Recommendations for cities to stimulate to lower food waste in households

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DCS.1 – KB-1-1D-1

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Content

1. Background of the Governance in Tools project

This project generates tools, tested and developed in practice, for behavioural change and decision-making options to support the transition towards a circular society:

(i) to guide the **transition process** towards circular society in a just and responsible way,

(ii) to better understand circular **behaviour** of all market actors: from supplier to farmer to processor to consumer

(iii) to select **instruments and incentives** that stimulate actors to move towards a circular society in a responsible way

(iv) to build **new circular business models**.

(v) to understand the concept of a just and responsible **phasing out process**

To facilitate **a just and responsible transition** towards a circular society, this research project aims:

- To provide **a guidance** for a just and responsible transition based on the understanding of the complexity of transition processes with a focus on "gebiedsgerichte aanpak", the role of government and research; the guidance includes several tools which can support the process, such as a set of leverage points, a trade off scheme.
- To understand individual and cooperative behaviour processes of market actors in the context of circularity resulting in **a checklist** of *relevant factors and determinants for circular behaviour; these factors and determinants form the base of the circular behaviour change wheel (see the third bullet)*
- To elaborate a model ("**a circular behaviour change wheel**" based on (i) Michie et al. (2011)) that identifies (the most) promising interventions and incentives supporting circular behaviour in different settings, in different situations and (ii) the factors and determinants for circular behaviour (see the second bullet) – including external factors.
- To assess and conceptually build a **circular business model (CBM)** in which principles of a circular society are put in practice.
- To formulate lesson learned for a just and responsible **phasing out** process.

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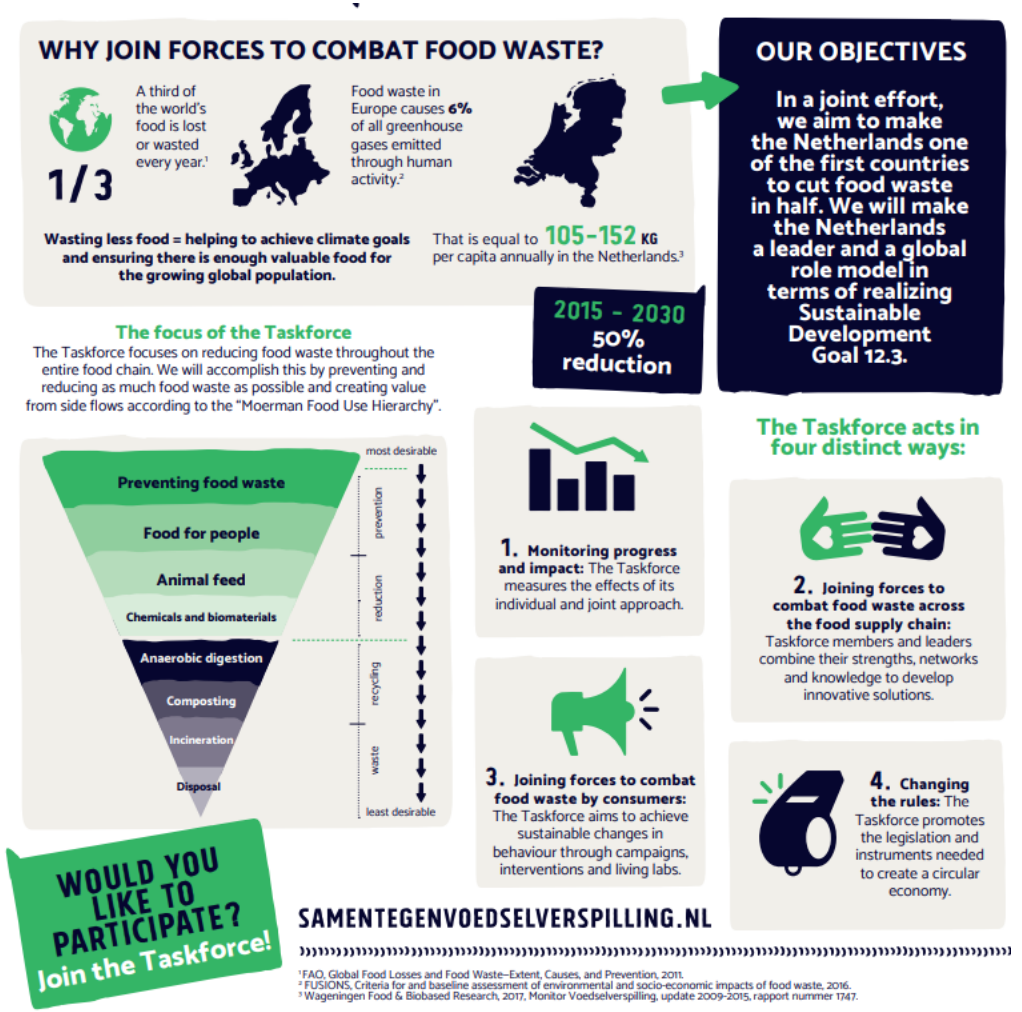
Casus: reducing food waste in households

2. Food Waste Free United - combatting Food Waste in NL

Food Waste Free United (Dutch: Stichting Samen Tegen Voedselverspilling [STV] aims to prevent and reduce food waste across the full agri-food system in the Netherlands. Via a multi-actor platform approach, STV is the nexus in the Netherlands to support stakeholder members with knowledge, tools, and action plans on Monitoring, Innovative Solutions, Consumer behaviour and Governmental instruments to reduce food waste. Within the Governance in Tools project, WFBR collaborates with STV and the Dutch Nutrition Center to develop, improve and implement a series of tools, based on scientific foundation & practitioner's experiences to support municipalities and cities to support their citizens (households) with lowering food waste levels at home.

Outputs of the Case study:

- 2023: DCS.1 Conclusions and recommendations for cities to lower food waste in **households**
- 2024: DCS.2: Set of tools to support municipalities in designing, implementing, and evaluating consumer-facing food waste interventions in line with circularity targets in collaboration with relevant business and societal organisations.



Source: www.samentegenvoedselverspilling.nl

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3. Legacy from Governance in Transition

Designing business interventions for changing consumer behaviour

Our main theoretical frameworks underpinning the understanding of consumer behaviour, its drivers and how it connects with developing behaviour change instruments, are best illustrated by the MOA-model (Geffen et al., 2016) and the Wheel of Michie (2011). Further described in Zeinstra et al. (2022)

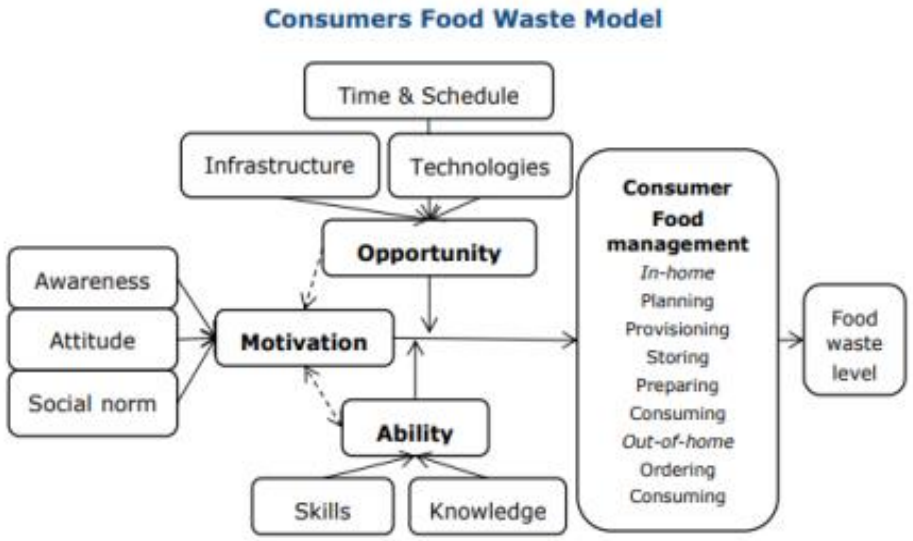
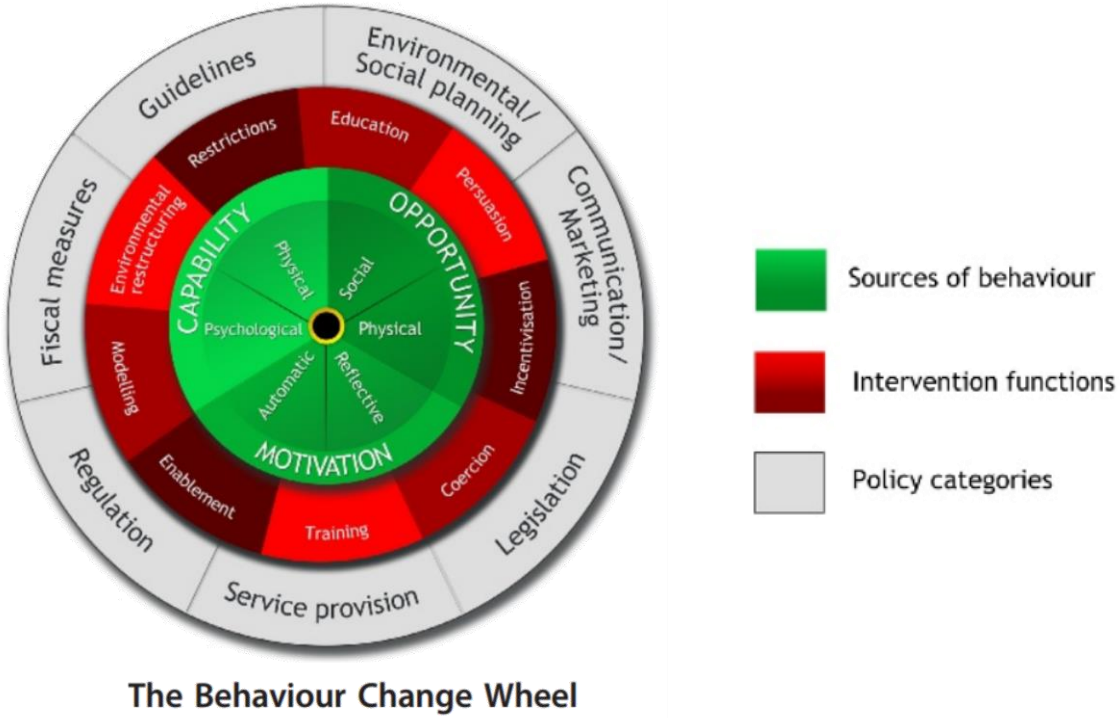


Figure 3 Consumers Food Waste Model (MOA), van Geffen et al 2016.



The Behaviour Change Wheel

Michie *et al.* Implementation Science, 2011.

3. Legacy from Governance in Transition

Intervention types by Van Geffen et al. (2020)

Based on the MOA-model, Van Geffen et al. (2020) designed a framework to identify different intervention types (shown in the table), which diferentiate by goal-intention and goal- striving settings. 10 types were identified, most related to Motivation-factors driving behavioural change. Starting with awareness and willingness to change as a first step into successful behavioural change.

Food waste: how to avoid it?

		Intervention type	Motivation	Ab
Goal-intention setting	1	Information campaigns	✓	
	2	Emotional appeal campaigns	✓	
	3	Social influences	✓	
	4	Commitment	✓	
	5	Regulations	✓	
Goal striving	6	Prompts	✓	
	7	Implementation intention setting	✓	
	8	Instructions		✓
	9	Feedback	✓	
	10	Making it easy		✓

3. Legacy from Governance in Transition

Intervention types by Michie et al., 2011

The intervention wheel approach by Michie categorises different types of interventions and policy measures, as described in the table.

Although not derived from food waste research, these intervention types resonate with consumer behavioural change within food related topics.

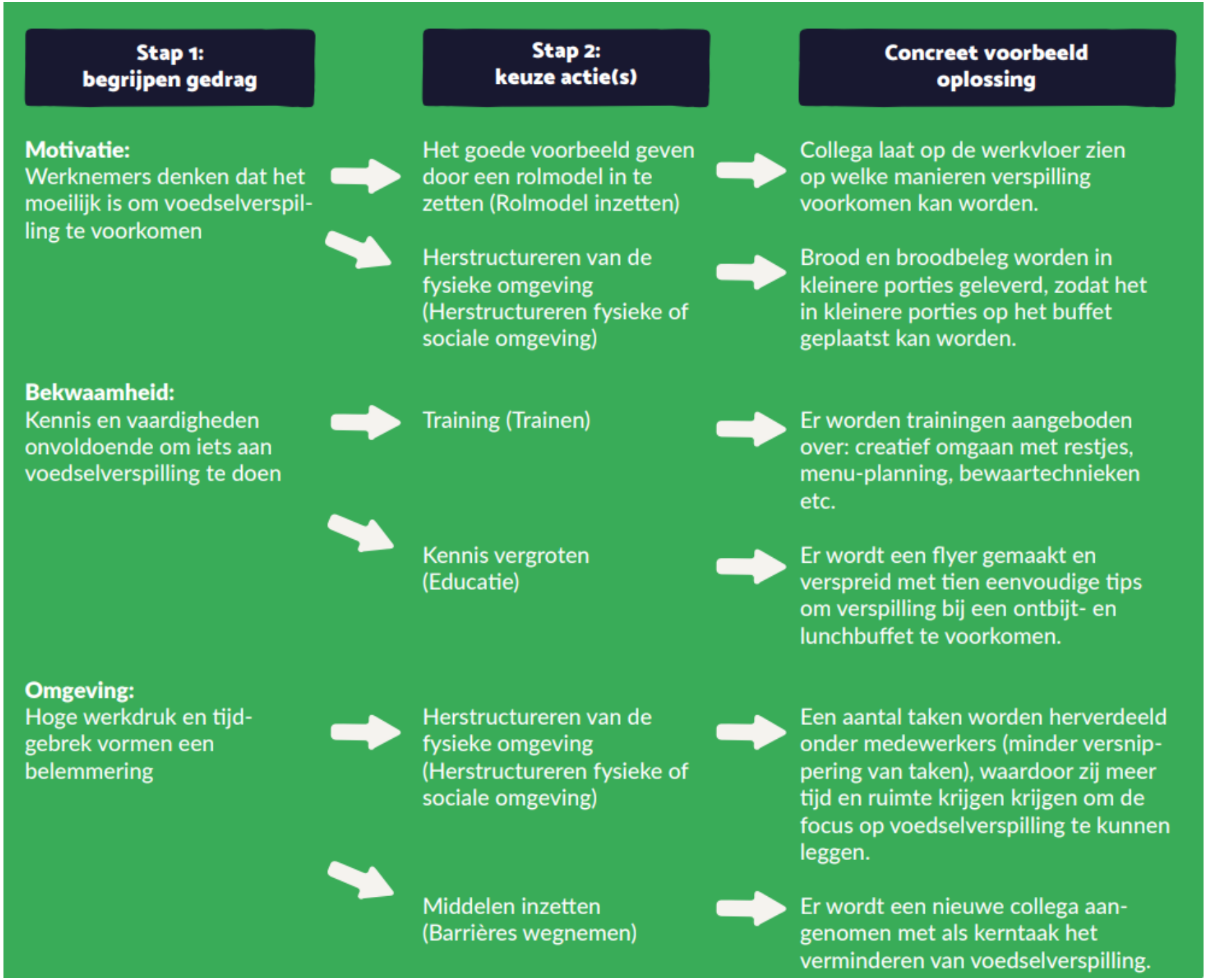
	Definition	Examples
Interventions		
Education	Increasing knowledge or understanding	Providing information to promote healthy eating
Persuasion	Using communication to induce positive or negative feelings or stimulate action	Using imagery to motivate increases in physical activity
Incentivisation	Creating expectation of reward	Using prize draws to induce attempts to stop smoking
Coercion	Creating expectation of punishment or cost	Raising the financial cost to reduce excessive alcohol consumption
Training	Imparting skills	Advanced driver training to increase safe driving
Restriction	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)	Prohibiting sales of solvents to people under 18 to reduce use for intoxication
Environmental restructuring	Changing the physical or social context	Providing on-screen prompts for GPs to ask about smoking behaviour
Modelling	Providing an example for people to aspire to or imitate	Using TV drama scenes involving safe-sex practices to increase condom use
Enablement	Increasing means/reducing barriers to increase capability or opportunity1	Behavioural support for smoking cessation, medication for cognitive deficits, surgery to reduce obesity, prostheses to promote physical activity
Policies		
Communication/marketing	Using print, electronic, telephonic or broadcast media	Conducting mass media campaigns
Guidelines	Creating documents that recommend or mandate practice. This includes all changes to service provision	Producing and disseminating treatment protocols
Fiscal	Using the tax system to reduce or increase the financial cost	Increasing duty or increasing anti-smuggling activities
Regulation	Establishing rules or principles of behaviour or practice	Establishing voluntary agreements on advertising
Legislation	Making or changing laws	Prohibiting sale or use
Environmental/social planning	Designing and/or controlling the physical or social environment	Using town planning
Service provision	Delivering a service	Establishing support services in workplaces, communities etc.

Deliverable result 2022:

The practical checklist for businesses to include behavioural incentives in designing food waste reducing interventions.

The checklist was tested with entrepreneurs from the STV network. It is also published via STV and in use during intervention workshops of the foundation.

Bron:
www.samentegenvoedselverspilling.nl (Dutch only)



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4. Case study introduction: the city's perspective on lowering food waste in households

Currently, the existing approach of STV with regards reducing FW in urban areas and municipalities can be described as follows:

Step 1

- Identify & map urban hotspots of food waste
- Designing effective monitoring approaches
- Analyse current urban policies/initiatives

Step 2

- Develop protocols & guidance for municipalities/cities to implement a target-measure-act approach, in alignment with national governmental support and policy.

This approach allows:

1) Identification of relevant urban level food system actors, hotspots of food waste & policy/technological and market-based interventions
2) Collaborations to develop municipal policies & regulations to valorise side flows
3) Develop local / place-based food policy that is integrated with other political agendas (e.g., climate change, energy, mobility, housing, etc.)

Cities differ in size, demographics, supply chains and other factors, therefore, food waste approaches need to be context specific and meeting local needs.

4: Case study - introduction

In 2023, STV initiated the municipality/city project to add to their existing toolbox of supporting stakeholders in (co-) developing FLW reducing interventions for cities and municipalities.

WFBR will support this initiative from the KB Governance in Tools project by increasing the scientific knowledge base on incentives for behaviour change, and the role of municipalities and cities to lower food waste within households, and thereby translating the knowledge into practical recommendations (governance tools) for city and municipal stakeholders.

Lead coordinator on behalf of STV is the Dutch Nutrition Center (Dutch: Voedingcentrum [VC]), responsible for the Consumer Behaviour Action line of STV. In this initiative, VC has formulated a project-approach, supervised and supported by a stakeholder group, including WFBR.

The main question guiding the initiative is *to identify the mix of interventions that municipalities can & want to implement, that support them lowering the food waste levels of households*.

Recognising that there are in fact many interventions that target household level food waste, the objective for the initiative is to support municipalities in selecting appropriate interventions that are fitting to their context and ambitions.

5. Case study - work structure

To coordinate the initiative, the following work packages have been formulated:

WP1	WP2	WP3	WP4
Inventory	Selecting the intervention mix	Piloting the intervention mix	Developing a blueprint

To guide the initiative, the following supporting questions have been formulated:

- Which interventions can be implemented by municipalities
- What differentiates municipalities in selecting & implementing interventions?
- Do the selected (mix of) interventions deliver food waste reduction results at household level?
- Are the interventions also effective on the longer term?
- Which factors influence implementation and effectivity results within municipal interventions?

6. Case study – project activities & conditions

Project activities

Project activities	General planning
Inventory in municipalities	2023-Q2
Selecting the intervention mix	2023-Q3/4
Production of interventions	2024-Q1
Baseline measurement	2024-Q2
Implementing interventions	2024-Q2
Effectivity analysis short & long term	2024-Q2/3
Analysis of results	2024-Q4
Blueprint development & publication	2025-Q1/2

Conditions

- Connecting with existing activities within municipalities
  - Is there existing policy / ambitions?
  - Is there operational capacity available?
- Establishing operational conditions
  - Limitations in practice (available funding, capacity, time)
  - Channels used for communication & implementation
  - Collaborations with stakeholders at local level
  - Extent of measurement efforts
  - Not (over)burdening citizens
- Supportive for the actual needs from municipalities

7. Connecting WFBR & the Municipality/city initiative by STV

WFBR case work for KB Governance in tools

Municipality/city initiative led by STV/VC

1 Review of academic literature, including parallel behaviours

Feed into

Inventory phase

Results inform

2 Intervention matrix, user groups & choice conditions
→ Why the VC' municipal test group' selects what (understanding the selection made)
→ 'Generic selection mechanism (how to make it applicable beyond the test group

...

Intervention Mix

...

3 Characterisation & contextual information for implementation success

Implementation

4 Evaluation criteria and understanding the baseline

5 Project deliverables checklist/factsheet

Evaluation / blueprint guidance

8. Overview of results WFBR activities 2023

1. **Review of scientific literature**, including parallel behaviours

Aims:
- To describe current scientific state of the art on food waste prevention and reduction interventions at city/municipality level, aimed at households.
- To gain new insights on how municipalities (cities/urban areas) aim to change the behaviour of their citizens towards less food waste + (broader) their pro-environmental behaviour

2. **Developing an analytical framework** for the analysis of the intervention mix (matrix) for municipalities.

Aim: understanding the choice conditions and parameters on the VC's municipality test group, on selected interventions for further testing. Translating the insights into a 'generic' selection mechanism, that is applicable beyond the test group, including international relevance.

8a. Review of scientific literature - approach

1. Search strategy scientific literature
- Define search queries
- Search relevant data bases (Web of Science, Scopus, PsychInfo)
- Relevance scan (scope) & prioritization (in case of too many relevant articles)

2. Search keywords
- Municipalities interventions/ activities/ initiatives/programs
- Behaviour/ behaviour change among consumers/ citizens/ inhabitants -> households

Focused on food waste, but looking broader at
1) pro-environmental behaviours (water, energy, waste separation) or even broader
2) healthy lifestyle (food, physical activity, mental wellbeing), meal planning
3) Financial gains of waste reduction

3. Classification of intervention articles
- Characterization of interventions
- Evaluation of interventions

4. Guiding analysis questions:

- How can municipalities influence the behaviour of their consumers/ citizens/ inhabitants?
  - Which intervention strategies are used, and for which target groups?
  - How effective and feasible were these interventions?
  - How did the municipality decide on this intervention: can we get insight into their decision-making arguments?
  - How are these municipality approaches different (or similar) to direct consumer/ household interventions?
  - What are success factors and barriers (for the implementation) of these interventions?
  - What are drivers/levers in the context of the interventions?

5. Summarize findings
- Which interventions are effective / most promising?
- Which promising household-level interventions allow for municipal-level implementation?

6. Conclusions and recommendations

8b. Review of scientific literature – search results

Search keywords used in the literature query

Term actor: Municipality	Term: Food waste/ pro-environmental behaviour	Term: intervention	Term: Consumer/ inhabitants	Other?
Municipal*	Food waste (reduction)	Intervention*	Consumer*	Public
Cit*		Initiative*	Citizen*	Community
Urban	Pro-environmental (behavio*)	Program*	Inhabitant*	Local
Government	Green (behavio*)	Action*	Household*	Domestic
Council	Eco-friendly (behavio*)	Strateg*	Resident(s)	Demographics
Metropolitan	Environmentally friendly	Approach*		Biogenic factors
Borough	Note: behaviour may not be used perse. It could be: to be more green	Policy		
Note: We focus on cities/ urban areas		Incentive?		
	Add 1:	Effort*		
	Waste (separation)	Campaign*		
	Energy (Use)	Impact		
	Water use/ consumption	Evaluation		
	Electricity (reduction)/ (consumption)			
	Add 2:			
	Physical activity			
	Diet			
	Nutrition			
	Meal (Planning)			
	Add 3:			
	Financ*			
	Money			
	Saving* / Gain*			

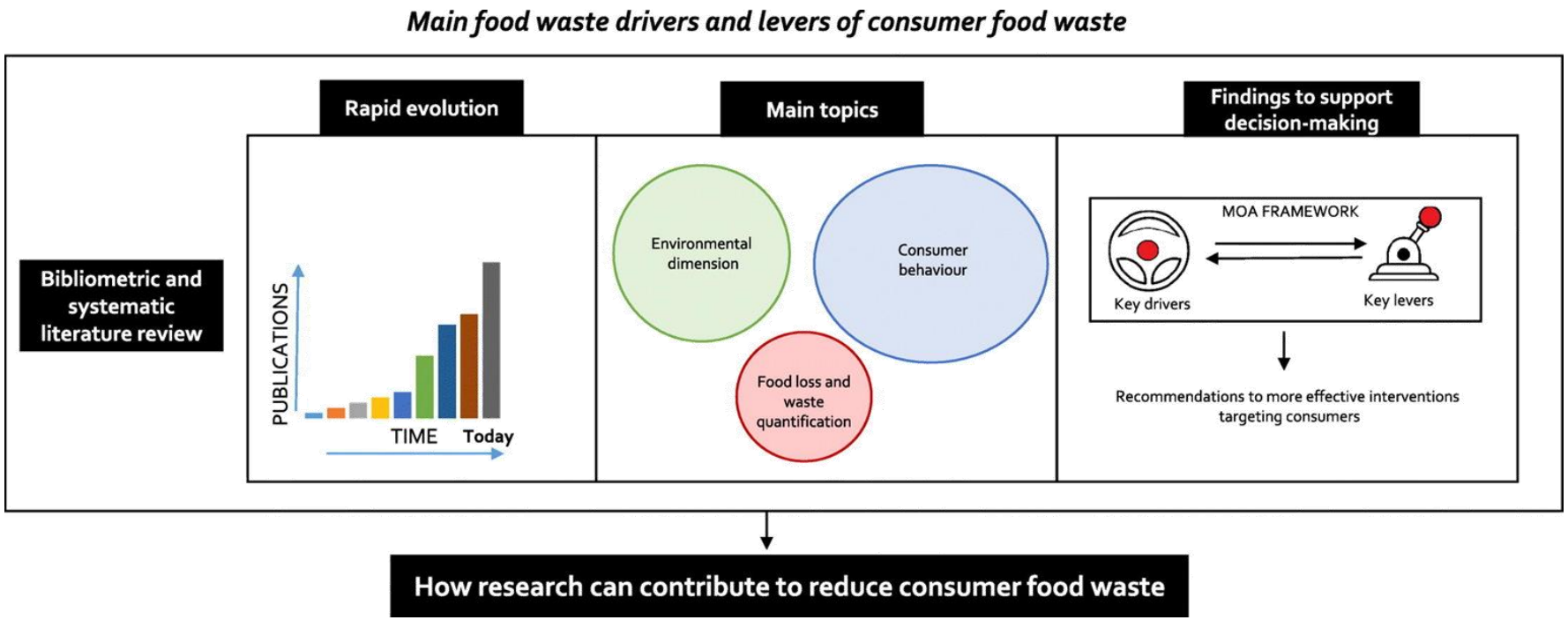
8b. Review of scientific literature – search results

189 articles in Scopus, and 305 articles in Web of Science (after deduplication)

Number	Concept	Query	N of documents
1	Municipality	TITLE-ABS-KEY (municipal* OR city OR urban OR council OR metropolitan OR borough OR town OR suburb OR builtup OR agglomeration)	2,151,379
2	Behaviour (1)	(TITLE-ABS-KEY (("food waste" OR "food loss*") W/15 prevent*) OR TITLE-ABS-KEY (("food waste" OR "food loss*") W/15 reduct*) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))	136
3	Behaviour (2)	(TITLE-ABS-KEY (waste W/15 reduct*) OR TITLE-ABS-KEY (waste W/15 prevent*) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))	2558
4	Behaviour (3)	(TITLE-ABS-KEY (energy W/15 (use OR usage)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))	2764
5	Behaviour (4)	(TITLE-ABS-KEY (water W/15 (use OR usage OR consump*)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))	3839
6	Behaviour (5)	(TITLE-ABS-KEY (electricity W/15 (reduct*)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))	586
7	Intervention	TITLE-ABS-KEY (intervention OR initiative OR program OR action OR approach OR policy OR incentive* OR effort OR campaign OR impact OR evaluation)	22,569,270
8	Consumer	TITLE-ABS-KEY (consumer OR citizen OR inhabitant OR household OR resident)	1,511,103
9	Other	TITLE-ABS-KEY (public OR community OR local OR domestic OR demographic OR "biogenic factors")	7,557,847
10	Combination of behaviour	((TITLE-ABS-KEY (("food waste" OR "food loss*") W/15 prevent*) OR TITLE-ABS-KEY (("food waste" OR "food loss*") W/15 reduct*) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))) OR ((TITLE-ABS-KEY (waste W/15 reduct*) OR TITLE-ABS-KEY (waste W/15 prevent*) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))) OR ((TITLE-ABS-KEY (energy W/15 (use OR usage)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))) OR ((TITLE-ABS-KEY (water W/15 (use OR usage OR consump*)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly))) OR ((TITLE-ABS-KEY (electricity W/15 (reduct*)) AND TITLE-ABS-KEY (pro-environmental OR green OR eco-friendly)))	9375
		Combination Queries	
11		1 AND 10	1316
12		1 AND 10 AND intervention	29
12b		1 AND 10 AND 7	854
13		1 AND 10 AND 7 AND 8	191

8b. Review of scientific literature – search results

Example findings from scientific literature



8b. Review of scientific literature – search results

Examples of current, relevant municipal initiatives (websites listed)

✓ **Milano Food Policy** (EUROCITIES Working Group)	REPORT-Food-Losses-and-Waste-in-European-Cities-WG-Food-City-of-Milan.pdf (refreshcoe.org)
✓ **Amsterdam Voedselstrategie**	https://www.amsterdam.nl/wonen-leefomgeving/duurzaam-amsterdam/voedselstrategie
✓ **New York State Pollution Prevention Institute**	https://www.rit.edu/affiliate/nysp2i/resources/municipal-food-waste-toolkit
✓ **Slow Food International**	https://www.slowfood.com/wp-content/uploads/2022/01/Guidance-on-food-waste-reduction-in-cities-EN.pdf
✓ **C40 Knowledge** (compilation of multiple cities initiatives)	https://www.c40knowledgehub.org/s/article/How-cities-can-reduce-food-waste-by-households-and-businesses?language=en_US
✓ **URBACT - Co-funded by the European Union**	https://urbact.eu/networks/food-corridors/waste-urban-approach
✓ **National Food Waste and Loss Initiative – UAE (Dubai)**	https://www.nema.ae/assets/Nema.pdf

8b. Review of scientific literature – search results

sustainability

MDPI

Article

Dubai Municipality Initiative to Reduce Food Loss

Sayed Essam [1,2,*], Tim Gill [2,3] and Robyn G. Alders [4,5]

Sustainability **2022**, *14*, 5374

ELSEVIER

Journal of Cleaner Production

Volume 414, 15 August 2023, 137596

Food waste interventions: Experimental evidence of the effectiveness of environmental messages

Christian Bretter [a b], Kerrie L. Unsworth [b], Sally V. Russell [c], Tom E. Quested [d], Gülbanu Kaptan [b], Aggelina Doriza [d]

ELSEVIER

Sustainable Production and Consumption

Volume 38, June 2023, Pages 104-114

Review Article

How to reduce consumer food waste at household level: A literature review on drivers and levers for behavioural change

Matteo Vittuari [a], Laura Garcia Herrero [b], Matteo Masotti [a], Elisa Iori [a], Carla Caldeira [b], Zhuang Qian [a], Hendrik Bruns [b], Erica van Herpen [c], Gudrun Obersteiner [d], Gulbanu Kaptan [e], Gang Liu [f], Bent Egberg Mikkelsen [g], Richard Swannell [h], Gyula Kasza [i], Hannah Nohlen [b], Serenella Sala [b]

8c. Review of scientific literature – analysis of results

Due to capacity issues, the analysis of findings has not been completed within 2023; this report draft will be updated within Q1-2024.

First impressions:

- There are many FW interventions described in scientific literature, but actually very little that cover fully the combination of food waste x households x municipality (or city level) and includes an evaluation of the intervention effect/impact (on the long term). This is a considerate caveat in literature.

- In the remainder of this case study, we will capture findings from parallel transitions related to sustainable (food) behaviour to draw lessons in designing, implementing & evaluating city-based/municipality-led interventions to lower household food waste levels.

8c. Review of scientific literature – analysis of results

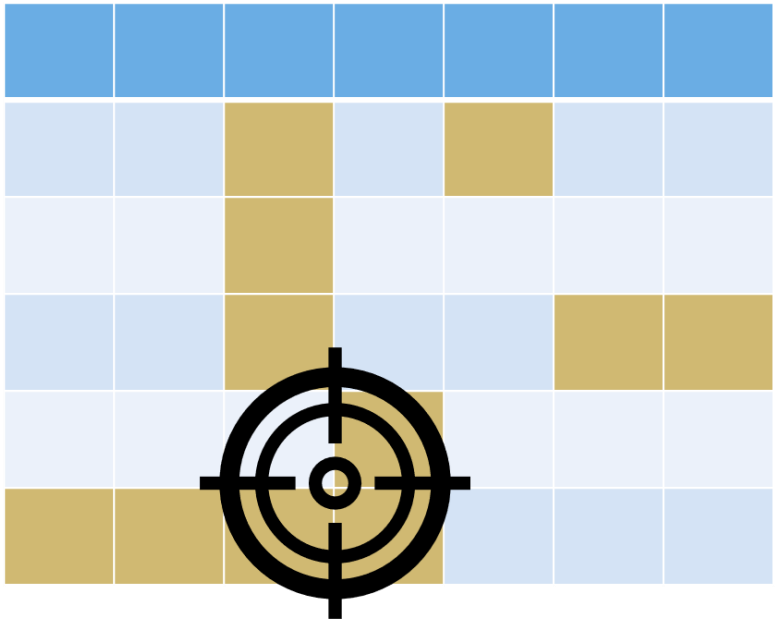
Developing an analytical framework for intervention selection

There are many possible and potential interventions that can be carried out by municipalities. All options represent the 'intervention matrix'.

Selecting interventions is a process that is both directly and indirectly driven by many factors, including amongst others:
- Direct & indirect effect on FW levels
- User characteristics
- Contextual information
- Positioning of the target neighbourhood/municipality on Societal Readiness level in the transition towards circular economy

And, it depends on the understanding the baseline and potential of the city/municipality, as well as the connection to existing activities and ambitions

Intervention matrix



8c. Review of scientific literature – analysis of results

To use an analysis metaphor: Changing behaviour = ‘lifestyle’ change

- What to learn from behaviour psychology behind lifestyle changes
- How to help municipalities drive change?
- What can be learned/used from parallel behaviours that are related to the ‘common’ good? And how do they relate to city/municipal level action
    - Energy
    - Waste
    - Mobility
    - Water
    - Health

9. Key references

- Zeinstra et al., 2022. How can behavioural insights from science and practice strengthen future food waste initiatives? Food waste free united case study - stakeholder workshop results.

- Van der Haar et al., 2022. Voedselverspilling verminderen binnen jouw organisatie door middel van gedragsverandering? Deze twee wetenschappelijk onderbouwde stappen helpen je verder.

- Zeinstra et al., 2021. Behavioural insights from food waste initiatives: what do they teach us? Case study Food Waste Free United.

To be updated