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Public and private sector catering in France and in UK: an overview of current knowledge on the obstacles and levers to reducing the environmental footprint of meals

Cool Food Pro Literature Review - Deliverable T1.1.1

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With the participation of the COOL FOOD PRO partners

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INTRODUCTION

This deliverable produced as part of the Interreg Cool Food Pro project aims to review the main challenges of sustainable food and the role of public and private sector catering in the transition of current food systems. It also highlights the main levers for action which should be used as a priority.

For the purpose of comparison, each of the points discussed will be considered from the perspective of France and the United Kingdom. However, the exercise is limited to the information available to us. As the Food Foundation report (Hughes et al., 2021) points out, a lack of transparent data within the UK food industry is currently hindering progress towards healthy, just and sustainable food systems. Despite some missing data, we will try to draw a portrait of the current situation in terms of sustainable food in these two countries, and more specifically in the catering sector, highlighting their main commonalities and differences.

SUSTAINABLE FOOD: CROSSCUTTING ISSUES

According to Ademe (2016a) the world's population will be 9.5 billion in 2050 (compared to 7.3 billion in 2015). Urbanisation (70% of urban dwellers in 2050), globalisation and higher standards of living have changed food habits, leading to more processed food, more meals taken out of home, more animal products, fats and sugars. This upward trend concerns all categories of food: the demand for plant-based products rose by 180% between 1961 and 2006 and is expected to continue to rise by more than 50% by 2050. Given the increase in global food requirements and the current limits of our ecosystem, food has become a major public issue with potential consequences on environmental, health and socio-economic balances.

- **1. ENVIRONMENTAL ISSUES**

Although the environmental impacts of food are spread across the whole supply chain, agricultural production concentrates most of them. The increase in the population to be fed and the change in the composition of meals are inevitably leading to a sharp rise in global food demand, and agriculture has had to adapt to meet this demand. Higher yields, improved logistical support and food security as well as the development of the agri-food business and

food distribution systems are putting increasing pressure on resources and the environment. The impacts of food production on soil, biodiversity, air and water are presented below.

- **1.1 Impact on soil**

Soil plays a key role in the water cycle, regulates mineral flows and pollutants (including nitrates and pesticides) and provides essential biological habitats. Due to its many functions, it is now recognised as an essential determinant of food quality and is part of the “natural capital” to be preserved (Sautereau and Benoit, 2016).

Agriculture accounts for the main share of human use of land. In 1999, pasture and crops already took up 37% of the earth's land area (Harrison, 2001). This resource is exposed to different types of physical (erosion, desertification, compacting), chemical and biological degradation that can be aggravated by land uses (deforestation, excessive grazing, cultivation practices, elimination of vegetation cover and/or hedges, etc.). Bai et al. (2008) estimate that 24% of the world's soils are degraded to various degrees, of which nearly half are agricultural. Among the physical degradations, the Institut de l’Agriculture et de l’Alimentation Biologique estimated that nearly 20% of French soils were at significant risk of erosion in 2016 and that any regular loss of soil of more than one tonne per hectare per year could be considered irreversible for a period of 50 to 100 years (Sautereau and Benoit, 2016). In 2018, the Service de la donnée et des études statistiques (Parisse, 2018) estimated water erosion at 1.5 tonnes per hectare per year (t/ha/yr) on average in France, with strong spatial heterogeneity. Brittany in particular has a higher risk of soil loss. Even today, water erosion contributes to phosphorus inputs into freshwater. In the UK, water is also the main source of erosion. 17% of the country's arable land is showing signs of erosion and 40% is considered at risk (Graves et al., 2015). Each year, 2.9 million tonnes of arable land are eroded.

Degradation can also be observed at the chemical level. Food production is said to be responsible for about one third of soil acidification and about 78% of eutrophication (Bouwman et al., 2002). Eutrophication, which can contaminate soils, is due to the accumulation of nitrogen and phosphorus. Nitrogen inputs may be organic or mineral. In France, inputs of organic nitrogen amounted to 62 kg per ha in 2015, while mineral inputs were around 77 kg per ha (Parisse, 2018). In 2014 in the EU28, the gross nutrient balance for nitrogen was estimated at 47 kg per ha of utilised agricultural area (UAA), and that of France at 45 kg per ha of UAA.

About 15% of forest soils in England and Wales are nitrogen saturated (Kennedy, 2002). Surplus nitrogen and phosphorus contributing to river or groundwater pollution are nevertheless decreasing in the EU (Parisse, 2018). In arid and semi-arid areas, between 10 and 50% of irrigated land is also affected by salinisation due to inadequate drainage (Harrison, 2001). This can cause yield reductions of 10-25% or, in severe cases, prevent cultivation altogether. Globally, the Food and Agriculture Organisation of the United Nations (FAO) estimates that 3% of the world's agricultural land is affected.

The quality of soils is also impacted by human exploitation of the land and notably the use of pesticides. France is the largest market for agricultural pesticides in Europe, followed by Germany, Spain, Italy and the UK (BASIC, 2021). Bureau et al. (2015) note a sharp decline in organic matter in the main arable crop regions, which is reflected in numerous changes in biodiversity, a point which we will discuss in the next section.

○ 1.2 Impact on biodiversity

Agriculture, forestry and fisheries are the most significant of human pressures on the biodiversity of land and sea according to the FAO (Harrison, 2001). The reduction in the overall area available for wildlife and the use of pesticides and herbicides directly destroy many insects and unwanted plants, thereby reducing food supplies for many animals. Some of the affected life forms, however, may be important soil nutrient recyclers or predators of pests, while others are potentially a major source of genetic material for improving domesticated crops and livestock.

Because of their position in the trophic chain, birds are considered good indicators of the state of biodiversity. The data collected by the STOC programme (Temporal Monitoring of Common Birds) show a uniformity of bird fauna with a decline in so-called “specialist” species in favour of generalists. In France, bird species specialising in agricultural environments have declined by 30% in 20 years (Parisse, 2018). At the European level, they decreased by almost a third between 1990 and 2014, with no recovery trend observed.

Studies also highlight the effect of pesticide use on bee mortality and reduced pollination (Woodcock et al., 2017). In some regions, three quarters of flying insects have disappeared (Hallmann, 2017). Among the chemical pesticides most commonly used to control insect pests

of crops and animals, neonicotinoids appear to affect a wide range of non-target invertebrates in terrestrial and aquatic habitats (Van der Sluijs et al., 2015).

○ 1.3 Impact on air

In France, the food system is currently responsible for a quarter of greenhouse gas (GHG) emissions (163 MtCO₂eq¹, i.e. 24% of the carbon footprint of French households) according to Ademe (Barbier et al., 2019). The British food system's contribution to GHG emissions is higher and is estimated at 35% (WRAP, 2021a).

In France, agricultural production is responsible for two thirds of these emissions. 44% are methane emissions from livestock. 34% are carbon protoxide emissions generated by the manufacture and use of nitrogen fertilisers. The remaining 22% are CO₂ emissions resulting from direct (equipment and buildings) and indirect (fertilisers, plant protection products, equipment manufacturing and building construction) energy use.

Forest fires set to clear forests and burn pastures and crop residues are also a source of atmospheric pollutants (nitrous oxide and smoke) and are thought to be responsible for around 90% of biomass combustion. Agriculture is also the main source of ammonia emissions (98% in 2015). 65% of these emissions come from livestock farming. In addition to polluting the air, they also cause acid rain that damages trees, acidifies soils, lakes and rivers, and harms biodiversity (Parisse, 2018). The meat component of food and agricultural practices are therefore largely responsible for the resulting carbon footprint and air pollution.

According to Ademe, the second largest source of GHG emissions is the transport sector. Transport of food by professionals and households accounts for 19% of the food carbon footprint (i.e. 30 MtCO₂eq), a large part of which is due to road transport (23 MtCO₂eq). While 43% of emissions concern domestic products, 57% come from imported products. Relocation is therefore a major issue.

Finally, the distribution of food products and the preparation of meals (at home and out of home) equally account for 9% of the carbon footprint. Food services to educational establishments, hospitals and old people's homes account for 13% of the tertiary sector's

¹ MtCO₂eq : million tonnes of CO₂ equivalent

emissions. One meal in seven is eaten out of home and is reported to emit almost twice as many emissions as a meal taken at home.

In the UK, agricultural production is responsible for about 30% of food-related emissions, of which 62% is emitted by livestock and only 1.26% by fertiliser production (WRAP, 2021a). One of the most important sources of emissions is food waste, at 23%. 10% of emissions are due to imported deforestation. Far behind, transport of food by professionals and households generates almost 8%.

○ 1.4 Impact on water

In France, 15 to 20% of renewable freshwater is withdrawn annually for drinking water and other economic activities (Ministère de la transition écologique, 2018): agriculture, industry, recreation, cooling of power plants. Withdrawals for agricultural uses amounted to 2.7 billion m³ in 2012 (Parisse, 2018). 80% of these withdrawals are for irrigation. In the UK, 2008 estimates put the internal water footprint of agricultural products at 28.4 billion m³ (Chapagain and Orr, 2008). Comparatively, the EU28 consumed nearly 40 billion m³ of water in 2010 (nearly 4,000 m³/irrigated ha). Projections for developing countries also suggest a 14% increase in water withdrawals for irrigation by 2030, which will leave one in five developing countries facing water shortages (Barbier et al., 2019).

Water is essential for human life and activities, but this renewable resource is not unalterable. With the need to increase agricultural yields to meet the growing demand for food, the use of pesticides, and more particularly herbicides, has increased in recent decades (Barbier et al., 2019). However, watercourses are extremely vulnerable to soil contamination from this use. In 2014, 90% of French waterways showed the presence of at least one pesticide, while 63% exceeded the drinking water standard (of 0.1 µg/l) (Parisse, 2018). That same year, 266 active substances from plant protection products were found at least once in groundwater, which is not surprising when one considers that 31% of the national territory exceeds the limits for pesticide use, or uses unauthorised substances (atrazine, simazine, metolachlor and alachlor for the most widely used).

Between 2007 and 2015, 11% of drinking water abstraction points in France (i.e. 573) were abandoned due to non-compliance with nitrate limits (44%), pesticide limits (31%), or both

(25%) (Parisse, 2018). In 2015, 950,000 people were supplied with water exceeding the quality limits for pesticides (i.e. 1.4% of the population) and around 460,000 inhabitants (i.e. 0.7% of the population) were exposed at least once to water exceeding the limit for nitrates (50 mg/l).

In the sea and in rivers, nitrogen and nitrate inputs mainly from agriculture lead to eutrophication phenomena characterized by the excessive development of microalgae or green algae (Parisse, 2018). The toxins produced can be dangerous for wildlife, but also for humans (in the form of food poisoning). France is the European country most affected by this, with 894 events recorded between 1980 and 2015.

- **2. OTHER ISSUES**

Although food production considerably transforms the environment, eating habits also have consequences that should be taken into account. A survey conducted by Inserm in 2017 showed that respondents who follow the 2017 nutritional recommendations reduce the overall environmental impact of their food consumption by half (Kesse-Guyot et al., 2020). Following these recommendations would also prevent 35,000 premature deaths, mainly related to cardiovascular diseases. Sustainable food has therefore an impact on the environment and on health and should be accessible to all. However, deep inequalities still exist, with nutrition as a major social marker.

- **2.1 Health issues**

Besides its impact on the environment, which can have repercussions on human beings, food plays a major role in preserving a good state of health. However, when inadequate, it can become a risk factor for a number of chronic diseases: obesity, cardiovascular diseases, cancers, type-2 diabetes and malnutrition. These chronic diseases represent the leading cause of mortality worldwide, as highlighted by Santé Publique France (2017). The World Health Organisation (WHO) (*in. Santé Publique France, 2017*) estimates that 25.2% of total mortality worldwide is attributable to a combination of nutrition-related risk factors: high blood pressure (16.8%), overweight and obesity (8.4%), physical inactivity (7.7%), high blood sugar level (7%), high cholesterol (5.8%) and low intake of fruit and vegetables (2.5%).

According to the latest WHO estimates (2020), 39% of adults aged 18 years and over are overweight and 13% are obese. These problems also affected 340 million young people aged 5-19 in 2016 and 38 million children under the age of 5 in 2019. The global population suffering from obesity has almost tripled since 1975. In France, the latest Santé Publique France census (2017) estimates the prevalence of overweight and obesity in adults at 49% and 17% respectively, compared with 17% and 4% in children aged 6 to 17. UK has one of the highest rates of obesity in the world. One in three people fall into this category according to the OECD (Organisation for Economic Co-operation and Development, 2019), compared to one in five in France. Overweight and obesity are no longer the preserve of high-income countries. In Africa, the number of children concerned has increased by almost 24% since 2000, while almost half of all overweight and obese children under 5 years of age lived in Asia in 2019.

It is also not uncommon for obesity and malnutrition to coexist within the same country. In France, the Esteban survey (Santé Publique France, 2017) revealed that 3.2% of adults and 12.9% of children were underweight. The prevalence of malnutrition varies among the elderly depending on whether the person lives at home (4%), in an institution (15-38%) or in a hospital (50-60%) (Pitard and Gabach, 2020).

Generally linked to obesity, type 2 diabetes also continues to increase. This is due to the fact that salt and sugar consumption is too high, while fruit and vegetables, which are sources of fibre, remain too low in diets. In industrialised countries, focussing public action on nutrition could also prevent more than 65% of upper aerodigestive tract cancers, 50% of colorectal cancers, and 45% of cervical cancers (Ancellin et al., 2015; Marmot et al., 2007 In Santé Publique France, 2017). Reducing salt consumption would reduce the incidence of strokes by 24% and the rate of cardiovascular diseases by 18% according to WHO (2011). A study conducted by Inserm (Deschasaux et al., 2020) shows that the consumption of food with a lower nutritional quality score (Nutri-Score) is associated with increased mortality. More generally, the Haut Conseil de la Santé Publique (2017) recommends eating nuts and legumes, as well as limiting the intake of animal proteins (especially from cooked meats).

Beyond the “nutrition” aspects, Inserm (2018) points to the emergence of new health concerns related to the increased consumption of ultra-processed food (1/3 of products consumed in France) containing a large number of additives (nearly 350 are authorised in the EU) whose effects on human beings remain little studied. Research carried out by the institute suggests that

their consumption could be associated with an increased risk of cancer. The presence of pesticides in food is also of concern and correlations between occupational exposure to these substances and health risks have been reported. The results of the BioNutriNet study support this idea by suggesting that a high consumption of organically produced food would reduce the risk of cancer (Baudry et al., 2015). The Haut Conseil de la Santé Publique (2017) also recommends varying the species and sourcing of fish and seafood to limit exposure to contaminants.

○ 2.2 Social issues

According to the French Ministry of Solidarity and Health (Ministère des solidarités et de la santé, 2019a), the children of French workers are four times more affected by obesity (16% are overweight and 6% are obese) than the children of French executives (7% and 1% respectively). This phenomenon continues to increase among the most underprivileged, while it decreases among the most affluent. Similarly, children living in deprived areas of England are twice as likely to be obese (Baker, 2022). Beyond the socio-professional category, the prevalence of overweight (including obesity) is also observed among the least qualified categories of individuals (Santé Publique France, 2017). In England, disability (+11%), ethnicity and education (+12% for those with no qualifications) also determine overweight (Baker, 2022). Some local authorities such as Halton (78.3% overweight adults on average), or Sandwell and Bolsover are also more likely to have overweight individuals than others such as Hammersmith & Fulham (41.6%), Westminster (44%) or Kensington and Chelsea (44.1%).

In its fourth National Nutrition and Health Programme (Ministère des solidarités et de la santé, 2019b) and its state of knowledge (Ministère des solidarités et de la santé, 2019c), the French Ministry for Solidarity and Health highlights the role of socio-economic status and, more specifically, of educational attainment in disparities in food consumption. The consumption of fruit and vegetables or fish is higher in populations with a high socio-economic status, whereas fat, cooked meats and sweet products are more present in the diets of those with a lower status. The report by the Agence nationale de sécurité sanitaire de l'alimentation, de l'environnement et du travail (Anses, 2012) shows a lower quality of nutritional intake among children and adolescents from disadvantaged backgrounds, but also points to the fact that, at equivalent income levels, nutritional quality increases with the parents' educational attainment. It would therefore seem that the least educated or well-off households have a less adapted diet and in

smaller quantities, since the daily ration is also positively associated with educational attainment in adults (Anses, 2017).

This is confirmed by purchasing behaviour. Nutritious foods are more expensive than energetic foods and poverty therefore limits access to healthy products. The Food and Agriculture Organisation of the United Nations (FAO) and the World Health Organisation (WHO) point out that, *“insofar as ‘easy to cook’ foods reduce effort or save water or fuel, affordability and convenience remain important considerations in economic access to nutritious foods by low-income groups worldwide”* (FAO and WHO, 2020). Given their more favourable situation, individuals in managerial positions or with a high level of education (4 years of higher education or more), for example, give greater priority to quality (origin, production method, quality signs or nutritional composition), in contrast to workers, employees, or those with primary or secondary educational attainment, whose priority is price, brand or promotional offers (Anses, 2017). The former preferably buy from markets, local producers or local shops (+20 points), while the latter prefer supermarkets (-20 points).

This discrepancy can also be observed in terms of the products consumed. An individual in a managerial position or with at least an A-level qualification consumes twice as many organic products as a worker who dropped out of secondary school. The same trend is reflected in children. Depending on their socio-economic and socio-demographic background, individuals, notably in France, are not all equal when it comes to food. More generally, we note that the proportion of the budget devoted to food has fallen among the poorest households (28% in 1979 vs. 19% in 2012), while it has remained stable for the most affluent families (14%) (Laisney, 2013). In France as in England, socio-demographic differences (educational attainment, professional status, income) are a determining factor for the practice of healthy eating (d'Angelo et al., 2020).

As a result of the economic, health and climate crises, as many as 811 million people still go hungry worldwide (UN, 2021). This figure has been steadily increasing since 2014, despite the global fight to end hunger. A report published by Oxfam in July 2021 estimated that as many as 11 people are likely to die of hunger and malnutrition each minute, which is more than the global death rate of Covid-19 (about 7 people per minute). In 2021, 155 million people around the world experienced a food crisis, that is, 20 million more than in 2020. Due to the surge in global food prices (estimated at 40% by Oxfam, 2021) and the lack of financial means, billions

of people cannot afford a healthy and/or nutritious diet. The cost of a healthy diet is effectively five times higher than the cost of filling one's stomach with starchy foods (UN, 2021).

In France, 5.5 million people, i.e. just over 8% of the French population, benefited from food aid in 2018 (Le Morvan and Wanecq, 2019). This figure is on the rise, as in 2020 the volume of food distributed by charities increased by 10.6% and the number of registrations by 7.3% compared to the previous year (Radé and Léon, 2021). Currently, more than half of the beneficiaries (51%) have been registered for less than a year. For 73%, food aid enables them to have a balanced diet and for 60% to be in better health (CSA, 2020).

In the UK, 2.5 million emergency food parcels were distributed by the Trussell Trust food banks in 2020/21, against 61,000 in 2010/11 (Bramley et al., 2021). This means that 2.5% of all UK households used a food bank in 2019/20. In the same year, 1.5 million households, i.e. 5.8%, reported food insecurity.

- **2.3 Economic issues**

The issues underpinning the current agri-food model (use of pesticides, threat to biodiversity, air and water pollution, carbon footprint, development of obesity and cardiovascular diseases) are resulting in increasing costs for society.

The Haut conseil de la santé publique (HCSP) estimates that, on a European scale, the cost of the impact of all pesticides on health, due to their endocrine disruption mechanisms, amounts to 120 billion euros per year (Delaunay et al., 2017). The loss related to the service provided by pollinating insects threatened by these products amounts to between 2.3 and 5.3 billion euros per year, while the annual cost of curative treatment for contaminated water is estimated at between 260 and 360 billion euros.

Regarding health issues, the OECD has developed a model of the economic consequences of overweight and obesity, estimated as an annual average over the period 2020-2050 (OECD). It is estimated that OECD countries spend about 8.4% of their healthcare budgets on treating overweight-related diseases (4.9% of health expenditure in France, compared to 8.4% in the UK), i.e. US\$209 per capita per year (US\$195 for EU28, US\$148 for France and US\$188 for the UK). Also, 70% of expenditure on diabetes treatment, 23% on cardiovascular diseases and

9% on cancers are attributable to overweight. Overweight also affects the labour market, which loses an average of US\$863 per capita per year in OECD countries, and more specifically €634 in France and £644 in the UK, thus reducing GDP in these two countries by 2.7% and 3.4% per year respectively. To cover this cost, every OECD individual pays an average of US\$359 in additional taxes per year, i.e. €323 in France and £409 in the UK. In addition to overweight, global estimates suggest that malnutrition costs society up to US\$3.5 trillion each year (Global Panel, 2016).

● **3. SYNTHESIS: COMMONALITIES AND DIFFERENCES BETWEEN THE TWO COUNTRIES**

The commonalities and differences between France and the UK in terms of environmental, health, social and economic issues are summarised in the following table.

● **Table 1. Synthesis of commonalities and differences between the two countries**

	Commonalities	Differences
Environmental issues	<ul style="list-style-type: none"> ● Agriculture is the main land use. ● Water is the main source of soil erosion. ● Pesticide use, acidification and eutrophication generated by food production affect soil quality. ● The reduction in the overall area available for wildlife and the use of pesticides and herbicides contribute to biodiversity loss ● Agricultural production is the main source of food-related greenhouse gas emissions. 	<ul style="list-style-type: none"> ● France is the largest market for agricultural pesticides in Europe. ● The carbon footprint of food is higher in the UK than in France (35% compared to 24%). ● In France, the top three emission contributors are: agricultural production, transport and distribution. In the UK the top three are agricultural production, food waste and imported deforestation. ● France is the European country most severely affected by water eutrophication.
Health issues	<ul style="list-style-type: none"> ● Inadequate diet promotes overweight/obesity, associated chronic diseases (diabetes) and various forms of cancer. 	<ul style="list-style-type: none"> ● The UK has one of the highest obesity rates (1/3 of adults are obese compared to 1/5 in France)
Social issues	<ul style="list-style-type: none"> ● Socio-demographic differences (educational attainment, occupation, income) are a determining factor for the practice of healthy eating. ● The number of food aid beneficiaries 	

	is increasing	
Economic issues	<ul style="list-style-type: none"> The issues underpinning the current agri-food model (use of pesticides, threat to biodiversity, air and water pollution, carbon footprint, development of obesity and cardiovascular diseases) are resulting in increasing costs for society. 	<ul style="list-style-type: none"> Healthcare expenditure related to overweight is higher in the UK (8.4% of healthcare expenditure compared to 4.9% in France, i.e. US\$188 s in the UK and US\$148 in France)

PUBLIC AND PRIVATE SECTOR CATERING AND THE FOOD TRANSITION

In both France and the UK, public and private sector catering provides a significant share of the meals taken out of home. Because of its importance and social nature, it is one of the cornerstones of national programmes promoting safe, healthy, sustainable and accessible food for all. Despite this common feature, the way public and private sector catering operates and is organised varies according to the country and target audience, the variety of the structures involved resulting in different organisational and behavioural obstacles and levers.

- 1. OPERATION AND ORGANISATION**

This section looks at how public and private sector catering is organised in France and the UK and at the principal measures taken by national governments to promote its food transition.

- 1.1 Public and private sector catering in France**

“Public and public sector catering in France differs from other forms of out-of-home food services by its social nature, members of a given community being offered a meal at a moderate price” (Souquet, 2021).

The Insee proposes a breakdown of French public and private sector catering into four segments according to the target audience: school catering (from nurseries to universities); health and social care catering (hospitals, old people’s homes); workplace catering (private companies and public administrations); other forms of catering (holiday centres, armed forces, prisons, etc.):

- **School catering** provides food services from nurseries to universities. The management model depends on the nature of the establishment and the age of the guests. Catering for primary school pupils (3-11 years) is managed by the municipalities. Catering for public secondary schools is managed by the Departmental Councils for pupils aged 12-15 and by the Regional Councils for pupils aged 16-18. At university level, food services are managed by a network of 26 regional organisations called CROUS.
- **Healthcare catering** covers university and regional hospitals (CHU and CHR), as well as nursing homes for elderly people (Ehpad). It is usually self-managed.
- **Workplace catering** is intended for the company's employees.
- **Other forms of catering** correspond to commercial catering.

Each of these types of catering is either managed by the local authority/establishment itself or contracted out:

- **Direct management:** food services are provided by the local authority or the establishment with its own staff and technical resources. In 2018, it accounted for 60% of the sector's turnover and 60% of the meals served, but its share is tending to decline. It is the most common form of management in schools and hospitals.
- **Management can also be contracted out**, usually to a private company providing food services (e.g. SODEXO). Three organisational modes are possible: an on-site kitchen, a hub kitchen or satellite restaurants, which are served, at least partially, by a hub kitchen. Most workplace restaurants are managed by contracted catering companies.

Procurement rules do not apply in the same way to direct and contract catering. The Cool Food Pro project will take this into account by offering personalised support for each type of management.

With more than 7.3 billion meals served each year, public and private sector catering accounts for almost half of the out-of-home sector in France (Ministère de l'Agriculture et de l'Alimentation, 2020). 81,495 public and private sector catering facilities serve more than 12 million meals every day to the four main segments identified by Restau'co, a network of professional caterers: schools and universities (33.7% of meals served), health and social care institutions (44.4%), workplaces (10.4%) and catering for holiday centres, the armed forces, prisons, etc. (11.5%) (Ademe et al., 2021a). Given the importance of the sector and the wide

range of audiences targeted, national plans tend to focus on this sector to promote safe, healthy and sustainable food accessible to all.

The EGalim law (Conseil National de la Restauration Collective, 2020) “for achieving a balance in trade relations in the agricultural sector and healthy and sustainable food”, as well as the National Food and Nutrition Programme (PNAN) and its two flagship plans - the National Food Plan (PNA 3) and the National Nutrition and Health Plan (PNNS) – set out and make effective new rules applicable to public and private sector caterers in terms of supply and practices. Quality and accessibility are now given priority over the search for the lowest cost. **Table 2** details the measures and the deadline set for each catering segment. The 2021 Climate and Resilience Act complements these measures (Pleinchamp, 2021).

• **Table 2. Measures of the EGAlim law applicable to the various public and private sector catering segments**

Measures (the segments concerned by the measures are shown in purple. The segments not concerned are shown in grey)	Deadline	Segments					
		Public and private schools		Any other public institutions		Any other private institutions	
		Schools (from infant schools to secondary schools)	Pre-school establishments for children under 6 (crèches, nurseries, day-care centres and kindergartens)	Universities	Other administrations or public establishments (administrations, public medico-social organisations, armed forces, prisons, public institutions, etc.)	Other private establishments mentioned under article L. 230-5 of the Rural and Fisheries Code (healthcare, social, medico-social institutions and prisons)	Other private establishments mentioned under article L. 230-5 of the Rural and Fisheries Code (private company restaurants)
At least 50% of quality and sustainable products, including at least 20% organic	1 st January 2022						
Compulsory information of guests at least once a year	1 st January 2020						
Experimental display of the nature of the products	Between 14 April 2019 and 31 October 2021	Optional (voluntary basis)	Optional (voluntary basis)		Optional (voluntary basis)		
Nutritional information	30 October 2018						
Multi-year plan to diversify protein sources	30 October 2018	If > 200 meals served/day	If > 200 meals served/day	If > 200 meals served/day	If > 200 meals served/day	If > 200 meals served/day	
One vegetarian menu per week experimentation	Between 1 st November 2019 and 1 st November 2021						
Ban on single-use plastic utensils	1 st January 2020						
Ban on plastic still water bottles	1 st January 2020						

Ban on plastic food containers	1 st January 2025 (1 st January 2028 if < 2000 inhab.)						
Diagnosis and measures to prevent food waste	22 October 2020						
Ban on making surplus food that is still edible unfit for consumption	1 st January 2020						
Proposition to sign a donation agreement with an authorised association	22 October 2020	If >3000 meals prepared per day	If >3000 meals prepared per day	If >3000 meals prepared per day	If >3000 meals prepared per day	If >3000 meals prepared per day	If >3 000 meals prepared per day

○ 1.2 Public and private sector catering in the UK

A number of different catering models also coexist in the UK. There are four in total:

- **Local authority (LA) caterer** - public funded caterer in a local area, run by the local council in conjunction with the public health team. Not-for-profit service.
- **Traded services** - more commercial and for profit. They operate under contract in collaboration with the local council. Due to cuts in public spending, local authority caterers are commonly set up as an independent enterprise. They are no longer funded by the council. They must cover their costs and any profit feeds back into the council.
- **In-house** - single site which employs its own kitchen team for the site.
- **Contract caterers** - commercial businesses that are not affiliated with any particular area.

The form of catering varies according to the type of establishment:

- **School catering**, if not in-house, is provided by one of the other forms of caterers (local authority, traded service or contract caterer). Schools then put out a tender for their catering service. They do group together, especially those in the same academy group or in local authority areas where the LA offers an incentive such as a preferred provider model and subsidies in some way.
- **University catering** will be with a contract caterer or in-house. Universities may have multiple operations on site where franchises, such as Costa Coffee or Greggs are allowed to operate.
- **Hospital catering** could be contracted or in-house. Patient food and retail (staff) food can be different models in the same hospital. For example the patient food could be in-house while staff and visitor food may be provided by a contractor. A large percentage of hospitals bring in frozen food for patients which is cooked by an off-site business and regenerated on-site. It is also usual for hospitals to allow franchises to operate such as Marks and Spencers or Wh Smiths.
- **Workplace catering** is mostly a contract caterer or will be in house. Local authority offices and town halls may be serviced by a local authority caterer.
- **Private Financed Initiative (PFI) site contracts** can be in place for 30 - 50 years with little chance of making changes. These apply to some hospitals and schools.

There are approximately 78,862 catering companies in the UK (Statista.com 2022). In the public catering sector, each day, around 10 million meals are served in schools, 120 million in hospitals and in universities. Each year 50 million people eat out in the UK with an estimated 2.4 billion meals eaten outside the home in commercial restaurants each year.

As in France, the UK's national food strategy is moving towards a more sustainable system that involves all catering stakeholders (Bonfield, 2014). In particular, the government has developed a set of procurement standards for food and catering services (Public Health England, 2017). Public procurement agencies, either directly or through their subcontractors, are required to apply them, while other purchasers are encouraged to follow them. The guidance includes a set of minimum mandatory standards for inclusion in tender specifications and contract performance conditions, as well as recommended but not required best practices. These standards cover production, processing and distribution of products, nutrition, resource efficiency and social economy. They are regularly updated and can be consulted on the government website (DEFRA, 2021a).

There are also many voluntary and private initiatives aimed at reducing the environmental impact of the UK food sector (such as the FDF's Ambition 2025², or the Courtauld Commitment³ 2030). Through the “20 percent less meat” campaign (Public Sector Catering, 2022), for example, public caterers are encouraged to reduce the amount of meat served per meal by 20% in schools, hospitals, universities and old people’s homes.

- **2. BRAKES AND LEVERS (ORGANISATIONAL AND BEHAVIOURAL)**

Given the way the catering sector is operated and organised, whether in France or in the UK, obstacles and levers are likely to emerge at various levels. Below is a review of the organisational and behavioural brakes and levers at the level of governance, procurement services, kitchen staff and guests. We will focus in particular on school catering. Indeed, due its very nature, school catering is the prime target of government plans promoting sustainable

² <https://www.fdf.org.uk/fdf/what-we-do/environmental-sustainability/ambition-2025/>

³ <https://wrap.org.uk/taking-action/food-drink/initiatives/courtauld-commitment>

food in public and private sector catering, and is therefore better documented than other catering sectors.

- **2.1 At the governance level**

As food governance involves a diversity of players, both public and private, local authorities wishing to promote locally-sourced, quality and sustainable food services in their territory are confronted with a number of resistances to organic and local sourcing (blocking points, social, economic or political reluctance) that need to be assessed and qualified. Indeed, there is a difference between the food production potential of a territory and the intensity, or flow, of food produce actually delivered to its catering facilities. Maréchal et al (2019) remind us that it is not because 100 tonnes of potatoes are grown in a territory that 100 tonnes are available for canteen purchases in said territory. The stronger the resistance, the weaker the intensity of the flows to the catering sector.

All together, the resistance of the various players involved in food governance can considerably slow down the virtuous organisation of public and private sector catering supply (Maréchal et al., 2019). Cooks, for reasons of practicality and resources (it is easier to reheat ready-made meals), or because they lack the know-how or professional skills required, may oppose any profound change to the organisation of their canteens. The real or perceived tastes and habits of the guests also come into consideration. And when elected officials limit the budgets allocated to the canteen for purchases or equipment, favour large catering companies, or show indifference or lack of political commitment, they also restrain the food transition in the catering sector. For economic reasons, some large catering firms are also lobbying to maintain the current economic model. Last but not least, the local supply of quality and sustainable produce can also be undermined by the producers themselves (environmental nuisance, indifference to social expectations, corporatist lobbying). And with its lower purchase prices, its many demands and several weeks of deferred payment, not to mention a risk of dependency, the catering sector is far from being their preferred buyer.

To overcome individual resistance, Maréchal et al (2019) advocate considering food governance from a more systemic perspective, that is as a set of interactions and retroactions between players. While many cooks are in fact in favour of changing food practices, their capacity to change depends on multiple factors over which they have no control, such as the

equipment of their kitchen, the instructions that determine their room for manoeuvre, the budget allocated to them, or their training. Collective rules also reduce what leeway active and committed elected representatives may have. Corporate initiatives on sustainable food are limited to performance and the need to comply with the conditions and terms of the contract signed with the contracting authority. And even if the investment is not always evaluated on a short term basis, some producers are nevertheless aware of the interest for them to supply catering facilities and of the need to educate the consumers of tomorrow.

In addition to organisational resistance, divergent conceptions are also likely to create resistance. For example, there are often conflicting proposals as to the type of products to be favoured. While organic/local products are generally presented as ideal, organic farmers' organisations may defend an extra-territorial organic product, while the dominant forces in agriculture want to impose a product presented as local, regardless of the production method and its environmental impacts.

Food governance must therefore be thought of as a system of independent actors whose interactions can favour or limit the food transition of the catering sector. Political intentions must be clear to all, otherwise resistance will increase.

The Food Plan of the City of Rennes, which aims to promote healthy food in public sector catering, while contributing to the agricultural and ecological transformation, reflects this idea (Noisette, 2019). The plan aims to create a virtuous cycle of relations between producers and consumers through a series of constraints and evaluations that are converted into benefits for each of the players involved (secured remuneration and outlet for the farmers, improved sanitary quality of water around abstraction points, consumption of fresh local produce, etc.). The key actions of the food plan include: a supply that respects the quality of water (purchasing organic foodstuffs directly from producers is allowed, provided water resources are protected); the fight against food waste (work on children's autonomy with regard to food portions); one vegetarian menu per week; a food council (to co-construct the sustainable food plan with all the food chain stakeholders: farmers, distributors, parents, consumer associations, city officials).

As in France, the transition from food policy to practice in the United Kingdom is a complex process involving various players. The study by Moore et al. (2010) shows how school meal preparation is influenced by local education authorities and school policies, as well as by staff

practices in the child's immediate social context. In general, national policy influences local authority policies, which in turn influence school policies. While national policies are broadly taken into account, the considerations of individual stakeholders also come into play, resulting in distinct practices. These individualised practices illustrate the tensions that may exist for catering professionals who have to both implement policies and resolve practical dilemmas that can lead to poor translation of said policies into practice.

School kitchens are supplied through competitive tendering by local authorities, with the aim of controlling costs and generating revenue. Seasonal or market variations in price or availability of products determine supply. The viability of services is also partly influenced by pupils' food preferences, which themselves reflect different social contexts (family environment and parental preferences). Menus have to be adapted accordingly, sometimes to the detriment of healthy, sustainable food.

At the kitchen level, the staff's choices are made according to organisational (quantity control, time control, waste reduction) and behavioural constraints (pupil's preferences and habits). Also, it is not uncommon that the portions served do not respect the recommendations made by the local authorities.

The point of view of UK professionals

The focus groups with actors in governing roles found that barriers to reducing their environmental footprints were a result of behavioural and organisational barriers

Perceived behavioural barriers:

- Behaviour change of consumers/mindset/complacency – things need to be easy and 'painless'.
- Historic perception of certain campaigns, e.g. how well have meat-free Mondays gone before?
- Cost implications for consumers.
- Challenge knowing market attitudes to sustainability changes – is there a demand?
- Language is important to destigmatise perceptions – preferred 'field-grown' over 'vegan'.
- Staff attitudes to meat-free days – can be resistance.

Perceived organisational barriers:

- Tenders – sustainability needs to be built in.
- Price – sustainability swaps should be the same price if not cheaper.
- Need accessible tools to make better decisions.
- Need authorisation from senior staff.
- Caterers at each site choose their own menus but all use the same suppliers

○ **2.2 At the level of procurement services**

Although the origin, quality, production method and cultural value of food are now major societal concerns and are pushing public and private sector caterers to source quality local produce, their choices are limited by behavioural and organisational constraints.

In France, the lack or poor knowledge of available supply is often the main factor restraining demand (Ademe et al., 2021a). Some caterers are not familiar, or not familiar enough, with the quality signs promoted by the EGalim law. Sourcing quality produce also requires a good knowledge of the existing supply chains for a very large number of products and carrying out some prospecting work that is often beyond the capabilities of the smallest structures.

Beyond the lack of knowledge, there is also the difficulty of matching supply and demand (Ademe et al., 2021). Where the producer needs to sell the whole carcass, for example, the buyer may seek to buy specific cuts only. Another example is that schools partly resort to processed food for lack of staff or dedicated space, which makes sourcing from small farms even more difficult. The packaging of certain products can also be a hindrance when large packages facilitate handling for small producers, but make the work of the catering staff more complex. Finally, seasonality represents an additional difficulty in terms of supply. All these constraints explain that public and private sector catering is considered a secondary market by many producers who prefer to turn to simpler and more profitable markets.

Moreover, increasing the share of local or organic supply is likely to result in an increase in the price of foodstuffs that are not sufficiently available (Lessirard et al., 2017). The capacity to supply caterers locally indeed depends on the local context and the category of products. The additional cost of local sourcing may vary between 0 (fruit and vegetables) and 20% (dairy products). The difference is even greater in the case of products with a quality or organic label

(42% for organic, 21% for protected geographical indications and protected designations of origin, 11% for short food supply chains), and can be as high as 50%, particularly for meat. The difference between French meat and local meat is estimated at 15-20%, a price increase that neither the caterers, nor the local authorities nor the consumers would be able to absorb. Processed foods are thus favoured, as they allow for better cost control, particularly labour costs (the wage bill is a major budget item in the catering industry, which is much less flexible than the “food purchases” item).

The inability for local producers to supply the required quantities and the lack of regularity in their supplies are also a major deterrent for public and private sector caterers (Lessirard et al., 2017). Conversely, as they are bound by relatively short-term contracts (5% of the contracts change hands each year) with very short notice periods (around three months), caterers cannot make long-term commitments to their suppliers (generally six months to a year), which makes the situation precarious on both sides. This is a reality that is still too little known about food markets.

In addition to this security risk, there are also health concerns and nutritional obligations (following the nutritional recommendations of the National Nutrition and Health Plan and the former Groupe d'Étude de Marchés Restauration Collective et Nutrition (GEMRCN)) which encourage a ‘standardised’ diet, less favourable to organic and local produce (Lessirard et al., 2017).

Some of these barriers also exist in the UK catering industry (Food Ethics Council, 2016; Morgan, 2008): lack of awareness of the need to source sustainable products and how to do so; lack of information and awareness of the sustainable offer, which can lead to a perception of lower quality; perceived increased costs associated with sustainable sourcing which seem incompatible with budgetary constraints and sustainability objectives; risk aversion to purchasing new foodstuffs from new producers; lack of organisational and political leadership limiting buying-in and initiatives at different levels; lack of personal or organisational incentives to drive change; plus uncertainty about what can and cannot be done under existing (UK and EU) procurement rules leading to inaction.

A number of levers can nevertheless be identified to overcome these various obstacles (Lessirard et al., 2017): improving knowledge of existing channels and supply and demand

among food chain actors; improving the organisation of the production sectors; greater mobilisation of public actors; and new rules to take better account of the specific characteristics of the food market. **Table 3** proposed by Ademe et al. (2021) summarises the main levers for the supply of sustainable and quality food products to the catering industry.

In the United Kingdom, the Department for Environment, Food & Rural Affairs (DEFRA) launched the “Public Sector Food Procurement Initiative” in 2003. The main objective is to encourage public sector purchasers to work with farmers, growers and suppliers to promote sustainable food consumption in public sector catering. It offers buyers and suppliers a single interface for guidance, advice and inspiration on overcoming barriers to sustainable procurement.

● **Table 3. Levers for promoting sustainable and quality food produce sourcing according to Ademe et al. (2021)**

School catering is not a priority market for quality produce	
The market share of school catering is very low compared to other markets	<ul style="list-style-type: none"> ● Reinforcing the relocation of school catering supplies, as is the case with beef, will also make it possible to increase the share of supplies with a quality sign or value-adding label ● Help create supply by increasing demand: the case of pulses ● Encourage contractualisation via distributors
The purchase prices of school catering are low compared to other markets	<ul style="list-style-type: none"> ● Generate financial margins by rethinking the organisation of catering, reducing food waste, etc., so that they can be reinvested in the purchase of products qualifying for SIQOs⁴ or value-adding labels
Discontinuous supply due to school holidays is a strong constraint for producers	<ul style="list-style-type: none"> ● Work on supply schedules to anticipate these discontinuities ● Set up cooperation agreements with other caterers or distributors with complementary needs or seasonal activities
Logistics can be complex to manage in the case of small schools scattered over large areas	<ul style="list-style-type: none"> ● Consider pooling deliveries to schools from the same area ● Adapt the requirements in terms of logistics
Lack of knowledge of the content of the EGalim law in terms of procurement	
Some schools are not familiar with quality signs	<ul style="list-style-type: none"> ● Train catering staff on the requirements of the EGalim law in terms of procurement and on the quality signs it promotes ● Propose appropriate tools
Some schools do not master the calculation method	
Lack of visibility of available products with SIQOs or value-adding labels	
School restaurants do not know what is available at their level	<ul style="list-style-type: none"> ● Draw up an inventory of what is available with the help of chambers of agriculture, representatives of the various production sectors, DRAAF (Regional Directorates for Food, Agriculture and Forestry), local food plans, etc. ● Share this information with all the schools from the same area across all levels of education (primary schools, secondary schools, etc.), public and private, which is still too rarely done ● Participate in presentation meetings, fairs, events, etc. ● Consult catalogues and visit platforms designed to connect producers and buyers

⁴ SIQO (official quality and origin indicators) is a European acronym that protects the name of a product in the EU.

Disconnection between supply and demand	
Compartmentalisation of food chain players leading to poor knowledge of each other's activities	<ul style="list-style-type: none"> • Identify the needs arising from school constraints (food processing levels, packaging, periodicity, etc.) and work with the producer/supplier on this basis • Test supplies on the basis of a few meals and adjust to constraints as they arise
Supply does not meet the demand from schools with in-house catering	<ul style="list-style-type: none"> • An intermediary, such as a wholesaler, can facilitate the supply of certain products, particularly in regions where supply is limited. Wholesalers know the products and what schools need and can therefore play an essential role in allotment and logistics • Adapt demand by gradually changing the organisation (work on food plan, menus, seasonality, etc.)
Optimise purchases	
Poor knowledge or even mistrust of public procurement procedures	<ul style="list-style-type: none"> • Take training courses on the subject • Adopt the right level of formalism (direct purchase, simplified bidding process, call for tenders) according to the situation
No sourcing from local suppliers	<ul style="list-style-type: none"> • Contact representatives of local producers (professional organisations, associations, groups of producers, platforms)
No public procurement method, resulting in a waste of time and confusion	<ul style="list-style-type: none"> • Use existing guides or available standard procurement documents • Contact other schools and learn from their experience

The point of view of UK professionals

Caterers evoked several of the barriers mentioned above:

- Time - to source different products, find new and different suppliers
- Staffing - limited staffing to source different products, suppliers, etc.
- Central ordering with less flexibility to order seasonal, organic or local products
- Cost - with a limited budget it is sometimes not possible to order organic for example or higher welfare meat, organic vegetables, etc.

○ **2.3 At the kitchen staff level**

Despite the willingness of a number of cooks to comply with national plans by offering vegetarian food, eliminating plastic and reducing food waste, behavioural and organisational obstacles still exist among kitchen staff. The data presented in this section are from Ademe et al. (2021). We have not been able to find equivalent data for the UK, but we believe that kitchen operations are relatively similar in both countries and that the barriers and levers identified for French kitchen staff also apply in the UK.

Regarding meals, and notably vegetarian ones, lack of knowledge among kitchen staff, whether in terms of cooking techniques or products, is the main obstacle to developing this type of offering (Ademe et al., 2021; Morgan, 2008). Most cooks are therefore asking to be trained (support and adapted tools) on how to prepare vegetarian dishes. In addition to these technical aspects, vegetarian dishes often take more time to prepare (prior preparation of ingredients, assembling different products, cooking time, more elaborate seasonings, etc.), while staff remains limited. Lack of communication, nutritional information or team support can also slow down the introduction of vegetarian dishes. Ademe has identified several cook profiles:

- Forerunners are cooks who believe in the food transition, have informed and trained themselves, and have already tested new recipes. If they are not followed by their team or supported by elected officials, these cooks may soon feel exhausted and demotivated.

- Cooks who experience the introduction of vegetarian meals as an imposed constraint. They more easily resort to meat substitutes (such as soy steak) or processed food, leading to an increase in waste, for lack of proper guests' support.
- Cooks who do not offer vegetarian meals because they have not been informed of the legal obligation, out of personal conviction, or even because of local political influence.

More generally, in terms of sustainable food, Beraud-Sudreau (2010) notes that, like the general public, some cooks have difficulty distinguishing between local products, organic products, products qualifying for quality labels or quality marks, products from integrated agriculture, short supply food chains, etc. There is also a lack of knowledge about the regional seasonality of products, and therefore their availability throughout the year.

When supplemented with appropriate tools (recipes, pre-processed products, etc.), training catering staff on legal requirements and quality signs can become an essential change driver towards introducing more local, organic and even vegetarian foods.

Eliminating plastic also involves a major organisational change. Because of the considerable weight of reusable containers (preparing 1,000 meals with stainless steel or glass containers means increasing total weight by 272 kg or 630 kg respectively), a strong mobilisation and organisation on the part of the catering teams are necessary in order to limit musculoskeletal disorders (MSD) and workplace accidents (Ademe et al., 2021).

Awareness-raising (of scientific knowledge on endocrine disruptors), as well as prior training, consultation and support regarding ergonomics and working conditions (new work procedures and new preparation or handling processes) are essential to obtain kitchen staff's acceptance and engagement. In 2015, the switch to stainless steel containers by the municipality of Les Sables d'Olonne, for example, involved changing some of the ovens and training the staff on using the new dishes and utensils. Similarly, as part of its 100% stainless steel approach, an initial diagnosis and support from an ergonomist enabled the City of Strasbourg to identify the sites requiring investment or space reorganisation. It is often the whole catering model that must be rethought (decentralised production, reduction in the size of hub kitchens, reconsideration of structural aspects).

Finally, certain kitchen practices contribute to increasing food waste when preparing or serving meals (Ademe et al., 2021). Among the arguments put forward at preparation level, the poor quality of the product is a major waste factor (damaged or under-ripe fruit, meat with too much fat, products that do not hold up to cooking, etc.). The storage of foodstuffs also represents an obstacle to the proper management of food produce as the lack of equipment to store overproduction (due to extra quantities or an unforeseen drop in the number of guests: strike, epidemic, unannounced school outings, etc.) increases the risk of food waste. The absence or misuse of equipment can therefore generate waste. Too restrictive or limiting clauses in catering contracts can also prevent kitchen staff from adapting quantities and portion sizes.

In the lunch room, poor management of the number of guests (no monitoring or reservation system), too short a meal time (opening time constrained by the students' schedules), disorganisation of the service (distribution area not very functional, overcrowding at peak times, no supervision) and of the self-service line (order of presentation of the dishes not thought through), an atmosphere that is not conducive to eating (high volume of noise, poor lighting, lack of space) and standardised quantities that are unsuitable for the guests (quantities based on the portion sizes recommended by the GEMRCN and/or served in the same proportions whoever the guests) are the main obstacles encountered in most contexts.

More generally, internal communication problems (between the kitchen team and the local authority) or external communication problems (between the kitchen team and the parents), as well as lack of staff, training, financial resources, space or suitable equipment are all obstacles that undermine the motivation of staff to embark on an approach to combat food waste.

Here again, training kitchen staff and promoting a dialogue in order to understand individual mental blocks to change and defuse them will contribute to the proper development of project decided and shared by all. In organisational terms, readjusting the system (monitoring of staffing levels, just-in-time work) and production equipment (investment in cooling cells) can also help reinforce the teams' commitment.

The point view of UK professionals

The focus groups with in-house catering teams allowed to identify the barriers as expressed

by kitchen staff:

Behavioural barriers :

- Desire to use the tool as an education piece for children (the consumers), but the focus on the curriculum for parents and teachers can be a barrier.
- In schools, the choice for consumers is limited by the children's disposable income. Therefore, children would often choose the cheaper option (e.g. a plastic bottle over aluminium can). It is down to suppliers to amend prices.
- The popularity of plant-based meals can vary dependent on the character of each university campus, e.g., popular at arts schools but not so much at business schools.
- Language was a barrier to the uptake of meat-free meals. They found that destigmatising meal names by just calling them Plate 1 and Plate 2 worked well.
- Monitoring can be a challenge.

Organisational barriers :

- Costs – free-school meal programme limits flexibility of choice – it is not possible to pass on the costs elsewhere
- Monitoring staffing levels can be a challenge.

○ **2.4 At guest level**

At the end of the food chain, guests play an essential role in the food transition of the catering sector as all the efforts made in terms of governance, supply management and with kitchen staff will only bear fruit if guests actually adopt sustainable food practices. 90% of French people report being interested in meals prepared with organic produce at schools (Ademe, 2021a). It is to be noted that environmental and societal commitments seem to reinforce buying intentions. Customers perceiving the commitment of a catering company reportedly multiply their buying intention by 3.3, against an average of 2.4, all sectors combined (Laville et al., 2019). But while the vast majority of consumers demonstrate a positive attitude towards changing current food practices to more sustainable options, such as reducing meat (Alves and Edwards, 2008; Grimmer and Miles, 2017), they often struggle to translate these intentions into behaviour change (Rees et al., 2018; Stubbs et al., 2018).

The theory of planned behaviour developed by Azjen (1991) is generally used to explain this discrepancy. According to this theory, there are components (attitudes, subjective norms, perceived behavioural control) that directly determine intentions, which in turn determine behaviour. When an individual finds it difficult to obtain or consume a sustainable product (e.g.

plant-based proteins), he or she may in fact hold a positive attitude towards sustainable food in order to conform to the social norm, without adopting good consumption practices (e.g. meat reduction). In this respect, a survey conducted in the UK by the WWF in 2019 showed that, although 49% of 18-24 year-olds were aware of the environmental impact of livestock farming and 38% of them intended to moderate their meat consumption for this reason, 33% continued to eat meat on a daily basis (WWF, 2019a). In 2015, 31% of French people also thought that “*producing meat is bad for the environment*” (Tavoularis and Sauvage, 2018).

According to Osman and Thornton (2019), three factors constitute psychological barriers that prevent individuals from changing their behaviour in favour of more sustainable consumption: 1) poor understanding of sustainability issues; 2) low perceived self-efficacy (underestimating the direct impact of changing one's personal behaviour on the environment) which, in turn, reduces motivation for change; 3) competition from other objectives such as healthy eating, price, taste, availability, or social trends, to the detriment of sustainability. The authors then demonstrate the value of informing guests through an easy-to-read display (traffic light labelling system informing about the impact of meals in terms of carbon emissions and calorific content, supplemented with general information) in order to overcome their reluctance to change.

However, information is not always enough to change individual practices. The experiment conducted by Merdji et al. (2019) shows that tastes and consumption habits take precedence over information, especially when it comes to a foodstuff as full of values and symbols as meat in France. Despite the adherence of guests to the environmental message and to the concerns it refers to, the meat menu is still preferred to the vegetarian one, which is perceived as monotonous, not very nourishing and insipid. The vegetarian menu represents in fact a dilemma since it means choosing between “the planet and pleasure”, thus eliminating the “win/win” option. Although eating habits seem difficult to change in the short and medium term for types of products such as meat, the information provided nevertheless promotes sustainable choices in terms of production. Meat products with a “supply chain” label (information on the producer, place and method of production) are more often chosen than “French origin” meat products, as they have a greater impact on the perception of the health-related, environmental and hedonic qualities of the product, and of its ethical and social value. While it is not yet possible to completely eliminate meat from the menu, it is at least possible to reduce the quantity of meat and increase its quality.

As for children, 77% are neophobic (i.e. reluctant to try unfamiliar foodstuffs) and exposure to food and education through taste are essential to get them to like plant-based products (Bonduelle Foundation, 2019).

The point of view of UK professionals

The focus groups with caterers identified several **behaviour-related** barriers among guests.

- No engagement / interest in climate friendly agenda.
- Value for money - customers may think that meat-free meals should be a much lower price, which is not always the case in practice
- Climate-friendly options may be more expensive, like organic products. Customers are not always ready to pay more for these options.

● **3. SYNTHESIS: COMMONALITIES AND DIFFERENCES BETWEEN THE TWO COUNTRIES**

The various commonalities and differences between France and the UK regarding the operation and organisation of the catering industry and the barriers and levers to sustainable food are summarised in **Table 4**. For lack of available data, the comparison between the two countries was made impossible on one point, i.e. barriers and levers at the kitchen staff level. Nevertheless, we have estimated that kitchen operations are relatively similar from one country to another and have drawn some general conclusions.

● **Table 4. Synthesis of commonalities and differences between the two countries**

	Commonalities	Differences
Operation and organisation	<ul style="list-style-type: none"> ● In France, as in the UK, public and private sector catering is segmented according to the profile of the guests (school, hospital, workplace or commercial catering). ● Given its importance, it represents a privileged lever for public policies to promote safe, healthy, sustainable and accessible food for all. 	<ul style="list-style-type: none"> ● In France, school catering is managed by local authorities. There is no such obligation in the UK, and this is reflected on price. ● In France, regarding sustainable food, public and private sector catering is governed by the EGalim law and the National Food and Nutrition Programme. In the UK, the "Government Buying Standard for Food and Catering Services" and the

		"School Food Standards Practical Guide" provide a general framework.
Barriers and levers at the governance level	<ul style="list-style-type: none"> • Three barriers have been identified: cost and logistics control, including the provision of adequate equipment, access to suitable supply chains and the human factor (reluctance of guests and staff). • A number of uptake levers also exist: the obligation to meet legal requirements, such as using an information system to better monitor supplies; the integration into professional networks; the evolution in guests' expectations; quality procedures; the skills and willingness of kitchen staff to offer "home-made" quality menus 	<ul style="list-style-type: none"> • In the UK, governance is more about achieving profitability (cost control and obligation to generate revenues), which makes it difficult to put national policies into practice (preference given to satisfying the tastes and habits of guests).
Barriers and levers at the level of procurement services	<ul style="list-style-type: none"> • Poor knowledge of existing supply chains • Inadequate supply (unsuitable products and packaging, seasonal constraints, discontinuous supply) • Additional costs linked to the supply of sustainable products • Health concerns and nutritional requirements encourage the use of "standardised" food • Expectations include : bringing food chain actors together, improving the organisation of the various production sectors and changing applicable rules 	<ul style="list-style-type: none"> • In the UK, poor knowledge of existing public procurement rules leads to inaction
Barriers and levers at the kitchen staff level	<ul style="list-style-type: none"> • At staff level, poor knowledge of cooking techniques or products hinders the introduction of sustainable produce into menus. • At organisational level, adapting practices implies a significant change (ergonomics and working conditions). • At preparation level, the poor quality of products, the lack of suitable equipment and overly restrictive contract clauses can prevent the development of good practices. • In the lunch room, poor staff management, too short a meal time, a disorganised service or self-service line, an atmosphere that is not conducive to eating and unsuitable standardised quantities are the most common obstacles. 	
Barriers and levers at guest level	<ul style="list-style-type: none"> • Despite a positive attitude towards changing current food practices to more sustainable options, people struggle to translate this intention into behaviour change. • Three obstacles have been identified: poor understanding of sustainability issues; underestimating the direct impact of changing one's personal behaviour on the environment; competition from other objectives (health, price, taste and habits, 	<ul style="list-style-type: none"> • In the UK, where the price of the meal is not fixed, guests are not prepared to pay more for sustainable food.

	availability, social trends). <ul style="list-style-type: none"> • Information about production helps promote sustainable choices among adult guests (preference for labelled products). Exposure to food and education through taste encourage the adoption of novel foods by children 	
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LEVERS OF ACTION TOWARDS MORE SUSTAINABLE FOOD IN PUBLIC AND PRIVATE SECTOR CATERING

From production to consumption, our current food model contributes significantly to global warming. In France, food production takes up 54% of the land area, generates 20% of greenhouse gas emissions and is responsible for 70-80% of deforestation worldwide (Ademe, 2021b). In the UK, food accounts for 35% of greenhouse gas emissions (WRAP, 2021a). The use of fertilisers, pesticides, GMOs and antibiotics has many negative impacts on the environment and biodiversity. Similarly, transporting and storing foodstuffs pollute the environment and emit significant greenhouse gases. Food preparation (cooking, refrigeration, washing dishes, etc.), changes in eating habits (over-consumption of animal proteins, ultra-processed foods and out-of-season fruit and vegetables) and food waste are also harmful to the environment and consume water and energy. All stages of the life cycle of food products are thus concerned.

Favouring labelled, local and seasonal organic products, changing the composition of menus and replacing the proportion of animal proteins and ultra-processed food with vegetable proteins and homemade products, reducing food waste at all levels (from purchasing to meal preparation and the size of the portions served on the plate), limiting water and energy use and reducing packaging are all actions that can be taken by public and private sector caterers to limit their impact on the environment and support the food transition. Each of these levers will be discussed in the following points.

- **1. IMPROVE PURCHASING PRACTICES**

Food accounts for about a quarter of greenhouse gas emissions in France and the UK, a contribution similar to that of transport or housing. Most of these impacts are related to agricultural production and to a lesser extent to food transport, with major differences depending on the products and their production methods.

The EGalim law of 30 October 2018 “Towards a more sustainable food supply” emphasises the role of public procurement in the catering sector and sets the objective of 50% of sustainable or quality products, including at least 20% organic (Ademe, 2019). This objective can be achieved with labelled products (SIQOs and Ecolabel for sustainable fishing), certified products (HVE or High Environmental Value), or through purchases that “take into account the cost of the environmental externalities of products throughout their life cycle (production, processing, packaging, transport, storage and use)”.

In the UK, the Government Buying Standard for Food and Catering Services (Public Health England, 2017) requires the purchase of at least 10% of organic raw ingredients (40% is recommended), or ingredients complying with publicly available integrated production or integrated farm management standards. In addition, all fish purchased must be from responsible fisheries (MSC, MCS⁵ or equivalent). In respect to the use of fresh produce, menus shall be designed to reflect the natural growing or production period for the UK and in-season produce shall be highlighted on menus. However, there is no provision for relocation.

Consequently, four levers of action that we will detail in the following sections can be used to improve the purchasing practices of public and private sector caterers: replace unsustainable fishery products with products from sustainable fisheries, replace conventional products with the same organic products, relocate and reseasonalise products.

- **1.1 Replace conventional products with the same organic products**

Consumers of organic products have a reduced environmental footprint compared to consumers of conventional products (Pointereau, 2019). They emit 37% fewer greenhouse gas emissions from agricultural production (1,160 kg CO₂eq compared to 1,856 kg CO₂eq per year). They

⁵ MSC “Marine Stewardship Council” and MCS “Marine Conservation Society” are labels guaranteeing that the fish come from responsible fisheries.

need 23% less agricultural land to feed themselves than conventional consumers (3,492 m² vs. 4,522 m²) and use 26% less direct and indirect energy (5,400 MJ/year vs. 7,200 MJ/year). These data relate to French consumers, as we have not been able to find equivalent data for the UK. However, the study analyses the consumption of organic produce that can be found in both countries. It is therefore consistent to imagine that the diets of organic consumers, whether British or French, are similar. We also see no reason why the decrease in the consumption of organic produce considered too expensive by French consumers, as is the case for meat, should not apply to their British counterparts. We therefore assumed that these data would show little variation from one country to another.

The Life Cycle Assessment (LCA) method is generally used to calculate the external climate costs of foodstuff. According to this method, the farming system is a determining factor in greenhouse gas emissions (Pieper et al., 2020). Organic farming generates fewer emissions than conventional production for plant-based and dairy products (organic farming causes 57% and 96% respectively of emissions from conventional farming). However, emissions are higher for animal-based products (150% of conventional production). Pieper et al. (2020) nevertheless point out the need to integrate emissions linked to land use change “LUC” (Barbier et al., 2020) into these calculations. Indeed, climate change-related emissions almost entirely originate from the cultivation of imported crops from countries where arable land is expanding at the cost of natural land. If imported crops (as fodder) are allowed in conventional production, this is not the case with organic production in Germany, or in other European countries, where the majority of the fodder must come from farms from the same region. When this variable is taken into account, the results for animal-based products change drastically (**Table 5**) and organic animal-based products then generate equivalent rates compared to conventional production.

- ***Table 5. Emission data for food specific, narrow and broad categories (following the classification from the German Federal Office of Statistics, Pieper et al., 2020)***

Emission data (in kg CO ₂ eq/kg product)											
Broad categories [b]	Prod. method			Narrow categories [n]	Prod. method			Food-specific [f]	Prod. method		
	Conv. [E _{b,conv}]	With LUC	Org. [E _{b,org}]		Conv. [E _{b,n,conv}]	With LUC	Org. [E _{b,n,conv}]		Conv. [g _{b,n,i,conv}]	With LUC	Org. [g _{b,n,i,org}]
Plant-based	0.20	/	0.11	Vegetables	0.04	/	0.02	Field Vegetables	0.03	/	0.02
								Tomatoes	0.39	/	0.22
				Fruit	0.25	/	0.14	Fruit	0.25	/	0.14
								Rye	0.22	/	0.13
				Cereal	0.36	/	0.21	Wheat	0.38	/	0.21
								Oat	0.36	/	0.21
								Barley	0.33	/	0.19
								Root Crops	0.06	/	0.04
Animal-based	8.90	(13.38)	13.39	Legumes	0.03	/	0.02	Beans	0.03	/	0.02
				Oilseed	1.02	/	0.58	Rapeseed	1.02	/	0.58
				Eggs	1.17	(1.18)	1.76	Eggs	1.17	(1.18)	1.76
				Poultry	13.16	(15.81)	19.80	Broilers	13.16	(15.81)	19.80
				Ruminants	24.84	(36.95)	37.37	Beef	24.84	(36.95)	37.37
Dairy	1.09	(1.33)	1.05	Pork	5.54	(9.56)	8.34	Pork	5.54	(9.56)	8.34
				Milk	1.09	(1.33)	1.05	Milk	1.09	(1.33)	1.05

Looking at the emission differences between conventional and organic production, the lower emissions of organic products in all three broad categories can be explained by the stricter European (EU-Eco) regulations applicable to organic farming (ban on mineral nitrogen fertilisers, sole use of organic feed, virtual ban on the use of imported fodder, higher proportion of grazing for dairy cows, use of grassland instead of farmland). In the narrow categories, however, this regulation undermines the performance of organic farming for eggs, poultry and ruminants due to the higher amount of land per animal (29.5% against 5% in conventional production), higher living age and lower productivity of organically produced feed and raised animals. In contrast, for pork, organic farming achieves lower GHG emissions. This is due to the different input quantities of soymeal used with different livestock categories (with different LUC emissions associated with each category). As pig farming is the livestock category with the highest share of LUC emissions (72%), it is the only subcategory where organic farming results in lower GHG emissions per kg. Beyond production systems, consumption habits must therefore evolve towards a reduction in the amount of meat consumed. We will come back to this in section 2.

In addition to its impact on reducing greenhouse gas emissions, organic farming also benefits soil and water quality. On average, organic field crop systems have more soil cover than conventional systems, resulting in reduced erosion (Sautereau and Benoit, 2016). Due to the lower use of pesticides, microbial life is also more active and organic matter levels are higher in organically grown soils. Organic farms also use a reduced amount of phosphate fertilisers and have consistently lower levels of nitrate in the soil, which leads to less eutrophication. With

regard to water, ITAB also points out that organic farming reduces the amount of leached nitrates by 35 to 65% (Sautereau and Benoit, 2016). Nitrogen use is more efficient in organic farming than in conventional farming (the median total nitrogen input rate is estimated to be 12% lower). Moreover, organic farming allows for less consumption of water resources (due to lower yield targets, reduced nitrogen fertilisation of crops and a more limited grain maize production).

In its educational guide, the Syndicat Réseau Entreprises Agroalimentaires BIO "SYNABIO" (2021) stresses that organic farming also benefits biodiversity with a 30% increase in the number of species (diversity) and a 50% increase in the number of individuals (abundance) on organic farmland. This could, for example, mitigate the decline in honey production and in the number of colonies (up to 37% more worker brood, 20% more adult bees and 53% more honey reserves in colonies with organic farmland in their surroundings) (Wintermantel et al., 2018).

The positive impact on health of consuming organic products must also be taken into account. For example, exposure to chemical pesticide residues through food is lower for organic consumers, between -23 and -100% depending on the molecule (Sautereau and Benoit, 2016). In terms of nutritional gains, consumers of organic produce show better compliance with nutritional recommendations (Pointereau, 2019). Thus, the mean values of the mPNNS-GS⁶ and PANDiet⁷ scores are respectively 8.83 and 69.18 for heavy organic consumers and 7.80 and 62.52 for non-organic consumers, i.e. an increase of +14% and +11%. The organic diet, which is more plant-based, thus provides more fibre. The results are also better for iron, iodine, potassium, magnesium, omega 3, polyunsaturated fatty acids and vitamins B6, B9, C and E.

In French public and private sector catering, the share of organic products is estimated at 2.9% of the purchase value of foodstuffs (Ademe, 2019). While the introduction of organic products is still limited in establishments where food services are contracted out, it seems to be more developed in establishments with in-house catering and in schools. 79% of schools offer

⁶ The "mPNNS-GS" reflects adherence to the 2001 PNNS (French National Nutrition and Health Programme) recommendations. For example, eating at least 5 fruits and vegetables a day or limiting salt intake. The maximum score is 13.5.

⁷ The "PANDiet" is based on the probability of meeting the nutritional requirements for 24 nutrients such as proteins, carbohydrates, fats, polyunsaturated fatty acids, fibres, vitamins, calcium, etc. The theoretical maximum score is 100.

'organic' products, followed by workplace catering (47% of company and public administration restaurants), and health and social care catering at 30%.

Regarding the additional cost of sourcing organic products, 77% of French caterers reported an average additional cost of 18% for raw ingredients in 2017 (Ademe, 2019). When integrating the costs of training staff and changing procedures inherent to this type of products, the additional cost is only 16%. The main lever used by local authorities to balance budgets is reducing food waste (83%), followed to a lesser extent by other tools: more diversified proteins (25%), use of in-season and unprocessed foods (16%) and training teams on how to make the most of the products (14%).

We have not been able to find specific data on the current situation of public and private sector catering in the UK. A rapid increase, however, in the share of organic products in the catering and foodservice sector is documented (Hospitality & Catering News, 2018). The Soil Association's 2018 Organic Market Report, for example, reveals that £84.4 million are spent annually on organic food and that spend on organic through the Food For Life Served Here⁸ scheme grew 20% in 2017 and doubled in just two years. The number of awards granted under this scheme is also increasing with over one million (1.7 million) meals served every day at schools, hospitals, workplaces and visitor attractions across the UK. Also, over 50% of primary schools in England serve menus certified by the scheme.

The point of view of UK professionals

Focus group feedback:

- Balancing other criteria/accreditations – working within certain frameworks which do not follow organic produce options.
- Cost implications from switching to organic.

Interview feedback:

- Easier if already working towards the Soil Association's Food for Life award as they already have target of % spend on organic
- Dependent on client demand, especially in workplace sites.
- Less demand to change to organic - more clients want local produce
- Cost can be an issue

The Soil Association's approach:

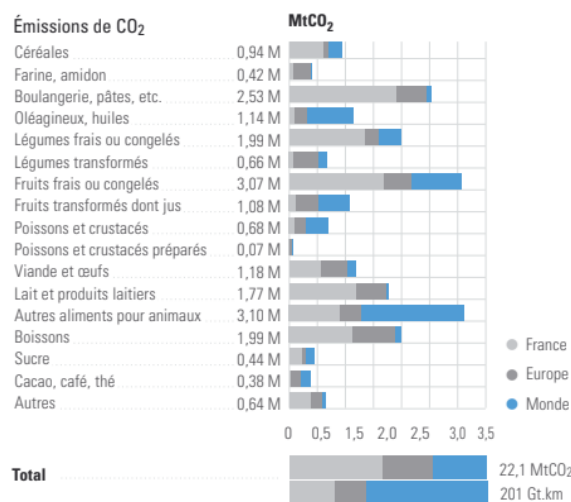
⁸ Scheme to reward catering establishments that offer sustainable food. <https://www.foodforlife.org.uk/about-us/food-for-life-served-here>

- *Within existing Food For Life programmes, training and education resources are shared with caterers to show the impact of changing to organic - the impact of organic farming on nature, biodiversity and climate as well as health. Caterers are supported with impact to costs incurred from switching to organic through other changes in practice such as reducing meat content, including more vegetables, reducing menu choices, which impacts staffing and purchasing costs*

○ **1.2 Relocate products**

In order to better understand the issue of relocation, it is necessary to have a better understanding of the footprint of the agri-food chain outside the country, as part of the impacts are effectively externalised through imports. Ademe (Barbier et al., 2020) proposes to assess the footprint and origin of agricultural and food products imported into France. Animal feed (4.5 Mt), fruit (4.4 Mt), vegetables and potatoes (4.4 Mt) account for most of these imports in volume. Of the 19 Mt of products considered in the study, almost 50% are of European origin. This is the case for the majority of meat, vegetables, sugar, rapeseed cakes, rapeseed and olive oil. In contrast, more than half of fruit (including juices) and most of sunflower cakes, soya cakes and beans, palm oil and stimulants (coffee, cocoa, tea) come from countries outside Europe. **Table 7** below summarises the origin of food products in France:

• **Table 7. Transport of food products by origin in France (Barbier et al., 2019)**



By value, the UK imports £48.0 billion of food, feed and drink (DEFRA, 2021b), representing 46% of the food it consumes. As in France, fruit and vegetables (£11.419 million, of which £7.235 million is imported from Europe) are the highest value category for imports.

other hand, animal feed (£2.540 million, of which £1.541 million is imported from Europe) does not represent a major item, which can be explained by the large share of imported meat (£6.239 million, of which £5.186 million is imported from Europe). This is followed by beverages (£5.941 million, of which £4.285 million is imported from Europe) and cereals (£4.448 million, of which £3.482 million is imported from Europe). The vast majority of imports therefore come from Europe (80%), particularly the Netherlands (£5.3 million), Germany (£4.5 million), Ireland (£4.4 million) and France (£4.4 million). The remainder is mostly spread between Africa, Asia, North America and South America. Overall, import volumes have increased rapidly in recent years (41.5 billion tonnes in 2020, i.e. 23% more than in 2011). If this is not yet visible, the landscape of UK imports and domestic production is currently in a state of change after leaving the European Union, the UK's largest trading partner for agri-food.

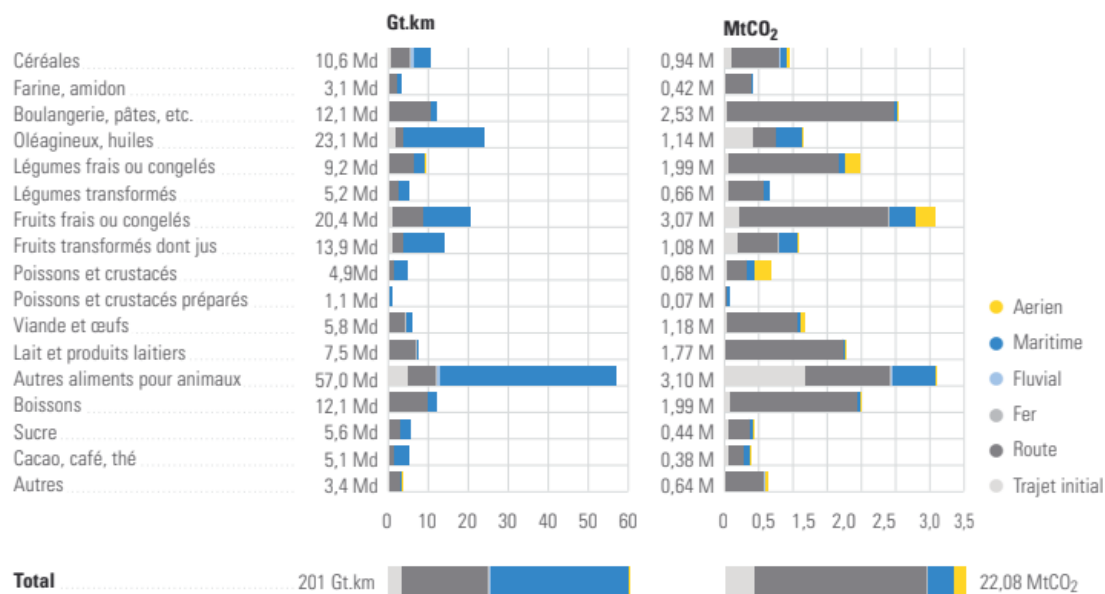
Producing all French imports requires using almost 12 million ha (Mha) of agricultural land (Barbier et al., 2020). A quarter of this land area is located in Latin America and 14% in Africa. Imports of meat (4.8 Mha) and fruit and vegetables (0.7 Mha) take up a significant share of this agricultural land. All these imports contribute to deforestation in exporting countries. For example, palm oil is gradually replacing the equatorial forest and peat bogs, and tropical products (cocoa, coffee) are replacing the tropical rainforest. Soya, mainly used to feed livestock, is a major contributor to imported deforestation (Ministère de la transition écologique, 2021). However, forests help combat climate change and epidemics and are a source of biodiversity. They are also home to many human communities. The United Kingdom is also concerned by these issues through its imports, particularly soya from Latin America.

Greenhouse gas emissions from the production of imported foodstuffs amount to 18.7 MtCO₂eq for France (Barbier et al., 2020) and 35.9 MtCO₂eq for the UK (WRAP, 2021a). In France, meat accounts for 8% of the imported volumes, 40% of agricultural land use and 71% of the emissions generated by the production of imported foodstuffs. The main sources of emissions are therefore production and land use change in exporting countries, rather than transport (only 8% of imports). The objective is thus to change consumers' diets and food practices towards more plant-based proteins. We will come back to this in **section 2.1**.

The situation is different for plant-based products (and meat in the United Kingdom). Place of production, demand and the mode of transport have a strong impact on the product's total carbon footprint. The eco-score calculations (Ademe, 2022a) take this parameter into account, making it possible to assess the carbon footprint of transport as a function of the distance between the origin and destination of the product and the mode(s) of transport used. The transport scores for France and the UK are respectively 100 and 76 (out of 100), which is quite high. The transport sector is the main contributor to the carbon (19%) and energy (31%, of which 22% is related to goods) footprint of the French food system (Barbier et al., 2019). In fact, it is the second largest source of GHG emissions from French households' food consumption.

In Europe, most food products are transported by road. Road haulage thus accounts for a large proportion of the food-related emissions in France with 23 MtCO₂eq, 57% of which concern imported products (considering the total journey from the country of origin to the French *département* of destination) (Barbier et al., 2019). Maritime transport, which is essentially used in France to import foodstuffs from outside Europe (particularly fruit), accounts for almost a third of the traffic in terms of tonne.km (t.km) travelled but weighs much less in the carbon balance (11%) since the emissions per tonne.km are much lower than for road transport (11g CO₂eq/t.km according to the eco-score calculations). **Table 8** below summarises the main modes of transport by type of food products.

- **Table 8. Transport of food products by mode of transport for France (Barbier et al., 2019)**



To sum up, maritime transport is essentially used to move fresh, frozen or processed fruit, whereas road haulage is the main mode of transport for vegetables coming from other French regions or European countries. Increasing the share of low-carbon plant products in diets therefore involves relocating production.

In the UK, although the share of emissions from domestic transport is known (7.7% of CO₂ emissions according to WRAP, 2021a), there is no national data from which import-related emissions can be determined (WRAP, 2020). However, the majority of transport is by sea (37% according to the Eco-score), which generates relatively low emissions. Only the import of fresh produce may involve air transport, but this represents a very small volume of imports.

Although the environmental impacts of relocating production in France cannot yet be calculated on the basis of existing data, as confirmed by the Parcel tool⁹, it would result in the creation of 581,600 direct jobs in agriculture (76% in livestock farming, 12% in market gardening, 6% in arboriculture and 5% in cereal crops and other crops).

In France, according to Direction Générale de la Concurrence, de la Consommation et de la Répression des Fraudes, DGCCRF, locally-sourced products account for 10-15% of food purchases in the out-of-home catering sector, which makes it quite a significant market, more

⁹ PARCEL is an online tool developed by Terre de Liens, FNAB and BASIC that gives the spatial, social and environmental footprint of food products depending on their mode of production and consumption://parcel-app.org/

or less developed depending on the catering segment and type of product considered (Lessirard et al., 2017). In the foodservices provided to the so-called “social” ministries in Paris, for example, local products represent 20 to 30% of the overall supply, but up to 80% of fresh produce and 90% of fruit and vegetables. More specifically, the French Law on the Future of Agriculture, Food and Forestry sets a target of 40% of local products in public and private sector catering by 2017 (Law No 2014-1170 of 13 October 2014). However, they only accounted for 5% of total supplies in 2017 (PIPAME, 2017), with significant differences: while primary school caterers are already working with local producers, there is still room for improvement in the other catering segments. 85% of the respondents to the study conducted by INRAE (Institut national de recherche pour l'agriculture, l'alimentation et l'environnement) (Fernandez-Inigo and Magrini, 2019) stated that they were willing to buy more French products, and 93% to buy regionally-sourced products.

In the UK, the government's School Food Standards practical guide also recommends fresh, sustainable and locally sourced ingredients (Department of Education, 2021). In this respect, the "*Food for Life Catering*" mark issued by the Soil Association (SA) provides independent endorsement that food providers are meeting the school food standards and serving food prepared from fresh, sustainable and locally sourced ingredients. To receive a silver award, the school must use local ingredients, which must represent at least 50% of the supplies to achieve the gold award. More than 50% of primary schools in England serve menus certified by the scheme.

The point of view of UK professionals

Focus group feedback:

- Consider locality a factor in reducing environmental footprint.
- Halal meat is more expensive if bought locally and so is sourced from abroad.
- Suppliers now provide more information about where food comes from

Interview feedback:

- Organisational aims around sourcing locally and supporting local suppliers
- Corporate Social Responsibility (CSR) commitments include sourcing locally
- Central Production Kitchens to act as hubs to distribute locally
- Local supply partners provide provenance for clients who want traceability information

The Soil Association's approach:

- *Caterers working on SA awards programmes are provided with a list and network of local suppliers. They are encouraged to buy seasonally to enable buying locally. There are SA training courses to explain why we ask caterers to purchase local products and the benefits*

○ **1.3 Reseasonalise products**

The need to source in-season fruit and vegetables is governed by the same considerations about imports as relocation. Fruit and vegetables, as well as fish and shellfish, are the food products with the highest share of imports in France (Barbier et al., 2019), whether they are fresh, frozen (nearly two thirds of volumes) or processed (one third of volumes). Imports (all uses combined) can therefore represent up to 40-50% of the volumes sold for the most consumed vegetables (tomatoes, cucumbers, courgettes) and between 39% (pears) and 74% (grapes) for fruit. Fruit and vegetables are also the most imported commodities in the UK (around 24% according to WRAP, 2021a), which produces only 54% of the vegetables and 16% of the fresh fruit it consumes (DEFRA, 2021c).

These imports supplement French and British production and enable the consumption of out of season fruit and vegetables (Barbier et al., 2019; DEFRA, 2021c). In France, vegetables come from Spain in May/June and from Morocco or other countries in winter. 50% of fruit comes from Spain, the Canary Islands, the Balearic Islands and Italy all year round; the remaining half comes from more distant areas (Africa, Latin America). Bananas and citrus fruits are the most imported categories of fruit, followed by melons (Spain), strawberries (Spain), pears (Europe and South Africa) and grapes (Italy). In the UK, to meet new consumption patterns, vegetables are mainly imported from Spain (33%) and the Netherlands (25%) and to a lesser extent from Germany, Ireland and Morocco (DEFRA, 2021d). Fruits are also largely imported from Spain (25%), but also from South Africa (15%), the Netherlands, Germany and Costa Rica. Citrus fruits are imported from Europe in November/December and from outside Europe in July/September.

With a peak in imports in December, fruits account for 16% of total transport demand for French food products and travel the longest distances (Barbier et al., 2019). Maritime transport is essentially used to move fruits, whereas road haulage is the main mode of transport for

vegetables coming from other French regions or European countries. Transport is the main source of greenhouse gas emissions in the carbon footprint of fruit, whereas for vegetables, agricultural production is clearly ahead of transport. As regards air transport, the food products that are most commonly transported as airfreight are fruit and vegetables (44% of volumes) and fish and shellfish (25% of volumes). However, according to Réseau Action Climat (2022), air transport emits about 40 times more emissions than sea transport. As mentioned above, in the UK fruit and vegetables are mainly imported by sea, which is the least CO₂ intensive mode of transport. Exotic fruits such as bananas, however, are imported by air.

In addition to the transport of imported fruit and vegetables, the method used for producing fruit and vegetables out of season (and more specifically the energy used to heat greenhouses) is a significant source of emissions. The production of vegetables in heated greenhouses emits 10 to 20 times more greenhouse gases than open field cultivation (Ademe, 2019). According to Ademe estimates (2022b), an out-of-season tomato, for example, emits four times more CO₂ than a tomato produced in an unheated greenhouse (0.51 kg CO₂eq/kg of product for an in-season tomato compared to 1.88 kg CO₂eq/kg of product for an out-of-season tomato).

The agribalyse database developed by Ademe (2022b) can be used to highlight the differences in the environmental footprint of a fruit (here tomato and strawberry) produced in season or out-of-season according to different indicators (**Table 9**).

● **Table 9. Environmental footprint of a fruit produced in or out-of-season (Agribalyse source)**

Indicator	Measure				Unit
	In-season tomato	Out-of-season tomato	In-season strawberry	Out-of-season strawberry	
EF single score ¹⁰	0.07	0.2	0.32	0.71	mPt/kg of produce
Climate change	0.51	1.88	0.47	0.67	kgCO ₂ eq/kg of produce

¹⁰ The lower the score, the lower the environmental impact. This unit-free single score is a weighted average of 16 indicators (see table below), calculated according to the European PEF (Product Environmental Footprint) methodology.

Ozone depletion	0.09	0.3	1.27	3.78	E-06 kg CVC11eq/kg of produce
Ionising radiations	0.28	0.36	0.26	0.22	kBq U-235eq/kg of produce
Photochemical ozone formation	1.17	3.74	1.71	2.08	E-03 kg NMVOC q/kg of produce
Particles	0.03	0.11	0.08	0.15	E-06 disease inc./kg of produce
Land and freshwater acidification	0	0.01	0.01	0	mol H+ eq/kg of produce
Land eutrophication	0.01	0.02	0.02	0.02	mol N eq/kg of produce
Freshwater eutrophication	0.09	0.45	0.14	0.2	E-03 kg P eq/kg of produce
Sea eutrophication	0.62	2.61	3.82	1.89	E-03 kg N eq/kg of produce
Land use	-7.74	6.38	31.62	19.35	Pt/kg of produce
Ecotoxicity for freshwater ecosystems	20.96	39.52	392.91	1153.21	CTUe/kg of produce
Depletion of water resources	1.99	2.7	7.75	9.37	m3 depriv./kg of produce
Depletion of energy resources	11.38	31.3	11.02	12.95	MJ/kg of produce
Depletion of mineral resources	4.86	11.36	7.29	17.84	E-06 kg Sb eq/kg of produce

While we did not find equivalent data for the UK, as the production methods are relatively the same, we can logically expect similar results.

The PNNS (French National Nutrition and Health Programme) includes recommendations concerning the consumption of seasonal fruit and vegetables in French public and private catering although local seasonal products are not much used in this sector. However, respecting seasonality would significantly improve the quality of fruit and vegetables in particular (Conseil national de la restauration collective, 2011). Planning purchases according to seasons and production times would also make it easier to control supply costs as ordering large quantities would make it possible to obtain seasonal products at a competitive price.

As with the sourcing of local products, procurers are required to respect the seasonality of products in the UK (DEFRA, 2021a) and more particularly in school catering (Department of Education, 2021), although no evaluation tool exists to monitor compliance with this measure. The "Food for Life Catering" mark ensures that participating schools provide seasonal menus.

The point of view of UK professionals

Focus group feedback:

- Organisational aims around using seasonal, local products
- Menu changes throughout year enable seasonality
- To meet Food for Life Served Here criteria, seasonality already incorporated
- Lack of availability into supply chain - most seasonal produce goes into supermarkets.

○ **1.4 Replace unsustainable fishery products with products from sustainable fisheries**

The FAO (2020) estimates that 34.2% of the world's wild fish stocks are now overexploited and that 59.6% of fish stocks are exploited at their maximum sustainable level. Overfishing and habitat destruction have significantly disrupted and degraded marine ecosystems around the world (Greenpeace France, 2018). The targeted capture of predators such as sharks or tuna, for example, has increased the number of small marine animals, resulting in increased algae growth. Marine corals are also threatened by beam trawling which damages the seabed. According to WWF (2022a), these trawls, as well as other fishing gears such as purse seines (as opposed to gillnets), also accidentally catch a number of other rare and wild, sometimes protected species which are then threatened. Dredges (i.e. metal structures that are towed along the seabed to harvest bivalves such as clams) reduce the quality of water. Water quality is also

threatened by oil, liquid and chemical spills. In fact, fishing is one of the main contributors to biodiversity loss in the oceans.

Among the possible solutions, the Global Seafood Alliance (Boyd, 2013) points out that in terms of carbon footprint, aquaculture products are almost neutral. Indeed, part of the carbon dioxide emissions from using manufactured feed products and mechanical aeration systems are sequestered in the ponds. According to the International Salmon Farmers Association (2015), the demand for farmed fish has now exceeded that for beef. As a result, more than 50% of fish and seafood is now from aquaculture. Whereas land-based agriculture alone cannot feed the world's population due to limited arable land and freshwater resources, aquaculture may provide a sustainable solution to feed the planet. For example, it takes 3.57 hectares of pasture to produce 1M kg of beef, while it takes only 1.6 hectares of ocean to produce the same amount of salmon. Moreover, fish feed production generates six times less greenhouse gas than cattle feed and almost three times less than pig feed. This makes fish, and salmon in particular, one of the most energy-efficient animal proteins to produce (less energy-intensive and more cost-effective). In terms of health, eating omega-3 rich seafood such as salmon would be beneficial on several levels, in particular to reduce coronary risks (-36%), improve life expectancy (+2.2 years) and lower cholesterol. Farmed salmon ultimately benefits the local economy and create jobs (52,000 direct jobs and 80,600 indirect jobs worldwide). Indeed, economic data show that where fisheries are sustainable, incomes also increase (European Economic and Social Committee, 2020). In the UK, central government investment in sustainable fisheries could create over 14,000 jobs and generate £2 billion per year (Sustain, 2021). However, WWF (2022b) warns against the ecological impact of some types of aquaculture (added chemicals and antibiotics, wastewater, escapees).

Beyond the ecological footprint, even though fish and shellfish, both wild caught or farm raised, are considered to be among the safest and most nutritious food, certain practices may increase food safety hazards. The Global Seafood Alliance (Global Sea Food, 2019) has identified three types of hazards:

- Chemical hazards resulting from drug residues in fish. They can affect humans when consumed (such as antibiotics). They can come from the improper use of chemicals during farming, or even from an aquaculture site being built on an area previously used

for agricultural processes that used chemicals and heavy metals (such as pesticides and herbicides).

- Biological hazards have to do with microbial sanitation and hygiene at the farming level, as well as at harvest and during transport. Sewage contains micro-organisms that can be harmful to humans. Food-borne pathogens (such as Salmonella) are also a biological food safety hazard.
- Contaminant risks occur when the product is contaminated somewhere along the production chain.

All these hazards and risks can be kept under control by implementing responsible practices in the form of quality marks such as the MSC (Marine Stewardship Council) label at international level, or the “pêche durable” label in France. The WWF (2022b) also makes recommendations based on the state of stocks, environmental impact and management of fisheries and aquaculture around the world.

For example, the UK government requires its buyers to source fish that comply with the FAO Code of Conduct for Responsible Fisheries (MSC, MCS, or equivalent labels). No red-listed or endangered fish species should be offered. The Sustain alliance behind the “Sustainable Fish Cities pledge”¹¹ notes that a number of large caterers and catering firms in the UK, such as Apetito, Aramark and Brakes, have committed to sourcing sustainable fish. Together, these companies serve over a billion meals a year. This government policy now covers all foodservices for central government departments, prisons and parts of the armed forces, which amounts to serving around 400,000 people a year with sustainable fish. Many universities and private companies are also involved. The obligation also theoretically extends to public hospitals, but in practice only half report compliance, and few controls are in place to encourage improvement.

On the French side, although government programmes for sustainable food in public and private sector catering are also moving in this direction, some establishments are not aware of these quality signs or are not familiar with them (Ademe, 2021a). This is the case for the “pêche durable” label for seafood from sustainable fisheries, a label that is less well identified than the MSC label but the only one currently recognised by the authorities.

¹¹ https://www.sustainweb.org/sustainablefishcity/whos_working_on_it/

The point of view of UK professionals

Focus group feedback:

- Corporate social responsibility targets around sustainable fish and seafood
- Replacing fish dishes with plant-based meals to reduce fish consumption
- Global targets mirroring UK strategy to increase sustainable fish / seafood
- Increasing variety / introducing new less known fish is difficult as consumers do not want them, particularly in schools

The Soil Association's approach:

- *Provide a list of sustainable fish and fish to avoid and ask caterers to use the list to inform purchasing. Caterers are also asked to source locally caught fish if they live near coastal areas*

● 2. IMPROVE MENUS AND RECIPES

Beyond purchasing practices, the food transition is also about what we actually have on our plate. The food we eat is too rich in greenhouse gases (Réseau Action Climat, 2022). And for lack of time or knowledge, or due to financial constraints, the over-consumption of meat and ultra-processed foods is quite common in public and private sector catering contexts.

Unhealthy, energy-intensive and a major source of greenhouse gas emissions, meat and ultra-processed foods are the main targets of programmes promoting sustainable and quality food. In France, the EGalim law (Conseil National de la Restauration Collective, 2020) highlights the need to introduce more plant-based protein sources into menus through the implementation of a plan to diversify protein sources and the experimentation of one vegetarian menu per week in school canteens, an experimentation that was introduced in 2019. The initiative was extended by the “Climate and Resilience” Act in 2021. An amendment by the French National Assembly (2021) also “*limits the use of ultra-processed foods to one ultra-processed food per meal if it is a single menu or two ultra-processed foods out of the total offer of the day if several dishes or menus are proposed*”. We will discuss these two legislative levers in the following sections.

- 2.1 **Reduce the share of meat on menus in favour of plant-based proteins (legumes)**

By 2050, the United Nations predicts a global increase of more than 75% in meat consumption (WWF, 2019b). The average meat consumption of a French person has increased fourfold in two centuries and now represents 86 kilograms of meat per year. The contribution of livestock farming to climate change is estimated at 14.5% (FAO, 2013 in WWF, 2019). According to Springmann et al. (2018), livestock production is responsible for the majority of greenhouse gas emissions (78%), 10% of the blue water footprint (abstracted water used for irrigation in particular), 20% of nitrogen and 25% of phosphorus use worldwide.

Whether produced conventionally or organically, animal-based products, in particular meat, account for the largest share of greenhouse gas emissions from food (Pieper et al., 2020). In France, these emissions vary from 1,908 kg CO₂eq per year for a heavy meat eater (170g /day) to 315 kg CO₂eq for a vegan, i.e. 6 times less (**Table 10**, Barbier et al., 2020). Animal-based products thus account for 89% of consumer emissions (Pointereau, 2019). This is due, on the one hand, to the inefficient conversion of animal feed into animal products (with a ratio of up to 43:1, i.e. 43 kg of feed are needed to produce 1 kg of beef), and on the other hand, to the building uses and methane emissions from the animal itself (enteric fermentation and excrement). Reducing the proportion of meat consumed per day by a French person by 10 g would result in a 5.2% reduction in total greenhouse gas emissions at the agricultural stage (Barbier et al., 2020).

- **Table 10. Greenhouse gas emissions (kg CO₂eq per capita per year) from agricultural production across different diets (Barbier et al., 2020)**

Agriculture conventionnelle	Viande_170g	Viande_75g	Viande_30g	Pescetarien	Vegetarien	Vegetalien
Céréales et oléoprotéagineux	82	73	74	85	87	98
Légumes	59	52	57	81	78	93
Fruits	40	37	37	40	39	47
Viande de volaille	81	38	18	1	0	1
Viande de porc	199	94	43	6	8	6
Viande ovine	274	117	53	4	8	10
Viande bovine	798	319	113	9	15	19 ¹²
Lait	303	243	213	215	196	25
Autres (sucre, pommes de terre, café, cacao, œufs, poissons...)	73	62	58	70	26	16
Total	1 908	1 036	666	511	457	315
Dont part produits animaux	90%	83%	73%	57%	53%	21%

The study by Scarborough et al. (2013) conducted on a sample of English consumers also points to a significant carbon footprint reduction, heavy meat eaters (more than 100g/day) and vegans

emitting 2,624 kgCO₂eq and 1,054 kgCO₂eq per capita per year respectively, i.e. a 60% reduction. The annual savings obtained per capita are equivalent to travelling 18,000 km by car, 143,000 km by train (11g of CO₂/km) or 7,800 km by plane (200 g of CO₂/km).

Animal products also account for 90% of the surface area needed to produce food for French meat consumers, i.e. 4,109 m² (Pointereau, 2019). Ademe (Barbier et al., 2020) indicates that there is a strong correlation between the surface area used and the level of meat consumption. The surface area needed ranges from 1,200m²/capita for a plant-based diet to 5,200m²/capita for a 170g meat per day diet, i.e. 4.5 times more (**Table 11**). At international level, the meta-analysis conducted by Aleksandrowicz et al. (2016) shows that the vegetarian diet reduces emissions by an average of 31% and land use by 51%.

● **Table 11. L Surface area needed across different diets (Barbier et al., 2020)**

Agriculture conventionnelle	Viande_170g	Viande_75g	Viande_30g	Pescetarien	Vegetarien	Vegetalien
Céréales et oléoprotéagineux	397	366	371	431	439	481
Légumes	85	76	82	109	108	129
Fruits	216	206	203	227	223	279
Viande de volaille	158	74	35	1	1	2
Viande de porc	371	176	81	12	14	10
Viande ovine	1 012	431	197	14	31	37
Viande bovine	2 201	880	313	26	40	52
Lait	647	520	457	464	421	53
Autres (sucre, pommes de terre, café, cacao, œufs, poissons...)	131	121	124	136	133	116
Total	5 218	2 850	1 862	1 421	1 411	1 159
Dont part produits animaux	85%	74%	59%	38%	38%	14%

Through land use modification or radical habitat change, agriculture has thus been identified as a primary cause of the exponential erosion of global biodiversity (WWF, 2019b). The inability of countries to produce all the feed they need for livestock breeding also contributes to imported deforestation and the conversion of natural ecosystems. France, for example, imports almost all the soya it needs from Brazil and Argentina, but also from the United States. As already mentioned, the UK imports some of its meat from European countries. Between 2005 and 2017, soya imported by the EU contributed to 31% of tropical deforestation (89,000 hectares lost per year) (Wedoux and Schulmeister-Oldenhove, 2021). A European citizen indirectly consumes an average of 61 kg of soya per year through the ingestion of animal-based products (WWF, 2019b).

In short, lower meat consumption would lead to a significant reduction in greenhouse gas emissions and less use of agricultural land. At the global level, a shift towards a diet based on more plant-based proteins would make it possible to reduce emissions by 56% and other environmental indicators (blue water footprint, land use and phosphorus and chemical nitrogen use) by between 6% and 21% by 2050. Taking into account nutritional recommendations alone would already result in a 29% reduction in emissions and a 5-9% reduction in other impacts (Springmann et al., 2018). In France, a vegetarian menu can thus have a carbon and soil footprint that is four times lower than that of a menu containing beef (Ademe, 2021a).

Reducing meat consumption in favour of plant-based proteins would also be beneficial to health. Meat consumption is still too high for some Western consumers. While a French adult consumed an average of 331g of meat and 191g of cooked meats per week in 2015, nearly 30% of male consumers ate more than what is recommended by the French National Nutrition and Health Programme (2019b), that is “*limiting the consumption of red meat (500 g/week) and cooked meats (150 g/week)*” and “*eating legumes (at least twice a week)*”. This excessive consumption of meat products, and especially of processed and industrial meat products, promotes obesity, cardiovascular diseases and certain cancers (WHO, 2015). In contrast, Aleksandrowicz et al. (2016) documented the positive effect of adopting a sustainable diet (complying with nutritional recommendations, replacing ruminant meat by poultry or pork, replacing part of the meat and dairy products by plant-based products, adopting Mediterranean, vegetarian or vegan diets) on health (reduced risk of mortality, longer life expectancy, reduced risk of colorectal cancer and type 2 diabetes). The effect ranges from 1% to 19%, with the Mediterranean diet, for example, reducing the risk of mortality by 18%.

In this respect, the EGalim law (Conseil National de la Restauration Collective, 2020) highlights the need to introduce more plant-based protein sources in catering menus in France. 41% of guests want alternative dishes (vegetarian or vegan) (Fernandez-Inigo and Magrini, 2019). However, 73 to 89% of primary school canteens and only 59% of secondary schools (years 7 to 10) and 52% of secondary schools (years 11 to 13) currently offer a vegetarian menu once a week (Ademe, 2021a). And 62% of all catering sites (all segments included) declare preparing alternative dishes for only two years (Fernandez-Inigo and Magrini, 2019). Lack of knowledge of the nutritional benefits of plants or of applicable legislation and the need to improve kitchen staff skills are obstacles to change. The survey conducted by INRAE (Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement) (Fernandez-Inigo

and Magrini, 2019) reveals, for example, that legumes are rarely on the menu (less than twice a week for most catering sites) and moderately appreciated by guests (popularity index of 2.7/5). However, 79% of the respondents consider legumes to be “interesting” and “innovative” products, and for a majority of them, they are easy to prepare. There is therefore a huge need for training among caterers who also want more recipes to diversify the legumes they serve and integrate them into their menus.

In the UK, the government is not planning any measures aimed at reducing the amount of meat on the menus served in the catering sector. However, the School Food Standards (Department of Education, 2021) encourage caterers to serve alternative non-dairy proteins and to offer a weekly meat-free day using alternatives such as pulses, soya hash, tofu and mycoprotein-based meat substitutes. Through the “20 percent less meat” campaign, public sector caterers are being encouraged to reduce the amount of meat served on menus in schools, hospitals, universities and old people’s homes by 20%. This reduction is identical to that proposed by the UK Climate Change Committee report published in January 2020 (Climate Change Committee, 2020a).

The point of view of UK professionals

Focus group feedback:

- They already use processed meat substitutes but would be open to using more pulses.
- Stigma around meat-free - concerns around use of language to promote meat-free meals.
- The uptake of meat-free meals is dependent on the character of certain groups/campuses
-

The Soil Association’s approach:

- *Encouraging less meat, increased pulses / vegetables, e.g. butternut squash / mushrooms, makes more impact.*

○ 2.2 Reduce the share of ultra-processed foods

The degree of food processing can be assessed using the NOVA classification (Monteiro et al., 2017). Four food categories are identified: unprocessed food (such as fresh fruit, vegetables and legumes, cut and packaged meat), processed ingredients (salt, sugar, animal and vegetable fats), processed food (canned foods, smoked foods, cheeses, breads) and ultra-processed food. The latter category is composed of ingredients that have undergone a series of transformations, such

as additives or supplements. They are most often ready-to-eat products such as sausages and ham or industrially fried vegetables.

In France, the consumption of ultra-processed food is increasing (Anses, 2017). Foods such as vegetables, cereals, meat and fish are increasingly consumed in processed form. The consumption of sandwiches, pizzas and other savoury pastries is also increasing. This type of food accounts for 31% of the average total energy intake (Calixto Andrade et al., 2021). The share of ultra-processed foods in the average French basket is however much lower than in the UK, which consumed an average of 51% of ultra-processed products in 2017, compared to 14% in France (Monteiro et al., 2017).

An ultra-processed product impacts the environment at all stages of its life cycle (Ademe, 2019; Fardet, 2018). At production level, it favours the creation of intensive monocultures of agricultural primary products that have a negative impact on biodiversity, involve increased recourse to pesticides and significant use of fertilisers and water. At the manufacturing and distribution levels, its transport emits pollutants and leads to the excessive use of non-renewable energy and water. In France, processed food products account for almost half of the transport demand (95 Gt/km, i.e. 47%) (Barbier et al., 2019). Finally, its production and consumption generate significant amounts of waste (plastic packaging).

Fardet (2018) also highlights its role in homogenising food practices, thereby contributing to social isolation and the disappearance of cultures.

By their very nature, ultra-processed foods have an impact on health. A study conducted at European level has shown a significant positive association between the availability of ultra-processed products and body weight (Monteiro et al., 2017). A trial carried out on 20 subjects (Hall et al., 2019) also found that in the short term, ultra-processed diets result in higher energy intake (+500 kcal) and weight gain (+0.9 kg). Their consumption promotes overweight and obesity, as well as associated metabolic disorders, such as diabetes, cholesterol or hypertension (Pagliai et al., 2021; Askari, 2020; Mendonça et al., 2017). In particular, they increase the risk of cancers (Fiolet et al., 2018). A daily intake of 50g of processed meat increases the risk of colorectal cancer by 18% (Bouvard et al., 2015). One of the reasons put forward is a lower nutritional quality (Salomé et al., 2021; Steele, 2017). Modelling by Salomé et al. (2021) suggests that eating more unprocessed or minimally processed foods could potentially prevent

25% of deaths associated with cerebrovascular diseases and 19% of deaths associated with diabetes.

Given the many constraints they have to face (time constraints, insufficient staffing level, limited budgets), caterers tend to rely heavily on processed and even ultra-processed foods, particularly for vegetarian menus (Ademe, 2021). In view of this, the Haut conseil de la santé publique en France has recommended that the National Nutrition and Health Programme (PNNS) include the objective of “*halting the increase in the consumption of ultra-processed foods (according to the NOVA classification) and reducing the consumption of these products by 20% over the period 2018-2021*” (Assemblée Nationale, 2021). This measure targets the public and private sector catering industry, which is required to limit the use of these products to 1 or 2 per day, i.e. 15% of the daily calorie intake.

So far, no similar measures have been taken in the UK. While central government programmes limit sugar and salt intake (e.g. snacks are limited to 35g or less), there are no plans to limit the consumption of ultra-processed foods (DEFRA, 2021a; Department of Education, 2021). In the face of this lack of government action, school food initiatives such as Food for Life, TastEd and others are advocating reducing their consumption (Soil Association, 2021).

The point of view of UK professionals

The Soil Association’s approach :

- *Within Food for life awards programmes, 75% of meals have to be cooked from scratch.*
- *Training given around replacing processed products e.g. meat substitutes, sauces. Encouraging them to cook from scratch and have control of what is going into their food.*
- *Highlighting salt / sugar / fat content of processed products.*
- *Job satisfaction - using skills, staff retainment as engaged in cooking, not just opening packets / reheating ready products.*

● 3. REDUCE FOOD WASTE

Reducing food waste is one potential lever for reducing the environmental footprint. As for the other levers of action, we will first examine the issues raised by food waste, before looking at the current situation of the catering sector in this respect.

○ 3.1 Food waste issues

Tackling food waste presents several cross-cutting environmental, ethical, social and economic issues. From an environmental point of view, food waste is a waste of resources and a source of pollution resulting from the production of uneaten food. Producing this food has indeed required farming unnecessary land, which implies a significant consumption of water, fuel, fertilisers and pesticides. The energy required throughout the life cycle of this uneaten food must also be taken into account. According to the FAO (Scialabba, 2013), 1.4 billion hectares, i.e. nearly 30% of the world's agricultural land area and 250 km³ of water, were used to produce food that ended up in the rubbish bin instead of the plate in 2007. Among the food wasted, the products with the greatest impact on the environment come from animals (beef, poultry, pork, milk), as they consume more resources. Quite logically, the FAO observes that the major contributors to the blue water footprint are cereals (52%) used to feed livestock and fruit (18%). Ademe estimates that in France, food waste represents 210 litres of water spent/capita/year, i.e. almost the equivalent of the amount of water used each year by a French person to satisfy his or her daily needs (showers, watering plants, toilets, etc.). Throwing away foodstuffs therefore amounts to leaving the tap running.

The carbon footprint of wasted food is also high. The FAO (Scialabba, 2013) estimates that food produced and not eaten generates 3.3 billion tonnes of CO₂ equivalent each year. Food waste therefore ranks as the 3rd top emitter of greenhouse gases after the United States and China. In France, according to ADEME (2016b), its carbon footprint is estimated at nearly 15.3 million tonnes of CO₂ equivalent, that is 3% of all greenhouse gas emissions from domestic activity, or 5 times the emissions generated by domestic air traffic and 1/3 of the emissions from private vehicles. 44% of this carbon footprint would be linked to food consumption (catering and home consumption). Again, meat products have the highest environmental footprint. In the UK, the Office for National Statistics (2021) reports that the carbon footprint of food waste is 38 million tonnes of CO₂ equivalent, i.e. 8% of UK emissions.

Food waste also raises ethical and social issues when one realises that in industrialised countries, food waste at consumer level is almost as high as the total net food production in sub-Saharan Africa (222 million tonnes wasted against 230 million tonnes produced) (FAO, 2011). Worldwide, 690 million people went hungry in 2019 (UN, 2020). In France, due to the

health crisis, 7 million people are reportedly in a situation of food insecurity, leading to a 15 to 20% increase in the food aid provided in 2020 compared to 2019 (COCOLUPA, 2021). In the UK, 1.5 million or 5.8% of UK households reported food insecurity in 2020 (Bramley et al., 2021). Beyond accessibility, food quality and variety are also an issue for people living in food deserts where food insecurity is high. The more food is wasted, the higher the demand on the global market, which leads to higher prices making it difficult for these people to access food.

In economic terms, the wastage of agricultural products (excluding fish and seafood) is estimated at \$750 billion per year worldwide (Scialabba, 2013). In France, the commercial value of lost or wasted food amounts to 16 billion euros across the supply chain (Ademe, 2016b). At the end of the chain, consumption, i.e. catering and home consumption, accounts for 45% of the economic cost of food waste. In the UK, the “avoidable” fraction of food and drink waste is estimated to be worth a total of £12.5 billion a year (almost €16 billion) (WRAP, 2013a). A report by WRAP and the World Commission on the Economy and Climate (2015) also indicates that by 2030, reducing food waste from global consumption by 20-50% could generate up to US\$300 billion in savings per year.

- **3.2 Food waste in the catering sector**

The role played by the catering sector is essential, as losses and wastage at this consumption level are much higher than at home. In 2011, the French Ministry of Agriculture estimated at 167g the weight of lost or wasted food per guest and per meal in the French catering sector (MAAPRAT, 2011). ADEME (2016b) calculated an overall loss and waste rate of 20%, including 3% of out-of-date or spoiled products, 5% of prepared but not consumed food and 12% of leftovers. For each guest, this corresponds to losses and waste of 116g/person/meal. Of all the catering segments, health and social care records the highest amount of loss and waste per guest at each meal (264g/person/meal on average), unlike workplace catering, which generates the lowest volume of loss and waste (125g/person/meal on average with a standard deviation of 35.4g) (MAAPRAT, 2011) The reasons put forward by the French Ministry of Agriculture to explain this high level of food waste in healthcare catering include hygiene and cold chain disruptions, while the more adult profile of guests, who are offered more varied and tasty meals at a higher price explain the lesser level of food waste at workplace catering sites. As far as school catering is concerned, secondary schools are less successful than primary schools (179 to 200g for secondary schools against 110 to 130g per person and per meal for

primary schools). The main reasons put forward are a lack of awareness among pupils and staff, the imposed menu, the often lower taste quality of food and a lack of time to eat.

In all three catering segments, the results may vary depending on the supply chain and the kitchen operating mode. A hub kitchen serving several satellite kitchens will have more losses and waste since it prepares the dishes that generate waste. This waste will also be greater if the kitchen works with raw (vs. industrial) products. Indeed, a hub kitchen where food preparation is more akin to mixing products purchased in a more or less elaborate state produces less bio-waste (11 g/meal on average, compared to 125 g/meal for satellite kitchens regenerating food), as some of the traditional food preparation stages have already been taken care of by the agri-food industry (GNR, 2011).

The food products that are most often lost or wasted in public and private sector catering settings are above all bread (when it is made available at the beginning of the meal and is free) and fresh vegetable dishes (school catering).

In the UK, almost a million tonnes of food is thrown away each year at hospitality and foodservice outlets, 75% of which is avoidable. This is equivalent to over 1.3 billion meals, or throwing away one in every six meals (WRAP, 2017). According to WRAP (2015), 21% of food waste in catering arises from spoilage, 45% arises from food preparation and 34% is generated from customer plates. The cost of food being wasted in this sector was estimated at £2.5 billion per year. Preventing this waste has the potential to reduce greenhouse gas emissions by 2.7 million tonnes (CO₂eq). The lowest wastage rates are associated with quick service restaurants and workplace catering, where lighter meals are served and/or where snacks and “grab and go” catering is more prevalent. The amount of food that is wasted is thus influenced by a number of factors, such as: the amount of on-site food preparation, over-production of meals, menu choice and the extent to which consumers leave food uneaten. The most wasted foods are carbohydrate foods (40%) such as potatoes (21%), bread (12%) and pasta/rice (7%). This is followed to a lesser extent by fruit and vegetables (15%) and meat (6%). The rest is unavoidable waste such as peelings.

In its 2011 study (MAAPRAT, 2011), the French Ministry of Agriculture reported that the majority of stakeholders in the catering and food distribution sectors consider food loss and waste to be a growing problem that occurs across the production, distribution, preparation and

consumption chains. They are also well aware that food waste is preventable and has important economic as well as environmental consequences. However, they stress the lack of knowledge or measurement tools to assess the volumes wasted and express difficulties in implementing food donation. The study highlights three critical phases during which food waste occurs: before the meal (preparation in the kitchens), during the service (return of trays) and after the service (surplus management).

In the kitchens, catering professionals have difficulty estimating the number of guests and therefore the quantities of food to prepare. Even when the number of guests is higher than estimated, particularly in school catering, waste at the end of the service remains equivalent due to food preparation (cleaning, peeling, etc. of fresh fruit and vegetables). Certain practices designed to save time, facilitate work or eliminate certain chores also encourage waste, such as peeling vegetables by machine rather than by hand. In addition, the portion sizes recommended by the GEMRCN are generally increased by kitchen staff, especially for vegetables and starchy foods. Meal trays consisting of five dishes (vegetables and/or starchy foods, cheese or other dairy products, dessert, plus bread and sometimes salad and fruit) may also represent a cause of waste.

In the lunch room, size portions that are too large, inadequate for the age, size or stature of the guest, is a source of waste. The layout of the self-service area and the general organisation of the restaurant are also mentioned by some professionals. The forecast number of guests also plays a role at this stage.

At the end of the meal, the time available for the guest to eat, his or her overall attitude towards food (not very concerned about waste vs. strong ecological/ethical awareness) or the general atmosphere (particularly in school catering) all play a role in food wastage. On a more technical level, strict hygiene or dietetic rules are mentioned by professionals as a cause of food wastage. For example, a yoghurt left on a tray will be thrown away at the end of the service due to cold chain disruption concerns. Contract caterers are also required to comply with a set of specifications that are sometimes stricter than current recommendations. For example, in a workplace restaurant, the level of service provided must be the same at the beginning and at the end of the service. In school catering, some specifications require greater portion sizes than recommended. In health and social care catering, the wide variety of nutritional profiles (between 27 and 30 depending on the establishment) and compliance with the nutritional

recommendations in terms of daily calories (1650 – 2000 kcal/day depending on the patient) despite the poor appetite of patients inevitably lead to more leftovers at the end of the day.

WRAP (2015) also highlights these same sources of food loss and wastage and suggests a number of waste prevention opportunities in meal planning (menu rotation, 12-step design), demand forecasting (meal pre-selection), procurement (temperature classes, size and frequency of deliveries, packaging), food storage and stock management, meal preparation, portioning and service, consumer and staff behaviour, contract management, as well as waste control and waste management.

Since 2020 in France, the objective is to reduce food waste in food distribution and public and private sector catering by 50%, compared to 2015 levels, by 2025 (République Française, 2020a). At the end of 2019, the EGalim law (Conseil National de la Restauration Collective, 2020) extended the obligation to have a food waste prevention plan in place to private sector caterers, as well as the prohibition on making edible surplus food unfit for consumption (early 2020). Caterers preparing more than 3,000 meals per day are also required to have a donation agreement with an authorised charity.

Food waste is also an issue of great concern in the UK (DEFRA, 2021a). Caterers providing on-site catering services are required to create a food waste minimisation plan describing what actions they intend to take, to regularly review and revise these actions, and to inform their clients of progress and results. In particular, the contracting authority shall check whether a separate food waste collection service can be provided. They are also strongly encouraged to train their staff and to distribute surplus food as donations to charities and food banks.

230 leading players, representing 25% of the hospitality and foodservice sector, signed a three-year voluntary agreement developed by WRAP (Hospitality and Foods Service Agreement "HaFSA", 2017) to reduce their food waste. At the end of the period, the programme helped reduce food and packaging waste by 11% (exceeding the initial target of 5%), prevented the loss of 24,000 tonnes of food (worth £67 million), doubled the redistribution of surplus food (1.5 million meals redistributed) and increased recycling from 42% to 56%. Through the FoodSave project, WRAP also helped 91 establishments to reduce their waste, resulting in an average annual reduction of 149 tonnes of waste (41g per meal) and savings of £551,694.

The point of view of UK professionals

Focus group feedback:

- Gaps in knowledge around waste processes, i.e. what happens to food waste?
- Disposing of food waste in an anaerobic digester is very expensive.
- Time consuming - need to make environmental / financial case = make as easy as possible.
- Informs / influences nutrition.

The Soil Association's approach:

- *As part of awards programmes, caterers are encouraged to monitor their waste regularly and use a food minimisation document to evidence steps to take to minimise food waste*

- **4. IMPROVE KITCHEN MANAGEMENT**

The food transition is also about improving kitchen management. Significant energy savings can be achieved at meal preparation phase whilst reducing packaging and plastic use can help reduce food-related waste. Waste sorting should also be improved.

- **4.1 Reduce energy and water consumption when preparing meals**

Our water and energy resources are not unlimited. It is predicted that by 2030, due to global population growth and climate change, the world will need to produce 50% more food, 45% more energy and 30% more freshwater (Beddington, 2009). Food security is therefore high on the agenda of many governments, including France and the UK. Using the resource sparingly and reducing greenhouse gas emissions from the food system is a challenge for both countries.

Food catering is a water and energy intensive activity. In the UK, catering facilities are responsible for approximately 24 TWh/year energy use (i.e. approximately 13% of total energy use by non-domestic buildings) and for approximately 6.0 MtCO₂eq emissions (Amaris et al., 2015). More than 40% of the energy used in the catering sector is from non-commercial catering facilities such as schools, hospitals and other public institutions. Among the most important

items, the kitchen accounts for 26% of the energy used (6.24 TWh), with 1.3 million tonnes of CO₂ emitted per year (Amaris et al., 2015). Around 40% of the energy used in kitchens is used for cooking, 28% for refrigeration, 17% for air extraction and 5% for dishwashing (Carbon Trust, 2012). The study by Mudie et al. (2013) adds further detail to these consumptions and evokes much higher energy use figures: 41% for refrigeration (70 kWh), 13% for deep fryers (11 kWh), 12% for combi ovens (35 kWh), 9% for bain-marie (27 kWh) and 12% for grills (37 kWh). Behavioural factors and poor maintenance are also identified as the main contributors to excessive electricity consumption with potential savings of 70 and 45%, respectively.

In France, it takes an average of 2.5 kWh to prepare a hot meal in a cook-and-serve system, compared to 1 kWh/meal in a cook-chill system (Energie+, 2007). Depending on the source, the energy needed to produce a meal varies by item (**Table 12**), but on average, ventilation accounts for 30%, cooking 28%, domestic hot water 16%, refrigeration 11% and lighting and other uses 15%.

• **Table 12. Energy used to prepare a meal by item (Energie+, 2007)**

	Concevoir Gérer Programme – Ademe – Pyc Édition (2014)		Metering by Direction des Etudes et Recherches - EDF	
	Cook-and-serve system	Cook-chill system	Cook-and-serve system	Cook-chill system
Cooking	350 -2 000 Wh/meal	150-400 Wh/meal	Energy use: 363 - 2, 030 Wh/meal Power: 329-986 W/meal	Energy use: 167-386 Wh/meal Power: 136-270 W/meal
Refrigeration	Energy use: 50-90 Wh/meal Power: 6-8 W/meal	Energy use : 200 - 300 Wh/meal Power: 10-30 W/meal	Energy use: 46-580 Wh/meal Power: 5.7-45.8 W/meal	Energy use: 190-300 Wh/meal Power: 11.8-28.6 W/meal
Washing*			Energy use: 258 Wh/meal Power: 170 W/meal	Energy use: 150 Wh/meal Power: 30 W/meal
Domestic hot water*	Energy use: 150 - 1, 300 Wh/meal Power: 10-500 W/meal		Energy use: 725 Wh/meal Power: 190 W/meal	Energy use: 270 Wh/meal Power: 40 W/meal
Heating and ventilation :			473 Wh/meal	305 Wh/meal
*Total water use varies from 3 to 15 litres per meal				

Several energy saving opportunities have been identified in relation to lighting, ventilation and more efficient cooking/refrigeration equipment (Amaris et al., 2015). For example, replacing obsolete equipment with more energy-efficient appliances leads to a significant reduction in energy consumption (annual savings ranging from 31.1% to 52.8%). Savings can also be achieved by using demand-controlled kitchen ventilation.

In 2007, water consumption in the UK food and drink industry was estimated at 412 million m³, of which 41.1% was for catering (WRAP, 2013b). While the industry achieved a 13.3% reduction in 2010, catering only reduced its consumption by 7.5% and still accounted for a significant proportion of total industry water use (around 43.8%). Consumption in this sector is mainly related to food preparation (food washing, cleaning of preparation areas and equipment, cooking, food waste disposal and dishwashers/glasswashers) and includes water use by employees and customers. In France, it takes between 10 and 20 litres of water to prepare a meal in the public and private sector catering industry (CREAQ, 2005). Dziegielewski et al. (2000) estimate that about 52% of water consumption is due to equipment (especially dishwashers/glasswashers) and 17% to landscaping, refrigeration and heating systems, and other uses.

A series of best practice procedures were published by the Office of Environmental Sustainability to reduce water consumption in kitchens (Amaris et al., 2015). With regard to water used by employees and customers, the catering industry could adopt measures implemented in other sectors. For example, hotels have managed to reduce water consumption by an average of 25% per day and per guest thanks to the use of efficient water saving measures (push taps and trigger hose spray taps, infra-red controlled waterless urinals). Subramanian et al. (2021) have also developed an audit tool based on the life cycle assessment of the food waste-energy-water-emissions nexus at commercial kitchens (FEWE). The tool comprises several indicators to monitor and quantify energy and water consumption, cooking emissions, food waste generated, and the type and efficiency of equipment used. The results should enable decision-makers to optimise water and energy use by improving energy efficiency.

The UK has an energy management policy for off-site and on-site catering operations (DEFRA, 2021a). Catering service contractors with off-site preparation kitchen operations shall have in place an energy management policy appropriate to the nature and scale of their energy use and

consumption. Their policy shall commit the organisation to continual improvement of its energy performance. On-site catering operations shall be run in accordance with the host building's overall energy management policy. The minimum mandatory Government Buying Standards for catering equipment shall apply as well as the duty under Article 6 of the Energy Efficiency Directive. Kitchen taps shall have flow rates of no less than 5l/min and non-flow rate elements shall meet the Enhanced Capital Allowance Scheme (ECA) Water Technology List criteria.

In France, less thought has been given to the energy management of catering operations. The standards for energy-efficient buildings resulting from the Law on the Energy Transition for Green Growth (Ministère de l'Environnement, de l'Énergie et de la Mer, 2016) apply to the public and private sector catering industry. However, there is no energy management policy in place at an individual level.

The point of view of UK professionals

Focus group feedback:

- Monitoring can be a challenge, i.e. potential problems isolating certain datasets, like water usage in the kitchen, to audit progress.

The Soil Association's approach:

- *Caterers often have a lack of policy around energy / water consumption. For example a cleaning policy to clean lights and windows could help reduce electricity use but may not be in place. SA encourage training to increase awareness e.g. low energy cooking, turning off appliances*

○ **4.2 Reduce packaging and the use of plastic**

Packaging is used to protect and preserve the food it contains. It avoids food waste and loss, but is not without environmental consequences. According to the meta-analysis by Poore and Nemecek (2018; 2019), in 2010 food packaging was responsible for 0.65 GtCO₂eq greenhouse gas emissions, for the acidification of 3.5 MtSO₂eq of land and for the eutrophication of 0.6Mt PO₄³-eq of water.

A study conducted by the National Zero Waste Council in Canada showed that packaging accounts for an average of 5% of the greenhouse gas emissions of a food product (Gooch et al., 2020). The scenario analysis conducted compares the greenhouse gas emissions of 12 representative food products and their packaging (**Table 13**). The food where the footprint of packaging represents the highest percentage of that product's total footprint is dried pasta at 60%. This analysis gives an idea of the carbon footprint of packaging in a French or English context.

● **Table 13. Food item and packaging tCO₂eq per tonne of food**

Aliments	tm éq. CO ₂ de l'aliment	Matériau d'emballage de l'aliment	Masse de l'emballage (tm)	tm éq. CO ₂ de l'emballage en matériaux vierges	Total de tm éq. CO ₂ (aliment et emballage)	tm éq. CO ₂ de l'emballage exprimée en % de l'éq. CO ₂ total du produit
Légumes en feuilles	0,49	PET en coquille	0,11	0,260	0,75	35%
Baies	0,49	PET en coquille	0,10	0,244	0,73	33%
Pommes	0,49	Sac en plastique (PEBD)	0,01	0,012	0,50	2%
Lait liquide	1,93	Carton	0,03	0,270	2,20	12%
Yogourt	1,93	PP (couvercle et contenant)	0,04	0,065	2,00	3%
Burgers de bœuf (surgelés)	33,16	Carton	0,08	0,702	33,87	2%
		Sac en plastique	0,004	0,008		
Sucre granulé	4,03	Papier	0,01	0,059	4,09	1%
Crevettes surgelées	4,03	Sac en plastique	0,06	0,119	4,15	3%
Pain tranché	4,03	Sac en plastique (PEBD)	0,02	0,044	4,08	1%
Pâtes sèches	0,68	Carton	0,12	1,034	1,72	60%
Poulet frais	2,70	Barquette en PS	0,02	0,067	2,86	5%
		Pellicule et buvard absorbant	0,04	0,088		
Filets de poisson frais	4,03	Barquette en PS	0,04	0,101	4,27	5%
		Pellicule et buvard absorbant	0,07	0,132		
TOTAL	58,01		0,75	3,20	61,21	5%

The carbon footprint of packaging is therefore not so high compared to the production of the food itself and its transport. Packaging avoids food loss and waste and therefore reduces potential emissions. For example, having packaged a 330g sirloin steak in optimised packaging

would result in a 2,106g reduction in CO₂eq: 2,100g from preventing the beef from going to waste and 6g from optimising the packaging. (Denkstatt, 2015 *in* Gooch et al., 2020)

However, food packaging has other noxious effects on the environment. Food packages, especially those made of plastic, may end up in the environment and are now the most common waste collected on beaches (4.7 million food packages collected from 39,358 km of beaches in 116 countries) well ahead of cigarette butts (Parker, 2020). In the sea, they join other waste in an accumulation area that some people call the seventh continent given its impressive size (about six times the size of France). Over 5 trillion pieces of plastic currently litter the ocean (The Ocean Cleanup, 2022). These plastics carry chemical pollutants at levels that appear to be high enough to represent a health risk for marine organisms ingesting them (Chen et al., 2018). They also impact the productivity of some of the world's most important marine ecosystems, such as coral reefs and mangroves (Tekman et al., 2022). Manufacturing packaging ultimately requires significant energy and water resources (Pacific Institute, 2007) and often involves polluting materials (such as bisphenol A, phthalates, hydrocarbons, aluminium or micro-plastics) (SIGA, 2019). Packaging therefore represents a health risk for humans because of its migration into the food consumed, or its absorption in the natural environment by fish, animals or even the fruit and vegetables subsequently consumed.

As regards immediate consumption, the French out-of-home foodservice market generated 718,691 tonnes of single-use packaging in 2018 (Citeo and Ademe, 2018), i.e. +3.7% compared to 2012 in a context of stable patronage over 6 years. Public and private sector catering produces 20% of this volume, 76% of which is attributable to workplace catering, with a fairly balanced distribution between glass (36%), paper-cardboard + carton (32%) and plastic (23%). In the health/social care and school catering segments (24% of remaining volumes), plastic prevails (40%). It should be noted that these figures do not take into account commercial/industrial size packaging used by professionals (such as draught beer kegs) and those used in the preparation of meals in the kitchen (such as packaging for a butter pack or a bag of chips).

In the UK, 1.3 million tonnes of food packaging and other 'non-food' wastes (cleaning products and other supplies) are discarded each year in the hospitality and foodservice sector (Hollins, 2013). 66% is recycled (particularly glass and cardboard/paper). 56% of packaging and other

‘non-food’ wastes that are thrown away could have been readily recycled, resulting in GHG savings of 0.4 MtCO₂eq. Only 16% of packaging and other wastes are not readily recyclable.

With the support of the British government, WRAP launched the Hospitality and Food Service Agreement in June 2012. This agreement aims to reduce food waste and associated packaging by 5% and increase recycling by 70% or more. The Education Secretary is also urging all schools to eliminate the use of single-use plastics by 2022 (Department for Education & The Rt Hon Damian Hinds MP, 2018). In line with this, WRAP jointly launched with the Ellen MacArthur Foundation in 2018 the “UK Plastics Pact”, the first global pact against plastics (WRAP, 2022a). This initiative brings together companies from across the plastics value chain, UK governments and NGOs to work towards a circular economy for plastics. The pact has four targets (WRAP, 2021b): eliminate problematic or unnecessary single-use packaging through redesign, innovation or alternative (reuse) delivery models; 100% of plastic packaging to be reusable, recyclable or compostable; 70% of plastic packaging effectively recycled or composted; 30% average recycled content across all plastic packaging. Since its implementation, the pact has delivered significant results: a 46% reduction in plastic items since 2018; 70% of plastic packaging is now reusable or recyclable; 52% of plastic packaging is recycled (+44% compared to 2018); 18% recycled material (+9% compared to 2018). Among the pact members that account for two-thirds of packaging used in the UK, however, only three are from the Hospitality and foodservice industry. There is still significant room for improvement in this sector.

Measures have also been taken in France regarding the substitution of plastic food containers in certain sectors of the catering industry. Since 2020-21, the use of still water plastic bottles, as well as all single-use utensils (plastic tumblers, glasses and plates, straws, cutlery, steak picks, glass lids, meal trays, ice cream pots, salad bowls, boxes and stirrers for beverages) have been banned in school catering (République Française, 2021). The EGalim law (République Française, 2018) also provides for the elimination of plastic cooking, reheating and serving containers by 2025 in school and university catering services, as well as in establishments catering for children under the age of six. Implementation has been delayed to 2028 for local authorities with fewer than 2,000 inhabitants. The “Agec” law (République Française, 2020b) extends this ban to paediatric, obstetric and maternity wards, local perinatal centres and the services mentioned in Chapter I Title I Book I of the second part of the Public Health Code (maternal and child health services (Article L2111-2)).

However in France in 2019, no hub kitchen had become plastic-free (Agorès, 2019). The operating model and local budget constraints limit the room for manoeuvre (Ademe et al., 2021; CNA, 2021). Moving away from plastic involves rethinking a multitude of practices and procedures, and even reinventing processes or creating uses that did not exist before. Many initiatives are nevertheless emerging to find alternatives to plastics (Laville et al, 2019). Since 2019, the school canteens of the City of Montpellier, for example, have replaced plastic trays with containers made of plant cellulose from sustainably managed forests, which are 100% compostable. The school canteens of the City of Strasbourg have opted for reusable stainless steel containers.

The point of view of UK professionals

Focus group feedback:

- Existing initiatives/solutions: My Cup, Vegware.
- Gaps in knowledge: What is the correct way to dispose of compostable packaging? Consumers often get this wrong

The Soil Association's approach:

- *Encouraging customers to bring their own utensils for takeaways etc.*
- *Not having plastics available - work with suppliers, reduce individually wrapped items.*

○ **4.3 Improve sorting practices**

In 2018, France generated 342 million tonnes of waste, i.e. 5.1 tonnes per capita (Haeusler et al, 2021). 66% was recycled (+11% in ten years), 28% disposed of (-21% in ten years) and 6% recovered (+48% in ten years). The United Kingdom generated 222.2 million tonnes of waste in 2018 (with England responsible for 84% of the UK total), i.e. 3.3 tonnes per capita (DEFRA, 2021e). 50% of this waste was recycled or recovered (+5.3% in two years), the rest was disposed of (incineration with or without energy recovery, backfilling, landfill, land treatment and release into water bodies). While governments are moving towards zero waste, some waste remains unavoidable, in particular bio-waste (banana peel, melon rind, egg shells, bones, etc.).

Beyond the impacts in terms of waste and packaging, the treatment of bio-waste has also detrimental effects on the environment.

By its very nature, the incineration of bio-waste, which is 60-90% water, requires a significant amount of energy (CNIID, 2022). Some of the incineration plants therefore propose to recover the energy produced by their combustion to produce heat or electricity. Nevertheless, incineration remains a polluting process that emits toxic substances (20-25% of the incoming tonnage comes out in the form of unburned residues, non-combustible materials, ashes, etc.) and toxic flues (3% in the form of hazardous waste from flue gas purification) according to the Zero Waste France association (Turchet, 2015a). It is also an expensive treatment with an average cost of about €120 per tonne of waste treated in France. On the other hand, the decomposition of bio-waste stored in landfill sites results in polluted liquid materials called leachates which, over time, may seep into the soil and contaminate groundwater with potentially carcinogenic chemicals. Landfill in France is subject to a “general tax on polluting activities” paid by the operators. Landfilling one tonne of waste currently costs about €80 on average in France (Turchet, 2015b). Burying waste therefore also generates nuisance and pollution.

All these treatment solutions emit greenhouse gases. According to the Haut Conseil pour le Climat (Fontain et al. 2021), 4% of greenhouse gas emissions in France in 2019 were related to waste management (15 MtCO₂eq) and more particularly to waste storage (83% of emissions). After a 2.4% decrease over the 2015-2018 period compared to 2011-2014, these emissions increased again slightly in 2019 compared to 2018 in France (+1.6%). The results are similar in the UK, where 4% of greenhouse gas emissions were attributable to the waste management sector in 2019 (DEFRA, 2020). 89% of these emissions were methane, a gas with 25 times the global warming potential of CO₂ (Ministère de la transition écologique, 2022). Contrary to France, the emissions from the waste management sector continue to decrease (-7% between 2019 and 2020, -1% between 2018 and 2019, -73% between 1990 and 2020).

Waste sorting is therefore an essential part of the circular economy. It contributes to saving natural resources by avoiding the waste of materials through recycling, thus limiting the pollution generated by the extraction of natural resources, the transport and manufacturing of products, and waste management (landfill and incineration).

Sorting at source also contributes to saving non-renewable natural resources (Select'om, s. d.). One tonne of sorted glass packaging contributes to saving 660 kg of sand and 1.17 m³ of water, one tonne of sorted aluminium packaging 2,440 kg of bauxite (the principal ore of aluminium) and 1.07 m³ of water; one tonne of sorted paper/cardboard packaging 1,410 kg of wood and 48.20 m³ of water; and one tonne of sorted plastic bottles and containers 610 kg of crude oil and 300 kg of natural gas.

The next step to sorting is recycling, which contributes to saving 15 million tonnes of CO₂ and 32 TWh of fossil fuel in France each year (Haeusler et al., 2021). According to WRAP (WRAP, 2021c), increasing the use of recycled materials in the UK could contribute 16 Mt CO₂eq to the 6th Carbon Budget (2033-37) and up to 279 Mt CO₂eq by 2050 including imported emissions (equivalent to taking all of the UK cars off the road for around 4 years). Globally, the Drawdown project estimates that between 2020 and 2050, recycling will reduce carbon dioxide emissions by 5.5 to 6.02 gigatonnes (equivalent to taking more than a billion cars off the road for a year). Recycling also creates jobs. According to a report by the NGO Gaia (Gaia, 2021), recycling creates 50 times more jobs than landfills and incinerators. The waste management sector contributed to the direct employment of 113,250 people in France in 2018 (Haeusler et al, 2021) and has the potential to create up to 60,000 jobs in the UK (WRAP, 2021c).

As already discussed, the amount of waste generated by the public and private sector catering industry is significant. Since 2010 in France, the Grenelle 2 law (Préfet de la Meuse, 2013) stipulates that entities that produce or hold a significant amount of bio-waste are required to sort it at source for organic recovery. This measure should make it possible to achieve the 75% recycling target for non-hazardous waste from economic activities, excluding construction and public works, agriculture and the agri-food industry, and to reduce by 15% the volume of waste sent to landfill or incineration. The 2020 Agec law (République Française, 2020b) reduced the deadline for sorting at source bio-waste, which should become effective at the beginning of 2023 for operators producing more than 5 tonnes of bio-waste per year.

The total amount of waste generated annually in the UK by the hospitality and foodservice sector is 2.871 million tonnes, of which 46% is recycled, sent for anaerobic digestion or composted (Hollins, 2013). 12% of food waste and 62% of packaging and other “non-food” waste is recycled. The highest level of recycling is for glass and cardboard. However, 56% of packaging and other non-food waste that is thrown away could have been readily recycled. We

were unable to find specific data on waste sorting in the UK catering industry, but these figures do provide a general overview of current practices in the sector. For example, the UK aims to reduce edible food waste by over 50% by 2030 and over 60% by 2050, compared to 2007 levels (Climate Change Committee, 2020b). In addition, the landfilling of biodegradable waste will be banned by 2025.

In France, about one third of the plate content is thrown away in public and private catering facilities (CNFPT, 2017), i.e. almost one billion meals per year. We have not found equivalent data on waste sorting in this sector in the UK, but according to the study conducted by the local authority association Amorce in France in 2019 (Amorce, 2019), sorting bio-waste at source is not yet widespread (only 65% of the local authorities surveyed have put in place separate collection systems in their catering facilities). The largest producers of waste concerned by the current legislation seem to be more involved in this process (secondary school canteens vs. primary school canteens). Composting is the preferred bio-waste treatment solution.

The point of view of UK professionals

Soil Association approach :

- *Make visible / clear where waste / recycling goes. E.g. plate waste - with separate practices for consumer or kitchen staff?*
- *Make case why consumers / caterers are being asked to recycle - have infographic, data to encourage sorting*
- *Up-to-date data - share gains on recycling / food waste reduction with consumers.*

● **5. SYNTHESIS: COMMONALITIES AND DIFFERENCES BETWEEN THE TWO COUNTRIES**

The commonalities and differences between France and the UK in terms of the levers of action towards more sustainable food in the public and private sector catering industry are summarised in the following table.

● **Table 14. Synthesis of commonalities and differences between the two countries**

	Commonalities	Differences
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Improve purchasing practices		
<p>Replace conventional products with the same organic product</p>	<ul style="list-style-type: none"> • Consumption of organic vegetable and dairy products reduces greenhouse gas emissions, agricultural land use and energy consumption. • Organic farming improves soil and water quality and biodiversity. • Consumption of organic produce reduces exposure to pesticides and increases nutritional gains. • The share of the catering budget devoted to organic food is increasing, especially in school catering. 	<ul style="list-style-type: none"> • In France, the EGalim law sets a target of 20% organic labelled products in all private and public sector catering segments • In the UK, 10% of products purchased by Food and catering services must comply with strict environmental production standards. This may involve the purchase of organic labelled products but not only. This obligation is also limited to public procurers.
<p>Relocate products</p>	<ul style="list-style-type: none"> • Fruit and vegetables are among the most imported commodities in France and the UK. • Food from countries outside Europe (Africa, Asia, North and South America) contributes to deforestation. • Transport, particularly road transport, has a significant impact on the carbon footprint of food (eco-score of 100 for France, 76 for the UK). • Maritime transport, which is less polluting, is essentially used to import food from outside Europe, particularly exotic fruit and soya. • School catering is making notable progress in local sourcing but there is still considerable room for improvement. 	<ul style="list-style-type: none"> • Animal feed accounts for most of the imported volumes in France, unlike the United Kingdom, which imports most of its meat. • Almost 50% of French imports are of European origin, compared to 80% for the UK. • The majority of UK imports are by sea, which generates significantly lower emissions than road transport used by France to import fruit and vegetables • While there are laws in France governing the sourcing of local produce, only recommendations are issued at UK level.
<p>Reseasonalise products</p>	<ul style="list-style-type: none"> • Imports are used to supplement French and British production and enable the consumption of out-of-season fruit and vegetables. • Spain is the main supplier of fruit and vegetables to both countries. • Fruit, particularly exotic fruit, is transported by air, which emits 40 times more emissions than sea transport. • The production of vegetables in heated greenhouses emits 10 to 20 times more greenhouse gases than open field cultivation. 	<ul style="list-style-type: none"> • Maritime transport, which is less polluting, is the preferred mode of transport for importing fruit and vegetables into the UK. In France maritime transport is used for fruit whereas vegetables imported into France are transported by road. • Respecting the seasonality of fruit and vegetables served in public and private sector catering facilities is recommended by the National Nutrition and Health Programme in France, while it is required of public procurers in the UK, particularly in schools. However, there is no tool to evaluate its implementation.
<p>Replace unsustainable fishery products with products from sustainable fisheries</p>	<ul style="list-style-type: none"> • Overfishing threatens marine ecosystems and biodiversity. • Aquaculture may provide a sustainable way to feed the planet. • Chemical, biological and contaminant risks associated with 	<ul style="list-style-type: none"> • While in the UK the supply of sustainable fish to the catering industry seems to be well established, there is still considerable room for improvement in France where the only recognised label, “pêche

	<p>some fishing practices may increase food safety hazards</p> <ul style="list-style-type: none"> • These hazards and risks can be kept under control by implementing responsible practices in the form of quality signs such as the MSC (Marine Stewardship Council) label at international level, or the “pêche durable” label in France. 	<p>“pêche durable”, is still poorly identified.</p>
<p>Improve menus and recipes</p>		
<p>Reduce the share of meat in menus in favour of plant-based proteins (pulses)</p>	<ul style="list-style-type: none"> • Animal products, especially meat, account for the largest share of greenhouse gas emissions from food. • The level of meat consumption is positively correlated with the amount of agricultural land used. • Livestock feed contributes to deforestation and the destruction of biodiversity. • The over-consumption of meat by Western consumers is detrimental to their health (obesity, cardiovascular diseases, cancers). • Reducing meat consumption reduces the carbon and soil footprint of consumers and improves their health. 	<ul style="list-style-type: none"> • In France, the EGalim law highlights the need to introduce more plant-based protein sources in menus. As of 1 January 2023, the Climate and Resilience Act requires public and private caterers providing food services to Ministries and other central government administrations to offer one vegetarian menu per week. In practice, the lack of knowledge is holding back the deployment of this measure • In the UK, protein diversification and the provision of one vegetarian menu per week in schools are encouraged but not required.

<p>Reduce the share of ultra-processed foods</p>	<ul style="list-style-type: none"> • The consumption of ultra-processed foods is increasing globally. • An ultra-processed product impacts the environment at all stages of its life cycle (biodiversity loss, emission of pollutants, excessive energy use, significant waste production). • Because of their high energy and low nutritional value, ultra-processed foods may seriously affect health (higher risks of overweight/obesity and associated metabolic disorders, cancers) • Given the many constraints they have to face, public and private sector caterers tend to rely heavily on processed and even ultra-processed foods. 	<ul style="list-style-type: none"> • The proportion of ultra-processed foods consumed in the UK (51%) is much higher than in France (14%). • The French government has set a target of reducing ultra-processed foods by 20% between 2018 and 2021. Public and private sector caterers are thus required to limit the use of these products to 1 to 2 per day, i.e. 15% of the daily calorie intake • Despite a much higher use of ultra-processed foods in the UK, no action has been taken by the UK government to limit their consumption
<p>Reduce food waste</p>		
<p>Reduce food waste</p>	<ul style="list-style-type: none"> • Food waste contributes to the depletion of non-renewable resources (fertile soils, water, energy). • The carbon footprint of wasted food is high (3.3 billion tonnes of CO₂ equivalent emitted each year). • Food waste limits access to food for certain populations. • Agricultural waste is estimated at US\$750 billion per year worldwide. • Healthcare catering records the highest level of food waste. Workplace catering generates the lowest volume. • Food waste occurs at three levels: before the meal (preparation in the kitchen), during the service (return of trays) and after the service (surplus management). 	<ul style="list-style-type: none"> • In France, the objective is to reduce food waste by 50% compared to its 2015 level in food distribution and public and private sector catering by 2025 • In the UK, caterers must create a food waste minimisation plan, regularly review and revise these actions, and inform their customers of progress and results. The contracting authority shall check whether a food waste separation service can be provided. They are also encouraged to train their staff and to redistribute surplus food as donations.
<p>Improve kitchen management</p>		
<p>Reduce energy and water consumption when preparing meals</p>	<ul style="list-style-type: none"> • Food catering is a water and energy intensive activity. • The kitchen, in particular cooking and refrigeration, is one of the most energy intensive items. • Investment in new equipment and education of employees and customers would result in significant energy and water savings. 	<ul style="list-style-type: none"> • The UK has an energy management policy in place for off-site and on-site catering operators. • Apart from the law on the energy transition for green growth which applies to public and private sector catering buildings, there is no energy or water management policy in France.

<p>Reduce packaging and the use of plastic</p>	<ul style="list-style-type: none"> • While the carbon footprint of food packaging is not very high, its manufacture requires significant energy and water resources. • Food packages pollute and destroy marine ecosystems. • Packaging poses a health risk to humans through migration into consumed food or absorption into the natural environment. • Despite the introduction of measures to reduce plastic waste by governments, no kitchen is currently plastic-free. 	<ul style="list-style-type: none"> • Ban on the use of plastic water bottles and single-use plastics in school catering in France as of 2020-2021. • In the UK, WRAP launched a global pact against plastics in 2018, but very few pact members belong to the Hospitality and Foodservices sector.
<p>Improve sorting practices</p>	<ul style="list-style-type: none"> • Processing bio-waste (incineration, landfill) is an energy-intensive, polluting and costly activity. • Sorting at source also contributes to saving non-renewable natural resources through recycling. • It is estimated that between 2020 and 2050, recycling will reduce carbon dioxide emissions by 5.5 to 6.02 gigatonnes. • Recycling creates 50 times more jobs than landfills and incinerators • Source separation of bio-waste is not yet a common practice in public and private sector catering. 	<ul style="list-style-type: none"> • Despite higher volumes, France has a highest waste recycling rate than the UK (56% compared to 50%). • In contrast to France, greenhouse gas emissions from waste treatment in the UK have been steadily decreasing. One explanation is the increased use of incineration with energy recovery • In France, the Agec law makes the separate collection of bio-waste mandatory for producers of more than 5 tonnes of bio-waste per year as of 2023. • In the UK, landfilling of biodegradable waste will be banned by 2025.

CONCLUSION

The aim of this document is to provide an overview of current knowledge on sustainable food so as to better understand the environmental, health, social and economic issues associated with the food transition in France and the United Kingdom. Although the issues identified have a similar impact on both countries, some of them affect one country more than the other. From an environmental point of view, France stands out by its massive use of pesticides, which contributes to increased eutrophication of its waterways. It also has to make greater efforts in terms of food transport, which is responsible for a significant share of its greenhouse gas emissions. However, the UK's carbon footprint is higher, not least because of the country's food waste. This may seem at odds with the fact that UK is one of the countries with the highest obesity rate ($\frac{1}{3}$ of obese adults compared to $\frac{1}{5}$ in France), resulting in higher healthcare expenses.

Being a major player in the hospitality and foodservice sector in France and the UK, public and private sector catering represents a key public policy lever for promoting safe, healthy, sustainable and accessible food for all. In France, public and private sector catering is governed by the EGalim law and the National Food and Nutrition Programme. In the United Kingdom, the “Government Buying Standard for food and catering services” and the “School Food Standards practical guide” provide a practical framework. In both countries, public and private sector catering is structured according to the guests’ profile (school, hospital, workplace or commercial catering) but different types of management may apply. In France, school catering, for example, is always managed by local authorities, whereas this is not necessarily the case in the UK.

Governance is thus more subject to the obligation of profitability, which makes it more difficult to put national policies into practice. However, both countries concur on the obstacles and levers regarding supply and share a common ignorance of sustainable products. They also share the perception that supply is unable to meet the constraints imposed on public and private sector catering, thus leading to additional costs, and the fact that health-related concerns and nutritional requirements tend to encourage the use of "standardised" food. Bringing together all the stakeholders involved, improving the supply chain organisation and changing applicable rules are among the solutions put forward. Kitchen teams are increasingly willing to adopt a quality approach, but they probably also share the same resistance at individual, organisational, production and service levels. Whether in France or in the UK, we observe a generally positive attitude towards sustainable food among guests, although translating this intention into behaviour change seems to be more difficult. While in France this reluctance has to do with taste and cultural habits, in the UK it is more a question of price, as guests are not necessarily prepared to pay the extra cost of sustainable food. The main levers to overcome these obstacles are raising stakeholders’ awareness, as well as informing and training them. All these aspects should be taken into account when developing national policies in favour of the food transition in public and private sector catering.

To promote a more sustainable diet, public and private sector caterers must in particular improve their purchasing practices by preferably buying organic products, whose production method is more respectful of the environment and human health. In France, the EGalim law sets a target of 20% labelled organic products in all public and private sector catering segments, while the 10 % standard in the United Kingdom only applies to public procurers and includes

products with no labels. In addition to organic products, sourcing local products is also recommended, or even required in France. As a result, the proportion of the budget devoted to organic and local products is increasing in both countries, particularly in school catering. While the UK imports mostly from European countries (80%), France imports half of its food from countries where deforestation is widespread. The majority of the UK's food imports are by sea, a mode of transport that generates fewer emissions than road transport which is preferably used in France to import fruit and vegetables. Imports are used to supplement French and British production to provide out-of-season fruit and vegetables. While relocation is possible for some products, seasonality may be the preferred option for others. The production of vegetables in heated greenhouses emits 10 to 20 times more greenhouse gases than open field cultivation. Respecting the seasonality of the products served in public and private sector catering facilities is thus recommended by the French National Nutrition and Health Programme, while it is required of public procurers in the UK. However, no evaluation tool is yet available. Finally, sustainable fishery products seem to be well known in the UK, whereas there is still considerable room for improvement in France, where the only recognised label, “pêche durable”, is still poorly identified.

Reducing the share of meat and ultra-processed foods must also be a priority for public and private sector caterers. Whether in France or in the UK, which imports a large part of its meat, meat-based products have the most detrimental impact on the environment (greenhouse gas emissions, agricultural land use, deforestation, destruction of biodiversity). Their over-consumption is also dangerous for health (obesity, cardiovascular diseases, cancers). France is therefore imposing a diversification of protein sources on catering professionals and the obligation for school caterers to offer one vegetarian menu per week, which is encouraged but not imposed by the British government. The same applies to ultra-processed foods. Although the UK is a major consumer of such products (51% compared to 14% in France), no measures have been taken to limit their consumption. In view of their increased consumption and impacts on the environment (biodiversity loss, pollutant emissions, excessive energy use, significant waste generation) and on health (increased risk of overweight/obesity and associated metabolic disorders, cancers), the French government has limited the use of these products in public and private sector catering facilities to 1 or 2 per day, i.e. a maximum of 15% of the daily calorie intake.

The catering industry is also one of the major sources of food waste. It must therefore commit to reducing food wastage before (preparation in the kitchens), during (return of trays) and after serving meals (surplus management). National governments are aware of the environmental (depletion of non-renewable resources, high carbon footprint), social (limited access to food for certain populations) and economic (US\$750 billion per year worldwide) consequences of food waste and have implemented policies to this effect. In France, the objective is to reduce food waste in the food distribution and public and private sector catering by 50% compared to its 2015 level by 2025. In the UK, caterers must create a food waste minimisation plan, regularly review and revise these actions, and inform their customers of progress and results.

Finally, additional actions relating to kitchen management can be undertaken. In the food chain, the catering sector is indeed a major energy and water consumer. Investing in new equipment and educating employees and customers would result in considerable savings. The UK has put in place a specific energy management policy for the catering industry, which is not the case in France. Finally, although the carbon footprint of packaging is not very high, its manufacture requires significant energy and water resources. It is a source of pollution and presents a health risk for humans. Similarly, the treatment of bio-waste (incineration, landfill) is an energy-intensive, polluting and costly activity. Despite the introduction of measures by governments to reduce plastic waste and promote sorting at source, no kitchen is totally plastic-free and sorting is not yet a widespread practice.

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