SUPER HEERO

Human Energy Efficiency Retrofitting Optimisation

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D1.1 - ANALYSIS OF POLICY FRAMEWORK AND BARRIERS

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Terms, definitions and abbreviated terms

TABLE OF ACRONYMS			
Acronym	**Definition**	**Acronym**	**Definition**
BSO	Building Stock Observatory	**GHG**	Greenhouse Gas
EED	Energy Efficiency Directive	**M**	Month
EPBD	Energy Performance of Buildings Directive	**NEEAP**	National Energy Efficiency Action Plan
EPC	Energy Performance Certificates	**NZEB**	Nearly Zero-Energy Buildings
ESCO	Energy Service Company	**PEF**	Primary Energy Factor
ETS	Emissions Trading Scheme	**SMS**	Super Market Sector
EU	European Union	**WP**	Work package

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1. EXECUTIVE SUMMARY

This document is the SUPER-HEERO project report corresponding to D1.1 (M6) leaded by Sinloc.

It provides an analysis and evaluation of the current and prospective policy framework on energy efficiency renovation, initially giving an overall picture of the European context and then focusing on the two pilot Countries, Italy and Spain.

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.

Over the years several directives have been issued by the EU which have set specific objectives and requirements for the renewal of the building stock and not only (NEEAP, The ErP Directive, NECPs, the 2102 EED, etc.). In particular, the directive on energy performance in buildings (EPBD) is the main policy tool to address this challenge in both existing and new buildings.

In turn, EU Member States have created several policies and initiatives to increase awareness and actions for stakeholders in order to facilitate the renovation process in buildings.

In Spain, the most relevant law is the Royal Decree 56/2016, relating to energy audits, and there are several programs already implemented, both national and regional, aimed at promoting actions that seek energy saving and efficiency. The national ones are: “FES – CO2” (2011-2019); “Energy Efficiency National Fund” (2014); “ICO – IDEA Energy Efficiency Financing Line” (2017-2018); ”PIMA Frìo” (2018); “JESSICA – F.I.D.A.E.” (2018); “PAREER II” (2018); “Multiregional OP for Spain ERDF 2014-2020” (2020). The most relevant support programs and policies at regional level are instead: “Castile-Leon III commercial plan” (2016); “Energy strategy plan in the Basque Country 2030” (2017); “PEN 2030” (2018); “Aids – Extremadura” (2019) “Subsidies from INEGA” (2020); “Subsidies – Canary Islands” (2020).

Also in Italy most of the regulatory framework about energy efficiency in buildings comes from the transposition of the EU Energy Performance of Buildings Directive (EPBD), its following updates and the guidelines for the application of the directive and law. The current national Italian support programs are the following: “Titoli di Efficienza Energetica” (2004); “European Structural and Investment Funds” (207-2013 and 2014-2020); “Ecobonus/Sismabonus” (2013), “Conto Termico” (2016); “Fondo Nazionale Efficienza Energetica” (2017).

The report also presents a general overview of the food retail sector in the two Countries, focusing in particular on the supermarket format. In fact, this project places a particular focus on the supermarket sector, as it can be considered an interesting sector for testing innovative technologies and business models.

In both Spain and Italy, the retail food sector is highly diversified, with different types of stores. Most of the Spanish supermarkets are small in size (from 100 to 399 m2) and the distributor with the largest

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share of the market is Mercadona, followed by Carrefour and DIA group. Also, in Italy, the majority of supermarkets have an area between 100 and 399 m2, while the top three retailers in 2019 were Conad, Coop and Selex.

Post Covid-19 situation revealed a change in consumer habits, giving greater priority to e-commerce. Increasing attention is also placed on the sustainability of products and companies, in addition to products that communicate healthy nutrition, even if the recent epidemic has favored the optimization of spending and convenience.

Furthermore, this report investigates the energy consumption and saving solutions in the supermarket sector. Supermarkets are one of the retail sectors with the highest energy consumption manly due to refrigeration equipment and lighting. In particular, the three main direct energy-consuming processes can be divided in: heating/air conditioning; food cooling and refrigeration systems; lighting.

In order to reduce energy consumption, one of the most recommended measures is the disconnection of the electrical resistance of the air curtain, maintaining the air supply to continue generating the barrier effect between the interior and exterior of the premises. Another of the energy-saving measures recommended in certain cases is the installation of variable speed drives in the compressors of large refrigeration generation equipment for freezing and positive cooling.

Finally, the report also identifies the barriers and risks on the road to energy-efficient buildings. Barriers and risks can be of different nature: they can be objective, therefore deriving from regulatory constraints or technological solutions, or, in many cases, subjective, thus depending on the awareness or knowledge of those who have to decide whether to invest in the energy renovation of buildings.

More precisely, five types of major barriers have been identified: awareness barriers, knowledge barriers, social barriers, organisational barriers and legislative ones. These barriers are mostly related to non-technical issues, since technology for energy renovation is quite mature and available in the market.

Besides all the barriers listed, all investments, including energy efficiency renovation of buildings, bear typical risks, mainly related to the quality of renovation works and the actual technical and financial performance of the investment. According to EEFIG (2015), the main problems related to energy efficiency renovation of buildings are the lack of evidence on the performance of energy efficiency investments, that makes the benefits and the financial risk harder to assess, and the lack of commonly agreed procedures and standards for energy efficiency investment underwriting, that increase transaction costs.

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2. PURPOSE OF THE 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. Note that by supermarkets we refer to self-service shops offering a wide variety of food, beverages and household products: they are larger and have a wider selection of products than grocery stores but are smaller and more limited in the range of merchandise than a hypermarket or big-box market.

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.

SUPER-HEERO will enable upfront cost reduction and engagement of additional investment sources, while bringing direct economic and environmental savings for the supermarket, as well as cascade to the final customer, the engaged ESCOs and utilities, and technology providers.

The main **objectives** of the project are:

- Develop and engineer an innovative scheme for energy efficiency investment in small and medium supermarkets based on stakeholder and community engagement
- Compile a portfolio of ad-hoc energy measures for supermarkets and elicitation of requirements and high-level design based on case studies for segmentation
- Implement the innovative financial instruments for energy efficiency investments in two relevant pilot case studies
- Define a structured strategy and methodology for the replicability of the financial scheme at regional and national level
- Identify barriers and needs to support the development of regulatory and policy frameworks that allow the uptake of innovative financial schemes for energy efficiency investment

The expected **impacts** are instead the following:

- 88 Stores engaged to implement mechanisms with a total floor of 29,560 m2
- Primary energy saving of 7094 GWh/year
- Reduction of the greenhouse gases emission of 6807 tCO2/year
- 4.7M of investment in energy efficiency measures will be leveraged
- Delivery of innovative financing schemes that are operational and ready to be implemented

The Super-HEERO work plan is structured in 6 work packages (WP) and each of them is divided into tasks. This report represents the delivery of WP1 first task (Task 1.1 - Policy framework analysis and barriers identification).

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3. INTRODUCTION

3.1 Content and objectives of this report

WP1 has the ambitious objective of defining innovative financial instruments and business models to make supermarkets and their consumers realize energy efficiency renovation of buildings. Given the complexity and the level of innovation of the specific objective, analysis will be conducted in strict cooperation between consortium partners and linked supermarkets involved in the project, in order to engineer and set up the instruments and business models according to corporate policies of the supermarkets towards these themes. On the other side, analysis will focus on the development of a framework of a potential partnership with ESCOs/utilities/technology providers in order to involve them into the actual implementation of the renovation measures. Eventually, strong attention will be paid to the assessment of the policy framework as well as the fiscal and legal compliance of the new business model to local regulation, in order to increase the reliability of the model and its future replicability.

Task 1.1 Policy framework analysis and barriers identification

This task aims at analysing the policy framework in which the project is going to be implemented. Analysis will focus on the identification of risks, barriers and opportunities coming from the local policy context. In fact, local policies may affect investments according to the existence, to the type and amount of public incentives available for energy efficiency renovation works but may also, in some cases, represent a barrier if some kind of renovation measures or contracting are not allowed or limited. This type of analysis is fundamental also for the identification of the energy efficiency measures and building renovation planning to be assessed in WP3 - Strategies to connect with customers led by ZERO-E.

D1.1 Analysis of policy framework and barriers

This report describes the national and local policy framework in Italy and Spain, the two Countries targeted by the project and where the pilots are located, regarding incentives for energy efficiency renovation, and potential barriers to the realization of energy efficiency projects.

3.2 Document structure

The document is structured as follows:

- **Section 4** gives a general overview of the European regulatory framework
- **Section 5** presents the regulatory situation in Spain, also giving an introduction on the Spanish economic and energy efficiency context
- **Section 6** deals with the same issues as section 5 for Italy
- **Section 7** instead focuses on energy efficiency in the supermarket sector
- **Section 8** presents the main barriers and possible risks relating to the energy efficiency of buildings

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4. EUROPEAN FRAMEWORK

4.1. The EU regulatory review

The European Union has committed to several key targets for the period 2021-2030. The overall target for 2030 is to cut the energy system greenhouse gas (GHG) emissions by at least 40% compared to the 1990 levels. On the other hand, the Renewable Energy Directive requires a minimum share of 32% of renewable energy for final energy use as EU-average. The Energy Efficiency Directive sets an indicative target of at least 32.5% improvement in energy efficiency by 2030 at EU level versus the projections. This is expected to lead the way towards a low-carbon economy in connection with the commitments under the Paris agreement.

To achieve these goals, a key measure is the improvement of the energy performance in buildings. The building sector is one of the largest energy consumers in Europe[1]Nearly two-thirds of the building area that exist today will still exist in 2050.[2] Therefore, energy renovation is key to shift to a low carbon building stock. The bulk of the current building stock was built without significant energy performance requirements and for that reason offers a high potential for energy saving measures. However, neither the rate nor the depth of current energy renovation - 0.4-1.2% depending on the country according to the European Commission's estimations - live up to that savings potential.

The Energy Performance of Buildings Directive (EPBD) is the main policy instrument to tackle this challenge within both existing and new buildings. According to the EPBD, all new buildings are required to be nearly zero-energy buildings (NZEB) from 2021 onwards (public buildings from 2019 onwards). Subsequently, this Directive was updated as part of the Clean Energy for all Europeans with two complementary objectives: i) to accelerate the renovation of existing buildings by 2050; and ii) to support the modernisation of all buildings with smart technologies and make a clearer link to clean mobility.

On the other hand, instruments like Energy Performance Certificates (EPCs) are to deliver a demand-driven market signal for energy efficient buildings in the stock and to provide recommendations for energy renovation measures. This Directive is complemented by building related elements in the Ecodesign Directive and Energy Labelling Regulation, and in the Energy Efficiency Directive. Currently there are other important initiatives such as the "Smart Finance for Smart Buildings" that complement the clean energy legislative framework with actions to help redirect private capital towards energy efficiency, and in particular towards buildings and their renovation, and the EU Building Stock Observatory (BSO), that was recently established to track the energy performance of buildings and other characteristics across Europe, which serves as a centralised, official repository of information on Europe's buildings stock and informs policy making (European Commission, 2019).

[1]https://ec.europa.eu/info/news/new-rules-greener-and-smarter-buildings-will-increase-quality-life-all-europeans-2019-apr-15_en
[2] https://architecture2030.org/existing-buildings-operation/

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4.1.1. Legal framework

EU has been working towards the target of increasing energy efficiency in all economic sectors for at least half of a century, being the most up to date targets part of the 2018 amending Directive for the 2012 Energy Efficiency Directive (EED). The EED was a set to achieve a 20% energy efficiency improvement by 2020 through the implementation of a series of measures, however in 2018, the EU noticed that the 20% target will not be reached and the efforts were not enough, therefore the EU decided to amend the Directive and published a new Energy Efficiency Directive (2018/2002), which is now the overall target, and goes from 20% improvement in energy efficiency by 2020 to 32,5% or even higher up to 40% by 2030 compared to 1990 levels.

With the 2012 EED all the EU State Members had to adopt measures and to establish policies for the renovation of their building stock from government premises to rental buildings, standards for household electronic products, improvements on their electricity and gas networks, regulations for companies and rights protection of consumers collected real-time and historical energy consumption.

The amended Directive also included: stronger rules on metering and billing, requirement for Member States to have national rules on the allocation of heating, cooling and hot water consumption, monitoring efficiency levels in new energy generation capacities, updated primary energy factor (PEF) for electricity generation and a general review of the EED for 2024.

A key piece of legislation for energy saving is the EU framework Directive on energy end-use efficiency and energy services (2006/32/EC), under which every EU Member State had to adopt a National Energy Efficiency Action Plan (NEEAP). Member States also set national quantitative targets for saving energy in sectors not covered by the EU Emissions Trading Scheme (ETS) such as transport, buildings, agriculture and waste. However, the Effort sharing legislation[3] establishes binding annual greenhouse gas emission targets for Member States for the periods 2013–2020 and 2021–2030 also for these sectors. Some included measures and actions addressing the tertiary sector.

Table 1 collects several legislation directives that should be assessed for this project in order have a clear path to follow regarding EU emissions reduction.

Table 1. European Legal framework

Law	Description
Directive on energy end-use efficiency and energy services (2006/32/EC)	Under which every EU Member State had to adopt a National Energy Efficiency Action Plan (NEEAP). Member States also set national quantitative targets for saving energy in sectors not covered by the EU Emissions Trading Scheme (ETS). Separate national targets for the increased use of renewable energies could equally have a positive effect on the energy efficiency strategies adopted by retailers. Some

[3] Effort sharing: Member States' emission targets https://ec.europa.eu/clima/policies/effort_en

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	countries are planning extensive measures to advance the construction of renewable energy installations (e.g. solar collectors, geothermal heat pumps etc).
Binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 amending Regulation (EU) No 525/2013	This reaffirmed the emissions reduction target to 30% by 2030 compared to 2005 with efforts distributed according to relative Gross Domestic Product (GDP) per capita. Therefore, Member States with a GDP per capita above the Union average should be adjusted relatively to reflect fair and balanced cost-effectiveness. The measures adopted by this regulation applies for sectors not covered in the EU ETS, moreover, those measures contribute to increase energy savings, to reduce greenhouse gas emissions, through the use of more efficient technology in buildings, industry and transport and to implement a cost-effective way for Member States to achieve their targets under this regulation.
Energy Related Products (ErP) Directive (2009/125/EC)	The ErP Directive establishes a framework for setting eco-design and minimum energy efficiency requirements for energy related products (ErP), imported into or sold in the European Union. It has a direct effect on the business activities of European retailers, in particular when purchasing equipment like refrigerators and freezers, boilers, air conditioning or lighting.
National energy and climate plans (NECP)	The national energy and climate plans (NECPs) were introduced by the Regulation on the governance of the energy union and climate action (EU)2018/1999, agreed as part of the Clean energy for all Europeans package which was adopted in 2019 and it will address energy efficiency, renewables, greenhouse gas emissions reductions, interconnections, research and innovation.[4]
Energy Performance of Buildings Directive 2010/31/EU (EPBD) **Energy Performance of Buildings Amendment (EU) 2018/844**	Directive 2010/31/EU ('EPBD') requires Member States to adopt long-term renovation strategies and establish minimum requirements for the energy performance of newly constructed buildings and existing buildings undergoing major renovation. For instance, the Member States must ensure that by 31 December 2020 all new buildings meet the nearly zero-energy building criteria. Moreover, it aims for the aggregation of projects, including by investment platforms or groups, and by consortia of small and medium-sized enterprises, to enable investor access as well as packaged solutions for potential clients and to reduce the perceived risk of energy efficiency operations for investors and the private sector. In this context, European retailers are materially affected by this directive because it specifies binding energy standards for commercially used buildings (new buildings and existing buildings that are subject to major renovation).
The Energy Efficiency Directive (2012/27/EU)	Directive 2012/27/EU ('EED') contained provisions on building renovation and long-term strategies for mobilising investment in the renovation of national building stocks. It sets inter alia a requirement on member states to ensure the availability of efficient, high-quality energy audit schemes to identify potential for energy efficiency improvements for all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers.
Regulation (EU) no 517/2014	A prohibition from 2022 on the placing on the market of products whose functioning relies upon, fluorinated greenhouse gases, including refrigerators and freezers for commercial use (hermetically sealed equipment) that contain HFCs with GWP of 150 or more
F-Gas Regulation (EU) No 517/2014	F-gas Regulation strengthens the existing measures by:

[4]Https://ec.europa.eu/info/energy-climate-change-environment/overall-targets/national-energy-and-climate-plans-necps_en

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	• Limiting the total amount of the most important F-gases, the HFCs, that can be sold in the EU from 2015 onwards and phasing them down in steps to one-fifth of 2014 sales in 2030; • banning the use of F-gases in many new types of equipment where less harmful alternatives are widely available, such as fridges in homes or supermarkets, air conditioning, foams and aerosols; • preventing emissions of F-gases from existing equipment by requiring checks, proper servicing and recovery of the gases at the end of the equipment's life.
Energy Performance of Buildings Directive (EU) 2018/844	It includes measures that will accelerate the rate of building renovation towards more energy efficient systems and strengthen the energy performance of new buildings, making them smarter. Moreover, it encourages to reduce energy consumption for households and businesses – thereby lowering energy bills.
Commission recommendation on building renovation (EU) 2019/786	Which allows Member States to achieve strong impacts in terms of energy performance of their renovated building stock.

4.1.2. Policy framework

Considering the ambitious targets that the EU has for 2050 regarding energy efficiency, it is important to highlight that the building stock is one of the largest energy consumers and it is responsible for more than one third of the EU's emissions. With this overview it is stated that renovation of private and public buildings is an essential measure.

EU Member States have created several policies and initiatives to increase awareness and actions for stakeholders in order to ease the renovation process in buildings, which is a great opportunity for economic growth since it provides jobs and boosts the construction sector.

The following policies and initiatives in energy efficiency in building have been identified as relevant for the project:

Table 2. Renovation Wave Initiative

Renovation Wave		***2020***
Scope	***Responsible bodies***	***Type***
European	*Green Deal*	*Initiative*
Description: Is part of the EU's Green Deal, it seeks to optimise building renovations across Europe by increasing the renovation rate of existing building stock. It suggests that renovation of buildings offers high social and private returns in several aspects such as efficiency in energy and heating and cooling; climate resilience; circularity; renewables uptake, pollution cuts, better health, lower poverty, e-mobility infrastructure, e-solutions for health, schooling and work. Even though 11% of EU building stock undergoes some level of renovation, the majority does not address energy performance and it is stuck at only 1%		

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Table 3. Recovery and Resilience Facility

Recovery and Resilience Facility		***2020 - 2027***
Scope	***Responsible bodies***	***Type***
European	*Next Generation EU 2020*	*Instrument*
Description: As part of the Next Generation EU 2020 initiative that aims to boost the EU budget with new financing raised on the financial markets for 2021-2024, The Recovery and Resilience Facility is an opportunity to create European flagships with tangible benefits for the economy and citizens across the EU. By addressing common issues of Member States, the EU seeks to create significant investments, create jobs and growth. Each EU State Member should redact a Recovery and Resilience Facility plan that includes investments and reforms in the next areas: Power Up, Renovate, recharge and refuel, connect, modernise, scale-up, reskill and upskill.		

Table 4. EU Climate Mitigation Policy

EU Climate Mitigation Policy		***2021***
Scope	***Responsible bodies***	***Type***
European	*International Monetary Fund*	*Paper*
Description: This document aims to add on the debate to choose the policies that will regulate the implementation of the emission reduction goals set for 2030. It has found that increasing carbon cost in all EU Member States and sectors combined with the increase of taxes and green investment support would allow the EU to reach the emission goals with practically no effects on aggregate income. These changes should address considering using the revenue of carbon pricing to compensate the most vulnerable households and support the transition of workers to greener jobs, which will enhance social and political acceptance of the policies.		

Other relevant EU H2020 projects related to energy renovation in buildings are the following:

Table 5. EU H2020 developed projects related to energy renovation in buildings

Acronym	Description-Title	Webpage
E-FIX	Country-specific financing mechanisms for viable energy efficiency investments	*http://energyfinancing.eu/en/*
SuperSmart	Expertise hub for a market uptake of energy-efficient supermarkets by awareness raising, knowledge transfer and pre-preparation of an EU Ecolabel	*https://cordis.europa.eu/project/id/696076*
BIMEET	BIM-based EU - wide Standardized Qualification Framework for achieving Energy Efficiency Training	*https://cordis.europa.eu/project/id/753994*

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SENSEI	Smart Energy Services Integrating the Multiple Benefits from Improving the Energy Efficiency of the European Building Stock	*https://cordis.europa.eu/project/id/847066*
PENNY	Psychological, social and financial barriers to energy efficiency	*http://www.penny-project.eu/*
HERON	Forward-looking socio-economic research on Energy Efficiency in EU countries	*https://cordis.europa.eu/project/id/649690*
CHEETAH	Changing Energy Efficiency Technology Adoption in Households	*https://www.briskee-cheetah.eu/*
QualitEE	Quality certification frameworks for Energy Efficiency services to scale up responsible investment in the building sector.	*https://qualitee.eu/*

5. SPANISH FRAMEWORK

5.1 Introduction

5.1.1. Economic and energy efficiency context

The Spanish building stock is quite aged, as **56.3% of the country's buildings were built prior to 1980**. This is accentuated by the fact that the largest number of buildings in poor condition were built prior to 1900, followed by those built over the 1941-1950 decade. It is relevant to highlight that the Spanish stock ages[5] at a rate of 3.3% each year, which has a direct impact on the state of buildings and emphasises the potential for energy efficiency renovations.

The buildings sector in Spain accounts for a growing share of overall energy demand, in contrast with the industrial sector, whose relative weight has been decreasing. In the last few years, in the context of the recession, buildings' energy consumption has gradually dropped, at a rate similar to neighbouring countries, and a change in trend can be observed starting in 2014, which is concordant with the increasing dynamism displayed by the Spanish economy from that point onwards.

In 2016, buildings' energy consumption represented 31.2% of total final energy demand and 60.9% of total electricity demand (IDAE, 2018). These figures are slightly below the EU average for total consumption (39.0%) and for electricity demand (59.5%). Furthermore, average per capita consumption by buildings in Spain stands at 0.53 toe/year, one third below average EU Member State consumption. This difference can be explained in part by Spain's more favourable climate, where the difference in the relative weight of heating largely conditions building sector energy intensity.

Among the subsectors making up the buildings sector, we can differentiate between the residential sector and the service sector.

[5] The obsolescence of a building depends on different factors: from the off-plan approach, plastering materials and interior finishes, up to the structure or the aggressiveness of the environment.

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- In the **residential sector**, out of the more than 25 million homes in Spain, approximately 90% precede the Technical Building Code (approved in 2006) and 60% were built without any energy efficiency regulations. The regions with the highest number of dwellings are *Andalucía* and *Cataluña*, with around 3 million dwellings, followed by *Madrid*, with 2.4 million and *Comunidad Valenciana* with around 2 million. These four regions house 59% of the Spanish population.

  In Spain, energy consumption of the residential sector accounts for 17% of final energy consumption and 25% of final electricity consumption. Thus, the average total annual energy consumption of Spanish households is 9,908 kWh, with an average annual electricity consumption per household of 3,487 kWh, and an average total energy expenditure of 990 EUR/year.

  In terms of the structure of residential consumption by energy source, the weight of electricity consumption stands out (35% of the total, on average), followed by consumption of natural gas (25%), oil derivatives (22%) and renewable energies (18%). On the other hand, heating is the service that consumes the most energy on average in Spanish households (47% of the total), while in terms of electricity consumption the consumption of electrical appliances stands out (55% of the total).

- The **service sector** covers among others offices, wholesale/retail, healthcare, education and accommodation/food, presenting a high level of electricity consumption. As a whole, these activities make up for 67% of GDP and 13% of final energy demand in 2016. Specifically, the needs of the office and wholesale/retail segments with respect to lighting, heating and air-conditioning, office equipment, information and communication technologies, etc. largely explain the electricity demand associated with this sector. Moreover, it could be said that the evolution in intensity in the services sector has been mainly marked by these two branches, owing to their importance in what concerns energy and activity (IDAE, 2018).

  Over the course of the 2000-2016 period, energy consumption in the services sector in Spain has increased by 3.9 Mtoe. This increase is due to the greater energy demand induced during the crisis due to inefficiency in the use of equipment and facilities, which was particularly manifest during the 2008-2014 period. From 2014 onwards, this effect became mitigated due to the recovery in economic activity which led to a better use of productive capacity and, as a result, increased efficiency in the use of equipment (IDAE, 2018).

  Under this context, a sharp decrease in the energy consumption and use of fossil fuels in the retail sector is needed for Spain to fulfil its climate and decarbonisation goals.

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5.1.2. Energy efficiency in the retail sector

The retail distribution sector in Spain has undergone major changes over the past 50 years. Globalization, market liberalization and the entry of Spain into the European Union have transformed society and its buying habits, increasingly leaving behind the traditional business, and increasing the presence of multinationals and large retail chains (Rodríguez Pérez, 2014).

In 2018, the food distribution sector has been characterized by a decline in consumption, at a higher price. The sector's turnover increased by 1.5% (2% in 2017), reaching 91,070 million Euros (89,730 million Euros in 2017) (CESCE, 2019), with margins remaining stable in a context of strong price competition and an upward trend in volume in the short term. The value of purchases increased by 2.2%, with 0.9 points of this increase due to the transfer of purchases to more expensive products, brands and varieties, according to a report by the EAE Business School.

Furthermore, the most recent data of 2019 presented in the report "Balance and Trends in Distribution and Consumer Goods 2019" ("Kantar - El Gran Consumo en España crece un 1% en 2019 por los frescos", 2020) by the consumer consulting firm Kantar indicates to be in line with 2018: the sector has grown 1% in value between January and September 2019 and decline 0.6% in terms of volume. This increase in value over volume is common to all sectors, especially fresh produce, where Spaniards have spent 1.9% more than a year ago, with demand practically stable (+0.2%).

In this context, the Spanish distribution sector is focusing on greater customer proximity, convenience, omnicality and sustainability, being expansion no longer a priority. In fact, the growth in 2018 by 1.9% in surface area (1.2% in 2017), was mainly due to remodelling. Furthermore, its contribution to the Spanish GDP was 3% in 2018.

The Spanish retail food market is highly diversified. Hypermarkets/supermarkets, convenience stores, major discount stores and specialized stores coexist with traditional corner grocery stores and open-air markets (*Spain Retail Foods,* 2019). From Figure 1 we can conclude that consumers prefer supermarkets to make purchases corresponding to 69,9% of the surface area in distribution, of which 28% are small supermarkets. On the other hand, self-service stores and hypermarkets have decreased their share: self-service stores have gone from 17% to 16.8% and hypermarkets from 13.6% to 13.3%.

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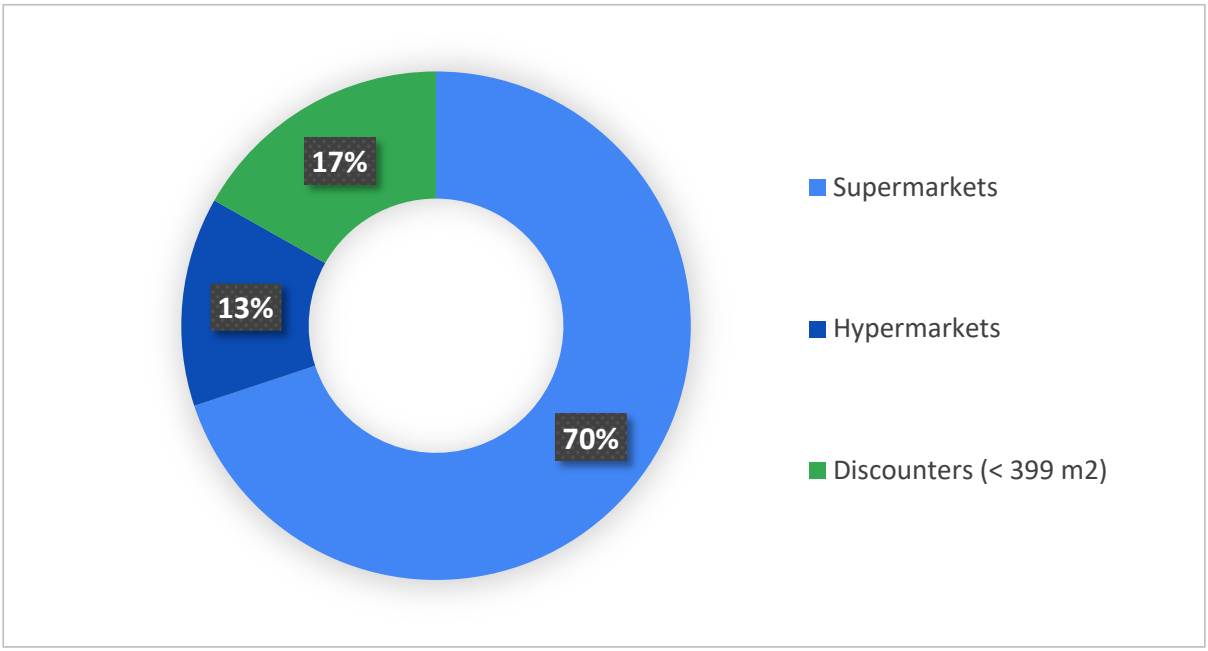
Figure 1. Distribution of retail surface area by format



Source: Creara elaboration with information from Alimarket, Gran consumo

Despite its little presence in the international market, Spanish supermarkets have increased their exports by 8%, reaching a record figure in 2017 of 27.5 billion euros. Owing to the proximity of supermarkets to households, their large presence, and a clear preference of Spanish consumers for fresh products, online shopping accounts only for 0.9% of the total sales.

5.2 Analysis of the supermarket sector

5.2.1 A general overview of the supermarket sector

In Spain, three types of supermarkets can be found depending on their surface: small (100 – 399 m^2), medium (400 – 999 m^2) and large (1,000 – 2,499 m^2). In the light of SUPER-HEERO project, we are going to focus on small/medium scale supermarkets (100 m^2 to 500 m^2), for which securing financial investments is more complicated compared to the large ones.

According to Euromonitor, in 2018, supermarket sales increased by 1% in current value terms to reach 56.1 billion Euros ($62.8 billion). Furthermore, supermarket sales are expected to increase by 3% in the next five years (*Spain Retail Foods,* 2019). Within this process, Mercadona continues to consolidate its position as leader, increasing its renovations and promoting its exit to the exterior. The expansion of Aldi and Lidl is also noteworthy, as well as that of the regional chains. On the other hand, DIA, after the recent change of shareholders (Letterone's takeover bid), closed 2018 with a drop in its network due to the closure of stores, a trend that continued in 2019 (CESCE, 2019). Thus, the growth in 2018,

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as indicated in Alimarket's Food Distribution Report (*Spain Retail Foods,* 2019), has occurred thanks to the push from large supermarkets such as Mercadona, Aldi and Lidl.

The competitive environment is quite concentrated in the grocery store-based retailing, with Mercadona accounting for the largest share, followed by Carrefour. Table 6 includes the market share and penetration of supermarkets in Spain for 2019. The Spanish grocery retail market, as seen above, is highly fragmented, with a large number of smaller retailers. Although Mercadona has the largest share of the market, Carrefour has a higher value of net sales per store. On the back of the economic recession, discounters have grown in value and importance as Spanish consumers have had a smaller disposable income and reined in their spending. The economic situation as a whole has resulted in a decrease in the number of units of store-based grocery retailers ("Spain: grocery market share 2019 | Statista", 2020). Further concentration of the sector is unlikely in the short term, as the leader is undisputed and the merger of two of the big players, given their short-term situation, seems unlikely. Moreover, the regional players are still very powerful.

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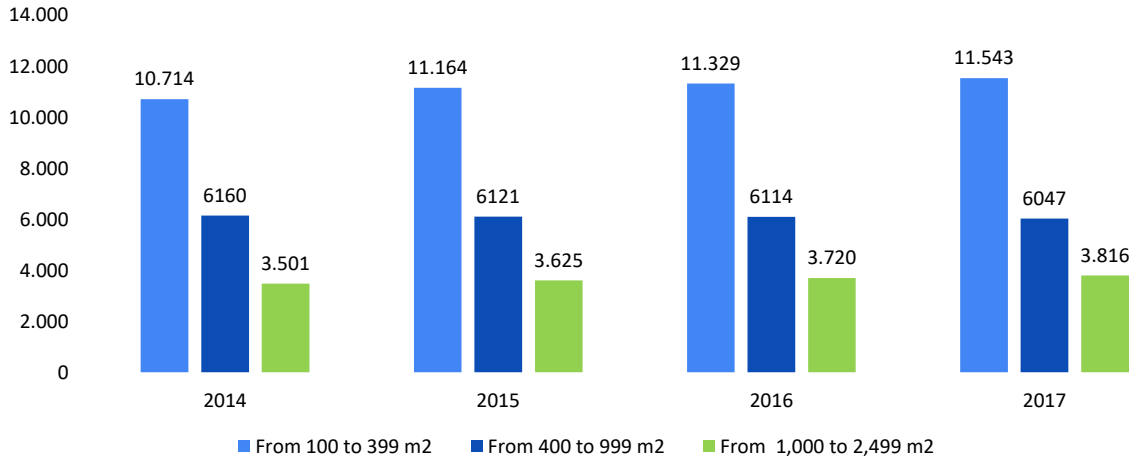
Table 6. Market share and penetration in Spain 2019 (Jan - sept 2019)

SUPERMARKET	MARKET SHARE	BUYERS (% OF PENETRATION)
Mercadona	25,8%	89,9%
Carrefour	8,7%	59,8%
DIA group	6,6%	57,6%
Lidl	5,5%	63,4%
Eroski group	4,9%	29,9%
Auchan group	3,4%	31,8%
Regional supermarkets	12,2%	68,3%

Source: Creara elaboration with information from Kantar

Following the reports "Food in Spain. Production, Industry, Distribution and Consumption" by Mercasa (2020), in 2010 more than 17,000 stores were identified as supermarkets without differentiating them according to their surface; from 2011 onwards, there are numbers available for each type of supermarket, accounting more than 22.000 stores in Spain, being the European country with more supermarkets and hypermarkets per capita (EC - DG COMP, 2014). Figure 2 shows the number of supermarkets in Spain according to size. The number of small supermarkets has increased by 28.4% from 2011 to 2019, while the number of medium ones has dropped 3.6% in the same period. As the number of small supermarkets increased, so did their total surface, which faced a growth of 22.6%, while the total surface of medium supermarkets decreased by 2.8%.

Figure 2. Number of SMS in Spain per year



Source: Creara elaboration with information from Mercasa

As mentioned before, regional supermarkets are a characteristic phenomenon in Spain, where unlike in other countries, they are not only not losing share to the big chains but are gaining it, thanks in part to their association with the retail group Grupo IFA ("El éxito de los supermercados regionales en

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España: IFA vende 13.560 millones, un 4,9% más", 2020). In fact, in recent months, with the effect of the pandemic and confinement, regional supermarkets have increased their share by six tenths to the detriment of Mercadona, Carrefour and DIA ("Los supermercados regionales ganan peso frente a los grandes retailers", 2020).

Concerning location, there is no homogeneous distribution at a national level, with regions such as Andalusia and Catalonia accounting for 40.4% of the total for small and 34.6% for medium supermarkets. In relation to the total share, Madrid is in the third position, followed by different autonomous communities depending on the type of supermarket. The distribution of supermarkets among regions is therefore directly related to the distribution of the population, with the most populated regions being those with the largest number of supermarkets.

Table 7 shows that for each type of supermarket there are 5 autonomous communities which represent more than 60% of the total number of establishments. As they are located mostly in urban centres, they have become centres of intensive energy consumption, due to the high number of facilities that make up the whole of these establishments. In addition, fitting out these establishments in the cities has become a challenge due to the limited space available to them, since most of them are located in low-lying residential areas. Therefore, there is a growing interest to implement sustainable and energy efficiency measures.

Table 7. Share of SMS per autonomous communities

Autonomous communities	Small (< 399 m^2) (%)	Autonomous communities	Medium (400-999 m^2) (%)
Andalusia	22.1	**Catalonia**	17.6
Catalonia	18.3	**Andalusia**	17.0
Community of Madrid	7.4	**Community of Madrid**	10.0
Castilla-La Mancha	6.3	**Valencian Community**	10.0
Extremadura	6.3	**Galicia**	8.2
Others	39.7	**Others**	37.2

Source: Creara elaboration with information from Mercasa

These establishments can decide whether to own all stores or expandas franchises. Supermarket chains normally focus on large supermarkets, but they have seen the franchise as the ideal formula to grow, both in large supermarkets and in smaller, urban establishments, also known as Express ("Franquicias de supermercados y venta de alimentación", 2020). Supermarkets represent one of the most important segments in franchising in Spain. The expansion through a franchise format has increased as it represents a low risk for the investor who owns the brand, as being part of a

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supermarket chain means entering a business with an almost assured demand, since it sells basic necessities. Moreover, supermarket franchises constantly adapt to the specific needs of the consumer and to market trends ("FRANQUICIAS ALIMENTACIÓN VALORADAS | + Rentables", 2020)

This sector has proximity as its main asset in conjunction with the convenience format which has grown significantly both in its urban side and in-service stations. In this latter type, numerous collaboration agreements are being implemented with oil companies and establishments such as Carrefour Express or Supercor Stop & Go are expected to triple their presence in the upcoming years.

5.2.2 Market trends

Before Covid-19 situation, packaged food had a negative evolution in volume in recent years, falling by 1.1% in the last year, to accumulate a drop of 2.2% in demand for packaged food since 2015. The demand for fresh products, which at the end of 2018 was falling by 2%, has managed to turn positive, allowing this section, which represents almost half of Spanish spending, to be the driving force behind mass consumer spending. The search for higher quality products and more sophisticated varieties is a key element in this growth: Spaniards have increased their spending on products such as seafood by 9.5% and up to 23.5% more on avocados. However, the boost to spending on fresh produce is mainly due to the increase in the price of the most common varieties in Spanish households ("Balance de la Distribución 2019 - Español - Kantar Worldpanel", 2019)

In addition to the commitment to fresh produce, the market is also opting for new products aimed at a consumer who is more concerned about health but, as Kantar points out, linked to consumption for pleasure and convenience (CESCE, 2019). The growth in products linked to the healthy diet stands out, increasing by 35% more in 2019. Especially organic food, which is growing by nearly 20% in 2019, confirms this consumer trend in Spanish food. Moreover, consumers are also reinforcing their demands in terms of issues such as ecology, the environment and animal welfare. All retailers are already devoting a large part of their strategies to these issues, something that will certainly be extended in 2020 ("Balance de la Distribución 2019 - Español - Kantar Worldpanel", 2019)

Post-covid studies suggest that 68% consumers in Spain will give preference to companies/brands where they perceive a purpose of solidarity and commitment to sustainability, which accentuates the trend that has been already marking the food retail and consumer sector. From the point of view of environmental sustainability, 78% of Spanish consumers say that they will be more cautious in what they buy with a view to the scarcity of natural resources and 74% that they will be more aware of the impact of their consumption (Food retail & Shoppers, 2020)

E-commerce, on the other hand, continues to advance and no longer in such a slow manner. Figure 3 presents the evolution of e-commerce turnover in the hypermarket, supermarket and food store sector in Spain from the first quarter of 2014 to the fourth quarter of 2019. The value of electronic commerce transactions in this sector, both with origin and destination in Spain, exceeded 257 million euros in the last quarter of 2019 ("E-commerce: facturación supermercados 2014-2019 | Statista", 2020). It has entered fully, although it continues to face its great competitor, the super, and also the

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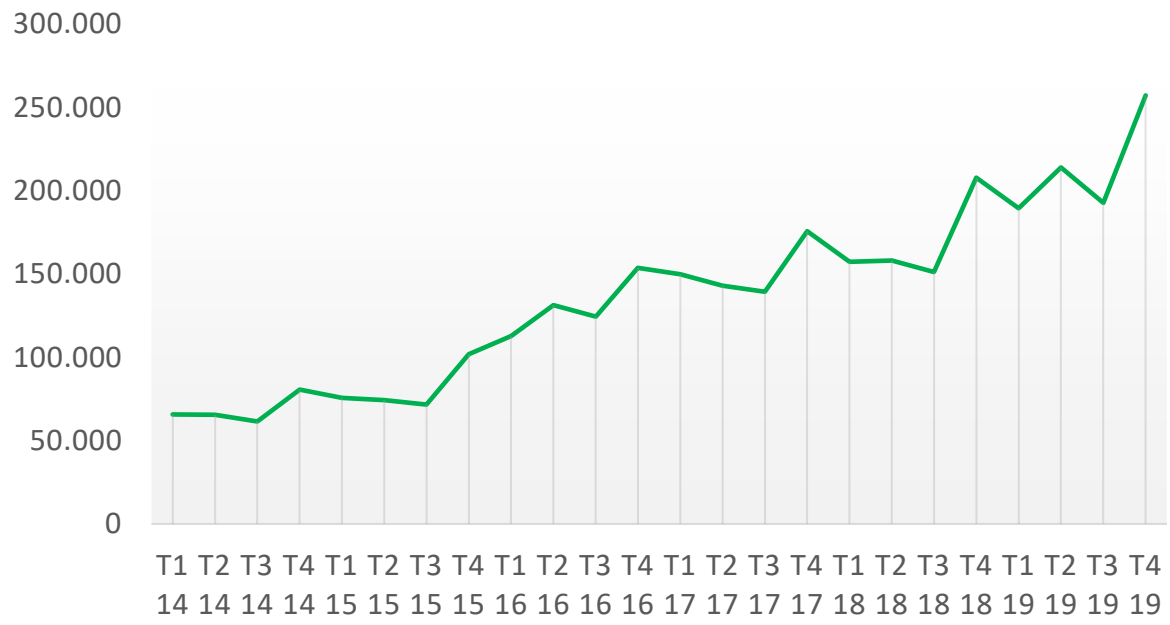
hard discount (Lidl and Aldi). There are many proximity supermarkets, which allow for more frequent and faster purchases making the consumer choose a physical store rather than online purchases. This means that online shopping in the supermarket shopping still has a long way to go, it is in the process of expansion, but it does not appear that will replace the physical stores. However, companies are increasingly choosing to connect the digital with the offline. In this line, it is worth mentioning the new platform for online purchases launched by Mercadona in 2018 (CESCE, 2019)

Furthermore, post-covid researches indicate that online channels and more convenience options in delivery have risen from 25% in the case of the Spanish to 35% and that in the next 6-9 months, more consumers will have high levels of interaction (37% in the case of the Spanish) (Food retail & Shoppers, 2020)

Figure 3. E-commerce turnover in hypermarkets, supermarkets and food stores in Spain (EUR)



Source: Creara elaboration with information from "Comisión Nacional de los Mercados y la Competencia"

Supermarkets in Spain have consolidated their commitment to energy efficiency and respect for the environment as one of their strategic priorities, contributing to the fight against climate change. Apart from energy efficiency, in the supermarket sector, there is a clear tendency to open more small supermarkets, and companies are focusing their strategy on reforming existing ones rather than offering new franchises. Another tendency is found in self-consumption Aldi ("Aldi cumple dos años de consumo de energía 100% renovable en todos sus supermercados", 2020), E.Leclerc ("E.Leclerc sumo de más de 600 kWp - Autoconsumo", 2020) and Masymas (Cadena de supermercados abre en León su primera tienda con una instalación fotovoltaica para autoconsumo - ESEFICIENCIA, 2020)

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which are some of the first supermarket chains which have installed photovoltaic installations for self-consumption, benefiting from their characteristic large surface on the rooftop.

5.3 National regulatory review

5.3.1 Legal framework

One important goal of the EU is to improve the energy efficiency of buildings. To this end, it enacted the Directive on the Energy Performance of Buildings (EPBD), among other measures. European retailers are materially affected by this directive because it specifies binding energy standards for commercially used buildings (new buildings and existing buildings that are subject to major renovation). The directive also sets inter alia a requirement on member states to ensure the availability of efficient, high-quality energy audit schemes to identify potential for energy efficiency improvements for all final consumers, including smaller domestic, commercial and small and medium-sized industrial customers. Although this directive does consider the different climatic conditions in the EU member states, some European countries have gone beyond the requirements of the directive. In Spain, for example, new commercial building projects are mandatorily required to use renewable energies.

The most relevant Spanish law transposing the European Directive is the RD 56/2016, regarding energy audits. The Royal Decree establishes a regulatory framework that develops and promotes actions aimed at improving the energy efficiency of an organization, the promotion of energy savings and the reduction of emissions of greenhouse gases that contribute to the objectives of the Union on energy efficiency.

In addition, the following obligations which influence the energy efficiency improvements in small and medium-size supermarkets have been adopted so far:

Table 8. Spanish legal framework

Law	Description
Royal Decree 314/2006	This RD adopted the CTE (Spanish Technical Building Code) which includes a Basic Energy Saving Document and covers regulations on: 1)Limitations on energy demand (heating and air-conditioning) 2) Performance of Thermal Installations/Air-conditioning systems 3) Efficiency in the indoor lighting installations 4) Minimum solar thermal contribution (hot water), and 6) Minimum PV contribution.
Royal Decree 47/2007	Royal Decree 47/2007 of 19 January 2007, approving the basic procedure for the energy efficiency certification of new buildings
Royal Decree 1027/2007	The Regulation on Indoor Heating and Air-conditioning Systems (RITE), approving the regulation on building heating systems, regulates the minimum output requirements applicable to heating, cooling, ventilation and domestic hot water systems and periodic energy efficiency audits, as well as the design, size, assembly and maintenance of such systems.

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Royal Decree 1494/2011	Royal Decree 1494/2011 of 24 October regulating the Carbon Fund for a Sustainable Economy. The Climate Projects of the Carbon Fund for a Sustainable Economy (FES-CO2) are Greenhouse Gas emission reduction programs developed in Spain, which were designed to lay out a path for the transformation of the Spanish productive system towards a low-carbon model. These Climate projects must be located in Spain and developed in the so-called "diffuse sectors" (that are not subject to the European emissions trading scheme) such as the residential and commercial sectors.
Royal Decree 235/2013	It adopted the basic procedure for building energy efficiency certification lays down the obligation to provide the buyers or users of buildings with an energy efficiency certificate that must include objective information on the energy efficiency of the building and reference values, such as minimum energy-efficiency requirements, so that the owners or tenants of the building, or a unit of it, can compare and evaluate its energy efficiency
Orden FOM/1635/2013	Updating the Basic Document DB-HE "Energy Saving", of the Technical Building Code, approved by Royal Decree 314/2006, of 17 March and raised the level of the minimum energy-efficiency requirements for new builds and for extension and renovation of existing buildings.
Royal Decree 235/2013	Approving the basic procedure for certifying the energy efficiency of buildings.
Royal Decree 238/2013	Amending certain articles and technical instructions of the Thermal Installations Regulations in the Buildings, approved by Royal Decree 1027/2007 of 20 July.
Law 15/2014	The adoption of Law 15/2014 of 16 September 2014 on the rationalisation of the public sector and other administrative reform measures represents an added stimulus for energy efficiency in the service sector, as it introduces a series of energy efficiency requirements applicable to procurement of goods, services and buildings by central government.
Royal Decree 56/2016	Which transpose the Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency with regard to energy audits, accreditation of service providers and energy auditors and the promotion of energy efficiency.
Royal Decree 244/2019	It regulates the administrative, technical and economic conditions for self-consumption in Spain

Source: Creara elaboration

5.3.2 Policy framework and opportunities for energy efficiency

Both nationally and regionally, the various incentives public programmes available have an objective to promote actions that seek energy saving and efficiency, as well as the use of renewable energy in facilities and buildings. Yet, there is not any specific programme available for SMS.

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National Level

i. Current policies

The following are national support programs and policies already implemented that may apply to SMS in order to promote the energy efficiency renovation in this sector:

Table 9. PIMA Frío

PIMA Frío		***2018***
National	*Ministerio para la Transición Ecológica*	*Grant*
Description: Subsidies for the installation of refrigeration installations based on alternative technologies to fluorinated gases with high global warming potential in establishments dedicated to commercial distribution (supermarkets and hypermarkets). **Eligible actions:** The amount will be determined according to the following ratio: 650 euros per kW of installed cooling capacity, with a maximum of 100,000 euros per installation and 200,000 euros per beneficiary in the case that the same person who is a beneficiary submits several applications.		

Table 10. JESSICA - F.I.D.A.E.

JESSICA-F.I.D.A.E Fund (Energy Saving and Diversification Investment Fund)		***2018***
National	*The management and marketing of JESSICA-F.I.D.A.E. Fund was entrusted by the EIB to BBVA through public tender.*	*Grant / subsidy*
Description: The aim of this fund is to finance urban sustainable development projects to improve energy efficiency, use renewable energies and be developed by energy services companies (ESCOs) or other private enterprises. This fund is to finance all the investments directly bound to the issue of energy efficiency and the use of renewable energies in urban environments, and it is compatible with other public or private funding sources, as well as with subsidies either co-funded or not by the FEDER. Projects need to be located in one of the Spanish Regions included in F.I.D.A.E. - Andalusia, the Canary Islands, Castile & Leon, Castile-La Mancha, Ceuta, Valencia, Galicia, Melilla & Murcia Region. **Target sectors:** among the priority issues we can find: Energy Efficiency Projects and energy management: Renovation of existing buildings, with actions on the thermal envelope, heating installations, cooling, lighting, etc. New buildings with energy rating A or B. Renovation or enlargement of the heat/cool existing networks. Renewable Energy Projects: Solar thermal. Solar PV if integrated in an energy efficiency project. **Financial**: fund endowed with about 123 M		

Table 11. Energy Efficiency National Fund

Energy Efficiency National Fund		***2014***
National	*Secretariat of State for Energy at the Ministry of Energy, Tourism and Digital Agenda.* *The fund is overseen by a Supervision and Monitoring Committee and managed by the IDAE*	*Legislative, financing*
Description: Its purpose is to finance economic and financial support mechanisms, technical support, training, information and other measures to increase energy efficiency in the various energy-consuming sectors to enable them to contribute towards achieving the national energy savings target set by the national energy efficiency obligation scheme provided for in Article 7 of Directive 2012/27/EU		

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Table 12. PAREER II / Aids program for energy retrofit of existing buildings

PAREER II/Aids Program for Energy Retrofit of Existing Buildings		*2018*
Scope	*Responsible bodies*	*Type*
National	*Secretariat of State for Energy at the Ministry of Energy, Tourism and Digital Agenda*	*Grant*
Description: It provides for implementation of comprehensive measures in existing buildings of all kinds (residential, government, retail, healthcare, education, etc.) and includes the same categories of measures as the previous PAREER. Aims to continue to incentivize the execution of measures promoting energy efficiency and renewable energy sources in extant buildings **Eligible actions**: Four types of beneficiary actions: - Improvement of the energy efficiency of the thermal envelope - Improvement of the energy efficiency of thermal and lighting installations - Replacing conventional energy with solar thermal energy - Replacing conventional energy with geothermal energy The actions must improve the energy rating of the building by at least 1 letter with respect to the initial energy rating of the building **Financial:** The available budget amounts to EUR 204 M. **Savings:** Cumulative final energy savings by 2020: 40.23 ktoe		

Table 13. FES - CO2

FES – CO2		*2011 - 2019*
Scope	*Responsible bodies*	*Type*
National	*Ministry of Agriculture, Food, and Environment (MAGRAMA)*	*Incentives*
Description: Climate Projects have been performed under the Carbon Fund for a Sustainable Economy (FES-CO2). They are greenhouse gases (GHG) emissions reduction projects, that must be implemented in Spain, in sectors not covered under the European Union Emissions Trading Scheme (EU ETS). The incentive given to the selected climate projects is the payment by FES-CO2 for every reduced and verified tonne of CO2 equivalent (tCO2e).		

Table 14. ICO - IDAE Energy Efficiency Financing Line 2017-2018

ICO-IDAE Energy Efficiency Financing Line 2017-2018/ Aids for energy efficiency industry and trade sectors		*2017 - 2018*
Scope	*Responsible bodies*	*Type*
National	*The Official Credit Institute (ICO) with IDAE*	*Loan/debt finance*
Financial: The 2017–2018 ICO-IDAE Energy Efficiency Financing Line has a budget of €70 million, allocated for the improvement of energy consumption in small and medium-sized firms and large firms in the manufacturing and commercial sector. The risk associated with the transactions is guaranteed 50–50 by the financial institution and the IDAE (Institute for Energy Diversification and Saving) itself through the National Energy Efficiency Fund.		

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Table 15. Multiregional OP for Spain ERDF 2014-2020

Multiregional OP for Spain ERDF 2014-2020		***2020***
Scope	***Responsible bodies***	***Type***
National	*Ministry of Finance and Public Administration - Subdirectorate General for the Administration of the ERDF*	*Grant / subsidy*
Aim: It aims to contribute to the fulfilment of the Europe 2020 "resource efficiency" flagship initiative, by bringing major economic opportunities, improving productivity, driving down costs and boosting competitiveness. This programme is the major Spanish programme as regards the ERDF (EUR 5,5 billion contribution). Among their funding priorities, the program supports the transition towards a low carbon economy through energy efficiency in enterprises, houses and public infrastructure; the production, distribution and use of renewable energy; support for multimodal sustainable urban mobility; research and innovation in low carbon technologies (38%). **Expected impacts**: For instance, a 10% increase of renewables consumption in the industry and tertiary sector and 10% increase of renewables production capacity, mainly small scale and in production sites near to the place of consumption. **Financial:** Total OP budget: 14,473,562,237.00 €		

ii. Future policies

In the context of the energy and climate policy framework in Spain, the EU requires each Member State to prepare an Integrated National Energy and Climate Plan 2021-2030 (INECP). 'Energy efficiency first' is one of the core principles that has guided the preparation of this Plan. Indeed, the measures envisaged are expected to achieve a 39.5% improvement in energy efficiency by 2030. Since the document is still a draft, it has not been included in any Laws/Royal Decrees/Official Journals. This is most likely to happen once the Spanish Law for Climate Change and Energy Transition is approved (2021). Among the principal energy efficiency measures designed to meet the final energy saving, the ones which can influence the SMS are:

Table 16. Energy efficiency in services sector buildings (NECP)

Measure 2.8. Energy efficiency in services sector buildings (NECP)		***2020***
National	*MITECO/IDEA together with the autonomous communities and local administrations*	*Legislative (NECP)*
Description: This measure aims to reduce the energy consumption in existing buildings used for services, owned publicly or privately, through energy upgrade activities that will improve their energy rating. **Financial:** Mobilisation of approximately EUR 3.671 billion of investment. **Eligible actions:** *Thermal envelope: action will be taken on the thermal envelope of buildings to achieve a reduction in demand for the heating and cooling of buildings. *Thermal installations: action will be taken on the thermal installations for heating, air-conditioning, production of domestic hot water and ventilation, governed by the Regulation on Thermal Installations in Buildings. *Lighting systems: action will be taken on the indoor lighting systems of buildings, adapting them to the energy efficiency values required depending on how each zone is to be used		

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Table 17. Energy efficiency for cooling equipment and large air-conditioning systems

Measure 2.9. Energy efficiency for cooling equipment and large air-conditioning systems in the services sector and public infrastructure (NECP)		***2020***
National	*MITECO/IDEA together with the autonomous communities and local administrations*	*Legislative (NECP)*
Description: The objective of this measure is to reduce electricity consumption in the services sector, and it can by the upgrade of large air-conditioning systems, cooling equipment and refrigeration and freezing compartments. **Financial:** The total estimated public budget required to develop this measure in the 2021-2030 period is EUR 3.947 billion for a volume of mobilised investment of EUR 6.333 million **Target sectors:** The measure is aimed at the services sector, either natural or legal persons owning large refrigeration (more than 70 kWe) or air-conditioning systems and the owners of small installations, through units and deep-freeze boxes, in grocery stores, shops and retail areas. **Eligible actions:** Cooling equipment that improves energy efficiency through the incorporation of monitoring and control systems, the recovery of condensation and/or evaporation heat, and other equipment with high energy-saving capacity (multi-layer or capacity for variation of the condensation and/or evaporation temperatures). In the case of refrigeration units, the installation of covers or doors and replacement of lighting systems by new systems with lower energy consumption and heat dissipation.		

Table 18. Communication and information concerning energy efficiency

Measure 2.15. Communication and information concerning energy efficiency		***2020***
National	*MITECO, through the IDAE, will have a central role in defining and applying the Plan's communication strategy*	
Aim: These actions should improve the awareness of the financial agents to reduce the perception of investment risk for energy efficiency and saving which often penalises the promoters of this type of project and limits their access to finance **Target sectors:** All energy-consuming sectors and the financial sector.		

Regional level

i. Regional energy actions plan

Practically all the Autonomous Communities have developed strategies in the field of the promotion of rational use of energy and the promotion of renewable energies, with emphasis on the establishment of measures at the industrial, institutional and domestic levels. In most cases, Autonomous Community have their own energy agencies or regional administration, which have elaborated different energy action plans. The most relevant which have elaborated measures that may apply to SMS are:

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Table 19. Castile-Leon III commercial plan

III commercial plan: strategy for the Castile-Leon commercial sector 2016-2019		*In force since 2016*
Regional	*Government of Castile and Leon*	*Legislative*
Castile-leon's commercial network is made up of more than 32,000 retail establishments which has a very high potential for energy savings, which is why this plan includes the promotion of actions aimed at implementing energy saving and efficiency measures and the use of renewable energies in shops.		

Table 20. Energy strategy plan in the Basque Country 2030

Energy strategy plan in the Basque Country 2030		*In force since 2017*
Regional		*Legislative*
Eligible actions: Among its eligible actions, we can find the improvement of the energy efficiency of buildings in the Basque Country and promotion of greater use of renewable energies, both in housing and in the service sector through: L3.1.1 Promotion of energy audits and diagnostics in buildings L3.1.2 Promotion of the rehabilitation of the thermal envelope in buildings L3.1.3 Renewal of energy-using equipment L3.1.4 Promoting the implementation of renewable energies in buildings **Target:** reduction of energy consumption in buildings by 2025 of 135,000 toe/year and by 2030 of 199,000 toe/year		

Table 21. Navarra Energy plan Horizon 2030 (PEN 2030)

Navarre Energy Plan Horizon 2030 (PEN 2030)		*In force since 2018*
Regional	*Government of Navarre*	*Legislative*
Eligible actions: Among its eligible actions for supermarkets in the context of energy efficiency we can find: *Assigning subsidies to energy rehabilitation, for the improvement of thermal insulation in buildings, industrial plants, shops, education centres, etc.		

ii. Policies and measures

The following are some of the most relevant support programs and policies at regional level already implemented that may apply to SMS in order to promote the energy efficiency renovation in this sector

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Table 22. Subsidies from INEGA

Subsidies for carrying out energy audits, implementation of management systems and energy-saving and efficiency projects in companies in the industry and services sectors		***2020***
Regional	*INEGA*	*Subsidy/Incentive*
The endowment of this call from Inega's budgets for 2020 amounts to 3,500,000.00 euros financed with community funds derived from the Feder-Galicia 2014-2020 operational programme. **Eligible actions**: Investments in the replacement or improvement of equipment and installations that consume energy in the production process in the industrial and services sector, as well as in auxiliary systems; improvement of lighting installations with an annual reduction in consumption of 40% with respect to initial consumption; cogeneration and biogas projects that contribute to increasing the energy efficiency of companies; any other action that involves energy savings of at least 20% with respect to initial consumption; implementation of energy consumption accounting/telegraphic management systems associated with other energy saving actions. The minimum investment for the action to be eligible is 10,000 euros, which is reduced to 3,000 euros in the case of energy audits. Each application will contain a single technical project which may consist of a single action or several homogeneous actions to be carried out on the same site. Each company may submit one or more applications. **Financial:** The amount of the grant will be 35 % of the eligible cost of the action. The aid intensity will be increased by 15 % in the case of aid granted to small enterprises and by 10 % in the case of aid granted to medium-sized enterprises. As a general rule, the maximum aid per project amounts to 100,000 euros, although it could go up to 1,000,000 euros for projects that justify high levels of energy saving.		

Table 23. Subsidies - Canary Islands

Subsidies for the improvement of energy efficiency and the use of renewable energy in companies and residential buildings, co-financed with FEDER within the scope of the Canary Islands Operational		***2020***
Regional	*Energy efficiency and new energy service – Canary government*	*Subsidy/incentives*
Description: Subsidies for the improvement of energy efficiency and the use of renewable energies in companies and residential buildings, within the framework of the ERDF Operational Plan of the Canary Islands 2014-2020, axis 4, specific objectives 4.3.1 and 4.3.2, with a co-financing rate of 85% of this fund. **Eligible actions in the business sector**: Improvement of technology in equipment and industrial processes, energy efficiency measures in buildings, renewable energies for electricity production in buildings, infrastructures and facilities, renewable energies for thermal uses in buildings, infrastructures and installations. **Financial:** For the business sector, projects whose subsidy is less than 15,000 euros will not be eligible. The grant percentage will be up to 45% of the eligible costs, with a maximum of 60,000 euros of grant per project.		

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Table 24. Aids - Extremadura

Aid program for energy saving and efficiency in Extremadura		***2019***
Regional	*Basque entity of energy*	*Incentive/, Financing*
Description: two lines of aid, one for energy saving and efficiency actions and projects and the other for better use of energy in existing installations. The first line has as potential beneficiaries micro, small and medium-sized enterprises and their groups, provided they have legal personality, as well as individual entrepreneurs and energy service providers, and the second line is for smaller municipalities and local entities. **Financial:** The budget for the first line of aid will be 1,880,000 euros, while for the second it is 425,000 euros. The maximum amount of the subsidy per beneficiary, in both cases, will be 200,000 euros. **Eligible actions:** include comprehensive energy audits, the implementation of energy management systems and investments in the replacement or improvement of energy-consuming equipment and/or installations with equipment and installations using highly efficient technology. Also included are the replacement or improvement of existing heating and cooling equipment and/or installations with others that are highly energy-efficient; the improvement of the energy efficiency of indoor lighting installations and of lifting and maintenance equipment in existing buildings; and the improvement of the energy efficiency of outdoor lighting installations.		

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6. ITALIAN FRAMEWORK

6.1. Introduction

6.1.1. Economic and energy efficiency context

The country's building and infrastructure capital have entered a cycle of growing obsolescence. With reference to the year 2011, in fact, the date of the last ISTAT census, more than 60% of the Italian building stock is over 45 years old, that is prior to law no. 373 of 1976, the first law on energy saving.

On the national territory, the buildings and complexes surveyed in 2011 amounted to over 14.5 million, 13.1% more than in 2001. The 84.3% of the overall buildings surveyed are residential (equal to approx. 12 mln), up by 8.6% in the inter-census decade (ISTAT, 2014).

Primary energy demand in 2017 was 159.5 Mtoe, an increase of 3.4% compared to 2016. Final uses recorded an increase compared to 2016 (+ 3.8%), settling at 121.2 Mtoe in 2017: final consumption was 113.6 Mtoe (+ 1.8%) while for non-energy uses there was a significant increase of 25.4%. The increase is mainly due to the growth in final civilian uses (+ 7.6% compared to 2016).

This civil sector grew at an average annual rate of 1.8% in the period 1990-2017, mainly due to the growth of the services sector (+4.6% per year). The industrial sector in 2017 instead achieved a reduction in final energy consumption of 0.7% compared to 2016, confirming the downward trend of the last decade. The civil sector therefore absorbs more than 40% of final uses against 30% in 1990, followed by the transport sector, which represents the second most important sector, with a share of 28.5%. The industrial sector, which in 1990 was the first sector for energy consumption with a share of about 30%, reduced its contribution to final consumption by up to 20.6% in 2017.

In 2017, the energy consumption of the **residential sector** was 32.6 Mtoe, an increase of 1.9% compared to the previous year. A significant increase is observed in the consumption of biofuels with 6.7 Mtoe (+ 9.6%) and of other fossil fuels with + 9.6% (consumption, however, is less than 0.1 Mtoe). LPG with + 2.6% confirms the growth trend. Electricity consumption also slightly increased with 5.6 Mtoe (+ 1.8%) and natural gas with 17.3 Mtoe (+ 1.0%). Natural gas is confirmed as the main source of energy, accounting for over 50% of consumption in the residential sector, followed by biofuels (20.6%) and electricity (17.3%). Consumption for air conditioning (heating and cooling) absorbs about 70% of final consumption, conditioned by the temperature trend: in particular, in 2017, energy consumption for air conditioning fell by 3.8% compared to 2016. Consumption energy for lighting and electrical appliances increased by 1.0%, as well as consumption for kitchen and domestic hot water uses (+ 2.1%), bringing the consumption shares, respectively, to 11.8% and 17.7%.

Energy consumption in the **non-residential sector** (hospitals and nursing homes, shops and workshops, schools, offices, hotels, restaurants, pizzerias and bars, large-scale distribution and banks) was 18.2 Mtoe in 2017, a significant increase compared to 2016 (+ 18.2%). The non-residential sector was the leading sector in the period 1990-2017: energy consumption practically doubled, despite the decline due to the economic crisis. The main energy sources in the sector are electricity and natural

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gas: together they satisfy more than 80% of the total demand. In 2017, in particular, electricity absorbed 44.1% of the sector's energy consumption, followed by natural gas with 36.1% (ENEA, 2019).

6.1.2. Energy efficiency in the retail sector

In Italy, the modern retail system is defined as “Grande Distribuzione Organizzata” (GDO - Large Organized Distribution). Another definition used for this sector is also “Distribuzione Moderna Organizzata” (DMO - Organized Modern Distribution), which includes a complex universe of companies that carry out their business through different formulas of commerce, both food and non-food: shopping centers and hypermarkets, large and small supermarkets, department stores, large specialized areas, discount stores, Cash & Carry, chain stores, franchises, online.

From the post-war period to the present, the evolution of the Italian socio-economic context has taken place in parallel with that of the DMO, influencing each other. It is not only the evolution of society and the economy that requires and stimulates new models and approaches in distribution, but also the same distribution that has allowed the evolution of society to go in certain directions.

Many changes took place within the DMO in Italy, starting from the pioneering phase from the 1950s to the 1970s, the era of full consumption and the true affirmation of the new distribution model in the 1980s, up to the search for new consumption patterns and lifestyles in the new millennium and the maturity phase of the DMO (Censis, 2017).

Consumption in food and non-food goods (excluding services such as health, welfare, utilities, etc.) contribute to 21.7% of Italian GDP and 36.4% of total consumption in 2019. Food and non-food distribution is therefore a key sector for the Country, which has recorded positive growth performance in recent years, ranking first in terms of turnover, Added Value, number of companies, investments and employees in 99 sectors (two-digit ATECO codes).

In particular, the food distribution alone generates a total turnover of 240 billion euros, 2.85% more than in 2015, an Added Value of 34.4 billion euros (+ 13.38% vs 2015) and supports over 900 thousand employed, with more than 200 thousand companies.

The DMO is one of the most important drivers of development and employment growth in Italy, in fact it represents the 4th economic sector out of 245 for employment growth in 2018 (+ 31,027 employed since 2013) and the 3rd sector for contribution to employment in the South (~ 5.6% of total employment in the South of the Country in 2017). The DMO also promotes youth employment (21% of the employed are under 30 years of age, +75% compared to the Italian average) and female employment (63% of the employed are women, + 29% compared to the Italian average percentage) (The European House – Ambrosetti, 2020).

In January 2020, for retail sales, there was a growth of 1.4% in value and 1.3% in volume compared to 2019. The food sector is growing significantly, both in value (+ 1.9%), and in volume (+ 1.1%), but sales of non-food goods also increase (+ 1.0% in value and + 1.6% in volume). As regards the distribution

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form, again compared to January 2019, the value of retail sales increases by 2.3% for large retailers and decreases by 0.2% for companies operating on small surfaces. In particular, there was a strong increase in sales in food discount stores (+ 5.3%) but above all e-commerce (+ 15.8%) (ISTAT, 2020).

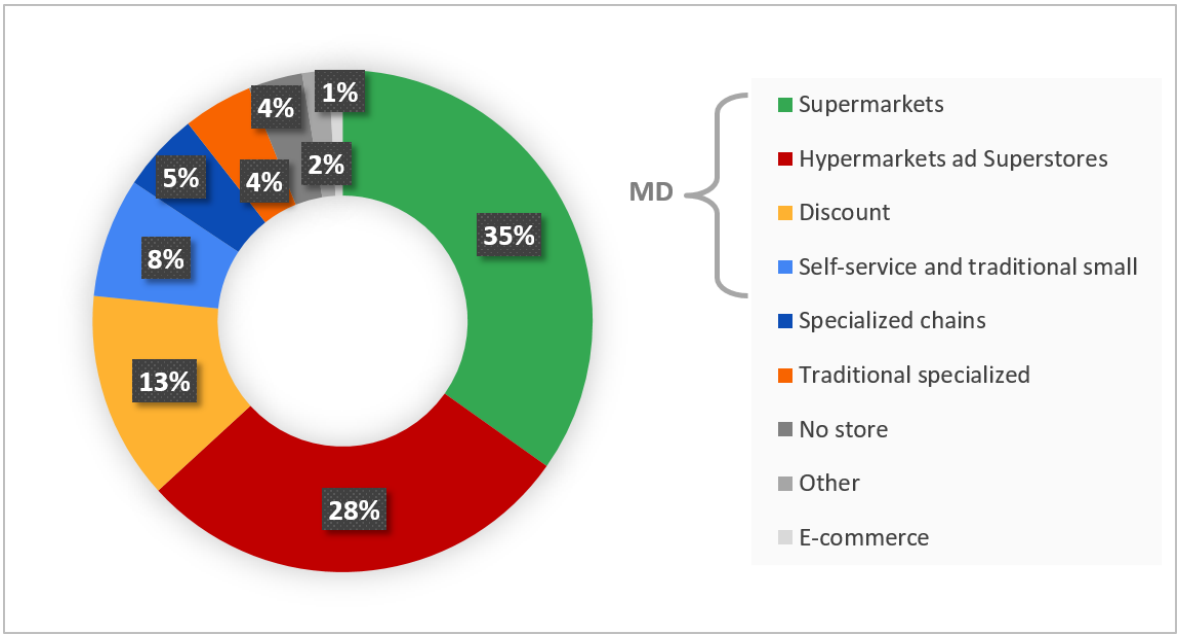
In a scenario of still weak consumption, DMO transfers all the advantages deriving from greater efficiency directly to customers, constantly reducing their commercial margins. In the 2008-2018 period, in the face of cumulative increases in tariffs and services of 21.4% and inflation of 12.3%, the prices of packaged products increased in the DMO by only 2.6% (FederDistribuzione, 2020).

The DMO sector in Italy is made up of different commerce formulas, both food and non-food, which can be grouped mainly into four types: Self-Service (100 - 399 m2), Supermarkets and Superstores (the former are characterized by a surface that varies between 400 m2 and 2,499 m2, while the latter range from 2,500 m2 to 4,499 m2), Hypermarkets (≥ 4,500 m2) and Discount.

In 2019, the total number of food stores was 25,534 units, of which 43.7% attributable to the category of Self-Service, with over 11,000 shops. Supermarkets and Superstores represent 34.3%, while 20.6% by Discount and only 1.4% by Hypermarkets.

The Modern Distribution (MD) is the primary purchasing channel for Italian consumers' food spending, in fact it represents 84.3% of the total latter. Consumers certainly prefer Supermarkets to make their purchases, which make up 34.8% of household food expenditure in 2019, and secondly they rely on Hyper and Superstore (28.4% of total expenditure), as we can see in Figure 4 (The European House – Ambrosetti, 2020).

Figure 4. Food expenditure of Italian households by channel (percentage values), 2019



Source: Sinloc elaboration with information from The European House – Ambrosetti, 2020

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In the national competitive context, the GDO remains characterized by some structural limits that might be overcome by the health crisis of the first half of 2020. The Italian grocery market presents more modest growth prospects than the main European countries. The forecasts formulated before the pandemic indicate up to 2023 an average annual expansion of 1.7% for Italy compared to values well above 2% for the major markets, with peaks of 2.8% for the UK and 2.9% for Germany. Even the share of online sales, before the acceleration due to the pandemic, saw Italy reach 2023 with a share of 3%, far from the leading countries such as the UK (7.9%) and France (6%).

The Italian market also combines its modest overall dynamics with a high level of fragmentation: only Spain has a parcelling out comparable to the Italian one. The largest Italian operator is far behind in the ranking of the major international retailers in whose first positions are, alongside the American giants, German, French, Dutch, Spanish and even Swiss groups. The small scale of Italian operators and the low dynamics of the domestic market subject our retailers to strong pressure on the prices that can be applied to the consumer, making it difficult to transfer the price increases that occur along the supply chain to the final buyer. In fact, the ability of the GDO distribution groups to pass on the increases in the purchase price to the shelf prices appears to be the most contained in the European context. The so-called 'price transmission' detected by Eurostat is 10% in Italy, 19% in Spain, 48% in Germany and 68% in the UK (Area Studi Mediobanca, 2020).

6.2. Analysis of the supermarket sector

6.2.1. A general overview of the supermarket sector

As already mentioned, the Italian retail food market, like the Spanish one, is highly diversified, with different types of stores. ISTAT data reveal that retail sales in the Supermarket category alone increased by 1.2% in the period January 2019 - January 2020. According to FederDistribuzione's latest annual report, on the other hand, the market shares of Modern Distribution related to the food sector (fresh + packaged) have increased by 0.4% since 2018 and by 6.9% since 2000 for the category "Supermarkets and Superstores ", while they decreased by 0.1% since 2018 and by 5.1% since 2000 for “Self-Service”.

Food retailers witnessed a major move in May 2019 when Conad announced the acquisition of 1,600 points of sale (including 46 hypermarkets) from Auchan Retail Italia, operated under the brand names Auchan and Simply. Through such acquisition, Conad strengthened its lead over the second-placed player in grocery retailers, Coop Italia. Domestic and international discounters continued their expansion plans in Italy. In addition to the leader Eurospin Italia, which reached the 1,100 stores threshold, German discounters Lidl Italia, Aldi, and Penny Market Italia announced major investments for 2019-2020, and the opening of more than 140 new stores to strengthen their foothold in the Country (USDA, 2020).

Nielsen has announced the market shares of 2019 for GDO, confirming Conad's overtaking on Coop Italia, which had been the leader in the 2nd half of 2018 with 13.7%. Conad therefore claims with 13.8%, gaining 0.9% compared to the previous year, followed by Coop Italia (13.0%) and Selex (10.1%),

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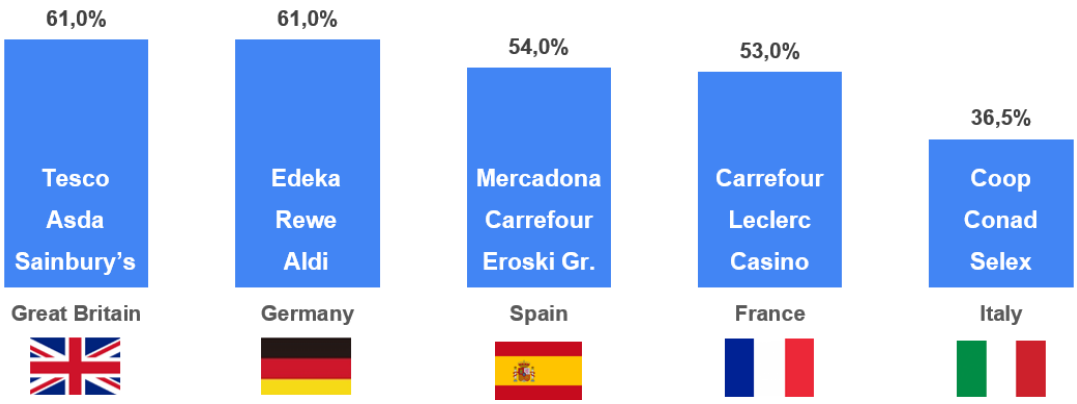
which remains in third place, increasing its share by 0.2%. These first three companies hold 36.5% of the total turnover achieved in 2018 by the GDO, as shown in Figure 5 (FederDistribuzione, 2020).

Food retailing in Italy remains one of the most atomised markets in Europe. The top five operators share just over half the market (51.8%) while in countries such as Germany, France and the United Kingdom the share is between 75% and 80%. Similar to that Italian is the concentration of the top five retailers in Spain, with a 51.2% share, half of which is held by the first operator (Mercadona). Looking ahead, the concentration of the Italian market is expected to rise following Conad's acquisition of the Auchan sales network (Area Studi Mediobanca, 2020).

Figure 5. Share of the top three distributors compared to 2018 turnover



Source: Sinloc elaboration with information from FederDistribuzione, 2020

Table 25. Market shares of the first 10 groups in Italy, 2019

GROUP	MARKET SHARE	Δ 2nd SEM. 2019 vs 2nd SEM. 2018
Conad	13,8%	+0,9%
Coop Italia	13,0%	-0,7%
Selex	10,1%	+0,2%
Esselunga	8,9%	-0,1%
Gruppo Vege	7,0%	+1,7%
Eurospin	6,3%	0,0%
Gruppo Carrefour	5,7%	+0,5%
Lidl Italia	4,3%	+0,4%
Gruppo Sun	3,1%	+0,2%
Agorà Network	3,0%	+0,1%

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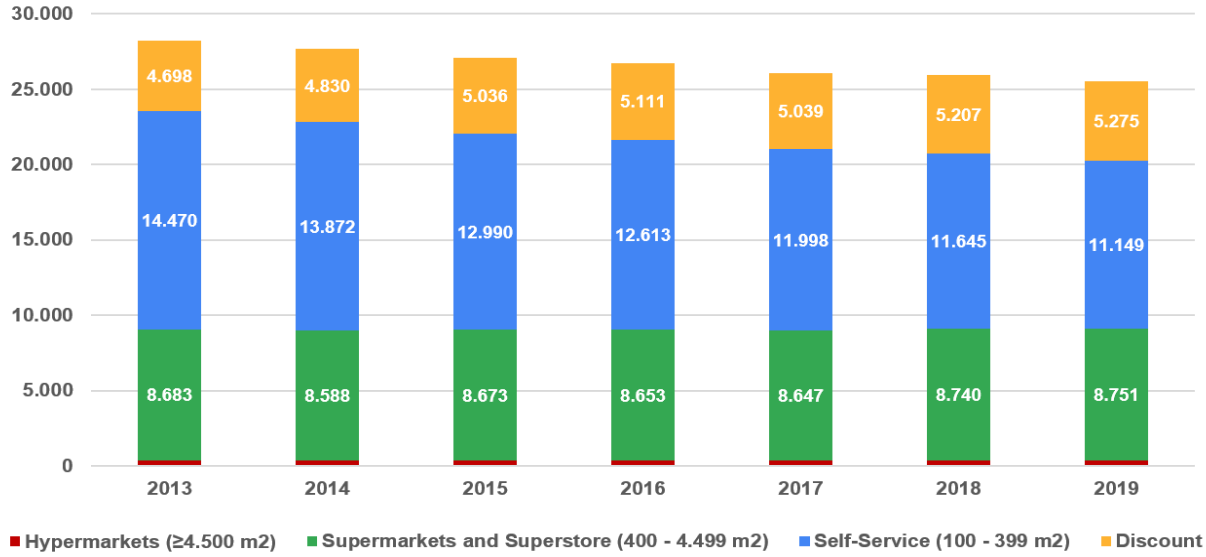
Source: Sinloc elaboration with information from FederDistribuzione, 2020

Although the GDO in Italy is increasing its turnover more and more, both as regards the food and non-food sectors, there is a constant decrease in the number of sale points (about -2,700 units, or 10% less since 2013), due to the sharp reduction (-26.1%) in small-scale stores (Self-Service) which saw a decrease of over 3,000 stores in 7 years, partially offset by the expansion of Discount stores (+11.6 %). Supermarkets and superstores are also growing, albeit small (+ 0.8% since 2013), while hypermarkets are downsizing (FederDistribuzione, 2020).

Figure 6. Evolution of stores number in the Modern Distribution (food sector) from 2013 to 2019



Source: Sinloc elaboration with information from FederDistribuzione, 2020

The majority of supermarkets are located in northern Italy (47.1%), followed by the south (28.6%), and then by the central region (24.3%). Convenience stores and small supermarkets are commonly located in central areas of towns and cities. Hypermarkets and supermarkets tend to be positioned within large shopping centers in suburban areas and on the outskirts of cities (USDA, 2020).

The formula of the Hypermarket is not very present in Italy, as can be seen in Figure 6, and is developed superficially above all in the North, as it can be seen from the graph below (Figure 7). The predominant sales area per 1,000 inhabitants is undoubtedly that relating to the Supermarket formula, with a national total of 121.1 m2.

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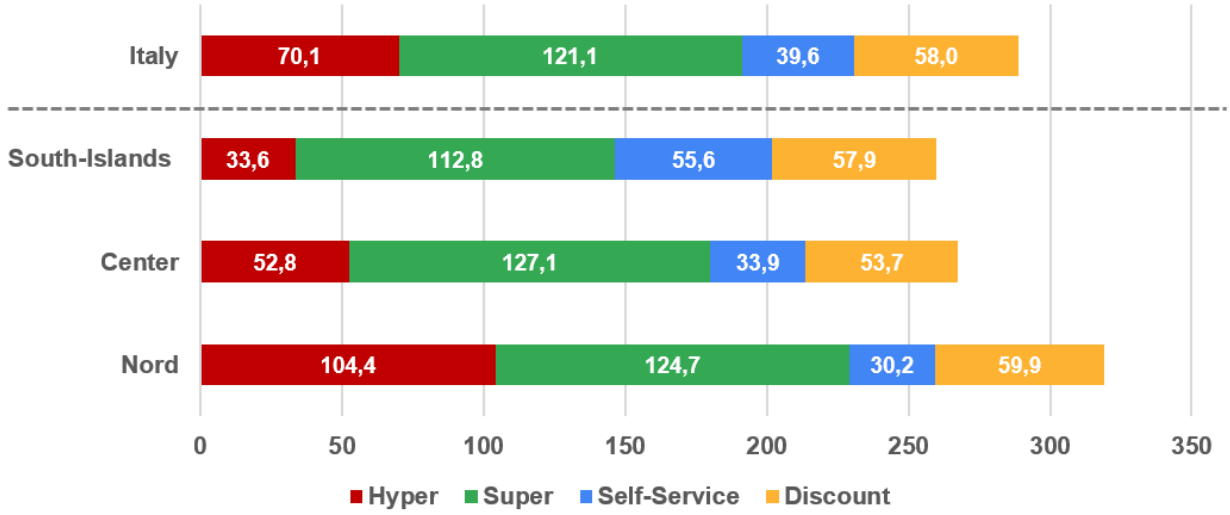
Figure 7. Sales area (m2) per 1,000 inhabitants, 2019



Source: Sinloc elaboration with information from FederDistribuzione, 2020

There is no homogeneous distribution of the businesses on the national territory, as most of the shops are located in the most populated regions (Lombardy, Lazio, Campania and Sicily are the top four in 2019). The Campania Region holds the record for quantities of small shops (100 - 399 m2), with over 1,500 units, while Lombardy for medium-large ones (400 - 2,499 m2), with more than 1,000 stores. Veneto, the region in which a pilot case will be developed (i.e. in Padua), ranks 6th for the number of Self-Services and 5th for the number of Supermarkets (FederDistribuzione, 2020).

Table 26. Stores number in the Modern Distribution (food sector) by region (top ten) in 2018

REGION	SELF-SERVICES (100 - 399 m2)	REGION	SUPERMARKETS (400 - 2.499 m2)
Campania	1526	**Lombardy**	1046
Lombardy	1092	**Lazio**	808
Sicily	1038	**Sicily**	789
Puglia	974	**Campania**	718
Lazio	855	**Veneto**	677
Veneto	747	**Emilia Romagna**	619
Sardinia	701	**Puglia**	556
Piedmont	682	**Piedmont**	512
Emilia Romagna	654	**Tuscany**	359
Calabria	577	**Calabria**	342

Source: Sinloc elaboration with information from FederDistribuzione, 2020

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6.2.2. Market trends

Multi-channel strategies, blending online and in-store sales, are key to success across retailing. Grocery retailers are paving the way towards innovative solutions in this respect, offering e-commerce shopping with deliveries to the consumer's home and in-store lockers for customers to collect online orders.

In Italy, grocery retailers continue to adapt their product assortment towards Italian consumers, expanding the range of locally grown, but also ethnic, vegan and vegetarian alternatives, "free from" products (e.g. gluten, lactose, or sugar free), and superfoods. Convenience remains a valued commodity by Italian shoppers. Hectic lifestyles and busy agendas force consumers to look for solutions that allow them to save time and shop on the go. This is especially true in urban scenarios, where proximity stands high in the priority list (USDA, 2020).

The Italian consumer is therefore increasingly selective and aware, he pays more attention to waste and his purchase path is characterized by a greater interaction between online and offline. We then move from the concept of "multichannel" to that of "omnichannel": we are informed and purchased simultaneously on multiple channels taking advantage of technological evolution and, in particular, smartphone. In this context, as mentioned above, a return to proximity emerges, where suburban and large retail outlets are particularly affected, especially as regards food spending (FederDistribuzione, 2020).

In 2019, the expenditure of Italian families for food products grew by 0.4% compared to 2018. The data of the Panel Ismea Nielsen highlighted a slowdown in household consumption in the second half of the year, which reduced the impulse of the first half when the receipt had grown 1.1% on a trend basis. The stagnation of food consumption in the home is now a structural phenomenon that affects the change in consumption patterns and lifestyles rather than the level of disposable income. More rational purchasing models are asserted which are capable of containing waste and "away from home" meals; this determines the dynamics of domestic consumption.

A greater willingness to spend on drinks (+ 1.7%) rather than on food (+ 0.2%) is confirmed. Large-scale consumer products ("Largo Consumo Confezionato" - LCC, + 1.9%) continue to be the driving force to which more and more space is dedicated on the shelves in large-scale distribution, while for fresh bulk products, expenditure continues to contract (-3.1%). Among the sectors only meats, fish and fruit maintain more than half of the offer in "unpackaged" format, for the other supply chains the "packaged" product represents approximately three quarters of the offer.

The attitudes in household purchases are homogeneous in the four national macro areas (Northeast, Northwest, Central and South): wherever the packaged product replaces the loose, with a more evident imbalance in the Center, where fresh products purchases lose 4.8 percentage points offset by a 2.8% increase in packaged goods.

The evolution of lifestyles is however generating a growing attention towards sustainability and the consumer is starting to pay more for more sustainable products (0 km products, bio and natural

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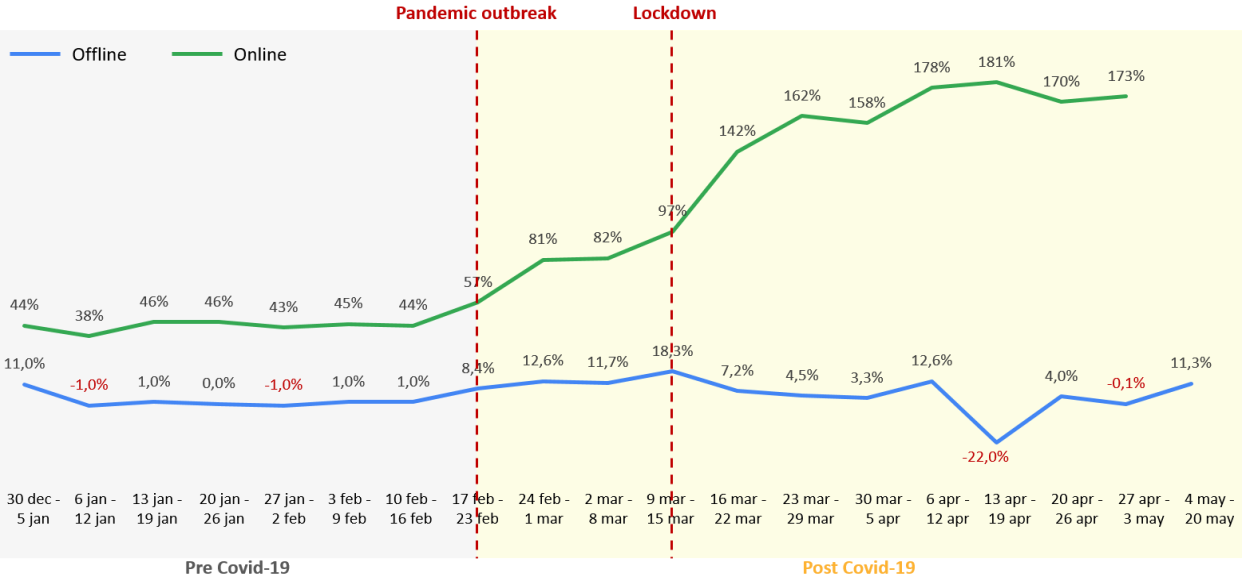
cosmetics products, low consumption appliances), despite the moment of economic crisis (The European House - Ambrosetti, 2020).

According to the Shopper Europe IRI Study (2018), Italians are much more attentive to issues related to sustainability (+10/15 points compared to the European average), both as regards the products themselves, and for the companies that produce them: 82% of Italians prefer products from companies that respect the environment, compared to the European average of 72%.

The sustainable products market was worth 20 billion euros in 2019, with an increase of 2.1% compared to 2018. Italians spend over 7.5 billion euros on products that communicate healthy nutrition (+ 2.1%) and 5.5 billion euros in those made with sustainable production (+ 1.4%). In particular, sales of 100% Italian products are growing significantly (+ 5.2%). Sustainable products are beginning to represent an interesting share of DMO's sales and, therefore, the market is investing more and more in the growth of the offer of sustainable products (IRI, 2020).

Online grocery shopping is rapidly growing in Italy and experienced a significant surge during the Covid-19 emergency. In 2019 e-commerce constituted only 1% of food expenditure, as previously shown in Figure 4, but during the months of lockdown due to the Covid-19 pandemic, this channel has strengthened and has undergone a variation considerable, reaching the 181% in April 2020 (compared to the same month of the previous year). The offline channel also grew in March (variation of +18.3% compared to 2019) and in the first half of April (+ 12.6%), against a slowdown after Easter (-22.0%) and a new recovery after May 4 (+ 11.3%), as shown in Figure 8 (The European House - Ambrosetti, 2020).

Figure 8. Offline and online sales of food (% changes in value vs. 2019), 2020



Source: Sinloc elaboration with information from The European House - Ambrosetti, 2020

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The buying push registered since the start of the lockdown also remains sustained in the first half of May. In the week from the 11 to 17 May, i.e. the one in which the decrees allowed the first reopening and less containment of travel, the increase in spending on packaged food on an annual basis still marks a growth of + 11% (Ismea, 2020).

As regards the choice of distribution channels in the emergency period, the increases in sales were recorded above all in the Self-Services (+ 26.9%), but also in the Supermarkets (+ 12.9%) and in the Discounts (+7.9 %). In contrast, sales fell 39.8% in Cash & Carry formats due to the closure of pubs, bars, cafes, restaurants and catering services. Similarly, sales in hypermarkets (-9.8%) were penalized by the closure of shopping centers (USDA, 2020).

During summer 2020 the drop in infections and the gradual return to normal have led to a presumed improvement in Italian sentiment on the health front, but the impact of confinement at home and the fear of an imminent economic crisis seems to have changed lifestyles. It will be interesting to check if this dynamic will stabilize on a new normal or if it will gradually tend to resume the trends in progress before the Covid-19 emergency. In recent months, home consumption and the preparation of meals at home have favoured the optimization of spending; the growing concern for general economic conditions then produced a sort of empowerment in consumer behaviour, which led to a sharp reduction in wasted food (Ismea, 2020).

Today, stakeholders evaluate a company also focusing on the values it expresses and not only on the product. Sustainability becomes a competitive factor for companies: more sustainable companies are also more productive. As reported by The European House - Ambrosetti, in fact, highly sustainable companies are 10.2% more productive than unsustainable ones and the integration of environmental and social sustainability criteria can guarantee a medium-long term competitive advantage for companies and investors.

In 2018, investments in sustainable assets in the world amounted to 31 trillion dollars (half of which in Europe), with a growth of 70% compared to 2014. The analysis of market yields shows that the securities belonging to the quartile of the companies with the highest ESG (Environmental, Social and Governance) ratings are the ones that perform best. Investors require companies to formulate clear and measurable sustainability objectives over time.

6.3. National regulatory review

6.3.1. Legal framework

As in the Spanish case, also in Italy most of the regulatory framework about energy efficiency in buildings comes from the transposition of the EU Energy Performance of Buildings Directive (EPBD), its following updates and the guidelines for the application of the directive and law.

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Table 27. Regulatory framework

Law	Description
Legislative Decree 192/2005	Transposition of directive 2002/91/CE on energy performance of buildings
Legislative Decree 56/2010	Updating and integration of Legislative Decree 115/2008 for the transposition of EU directive 2006/32/CE about efficiency in the final use of energy and energy services, replacing Directive 93/76/CEE
Legislative Decree 28/2011	Transposition of EU directive 2009/28/CE on the promotion of the use of renewable energy, replacing Directive 2001/77/CE and Directive 2003/30/UE
Decree Law 60/2013	Transposition of EU directive 2010/31/UE on energy performance of buildings
Interministerial Decree 26 June 2015	National guidelines for energy performance certification of buildings.
Legislative Decree 48/2020	Transposition of EU directive 2018/844, replacing Directive 2010/31/UE on energy performance of buildings and Directive 2012/27/UE on energy efficiency

6.3.2. Policy framework and opportunities for energy efficiency

Both nationally and regionally, the various programmes available have the objective to promote actions that seek energy saving and efficiency, as well as the use of renewable energy in facilities and buildings. Yet, there is not any specific programme available for SMS.

National Level

i. Current policies

Following are the national support programs and policies already implemented that may apply to SMS in order to promote the energy efficiency renovation in this sector:

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Table 28. Ecobonus/Superbonus

Ecobonus/Superbonus		***2013-ongoing***
National	*Agenzia delle Entrate (Revenue Agency)*	*Tax Incentives*

The Italian Government established in 2007 a national program of tax incentives for investments in energy efficiency of buildings. Since then, the program has been continuously updated and relaunched every year with minor or major changes to the type of investment and nature of beneficiaries that can benefit from the tax incentives up to its latest version published in July 2020.

The incentive consists of a tax credit equal to a percentage of the investment (from 50% up to 110%) that the beneficiary can use either:

- As a tax reduction over 10 years;
- As a transferable credit, that can be sold to the executor of works or to a bank or a financial intermediary.

The Ecobonus is one of the most widely used and effective incentives for the activation of energy efficiency investments in Italy, especially in the residential sector. In 2019, as reported in the following table, this mechanism allowed the implementation of about 318 thousand projects with investments for about 3.4 billion Euros.

Table 28.1 - Ecobonus results in 2019 for residential buildings

	N. of projects	**Investments [EUR mln]**	**Final energy savings [ToE]**
Global building renovation	2.429	218	5.800
Building insulation	175.047	2.033	61.500
Thermal solar panels	4.982	37	2.200
Heating equipment	132.537	985	33.700
Building automation	2.236	24	2.100
Common parts of condominiums	588	85	1.900
TOTAL	**317.819**	**3.383**	**105.500**

Source: ENEA - Ministry of Economic Development - Annual Report on Energy Efficiency (2020)

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Table 29. Conto Termico

Conto Termico 2.0		***2016-ongoing***
National	*Gestore dei Servizi Energetici (GSE)*	*Incentives*

The Conto Termico is a public incentive program first established in 2012, then updated and expanded in 2016, in order to facilitate investments in energy efficiency.

The Conto Termico provides incentives to increase energy efficiency of buildings and the production of renewable energy from small-sized plants. Private beneficiaries can obtain these incentives for investments in heat pumps, biomass boilers, solar thermal plants and hybrid heat pump systems.

The Program provides 700 mln Euros per year as grant for private beneficiaries and 200 mln Euros for Public Administrations to cover up to 65% of the investment cost, according to a series of technical requirements defined by the Decree.

Even though the total amount of available resources and the percentage covered by the grant is very attractive, the Conto Termico is still very underused (in 2019 only 30% of total cap was assigned to the private sector and only 26% to the public sector). Anyway, the yearly amount of assigned incentives has been constantly increasing since the beginning of the program. Up to July 2020, a total of 335.113 incentives requests have been worked out by the GSE.

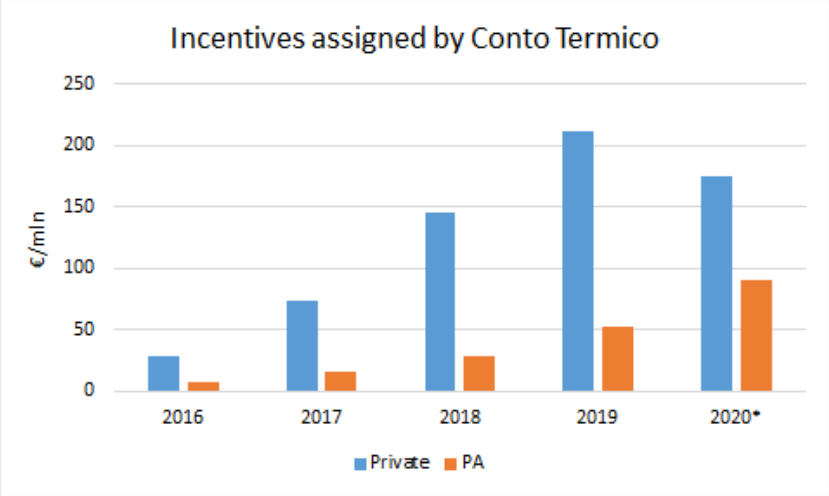

Table 30. Titoli di Efficienza Energetica

Titoli di Efficienza Energetica (White Certificates)		***2004-ongoing***
National	*Gestore dei Mercati Energetici (GME)*	*Incentives*

Titoli di Efficienza Energetica (TEE or White Certificates) are tradeable titles issued by the Manager of Energy Markets (GME - Gestore dei Mercati Energetici) to the subjects that achieved a certified amount of final energy saving in terms of Tons of Oil Equivalent (TOE).

Beneficiaries of the White Certificates can be:

- "obliged parties": a) electricity distributors who, at the date of 31 December of two years prior to the considered year of obligation have more than 50,000 final customers connected to their distribution network; b) natural gas distributors who, at the date of 31 December of two years prior to considered year of obligation have more than 50,000 final customers connected to their distribution network;
- companies controlled by obliged parties or controlling obliged parties, pursuant to art. 1, paragraph 34, of Law no. 239 of 2004 and subsequent amendments;
- electricity and natural gas distribution companies not subject to the obligation;'

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- public and private parties who/which, during the established period, are in possession of a certification in accordance with UNI CEI 11352, or have appointed a certified energy management expert in accordance with UNI CEI 11339 or are in possession of a certified energy management system in accordance with ISO 50001.

Once obtained, White Certificates can be sold either through the GME market platform or through bilateral contracts. Average market price for 1 TEE in the first semester of 2020 was about 260 Euros.

White Certificates are the main incentivisation program for energy efficiency in the industrial, infrastructure, services and transport sector, but can also apply to investments in other civil sectors.

In 2019, the GME issued 2.9 mln of TEE, equal to about 1 mln TOE of energy savings[6].

Table 31. Fondo Nazionale Efficienza Energetica

Fondo Nazionale Efficienza Energetica (National Energy Efficiency Fund)		***2017***
National	*Invitalia, on behalf of the Ministry of Economic Development and Ministry of Environment*	*Financing, Guarantee*
The National Energy Efficiency Fund is a joint initiative of the Ministry of Economic Development and the Ministry of Environment. Established in 2017 with an overall budget of 185 mln Euros, it provides subsidised financing and guarantees for private companies, ESCOs and Public Administrations. The fund can finance up to 70% of eligible costs for investments between 200,000 and 4,000,000 Euros at an interest rate of 0.25%, with a maximum duration of 15 years. The fund can also provide guarantee on financing (both for principal and interests) up to 80% of eligible costs for an amount between 150,000 and 2,000,000 Euros. As of April 2020, the Fund approved 17 projects, for a total investment of about 20 mln Euros and a direct financing from the Fund of over 11 mln Euros.		

Table 32. European Structural and Investment Funds

European Structural and Investment Funds, used for energy efficiency		***2007-2013 and 2014-2020***
National/Regional	*Resources managed and granted by the Regions*	*Grant*

European Structural and Investments Funds (ESIF) have been widely used to provide financing for the activation of new investments in energy efficiency, especially for the public/tertiary sector. Over the last two programming periods, as of the end of 2019, Italian Regions have granted about 890 mln Euros to over 2,000 energy efficiency projects, as shown in the following tables:

Table 32.1: ESIF for energy efficiency projects - Period 2007-2013

	N. of projects	**Payments granted [EUR mln]**
Public buildings/tertiary	736	309
Residential/Social housing	2	1

[6] *Source: GSE - Report on 2019 activities (2020)*

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Public lighting	246	53
Industry	629	45
Smart grids	38	111
Information campaigns	22	0.1
Urban transports	9	18
Railways	3	119
TOTAL	**1.685**	**657**

Table 32.2: ESIF for energy efficiency projects - Period 2014-2020 (as of end 2019)

	N. of projects	**Payments granted [EUR mln]**
Buildings and lighting	308	78
Local public transports	6	46
Railways	3	107
Smart grids	19	0.8
TOTAL	**336**	**232**

Source: ENEA - Minister of Economic Development - Annual Report on Energy Efficiency (2020)

i. Future policies

In the context of the energy and climate policy framework, the EU requires each Member State to prepare an Integrated National Energy and Climate Plan 2021-2030 (INECP). 'Energy efficiency first' is one of the core principles that has guided the preparation of this Plan.

Italy approved its INECP (PNIEC - Piano Nazionale Integrato per l'Energia e il Clima) in January 2020. The main objectives of the plan to be reached by 2030 are:

- 56% emission reduction in the large industry sector;
- 34.6% emission reduction in the service, transport and civil sectors;
- 30% share of renewable energy.

The Plan will be actually implemented through Decrees for the transposition of EU directives in the National regulation to be issued by the end of 2020. Regarding the tertiary sector, which includes commercial buildings, the Plan foresees the mobilization of approximately EUR 90 billion, as described in the following table:

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Table 33. Integrated National Energy and Climate Plan (INECP)

Energy efficiency in the tertiary sector (INECP)		*2020-2030*
National	*Minister of Economic Development*	*Legislative (INECP)*
Description: This measure aims to reduce the energy consumption and emissions in the tertiary sector, including buildings (public and private), through investments in energy efficiency. **Financial:** Mobilisation of approximately EUR 90 billion of investment. **Actions:** ● Increasing of energy efficiency of building ● High yield cogeneration ● District heating ● Renewable energy (mainly photovoltaic) **Main measure to achieve the targets:** ● White certificates; ● Ecobonus/Superbonus; ● Conto Termico; ● National Energy Efficiency Fund; ● Cohesion Policies (ERDF and Cohesion Funds)		

In addition to the already mentioned measures, one of the financing mechanisms that could help the achievement of the target is the European Regional Development Fund for the period 2021-2027.

Table 34. European Regional Development Fund 2021-2027

European Regional Development Fund 2021-2027 (POR-FESR)		*2021-2027*
Regional	*Regions*	*Incentives*
Description: The objective of the Fund is to help the development and cohesion of EU countries and regions. It mainly focuses on smart growth and green economy. **Financial:** EUR 27.4 billion assigned to Italy **Target sectors and eligible actions:** Every Region will draft an Operational Program containing the allocation of the budget among the different axis and the guidelines to assign the incentives. In previous periods (2007-2012 and 2013-2020), ERDF funds in Italy were widely used to finance energy efficiency projects, both in the private and public sectors. At the time of writing, the MFF 2021-2027 is still under definition, so it's not possible to make any further consideration.		

Eventually, the Next Generation EU program, with a total budget of EUR 750 billion, could also help boost the green growth and transition, by providing additional finance to the EU's budget.

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7. ENERGY EFFICIENCY IN THE SUPERMARKET SECTOR

This paragraph introduces the theme of energy and energy efficiency in the supermarket sector to complete the overview of the sector and to provide some initial data and information. A deeper analysis from the technical and technological point of view will be developed in Deliverable D2.1- ”Renovation Measure catalogue for Supermarkets”.

7.1 Energy consumption

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.

The highest energy consumption comes from cooling appliances which accounts for approximately 60% of the total energy cost ("Eficiencia Energética en Supermercados: Caso de Éxito SUPERSPAR", 2018). The refrigeration needs of the supermarket are mainly based on the refrigeration appliance and the various chambers that contain different products with variable temperature and humidity need depending on the case, taking into account the diversity of simultaneous cargo within a supermarket, namely: refrigeration for perishable products, positive in frozen chambers and heating for users and staff (Fenercom, 2013).

The main direct energy-consuming processes can be divided in:

- **Heating/air conditioning:** which includes both, ventilation systems and heating/air conditioning. The control of temperature inside the SMS normally involves between 25% and 40% of the consumption of the installation resulting from the use of heat pumps and chillers ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017) in which the energy dissipated in the interior by means of heat recovery can be used to save energy (Fenercom, 2013). Ventilation systems are needed to ensure air exchange which is mainly required for hygienic reasons. The ventilation systems that provide for a continuous inflow of fresh air are driven by powerful electric motors. Their power consumption will depend on the stores opening times and thus, will have regional variations (Retail forum for sustainability, 2009). Regional differences should be taken into consideration in heating/air conditioning, not only for the different climate temperatures but also because customer expectations regarding a pleasant shopping atmosphere may vary substantially from one region to another.
- **Food cooling and refrigeration systems:** the stringent requirements of European food law and the rising customer demand for convenience and fresh products call for extensive food refrigeration (Retail forum for sustainability, 2009). 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, as well as the over-dimensioning of the compressors, with variable temperatures and humidity according to

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the product that is going to be stored. The formation of cold for the display cabinets and the storage rooms is carried out with compression machines of high cooling power, some of them with double effect. On the other hand, preventive and corrective maintenance of these installations is fundamental for very important energy savings.

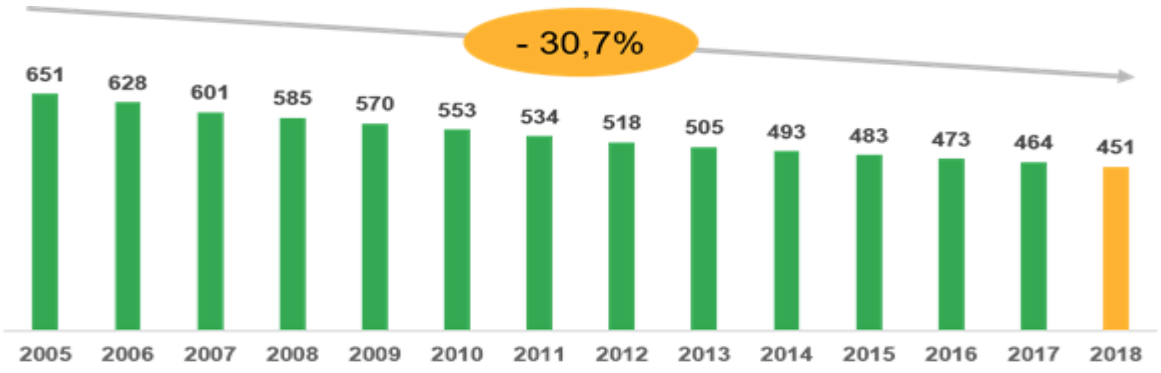
- **Lighting**: Lighting accounts for between 15% and 30% of the total consumption of the facility, which is found in ceilings, shelves and displays. It is in this area where the audits reveal that conventional fluorescent lamps with electromagnetic ballasts or projectors with a significant energy-saving path are still mostly used, although quite a few cases have been found where lighting has been recently renewed incorporating LED technology ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017).

These are average figures for the sector, hence these percentages will vary depending on each establishment and its characteristics. For example, for some supermarkets, the bakery area may be larger and consume more than the fish shop, or vice versa. Furthermore, the energy balance of commercial premises varies considerably depending on the climatic zone in which they are located. Thus, the values of potential energy savings for surfaces located in regions such as Asturias and Galicia are in the range 2-5%, while in Madrid, Catalonia or Aragon would be reached between 15-20%. ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017).

The specific consumption of SMS is highly variable, with a consumption range of 100 to 600 kWh/m2 per year. In these stores, the refrigerator is predominant, both in the number of installed equipment and in average installed power, which is normally above 1.7 kW.

In Italy, in recent years (2018 vs. 2017), the electricity consumption of a generic supermarket fell by 2.9%, from about 464 kWh/m2 to 451 kWh/m2. If all economic sectors had reduced electricity consumption by 30.7% in the period 2005-2018 (compared to the actual 2.6%), a further 25 million tons of CO2 would have been avoided with a saving of over 10 billion euros in 13 years, equal to the additional resources allocated for infrastructure in the 2020 Budget law for the period 2020-2022 (The European House - Ambrosetti, 2020).

Figure 9. Electricity consumption in a generic supermarket in Italy (kWh/m2), 2005-2018



Source: Sinloc elaboration with information from The European House - Ambrosetti, 2020

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The main drivers that contributed to energy savings were:

- LED lighting (adopted by 95% of stores)
- Valves to optimize the temperature in the refrigerated counters (adopted by 93% of retailers)
- Closing of doors on the road (adopted by 90% of points of sale)
- Closing horizontal and vertical refrigerated counters (adopted by 86% of stores)

The energy demand from commercial establishments in 2017 came mostly from electricity and gases, with the lowest demand coming from renewable sources that reached 0.1% of the total (IDAE, 2018).

In Italy, the distribution of fuel consumption in large-scale distribution is around 93% for electricity and 6% for gas; the remaining 1% consists of purchased heat. The 86% of electricity is divided into auxiliary services, i.e. all activities supporting the service provided (production of cold food at normal temperature and for the preservation of frozen and deep-frozen products; air conditioning and lighting of areas open to the public), while 14% on general services, that is all activities connected to those of sale whose needs are not strictly related to them (lighting and air conditioning of offices and warehouses; parking lighting; goods handling) (ENEA, 2019).

Figure 10. Distribution of fuel consumption in Italian GDO

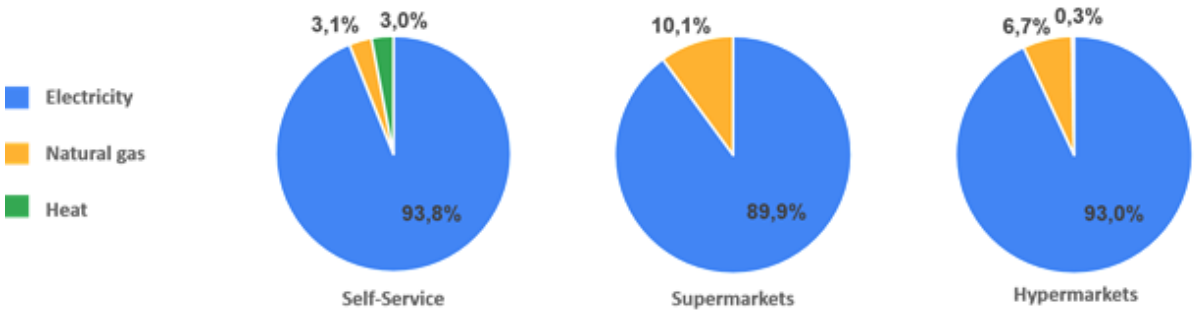
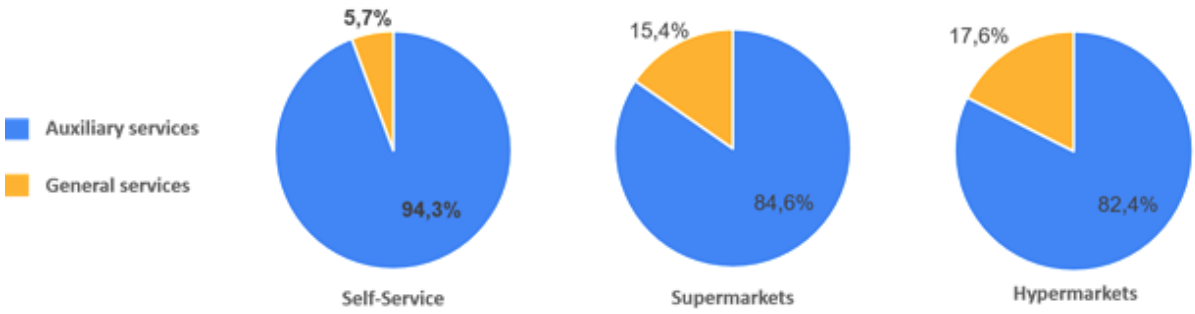


Figure 11. Distribution of electricity consumption between macro areas in Italian GDO



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Source: Sinloc elaboration with information from ENEA, 2019

7.2 Energy savings solutions

If we consider the high cost in energy (between 10% and 15% of their operational costs) that supermarkets have and the fact that the margins in the sector are not usually very high, implementing an energy efficiency plan in a supermarket is one of the best strategies to carry out ("Eficiencia Energética en Supermercados: Caso de Éxito SUPERSPAR", 2018).

As energy efficiency involves the development of different measures in various fields, SMS in Spain are focusing on the one hand, on improving the efficiency of the food retail stores while implementing measures in areas such as logistics by optimizing their routes and systems. According to a Creara study, the supermarket sector has a savings potential of up to 30% ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017). The efficiency values that supermarkets can achieve by implementing appropriate measures will depend on the type of installation in question and the climatic zone where it is located: commercial premises can achieve energy saving values of between 10 and 20%, while for warehouses and logistics centres the saving is between 5 and 10%. Furthermore, heating and cooling measures will have a greater impact in supermarkets in Andalusia than in other regions, as the energy consumption due to air conditioning is higher (range between 25-35%). To some extent, the geographic perspective also includes social and cultural aspects, which are relevant to the topic. As a matter of fact, shopping habits (opening hours, shopping frequency, diffusion of online shopping), food traditions (fresh vs frozen), average income, etc. influence the adoption of specific solutions and the resulting energy consumption (Minetto et al., 2016). There are many conventional solutions for energy saving. The Spanish Supermarket Energy Audit Guide includes (Fenercom, 2013):

- To have adequate insulation of the thermal enclosure.
- The use of refrigerators and freezers fitted with doors (open refrigerators consume 1.3 times more energy than refrigerators with door),
- Make a correct calculation of the thermal loads of the supermarket.
- Analyse the cooling needs of refrigerated furniture and chambers with different temperature and humidity requirements.
- Analyse the heating and cooling needs of users and staff.
- Air-conditioning the premises with cooling machines by compression or by a heat pump.
- To recover heat dissipated for other services. For example, for DHW.
- Plan the formation of ice at night using rate discrimination to air-condition the supermarket for much of the next day.
- Take advantage of free cooling in periods where the mornings are less hot to save energy. Also, to improve indoor air quality.
- Carry out adequate preventive and corrective maintenance.
- LED lighting
- Presence detectors and control of unoccupied areas.
- Programming of off and on, control of expenditure and peak and off-peak hours.
- The grouping of refrigerators and freezers in the same area of the establishment

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- The installation of speed changers in compressors of large cold generation equipment

Energy efficiency measures in air conditioning

With regard to the air conditioning of supermarkets, one of the most recommended measures is the disconnection of the electrical resistance of the air curtain to reduce energy consumption, maintaining the air supply to continue generating the barrier effect between the interior and exterior of the premises. This measure is very interesting because it results in great savings without the need for investment.

In many cases, the heat pumps used for air conditioning still have R-22 as a refrigerant which has been banned from being recharged since 2015. Replacing them with other permitted refrigerants is another recommended measure, although the investment is hardly justified by the profitability of the measure ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017).

Finally, another of the energy-saving measures recommended in certain cases is the installation of variable speed drives in the compressors of large refrigeration generation equipment for freezing and positive cooling. In general, it has been found that this equipment is designed for thermal jumps that do not usually occur except on a few occasions during the year due to weather factors. In this way, they are working 24 hours a day, 365 days a year, for weather conditions that do not occur at that time. This is where investment in variable speed drives allows for very interesting savings with very short simple payback periods ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017).

Energy efficiency measures in refrigeration equipment

In terms of refrigeration equipment, there are different solutions that allow to reduce space and installation costs, maintenance costs, as well as energy costs in the stores. In many cases, this is achieved with systems capable of finding in a single outdoor unit all the necessary temperature levels in an SMS: cold in medium and low temperature for keeping fresh and frozen food and conditioning the food retail stores. In addition, the equipment must have a compressor inverter system, so that it only consumes what is necessary to produce the required cold. leading to a saving of 30% of the total consumption (Asociación técnica española de climatización y refrigeración, 2012)

When installing equipment with environmentally friendly refrigerant gas, it is estimated that, concerning total CO2e emissions, the ratio of the emissions per m2 is reduced by 30%, emitting between 40-50 kg CO2e less per m2. By increasing energy efficiency, investing in new equipment and technologies to reduce consumption and increase control over it, as well as contracting energy from renewable sources, it can be reduced the CO2e emission ratio per m2 by 50%.

Energy efficiency measures in lighting

In Spain, most conventional fluorescent lamps with electromagnetic ballasts or projectors are still in use. For energy efficiency in lighting, LED is an opportunity to reduce energy consumption by approximately 25% compared to other technologies, which results in a reduction in economic costs. Its implementation plays an important role since good lighting of the displays makes natural colours stand out and the product displays a fresh and suggestive image, capturing the attention of customers

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and awakening and stimulating their interest. Moreover, according to the study presented by Creara ("Estudio sobre el potencial de ahorro energético de los supermercados", 2017), replacing this type of lighting with LEDs has proven to be cost-effective in SMS, with simple payback periods of less than three years.

The lighting optimisation normally is accompanied by luminaires that allow 100% use of the light produced, by using reflectors that direct the light towards the areas to be illuminated. Considering the costs related to the implementation of this measure, switching a halogen for LED costs around 15€, and if it is adjustable, the price can be raised to 32 €. If the SMS opts for the installation of LED panels to favour the lighting of specific products such as fresh ones, the price is around 50€ to 100€ per unit.

Other energy-related improvement measures

In addition to the three main areas identified as main responsible of supermarkets' energy consumptions, i.e. HVAC, products refrigeration and lighting, other potential improvement measures exist. These are mainly related with the overall energy management at supermarket level, to the optimization of energy supply and to the increase of energy efficiency of other devices in the site.

Indeed, 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.

On the other hand, 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. Specifically, this category includes the exploitation of solar energy with different technologies and final uses, micro-wind power plants, biomass, cogeneration/trigeneration, etc.

To conclude, the energy efficiency actions on "other areas" are related to any type of energy users not included in the three main categories, e.g. offices, warehouses' logistic equipment, lifts, etc. In this case the retrofitting actions are mainly related to the replacement of devices of components with new items characterized by a higher efficiency or allowing a better control of the service.

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8. BARRIERS AND RISKS ON THE ROAD TO ENERGY-EFFICIENT BUILDINGS

8.1. Introduction

After having assessed the policy framework and the opportunities available locally in the two target Countries, this paragraph aims at identifying in general the main barriers and risks that could prevent investments in this sector to be undertaken.

Barriers and risks may be of different nature: they may be objective, thus deriving from regulatory constraints or technological solutions, or in many cases subjective, thus depending on the awareness or knowledge of who needs to decide whether to invest in energy efficiency renovation of buildings.

This paragraph will highlight the most relevant barriers and risks that need to be taken into consideration for the development of new and innovative business models to trigger energy efficiency investments. This is not meant to be a full in-depth analysis of all barriers, but just a brief presentation of some of the topics that will be individually faced and addressed in other tasks about the development of the different business models.

8.2. Awareness barriers

Although efficient technologies are available, they continue to evolve and they are gaining higher market shares, there are still many subjects who are not aware of the different possibilities to increase energy efficiency and that there is a real possibility to apply those technologies on their buildings. The lack of awareness refers in particular to:

- the current situation of energy consumption, specially a comparison with a benchmark;
- availability of technology;
- availability of financial support (by banks, financial bodies or govt funding) or reward schemes for energy efficiency;
- availability innovative business models that could facilitate the renovation, reducing the up-front investment cost;
- possible financial savings from energy efficiency solutions;
- environmental benefit of energy efficient systems.

Awareness barriers exist in all sectors, but especially where there is also lack of knowledge (see following Par. 8.3), with a particular reference to the private homeowner's segment. This is one of the most important aspects to be taken into consideration for the development of innovative business models with the direct involvement of citizens in the energy renovation process, as will be further analysed in other reports within the Super-Heero project.

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The supermarket sector usually features well-structured companies, employing personnel specifically dedicated to the energy management of the stores, thus aware of the technical aspects related to the current energy consumption and potential energy savings. However, in some cases and in particular for the smaller or less structured companies, supermarkets may not be fully aware of the latest technologies as well as the availability of funding or innovative business models.

8.3. Knowledge barriers

Target groups involved in the choice and employment of efficient heating and cooling solutions often lack the necessary knowledge to operate in the best way. As technologies evolve towards more efficient solutions, system complexity increases, and interdisciplinary knowledge is required to fully understand the integration of subsystems and implication of specific choices on the final energy bill. Among the possible knowledge barriers, we can find:

- Lack of training programs
- Lack of experienced trainers
- Lack of free or low-priced educational material, easily available
- Lack of education material for different technical knowledge levels
- Lack of unbiased third-party data to compare alternative technologies. Need for a shared and repeatable methodology for comparing different systems under the same boundary conditions
- Lack of public services aimed at supporting investments decisions and helping building owners to approach energy efficiency renovation (such as one-stop-shops)

As already stated in paragraph 8.2. Awareness barriers, medium and large supermarkets usually employ qualified people to manage energy and related issues in their shops.

The different stakeholders which are considered to be trained about energy-efficient heating & cooling solutions include food retail chains and supermarket owners, system manufacturers and component suppliers HVAC&R, consulting, contracting, engineering staff, servicing, repair and maintenance staff.

In Italy, since 2014 all companies with energy consumption over 1.000 TOE/year are obliged to hire an Energy Manager. So, most supermarket chains which fit into the obligation threshold, can rely on a qualified and certified professional that can help them manage energy flows and plan new energy efficiency investments.

On the other side, small companies and private people need qualified external support in order to increase their knowledge about new technologies and the energy savings potential of new investments. This barrier makes it very difficult to make building owners understand the actual benefits (direct and indirect) that may come from an investment in energy efficiency. As a result, very few relevant projects are carried out on the private side in absence of public incentives and/or support services for the development and deployment of the projects.

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8.4. Social barriers

The social barrier is related to the bias of (some) target groups towards changes under multiple aspects, such as: technology, planning procedures, and collaboration necessary to implement energy efficient solutions. For instance, some planners may have concerns regarding new efficient technology, as they do not want to move from the technology they are very experienced in and which makes them very confident in achieving the final result.

Social barriers also imply the lack of trust between different actors of a typical investment process. Typically, private property owners have little trust towards Utilities/ESCo proposing them an energy efficiency renovation, mainly due to asymmetric information between the two stakeholders. Households may also have little trust towards financial institutions (banks), resulting in low willingness to get a mortgage to finance the investments in a traditional way.

This is one of the most relevant barriers that very often prevent relevant energy efficiency investments to be activated. This is particularly true for condominiums, where having several owners means higher difficulty to find an agreement on the investment.

In this sense, the involvement strategies of citizens/customers together with the innovative financing schemes that will be developed in the Super-Heero project will require to address and overcome this barrier through innovative solutions.

8.5. Organisational barriers

The organisational barrier refers to the relation between two or more stakeholders involved in planning or operation, which impede the uptake of more efficient heating and cooling solutions. This could be due not only to a general lack of awareness or knowledge about energy efficiency investments, as already mentioned in 8.2 and 8.3, but also to a lack of organizational skills to establish partnerships between stakeholders or willingness to experiment innovative business models. In the energy efficiency sector, many business models rely on cooperative schemes between different actors involved, such as:

- Energy Performance Contracts (EPCs): agreement between a property owner/tenant and an ESCo where the ESCo implements a project to deliver energy efficiency and uses the stream of income from the cost savings to repay the costs of the project, including the costs of the investment. This allows the property owner/tenant to have its building renovated without paying the up-front cost of the investment, but just continuing to pay the same amount (or little less) of money as the current bill cost for a certain period of time. EPCs have become quite a common and widely-used solution for energy efficiency investments in the public sector, but still struggle to take off in the private sector;
- Technology renting: agreement between a property owner/tenant of a building or manager of a business activity and a technology supplier to rent equipment and pay for its use. This is

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an innovative business model used for highly-technological equipment that needs specific maintenance/assistance during its life and is subject to frequent updates/upgrades due to technological evolution. This scheme is similar to leasing but usually does not involve a financial intermediary and there is a direct contract between the supplier and the user;

- Technology leasing: agreement between a property owner/tenant of a building or manager of a business (lessee), a leasing company (lessor) which buys the equipment and the technology supplier who sells the equipment to the lessor. The lessor becomes the owner of the equipment and leases it to the lessee for a certain period of time (generally a short- or medium-term) getting paid a periodical fee. At the end of the contract, the lessee has the option to buy-back the goods at an agreed upon price.

In any case, these schemes look more appropriate in a business-to-business logic, as private households or residential condominiums may have little interest or advantages compared to other specific schemes. Potential cooperation schemes based on EPCs will be assessed in Task 1.2 while for innovative cooperation schemes based on technology rent/leasing will be assessed in Task 1.3, also based on the technical analysis and involvement of technology providers in WP2 - Energy efficiency renovation actions for supermarkets.

The organisational barrier is also often related to conflicts of interests. Each stakeholder has their own interests, which may interfere with the interests of other stakeholders.

The main example is the situation where the stakeholder who pays for the investment cost is not the same who pays the energy bill. This is the case of rented apartments/buildings, for which the owner should be the one who invests for the renovation of its property, while the tenant is the one that benefits from the reduction of energy cost. In this situation, it's often difficult to find an agreement between the two stakeholders as, on one side, owners are not willing to invest without a proper and direct economic return while, on the other side, tenants won't invest a relevant amount of money on something they don't own and with payback period often longer than their rental period. This is one of the main reasons why it's difficult to renovate large condominiums where most of the inhabitants are tenants. To overcome this hurdle, some business models have been studied, trying to encourage owners and tenants to cooperate and to share energy savings in order to make the investment a win-win for both sides.

8.6. Legislative barriers

Although major parts of supermarket systems and subsystems are actually affected by relevant EU regulations in terms of environmental sustainability, there is a lack of legislation considering the supermarket system as a whole. There is no strong legislative incentive towards energy efficient supermarkets and neither against inefficient ones, except for some regional/national regulations. Regulatory standards can be a key driver for sustainability; however, cost increase related to standards is to be kept under control in order not to determine a loss of competitiveness. According to Forum

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for the Future (2009), in regions with stronger regulations, consumers feel safer and they are therefore less fierce in scrutinizing retailers' credentials.

From an operational point of view, the implementation of some energy efficiency investments could face some legislative barriers, mainly coming from local/regional/national constraints on the kind of viable measures. This is the case, for example, of the regulatory constraints on historical buildings (for which external wall insulation is not allowed) or landscape (especially in city centres).

This kind of boundaries may also affect supermarkets, especially small-sized shops located at the ground floor of multi-storey buildings in city centres. In these cases, in fact, it could be difficult to apply some energy efficiency measures that could easily be applied to single and stand-alone supermarket buildings, such as external wall insulation or photovoltaic panels on the roof. When evaluating an energy efficiency investment, it's always important to take into consideration these kinds of barriers that could limit the range of viable measures, increase investments costs and reduce achievable energy savings.

8.7. Risks related to energy efficiency in buildings

Besides all the barriers listed and described in previous paragraphs, which may also represent in general terms a risk of not even taking into consideration an energy efficiency investment, when it comes to evaluate an investment there are many risks that may affect the decision.

As all investments, also energy efficiency renovation of buildings bears typical risks, mainly related to the quality of renovation works and the actual technical and financial performance of the investment. According to EEFIG (2015), the main problems related to energy efficiency renovation of buildings are the lack of evidence on the performance of energy efficiency investments, that makes the benefits and the financial risk harder to assess, and the lack of commonly agreed procedures and standards for energy efficiency investment underwriting, that increase transaction costs.

For this reason, with the objective of providing a supporting tool for investors, the EEFIG developed an "underwriting toolkit" to help and assist investors to scale up the deployment of capital in energy efficiency. In addition, EEFIG developed the DEEP platform[7], an open-source initiative to up-scale energy efficiency investments in Europe through the improved sharing and transparent analysis of existing projects in Buildings and Industry.

Though the EEFIG initiative mainly targets financial institutions and their commitment to the energy efficiency sector, perception of risks and the need for data and instruments for a better evaluation is a common factor for all sectors involved. In this sense, many Horizon 2020 projects financed under

[7] https://deep.eefig.eu/

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the "Mainstreaming EE investments[8]" and "Innovative Financing[9]" topics focus on the development of methodologies, instruments and tools for the assessment and evaluation of technical and financial risks in energy efficiency[10] and applicable to various sectors.

The evaluation of risks of energy efficiency is not in the scope of the Super-Heero project, but risks will be taken into consideration to assess the viability of the innovative financing schemes that will be developed.

8 https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/lc-sc3-ee-10-2018-2019-2020

9 https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/lc-sc3-ee-9-2018-2019

10 See, for example, SEAF (www.seaf-h2020.eu), LAUNCH (www.launch2020.eu) and EENVEST (www.eenvest.eu).

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9. CONCLUSIONS

The European Union has set the basis to boost the energy renovation of buildings towards the challenging 2030 objectives. Many programs are available (Smart Finance for Smart Buildings, Horizon 2020, ELENA, etc.) and others are yet to come (Horizon Europe, Life, the new ERDF programming period 2021-2027, etc.) 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. The two pilot Countries, Italy and Spain, have already activated national and regional programs to boost the renovation process. Different kinds of incentives are available for energy efficiency renovation and many financial schemes have already been developed but still need further exploration and implementation in real practice.

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 this sense, 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/customers. As for the first aspect, the Super-Heero project will explore 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 will study innovative business models for the involvement of the customers.

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. As shown in paragraph 8, 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 will be mainly addressed by the innovative business models to be produced during the Super-Heero project.

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