



Algemene gegevens	
TKI-Nummer	AF-EU-16008
Titel	REFRESH
Topsector (A&F of T&U)	A&F
Projectleider (onderzoek)	Hilke Bos-Brouwers
Werkelijke startdatum	1 juli 2015
Werkelijke einddatum	31 juli 2019
Korte omschrijving inhoud	<p>REFRESH is a European Research and Innovation Action project, funded by the H20202015 programme (EC No 641933). The overall aim of the REFREHS project is to contribute significantly towards the SDG 12.3 objective of halving food waste at retail and consumer level and reduce food losses in the supply chain, and maximizing the value from unavoidable food waste and packaging materials. Developing a 'Framework for Action' model that is based on strategic agreements across all stages of the supply chain to support transformation towards a more sustainable and secure EU food system, benefitting Europe's economy, environment and society.</p> <p>Wageningen Research will aim to be the innovation partner for sustainable growth, collaborating with frontrunner, innovative SMEs, industrial and societal partners.</p>

Uitvoerende partijen	
Betrokken kennisinstellingen	<ul style="list-style-type: none"> - Wageningen University (Netherlands) - Institute of Food Research (UK) - University of Bologna (Italy) - Institute foer Livsmedel och Bioteknik (Sweden) - Universität für Bodenkultur (Austria) - University of Newcastle upon Tyne (UK) - Ecologic Institute (Germany) - Collaborating Centre on Sustainable Consumption and Production – Wuppertal Institute (Germany) - IVL Swedish Environmental Research Institute (Sweden) - CREDA – UPC – IRTA (Spain) - Institute of Geographical Sciences and Natural Resources Research – Chinese Academy of Sciences (China) - Jožef Stefan Institute (Slovenia) - University of South Denmark (Denmark)
Overige partijen	<ul style="list-style-type: none"> - Provalor BV (NL) - Vacuvita Holding BV (NL) - GS1 AISBL (BE) - Bactevo Ltd. (UK)

Highlights

REFRESH contributes to a resource efficient food and drink supply chain, and has achieved between M1-18 to following key outcomes.

WP1 (Consumer engagement): A research framework was developed to consolidate existing pan-European consumer understanding on food waste behaviour. Next, a research protocol was developed and applied to 24 focus groups in NL, ES, HU and GE creating a basis for qualitative insight into food waste diversity across Europe. It was found that recognition and awareness of the food waste issue is considerable across the countries and on the increase. Education plays a large part, as well as the motivation to not waste food competes with several other consumption and household management goals, such as convenience and hospitality culture. Secondly, food waste measurement methodologies at household level were assessed. Self-reporting appeared to be well-suited for large sample studies. Thirdly, the potential of ICT applications to create interventions in consumer food waste behaviour was studied through an inventory and analysis of existing ICT-based tools, also identifying missing functionalities.

WP2 (Business engagement / frameworks of action): Existing voluntary agreements were inventoried and analysed to find success factors to enhance the effectiveness of the Framework of Action (FA) approach. It is exemplified through the development of Piloting Working Platforms (PWP) in four pilot countries (NL, ES, HU, GE) and was replicated in China. To support the FA, agreements, baseline measurement methodology and piloting action project templates were created. The pilots will start in period 2. First steps were taken in the design and testing of a decision support system and preliminary research was performed to model on retail level. To support replication, the first steps in developing a Community of Experts web-based platform were implemented.

WP3 (Policy): The focus is creating policy roadmaps for voluntary (business) agreements, consumer behaviour and valorisation of former food products. To support this, macro- and micro level systems maps on 5 food product categories were developed to identify drivers and policy influences.

WP4 (socio-economic modelling): Typologies explaining the link between behaviours and food waste levels were identified and tested for minimising type I (false positive) errors, using WRAP and Euro-barometer databases. System maps were developed to allow holistic modelling of waste as an emergent property of a complex system. Such modelling should not be restricted to a single stage in the food supply chain (environment). Businesses can be addressed via behavioural economics that indicate that specific psychological factors may affect the adoption of innovation. Also, technological and organisation innovation within the business context were studied on their impact on a number of food waste drivers. A model development protocol was created to support sharing of data between work packages and the alignment of data definitions and descriptions (metadata) to feed into the ABM and BN models.

WP5 (Evaluation of environmental impacts and life cycle costs): This WP works to provide the environmental and cost dimension of valorisation routes and waste management options by life cycle assessment (LCA) and life cycle cost (LCC) analyses. After a literature review a guidance document was created describing how to combine LCA and E(nvironmental)-LCC to assess different options to handle side flows from the food supply chain, built on existing standards and state-of-the-art LCA/LCC research. Four "REFRESH Situations" were developed to study further on LCA and LCC. A preliminary study combining LCA and a Mass Flow Analysis (MFA) has been carried out on the German meat supply chain.

WP6 (valorisation of unavoidable food waste): Key to optimise valorisation is the selection of appropriate edible and inedible waste streams. To this purpose, a top 80 of products was identified based on consumption volume and environmental impact and their associated 291 waste streams. Based on selection criteria, these were narrowed down to a top 20 of appropriate, unavoidable waste streams, including spent grains, press cakes from vegetable oil pressing, and meat and dairy side flows. The work on creating a new tool for the waste composition database has started. Investigating technical solutions, sample carrot and chicory fibres with modified textural

characteristics have been produced, and will be furthered into larger volumes and incorporated into model food systems. Technologies that carried this experimental work are hydrothermal (autoclaving) and steam explosion processes. Secondly, opportunities to convert putrescible waste to fuels and chemicals were studied, by testing the potential of the TarGET mutant libraries of *P. fluorescens* and *P. putida* and to identify the genetic basis for waste conversion. Also, a draft decision support tool to identify potential animal feed conversion routes was created (UK based).

WP7 (dissemination): A broad variety of dissemination activities have supported the REFRESH project including a Project Dissemination strategy, website, social media channels, 'corporate design' for communication products, flyers, newsletters, postcards, and banner. REFRESH was presented at over 37 external events. Other actions include the initiation of the REFRESH Food Waste Solution Contest and the first REFRESH multi-stakeholder event. Two scientific publications have been published.

WP8 (management): this WP manages the project and administrative aspects of REFRESH, and coordinates the Consortium and its governance bodies. 2 governing council meetings were organised, and 2 intermediary activity reporting on M1-6 and M7-12 were produced. Regular meetings of the EB were organised as well as bilateral EAB meetings. A Knowledge & Information Protocol was created to structure the internal and external knowledge sharing of the work.

Aantal opgeleverde producten			
Wetenschappelijke artikelen	Rapporten	Artikelen in vakbladen	Inleidingen/ workshops/ invited lectures
2	14		37 (heel consortium)

Bijlage: Titels van de producten of een link naar de producten op een openbare website

De publicaties van REFRESH zijn te vinden / downloadbaar via www.eu-refresh.org , behalve de disseminatie strategie en het knowledge & information protocol, omdat dit projectinterne rapporten zijn.

Titels van rapporten vanuit het project zijn als volgt:

1. Causes & determinants of consumers food waste
2. National, qualitative insights on household / catering food waste
3. Consumption life cycle contributions
4. Inventory and evaluation of effectiveness of existing approaches
5. Protocol for evaluating business food waste
6. Socio-economic implications of food waste
7. Data protocol socio-economic modelling
8. Methodology for evaluating environmental sustainability
9. Methodology for evaluating LCC
10. Generic strategy LCA & LCC
11. Valorisation appropriate waste streams
12. Top20 food waste streams
13. Dissemination strategy (niet gepubliceerd)
14. Knowledge & information protocol (niet gepubliceerd)

REFRESH op KennisOnline: <http://www.wur.nl/en/project/AF-EU-16008-REFRESH-.htm>