Publizierbarer Endbericht

Gilt für Studien aus der Programmlinie Forschung

A) Projektdaten

Allgemeines zum Projekt	
Kurztitel:	FoodClim
Langtitel:	Reducing the contribution of food waste to Austria's GHG emissions
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KoordinatorIn/ ProjekteinreicherIn:	Wirtschaftsuniversität Wien Prof. Dr. Sigrid Stagl
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Projekt- und KooperationspartnerIn (inkl. Bundesland):	Joanneum Research Forschungsgesellschaft mbH, Graz, Steiermark
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B) Projektübersicht

1 Kurzfassung

(max. 2 Seiten, Sprache Deutsch)

Jeden Tag werden -vor allem in den industrialisierten Ländern -Unmengen an vermeidbaren Lebensmittelabfällen weggeworfen und landen ungegessen in der Tonne. Das Projekt FoodClim möchte Bewusstsein für das Thema schaffen und zu einem Rückgang der Lebensmittelverschwendung in Österreich und den damit einhergehenden Emissionen beitragen. Das Projekt hat es sich zum Ziel gesetzt, Österreich dabei zu unterstützen seine Emissionen im Bereich Ernährung zu verringern und somit einen Beitrag dazu leisten, dass das Ziel die Treibhausgasemissionen bis 2050 um 80-95% zu reduzieren, erreicht wird.

Insbesondere möchte das Projekt neue Einsichten und Erkenntnisse darüber gewinnen, welchen Beitrag Initiativen wie von Experten begleitete Peer-Gruppen und Food-sharing Plattformen leisten können, um die Verschwendung von Lebensmitteln einzudämmen. Dazu wird die lokale Lebensmitteltauschplattform „myfoodsharing.at" als ein Fallbeispiel untersucht. Die von Experten unterstützten Peer-Gruppen sollen zu einem besseren Verständnis über das individuelle Wegwerfverhalten der TeilnehmerInnen führen.

Im Zuge der Literaturanalyse in **AP1** haben wir mittels einer qualitativen Analyse 60 Publikationen analysiert und haben uns angesehen, warum es auf der Haushaltsebene zu Lebensmittelverschwendung kommt und welche Faktoren dazu führen, dass mehr bzw. weniger Lebensmittel weggeworfen werden. Insgesamt kann man sagen, dass die Gründe für LMV sehr divers und facettenreich sind. Die Literaturanalyse hat gezeigt, dass Soziodemographische Faktoren generell eine untergeordnete Rolle spielen, dass aber Menschen ab 65 Jahren weniger, Haushalte mit Kinder und Einpersonenhaushalte pro Kopf mehr Lebensmittel wegwerfen. Überversorgung mit Lebensmitteln, unsystematische Lagerung, Fehlinformationen über das Mindesthaltbarkeitsdatum, die Haltbarkeit von Lebensmitteln und eine Abneigung gegenüber Speiseresten (z.B. übriggebliebenes Essen vom Vortag zu essen) sind ein paar der Gründe die hier eine Rolle spielen. Ein weiterer wichtiger Aspekt in Bezug auf das Abfallaufkommen ist Zeit. Die Aktivitäten die dazu führen könnten, dass weniger weggeworfen wird (z.B. Planung von Einkauf und Menüs, Lagerung) etc. sind mit erhöhtem Zeitaufwand verbunden und angesichts der Herausforderung Berufstätigkeit, Familie und Freizeit zu vereinbaren daher meist schwierig umzusetzen. Dadurch, dass LMA meist durch ein Zusammenspiel von verschiedenen Faktoren ist es meist schwierig das Problem (die Lebensmittelverschwendung) mit einzelnen Maßnahmen zu bekämpfen. Aus diesen Grund müssen Politikmaßnahmen über reine Informationsbereitstellung hinausgehen. Es braucht daher einerseits ein Bündel an verschiedenen Maßnahmen, die gezielt eingesetzt werden um das Thema LMV in seiner Komplexität zu adressieren und andererseits die Kooperation aller beteiligten

Akteure entlang der gesamten Wertschöpfungskette und den Willen zur Umsetzung.

AP2 adressiert die Rolle von Infrastruktur und Technologien beim Entstehen von Lebensmittelabfällen in Haushalten. Von November 2016 bis Februar 2017 wurde dazu eine qualitative Studie mit 24 österreichischen Haushalten durchgeführt. Die Ergebnisse zeigen, dass die Charakteristika der vorhandenen Einzelhandels-Infrastruktur, vor allem die Dichte und der Typus der vorhandenen Geschäfte, übermäßigen Lebensmitteleinkauf beeinflussen. Sind beispielsweise Supermärkte gut erreichbar und lange geöffnet, kaufen KonsumentInnen öfter aber weniger pro Einkauf ein. Wird öfter eingekauft, ist es nicht mehr notwendig, leicht verderbliche Lebensmittel lang im eigenen Haushalt zu lagern was wiederum zu einer Reduktion von Lebensmittelabfällen führen kann. Gibt es zudem eine dichte Einzelhandelsstruktur, wird häufiger und gemäß gegenwärtigen Bedürfnissen eingekauft. Auch das kann die Menge an Lebensmittelabfällen im Haushalt beeinflussen, weil Präferenzen besser mit tatsächlichen Einkäufen abgestimmt werden können. Allerdings empfinden KonsumentInnen oft, dass im klassischen Supermarkt ihre Intentionen weniger einzukaufen im Widerspruch zu den Werbemaßnahmen des Handels stehen. Im Gegensatz dazu, wird das Einkaufen auf Bauernmärkten mit Vertrauen und Authentizität assoziiert. Hier schreiben die Konsumenten den gekauften Produkten einen höheren, symbolischen Wert zu was dazu führt, dass diese Lebensmittel weniger leicht weggeworfen werden.

Wie Lebensmittel im eigenen Haushalt gelagert werden hängt ebenfalls von den vorhandenen infrastrukturellen Gegebenheiten und den eingesetzten Geräten ab. Das Vorhandensein von passenden Lagerplätzen (z.B. Keller) sowie die eingesetzten Technologien (z.B. Kühlschrank) und ihre Funktionsfähigkeit beeinflussen wie Lebensmittel gelagert werden und damit auch ihre Haltbarkeit. Was eine wichtige Rolle spielt, sind Wissen und Kompetenz hinsichtlich der richtigen Lagerung von Lebensmitteln; auch Technologien wie Kühlschrank und Gefrierfach können nur dann die richtige Lagerung von Lebensmitteln unterstützen, wenn die NutzerInnen über ihre Funktionen Bescheid wissen. Allerdings kann Produktdesign ein mögliches Fehlen von Wissen ausgleichen, wie das zum Beispiel bei Gemüsefächern ersichtlich ist. Zusammenfassend lässt sich sagen, dass Politikmaßnahmen über Information und Bewusstseinsgenerierung hinausgehen und beachten müssen wie kontextuelle Faktoren den Umgang mit Lebensmitteln in Haushalten bestimmen.

AP3: Im Zeitraum zwischen Dezember 2017-November 2018 wurden semi-strukturierte Tiefeninterviews mit sogenannten Foodsavern aus Wien und Graz geführt, die freiwillig bei foodsharing in Österreich tätig sind und Lebensmittel bei verschiedenen Lebensmittelbetrieben abholen bzw. „retten" und verteilen. Ziel der qualitativen Studie war es herauszufinden was Foodsaver dazu motiviert sich bei foodsharing zu engagieren und was sie mit ihrem Engagement bewirken möchten. Insgesamt wurden 16 Tiefeninterviews durchgeführt und anschließend analysiert.

Insgesamt kann man sagen, dass die Motivationen sich bei foodsharing zu engagieren sehr divers sind. Der Fakt, dass Essen, das eigentlich essbar wäre weggeworfen wird und dass verantwortliche Akteure nichts oder zu wenig dagegen machen löst bei den Foodsavern Emotionen wie Ärger, Frustration und Empörung hervor. Diese Emotionen, die auf der Vorstellung beruht, dass genießbare Lebensmittel wegzuwerfen falsch und moralisch nicht vertretbar ist, bewegt Menschen dazu aktiv zu werden. Die Tätigkeit Lebensmittel zu retten löst bei den Freiwilligen auch positive Emotionen hervor wie Freude und Stolz. Diese positiven Emotionen entstehen durch die Freude an der Gemeinschaft an Gleichgesinnten und an Tätigkeit selbst z.B. das Retten und Verteilen an Menschen, die sich über die Lebensmittel freuen. Auch Stolz darüber, dass so viele Lebensmittel gerettet werden konnten motiviert Freiwillige dazu immer mehr retten zu wollen. Die meisten Foodsaver sind durch ihr persönliches Netzwerk aus Freunden, Studien- bzw. Arbeitskollegen und Nachbarn zu foodsharing gekommen. Für viele Freiwillige stellt der Zugang zu kostenfreien Lebensmittel eine wichtige Motivation dar. Letztendlich stellt vor allem auch die Identifikation mit der Initiative selbst eine der wichtigsten Motivationen dar, die Menschen dazu bewegt sich bei foodsharing zu engagieren.

AP4: Im zweiten Berichtszeitraum wurden die Antworten aus den Lebensmitteltagebüchern analysiert. Das Hochskalieren der Essenstagebuch-Daten zeigt, dass die Österreichischen Haushalte rund 440,000 ± 44,000 Tonnen Lebensmittelabfälle pro Jahr verursachen. Das entspricht 17% der gesamten Nahrungsmittelproduktion für Haushalte. Davon sind 175,000 ± 22,000 Tonnen pro Jahr vermeidbar oder potentiell vermeidbar. Würden diese Lebensmittelabfälle vollständig vermieden, würde sich durch geringere Lebensmittelproduktion eine Emissionsreduktion von 150,000 ± 29,000 t CO2e pro Jahr, durch die damit verbundene Vermeidung von Plastikverpackungen eine Reduktion von 17,000 ± 7,100 t CO2e pro Jahr, sowie durch verringerte Abfallentsorgung eine Reduktion von 7,600 ± 5,100 t CO2e pro Jahr ergeben.

Weiter konnte gezeigt werden, dass im Jahr 2017 durch Food Sharing in Österreich rund 788,000kg Lebensmittel „gerettet" werden konnten. Unter Verwendung der selben Methodik und Daten über die Menge und Art der durch Food Sharing „geretteten" Lebensmittel schätzen wir, dass durch den aktuellen Umfang von Food Sharing im Bereich der Lebensmittelproduktion Treibhausgasemissionen in Höhe von 590,000kg CO2e pro Jahr und durch damit vermiedene Plastikverpackungen 67,000 kg CO2e pro Jahr (also insgesamt rund 660,000kg CO2e pro Jahr) vermieden wurden, während durch Abfallentsorgung 10,000 kg CO2e verursacht wurden.

AP5 & 6: Wir haben die verläufigen Ergebnisse der einzelnen AP synthetisiert und jeweils ein Poster pro AP sowie ein Poster für das ganze Projekt erstellt. Diese Posters dienten als Input für den Stakeholderworkshop, wo wir die Gelegenheit hatten die Ergebnisse mit Stakeholdern aus unterschiedlichen Bereichen

(Ministerien, Sozialpartnern, NGO's etc.) zu diskutieren. Die Diskussion beim Stakeholder Workshop betonte die Wichtigkeit von Bildung, Bewusstseinsänderungen und Kommunikation in der Reduzierung von Lebensmittelabfällen. Dazu wurden Maßnahmen um foodsharing und Verteilung zu unterstützen und auch Forschungslücken identifiziert.

2 Executive Summary

(max. 2 Seiten, Sprache Englisch)

A large amount of food is wasted in Western societies, regardless of whether it is beyond the expiry date or not. FoodClim (Reducing the contribution of food waste to Austria's GHG emissions) is a research project that deals with the climate impact of food waste and opportunities for its reduction and prevention.

In particular, the project aims (i) to get a more detailed understanding on why food gets wasted and (ii) to provide insights into the role and potential of peer-supported groups and local food-sharing initiatives in reducing food waste.

WP1 maps the still small but continuously expanding academic territory of consumer food waste by systematically reviewing empirical studies on households´ food waste practices, and distilling factors that foster and impede the generation of food waste on the household level. As highlighted by various authors, food waste generation on the household level is a highly complex and multifaceted issue driven by a variety of reasons and types of behaviour. The literature review also showed that socio-demographic factors do not have a strong predictive role in explaining food waste behaviour, although research has found that people over 65 years tend to waste less and households with children tend to waste more food. On a per capita basis, larger households waste less while single households waste most. Overprovision, unsystematic storage, misinformation about the shelf-life of food and date-labels, as well as an aversion towards eating leftovers are, among others, prominent reasons for the disposal of superfluous food. Moreover, our analysis of the literature shows that the lack of knowledge regarding the social and environmental consequences of food waste needs to be tackled to improve people's awareness of the wider impacts of wasteful behaviour. Perceived time shortage due to today's complex scheduling of work, family and leisure time appeared at all stages of food-related household practices as a key constraint to practices of food waste reduction.

While emphasizing the various strategies that can be adopted by individuals to prevent food waste in their households, one must, however, acknowledge the individual as embedded in wider social, economic, and cultural structures and contexts that may prevent the adoption of less wasteful practices. Thus, a holistic waste prevention approach has to go beyond putting the responsibility solely on individuals. In the search for solutions to meeting the food waste challenge, it becomes obvious that we need both, more aware and capable consumers, and

policy makers who are aware of and committed to the problem, and implement the right mix of policy measures to make waste prevention the preferred option for households. The creation of favorable framework conditions as well as support and cooperation with food producers and retailers is of utmost importance for a more sustainable and appreciative handling of food. When designing initiatives and measures to engage the public and reconfigure food practices, however, a multi-tiered approach is needed that combines regulatory frames, informational and educational supports, and price-based measures as well as technological and social innovations in consistent and coherent ways. Hence, policy interventions must go beyond individualizing the problem and abandon a path that relies primarily on information provision, and instead take a more proactive approach that intervenes in the practices of stakeholders in order to push food waste prevention.

WP2 presents an in-depth, qualitative study with 24 Austrian households, conducted from November 2016 to February 2017. Data were collected through food waste diaries, semi-structured interviews and a total of 16 focus group discussions. The WP addresses the role of infrastructures and technologies in the shaping of food shopping and storing practices and thus consumer food waste. The findings of the in-depth qualitative study demonstrate how infrastructures of food provisioning – in particular, the density and type of food retail outlets – play a role for overprovisioning and consumer food waste. The physical and temporal accessibility of food retailers not only influences how frequently consumers do grocery shopping but also how much food they buy per purchase occasion. A high frequency of shopping trips makes it unnecessary to store food that is easily perishable at home, which may prevent overprovisioning and thus food waste. A dense food retail infrastructure also allows food purchases to align temporally with consumer needs that are increasingly dynamic as consumers seek variety and flexibility in their meals and food choices. In turn, this might lower food waste because preferences can be matched with actual purchases and shopping can be done according to needs. Food provisioning outlets themselves necessitate specific types of knowledge and understandings of what it means to "do grocery shopping". In the traditional supermarket, consumers feel that their intentions to "only buy what you need" are at odds with retailer practices aimed at designing a store environment that encourages excessive shopping. In contrast, food provisioning through alternative food networks such as a farmers' market is loaded with a symbolic quality revolving around trust and authenticity; here, people place greater value on food they grow and source themselves and tend to waste less such foods.

Food storing practices as well depend on the characteristics of domestic infrastructures and co-evolve with technologies used for storing food. We found that the availability of space co-dictates storing strategies and thereby prolong the durability and freshness of food items, helping to prevent food from becoming spoiled. However, an adequate storage of purchased food or leftovers demands consumer knowledge and competences regarding the optimal storage conditions of fruits, vegetables and other food items. Technologies such as the fridge and the freezer as well can assist in properly storing food only if consumers know about their functionalities. This also points to the potential of product design to make up for a possible lack of consumer knowledge as is apparent in the case of vegetable

boxes, for instance. Taken together the findings show that while awareness campaigns and economic incentives are important policy measures, it is crucial to look beyond individual decision-making and scrutinize how contextual factors frame consumer lifestyles in ways that intensify the issue of food going to waste.

WP3 analyses the initiative "foodsharing" in order to advance the understanding of the motivations of members and founders to participate in this initiative and their socio-demographic characteristics as well as future mechanisms and requirements to support food sharing in order to further strengthen and spread food sharing. Foodsharing" brings together a variety of people with a range of different backgrounds and motivations. Our case shows a diverse combination of motivations ranging from moral principles, i.e. ecological and social situations that are perceived as illegitimate, unjust, unfair, and thus "wrong" to more individualistic reasons i.e. to benefit personally and financially as receivers of free food. Both positive (e.g. joy, satisfaction, hope) and negative emotions (e.g. annoyance, frustration) play a role in motivating people to be become active. Among the interviewed persons we found a strong identification with the initiative due to shared goals, values, moral standards and a joint interest in food. Foodsavers actively seek the company of like-minded people and value the community aspect, above all the exchange of knowledge, ideas around food and the solidarity with others. Beyond that, engagement is also spurred by the influence of the social environment e.g. what other important and close people think about the participation or if they actually engage too. Others see their participation as way to obtain desired outcomes and reaching valued goals e.g. challenging society's relationships with food and reinvigorating a culture where food is valued, decrease the amount of food that is discarded and/or increase food surplus prevention. Hence, very different motivations are all able to co-exist and in some cases mutually re-enforce each other.

In **WP4**, scaling up of the food diary data shows that around 440,000 ± 44,000 t/a of food waste are produced annually by households in Austria. This corresponds to 17% of the total food produced for consumption by households. Of this, 175,000 ± 22,000 t/a are avoidable and possibly avoidable food waste. If this food waste were completely eliminated, the maximum potential emissions reduction would be 150,000 ± 29,000 t CO2e/a from food production, 17,000 ± 7,100 t CO2 e/a from production of plastic packaging and 7,600 ± 5,100 t CO2e from waste disposal.

Food sharing in Austria has "saved" 788,000 kg of food in 2017. Using the same methodology and the data on the amount and types of "saved" by the food sharing, we estimate that the current food sharing effort reduced GHGs from food production by 590,000 kg CO2e + 67,000 kg CO2e for plastic packaging (total = 660,000 kg CO2e) and caused GHGs from waste disposal of 10,000 kg CO2e.

In **WP 5** we synthesized the results and prepared posters for each WP as well as one overall poster that summarizes the work of the FoodClim project. The posters were used as an input for discussion with various stakeholders (from ministeries,

NGO's, social partners etc.) at the FoodClim Stakeholder Workshop **(WP6)**. Overall, the discussion at the stakeholder workshop emphasised the important role of education, awareness-raising and communication in solving the food-waste problem. In addition, the needs for policy – making to support food sharing and distribution and some clear research gaps were identified.

3 Hintergrund und Zielsetzung

The aim of this project is to stimulate further reflections about food waste and thereby reduce the environmental impact arising from post-consumer food waste in order to i) contribute to emission reductions within the Austrian food sector; and to ii) help Austria attain a 80-95% reduction in greenhouse gas (GHG) emissions by 2050. In order to meet this objective, the project has developed a theoretically-based and empirically-grounded understanding of possible solutions and prospects for a transition to a more sustainable use of food, as well as identified the most effective means to support and accelerate them. The research is supposed to support Austrian policymakers and stakeholders in designing possible interventions and facilitating emerging initiatives and more sustainable lifestyle practices and behaviours. A precondition to implement the right measures to overcome the careless handling of food is an improved understanding of the influencing factors that lead to the wastage of edible food and an assessment of the effectiveness of the different approaches in mitigating GHG emissions. We therefore started with a comprehensive literature review on the circumstances in which these behaviours occur and give an overview of the main causes of food waste. The project also discussed some policy instruments for achieving sufficiently fast-paced waste prevention strategies in line with the objectives established in the Europe 2020 strategy and the Resource Efficiency Flagship Initiative. Furthermore, the project assessed the food sharing platform "foodsharing" as one alternative initiative for sustainable food consumption in terms of (i) the initiators´ and participants´ motivations and goals, (ii) discussed the prospects for up-scaling, and (iii) the platform's potential in terms of saving GHG emissions. Furthermore, the peer-supported group was designed to to provide a more nuanced understanding of participants' waste behaviours.

4 Projektinhalt und Ergebnis(se)

(max. 20 Seiten)

To meet the requirements of the call, the project is organized in 7 work packages. WP 1 is dedicated to the literature review and best practice collection, WP 2 to 4 will focus on empirical research, WP5 on the synthesis and WP 6 on stakeholder engagement. Finally, WP 7 is devoted to the management of the whole project and the dissemination.

WP1:

This WP maps the still small but continuously expanding academic territory of consumer food waste by systematically reviewing empirical studies on households´ food waste practices, and distilling factors that foster and impede the generation of food waste on the household level. We conducted a systematic literature analysis to review the still modest but rapidly growing body of academic literature on consumer food waste. Thereby, we go beyond a sole focus on individual consumers and situate consumer food waste in the context of private households. We categorized these factors into socio-demographic and psycho-social aspects as well as food household behaviours that relate to the various stages of the household food journey. To conclude, we see that research in the field of households' food waste behaviour is progressing well, evidenced by the growing number of studies. As highlighted by various authors, food waste generation on the household level is a highly complex and multifaceted issue driven by a variety of reasons and types of behaviour. To begin with, our analysis has shown that households are generally concerned and feel guilty about wasting food. These feelings of guilt are mainly based on personal concerns such as financial loss, rather than on concerns about negative environmental and social effects of food waste. Also, it is noticeable that households often have ambivalent emotions with regard to waste prevention and face conflicts between the intention to reduce food waste and their own preferences and standards regarding food safety and freshness. In addition, reducing food waste may also run counter to the desire to adhere to the image of the organized and careful homemaker, provider, and host. Consequently, people sense a discord between the care for oneself (and immediate others) and eliminating 'avoidable' food waste. Still, several studies have demonstrated that guilt, perceived behavioural control, and negative attitudes towards food waste present potential factors to predict the intention to reduce food waste and/or reported food waste. Socio-demographic factors seem to play less of a role, even though research has shown that people over 65 years of age tend to waste less, and households with children tend to waste more food. Larger households waste less on a per capita basis, while single household waste most per capita. Overprovision, unsystematic storage, misinformation about the shelf-life of food and different labels, as well as a persistent aversion to eating leftovers are, among others, prominent reasons leading to the disposal of superfluous food. Moreover, our analysis shows that the lack of knowledge regarding the social and environmental consequences of food waste needs to be tackled in order to improve people's awareness of the wider impacts of wasteful behaviour.

While emphasizing the various strategies that can be adopted by individuals to prevent food waste in their households, one must, however, acknowledge the individual as embedded in wider social, economic, and cultural structures and contexts that may prevent the adoption of less wasteful practices. The absence of time to care about food waste and take actions to reduce it, paired with the unpredictability of daily lives make food waste prevention a difficult challenge. Thus, a holistic waste prevention approach has to go beyond putting the

responsibility solely on individuals. In the search for solutions to meeting the food waste challenge, it becomes obvious that we need both, more aware and capable consumers, and policy makers who are aware of and committed to the problem, and implement the right mix of policy measures to make waste prevention the preferred option for households. The creation of favorable framework conditions as well as support and cooperation with food producers and retailers is of utmost importance for a more sustainable and appreciative handling of food. The increasing development and uptake of initiatives that have spread around the globe give encouraging signs that tackling food waste is moving onto the political agenda. Yet awareness-raising is still at the top of the list of key interventions deployed on a regional, national and European level. When designing initiatives and measures to engage the public and reconfigure food practices, however, a multi-tiered approach is needed that combines regulatory frames, informational and educational supports, and price-based measures as well as technological and social innovations in consistent and coherent ways. Hence, policy interventions must go beyond individualizing the problem and abandon a path that relies primarily on information provision, and instead take a more proactive approach that intervenes in the practices of stakeholders in order to push food waste prevention. From a scholarly perspective, further research is needed that uses more objective techniques for data collection, such as using trash sorting or kitchen diaries instead of self-reported mechanisms which can bias individuals towards underestimating their food waste and may also limit the comparison with social variables. Further studies using qualitative or ethnographic methods may be valuable to shed light on the deeper underlying phenomena of household food waste. There is abundant room for further progress for investigating drivers and barriers for food sharing, among the things that deserve even closer attention. Finally, further work is required that tests and measures the effectiveness and impact of different policy measures and other interventions on food waste behavior on the household level. Given the multifaceted and complex character of the issue, a strong collaboration and integration of different disciplinary perspectives is also essential.

WP2:

The overall objectives of WP2 were (i) to obtain detailed insights into the lived experiences, employed strategies and perceived barriers of individual household members with regard to the reduction and prevention of food waste as well as (ii) to explore the effectiveness of information provision paired with a participatory Peer Supported Process (PSP) in initiating behavioural efforts to reduce and avoid food waste in households. The analysis of the focus groups conducted in the course of the PSP meetings revealed a variety of reasons for individual households to waste food that we attributed to the different stages of the consumer food journey. These reported reasons range from uncoordinated shopping practices over perceived or actual damage of food items to overprovisioning and neglect. In a similar manner, it was found that household members are already (intentionally

or implicitly) pursuing a broad range of strategies to reduce or prevent food waste in their household.

With regard to the effectiveness of input provided, the preliminary analysis indicates that especially information on date labels as well as advice on storage practices were well received and employed in individual households. Also, the collaborative and reflexive quality of the PSP meetings were clearly apparent in both groups; this was manifested in active exchanges of individual experiences and ideas as well as expressed mutual understanding of challenges encountered in household waste behaviours. The food waste diaries (n= 48) have been collected and include data on the quantity and composition of food waste as well as stated reasons for wasting food.

One dominant theme that emerged throughout the analysis concerns the interconnectivity of infrastructures of food provisioning as well as the material contexts of food practices situated in the realm of the private home, in particular with regard to shopping and storing practices. Thus, we decided to compile a paper with the objective to disentangle the role of material contexts – more specifically, (domestic) infrastructures, technologies, and the "things of everyday life" – in steering and scripting food shopping and storing practices and thus food waste. Thereby, we contribute to a growing body of literature on analysing the contextual dimensions of consumer food waste.

The findings demonstrate, for instance, that as the ascribed role of the supermarket diverges into that of a warehouse (for storing food) or kitchen (by providing ready-made meals), so will related food and consumption practices adapt. The paper also facilitates reflections on how material and functional attributes of domestic storing technologies and appliances become central to notions of food practices and waste generation as they co-evolve with food routines, habits and practices.

WP3:

Increasing concerns about food waste have enabled the rise of local initiatives that aim to reduce food waste and/or redistribute excess food. In the midst of these concerns, initiatives have emerged that illustrate how sharing has reached the food sector. However, while food sharing is often discussed as a potentially transformative mechanism for a more sustainable food system, empirical studies on food-sharing initiatives are still scarce and only few researchers have yet investigated the motivations and lived experiences of food sharing practitioners. Therefore, in this project we have explored underlying motivations to become involved in collective action around food and shed light on food-sharers' individual and collective goals. In sum, 16 interviews were conducted with members of the initiative "foodsharing" in Vienna, and Graz, which have the biggest "foodsharing" communities in Austria. The initiative "foodsharing" allows on the one hand individuals (so-called 'foodsharer') to share excess food among each other, on the other hand so-called 'foodsavers' collect food surplus from cooperation partners and distribute it afterwards for free to all people regardless of their origin, social

status and faith. The decision on who receives the saved food is at the discretion of the foodsavers themselves. They can use the collected food for themselves and/or give it to e.g. family, friends, neighbours, people in need or bring it to publicly accessible fridges called "Fairteiler". These public fridges are located in cafes, adult education centres, district municipal authority offices and can be accessed only during the opening hours. On the one hand foodsavers can place rescued food into it and the other hand all people can take out and put back in as much food as they like.

Drawing on in-depth interviews with 16 food savers (members of the initiative 'foodsharing') who collect food from a variety of food providers before it is thrown away or enters a 'waste' state and share it for free with a diverse group regardless of their social status.

The results show that members are motivated by: (i) Emotions and Morality, (ii) Identity and Sense of Community, (iii) Reward, (iv)Social influence and (v) Instrumentality. The category Instrumentality comprises different goals that have a strong motivating effect: Save food from being wasted, Food (re)distribution, Food surplus prevention and Reinvigorating a new consciousness around food. "Foodsharing" brings together a variety of people with a range of different backgrounds and motivations. Our case shows a diverse combination of motivations ranging from moral principles, i.e. ecological and social situations that are perceived as illegitimate, unjust, unfair, and thus "wrong" to more individualistic reasons i.e. to benefit personally and financially as receivers of free food. Both positive (e.g. joy, satisfaction, hope) and negative emotions (e.g. annoyance, frustration) play a role in motivating people to be become active. Among the interviewed persons we found a strong identification with the initiative due to shared goals, values, moral standards and a joint interest in food. Foodsavers actively seek the company of like-minded people and value the community aspect, above all the exchange of knowledge, ideas around food and the solidarity with others. Beyond that, engagement is also spurred by the influence of the social environment e.g. what other important and close people think about the participation or if they actually engage too. Others see their participation as way to obtain desired outcomes and reaching valued goals e.g. challenging society's relationships with food and reinvigorating a culture where food is valued, decrease the amount of food that is discarded and/or increase food surplus prevention. Hence, very different motivations are all able to co-exist and in some cases mutually re-enforce each other. Indeed, participation can be triggered by moral considerations and at the same time people can be motivated by the benefit of having access to free food. However, rich and diversified motivations and expectations behind individuals participating in collective action can also lead to tensions e.g. those who see their participation as an expression of certain sets of principles, values and concerns and others that mainly pursue individual benefit. The analysis also unveiled conflicts between different individual views on what food sharing should and can achieve i.e. between those who wish to upscale the initiative and are satisfied with collecting food and using it for self-

supply or giving it to other people while others intend to disestablish the initiative aiming at more radical changes making initiatives that collect food obsolete. Taking a closer look at the stated goals reveals that some foodsavers may also confuse the concepts of 'saving food from being wasted' and 'preventing food surplus creation' and use both interchangeably.

In contrast to other examples of collective action, however, the initiative does not primarily direct their concerns to the state, but rather develops practical alternatives that often add to and/or replace existing processes and structures that are incompatible with the visions of a sustainable food system. Not all foodsavers regard their activities as a form of political protest, but some explicitly stated that they show their concerns and express their dissatisfaction through their food sharing activities, which are in themselves a form of resistance against to current practices of the food system. While our interviewees seek less to directly target policy makers, "foodsharing Germany" recently released a position paper that prompts the German federal government to implement more stringent laws to prevent food surplus creation and facilitate food redistribution. This development of making demands and directly targeting national governments illustrates a desire to have more systemic impacts. In Austria no similar kind of efforts i.e. position papers have been released so far. Going beyond their main mission of collecting food can, however, be interpreted as a vital first step towards a more systemic overall approach to preventing food waste. Future research could analyse the extent to which food sharing initiatives are able to further push laws and regulations that create the necessary structures and mechanisms to prevent food surplus creation and foster food surplus redistribution and/or how governance structures impede food sharing activities.

The results of the "foodsharing Visioning Workshop" identified actions that could realized by the "food sharing initiative" itself and actions for the broader community in order to reach the vision they developed. The more general actions focus strongly on awareness-raising, in particular for young people.

The most important actions for "foodsharing" itself were:

- Establish district groups (8 points)
- Buddy system (4 points)
- Improve internal communication (4 points)
- Promotion of "foodsharing" (1 point)
- Update and improve app (1 point)
- Establish association (1 point)
- Financial support (1 point)
- Improve website/platform (1 point)
- Take the initiative and develop own ideas (1 point)

The most important actions in general were:

- Workshops and talks for all generations (5 points)
- Workshops and awareness raising campaigns in schools, kindergarten, after-school care clubs (3 points)
- Global awareness raising campaigns and demonstrations (3 points)
- Involve children in cooking activities and knowledge transfer (1 point)
- Strengthen relationship with food and the environment (1 point)

The results of the quantitative survey conducted with foodsavers (members of the foodsharing initiatives) are still to be analyzed in detail before they are disseminated.

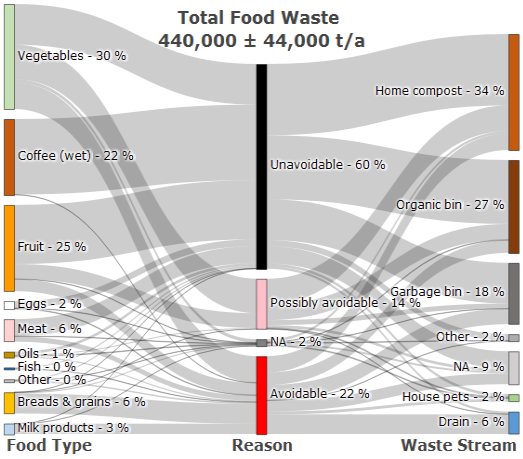


Figure 1: A Sankey diagram of the flow of food waste in households, as estimated on the basis of the food waste diaries and up-scaled for Austria. The sums of the individual nodes may not equal 100% due to rounding errors.

WP4: The results of the food diaries up-scaled to Austria are shown in Figure 1. We estimate that 440,000 t/a of food waste are produced in households. Of this about 40% is avoidable or possibly avoidable. The estimate is similar to an earlier estimate made by Schneider et al., 2012[1] in a waste composition study. The upstream GHGs for the production of the A&PA food waste are shown in Figure 2. The majority of the emissions (53%) come from the meat even though meat makes up only 4% of the amount of avoidable and possibly avoidable waste. This results from meat production being much more resource and emission intensive compared to other food types. The GHGs from the production of plastic packaging for the A&PA food waste are estimated to be an additional 17,000 ± 7,100 t CO_2e / a. The total (production + packaging) potential emission reductions upstream are about 1.2% of Austria's food based emissions or annual emissions from 18,000 Austrian's. They could also be achieved if Austrian's reduced meat consumption by 3%.

Figure 3 shows the estimated GHG from the disposal of the A&PA food waste. Since 2003, Austria has made a large effort to reduce its emissions in the waste disposal industry. In Austria very little organic waste goes to landfill and almost all organic

[1] Schneider, F., S. Lebersorger, F. Part, S. Scherhaufer, and K. Böhm. 2012. Sekundärstudie Lebensmittelabfälle in Österreich. . Universität für Bodenkultur (BOKU).

waste from large urban centres is either composted industrially or combusted, often for energy. It is LCA convention that processes receive credits for by-products that displace fossil fuels. In this case compost displaces inorganic fertilizer and electricity and heat are generated from the combustion. Since disposal of food waste reduces GHGs, a reduction in food waste may actually **cause** emissions. Nevertheless these emissions are small in comparison to the emission reduction potential from decreased agricultural production (Figure 2).

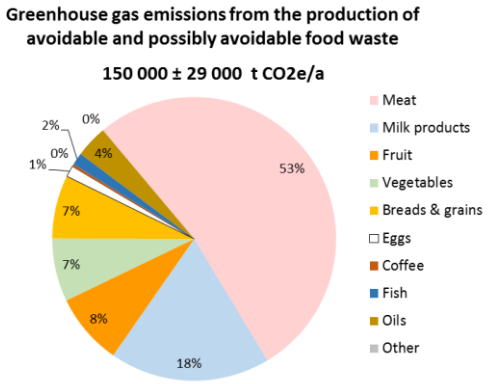


Figure 2: Greenhouse gas emissions [t CO2e/a] from the production of food that is wasted (avoidable and possibly avoidable) in Austrian households

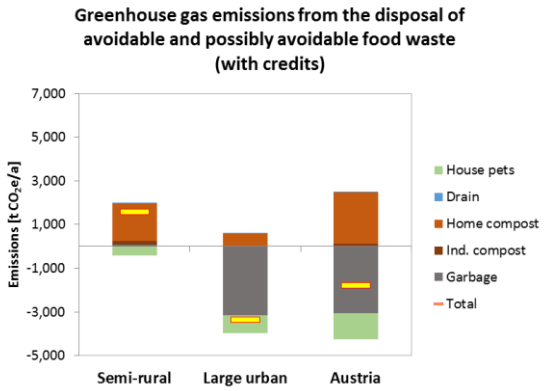


Figure 3: Greenhouse gas emissions from the disposal of avoidable and possibly avoidable household food waste in Austria, with credits for the displacement of fossil-based products by bio-based products from the waste disposal stream.

Food sharing in Austria has "saved" 788,000 kg of food in 2017. Using the same methodology and the data on the amount and types of "saved" by the food sharing, we estimate that the current food sharing effort reduced GHGs from food production by 590,000 kg CO2e + 67,000 kg CO_2e for plastic packaging (total = 660,000 kg CO_2e) and caused GHGs from waste disposal of 10,000 kg CO_2e.

WP 5& 6:

The main objectives of the stakeholder workshop were (i) to connect stakeholders from the areas of policy, retail, research, and civil society who are involved in issues around food waste in Austria as well as (ii) provide a space for discussions, exchange of experience and active contributions to policy recommendations.

The workshop addressed a broad range of stakeholders from different institutional levels linked to food and food waste, such as the MA48, Global 2000, and the Federal Ministry of Sustainability and Tourism, as well as business representatives and members of local initiatives that reduce food waste (i.e. food sharing platform). A total of 18 stakeholders participated in the workshop as well as all project team members. Overall, the discussion at the stakeholder workshop

emphasised the important role of education, awareness-raising and communication in solving the food-waste problem. In addition, the needs for policy – making to support food sharing and distribution and some clear research gaps were identified.

5 Schlussfolgerungen und Empfehlungen

(max. 5 Seiten)

In this section we summarize the main findings of the FOODCLIM project and also reflect on the methods and tools used in the project. We also discuss further research needs that have been identified during the course of the project.

WP1 provides a systematic literature review that offers first glances and starting points for understanding food (waste) practices on the household level and for investigating the factors that make engagement in food waste prevention and reduction challenging. The literature review on food waste research showed that a considerable amount of research is now being carried out. The literature demonstrates that food waste generation on the household level is a highly complex and multifaceted issue driven by a variety of reasons and types of behavior. Overall, we find that there is a need for a holistic waste prevention approach that goes beyond putting the responsibility solely on individuals. In the search for solutions to meeting the food waste challenge, it becomes obvious that we need both: more aware and capable consumers and policy makers who are aware of and committed to the problem and implement the right mix of policy measures to make waste prevention the preferred option for households. Thus, a multi-tiered approach is needed that combines regulatory frames, informational and educational support and price-based measures, as well as technological and social innovations in consistent and coherent ways.

The audience for the results of the project is extremely broad, as was pointed out during the final stakeholder workshop. We have identified tasks for policy makers (e.g. providing clear criteria and guidelines for the re-distribution of food), for food retailers (e.g. establishing infrastructure to re-distribute imperfect food products), for business - caterers, hotels, restaurants, company canteens – (e.g. passing on leftover-food to employees) and civil society (e.g. encouraging the use of public fridges / "fair-teilers"). A wide range of actions have been identified, underlining the need for a multi-tiered approach towards reducing food waste.

The review highlights, that food waste is integrated and intersects with a plurality of other (food) practices unfolding within and outside the context of the home, ranging from food planning and grocery shopping over storing, cooking, and eating to the handling of leftovers and waste. Finally, domestic food practices (and related skills and values) co-evolve with changes e.g. in production technologies, supply

chains and retail systems as well as material structures. Our analysis from WP2 also showed that consumer practices around food are mediated, enabled and constrained by infrastructures at home (e.g. cellar, pantry, fridges, freezer) but also by infrastructure of provision and the corresponding retail environments (big supermarkets, local stores, farmers' markets). The characteristics of food retail infrastructures – in terms of accessibility, density, and type – shape these routines and thus potentially influence excess food purchases. The physical and temporal accessibility of food retailers not only influences how frequently consumers do grocery shopping but also how much food they buy per purchase occasion. Furthermore, we find that a high frequency of shopping trips makes it unnecessary to store food that is easily perishable at home and thus could potentially reduce or prevent overprovisioning and thus food going to waste. Participants in the study also pointed out that stronger planning routines, such as writing a shopping list, often relate to lower reports of buying unplanned items and big packs. Food storing practices as well depend on the characteristics of domestic infrastructures and co-evolve with technologies used for storing food. Our findings underline the importance of consumers' competences when it comes to the proper storing of food. This has already been identified as a crucial issue in food waste reduction and prevention. We found that the availability of space and the characteristics of the infrastructure in the home co-dictate storing strategies and thereby prolong the durability and freshness of food items, helping to prevent food from becoming spoiled. Unraveling the interconnectivity between material contexts and household food practices can inform policy, product design and food retail development and thus has implications for reducing consumer food waste.

In WP3, we also found that people who engage in food sharing often make greater use of fridges and freezers to prolong the shelf life of food. Foodsavers accumulate a large amount of knowledge on proper storing and have sophisticated storing systems that are deeply entangled with individuals' practices around food. Food storing practices as well depend on the characteristics of domestic infrastructures and co-evolve with technologies used for storing food. Our findings underline the importance of consumers' competences when it comes to the proper storing of food. This has already been identified as a crucial issue in food waste reduction and prevention. We found that the availability of space and the characteristics of the infrastructure in the home co-dictate storing strategies and thereby prolong the durability and freshness of food items, helping to prevent food from becoming spoiled. In sum, we find that food waste is a largely unintended outcome of entangled daily routines revolving around food, such as meal planning, grocery shopping, and food storing. Unraveling the interconnectivity between material contexts and household food practices can inform policy, product design and food retail development and thus has implications for reducing consumer food waste.

The literature review (WP1) also showed that fewer waste is produced in households that infrequently throw away food that has passed its best-before date. In other words, people who use more nuanced assessments of food edibility (using

their own senses) instead of date labels are wasting less food. Studies also indicate that respondents with greater environmental commitment waste less food that has passed its best-before date. Moreover, interviews in WP3 show that foodsavers make more use of their sensory skills to assess edibility and are generally more willing to eat 'expired' food. They do not only accept food that has any sensory impairments and which is no longer considered spotless by food providers; through collecting and distributing expired and 'imperfect' food which is considered as waste, they also aim to question and renegotiate the social and political definition of 'waste', but also the legislative frames that determine and reinforce these definitions. Our results suggest, that a starting point for policy makers should be the streamlining and optimising of expire date labels for pre-packed food products, for instance by removing the sell-by date or by removing date labels completely from some product groups and extending the list of food products exempted from indicating the date of minimum durability.

Various studies reviewed in WP1 highlight that people usually experience a conflict between trying to avoid food waste and protecting themselves from food-related health risks. Here, concerns about food safety tend to outweigh others, such as wasting food. By contrast, concerns about foodborne illnesses, together with a desire to eat fresh food, are less prominent among people engaged in food sharing (WP3).

Beyond that, perceived time availability plays a decisive role in shaping household food (waste) practices (WP1). A perceived lack of time due to today's complex scheduling of work, family and leisure time appeared at all stages of food-related household practices as a key constraint to practices of food waste reduction such as planning shopping trips, shopping more frequently, shopping at smaller stores, growing one's own food, storing food properly or cooking with leftovers. For foodsavers interviewed in WP3, however, food-related household practices (planning, provisioning, storing, cooking, assessing edibility, managing leftovers) are given a great priority: they are central to their lives, and foodsavers devote a lot of time to provision, handle, prepare and redistribute food. Underlying reasons for food waste such as the complexity of daily life are challenging to address and require more innovative approaches that go beyond traditional policy instruments. If we are to tackle food waste in a systematic way, we might also take into account the links between changing patterns of work and leisure (e.g. shorter working hours) and consumer food waste.

If food waste in Austria were completely eliminated, WP 4 estimated that the maximum potential emissions reduction would be 150,000 ± 29,000 t CO2e/a from food production, 17,000 ± 7,100 t CO2 e/a from production of plastic packaging and 7,600 ± 5,100 t CO2e from waste disposal.

Food sharing in Austria could potentially save 788,000 kg of food in 2017. Using the same methodology and the data on the amount and types of "saved" by the food sharing, we estimate that the current food sharing effort reduced GHGs from food production by 590,000 kg CO2e + 67,000 kg CO_2e for plastic packaging (total = 660,000 kg CO_2e) and caused GHGs from waste disposal of 10,000 kg CO_2e.

Methods and approaches

During the course of the project we have used a wide variety of methods and approaches: literature review, structured and semi-structured interviews, food diaries, peer support groups, focus groups, a visioning workshop, life-cycle assessment and an interactive stakeholder workshop to synthesis results. All of these approaches have substantially contributed to the success of the project. The literature review provided a strong basis for the research and for informed discussions with stakeholders. The food diaries were very effective in stimulating a creative discussion about the causes and consequences of food waste, as well as possible solutions. They also provided useful input for the life-cycle assessment. The testing of the food diaries by the research team before they were used for research was an important step, since it improved both the content and presentation of the product. All of the workshops carried out within the project were carefully designed and used a wide variety of participatory approaches that stimulated knowledge exchange, learning and the development of exciting and creative solutions to the problem of food waste. This underlines the importance of design of stakeholder engagement, so that it is truly engaging and productive.

The literature review identified various areas for further research:

- Studies employing more objective techniques for data collection, such as trash sorting or kitchen diaries instead of self-reported mechanisms (which can bias individuals towards underestimating their food waste and potentially limit the comparison with other variables) are needed;
- Given the multifaceted and complex character of the issue, strong collaboration and integration of different disciplinary perspectives is essential;
- Research is needed that goes beyond investigating attitudes towards food waste and instead adopts a social practice ontology that potentially sheds light on the daily routines and practices that underlie household food waste;
- Using multiple methods of data collection (e.g. combining interviews with observations) is important to capture lived experiences and provide a nuanced account of how and why food gets wasted;
- Further research should investigate the role of structural elements such as shopping infrastructures or storage places at home on food waste;

- Another relevant area of future research concerns the potential of emergent technologies (e.g. smart fridges, fridges and boxes that prolong the shelf life, apps on in-home food availability, etc.) to support food waste reduction;
- Further research is needed assess the effectiveness and impact of different policy measures and other interventions on food waste practices;
- There has been little research conducted on how perceived time availability influences people's waste practices. If we are to tackle food waste in a systematic way, we must also take into account the links between changing patterns of work and leisure (e.g. shorter working hours) and consumer food waste.
- Furthermore, we found that there is little research on the link between different types of food provisioning systems and food waste generation. As food retail infrastructures are in constant flux, further research should explore how anticipated developments such as online grocery shopping will influence food provisioning practices and thus food waste generation. Similarly, research on the impacts of "digitalization of the home" on food (waste) practices would provide useful insights.
- While investigating the relationships between quantifiable variables such as shopping frequency and food waste is crucial, a deeper understanding is needed regarding the question of how specific practices of food acquisition evolve, persist and disappear in order to design effective policies and interventions.

C) Projektdetails

6 Methodik

(max. 10 Seiten)
Begründung und Darstellung des gewählten Forschungsansatzes.

Throughout the project, several different methods such as systematic literature review, qualitative interviews; a quantitative survey; kitchen diaries; Lifecycle Analysis (LCA); workshops (visioning workshop, stakeholder dialogue) were employed.

WP1:

In this paper, we review the still modest but rapidly growing body of academic literature on consumer food waste. Thereby, we go beyond a sole focus on individual consumers and situate consumer food waste in the context of private households. Empirically, we orient ourselves along the systematic literature review methodology. For practitioners, systematic reviews can help address managerial problems by producing a reliable knowledge base through accumulating findings from a range of studies. For scholars, systematic reviews can enhance methodological rigor as well as highlight opportunities for further research. In our study, we first located relevant studies based on our review objective of distilling evidence on why food waste occurs in households. Here, we limited the search to peer-reviewed journal articles published in English and consciously omitted grey literature such as research reports or books. We believe a highly commendable scientific journal should refer to peer-reviewed literature only. Besides, 'grey' literature that meets scientific standards are often published in the scientific literature in form of a condensed version. The databases Web of Science, Scopus, and GoogleScholar were used as a basis for the literature search. The initial key word search included the search strings "food waste" AND "consumer" as well as "food waste" AND "household". Subsequently, the articles generated from the initial search were checked manually (mainly by reading through the abstract). We excluded studies that (i) did not have households and consumers as units of analysis; (ii) did not have a focus on reasons and drivers for food waste on the household level (studies that solely dealt with the quantification of food waste were excluded), and (iii) were not empirical studies (literature reviews were not analysed). This pool of literature was further developed through the snowballing technique i.e. by checking the references of the articles yielded by the initial search. The complete search resulted in a list of 60 articles on which the systematic literature review is based. In a next step, we coded the gathered papers on various dimensions using the MAXQDA software tool for qualitative data analysis. The codes are organized around the identified key variables and factors which are sought to impact the amount of food waste occurring in households and that were investigated by the selected studies. The initial codes were scaled up into three

core categories: socio-demographic factors, psycho-social factors, and food-related household behaviours.

WP2:

In this WP we conducted a qualitative empirical study involving two neighbourhoods in Austria, one located in an urban area (Währing, the 18th district of Vienna) and one located in a rural area (Neumarkt in Styria) from November 2016 until February 2017. In each neighbourhood, a group of selected, individual household members met over the period of 16 weeks to discuss various aspects of and experiences with food waste in their homes. The group in Vienna consisted of 8 individuals; the group in Styria was larger with 16 individuals participating. To take part in the project, each individual household member had to commit to (i) participate in a total of 4 Peer Supported Process meetings and (ii) complete two food waste diaries for a period of 7 days each (14 days in total). Food waste diaries are an adequate instrument to determine quantities, disposal routes and reasons for the discarding of food. The main advantage of this method is the disposal to waste streams that are hard to measure from compositional analysis (e.g. what is poured down the kitchen sink, home composted or fed to animals are also included).

The specific content covered in the respective PSP meetings was a follows for each of the two neighbourhoods:

1st Project Meeting (Kick-Off): After a brief round of introductions, an overview of the FOODCLIM-project was presented, which also included information on the project team, funding and time line. Subsequently, the schedule and outline of the PSP meetings were presented and the food waste diary introduced, explained, and handed out to each participant (Food Waste Diaries/Phase I).

2nd Project Meeting: In focus groups, participants reflected on their experiences with the food waste diary. More specifically, it was discussed (i) which reasons participants had in Phase I for throwing away food in their households as well as (ii) which strategies they felt they employed to avoid food waste. In addition, participants were encouraged to think about additional reasons for and strategies against food waste which may occur and be pursued in households other than their own.

3rd Project Meeting: First, the project team gave a brief presentation on the link between food waste and climate change which was followed by a round of questions and a discussion. Afterwards, a poster was presented of the food waste strategies mentioned and discussed in the 2nd Project Meeting. The main emphasis of the meeting was on providing information and advice on the right handling and storing of food items. This was mainly done through handouts designed by the project team that included information on (i) the shelf life of selected food items, (ii) the meaning of various labels such as the "best before" date, (iii) advice on storing food in the fridge, and (iv)advice on the freezing of food items. All of these

aspects have already been identified in academic literature as crucial for the reduction of food waste on the household level. The handouts were distributed and discussed in small focus groups with the World-Café method. Finally, the handouts together with the second round of food waste diaries were handed out to each participant (Food Waste Diaries/Phase II).

4th Project Meeting: First, participants reflected on their experiences with the second food waste diary as well as on the feasibility and effectiveness of the different kinds of advice and information provided. After these rounds of reflection, participants were invited to collect and describe their ideas for projects and initiatives around food waste that could be implemented in their respective region or district. In relation to this brainstorming, participants formulated messages to various kinds of stakeholders on postcards provided by the project team. The meeting ended with a brief discussion on lessons learned, an outlook of the next steps in the project, and an evaluation of the whole project process by the participants.

WP3:

Qualitative phase- Interviews:

Participants were recruited through personal contact at a regular meeting of "foodsharing", via the "foodsharing" online platform and the "foodsharing" facebook group and selected interviewees based on a theoretical sampling method. Most interviewed foodsavers are involved in "foodsharing" for a longer period (i.e. at least a few months) and save food on a regularly basis The interviews were conducted between December 2016 and November 2017 at the researcher's office, at the home or the University of the participant or in a separate room of a café. In sum, 16 interviews were conducted with 'foodsavers' and 'ambassadors' of Vienna, and Graz, which have the biggest "foodsharing" communities in Austria. The interviews were in-depth, and semi-structured, following a minimal interview protocol to prompt participants to tell their story in their own words. The interviews lasted between 40 and 180 minutes, the majority of interviews taking at least 60 minutes. Interviewing continued until redundancy, and thus theoretical saturation, was reached. The following key open-ended areas were explored: first contact to "foodsharing"; motives for joining "foodsharing"; feelings when first rescuing food; feelings associated with activities around food sharing; perceived causes of food-waste; goals they pursue with their involvement in "foodsharing"; perceived effectiveness of "foodsharing" i.e. potential effects of "foodsharing" on food waste and any impacts in terms of witnessed changes with regard to food waste. Critically, whilst these areas provided a rough guideline for key themes to be covered during the interviews, the semi-structured interview allowed the interviewer to address specific hints of interviewees, explore emerging topics of interest and pose follow-up questions to fully grasp interviewees' notions and opinions.

Before we started the interview, participants were provided with a study information sheet which contained information on the project, and grants confidentiality and the right to withdraw. Participants signed a consent form which gave us the permission to audiotape and transcribe the interviews. Interviews were audio-recorded and transcribed verbatim and coded through NVivo. Interview transcripts were coded using grounded theory analytical procedures to identify thematic categories underpinning individual motivations, aims, and objectives with regards to their activity as members of "foodsharing". We started with 'open' coding to assign initial conceptual labels to the transcript material, and these labels were refined as new insights emerged. In a second step we used 'axial' coding to organise these concepts into broader themes. Finally, to gain a better sense of how core themes are connected to each other we deployed 'selective' coding (Strauss and Corbin, 1998). While we did not intend to develop a comprehensive theory, we rather conducted a thematic analysis of the content using grounded theory coding procedures.

Qualitative phase- Visioning Workshop:

The Visioning Workshop took place on the 19th of March, 2018 from 3 p.m. to 6 p.m.at the Vienna University of Economics and Business (WU). In sum, 11 foodsavers participated in the Visioning Workshop. The central focus was on how the initiative can be strengthened and brought forward. This workshop brought together relevant actors within the food sharing initiative.

The initiative "foodsharing" allows, on the one hand, individuals (so-called 'foodsharer') to share excess food among each other, on the other hand so-called 'foodsavers' collect food surplus from cooperation partners and distribute it afterwards for free to all people regardless of their origin, social status and faith. The decision on who receives the saved food is at the discretion of the foodsavers themselves. They can use the collected food for themselves and/or give it to e.g. family, friends, neighbours, people in need or bring it to publicly accessible fridges called "Fairteiler". These public fridges are located in cafes, adult education centres, district municipal authority offices and can be accessed only during the opening hours. On the one hand foodsavers can place rescued food into it and the other hand all people can take out and put back in as much food as they like.

The aim of the workshop was to develop a joint vision for 2030 and find pathways needed to meet the vision. The key questions were:

- Which future directions for the initiative are envisioned by the participants?
- Which concrete steps could be taken (and by whom) to support the realization of the vision for "foodsharing" in Austria?
- Which organisations/institutions/people are important in reaching this ambition?

- How could relevant actors, alliances and cooperative relationships help to support the vision?

The workshop was facilitated by Jill Jäger and was designed as an interactive and open process. First of all we started with a short personal introduction of the participants and a short overview over the FoodClim project. After that we split the participants into two groups and continued with an ice-breaker sequence that should give participants the opportunity to know each other a little better.

Subsequently, participants stayed in those two table groups and each group focused on potential elements for a vision of "foodsharing" in 2030. The discussions were interactive and were to enable participants to contribute to a common vision but also to discuss, share and exchange their individual ideas and suggestions. Those ideas and elements of the vision were collected and presented and discussed first within the group and then also in plenum. In a next step they were clustered into 7 overarching thematic groups that in sum resulted in a vision for "foodsharing":

- Overall vision
- Organization of „foodsharing"
- Awareness raising
- Community
- Image
- Policy, Business and Agriculture
- Diffusion of „foodsharing".

Quantitative phase- Questionnaire:

We conducted an online survey with foodsavers from Austria, Switzerland and Germany. The link to the online questionnaire was sent to acquaintances of the researchers and posted into discussion forums of the foodsharing communities in Germany, Austria, and Switzerland. The first question in the online questionnaire asked participants whether they engaged as foodsavers in the respective foodsharing initative. Only those respondents who self-identified as foodsavers were presented with the rest of the questionnaire/with the complete questionnaire, all others were thanked without filling in the questionnaire. A total of 320 foodsavers (78.1% female, M age = 32.96 years, SD age = 12.01) completed the online questionnaire. The great majority (54.1%) reported to actively share food only in Germany, 28.8% shared food solely in Austria, 20.0% solely in Switzerland. About half of the participants reported that they had a university degree (53.1%; 31.9% high school degree). About a third indicated that they earn more than 1,499.00€ (less than 500 Euro: 24.4%; 501-1,000 Euro: 26.9%; 1,001-1,499 Euro: 17.2%), 43.1% reported that they were employed (38.8% were studying).

Only 18.1% of the participants acted as an ambassador within the foodsharing community.

WP4:

Data from the kitchen diary study (WP2), which was conducted in November 2016 and February 2017 as part of the peer-supported process, were analysed statistically on a person-meal basis rather than household basis due to fluctuating numbers of people in the households. The kitchen diary data (mass of food waste) were organized along three different classifications: type of food wasted (e.g. meat, milk, etc.), category of food waste (avoidable, possibly avoidable and unavoidable waste[2]) and disposal method. The mean values were upscaled to the national level using the following formula:

$$AT = 365 * 3.3 * Pop_{AT} * AH * (NEU * (1 - Frac_{pop_{urban}}) + VIE * Frac_{pop_{urban}}) \quad (1)$$

Where

AT = the household estimate for Austria, Pop_{AT} = the total population of Austria, *AH* = the percentage of meals eaten at home, *NEU* = food waste in g / person-meal in Neumarkt, *VIE* = food waste in g / person-meal in Vienna, and *Frac_pop_urban* = the fraction of the population in large urban centres.

Greenhouse gas emissions (GHGs) along the food chain occur: 1) upstream of the consumer due agricultural production, processing and packaging and 2) downstream of the consumer due to waste disposal including food waste. The GHGs generated for the production of avoidable and possibly avoidable (A&PA) food waste were calculated by food type using the up-scaled masses multiplied by life-cycle (LCA) assessment based emission factors for fresh food delivered in retail outlets from the GEMIS database[3]. To this value, GHGs for the production of plastic packaging were estimated using a relationship of plastic packaging and food consumed and an LCA emission factor for plastic. GHGs for the disposal of A&PA food waste were estimated using the up-scaled masses of waste multiplied by average LCA emission factors from literature[4] corrected for the Austrian electrical energy intensity and transportation distances.

For the food sharing initiative, all food waste collected was assumed to be avoidable or possibly avoidable. GHGs for the production of this food were calculated as discussed in the preceding paragraph. GHGs for the disposal of this waste were calculated assuming that the waste would have been disposed in the

[2] In this project we adopted the definitions of foodwaste proposed in Beretta, C., F. Stoessel, U. Baier, and S. Hellweg. 2013. Quantifying food losses and the potential for reduction in Switzerland. Waste management 33:764–773.

[3] IINAS. 2018. GEMIS Database, V4.95. . International Institute for Sustainability Analysis and Strategy (IINAS).

[4] In total 26 papers were reviewed.

same manner as calculated as from the food diary study for Vienna on the assumption that food sharing initiatives occur only in larger urban areas.

For both the peer-supported process and food sharing initiative the estimate of upstream GHG emissions should be considered as an up-side potential for emission reductions since the savings would only occur if the farmers produce less food as a result of reducing food waste. The methodology used is an attributional style analysis and not a consequential analysis. The impacts of reducing food waste on food production must be analyzed using economic models.

WP 5 &6:

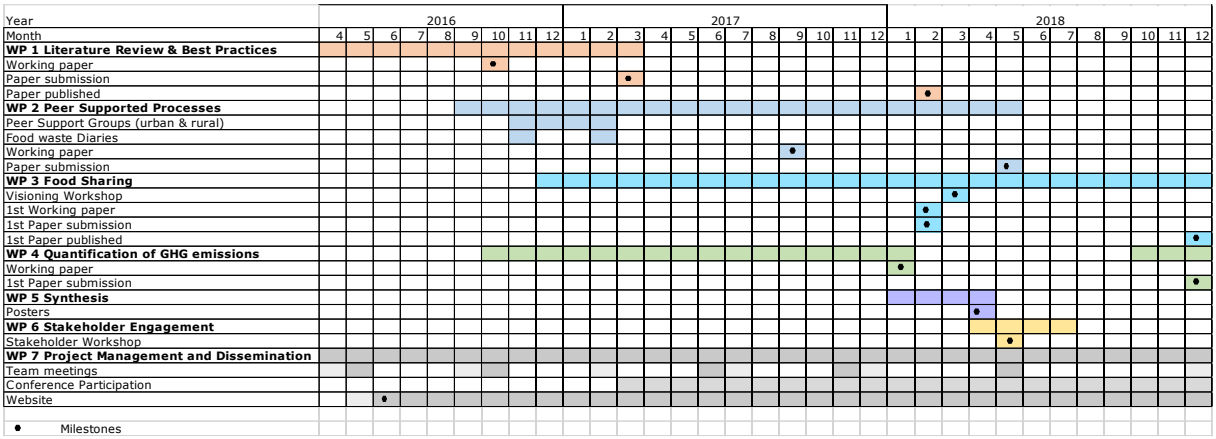
The FoodClim-Stakeholder workshop took place on May 16, 2018 from 1.00 to 5.00pm at the WU Vienna University of Economics and Business. The main objectives of the stakeholder workshop were (i) to connect stakeholders from the areas of policy, retail, research, and civil society who are involved in issues around food waste in Austria as well as (ii) provide a space for discussions, exchange of experience and active contributions to policy recommendations.

The workshop addressed a broad range of stakeholders from different institutional levels linked to food and food waste, such as the MA48, Global 2000, and the Federal Ministry of Sustainability and Tourism, as well as business representatives and members of local initiatives that reduce food waste (i.e. food sharing platform). A total of 18 stakeholders participated in the workshop as well as all project team members. The structure of the workshop was as follows: after a brief round of introductions and presentation of the FoodClim-project, the (preliminary) findings and a synthesis of the different work packages of the project were presented in the form of a poster walk. Subsequently, participants split into three table groups, each focusing on a different stakeholder type, i.e. policy, business, and civil society.

During the poster walk, participants had the opportunity to read about the findings and engage in discussions with the project team. In the subsequent interactive discussion rounds, each group was discussing (i) potential measures to prevent and reduce food waste as well as (ii) barriers to implement these measures. After the first round of discussions, the participants switched to another table group. In total, 3 table groups took place; thus, each workshop participant engaged in discussions about measures that could be implemented by all the three stakeholder groups. The key objectives of the interactive discussion rounds were to enable stakeholders to (i) share their experience and perspectives on the issue of food waste, and (ii) actively contribute to robust recommendations on measures that prevent and reduce food waste.

7 Arbeits- und Zeitplan

(max. 1 Seite)
Kurze Übersichtsdarstellung des Arbeits- und Zeitplans (keine Details).



8 Publikationen und Disseminierungsaktivitäten

Tabellarische Angabe von wissenschaftlichen Publikationen, die aus dem Projekt entstanden sind, sowie sonstiger relevanter Disseminierungsaktivitäten.

Publications

Published:

Schanes, K., Stagl, S., 2019. Food waste fighters: What motivates people to engage in food sharing? Journal of Cleaner Production 211, 1491-1501. (WP3)

Schanes, K., Dobernig, K., Gözet, B., 2018. Food waste matters - A systematic review of household food waste practices and their policy implications. Journal of Cleaner Production 182, 978-991. (WP1)

Under review:

Dobernig, K., Schanes, K., 2019. Domestic spaces and beyond: Exploring consumer food waste in the context of shopping and storing routines. Submitted to International Journal of Consumer Studies. Current status: under review. (WP2)

Bird, DN, Canella L., Dobernig, K., Schanes, K., Gözet, B., Jaeger, J., Pucker-Singer, J., 2019. Experience using kitchen diaries to estimate the amounts of household food waste and its implications for greenhouse gas emissions. Submitted to: Virtual Special Issue on Food Waste: Multidisciplinary Efforts towards UN Sustainable Development Goals Target 12.3. Resources Conservation and Recycling. Current status: under review. https://www.journals.elsevier.com/resources-conservation-and-recycling (WP4)

Planned:

Schanes, K., Dobernig, K., Hartl, B., 2019. Collective Action around Food Waste: Investigating the determinants and characteristics of participation in food sharing initiatives. Planned to submit to: Journal of Environmental Psychology. (WP3)

Policy Brief:

Bird, DN, Canella L., Pucker-Singer, J., 2018. Das Reduktionspotenzial von Treibhausgasemissionen durch die Vermeidung von Lebensmittelabfällen aus

Haushalten. Policy brief. JOANNEUM RESEARCH Forschungsgesellschaft mbH. (WP4)

Presentations

- **Dobernig, K. (WP3):** *"Collective Action around Food Waste: Investigating the determinants and characteristics of participation in food sharing initiatives."* Workshop on **"**Foodscapes of the sharing economy". 25th September 2018, Wageningen, **Netherlands.**
- **Stagl, S. (WP3): "***Food waste fighters: What motivates people to engage in food sharing?"* Presentation at the 15th Congress of the International Society for Ecological Economics: "Ecological Economics and Socio-ecological Movements: Science, policy and challenges to global processes in a troubled world" 10-12 September 2018 in Puebla, **Mexico**.
- **Dobernig, K. (WP2): "***Domestic spaces and beyond: Exploring consumer food waste in the context of shopping and storing routines."* Oral Presentations at the 3rd International Conference of the Sustainable Consumption Research and Action Initiative (SCORAI): "Sustainable Consumption: Fostering Good Practices and Confronting the Challenges of the 21st Century" in June 27–30 2018 in Copenhagen, **Denmark**.
- **Schanes, K. (WP3): "***Food waste fighters: What motivates people to engage in food sharing?"* Oral Presentations at the 3rd International Conference of the Sustainable Consumption Research and Action Initiative (SCORAI): "Sustainable Consumption: Fostering Good Practices and Confronting the Challenges of the 21st Century" in June 27–30 2018 in Copenhagen, **Denmark**.
- **Dobernig, K. (WP2): "***Tackling the consumer food waste dilemma: an exploration of household strategies and lock-ins."* Oral Presentation at the 18th European Roundtable of Sustainable Consumption and Production Conference (ERSCP). October 2017, **Greece**.
- **Schanes, K. (WP1), Bird, D.N. (WP4):** *"Lebensmittelabfälle in Österreich: Handlungsoptionen auf kommunaler Ebene".* Sitzung des Umweltausschusses des Österreichischen Städtebundes. 3rd October 2017, Graz, **Austria**.
- **Schanes, K. (WP1):** *"Lebensmittelabfälle in Österreich: Gründe für Lebensmittelverschwendung und Gegenstrategien."* Presentation at Tagung des Fachausschuss für Abfallwirtschaft. November 2017, Villach, **Austria**.
- **Schanes, K. (WP1): „***Food waste matters - A systematic review of household food waste practices and their policy implications."* Presentation at the Conference "Sustainable Lifestyles, Livelihoods and the Circular Economy". 27-29 June 2017, University of Sussex in Brighton, **UK**.

Posters

- Presentations at the FoodClim Stakeholder Workshop 16th May, 2018, WU, Vienna, **Austria**:

  Schanes, K. (WP1): *„Food waste matters - A systematic review of household food waste practices and their policy implications."*

  Dobernig, K. (WP2): "Household Study - Contextual Factors of Food Shopping and Storing Routines."

  Schanes, K. (WP3): "*Food waste fighters: What motivates people to engage in food sharing?"* **Bird, D.N., Canella L., Pucker-Singer J. (WP4):** Food waste diaries: quantification of greenhouse gas emission reduction potential.

- **Dobernig, K. (all WP)** Poster-Presentation at the Klimatag 2018, 23–25 April 2018, University of Salisbury, Salisbury, **Austria**.
- **Dobernig, K., Schanes, K. (WP1):** "Food waste matters - A systematic review of household food waste practices and their policy implications." Poster presentation at the Klimatag 22–24 May 2017, University of Vienna, **Austria**.

Media coverage

- Kleine Zeitung. Viel zu wertvoll zum Wegwerfen. 5. June 2018. (WP4)
- Österreichische Gastronomie Magazin (ÖGZ). Lebensmittelabfälle in Österreich. April 2018. (WP1)
- DerStandard. Ökonomin mit ökologischer Agenda. 23. September 2017. (WP1,2) https://derstandard.at/2000064317455/Oekonomin-mit-oekologischer-Agenda
- Kleine Zeitung. Was das Essen im Müll das Klima anheizt. 27. October 2017. (WP4)
- Green Tech Magazine. Weniger Lebensmittel im Müll. May 2017. (WP4)

All articles are available on the FoodClim website: http://www.foodclim.eu/results/

– **Doctoral dissertations**: If applicable, please list the names of the doctoral students involved in the project and indicate the status of their dissertations (doctoral dissertation started, in progress, terminated).

Within the context of the project Karin Schanes completed her Ph.D. in January 2019 with distinction at the Vienna University of Economics and Business. During the project she has published in internationally recognized and high-ranked journals (e.g. Journal of Cleaner Production) and two of the articles published from

the FoodClim project are part of her cumulative dissertation with the title "Confronting Food Consumption: Food Waste Prevention and Food Sharing as two Areas for Climate Change Mitigation".

Schanes, K., Stagl, S., 2019. Food waste fighters: What motivates people to engage in food sharing? Journal of Cleaner Production 211, 1491-1501. (WP3)

Schanes, K., Dobernig, K., Gözet, B., 2018. Food waste matters - A systematic review of household food waste practices and their policy implications. Journal of Cleaner Production 182, 978-991. (WP1)

Abstract of the dissertation:

This dissertation presents three contributions to the scholarly discussion on sustainable consumption and climate change mitigation with a special emphasis on the food domain. Previous global efforts to solve climate-change problems have not yet led to an agreement on a binding and coherent top-down approach to mitigate greenhouse gas (GHG) emissions. Instead, the role of civil society, through its private-sphere individual behaviour but also through engagement in collective action, has increasingly come into focus in the context of climate goals across different sectors. In the first paper, we seek to achieve a better understanding of different private-sphere options and strategies individuals can undertake to mitigate climate change. Based on an extensive review of literature on sustainable consumption we developed a framework with the aim of structuring consumer options that support climate change mitigation. The practical application of the framework is illustrated by using food consumption as an example. Building on the developed framework, the dissertation zooms in on two of the identified strategies within the food domain – one individual (food waste prevention) and one collective strategy (food sharing) – in order to gain a better sense of influencing factors and driving forces for the adoption of those strategies. The second article uses the systematic literature review methodology to analyse food waste at the level of the individual and the household with the aim of facilitate an in-depth understanding of the complex food practices that lead to food wastage in households, and thus reveal obstacles as well as barriers for food waste reduction and prevention. The third article draws on qualitative interviews, shedding light on the motivations for engaging in food sharing to discern the socio-psychological drivers of collective action for the redistribution of superfluous food.

Diese Projektbeschreibung wurde von der Fördernehmerin/dem Fördernehmer erstellt. Für die Richtigkeit, Vollständigkeit und Aktualität der Inhalte sowie die barrierefreie Gestaltung der Projektbeschreibung, übernimmt der Klima- und Energiefonds keine Haftung.

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