



**POLICY BRIEF**

**Time for action towards a sustainable future: a policy brief for  
“Green Supermarkets”**

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## Abstract

**Context:** Climate change is considered to be the greatest threat to global public health. It affects our food and water sources, the air we breathe and the weather we experience. Climate change is equally harmful to supermarkets: 95% of the current food supply is at risk from climate change. As fewer products become available, costs will increase not only for consumers but also for purchasers. The European Green Deal functions as a secure foundation to create a business that is focused on the protection of the environment. The aim of this policy brief is to guide industry leaders on how to transform supermarkets to function in a more sustainable way and mitigate negative environmental impacts.

**Policy Options:** Three policy options are presented for discussion: reduction of food waste, reduce energy efficiency, reduce plastic packaging. Supermarkets are a major factor in climate change contributing to food waste, high energy use and plastic pollution, each with negative effects. We see an urgent need and opportunity for supermarket chains to act. These policy options are presented in conjunction to allow for maximum effect of action.

**Recommendations:** Supermarkets should reduce fossil fuel use in transport, storage, and delivery, incorporating sustainable design into practice. Landfill and food waste should be minimised by an improved supply chain management. Harmful packaging should be diminished or replaced by alternative materials providing customers with more sustainable options.

**Keywords:** *Climate change, European Green Deal, Energy waste, Food waste, Sustainability*

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## Introduction

Global greenhouse emissions output declined briefly because of COVID-19, but this is not sufficiently slowing down the process of climate change (Mcsweeney & Tandon, 2020). COVID has shown how quickly the climate began to recover from the damage done by human actions. We need to act immediately and start changing the design of key industries, such as supermarkets. Supermarkets are a focal point in society but are insufficiently maintained and contribute heavily to food waste, plastic consumption, and energy loss. Food production produces greenhouse gas emissions along the entire food supply chain, and those emissions are produced in vain if food is wasted (Scholz et al., 2015). By changing current practice, supermarkets will make a large difference in the fight against climate change, avoid carbon taxes newly proposed by the European Commission, and help to improve population health. With this policy brief, we want to guide the supermarkets and their managers towards a more sustainable way and mitigate negative environmental impacts, in line with the European Green Deal (2019). Supermarkets can act as drivers by serving as an example of best practice towards sustainability and lead the way for other supermarkets to act (Baig et al., 2020). Three areas of improvement will be outlined in this brief to inspire managers to become leaders who are committed to promoting affordable, environmentally friendly, and ethical food provisions. We aim to secure a safe and sustainable future. Climate change is defined as a long-term change in the average weather patterns that have come to define Earth’s local, regional, and global climates (Shaftel, n.d.). It is one of the major concerns in the 21<sup>st</sup> century and is considered the greatest threat to global health (Poursafa et al., 2015; World Health Organization, 2020a). Climate

change affects our food and water sources, the air we breathe and the weather we experience, increasing the frequency and intensity of heatwaves, droughts, and extreme rainfalls (Crimmins et al., 2016; Leonard, 2020). This presents challenges to agriculture and food security, impacting nutrition and human health. Climate change is due, in large part, to human activities. Known, avoidable, environmental risks cause about one-quarter of all deaths and disease burden worldwide, amounting to thirteen million deaths each year (World Health Organization, 2020b).

## Context

Climate change is defined as a long-term change in the average weather patterns that have come to define Earth’s local, regional, and global climates (Shaftel, n.d.). It is one of the major concerns in the 21<sup>st</sup> century and is considered the greatest threat to global health (Poursafa et al., 2015; World Health Organization, 2020a). Climate change affects our food and water sources, the air we breathe and the weather we experience, increasing the frequency and intensity of heatwaves, droughts, and extreme rainfall (Crimmins et al., 2016; Leonard, 2020). This presents challenges to agriculture and food security, impacting nutrition and human health. Climate change is due, in large part, to human activities. Known, avoidable, environmental risks cause about one-quarter of all deaths and disease burden worldwide, amounting to thirteen million deaths each year (World Health Organization, 2020b). Climate change is not only a serious threat to public health; it is also threatening the economy. Adverse impacts of climate change are already being felt across Europe. Extreme weather is causing economic losses for farmers and for the EU’s agriculture sector (European Environment Agency, 2019). Without

reducing greenhouse gas emissions – the primary cause of global warming – some of the most common food products will no longer be available or affordable (World Wide Fund for Nature, 2015). In fact, 95% of the food supply is at risk from climate change. Many regions will experience declines in crop and livestock production from increased heat (Hatfield et al., 2014). Moreover, climate change has driven up food prices by twenty per cent over the past decade. As fewer products will be available, the costs will increase not only for consumers but also for purchasers, with knock-on effects on customer satisfaction, store offering and market value (Carrington, 2018). A fifth of the food that is produced in Europe becomes waste (Condamine, 2020). If we continue without change, food prices and supply-chain instability will rise further (Carrington, 2018). Supermarkets are in a position to make a difference. If supermarkets take action against climate change, now they can solve these issues and protect their business. The Green Deal, resolved in 2019, intends to address climate change and environmental challenges by promoting climate neutrality and reducing carbon dioxide emissions by compensating for any remaining emissions, such as removing carbon from the atmosphere or supporting sustainable projects (European Commission, 2019; European Council & Council of the European Union, n. d.). Furthermore, the primary aims of the Green Deal are to promote citizen health and a resource-efficient economy while developing economic growth, sustainability and inclusiveness. The role of supermarkets in climate change is taken up in the European Green Deal through the ‘Farm to Fork’ strategy which includes the following steps: sustainable food production, sustainable food processing and distribution, sustainable food consumption, food loss and waste prevention. Additionally, the Green Deal aims to introduce carbon taxes in

alignment with climate objectives (European Commission, 2019). For this reason, developing a sustainable supermarket that reduces carbon dioxide emissions will also reduce long-term expenditures for supermarkets. The European Green Deal offers the window of opportunity to create a business that is supported both politically and economically. It gives an incentive to protect the environment without fear of economic loss. The European Green Deal functions, therefore, as a secure foundation to create a business that is focused on the protection of the environment. Conforming to this legislation provides supermarkets with the first steps of becoming sustainable. Energy, food waste, and plastic packaging have a high negative contribution to climate change. Large changes can be made in these areas, with low opportunity cost to supermarkets. This policy brief, therefore, focuses on these three important areas for change.

### **Policy Options**

Due to the complex nature of climate change, we are addressing several policy areas within this brief. These are energy efficiency, food waste, and packaging. These three sectors have the greatest opportunity to reduce environmental impact directly. Supermarkets are energy-intensive buildings due to the equipment necessary to preserve fresh food and the regulation of temperature for customers, but this energy use can be both sourced and managed more sustainably. Unnecessary food waste both pollutes and places strain on land use and can be managed through changes to supply management, and supermarket packaging can be rethought to reduce landfill contributions. Furthermore, supermarkets can contribute to the EU ‘Energy Roadmap 2050’, prioritising the implementation of energy efficiency measures and the reduction of emissions (Lopez-Menendez et al., 2014).

### *Energy efficiency in and outside supermarkets, and transport*

Providing sustainable energy as well as reducing energy consumption are key factors in tackling climate change (López-Menéndez et al., 2014). Improving energy efficiency is the cheapest and usually, the most immediate way to reduce greenhouse gas emissions that negatively impact health (Environmental and Energy Study Institute, n.d.). There are great opportunities for efficiency improvements in supermarkets. Merely by adjusting the current energy consumption to specifically fit customer's needs, up to fifteen per cent can be reduced without a need for capital investment (Zhang et al., 2014). First, improvements can be achieved in refrigeration systems and heating, ventilation, and air conditioning systems (HVAC). Supermarkets are energy-intensive buildings because of the equipment necessary to keep food fresh and temperature regulated. The largest consumption of energy inside supermarkets occurs in HVAC and lighting (Timmer et al., 2016). By reducing the relative humidity in the supermarket by as little as 5%, the total store energy load can be reduced by 4.84%, leading to significant energy and cost savings (Bahman et al., 2012). Secondly, an energy management system can help to identify failures in a timely manner and help to reduce excessive energy consumption (Timmer et al., 2016). Moreover, solar panels as a renewable energy source have elicited the most positive attention because of their low pollution and the endless supply of solar energy. They represent an important energy source for a supermarket (Qi & Zhang, 2017). Transport is another area to reduce energy as it accounts for a quarter of the greenhouse gas emissions in Europe. To achieve climate neutrality by 2050, 90% of the transport emissions must be avoided (European Commission, 2019). Transport from the food production site to the final supermarket can include road, rail, aviation,

and waterborne transport (European Commission, 2019), which must all be considered when aiming to reduce CO<sub>2</sub>. A shift to local produce or shorter supply chains strengthens the economy through supporting local farmers but also decreases transport emissions which contribute to air pollution. Reducing the weight of the products through intelligent packaging also contributes to the reduction of greenhouse gases. Energy-efficient vehicles such as plug-in hybrids and fully electric vehicles generates fewer emissions and could be incorporated into current practise (Environmental and Energy Study Institute, n.d.). As stated in the European Green Deal, the construction of new buildings requires a large amount of energy. Therefore, the renovation of energy-inefficient buildings should be a priority (European Commission, 2019). Changes in existing buildings can be made to reduce energy usage and costs. These may include small actions, such as choosing LED light bulbs and energy-efficient technologies, or greater efforts such as upgrading insulation and weatherization (Environmental and Energy Study Institute, n.d.).

### *Food waste*

Food waste is defined as the avoidable or unavoidable waste of food items intended for consumption. Food waste occurs at different stages in the production chain and results from decisions and actions by retailers, food service providers and consumers (Food and Agriculture Organization of the United Nations, n. d.; Tonini et al., 2018). Twenty per cent of all the food that is produced in Europe becomes waste (Condamine, 2020). With the population projected to increase to nine billion by 2050, it is urgent to reduce food waste and promote sustainability in order to preserve land use and food supply (Bond et al., 2013). Additionally, reducing food waste is one of the cheapest options for supermarkets to become more sustainable.

Supermarkets, who are or would be affected by this in the future, have the interest to contribute as little as possible to climate change and use the available food in the best possible way. This section addresses two policy options for combating food waste within supermarkets: supply chain management and cosmetic standards.

#### *Chain management*

The agricultural sector, the food processing industry and the distribution sectors are connected through the food supply-chain (Deloitte, n.d.). The supply-chain includes food production, processing, distribution, consumption, and disposal (European Union., 2017). To achieve a sustainable food supply chain within a supermarket, the following options need to be considered (Baig et al., 2020). High levels of waste are present in the food, water, packaging, and energy sectors (Bond et al., 2013). There is a lack of awareness regarding the economic costs of food waste within the food production process (Bond et al., 2013). More importantly, within food supply-chains food waste is normalized and seen as collateral damage. These costs can be eliminated through management practices which consider consumer's expectations and act to make a difference (Mena & Whitehead, 2008). Supermarkets need to focus on improving their sustainability by enhancing the impact of supply-chain management within this process (Bond et al., 2013).

Whenever the supply-chain management applies adaptable forecasting methods, they are able to predict food demands and adjust the number of orders, preventing food waste and land strain through overproduction. More adaptable forecasting methods will eventually lead to saving costs. The consumer plays a key role in forecasting production. When the consumer makes sustainable demands, this leads to a supply of

sustainable products and a sustainable food-supply chain (Welch et al., 2018).

#### *Cosmetic Standards*

Cosmetic food standards regulate the appearance, weight, and colour of food items, setting a 'standard' that is not limited to the nutritional quality or food safety (de Hooge et al., 2018). Current, strict cosmetic standards that streamline attractive products to customers contribute to food waste further down the supply chain by limiting the amount of edible produce that reaches stores. Rejected produce cannot enter the market as readily, often being ploughed back into the ground, used as animal feed, or simply wasted (de Hooge et al., 2018). This promotes food insecurity through increased yield demand on farmers and arable land. Rejection can affect up to 40% of total yields (Bond et al., 2013). Customers are shown to have become more willing to accept 'ugly' products due to growing concern for the environment (Bond et al., 2013). With a shift in a consumer mentality and greater climate awareness occurring, an adaptation of the cosmetic limitations of saleable produce may increase consumer satisfaction and the brand image of retailers. Relaxing cosmetic standards also offers the opportunity to provide consumers with cheaper options, compared to products with higher aesthetic ratings. By utilising the full extent of edible food produced, supermarkets are able to reduce food waste and increase the amount of food on offer to their customers, often with a lower associated cost. This has the added benefit of making healthy and high-quality foods more affordable and helps people with a lower socioeconomic status, reducing nutritional poverty.

#### *Packaging*

Food packaging intends to preserve nutrition and shield commodities from external

degradation factors. Glass, metal, paper, and plastic are substances that are mostly utilized to produce packaging (Marsh & Bugusu, 2007). Constancy, adaptability, and cost-effectiveness are some of the characteristics that qualify plastic as one of the most popular raw materials in the manufacturing industry (Napper et al., 2020). Research has shown that the weight of the products and thus the manufacturing costs would quadruple if the industry were to use materials other than plastic and double energy use (Association of Plastics Manufacturers in Europe, 2001). However, extensive utilization of plastic generates crucial ecological issues, such as waterway pollution. Between five to thirteen tons of plastics leak into the oceans annually, contaminating our planet (Wijngaard et al., 2020; Rhein & Schmid, 2020). In 2020, 330 million tonnes of plastic packaging was used, a significant proportion of which is non-recyclable and single-use (Napper et al., 2020; Hatzidakis & Ioannidou, 2018; Rhein & Schmid, 2020). Universally 84% of packaging waste is not recycled (Hatzidakis & Ioannidou, 2018). The recycling industry cannot process current plastic volumes. Much of this packaging uses mixed materials or coloured plastics that cannot be easily separated and are not easily recycled (Association of Plastics Manufacturers in Europe, 2001). Packaging which is manufactured from blended materials offsets the ecological benefit of recycling due to the immense demands of energy needed. Instead of relying on recycling alone to solve the problem, supermarkets need to reduce the amount of plastic that is used and shift to alternatives where this is not possible. Removal of unnecessary packaging and adoption of cardboard, clear recyclable plastics, and food-safe bio-plastics such as PLA will reduce the amount of packaging sent to landfill and help to reduce the impacts of the food industry (van den Oever et al., 2017).

## Recommendations

From the policy options discussed above, the following six recommendations are suggested. These recommendations are proposed on the basis that they promote a sustainable future in line with the vision of the European Green Deal, providing guidance for action and considering the economic concerns of stakeholders.

### Energy

- *Measures to reduce energy wastage and greenhouse gas emissions should be implemented in all retail and corporate spaces and phase out the use of fossil fuels in transport, storage, and delivery:*

Use of solar or wind energy and sustainable refrigeration, heating, and lighting systems. Integrate an energy management system. A focus on the redesign of existing heating, refrigeration, and lighting systems should be made a priority as this is a primary source of energy and cost inefficiency with great scope for improvement, e.g., adapted defrosting and lighting control technologies like energy management systems to save energy. Switch to electric vehicles and local delivery services and fuel-free options such as bikes. Maximize the efficiency of transport through better utilization of container space.

- *Incorporate sustainable design practices into the design, construction and maintenance of all new retail and corporate spaces.*

Include heat recovery systems in design and place fruits or vegetables next to cooling areas (Kauko et al., 2016). Use stand-alone supermarkets with optimal size, shape, and proper insulation for the highest energy efficiency. Avoid many windows and, if

practical, introduce solar panels. Heat recovery (from refrigeration) is the most energy-efficient method (Karampour et al., 2016) as it can cover a great share of the heating demand. The size, shape, and insulation of a supermarket are critical for the highest possible energy efficiency.

#### Food Waste and Supply Chain Management

- *Reduce store contributions to landfill and food wastage at all levels of the supply chain.*

Supermarket chains should monitor and order more wisely. Adaptable ordering and control systems increase the accuracy of demand forecasting and reduce unnecessary waste. Supermarkets should invest in Artificial Intelligence and more sophisticated monitoring algorithms. Furthermore, unsold food still fit for human consumption should be donated to homeless shelters, and food banks to reduce hunger and landfill contributions. Adopting food donation schemes also has the benefit of positive publicity at negligible cost. For example, in the Netherlands arrangements can be made with ‘Leger des Heils’ to pick up food that is still fit for human consumption that would end up in trash otherwise.

- *Invest in sustainable supply chain management and abolish cosmetic standards of fresh products.*

Supermarkets should invest in sustainable methods and adopt shorter supply chains. Retailers have bargaining power within the supply chain and should engage suppliers through the promotion of sustainable practices, such as promoting organic and sustainably sourced products and adopting proceeds schemes where a portion of the profit is invested in the local agricultural infrastructure. Nutrition and sustainable

practices should be considered over aesthetic ideals. ‘Ugly’ fruit and vegetable options should be made available to maximize usable product and decrease pressure on production systems.

#### Packaging

- *Promote a culture of minimizing unnecessary packaging materials and diminish plastic consumption.*

Although packaging, in general, prolongs the life span of products, the food industry and supermarkets should focus on more sustainable solutions. Many products are packaged deliberately and for cosmetic reasons. Supermarkets should implement a strategy of essential packaging; in other words, products should be packaged for utility reasons with the most eco-friendly material and not for commercial aims.

- *Give clients greener options! Educate customers and sensitize them to the results of extensive waste, especially regarding plastic waste footprint to our planet.*

Give information and tips for proper recycling procedures in supermarkets. Most plastic waste is unable to be recycled due to inappropriate disposal. Supermarkets should ensure that all packaging materials are clearly labelled by type, giving information on recycling options. Providing recycling waste containers in store for plastics that are not collected kerbside, with clear instructions to customers specified through signs and digital media.

#### Conclusions

We need industry leaders who are committed to a sustainable future. The effects of climate change are now visible across Europe with



the action proposed through the European Green Deal to introduce carbon taxes and other measures. If retailers implement ambitious “green” measures, now, they will stay ahead of change and ahead of their competitors. Supermarkets and shareholders that promote the sustainable practice and act on climate change are better situated to serve and retain customers, today and in the long run. Taking action now will not only protect the health of the citizens but will contribute to creating a viable future in a changing world.

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