

Designing Sustainable Food Systems and Consumption Patterns



Current insights from the Wuppertal Institute's research into sustainable food

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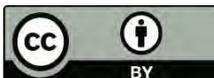
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Ten key messages

1. Promoting sustainable lifestyle and nutrition

Sustainable 1.5-degree lifestyles are based on a material footprint of 8 tonnes of resources or a 0.7-tonne carbon footprint per capita/year, as indicated in studies on 1.5-degree lifestyles and the 8-tonne society¹. Food has a great influence on the individual footprint. Under current recommendations, e.g. the Planetary Health Diet, which is both healthy and ecologically sustainable (published by the EAT-Lancet Commission in 2019), this is already possible – and, in terms of the climate and biodiversity targets for 2030, it is also crucial.

2. Leveraging the out-of-home gastronomy sector

According to data in 2020 from the Federation of German Food and Drink Industries (BVE), the out-of-home gastronomy sector reaches a vast number of German citizens annually with more than 12.4 billion meals. The sector is therefore one of the most significant levers for the transformation of food – despite the fact that little research is being done into this area. If we mean to advance the food transition in this sector there is a need for quality in terms of the environment and health along the entire supply chain – from farm to fork and back again. Environmental data and social indicators should be directly integrated into product management in a similar way to allergen labelling and prepared for use in communication between politicians, economists and society.

3. Establishing cooperative supply chains

By means of long-term collaboration, integrated supply chain management in the out-of-home gastronomy sector guarantees security for investments and changeovers. This results in important incentives for a more resource-efficient approach to (agricultural) production. The out-of-home gastronomy sector can communicate information on this subject from producers to consumers via the supply chain and realise its added value.

4. Creating a framework for a sustainable out-of-home gastronomy sector

It needs to become easier for the out-of-home gastronomy sector to offer and sell resource-efficient products. Buyers in the out-of-home gastronomy sector need to be able to easily recognise resource-efficient products and ingredients that enable them to create resource-efficient “1.5-degree menus”. There is great potential scope here for political action. A policy programme to support the sector including concrete measures (e.g. price incentives, further training, subsidised catering for nurseries and schools) should be able to develop this potential very rapidly.

5. Facilitating sustainable food in private households

Private households play another important role in the food transition. They bear a huge responsibility but they are not alone. If they are not able to translate their demand for more sustainable products into action for various reasons, potential further development stagnates and frustration arises. Because anyone who is prepared to take action expects to be presented with appropriate opportunities to do so. The good news is that private households can expect support from changed regulatory conditions. More sustainable variants need to be tastier and better, easier to procure and cheaper. A flood of labelling is not necessary to achieve this. What is required is clear information about the impact of individual decisions regarding one’s own use of resources.

6. Recognising and using food as a way of introducing sustainable consumption – designing experiences and experiential spaces

Consumers constantly demand alternative vegetarian products and organic foodstuffs, as market figures published in 2021 by the Federal Environment Agency indicate. The system is undergoing change. Food can offer an attractive means of testing sustainable behaviour: success, impact and self-efficacy motivate people to make further changes towards sustainable

¹Promoting 1.5-degree lifestyles: Lettenmeier et al. 2019a, promoting the 8-tonne society: Lettenmeier et al. 2014.

consumption, which also affect other areas of life (e.g. accommodation, transport and tourism, amongst many others). Farming, the retail and out-of-home gastronomy sectors and households will therefore interact and become experiential spaces that dynamically link production, lifestyles and food (key concept: real-world laboratories).

7. **Calling for and promoting resource conservation and biodiversity**

More sustainable agriculture (key concept: agricultural transition) is the prerequisite for sustainable food in the out-of-home gastronomy sector and in private households. So far, policy frameworks have not achieved the envisaged success. Farming needs support to allow it to be viable in the future, amongst other things by directing subsidies towards aspects of climate protection and biodiversity and by reducing the numbers of livestock to ensure better animal welfare and environmental protection. The transformation processes must be worthwhile. The Commission on the Future of Agriculture also highlighted this point in its final report at the end of June 2021. From a political perspective, adjustments to agricultural aid are necessary under the framework of the Common European Agriculture Policy and its implementation at national level. Control policies based on procurement law also offer potential: for example, in 2020, the Berlin Senate amended its awarding criteria for school catering, with the aim of making the system even more sustainable.

8. **Bringing creative solutions to the table and adjusting food prices**

The out-of-home gastronomy sector and private individuals can only prepare more sustainable foodstuffs if these are available. This requires food prices that illustrate the damage caused to health and the environment. In 2019, our research with the Institute for Future Studies and Technology Assessment showed that resource-efficient meals in the out-of-home gastronomy sector are often no more expensive than the current standard. What is more, it is constantly becoming clearer and has once again been confirmed by the Federal Environment Agency's "Klimawirkungs- und Risikoanalyse 2021 für Deutschland" [2021 Climate Impact and Risk Analysis for Germany] that lack of action to address the climate crisis is becoming more and more costly as the days go by.

9. **Enhancing literacy for sustainable consumption**

In order to create a form of overall social development aimed at facilitating the climate and resource transition in a socially balanced way, alongside technical innovations in the fields of production and consumption, we also need to develop literacy in terms of sustainability. This implies finding information relevant to sustainability, understanding it, putting it in context, assessing the information and integrating it into one's own decision processes, as mapped out in the Wuppertal Institute's 2021 "Zukunftsimpuls" entitled "Transformation zur Nachhaltigkeit" [Transformation towards Sustainability]. The need to develop competencies in the field of food is also emphasised. To this end, a programme of measures that changes educational structures is needed on a national scale in Germany. This needs to include establishing subjects such as home economics and/or dietetics at all educational institutions and consistently adapting curricula to meet the needs of the transformation.

10. **Scaling up transformation research to enable an agriculture and food transition**

Not everything is as sustainable as it seems at first sight. Products and services, social practices and everyday routines need to be systematically analysed and modelled, and information about these areas communicated as regards their impact on the environment, on people's health and on society. Because decisions that are made in private households and the out-of-home gastronomy sector, for example regarding daily diet, are strongly influenced by external factors (for example local availability, distances, special offers/advertising, time restrictions) and are closely related to other areas that need attention such as transport, accommodation, leisure, etc. Modern dietetics and home economics incorporate this complexity of systems and behaviour, which is still largely unresearched, particularly in terms of the transition towards sustainability. Only inter- and transdisciplinary research can address questions at this level of complexity, find potential solutions and put these into practice – in the areas of production and consumption. Current research programmes fall far short of what is required.

1 Designing sustainable food systems and consumption patterns

Health is given high priority in Germany (Huber et al., 2015; SINUS-Institut & YouGov, 2019). An intact environment is also very important to the German people. (UBA, 2021a). Our food incorporates both aspects (Lukas et al., 2016): as a field of activity and research, food links individual and collective health to climate and environmental protection as a healthy diet is often more beneficial for the environment and for the climate. In addition, a large number of other challenges are addressed here, for instance humane working conditions within supply chains and combating poverty and hunger (UN SDGs 1 and 2). Food is linked to all the United Nation's Sustainable Development Goals (Rockström & Sukhdev, 2016), meaning that decisions about the food system can **generate huge leverage** (Marlow et al., 2009; Speck et al., 2020; WBAE, 2020). This field of activity is both an area of transformation and a lever at the same time².

Various political programmes address food as a relevant area of activity:

In terms of health policy, a diet that contributes to a good and healthy life is given high priority (Federal Ministry of Food and Agriculture (BMEL), 2020; BMEL & BMG, 2014; FAO & WHO, 2019). The recommendations for healthy diet coincide to a great extent with those for climate-friendly food – scientifically and from a policy perspective. In their new quality standards for the out-of-home gastronomy sector, for example, the German Nutrition Society (DGE) draws very close links between the two subjects; the World Health Organisation has also been addressing these topics for years and, with its Planetary Health Diet, the scientific EAT-Lancet Commission has explicitly linked the areas of health and the environment (DGE, 2020; FAO & WHO, 2019; Willett et al., 2019).

In terms of climate and environmental policy, the Paris 1.5-degree target (UN, 2015) applies, in line with which the German Federal Government has firmed up and substantiated its climate objectives following the historic decision of the Federal Constitutional Court (Bundesregierung, 2021b). Environment and health are also jointly addressed from another perspective – namely *sustainability*. The German Sustainability Strategy picks up on the Global Sustainable Development Goals. It focuses on agriculture and food as one of the six areas of transformation and states that national, European and international agrarian, food, health, environmental and climate policies must be considered collectively and that this approach should also be used to draft strategies and measures (Bundesregierung, 2018).

The task of policymakers and scientists is to develop structures, experiential spaces and obligatory targets under which individual health, climate and sustainability policy decisions can be implemented. In turn, the task of the citizens is to take responsibility for consciously adjusting their consumption in order to protect their own health and that of the environment.

The objective – together with politics, business, society and science – is to jointly implement the socio-political decisions.

² In DNS 2021, food is stated as an area of transformation, but not as a transverse lever for all areas of transformation. Our theory – based on Rockström & Sukhdev 2016 – is that food, as a cross-sectional field, can accelerate sustainable consumption.

The transformation of the food system is a ***task for the whole of society***, as referred to, not least, by the Scientific Advisory Board on Agricultural Policy, Food and Consumer Health Protection at the Federal Ministry of Food and Agriculture (WBAE), the German Sustainability Strategy (DNS), the National Programme for Sustainable Consumption (NPNK), the Commission on the Future of Agriculture (ZKL) and other groups from the scientific and political communities (BMU et al., 2019; SVRV, 2021; WBAE, 2020; WPN 2030, 2020; Zimmermann-Janssen et al., 2021).

An insight into the reality of the German people shows that ***the out-of-home gastronomy sector*** plays an increasingly important role – 12.4 billion meals are served every year in Germany (BVE, 2020). Whether this involves catering for the traditional lunchtime clientele, offering an alternative to cooking or providing a leisure activity, people gladly avail of what the out-of-home gastronomy sector offers – in canteens, refectories, restaurants, snack bars, pubs, bakery coffee shops and similar facilities that are available locally and also through online delivery services. However, shopping, cooking and ***eating at home*** is also a high priority for the German population and even more so during the pandemic of course.

On average, Germans spend 1.41 hours per day eating and drinking – apart from sleeping, working and studying, hardly any other activity takes up so much time (Destatis, 2015).

The solution lies in the variety – the targets provide a guideline!

A more sustainable lifestyle is possible: with a global “environmental budget” of about 8 tonnes of resources per person per year and 0.7 tonnes of CO₂ eq for 2050 – for all spheres of life combined. Another 30 years are available to us for this transformation – a challenge for society, business, science and politics. Alongside changing production, other infrastructures and the corresponding ranges of products and services, people’s individual behaviour also plays an important role. Based on this widely available environmental budget, every single person can thus manage their own situation in this context as they please. ***For the field of food, we can infer an average target of 3 tonnes of resources or approx. 0.35 tonnes of CO₂ eq per person per year.*** For a main meal, for example, a CO₂ eq budget of max. 600 g of CO₂ eq would be available. This therefore requires creative cooking now and in the future, making more use of pulses and vegetables. These will gradually replace servings of meat (recommended: 300 g/week per capita = 2 portions) and high quantities of milk products (recommended: 250 g/day per capita = 2 portions). Food waste of any kind must be avoided. It is a case of trying out the wide range of possibilities for a more sustainable diet according to one’s own requirements and of making a collective contribution to ecosystems, animal husbandry and physical health. It is important to embed the development systematically into the social context and supply structures – in agriculture, the retail sector, private households and catering systems. (Lettenmeier, 2018; Lettenmeier et al., 2014, 2019b, p. 23 table D.1, 2019a; Speck et al., 2020)

2 The out-of-home gastronomy sector: a blind spot

What is needed, therefore, is to bring literacy in terms of sustainable consumption – i.e. the ability to find information relevant to sustainability, understand it and set it in context, assess it and integrate it into one's own decision-making processes – into the fields of politics, business and society (Zimmermann-Janssen et al., 2021). The out-of-home gastronomy sector is the ideal venue for this: it can create eating experiences; it is directly in contact with people and can transport human and animal health, biodiversity and judicious use of resources onto a lunchtime menu. Thanks to this position between consumers and the food-producing industry and its link to policymakers (for example due to the out-of-home gastronomy sector having to implement political regulations and supply the public sector more sustainably), the out-of-home gastronomy sector is becoming a ***negotiating venue for the food transition***. This is substantiated by the fact that nearly 40 million meals are served on a daily basis (BVE, 2020).

Accordingly, even small changes in the choice of ingredients or methods of preparation have an enormous impact on the environment. To give an example: simply reducing the use of pork by around 30 g per portion (average portion size 150 g) saves 60 kg of meat over 2,000 portions and correspondingly almost half a tonne of CO₂ eq. per day. Up until now, however, the numerous potential opportunities for change have not been exploited to a sufficient extent (Speck et al., 2020; WBAE, 2020).

Not only are company restaurants, school canteens and so on able to immediately save resources and reduce greenhouse gases on an appropriate scale and communicate this to employees and guests, they can also redefine themselves as experiential spaces aiming to provide self-determined, enjoyable and responsible food, thus making a contribution to the evolution of food literacy (Müller & Groeneveld, 2016). The out-of-home gastronomy sector has a clear literacy and experiential mission, particularly in the state sector, for example when school children in school canteens, students in refectories or employees in company restaurants are served selected, unusual foodstuffs, become more familiar with them and learn how to prepare them, opening up (new) culinary worlds. As a result of positive taste sensations using sustainable foods, impetus can be given to people's own meal planning at home. (Lopez et al., 2019; Ohlhausen & Langen, 2020).

2.1 Common guidelines provide orientation

Companies are increasingly trying to tackle social and ecological challenges and attempting to introduce individual activities that are geared towards sustainability – including in the out-of-home gastronomy sector. However, there is often a lack of clear guidelines on what sustainability means and how it can be implemented in a holistic way. On the basis of this observation, a model for sustainable management of out-of-home gastronomy was developed during the NAHGAST³ research project in collaboration with company representatives. It focuses on the gap between the target situation, as formulated by science and policy, and the current state of affairs in catering companies, covering various aspects of sustainability in the process:

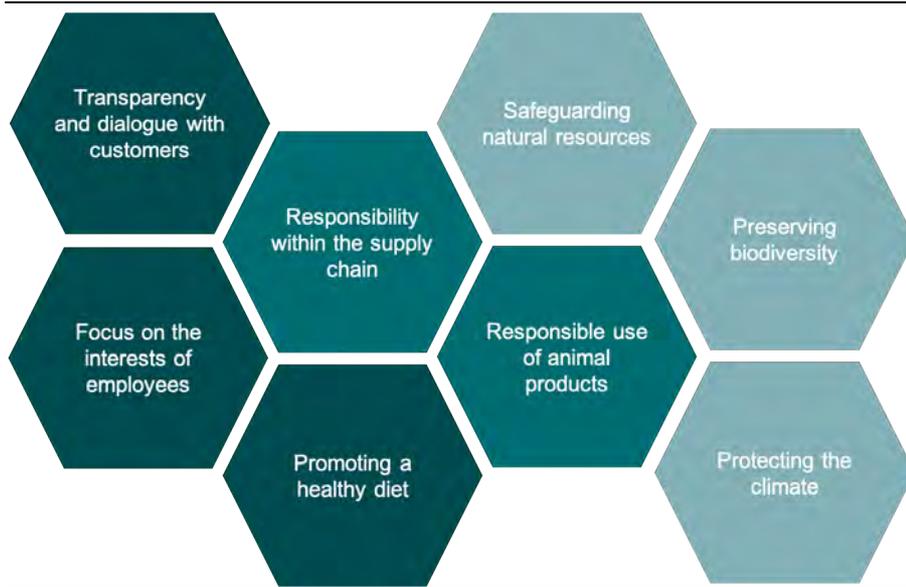


Figure 1: A model for sustainable out-of-home catering (source: own illustration adapted from Göbel et al., 2017)

The model embraces the demands of the various aspects of sustainability – ecology, economy, social issues and health. It serves as a guideline for the present and a general vision of the future for the entire sector. When developing a specific sustainability strategy within a company, the individual spheres of activity can be differentiated.

2.2 Developing competencies together on a level playing field – making sustainability processes transparent

A wide range of measures are needed in order to move from abstract models to transformation and change in the day-to-day operations of the company. It is a case of working with all the players in commercial kitchens, incorporating planning, procurement, preparation and the creation of menus, to gradually change interaction with customers, communications and marketing, thus establishing a new eating culture together, which will be developed further in iterative learning loops. Eating, tastes and enjoyment are dynamic and are constantly changing – a good prerequisite for sustainability management and innovation in the case of food. Alongside the company itself, players at upstream stages of the supply chain, e.g. farmers, wholesalers and retailers, also need to be addressed and brought on board (Wunder et al., 2018). In this way, a greater range of climate-friendly and resource-conserving products in wholesale facilities, such as plant-based substitute products, organic or other alternative products made from seaweed, for example, could have a positive influence on commercial kitchens and their recipes. New technological developments can also be tested and negotiated, whether it is a case of products that are produced synthetically, new agricultural developments or new types of processes. Furthermore, regional collaborative relationships and shorter delivery times often offer more transparency as regards social and ecological issues. (Lehtinen, 2012; Lopez et al., 2019; RMA, 2014). Company managers and kitchen staff should be able to recognise more sustainable foodstuffs and to buy or develop more sustainable dishes (Speck et

al., 2020). Neither should newly developed foodstuffs, ranging from synthetic meat substitutes to products made from insects, be excluded from the debate or the realms of new experiences. Mandatory training for kitchen staff, buyers, sales assistants and catering managers could be key (Bliesner-Steckmann et al., 2019; Süßbauer et al., 2019). It is also worth strengthening and promulgating the use of scientifically developed (free) tools (ranging from comics to new forms of workshops, from recipes right up to digital and interactive evaluation tools) and incorporating these kinds of tools into existing business systems.

These kinds of demands can certainly be implemented within the European criteria for tendering – as studies in Finland have shown (Lehtinen, 2012), as well as the regulations on school catering in the primary sector in Berlin. Since 2013, various sustainability issues have been incorporated into the tendering process for state schools. Meanwhile, they have gradually stipulated an increase in the percentage of organic ingredients of up to 50 per cent, for example, and for some groups of products such as pasta and bread, they even require a minimum of 100 per cent. (Berlin Senate, 2020; DNSV, 2020).

2.3 Choice of ingredients as the initial and simplest deciding factor for a sustainable out-of-home gastronomy sector

The choice of ingredients in food preparation is a leverage point for sustainable food. The Wuppertal Institute has developed an evaluation tool which will make it possible to determine the environmental and health impact of meals – the Nutritional Footprint (Lukas et al., 2016). It shows the impact a dish has on the environment and on health in the areas of use of materials, CO₂ eq emissions, water use, land use and calorie content, salt content, dietary fibre content and saturates – both positive and negative.

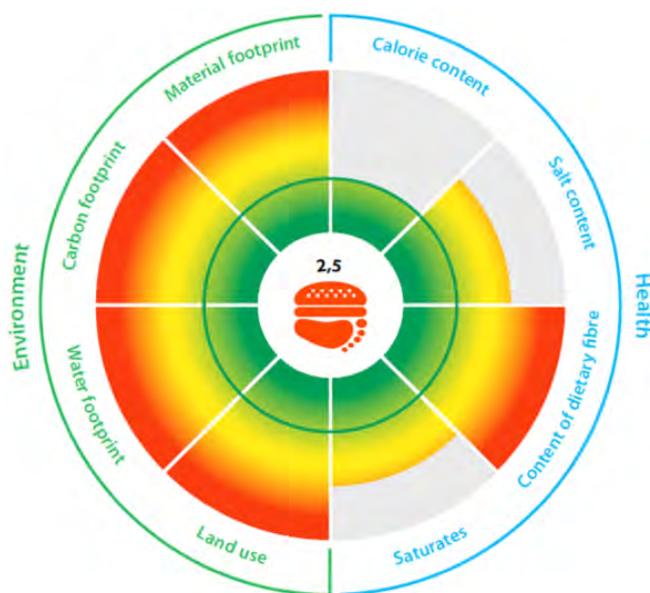


Figure 2: The Nutritional Footprint using the example of a beef roulade dish (source: Lukas et al., 2016)

Stating the figure for the entire meal is generally more practical than stating the amounts for individual ingredients. Likewise, the Nutritional Footprint issues an

overall rating to serve as guidance (the figure in the middle); the evaluation of the individual areas increases the transparency of what is being rated. Nevertheless, sustainability-oriented procurement of the individual ingredients is supported using these evaluations. By making the environmental and health impacts visible, the individual meals can be compared with each other and the factors influencing the integrated management of enjoyment and sustainability are revealed. In research projects such as NAHGAST and BiTe, the Nutritional Footprint was further developed as an online tool for the out-of-home gastronomy sector: the NAHGAST calculator (www.nahgast.de/rechner). Other indicators regarding animal welfare and fairness were added; biodiversity is already under development. Using the online tool it is now simple and quick to evaluate what impact a foodstuff has on environment, health and social issues. The results from the NAHGAST calculator show kitchen staff the ecological and social impacts changing the ingredients could have and, in many instances, underline the recommendations of the DGE (DGE 2020) and the EAT-Lancet Commission (Willett et al., 2019).

The medium-term inclusion of sustainability data in the company's own (merchandise management) systems is an important regulating device; this allows the information to be downloaded in the same standardised way as that used for data related to nutrition (e.g. kcal/KJ details, nutrients, allergens). A pilot project is currently envisaged with a project partner from the NAHGAST research project (www.nahgast.de), which will integrate environmental data into the merchandise management systems of companies.

2.4 Pushing forward the transformation of the out-of-home gastronomy sector – developing a framework and setting financial incentives

In view of the sheer number of meals served (BVE, 2020), the out-of-home gastronomy sector offers considerable potential as regards bringing delicious, healthy and sustainable food to the wider public. But regulatory conditions are needed to make it easier for the out-of-home gastronomy sector to further exploit its potential for sustainability. One example is the adaptation of price signals that favour more sustainable dishes. At the same time, the out-of-home gastronomy sector must be perceived as a social sphere where a fair and taste-oriented dining environment is created (WBAE, 2020).

Scenarios demonstrate that if ecological problems like climate change are not addressed, the price of foodstuffs will rise (Pieper et al., 2020), as will costs at the macro-social level (UBA, 2021c). It is therefore important to guide price increases in the right direction, namely that of sustainability: as already demanded in 2016 by the WBAE and the Scientific Advisory Board on Forest Policy, removing the reduced rate of VAT for animal products in general – i.e. for dairy products, eggs and fish too – can be considered wise as an initial step and a steering tax in this case (WBAE & WBW, 2016, p. 98 ff.). To go even further, a new consumer tax could be considered as a differentiated climate change levy on foodstuffs depending on their use of resources (WBAE, 2020, p. 571 ff). This would mean, for example, an increase of 1.46-4.79 euro per kg of beef or 0.07-0.23 euro per litre of milk (WBAE, 2020, p. 571). In our view, however, this can only be an initial step, since the climate impact varies greatly within different groups of foodstuffs. The agricultural structures also need to be considered: a large amount of pork is currently produced and consumed in

Germany (the degree of self-sufficiency is around 125% (BMEL, 2021), thus using a lot of resources. Just a slight increase in the price of pork could create a perverse incentive.

In the case of poultry, a shift in demand could result from the reduced climate impact as stated and the health recommendations mentioned. This could lead to an increase in production volume, which would not necessarily be beneficial to animal welfare in chicken and turkey coops. In terms of poultry farming, in particular, animal welfare means fewer birds per pen. *As a rough estimate*, on conventional poultry farms up to 26 broilers can be kept per square metre³. On farms that are run in line with the EU's regulation on organic production, ten birds are allowed per square metre. If all these birds were kept in accordance with the EU's regulation on organic production, which reckons the least space of all organic forms of animal rearing, 1.6 times more space would be needed than is currently the case. For the approx. 90 million broilers currently kept in Germany, that equates to 9 million square metres of land, i.e. two thirds of the area of Schleswig-Holstein. It is estimated that they currently occupy around 3.5 million square metres.

A reduction in animal stocks will thus be unavoidable. In this context, the Commission on the Future of Agriculture (ZKL) recommends "reducing the consumption of animal products, improving animal welfare and a more environmentally sound approach to animal husbandry, which will in all probability be accompanied by a further reduction in livestock numbers." (Zukunftskommission Landwirtschaft [Commission on the Future of Agriculture], 2021, p. 5); an important step towards transformation and the agricultural transition.

Apart from complying with animal welfare regulations, other quality guidelines regarding the sustainability of food on offer in the out-of-home gastronomy sector need to be endorsed at the national level. As a minimum, the guidelines of the EAT-Lancet Commission (Willett et al., 2019) should be binding for the various different living environments. For the out-of-home gastronomy sector, it must become easier to recognise and purchase resource-efficient products and to design menus based on these products. Environmental data and social indicators should be included in merchandise management – similar to the way allergens are handled. In the medium-term, statutory regulatory frameworks should be put in place for this in order to lend more transparency to the entire food sector as quickly as possible. Publicly sponsored canteens should implement the aforementioned measures swiftly, serving as a model for other establishments. In addition, a fair nutrition environment should be created, where eco-friendly and socially sustainable food is subsidised and the enjoyment derived from eating it is also aggressively communicated. WBAE 2020 recommends that children and adolescents in nurseries and schools should be provided with free school meals and that, simultaneously, municipal finance structures should be broadly encouraged to support this (WBAE, 2020, p. 648). In this context, it is also important for the out-of-home gastronomy sector to get away from the attitude of dependency and the waste disposal mindset and instead to develop a new vision of itself as an experiential space offering experiences that focus on enjoyment and adhere to a zero-waste culture. This also means the consumer being able to choose portions that are suited to their degree of hunger.

3 Exploiting the potential of private households and facilitating more sustainable consumption

In contrast to the out-of-home gastronomy sector, the decision-making power of private households is frequently overvalued. They are attributed a level of control over their own actions that often does not exist – non-eco-friendly, non-sustainable foodstuffs are over-represented in shops and the price incentives and communication of special offers are misplaced – all of which induces non-sustainable consumption (WBAE, 2020, p. 653). But neither should the potential of private households regarding the food system transformation be underestimated, as Germans spend around 175 billion euro on food every year (Destatis, 2021) and throw 46.6 million tonnes of food away as waste (Stenmarck et al., 2016). The amount that we buy or throw away depends on our consumption habits, e.g. how we plan and do our shopping, which varies from one household to another. These kinds of habits can change, however – for instance, more and more people are buying alternative vegan and vegetarian products instead of meat³ and also tend to choose environmentally friendly alternatives in other spheres of life (UBA, 2021b). Private individuals can change their dietary and consumption habits relatively quickly without waiting for political change, regulations, advances in technology or market adjustments. About 20 to 30 per cent of resources and CO₂ eq can be saved through changes to lifestyle – from one day to the next (Lettenmeier, 2018, own calculations).

Private households should be able to actively take decisions in favour of more sustainable solutions, if they so desire. What is needed here is reliable information, for example about individual foodstuffs, recipes and menus as well as the impact of behavioural changes. Incidentally, most consumers do want to do this (SVRV, 2021). As well as knowledge, competencies regarding sustainable consumption also need to be strengthened (SVRV, 2021) – for instance by experiencing self-efficacy, e.g. through their own “climate road-maps” (Greiff et al., 2017; Lettenmeier et al., 2019a) and also by reducing or banning advertising involving resource-intensive products such as meat (Wollenteit, 2021, p. 29 f).

3.1 Lifestyle as a deciding factor – exploiting this great potential in a participatory and deliberate manner⁴

Today’s lifestyles in the West exceed planetary boundaries many times over: in Germany, CO₂ eq emissions stand at 9 tonnes per capita; a sustainable level of annual CO₂ eq would be around 0.7 tonnes per capita by 2050 (Lettenmeier et al., 2019a). In NRW, annual resource consumption stands at approx. 30 tonnes per capita (Buhl et al., 2019), food accounts for 5.2 tonnes of that figure. Studies show that great potential can be opened up in the area of food by changing people’s eating habits (Poore & Nemecek, 2018; Willett et al., 2019). A sustainable

³In 2020, for the first time, the producer Rügenwalder Mühle achieved a higher turnover with alternative products than with meat. According to forecasts, the volume of meat substitute products could increase to 3 billion over the next ten years (Deter, 2020).

⁴(Messner, 2021) Input at the Wuppertal Institute’s anniversary conference, see: <https://www.youtube.com/watch?v=HHZKBF8bF48>

diet can also trigger more sustainable behaviour in other spheres of life, such as transport and leisure (Bienge et al., 2019; Liedtke et al., 2014; Speck, 2016).

However, the impact of individual actions has often been estimated to a completely erroneous extent. For example, the relevance of giving up using plastic bags has been vastly overestimated, while the impact of adopting a plant-based diet has clearly been underestimated (UBA, 2021a, S. 30). Overall, climate-friendly consumption is only possible if consumers’ decision-making and behaviour competencies are supported by transparent and credible information (Speck & Liedtke, 2016; SVRV, 2021). Table 1 picks up on a selection of climate tips that are frequently communicated and ranks their potential with regard to climate protection.

Options for action	Potential annual savings
Vegan diet	Approx. 1.5 tonnes of CO ₂ eq
Vegetarian diet	Approx. 850 kg of CO ₂ eq
Buying regional fruit and vegetables according to season	Approx. 260 kg of CO ₂ eq
Plant-based alternatives for milk	Approx. 70 kg of CO ₂ eq
Using one’s own shopping bags	Approx. 11 kg of CO ₂ eq
Flying less	Flying 5 hours less saves approx. 1,5 tonnes of CO ₂ eq
Working from home	Approx. 1.5 tonnes of CO ₂ eq
Car sharing, instead of having a car oneself	Approx. 700 kg of CO ₂ eq
Changing over to green energy	Approx. 1.5 tonnes of CO ₂ eq
Reducing your own living space ¹	If you reduce your living space by 20 square metres, you save approx. 700 kg of CO ₂ eq

¹ 20–25 square metres per person would be sustainable (Lettenmeier et al., 2014).

Table 1: Selected tips for action and their respective leverage for climate action (own calculations)⁷

The supply structure needs to allow individuals to be able to live 1.5-degree lifestyles. Therefore, every mix of behaviours that suits each respective lifestyle is possible. In terms of food, for example, this would mean options from a healthy diet that includes meat to a purely vegan diet, from loose products to packaged ones, from regional to international. Food is also closely linked to other activities and areas of consumption, however, for example accommodation and transport. In these contexts, the supply structure should offer various options – from flats for singles to multigenerational houses, from individual transport to community-based transport in cities and towns and in the countryside. Anything is possible provided that the focus remains on a socially compatible, resource-efficient and climate-neutral lifestyle in its entirety. How you live and what you contribute is your own responsibility – as long as it remains within the framework of the democratically defined, socio-political objectives. The ruling of Germany’s Federal Constitutional Court (BVerfG, 2021) has tasked us with not leaving our burdens for the next generation to shoulder. In order to face this challenging task, production and consumer systems must also now be geared towards sustainability. This demands including innovative products and services as well as business models in this framework. Work on this creative world has not yet really started – the EU has now announced the “New

European Bauhaus”⁵ (a creative and interdisciplinary initiative, convening a space of encounter to design future ways of living), as this need has been centrally recognised.

Research has shown that knowledge does not (yet) mean action – a large number of factors play a role in actually putting knowledge into practice: opportunity, price, social acceptance, time structures, infrastructures and many others (Kollmuss & Agyeman, 2002; Schlegel-Matthies, 2018; Schmidt & Matthies, 2018; Vermeir & Verbeke, 2006). Sustainable food or sustainable consumption in general and financial management need to be learned and also turned into actual experience. The strategy of transformative learning and future knowledge (Schneidewind, 2019; Zimmermann-Janssen et al., 2021) is intended to be the driving force – from private households to nursery schools right up to canteens, in curricula and training regulations⁵. Narratives and mission statements that are outside the area of consumption and are beneficial for sustainable lifestyles – for instance time prosperity – can thus also be imparted (Buhl, 2016; Reisch, 2015; Schlegel-Matthies, 2018; Speck, 2016). Digital decision-making aids, such as interactive apps, for example, should also be made available in a secure, appealing and intuitive way to facilitate the transition to sustainable consumption.

4 Compulsory structures need to be developed to achieve sustainable consumption

An extensive supply of sustainable foodstuffs is essential to enable the out-of-home gastronomy sector and private individuals to base the dishes they offer and their meals on more sustainable alternatives. In research projects, stakeholders from the out-of-home gastronomy sector reported time and again on the challenge of procuring more sustainable alternative foodstuffs. Goods are frequently obtained via a framework agreement with a full-range provider (supplier). In this way, for instance, obtaining substitute plant-based products in bulk and organic products from the entire range of food groups or just understanding the origin of the individual products is currently still a challenge. The situation is the same in the private domain: the range of sustainable products available is growing (UBA, 2021b) but is not yet wide enough. Furthermore, the procurement and pricing structures are not yet set up in such a way that more sustainable products can always be easily incorporated into everyday life.

4.1 A more sustainable, broader supply of agricultural products is needed to achieve sustainable consumption

The transformation of agriculture lies at the heart of sustainable food. Numerous scientific reports and studies point the way on this subject. High land use rates, the application of fertilizers and pesticides and the perpetuation of monocultures and factory farming are amongst the main drivers of the loss of biodiversity and increase in greenhouse gas emissions (BMU, 2015; Rockström et al., 2009, 2017; Secretariat of the Convention on Biological Diversity, 2014; UBA, 2020). On the other hand,

⁵The Federal Institute for Vocational Education and Training is taking the first steps in this direction, for example, by promoting vocational training for sustainable development (BMU, 2021)

diversified and regenerative forms of agricultural production can make a significant contribution to species conservation and to reducing greenhouse gas emissions that are harmful to the climate (BMU & BfN, 2020; Prognos et al., 2020; WBAE, 2020). As a rule, organic farming offers potential for a resource-efficient, recycling-oriented and eco-friendly economic system, but more conventional operations are also increasingly trying to work in ways that are more ecological and more beneficial to animal welfare (Sanders & Heß, 2019; Steinshamn et al., 2020). For long-term transformation in agriculture, production techniques that are climate-friendly and protect biodiversity are required. However, farmers must not be left alone with these challenges (Zukunftskommission Landwirtschaft [Commission on the Future of Agriculture], 2021). For this reason, the Commission on the Future of Agriculture are demanding the introduction of state financial support to improve the transfer of farms and programmes to network farmers with regard to transforming their animal husbandry systems (Zukunftskommission Landwirtschaft [Commission on the Future of Agriculture], 2021, p. 72, 88).

4.2 Promoting environmentally friendly agriculture – from all perspectives

It goes without saying that sustainable methods of production need to be encouraged at the political level in order to allow agricultural undertakings to align themselves from an ecological perspective or, in other words, to focus on working in a way that is more climate-friendly and preserves biodiversity. In order to transform the agricultural sector in the long term, changes to agricultural subsidies are needed – within the scope of the EU's Common Agricultural Policy and its implementation in Germany, for instance. To achieve sustainable farming, however, sufficient demand is also needed – from private households and commercial kitchens. As early as 2017, the BMEL made an observation regarding organically produced foodstuffs: “Die verlässliche anteilige Umstellung von Großküchen kann stabile Lieferantenbeziehungen zur Folge haben, die im Idealfall Umstellungsimpulse für die heimische Produktion mit sich bringen.” [“A reliable and proportionate changeover of commercial kitchens can lead to stable relations with suppliers, which, under ideal circumstances, will give momentum to domestic production”] (BMEL, 2017, p. 71).

Agricultural businesses need long-term, transformative trading partnerships for the foodstuffs they produce sustainably, e.g. with businesses in the out-of-home gastronomy sector. Such partnerships allow stable relationships with suppliers and create security of planning, in terms of investors, for example. This provides additional incentives for environmentally sustainable production. Here, public sector companies need to set a good example. A key pointer would be a collaborative road map with defined targets, as described in the 2021 German Sustainability Strategy, (Bundesregierung, 2021a), especially if it is communicated aggressively at federal, state and municipal levels and in the kitchens themselves.

Consumers along with the out-of-home gastronomy sector and its stakeholders frequently lack the link between biodiversity and foodstuffs and individual decisions on food (FAO, 2019). In order to further close this gap, an indicator index for commercial kitchens showing the impact of foodstuffs on biodiversity is currently being developed as part of the BiTe research project. Figure 3 shows an example of a design concept for visualising the impact of a beef curry on regional and global biodiversity,

which becomes clear when taking a look at the bigger picture. But there is also a need for political guidelines: the government should therefore take on a pioneering role and formulate mandatory targets for the promotion and preservation of biological diversity in the food sector. Both suppliers and consumers need simple information on the extent to which their behaviour contributes to the conservation of species.



Figure 3: Development of (digital) services for customer communication (Müller, 2021)

4.3 Healthy, environmentally friendly and socially compatible does not necessarily mean more expensive

The greatest challenge for businesses in the out-of-home gastronomy sector is to keep customers satisfied and thus take economic aspects into account – very often no more than 3.5 euro is available for lunch (Tecklenburg et al., 2018). Changes towards more sustainable dishes can sometimes involve additional purchasing costs. But these – like quite a few calculations of costs in the area of school meals – are usually in the region of a few cents per meal (Scharp et al., 2019; Tecklenburg et al., 2018). In addition, potential additional costs can be offset, as various studies show. So, relatively speaking, reducing animal products on the menu entails potential cost savings (Lopez et al., 2019).

5 What does sustainable really mean? All stakeholders need safe guidelines for their activities!

A blanket recommendation for a more sustainable lifestyle often suggests buying local and seasonal products. However, if you drive to a farm shop further afield on top of doing your shopping at the supermarket, you clock up additional car miles. This will render null and void the savings achieved by buying the more sustainable food.

In the context of the scientific view of social practices, it is not only the practices themselves that are decisive (Reckwitz, 2003). At the Wuppertal Institute, research is also being done into what side effects accompany a practice (Bliesner et al., 2013; Buhl, 2016; Lettenmeier et al., 2014; Liedtke et al., 2020; Speck, 2016), for instance the additional car miles accrued for shopping in the aforementioned example. “Jede Änderung von Verhalten [...] sorgt in einem komplexen Geflecht sozialer und wirtschaftlicher Aktivitäten für nicht intendierte Effekte, also solche, die nicht bewusst oder gewollt sind. Diese können mehr oder weniger umfangreich sein und mehr oder weniger stark positiv oder negativ wirken.” [“In a complex web of social and commercial activities, any change in behaviour [...] creates inadvertent effects, i.e. ones that are not conscious or intentional. These can be more or less extensive and may have more or less impact which can be either positive or negative in character”] (Liedtke et al., 2020, p. 134).

Understanding and evaluating social practices is fundamental for overall societal transformation – both from a scientific and from an individual point of view. On the one hand, one’s own self-efficacy can be conveyed through the practices (Matthies, 2018; Wittenberg et al., 2018). Because a person who understands which products and behaviour patterns have an impact can make better personal decisions about the contribution they can or choose to make or not. On the other hand, it is necessary to assess behaviour patterns in terms of their impact on the environment in order to move closer to the target of climate neutrality. In this context, we need to consider and assess not only individual consumer practices but also entire lifestyles and consumer patterns and their associated production patterns (SDG 12), so that a more sustainable system can be supported at the political level.

5.1 What behaviour is truly sustainable? Focusing on social practices and addressing them by means of transdisciplinary research

Our everyday lives consist of routines and habitual behaviour patterns that are all linked together – so-called social practices. Tools such as www.ressourcenrechner.de currently help us to consider complex structures like our own lifestyles. Using the resource calculator, it is possible to calculate an “ecological rucksack” on an individual basis. The susla.app calculator also shows the impact of various tips on making savings. These kinds of tools support the differentiation of social practices and improve estimates on which resource use or which greenhouse gas emissions accompany each individual practice. But that alone is not enough. Until now, the focus in lifecycle analyses has been on products and services, without taking into account the practices that are linked to them (Suski et al., 2021) – even though, for instance, food is not possible without transport and is dependent, for example, on place of residence and work (Pfeiffer et al., 2017). Researchers at the Wuppertal Institute have therefore developed a framework that they can use to analyse and assess consumption patterns holistically (Liedtke et al., 2020; Suski et al., 2021).

For this analysis, a single consumer practice is considered in the first step – such as food choice when shopping or gardening in the case of urban gardening. In a second step, a study is carried out to see how this practice is interwoven with other areas – e.g. with transport or sport (Lukas, Liedtke, et al., 2014; Nicolini, 2009; Zimmermann-Janssen et al., 2021). Finally, a specific assessment of the

consumption pattern is undertaken using environmental accounting. By combining different methods in this new way, behaviour patterns that only arise from another type of behaviour are investigated in conjunction with it. This allows us to take rebound effects into account in a more effective way (Buhl, 2016; Liedtke et al., 2020) and to better assess practices in terms of their environmental impact (Liedtke et al., 2020; Suski et al., 2021). Figure 4 shows the example of a consumer pattern for urban gardening:

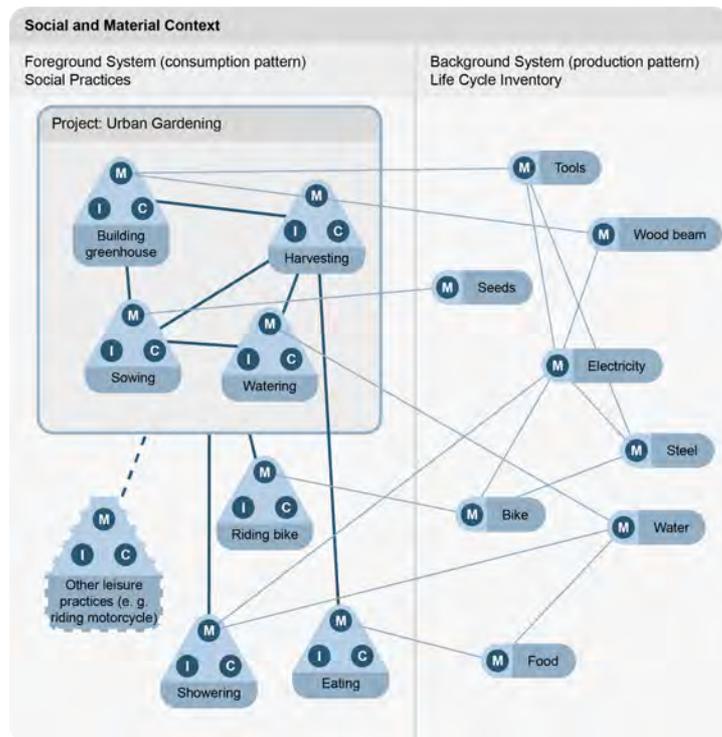


Figure 4: A social practice, in this case urban gardening, is embedded in numerous consumer and production patterns that mutually influence each other (Source: Suski et al., 2021)

This process goes way beyond the classic view of consumption patterns. To achieve a robust assessment of reality, environmental evaluations must, however, be in a position to include and quantify these complex networks of social practices (Liedtke et al., 2014, 2020; Røpke & Christensen, 2012). Research in this area needs to be broadened to allow control over one’s own consumption. It is assumed that the theoretical considerations underpinning current life cycle calculations frequently fail to consider the multi-optionality of everyday life and rebound effects are therefore revealed, the scale of which is as yet unknown. At the same time, existing analyses clearly show how relevant rebound effects are in terms of resource use (Buhl, 2016).

5.2 Social practices in terms of sustainable food – transformative research and education is essential

Practical perspectives bring up a range of questions that are important for a food transition and are worth assessing as regards their potential for the environment: what knowledge and competencies are needed to achieve a sustainable diet, for instance in the areas of purchasing, recipes, taste development and supply chains? And what importance does food have in different social contexts? These questions

are closely linked to everyday social practices. For this reason, their systematic assessment needs to be initiated and supported at the political level.

In order to create a food system that is sustainable, transformative learning and research into innovative, resource-efficient practices and product-service systems are needed. The impacts need to be considered quantitatively (see figure 4) and qualitatively at the same time. The focus should be on thematic areas that have great leverage – like food and transport and their systematic relationship. Political and legislative frameworks and their steering effect need to be investigated in order to evaluate the change potential of social practices. Real-world laboratory research can sound out this kind of potential for individual practices as well as for entire systems or experiential spaces such as out-of-home gastronomy (Ohlhausen & Langen, 2020; Süßbauer et al., 2019; Wanner et al., 2021). Real-world laboratory research can thus strengthen the competencies of individuals and companies that are needed to change the system – key concept: literacy for sustainable consumption (Zimmermann-Janssen et al., 2021) or food literacy (C. Müller & Groeneveld, 2016): this contains information relevant for sustainability in order to put a self-determined, responsible and enjoyable diet into context and integrate it into one's own decision-making processes. Alongside an evaluation of the environmental and health impacts, an understanding of rebound effects and the interplay with other aspects of consumption such as transport are particularly relevant in this context.

Flanked by climate-neutral and resource-efficient policy, sustainable management and innovative technology, the great transformation of our social system can thus be designed and implemented; key concept: future knowledge (Schneidewind, 2019). Support programmes for research in the area of transformative food and sustainable consumption should therefore not just be supported by relevant research funding lines from a few ministries and foundations, but should also receive the integrated support of all ministerial departments.

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