovate their stores and equipment also through the involvement of ESCO and technology providers.

For the second aspect, the project is studying innovative business models for the involvement of all of us as consumers.

These business models will need to face the existing and known barriers and risks that may prevent building owners/tenants to invest money into energy efficiency. These barriers are mostly related to non-technical issues, since technology for energy renovation is quite mature and available in the market.

Awareness, knowledge, social and organizational barriers are the ones that are mainly addressed by the innovative business models to be produced during the project.

How is SUPER-HEERO contributing?

The expected impacts are the following:



What about you?

Are you ready to be part
of the change?



Be a
CONSUMER-HEERO!

CONSUMER-HEERO!



SUPER HEERO

Human Energy Efficiency Retrofitting Optimisation



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SUPER-HEERO Project



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