REPAiR

REsource Management in Peri-urban AReas: Going Beyond Urban Metabolism

D5.5 Catalogue of solutions and strategies for follow up cases: Ghent

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Acronyms and Abbreviations

CE	Circular Economy
EC	European Commission
EIS	Eco-Innovative Solution
EU	European Union
FA	Focus Area
GDSE	Geodesign Decision Support Environment
IVAGO	Intercommunale Vereniging voor Afvalbeheer in Gent en Omstreken
LCA	Life Cycle Assessment
OVAM	Openbare Vlaamse Afvalstoffenmaatschappij
PESTELO	Political, Economic, Social, Technological, Environmental, Legal, Organizational
PULL	Peri-Urban Living Labs
VFG	Vegetables, fruit and garden
VLAREMA	Vlaams reglement betreffende het duurzaam beheer van materiaalkringlopen en afvalstoffen
WP	Work Package

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Publishable Summary

The Deliverable D5.5 “Catalogue of solutions and strategies for Ghent” presents a catalogue of Eco-Innovative Solutions (EIS) and preliminary strategies, which focuses on preventing waste generation or aim to transform waste streams into valuable resources.

Each of the EIS has been developed based on the research explored within the Ghent Peri-Urban Living Lab (PULL), following the five-step methodology, which includes the phases: Co-Exploring, Co-Design, Co-Production, Co-Decision, Co-Governance (cfr D5.4).

This report is divided into three main parts. The first part addresses the definition of EIS and its position in the innovation sector across the various disciplines involved in the REPAiR Project. The second part focuses on the results of the PULL events, which lead to the development of the EIS (and strategies) within the Ghent case. The third part presents the EIS catalogue divided into 5 themes: prevention, valorisation, logistics and mobility, circular economy and knowledge transfer. The latter theme includes the discussion about transferability of EIS developed in other REPAiR cities to Ghent and Destelbergen .

1. Introduction

This Deliverable 5.5. "*Catalogue of solutions and strategies for follow up cases: Ghent*" is developed mainly based on the research performed in the Ghent Peri-Urban Living Lab (PULL). It includes specific attention to site-specificity, general context, data, models, and availability of stakeholders input. The solutions and strategies are developed in the context of eco-innovation.

According to the European Commision (EC), eco-innovation is any innovation resulting in significant progress towards the goal of sustainable development, by reducing the impacts of our production modes on the environment, enhancing nature's resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources (EC, 2013). The innovation can be technological or non-technological and the concept is closely linked to eco-efficiency. It encourages a shift from "end-of-pipe" solutions to circular approaches that minimise material and energy flows by changing products and production methods.

Within REPAiR, Eco-Innovative Solutions (EIS's) are defined as creative and smart ideas aimed to innovate and improve a specific and fixed process in relation to the management of waste as a resource and Wastescapes (cfr. D5.4; Amenta et al., 2016).

More specifically, EIS:

- are elementary responses to case-specific problems, in a contextual approach towards innovation, where the real innovation is the process to achieve the result;
- depend on local/regional/national policies/resources (managerial, economic/financial, administrative capacity, etc.); are the result of a co-creation process implemented in the PULL environments; depending on multiple stakeholders' needs, as well as including proposal for solutions from experts and all the other individuals involved in the PULLs;
- cross the multiple scales, the different dimensions and grain of the peri-urban territories investigated;
- assure the reciprocities between the natural and the built environment (EC, 2016). EIS are not just changes in current technologies, but also process innovations (Dente, Coletti 2011) "contributing to the EU's ambition of a paradigm shift towards Circular Economy and a near-zero waste society" (EC, 2016); and
- are based on the key environmental principle "Reduce-Reuse-Recycle" (cfr. D5.4; Amenta et al., 2016).

EIS's aim at addressing both the objectives and challenges identified within a PULL towards the development of circular economy in particular in peri-urban areas. The EIS's may include an implementation of new materials or processes in existing economic activities or adding new activities in value chains; a proposal of modification to existing policies and governance, or new policy/governance developments; or development of spatial design proposals.

These decisions will potentially lead to a modification of existing flows, development of new material flows and processes and/or change the physical design of areas and will generate change in behaviour of stakeholders and inhabitants in the case study areas.

2. PULL Ghent: strategy

The REPAiR PULL team of Ghent consists of three partners and one user board member; OVAM, UGent, IVAGO, and City of Ghent, respectively. The PULL team is responsible for the entire organisation of the local PULLs. So far, four PULL workshps were organised and the content of each is described in the sections below. Figure 1 supports the understanding of the sequence of PULL workshops in the focus area (FA).

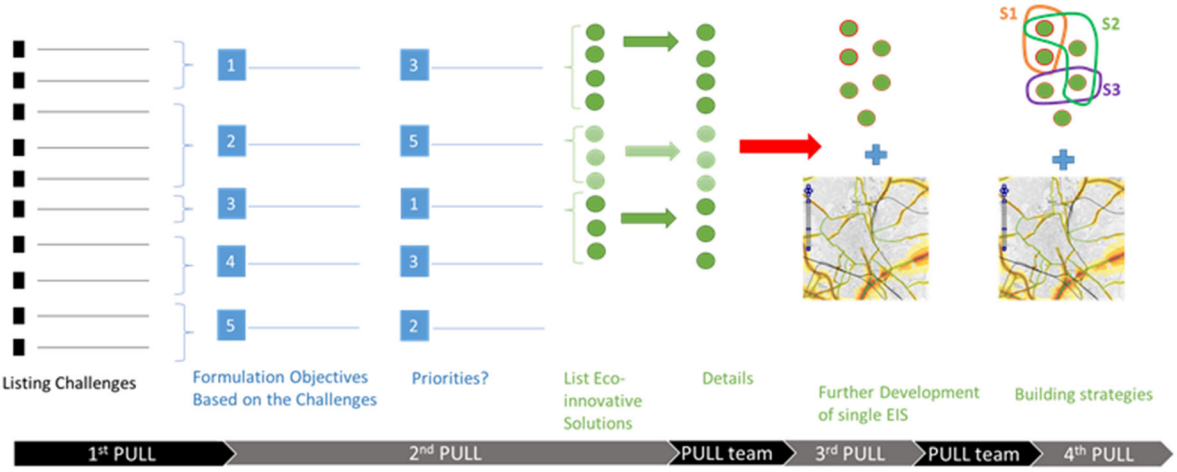

Figure 1 shows the sequence and objectives of the PULL workshops organized in the FA Ghent and Destelbergen.

2.1 First and Second PULL workshop

The 1st PULL workshop with external stakeholders for Ghent was held on 01/03/2018 at the faculty of Bio-science Engineering. A total of 23 participants, representing different sectors involved or affected by material management were invited for their involvement in waste management and Circular Economy, especially dealing with bio- and residual waste in the focus area. Researchers and policy/decision makers completed the group.

The objective was multifold: to set the boundaries for the FA, select the key waste flows, and to identify challenges/problems for the focus area Ghent and Destelbergen regarding organic (and residual) waste (which are the chosen key waste flow(s)). Based on these challenges, the REPAiR PULL team of Ghent identified 13 concrete objectives.

The participants to the first PULL workshop were also invited for the 2nd PULL workshop, which took place on 05/06/2018 in the Administrative Centre Portus. Some additional actors, that showed interest for the process, were also invited. During the 2nd PULL workshop, the objectives were presented to the stakeholders during a plenary session, after which a debate was possible. A few points of attention were made:

- The importance of an interaction between urban and peri-urban regions in the city as part of an eco-innovative solution
- The importance of maintaining or improving the value of secondary resources and the development of innovative treatment options
- The important role of prevention and reuse

The stakeholders ranked the objectives according to priority. An online application was used for this (www.mentimeter.com), accessible by smartphone, tablet or computer. The stakeholders divided 100 points over the 13 objectives, which allowed a certain prioritization. The results were anonymous and were visualized 'on the spot'.

The 6 objectives that scored highest were discussed further in small scale workshops to identify potential eco-innovative solutions.

The objectives selected were the following:

A) The distribution, catering industry and households are committed to preventing and reducing food surpluses or giving them a destination through reuse
B) Focus must be on the highest possible value creation/retention of organic material, taking into account the needs in Ghent (focus area)
C) More households, SMEs and catering businesses take part in the separate collection of organic waste
D) Innovative initiatives in the context of CE are given opportunities to develop into full-fledged solutions
E) The law and regulations make it possible to collect kitchen and food waste together with the VFG organic waste fraction
F) *There is an efficient collection system for organic waste in the focus area/region*

Regarding objective E, the Implementation Plan Household Waste and Comparable Industrial Waste (OVAM, 2016) provides research on the feasibility to extend the regulation on collection and treatment of VFG to kitchen waste. At the moment of the second PULL workshop, eight VFG processors were performing validation tests regarding acceptance of joint collection of kitchen waste and VFG. The adjustments will be included in the VLAREMA (Flemish regulations for the sustainable management of material cycles and waste). As of January 2019, kitchen waste can be collected with VFG. Therefore, further research into eco-innovative solutions within this objective was therefore considered not relevant.

A first preliminary list of eco-innovative solutions for the remaining five objectives was established during the 2nd PULL workshop. Eco-innovative solutions refer, in particular, to all forms of innovation – technological and non-technological – that create business opportunities and benefit the environment by preventing or reducing their impact, or by optimizing the use of resources. The EIS were developed eventually from different points of view, based on the expertise of the PULL stakeholders. However, because of time constraints, not all eco-innovative solutions had the required level of detail. Therefore, the REPAiR PULL team of Ghent provided more info for each EIS based on literature or expertise in the run-up to the 3rd PULL workshop.

In annex, the minutes of the 1st and 2nd PULL workshop Ghent can be found (in Dutch).

2.2 Third PULL workshop

The 3th Peri Urban Living Lab (PULL) workshop in Ghent took place on May 15th 2019 in De Stroom, one of the premises of the city of Ghent. Participants included local authorities, policy makers, waste management companies, research institute and the REPAiR PULL team (Ghent). Some members from the REPAiR team of TU Delft joined the Living Lab for the aspects of Knowledge Transfer and the demonstration of the GDSE. In addition, students taking the course 'Geo-design for Circular

Economy' at TU Delft participated in the PULL meeting to present their Eco-innovative Solutions (EIS) for the focus area Ghent-Destelbergen.

The objective of this PULL event was to collect feedback from the different stakeholders on

- the EIS developed during the previous PULL workshops in Ghent by local stakeholders (and further elaborated by PULL team Ghent),
- the EIS proposed by the TU Delft students,
- the transferability of EIS developed for other focus-areas in the REPAiR project (Amsterdam, Naples, Hamburg)

Eventually, each EIS was categorized into one of these five themes:

1. Prevention
2. Valorisation
3. Logistics and mobility
4. Circular Economy
5. Knowledge Transfer

First, a plenary was given to show the GDSE tool for the first time to the stakeholders from Ghent and surroundings and to present some highlights of the EIS. The plenary was followed by a round table workshop in smaller groups, of which each group addressed one of the five themes. Feedback from (local) stakeholders was provided on the EIS, based on a pre-selection of questions.

- *What is the relevance of the practice (why valuable): in general, for the focus area?*
- *Where in the focus area can the solution be applied:*
- *Who are the actors that should be involved?*
- *For whom would it be a business model / other way of funding?*
- *Does this involves policy changes?*
- *What changes does it imply for the current practice?*

For the knowledge transfer group, the questions were slightly different:

- *Is the EIS transferable to Ghent region? If not, why?*
- *If yes, what aspects of EIS are transferable and which are not? Why?*
- *Where could the EIS be applied (location in Ghent)*
- *What are the barriers for transferability of this EIS?*
- *What adaptations are needed to enable transfer to Ghent?*
- *Who should be the actors involved?*

The EIS's considered per theme are listed below:

1. Prevention

- P1. Food waste scan for schools
- P2. Mobile app for food waste reduction
- P3. App for the intelligent use of 'use by/ best before' expiring date on food products
- P4. Local restaurants that use 'food waste' for their preparations
- P5. City Hunt. The Journey to food waste reduction

2. Valorisation

- V1. A district facilitator for local waste management
- V2. Urban and Industrial Symbiosis
- V3. Neighbourhood composting
- V4. Local digesting unit for new buildings
- V5. Bokashi at home
- V6. Waste-2-go (cfr. restfest)

3. Logistics and mobility

- LM1. Extend separate VFG-collection to the entire territory of Ghent
- LM2. Increase frequency of organic waste collection for SMEs and households
- LM3. Collect and deliver system for food leftovers
- LM4. Waste collection over water
- LM5. Collection on demand (automated)
- LM6. Water based Waste Transport (cfr. bread to beer, over water)

4. Circular Economy

- CE1. Use of wastescapes to build a CE center for SME's
- CE2. Enabling environment for circular start-ups and business in transition to a CE
- CE3. Circular Kick-Start Region Ghent
- CE4. Waste-to-Bee (cfr black soldier fly)

5. Knowledge Transfer

- KT1. Hamburg: Rewarding good waste avoidance and separation behaviour
- KT2. Hamburg: Quarter Service Centre
- KT3. Hamburg: Guideline for new quarters
- KT4. AMA: Smart bio refinery
- KT5. Naples: Recompost

During the round table workshop, the stakeholders choose and discussed the EIS that appealed to them most or was closely linked to their field of expertise.

In WP5 of the REPAiR project, it is recommended to classify the different EIS according to the PESTEL model, referring to Political, Economic, Social, Technological, Environmental and Legal solutions. Since participation between stakeholders from different disciplines and different levels are considered an essential condition for the transition to a circular economy, the classification 'Organizational' was added (WP6), cfr. PESTELO.

In annex, the minutes of the 3rd PULL Workshop Ghent can be found.

2.3 Fourth PULL workshop

The 4th Peri-Urban Living Lab (PULL) workshop in Ghent took place on September 6th 2019, at the Faculty of Bioscience Engineering. The group with local stakeholders was smaller than on previous occasions. Carefully selected invites were sent to those people with a thorough knowledge of the focus area and/or waste management processes.

However, since the PULL workshop was embedded in the 7th REPAiR consortium meeting which took place at the same faculty (5-6 Sept 2019) the group was reinforced by other REPAiR partners for the use of the Geo-design Decision Support Environment (GDSE) and input from other focus areas.

The main objective of this PULL workshop was to develop eco-innovative strategies, based on the eco-innovative solutions developed during the 2nd and 3rd PULL workshops. REPAiR defines Eco-innovative strategies as: "*an alternative course of action aimed at addressing both the objectives and challenges identified within a PULL developing a more Circular Economy in peri-urban areas. The eco-innovative strategy can be composed of a systemic integration of two or more elementary actions, namely Eco-innovative solutions.*" In this PULL workshop, it was also the first occasion for the participants to work themselves with the GDSE. In advance of the 4th PULL workshop, the results of the previous PULL workshops in Ghent were carefully integrated in the GDSE by the PULL team Ghent: challenges, objectives, stakeholders, and EIS. On top, the ambition and targets for the different objectives were set, prior to developing strategies (Table 1). They were based on policy papers at European, Flemish or municipal level. Whenever the ambition or the targets of the municipality of Ghent are stricter than those defined at Flemish or European level, the former were preferred.

Table 1 Ambition and targets by 2030 per objective.

Objective	*Target by 2030*	*Reference*
A) The distribution, catering industry and households are committed to preventing and reducing food surpluses or giving them a destination through reuse	*Reduce food waste with 50%*	*Feedback about ongoing debate over future policy paper 20-25, Ghent*
B) Focus must be on the highest possible value creation/retention of organic material, taking into account the needs in Ghent (focus area)	*Reduce CO_2 emission with 40 %*	*Covenant of Mayors Strategy Gent en Garde Policy paper IVAGO '14-'19 Climate Plan Ghent,*
C) More households, SMEs and catering businesses take part in the separate collection of organic waste	*80 % of HH and companies participate in the separate collection of VGF*	*Policy paper IVAGO '14-'19 Flemish implementation plan for household waste and comparable industrial waste*
D) Innovative initiatives in the context of CE are given opportunities to develop into full-fledged solutions		*Policy agreement Ghent 2019-2024 https://persruimte.stad.gent/170348-nieuwe-gentse-coalitie-heeft-bestuursakkoord-2019-2024-klaar*
E) The law and regulations make it possible to collect kitchen and food waste together with the VFG organic waste fraction	*Reduce kitchen and food waste from residual waste*	*Flemish implementation plan for household waste and comparable industrial waste*
F) *There is an efficient collection system for organic waste in the focus area/region*	*Reduce CO_2 emission of waste collection with 40%*	*Flemish implementation plan for household waste and comparable industrial waste*

The targets were set to be realised by 2030. While the different policy papers apply different timeframes, for the calculations in the GDSE it is necessary to work with one single date. The year 2030 was chosen as reference year since this date is also proposed as an important target year in many policy papers of Ghent.

While the objective D) that aims at stimulating a favourable environment for circular business initiative was confirmed at policy level, it was not possible to identify a clear indicator that could be used in the GDSE. Consequently, this objective was not further considered.

The participants were divided into two groups, one named 'ACADEMIA', the other 'PRACTICE', referring to waste management practitioners. However, due to the limited number of stakeholders, the division of participants in the groups was not done in such a strict way. The groups were represented by a mixture of people with different backgrounds (even policy). The groups were challenged to reconsider and rank the objectives and to develop one (or more) eco-innovative strategies. Both groups ranked the objectives in an almost similar way, which clearly shows an emphasis on certain objectives. The result is shown in Figure 2.

Figure 2 Ranking earlier selected objectives according to PULL stakeholder preferences.

Both groups were challenged not only to reconsider and rank the objectives but also to develop one (or more) eco-innovative strategies:

- Using the Eco-innovative solutions already developed during previous PULL workshops (GDSE)
- Looking for the best possible location to implement this strategy (GDSE)
- Taking into account how the EIS affects one another and the different stakeholders.

Some guiding questions helped the participants on their way:

- How does this EIS influences/impacts
    - other solutions
    - other stakeholders
- Where can this strategy be applied ? On which condition?
- Who is involved in the implementation?

Table 2 Developing strategies by combining single EIS, using the GDSE tool.

	Academia		***Practice***
	Strategy 1	***Strategy 2***	***Strategy 3***
EIS	*Food waste scan for schools*	*Increase frequency of organic waste collection for SME's and households*	*Food waste scan for schools*
	Mobile app for food waste reduction	*Compulsory separate VFG-waste collection for households in the entire focus area*	*Mobile app for food waste reduction*
	District facilitator for local waste management		*Collection on demand*

The output of the work to build a strategy, but also additional remarks concerning missing stakeholders and the area/location indicated to implement the strategy, are safeguarded in the GDSE and will be used to finalise the strategies (done by WP4 and PULL team Ghent). One has to bear in mind that the time for the PULL event and thus the brainstorm about strategies was limited (Table 2). Therefore, the method applied in the PULL to develop strategies will be reproduced by the PULL team Ghent, in order to reflect again on the strategies built and potentially develop other strategies.

Afterwards, all finalized strategies will be imported in the GDSE (cfr. WP2) and the feasibility of assessing them from a sustainability point of view will be checked (cfr. WP4). The main criteria will be level of innovation, location-adaptability and (physical) data-availability in order to be able to perform the LCA/economic/social analysis.

In annex, the minutes of the 4th PULL Workshop Ghent can be found.

2.4 Fifth PULL workshop: near future

The 5th PULL workshop will be organised in the spring of 2020, once the sustainability assessment results of both the base case and single solutions and/or strategies are available in the GDSE. This PULL will be mainly informative for the local stakeholders and gives the final results for the Ghent case.

3. REPAiR Eco-Innovative Solutions - Ghent

The eco-innovative solutions developed can be applied to the FA and/or region level. Figure 3 shows the geographical boundaries for the Ghent case. The focus area is a combination of two municipalities (Ghent and Destelbergen) and the region is considered as Flanders.

(a) *(b)*

Figure 3 Representation of A) region (dark grey) and B) FA (red boundary) considered in the Ghent case.

Each of the EIS below are described according to a specific template. The template general information includes: title, keywords, author, specific objectives and potential impacts, category of outcome related to PESTELO, and location of the EIS. The latter often includes the search for wastescapes, to implement the respective EIS. On top, there is a detailed description part, including following items: description and process scheme of EIS, stakeholders involved/affected, solution or strategy level and references.

The eco-innovative solutions are described in sections 3.1-3.6 as they are categorized according to five themes as earlier mentioned (section 2.2).

3.1. Prevention

3.1.1. (P1) Food waste scan for schools

KEYWORDS: Education, raising awareness of preventive strategies, food waste prevention, waste management catering/professional kitchens

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Prevent avoidable food waste in schools, in different phases of its live cycles: conservation (stock management), preparation (kitchen), consumption (plate leftovers canteens). Raise awareness in professional kitchens at school or school caterers of behaviour patterns concerning food and food waste. Improve waste separation and reduce VFG and residual-waste. Raise awareness for the cost (financial, climate) of food.

Ghent is an 'educational' city. With over 100.000 students in basic or higher education, 2 universities and 4 high schools. Gathering information on food waste in different institutions is an essential step to take action for prevention. However, while the problem is common, the solutions might call for a diverse approach taking into account the specificity of each institution. Research in 24 kindergartens and primary school of the city of Ghent demonstrate that about 36% of food delivered to schools goes wasted. This corresponds with the amount used by the EU.

CATEGORY OF OUTCOME: social, technological, legal

DESCRIPTION OF THE EIS:

At school, food waste production is common during breaks or at lunchtime, while serving a hot meal or bringing a homemade lunch box. Tools can help in the fight against food waste and in a better sorting of unavoidable food waste. Having a better view on the amount of food wasted once purchased, during preparation or upon consumption as plate leftovers, is an important step to raise awareness of the extent and the origin of the problem (why and when do people throw away food, how much food is wasted). Once we have a better view on our behaviour, we need to link it with tips to adapt long established habits. Calculating the financial and environmental cost of food waste can be a strong incentive to change behaviour.

Several apps developed to reduce food waste in professional kitchens have proven to be successful to avoid food waste during the conservation and preparation process. We want to test/adapt these tools to the school context with its specific financial restrictions and regulations (joint procurement procedures for entire school communities), but often also strict rules (limited time and space for lunch time, control on consumption, educational role concerning healthy and sustainable food) during lunch time.

While the focus is on wasteful behaviour – wasting, throwing away food during the preparation and consummation process – we also look at the sorting behaviour. How are kitchen waste and plate leftovers sorted? As VFG or residual waste?

LOCATION OF THE EIS:

Schools in the FA. Figure 4 provides an overview of primary schools in Ghent (exclusive secondary schools or special needs education).

Figure 4 Primary schools in Ghent (orange dots).
(Source: https://stad.gent/nl/onderwijs-kinderopvang/scholen-en-adressen/scholen/stedelijke-basisscholen)

PROCESS SCHEME:

Schools offering meals for student either prepare meals themselves or rely on a catering service, in which case the meals are heated in the school kitchen. Individual schools have a limited impact on the purchase of ingredients or meals. This is often decided at the level of the organising authority to which the school belongs. As such, schools depending of the municipal network in Ghent rely on 1 caterer, which serves its 110 educational locations. This EIS intervenes in the preparation and consumption process at school, either in the school kitchen or the canteen where students have their meals (Figure 5). Food waste, as a result of the preparation or heating process, ends up in the residual or VFG waste bin. Fluids often disappear through the sink. Plate leftovers of meals in the canteen often end up in the residual waste. This contains waste of hot meals and homemade lunch boxes.

Waste of schools is collected by private collection companies. While OVAM encourages the separate collection of organic and bio-waste of companies, the residual waste of most schools still contains a vast amounts of biowaste.

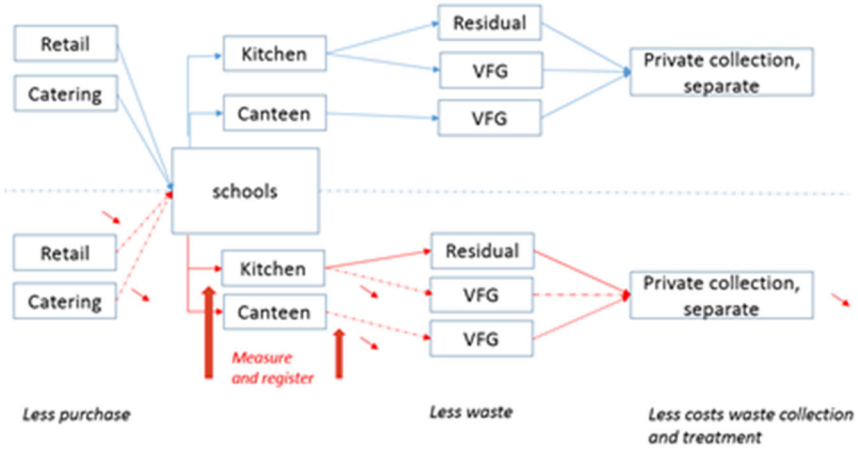

Figure 5 Food waste avoidance at schools

A user friendly tool helping kitchen personnel to keep track of the amount and nature of the avoidable food waste on a daily basis, is a first step to raise awareness for the problem and look for adequate

solutions. In the same way, measuring and communicating the amount of food waste as the result of lunch in the canteen, is a way of making students aware of the problem.

As of the first of January 2019, prepared food can also be collected as VFG waste. As of 2021, the separate collection of bio-waste will also be obligatory for large and medium sized companies, such as school communities.

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: Caterers; the school community (for different grades): staff, students, parents, but also personnel responsible for purchases; OVAM; waste treatment companies,...

SOLUTION OR STRATEGY:

Solution. This solution impacts the total amount of residual and bio-waste of schools and should be considered while looking at the methods and frequency of waste collection. Connecting this tool to a search engine to valorise avoidable food waste or neighbourhood initiatives to share food leftovers offers schools the opportunity to valorise their leftovers, reduce waste cost and even take up a social role in their neighbourhood.

REFERENCES:

- Food waste in schools. A report on the findings of a research project to better understand the nature and types of food waste in schools; the reasons why food is wasted in schools and the impact of interventions developed to help schools to reduce this waste (BE).
- Uitvoeringsplan huishoudelijk afval en gelijkaardig bedrijfsafval, OVAM, 2016.
- www.green-cook.org
- http://internationalfoodwastecoalition.org/
- http://www.pesaipensa.org/en/home

3.1.2. (P2) Mobile app for food waste reduction

KEYWORDS: Food waste prevention, household waste, education, waste prevention

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Around 6,74% of the annual residual waste of households in Flanders is food waste that could have been avoided. This action aims at providing citizens a tool to reduce this percentage. Apart from the reduction in environmental impact, this improvement might also affect the waste management of an area with 125,000 inhabitants. Since behaviour is an important factor in the separate collection of waste and prevention, raising awareness for food waste could have a positive impact on the way households look at waste as materials. The reduction of avoidable food waste should impact the total amount of residual or VFG-waste.

CATEGORY OF OUTCOME: social , technological

DESCRIPTION OF THE EIS:

Food waste is a common practice. Households are responsible for 23% of the avoidable food waste. Mobile apps can help in the fight against food waste generation. This action consist of developing an app to help households prevent spoilage and wasteful behaviour. The optimal valorisation of food and the prevention of food waste has become an important objective. The United Nations included the fight against food waste in their Sustainable Development Goals (12.3) in 2017 (UN, 2017). The Flemish Government strives to reduce food waste by 15% by 2020. This EIS focuses on households, aiming at reducing the food ending up in the (residual or VFG) waste bin. Providing an user-friendly app/tool to facilitate the registration of the amount and nature of food waste is an essential step to change behaviour.

The app should focus on:

- Giving insights in our waste behaviour: measuring
- Tips to change shopping habits: stop buying food we do not need/use, look for alternatives
- Look for possibilities to use food leftovers: recipes, other destinations…
- Keep track of stock and expiring dates.

If food waste cannot be avoided, an optional function for the local exchange of food within the neighbourhood could be added to the app. This should be combined with active campaigning and incentives encouraging households to use the tool.

LOCATION OF THE EIS: The Z-zone, as indicated in Figure 6.

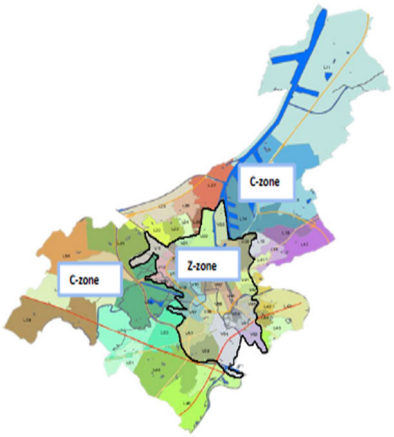

Figure 6 Waste collection zones in Ghent. C-zone ='rural zone'. Z -zone = 'urbanized zone' (delineated in black). Colours on the map are related to weekly collection schemes (source: IVAGO).

PROCESS SCHEME:

Flemish households produce approximately 37 kg of food waste per person a year. This represents about 8 percent of the family food budget and amounts to 240.925 ton a year for the Flemish region. About 45% of the food waste ends up in the residual and VFG waste. The remaining 55% disappears through the sink or goes to animal feed or home composting. Residual and VFG waste in Ghent is collected by IVAGO and goes for treatment to the incinerator in Ghent or the digestion/composting treatment plant in Ieper.

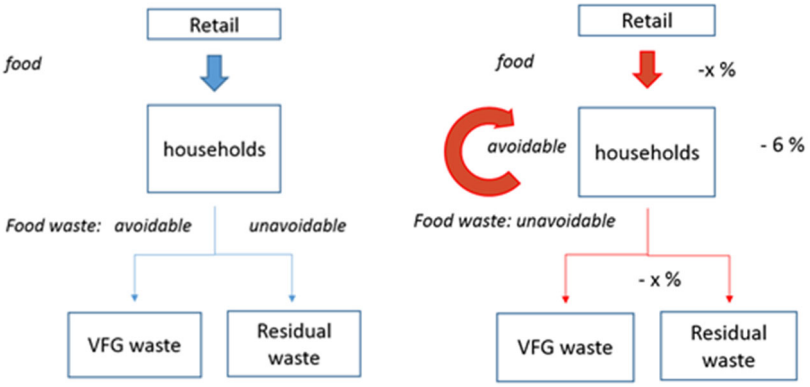

Figure 7 The food waste app for households to prevent avoidable food waste (left: current situation without app, right: EIS)

A food waste app, giving insights in our waste behavior, giving advice about (alternative) use of leftovers or food sharing initiatives could help reduce the amount of avoidable food waste (Figure 7). It would allow family to economize on their purchases, reduce their amount of waste (residual and/or VFG) and save on the costs for collection and treatment.

STAKEHOLDERS INVOLVED/AFFECTED:

Stakeholders involved: Households, retail, IVAGO, app developers

SOLUTION OR STRATEGY:

Solution. This solution could/should be combined with the scan keeping track of the expiring date for food.

Since it has an impact on the amount of residual and VFG-waste it could be combined with measures regarding the frequency or way of waste collection.

REFERENCES:

- Voedselverlies en consumentengedrag bij Vlaamse huishoudens. Dossier, Departement Omgeving, 2019
- Voedselverlies en consumentengedrag bij Vlaamse huishoudens. Rapport, Departement Omgeving, 2019
- Vlaams Ketenplatform Voedselverlies (2017).
- Voedselreststromen en voedselverliezen: preventie en valorisatie. Monitoring Vlaanderen 2015.
- Uitvoeringsplan huishoudelijk afval en gelijkaardig bedrijfsafval, Vlaamse overheid, 2016.

3.1.3. (P3) App for the intelligent use of 'use by/ best before' expiring date on food products

KEYWORDS: Food waste prevention, valorisation food products, households, expiring date food products

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Research in Flanders estimated that households threw away some 240.925 ton of avoidable food waste in 2018. While this is a relatively small fraction of the yearly food consumption of households (8%), households don't always consider it as a problem. They are not aware of the amount, cost nor impact of their 'waste'-behaviour. A recent study carried out by the European Commission, published in February 2018, estimates that up to 10% of the 88 million tonnes of food waste generated annually in the EU are linked to date marking. This EIS focuses on reducing avoidable food waste of households by avoiding incorrect reading of expiring date and adapt shopping behaviour to needs. A reduction of the total amount of residual and VFG waste at the household level is the final aim.

CATEGORY OF OUTCOME: economic, social, environmental

DESCRIPTION OF THE EIS:

Purchase and stock management are known concepts in the retail and catering business. To optimise the use of food products, tools have been developed to link the follow-up of expiring dates of food products to stock management. A simplified (and less expensive) version of these tools could also help households to avoid wasting food products. Combining a tracking system to register expiring dates with a shopping assistant app, can help households to keep track of their stock, prevent unnecessary purchases and avoid wasting food.

The app should:

- keeps stock of supplies, taking into account date expiring information,
- automatically suggest use dates for fruit, vegetables and frozen items

However, the actual use of the app will depend on many factors: not all households are that familiar with or in favour of the use of smartphone apps. It is essential that the app measures our behaviour in a simple way, adding little efforts for the users. At the same time it would be an added value if the app would make suggestions to avoid wasteful behaviour: suggest recipes, connect to local sharing platforms. A promotion campaign will be needed to encourage its use.

LOCATION OF THE EIS: Densely populated areas in Z-zone, as shown in Figure 8.

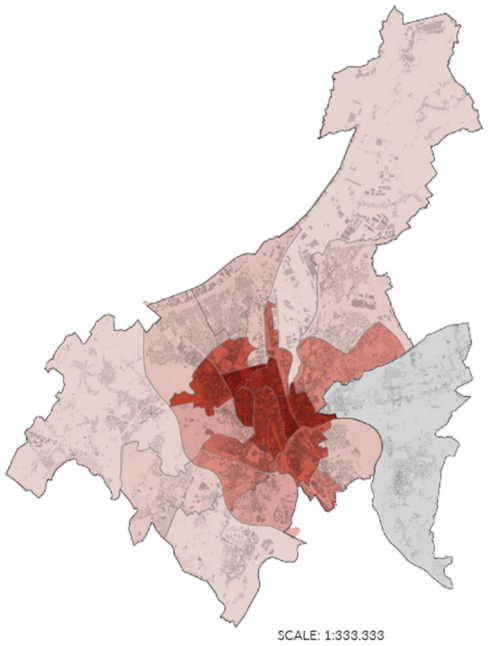

Figure 8 This map shows the population density in the different neighbourhoods in the Municipality of Ghent. (Source: TUD students, 2019; Emma Lucassen, Luuk Goossen, Qiaojia Zhang)

The densest area is the neighbourhood of "Rabot - Blaisantvest", with a density of 9402 inhabitants per square kilometer. The least dense neighbourhood is the neighbourhood of "Kanaaldorpen", with a density of 60 inhabitants per square kilometer. The average density of the municipality is 1655 inhabitants per square kilometer. In total, the municipality of Ghent has 261.483 inhabitants. There are as many people moving into the city as there are moving elsewhere.

PROCESS SCHEME:

While shopping, households are not always aware of their stocks, nor do they keep track of expiring date on food products. Households often buy more than they need. Furthermore, many people do not differentiate between the different 'use by' and 'best before' expiring date, meaning that lots of food that is still good for human consumption is thrown away, ending up in the residual or VFG waste (Figure 9).

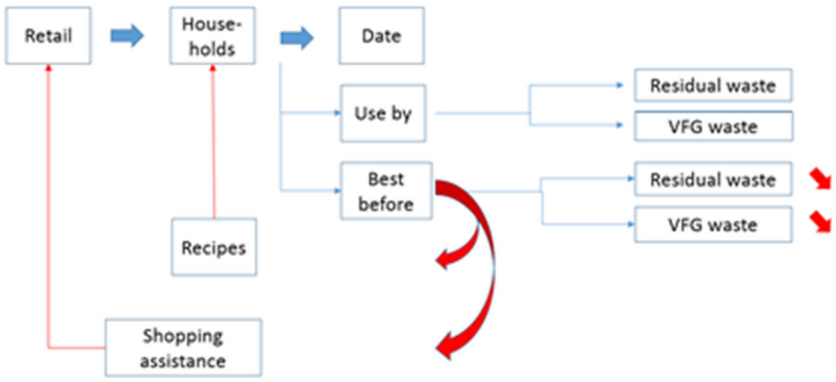

Figure 9 App that keeps track of expiring date of food products at household level.

The app keeps track of the expiring date of food. Food that has reached its 'use by' date is no longer considered as part of the stock, and should be disposed of, either in the residual or VFG waste. A suggestion is made to buy new supplies. For food nearing its 'best before' date, suggestions are made for

their preparation and use. By preventing food waste, household can reduce their amount of residual and VFG waste.

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: Households, retail, IVAGO, app-developers, municipality

SOLUTION OR STRATEGY:

Solution. Since it has an impact on the amount of residual and VFG-waste of households, it could be combined with measures regarding the frequency or method for waste collection.

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3.1.4. (P4) Local restaurants that use 'food waste' for their preparations

KEYWORDS: retail, food surplus, social organisations, poverty, employment

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

More social restaurants in the focus area, a better dispersion, more vulnerable households reached, less food waste.

CATEGORY OF OUTCOME: social, environmental

DESCRIPTION OF THE EIS:

The city of Ghent aims to set up systems and services in the city that contribute to reducing food waste in every link of the local food chain, through its food policy 'Gent en Garde'. Now 'Foodsavers' in Ghent collects surplus food from supermarkets, and distributes them amongst social organisations to the benefit of low income families. Social restaurants are open for a large public. They use diversified prices. A social rate makes meals accessible for people in poverty. Every new social restaurant can join this initiative.

LOCATION OF THE EIS: The entire Ghent area, however the densely populated zones might be of most interest as they are easily accessible to many people. See also Figure 8.

PROCESS SCHEME:

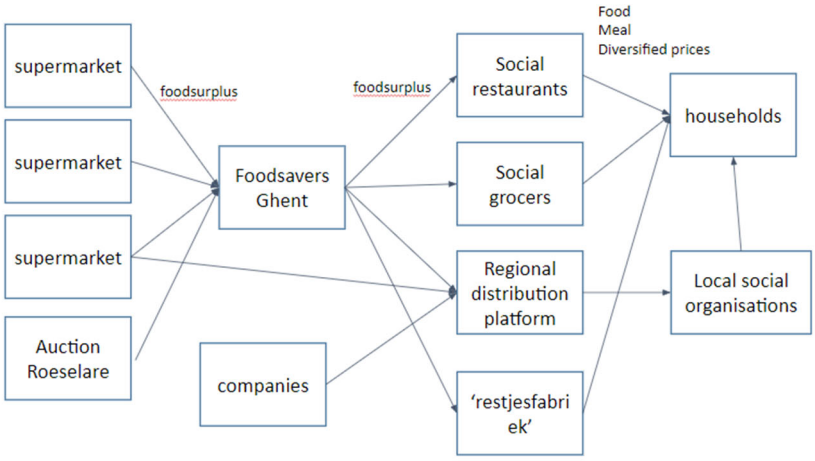

Figure 10 current situation: ten supermarkets + auction Roeselare, 106 social organisations and social restaurants, 17 food distribution points + 'restjesfabriek'

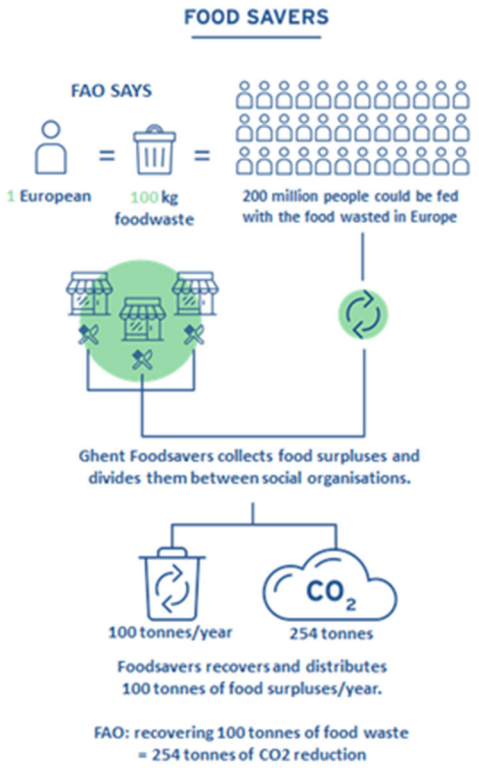

Figure 11 EIS: the same figure but with more social partners and a better dispersion in the focus area and more households reached

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: households, social communities, retail, Komosie vzw, OCMW Ghent

SOLUTION OR STRATEGY: Solution

REFERENCES:

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http://www.komosie.be/ko/themas/voedselverlies/de-restjesfabriek_173.aspx
https://www.ellenmacarthurfoundation.org/our-work/activities/cities-and-circular-economy-for-food/stories/the-role-of-restaurants-in-a-circular-urban-food-system

3.1.5. (P5) City Hunt. The Journey to food waste reduction

KEYWORDS: food waste reduction, awareness, citizens

AUTHOR: TUD students (William Guild, Eva Käller, Floor den Ouden)

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:
To generate awareness in Ghent, a city tour can be created. Ghent has a rich history of food production, trade and consumption with many of its streets and squares still named after their food related purposes. Using this as a starting point to the narrative, The City Hunt aims to visualise the wider food chain of the consumer, from planning to disposal.

CATEGORY OF OUTCOME: social, environmental, organizational, economic

DESCRIPTION OF THE EIS: The Hunt is divided into five steps, which represent five points in the food chain. These are (1) waste, (2) to the city, (3) purchase, (4) cook & consume, and (5) disposal. At each stop the participants will be given current and historical facts and, whenever possible, future goals and expectations. The City Hunt is designed for active participants as well as the general public. An exclusive route will cater to the experience of the participants while the stops themselves will have information available for the curious bystander. Initially, a single route through the city centre was designed, but there is scope to expand the experience to other areas depending on the target groups. Eventually, the exact route was decided based on first making clusters in which exclusive parts take place, followed by determining if there is either a crowded place, a food-related place, or an underused space in that same cluster. Then, the different steps of the food chain (1-5), were linked to those clusters. Eventually, when these steps where located on the map, they were selected in order to create a smooth flow through the city without the consecutive steps being too far away.

LOCATION OF THE EIS: To have a greater chance of success and the most effectiveness, The City Hunt should stop in popular places (e.g., stations, public transport hubs). The itinerary could also revive underused spaces (brownfields and unused spaces), which are still widespread in the city. Cycle and pedestrian routes provide an existing network of possible itineraries through the city centre of Ghent. Along the route, waste-conscious companies have the opportunity to showcase positive examples, which would make the experience all the more tangible. Together with waste conscious supermarkets, the City Hunt can, therefore, raise awareness and encourage people to act on the knowledge gained. These different components can easily be connected to create a single or multiple routes. Currently, the focus is mainly on the city centre and Z-zone, but the same principles can be applied to the C-zone where food wastage is much greater (Figure 11).

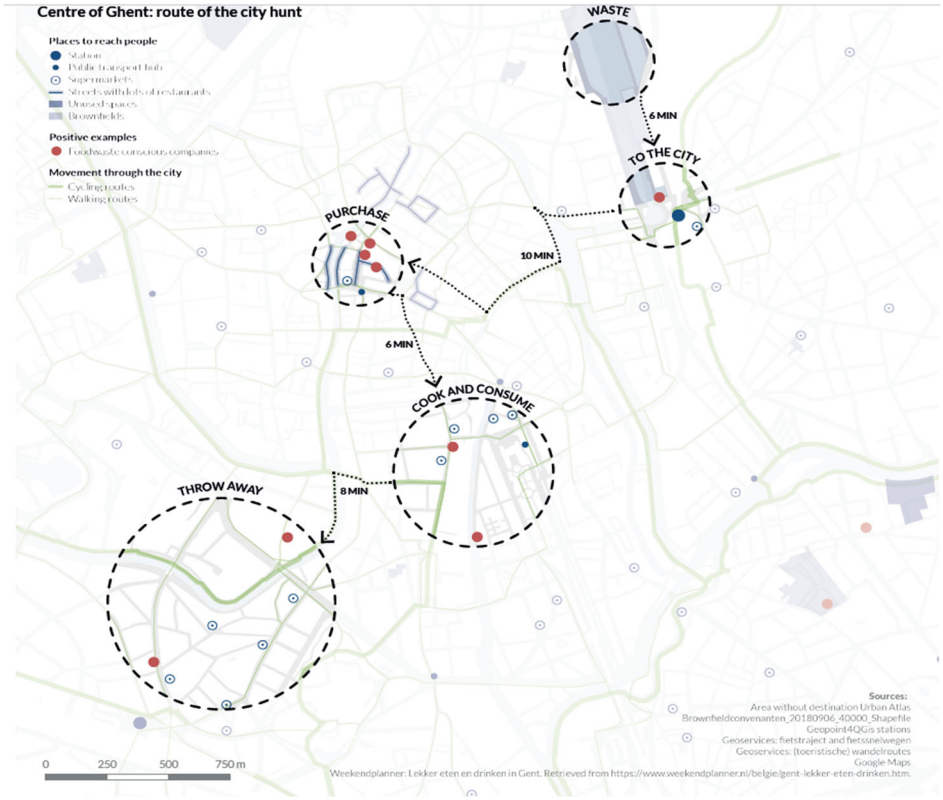

Figure 12 EIS City Hunt, geographical location in the Focus Area (Source: TUD students).

WASTE: The first stop of the City Hunt is at the Handelsdok, which is currently underdeveloped area. When this area is redeveloped it will be more attractive for people to visit. Here, people can enjoy the view on the water while sitting on the multipurpose bench that, on the one hand, represents the amount of food waste thrown away per month (in kg) and on the other hand is a designer bench to sit on. This bench is available for both people who are participating in the City Hunt and those who are not. While enjoying the view and the comfortable bench, the actual participants can open the application and start a quiz about their food waste knowledge.

TO THE CITY: The second stop is around Dampoort Station, which is a crowded place. Here, people who walk in and out of the station can see a (an interactive) world map displayed on the ground they can see where their food comes from. This map makes people aware that the food that one eats is often not food that is produced locally or even in the same country. Another goal of the map is to tell a story about food waste at production-level. After seeing this map, the actual participants visit a real-life food producer; namely, Urban Smart farm that cultivates without wasting. Participants can get inside information here on how the farm operates and can participate in the process. They might even be able to taste some of the fresh grown lettuce.

PURCHASE: The third stop is located around the Groentenmarkt. Here, at a square people see an artwork that represents the amount of products one purchases per year and how much of it is thrown away. This could be visualised with paint or small sculptures. In the middle of all the food there is place for exactly one person to lie down and watch his or her annual consumption and food waste. While lying there, the actual participant starts to think which shop (e.g., Groot Vleeshuis, Bakkerij Himschoot, Tierenteyn-Verlent, Mokabon) he/she wants to visit after. These shops are all historic and tell it own story about dealing with food waste over the years. One thing is sure, the participants will not leave without new knowledge and a filled stomach.

COOK AND CONSUME: The fourth stop is close to Gent van Vlaanderenplein, which is a public transport hub. Here, a fridge that functions as a recipe generator is placed. The people provide the input by selecting the leftover products that they still have (in their fridge) at home. The fridge will generate a recipe with these

products. Then, a QR-code can be scanned and people can scan it to get the recipe on their phone (a web page with the recipe will be opened). After acquiring inspiration for tonight's meal, the actual participants go to Wonky (or a local restaurant that uses food leftovers or other similar initiative) to make a tasty and healthy snack from rescued vegetables, that they will taste afterwards.
DISPOSAL: The fifth and last stop is close to the Central Station of Gent. Here, people see a few recycling bins that are equipped with a basket where they can throw in their waste. They have to guess in which bin they should throw what type of waste. Separating waste was never this much fun. Before experiencing this, the actual participants go to an initiative where value is given to food waste. Take, for instance, Spilvarken (English: Spill Pig). Here food waste is used for feeding the pigs. The pig manure was used afterwards for urban agriculture projects and community gardens. The participants become aware of the value of that food waste has and of the alternatives of just throwing it away.

PROCESS SCHEME:

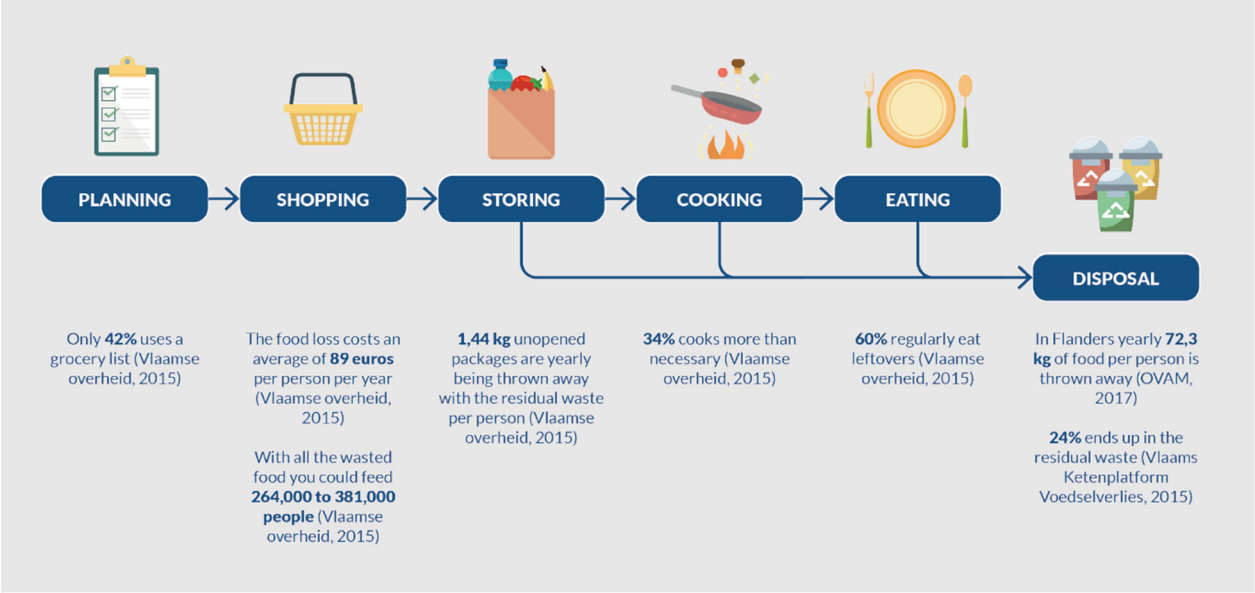

Figure 12 Current situation regarding EIS City Hunt (Source: TUD students)

Figure 13 Process scheme of EIS City Hunt (Source: TUD students)

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: the municipality, citizens/tourists, local food services, knowledge experts (e.g. historians, researchers), the creative sector (designers and developers).

SOLUTION OR STRATEGY: Solution.

REFERENCES:

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https://docplayer.nl/47870375-Voedselreststromen-envoedselverliezen-preventie-en-valorisatie.html
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https://www.ivago.be/
http://www.wrap.org.uk/content/west-london-food-waste-campaign
Timmermans, B & Cleeremans, A., 2015. How can we measure awareness? An overview of current methods. in M Overgaard (ed.), Behavioral Methods in Consciousness Research. Oxford University Press, Oxford, pp. 21-46.
Ellison, B., Nehrling, E. W., Nikolaus, C. J. & Duff, B. R. L., 2017. Evaluation of a Food Waste Reduction Campaign in a University Dining Hall. Journal of Nutrition Education and Behavior, 49, S9-S10.
Bryson, J. M., 2004. What to do when stakeholders matter: stakeholder identification and analysis techniques. Public management review, 6(1), 21-53.

3.2. Valorisation

3.2.1. (V1) A district facilitator for local waste management

KEYWORDS: Waste management efficiency, waste efficiency, local waste management, waste collection

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Planning and optimization of the waste management system per neighbourhood (or per cluster of neighbourhoods) by a district facilitator. Participation of neighbourhoods in local waste management. Improving the efficiency in the collection, transport and valorisation of waste.

CATEGORY OF OUTCOME: social, economic, environmental, legal

DESCRIPTION OF THE EIS:

This EIS consists of introducing a "district facilitator" with experience in the local administration of waste management in each neighbourhood to detect local opportunities to prevent, reduce or improve the management of local waste. This facilitator should work in parallel with an analyst with environmental studies to conduct the necessary environmental assessments and provide the necessary data and indicators.

A 'district facilitator' will be assigned to each neighbourhood in order to improve the overall management of waste. This district facilitator must have experience in the local administration, and be able to reach the right people to achieve the necessary changes to be implemented. Moreover, there will be a professional analyst involved, with experience on environmental assessment, who will develop the necessary environmental assessment and provide the required data and indicators to allow good decision making.

The district facilitator, along with the analyst, need to:

1) Inventorize the type and quantity/quality of the different waste streams of that specific neighbourhood(s),
2) Identify the actors that can use the waste as a resource to optimize valorisation,
3) Scan geographic opportunities for e.g. development of local waste treatment installations,
4) Identify the best collection-strategy for that region,
5) Stimulate consultation amongst the stakeholders and between district facilitators in the focus area.
6) Coordinate with/consult neighbouring communities and city waste management companies.

The outcome of this solution will come in two phases. Firstly, the environmental assessment of the waste management in the neighbourhood will be gathered in a report to ease justification and build up on future work. Secondly, the changes and actions recommended from this "diagnosis" will be implemented by the facilitator to bring improvements to the waste management of the neighbourhood. Thus, the final result of the action is both gaining understanding about the waste management in the neighbourhood and the implementation of improvements in the system.

LOCATION OF THE EIS:

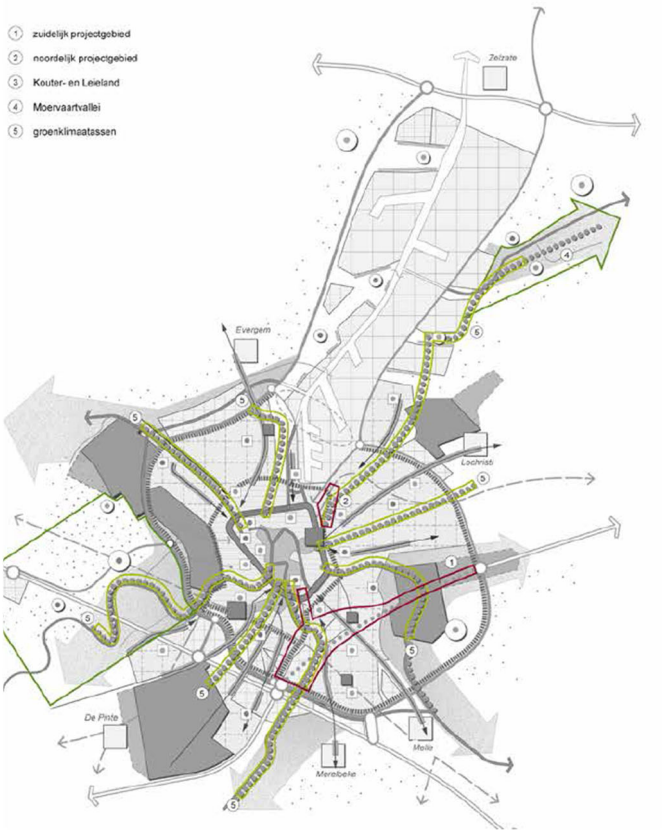

Figure 14 New large urban developments and reconversions in the focus area, such as oud/ nieuwe dokken or arsenaal. (Source: Ruimte voor Gent. Structuurvisie 2030)

PROCESS SCHEME:

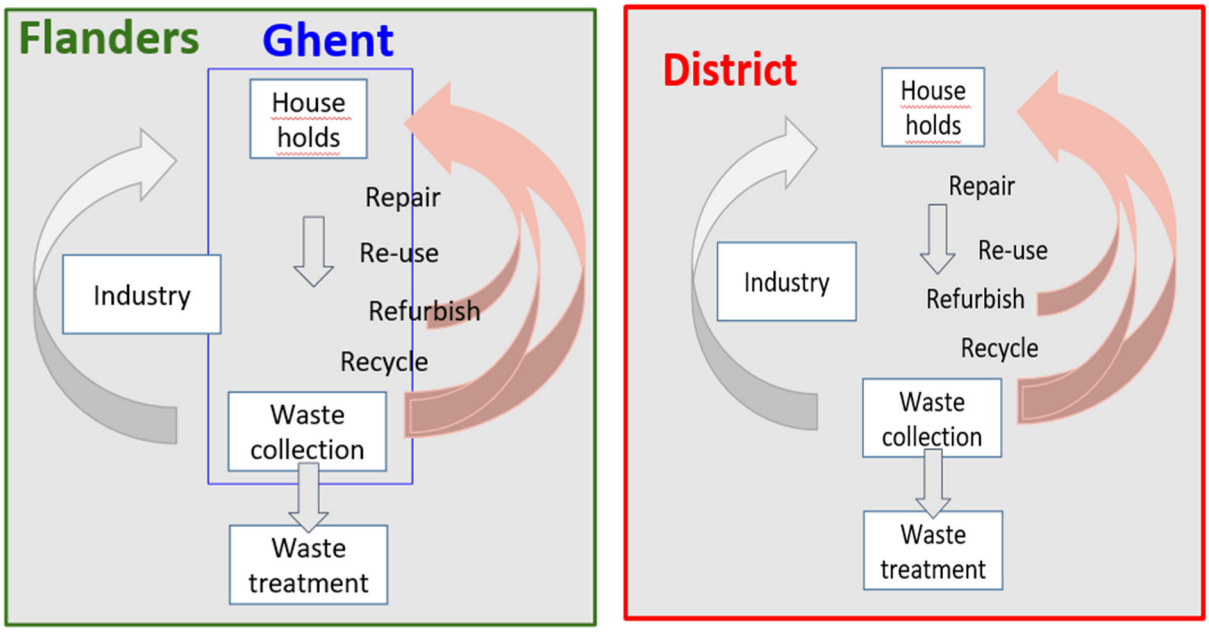

Figure 15 Current situation without a district facilitator (left) and EIS (right), where a facilitator operates per district in the FA.

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: City Of Ghent, IVAGO, local community, local companies, citizens

SOLUTION OR STRATEGY: Solution

REFERENCES:

https://gentengarde.stad.gent/vraag-en-aanbod
https://gentengarde.stad.gent/kaart

3.2.2 (V2) Urban and Industrial Symbiosis

KEYWORDS: Urban and Industrial symbiosis (UIS), organic waste exchange, waste reduction, secondary resources

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

The goal is to propose specific relations of urban and industrial symbiosis by matching actors in or close to the focus area that generate organic waste (e.g. VFG of households and companies in the FA) and actors (cfr. companies) that might use this waste as a resource to produce added value products. That way, waste will be reduced, and the use of raw material or virgin products will be avoided. UIS aims for a collective resource optimization mostly among co-located companies and municipalities.

CATEGORY OF OUTCOME: economic, technological, environmental

DESCRIPTION OF THE EIS:

The concept of symbiosis finds its origin in nature: *"two organisms living together in a beneficial relationship for both"* ([Hardy and Graedel, 2002]). An explicit definition of **industrial symbiosis (IS)** is given by [Chertow, 2000]: *"Industrial symbiosis engages traditionally separate industries in a collective approach to competitive advantage involving physical exchange of materials, energy, water and/or by-products. The keys to industrial symbiosis are collaboration and the synergistic possibilities offered by geographic proximity"*.

This fits under the circular economy 'umbrella', as waste from a municipality is turned into 'feed' for a company, with the objective to reduce virgin material and include waste into the loop to produce high-value products.

An example is the symbiotic interactions among the municipality of Kalundborg in Denmark and five closely located companies which forms an Eco-Industrial Park [Jacobsen, 2006, Ehrenfeld and Chertow, 2002]. Other studies of symbiosis networks over a region are available (e.g. [Sterr and Ott, 2004] and [Van Beers et al., 2007]). It shows that already several European regions attempt to be circular by efficiently linking waste and side streams from cities with nearby industry, leading to urban and industrial symbiosis (UIS) (figure..)

In the context of REPAIR, the EIS must focus on enhancing the efficiency and reduction of conventional organic waste treatment. A better valorization of VFG in the FA is aimed for. The final goal of the waste-to-resource EIS would be to improve business development and resource efficiency by finding a match between a waste generator and a waste consumer, preferably in a close geographical region. Reduction of transport and close location of actors to optimize waste as a resource are important benefits when short supply chain policy are incorporated [Cerceau et al., 2014]. The waste is transferred from the generator to the consumer, resulting in a win-win relation since both reduce their environmental impacts and usually make more economic profit. A geographical mapping of all relevant actors (both municipalities and companies, based on specific NACE and EWC codes) in the FA (and region) is needed to identify possible symbiosis opportunities for organic waste. is therefore needed. The difficulty in setting up a symbiosis can be manifold: no closeby industry that can use the waste, no economic incentive, no balance with regard to supply and demand, confidentiality issues concerning waste production, etc. This may restrict the number of symbiosis matches from the mapping exercise, however, it still can be valuable to find better valorization pathways in the surroundings of Ghent.

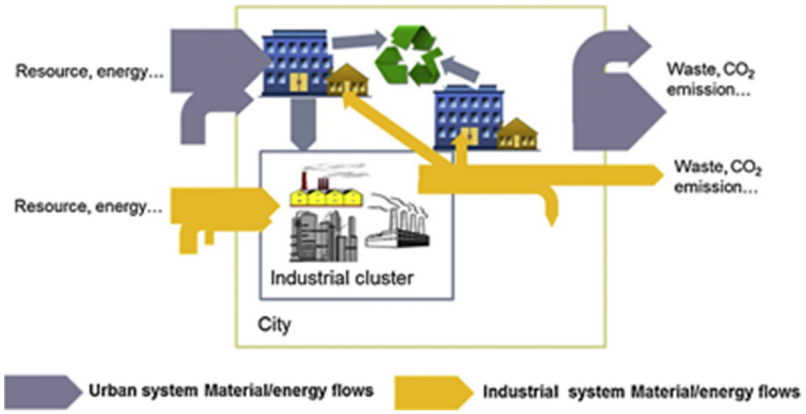

Figure 16 UIS model (Sun et al., 2017)

A concrete example of UIS applied to the Ghent case could be the production of Polyhydroxyalkanoates (PHA) granulates (bioplastic) from mixed VFG waste, instead of or parallel to biogas and compost production through digestion and composting. The PHA could be subsequently used as a feedstock in the production of carrier bags, internal panels of a passenger car, etc. that way avoiding the use of e.g. fossil-based material. See also the simplified process schemes below, of current situation versus EIS.

LOCATION OF THE EIS: Entire FA (or parts of it, specific urban VFG generators) and the location of industrial actors in the FA or region.

PROCESS SCHEME:

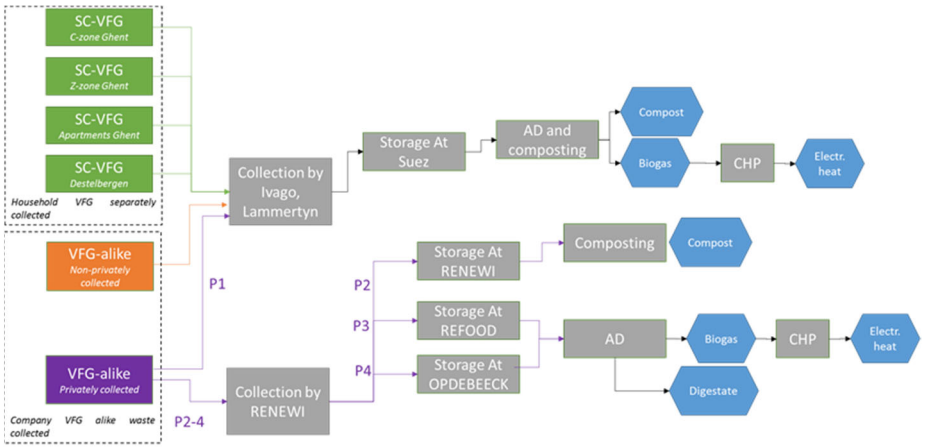

Figure 17 Current treatment pathway of separately collected VFG (households and companies)

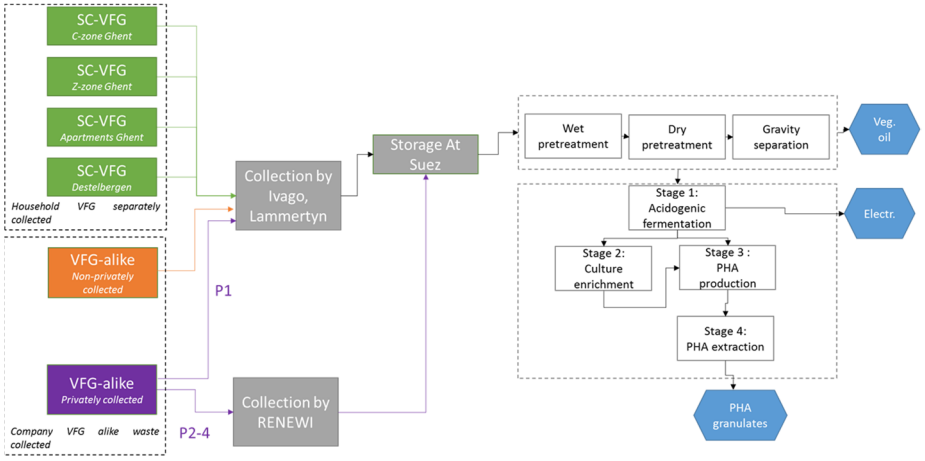

Figure 18 UIS example: production of PHA granulates from mixed VFG streams

STAKEHOLDERS INVOLVED/AFFECTED:

Important stakeholders are the households in the FA, the companies in the FA that produce VFG-alike waste, the collection companies such as IVAGO, RENEWI, Lammertyn, etc. The industrial actors that produce VFG-based (intermediate) products. EASTMAN in Ghent could be a potential actor.

Stakeholders affected are mainly those treatment plants that will no longer be used, or experience a reduced use, such as composting and AD plants.

SOLUTION OR STRATEGY:

Strategy. This entails an aggregation of multiple solutions:

- other transportation routing
- less actors involved to store the VFG waste streams, more storage at SUEZ, close to the FA
- other treatment facility and processes and auxiliaries used
- new secondary products, e.g. PHA production that reaches other markets
- etc.

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Project Symbiose (Industriële symbiose als hefboom voor de circulaire economie) https://www.smartsymbiose.com/

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3.2.3. (V3) Neighbourhood composting

KEYWORDS: Organic waste, bring collection, compost, closed loop, community

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

1. A better separate collection of organic waste and so reduction of the residual waste of households and SMEs.
2. Valorisation of organic waste to a community resource by neighbourhood composting.
3. A closed and local loop of organic material.

CATEGORY OF OUTCOME: Social / Environmental / Economic

DESCRIPTION OF THE EIS:

Households and SMEs are stimulated to participate in a separate collection of organic waste by offering a 'bring' solution in the neighbourhood. Gains for them are: flexibility, less odour and insects, cheaper, etc.

This '*bring collection*' needs to be combined with the development of a local treatment technique: composting. These systems are scaled to meet the needs of a self-defined community. Investments (financial and management) needed to set up these initiatives will guarantee a high quality of end products.

Compost is used to enhance local soils, support local food production, and conserve the natural ecology by improving soil structure and maintaining nutrients, carbon, and soil microorganisms. Local composting points in the city can help to supply gardens or greenfields with compost in the neighbourhood.

Ghent has 3 existing points of neighbourhood composting. This is not enough for the urban farming in the city, for example the community gardening (volkstuintjes). Compost for these gardens is mostly imported from out the focus area. On the other hand, the VFG waste collected by IVAGO is now transported to Ieper.

Compost programming engages and educates the community in food systems thinking, resource stewardship, or community sustainability, while providing solutions that empower individuals, businesses, and institutions to capture organic waste and retain it as a community resource.

LOCATION OF THE EIS: In the focus area: areas with building blocks, areas of urban farming, in neighbourhood parcs, in SME zone

PROCESS SCHEME:

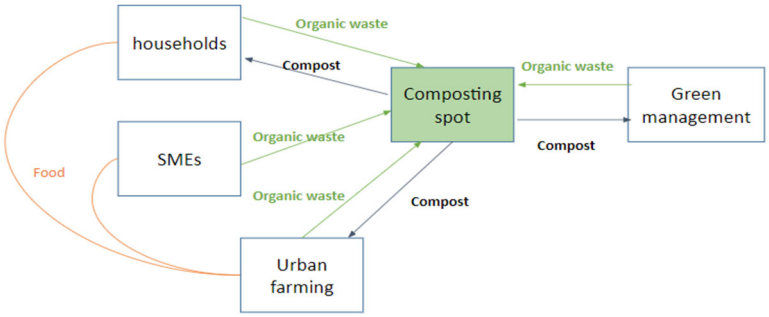

Figure 19 Neighbourhood composting process scheme.

STAKEHOLDERS INVOLVED/AFFECTED: Households, SMEs, IVAGO, volunteers/stewards, urban farming or green management (groenbeheer)

SOLUTION OR STRATEGY: Solution

REFERENCES:

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https://wormenhotel.nl/
https://www.arp-gan.be/fr/phosphore.html

3.2.4. (V4) Local digesting unit for new buildings

KEYWORDS: Organic waste, renewable energy, household biogas digester

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

- Valorisation of organic waste to energy
- Reduction of greenhouse gases
- Increased self-sufficiency in terms of energy
- Less transport

CATEGORY OF OUTCOME: political, legal, economic

DESCRIPTION OF THE EIS:

For a small-scale digesting unit we have companies in Ghent with a lot of experience like OWS and Trevi (BiogasTec). OWS focuses on household waste, whereas Trevi works with companies and farmers. e.g. Bakery Aernoudt has a small-scale digesting unit of Trevi (BiogasTec) for bread waste.

Small-scale or pocket digestion is a technology where the anaerobic digestion process is applied to proprietary biomass flows for the on-site production of renewable energy. This energy is made available in the form of electricity and heat after combustion of biogas in a combined heat and power (CHP) installation and is used to a maximum on-site. Biogas can also be used as a vehicle fuel. Digestate is what is left of the biomass after anaerobic digestion and can be used as an organic fertilizer.

The use of household digesters is not widespread, however, in rural parts of developing countries, anaerobic digesters provide a valuable source of cooking gas. In India and China, household scale digesters are common. Feedstocks include animal, human and food waste.

HomeBiogas is a Horizon2020 project that will adapt its existing organic waste anaerobic digestion design at three family building scale for the joint treatment of the solid fraction of waste water together with kitchen waste. The technology will be designed according to energy needs of a building in Austria, but also considering energy/compost needs of the neighbors who can provide kitchen waste for renewable energy and receive benefits from their engagement. ENGIE and The Closed Loop Fund made a joint-investment in HomeBiogas.

In comparison to other techniques for the production of renewable energy (such as solar panels and windmills) anaerobic digestion has the advantage that the production of energy can be controlled and can take place throughout the day, independent of the weather conditions.

Small scale anaerobic digestion in new buildings or projects of city planning, resulting in:

- Increased self-sufficiency in terms of energy demand and help achieving the European goals for renewable energy (biogas yield = 75 to 200 m^3/tonne mixed food waste)
- Reduced methane emissions
- Improved soil quality and structure, increased crop yield.

Using biogas as a vehicle fuel saves 97 kg CO2 equivalent per tonne. Using biogas for on-site combined heat and power (CHP) saves 86 kg CO2 equivalent per tonne.

LOCATION OF THE EIS: Within the FA: Areas of new development: Afrikalaan, Dampoort, Nieuw Gent, ...

PROCESS SCHEME:

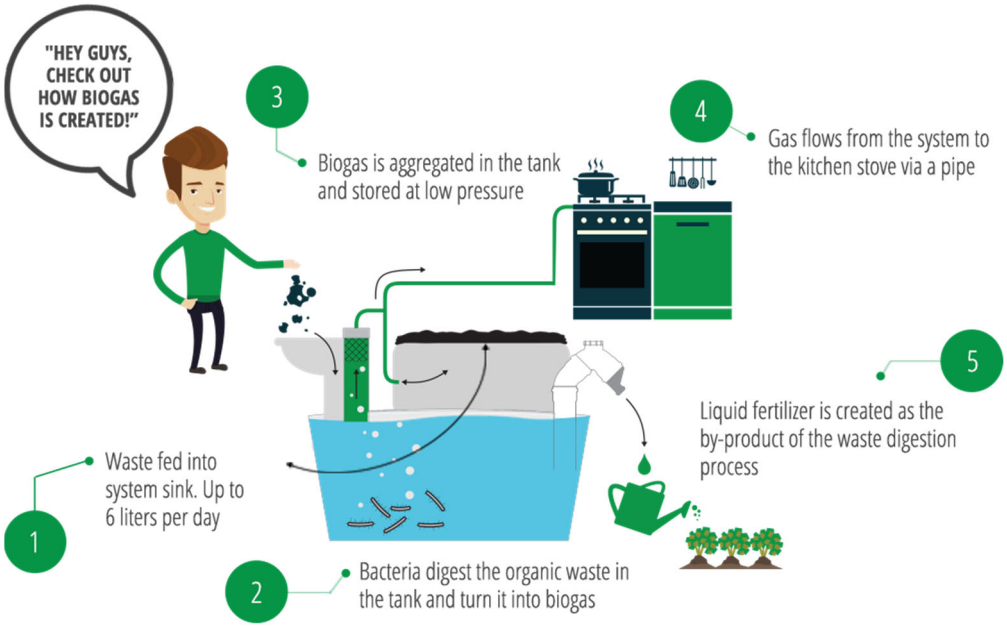

Figure 20 Small-scale digesting units to process local organic waste streams. The valuable products of the digestion plant are internally consumed to make it circular.
(Source: https://wastelessfuture.com/homebiogas-the-household-food-waste-treatment-plant/)

STAKEHOLDERS INVOLVED/AFFECTED: Regional and local authorities, project developers, investors, coöperatives, ….

SOLUTION OR STRATEGY: Strategy: a combination of different legal/financial/spatial incentives can accelerate the transition to a circular economy.

REFERENCES:

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https://www.bondbeterleefmilieu.be/artikel/groene-energie-uit-vergisting-van-groenten-fruit-en-tuinafval-ecologisch-en-0
http://ducoop.be/nieuws/de-verwarmingsrevolutie-het-zawent-systeem-uitgelegd-aan-dummies

3.2.5. (V5) Bokashi at home

KEYWORDS: VFG, fermentation, bokashi, households

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Local treatment of VFG into fermentation products, which could be applied locally as a fertilizer. It could be interesting, especially for households that have minimum space, such as those living in apartments. No odour emissions are spread.

CATEGORY OF OUTCOME: Technological, Social, Environmental

DESCRIPTION OF THE EIS:

"Bokashi" is a Japanese word meaning "fermented organic matter". It is a system of odorless composting, where carefully selected, "effective" microbes or "EM" are used to decompose organic kitchen waste. It is a good alternative for citizens with a small garden or living on an apartment. Similar to the wine-making process, this system relies on fermentation rather than putrefaction. Bokashi is made using a combination of sawdust and bran that has been inoculated with the microorganisms. See figure below to have an idea on the Bokashi container. It takes about ten days to do its work, and in the end you are left with nutrient-rich liquid compost. The system will also allow you to compost meat and dairy products. The fermented content of the Bokashi bucket can be used in the garden (personal garden or city gardens). The juice you can drain with a tap can be used with 100 parts of water for watering the plants at home.

REMARK: some stakeholders at the 3rd PULL debated about the quality of the end-product and raised concerns about the instability of it. If bokashi has no smell, so no gaseous constituents, it might be the case because the fermentation process is incomplete. By applying the end-product to the soil, an uncontrolled reaction takes place: carbon in the organic matter will be transformed into CO2 when oxygen is available. Odour issues may arise as well, plus it brings acidity to the soil.

Figure 21 A bokashi. (Source: https://www.consumentenbond.nl/gezond-eten/bokashi-fermenteeremmer)

LOCATION OF THE EIS: Proposed to be used in small residential housing and building blocks (e.g. apartments) in Ghent

PROCESS SCHEME:

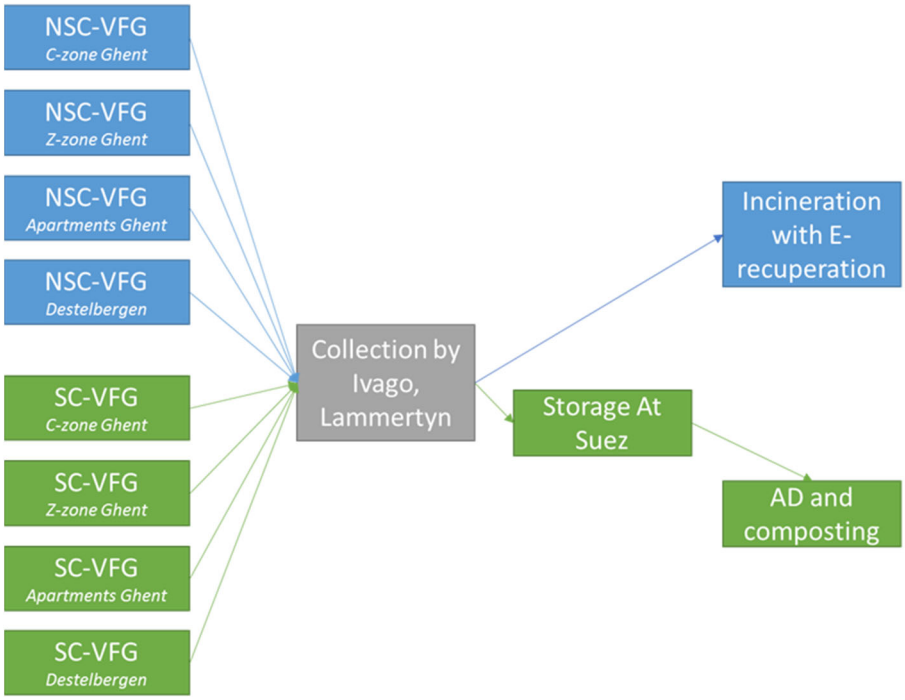

Figure 22 Current status regarding collection and treatment of VFG in the focus area.

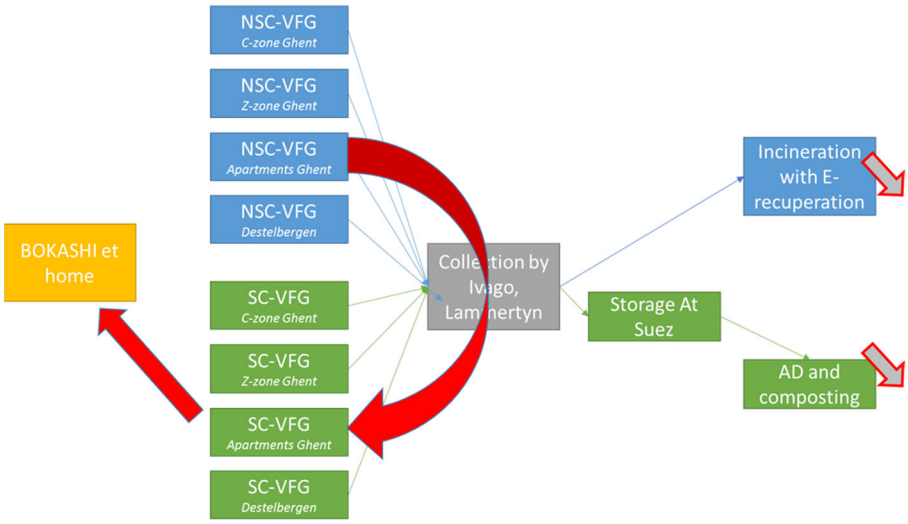

Figure 23 Bokashi EIS : households in apartments in the FA.

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: The households that use the bokashi and the seller of Bokashi (e.g. EM Agriton). Affected: the traditional treatment facilities (to a minor extent) as they receive less VFG.

SOLUTION OR STRATEGY:

Strategy. As nowadays in the FA not much VFG is separately collected, it could be a boost to separate more once a bokashi system is available. On top, it will be treated in another way, fermented instead of digested or composted. The end-product is available for households directly.

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www.agriton.be
www.embelgium.org
https://www.emrojapan.com/
https://www.vlaco.be/nieuws/bokashi-effectieve-micro-organismen-of-magie (Dutch)
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3.2.6. (V6) Waste-to-go (cfr. restfest)

KEYWORDS: reuse of food, leftovers, cooking event, citizens, chefs

AUTHOR: TUD students (Guus Speelberg, Fenna Westveer, Daniela Míková)

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Large amounts of food are wasted; each of us throws away 41 kg of food that could be avoided. The three main reasons for food waste are: incorrect storage, cooking portions that are too large, and buying too much food. The latter is of great importance for young singles and dual earners: 40% throws away food because the package size is too large. This is an important factor for Ghent, since 44% of its population is single. Consumers indicate that more education is required concerning food storage, shopping and cooking with residuals. For example, education about how to store food properly, how to incorporate food residuals into recipes, and how to manage grocery shopping to improve the quantity and frequency control is favourable.

CATEGORY OF OUTCOME: social, organizational, environmental

DESCRIPTION OF THE EIS:

Rest Fest is a monthly, educational cooking event. During this event, residents of Ghent will cook together, by using their own food 'waste'. They will learn how to properly store, buy and manage their groceries in a fun, educational way, for example by doing quizzes about where to store products. Famous chefs, or chefs from restaurants within Ghent will be asked if they want to provide a workshop on how to cook with meal residuals. This event will increase awareness of citizens on how much valuable food they waste, and how they can prevent this, which ultimately leads to a reduction of household food waste. The social aspect of this event is also very important: by cooking together, citizens get to know each other. Furthermore, the event increases the community feeling of resident in the neighbourhood. Participating in monthly social activities, especially activities that contribute to a community feeling, contribute to mitigating loneliness. Furthermore, 'cooking groups' are stimulated by this event, which can be very convenient and fun for singles or students: they don't have to waste the family packages and can enjoy a collective dinner.

LOCATION OF THE EIS:

Three important places identified: Rabot, Macharius, Brugse Poort.

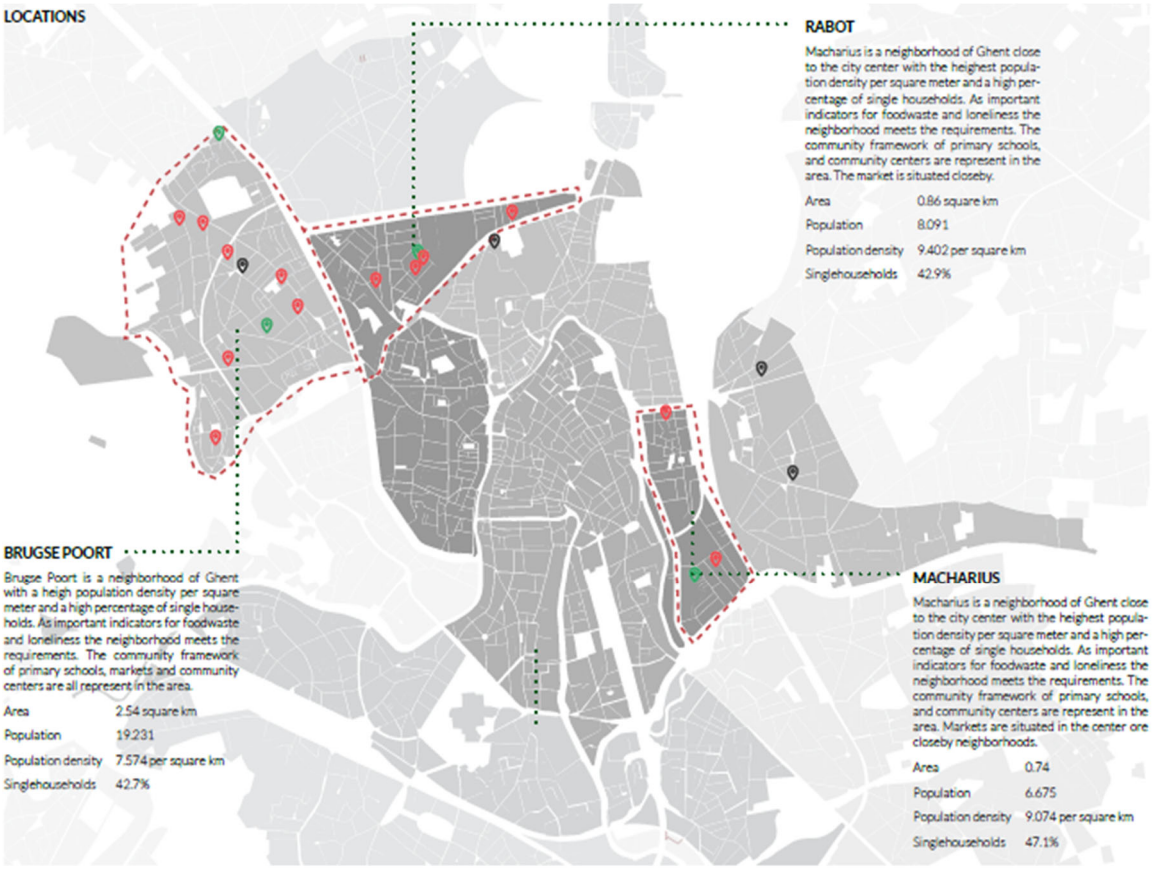

Figure 24 Identification of places suitable in the focus area for the EIS waste-to-go (Source: TUD students).

PROCESS SCHEME:

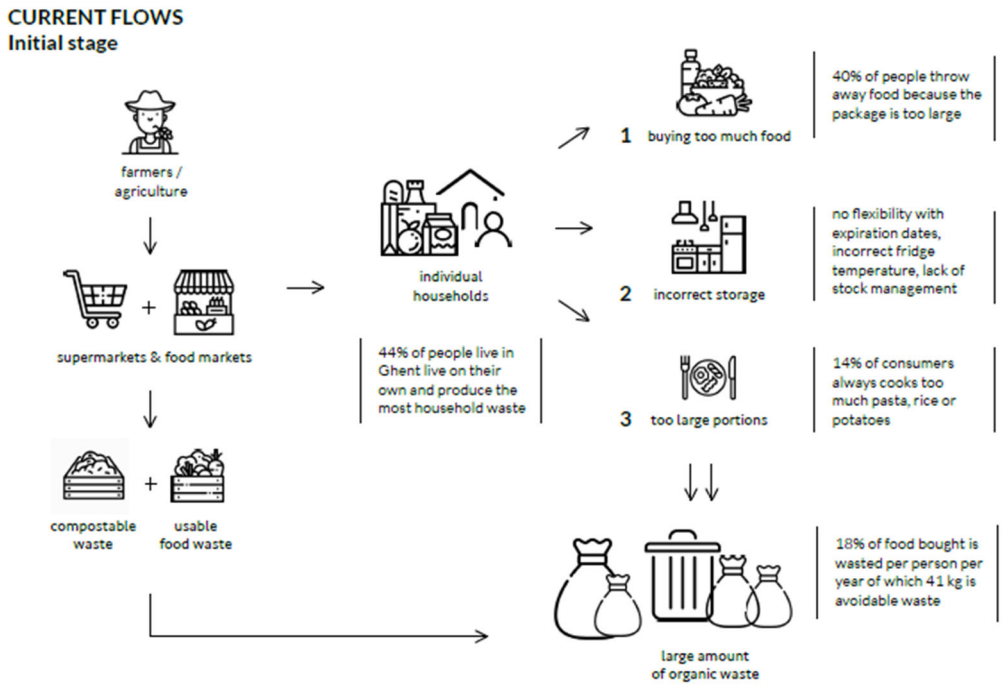

Figure 25 Current status regarding food waste generation at the household level. (Source:TUD students)

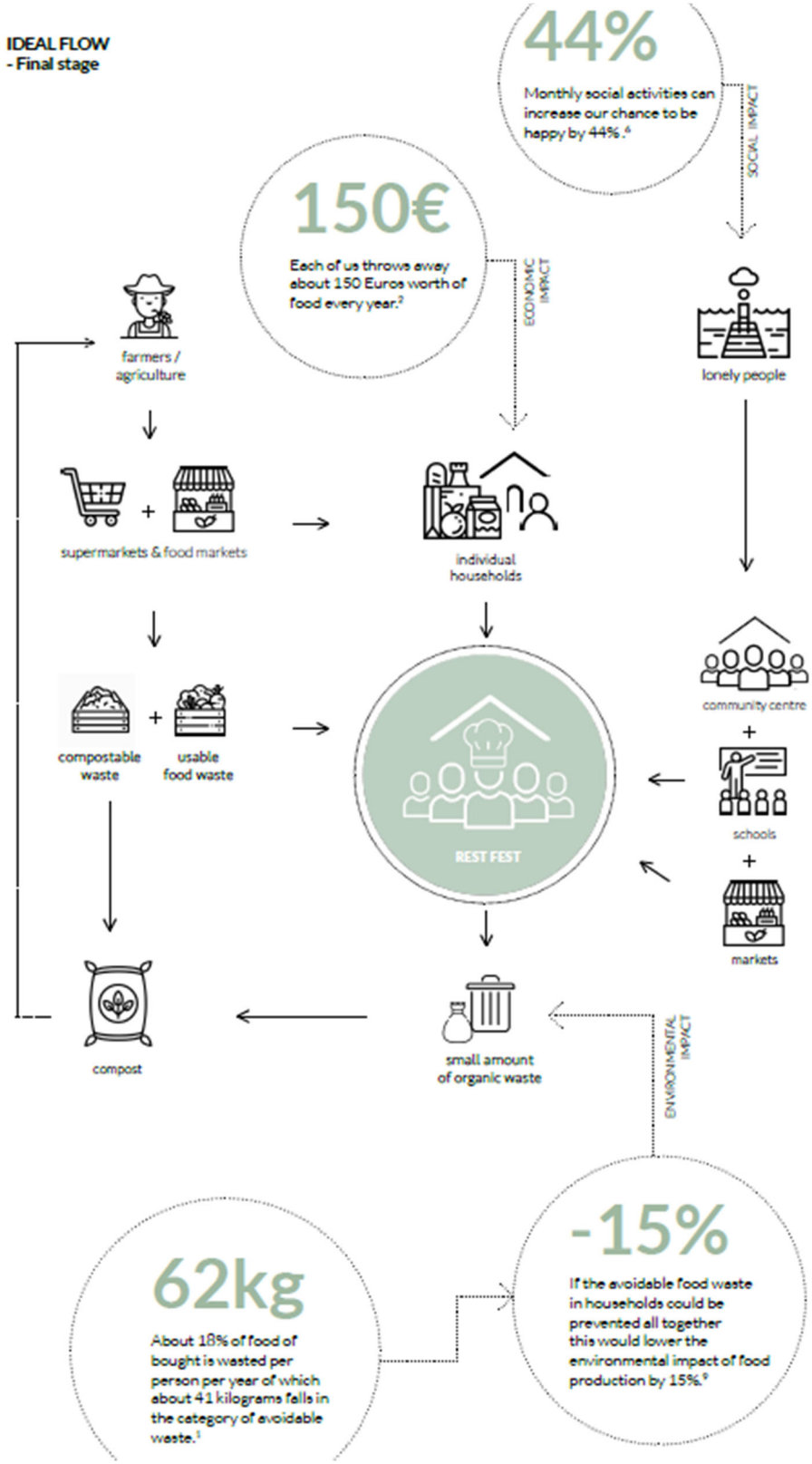

Figure 26 EIS rest fest and the impact it generates compared to the status quo. (Source: TUD students)

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: households, schools, community centers, ..

Affected: IVAGO, (organic) waste treatment facilities , retail, market

SOLUTION OR STRATEGY: Solution.

REFERENCES:

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3.3. Logistics and Mobility

3.3.1. (LM1) Extend separate VFG-collection to the entire territory of Ghent

KEYWORDS: Compulsory separate collection, VFG, focus area

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

This is a measure to stimulate the collection of VFG in a separate way, and to reduce the amount of organic material in residual (household) waste. This in order to achieve a higher valorization of VFG.

CATEGORY OF OUTCOME: economic, environmental, technological

DESCRIPTION OF THE EIS:

Vegetables, Fruit-and Garden waste (VFG) is a waste fraction whose processing has much potential to be improved, starting with its separate collection. In the Focus Area, the company IVAGO organises the collection of all residual waste and separately collected VFG of households. However, nowadays, the separate collection of VFG is not mandatory in the entire focus area. This could be changed to improve the collection efficiency of VFG, which can be used as a feedstock for higher valorization than incineration.

IVAGO organises Ghent in zones; which differ in the way residual waste and VFG are collected (Figure …). In the Z-zone or 'zakken–zone' (bag–zone) customers can dispose of their residual waste in yellow polypropylene garbage bags, which they can buy on a roll. At fixed times, IVAGO collects these bags in the street (curbside collection). The households in the Z-zone can request a High Density Polyethylene (HDPE) bin to dispose their VFG in (separate collection), so it is only on a voluntary basis. As a result, much VFG waste ends up in the residual fraction.

Conversely, in the C- zone or 'container-zone' (bin-zone) customers are obliged to take a green (for VFG) and a grey (for residual) waste bin. Both have a personal chip to attribute the collected waste to the right customer. A fixed tariff per collection unit is used (separate VFG collection is cheaper). The same system as in the C-zone is applied in Destelbergen, however, collection of the residual waste is done by a company called 'Lammertyn', while the VFG (in green bins) is collected by IVAGO. Ghent has buildings with more than 10 housing units. Residents of such housings have to dispose all their residual waste and VFG in yellow bags, and have to throw these bags in big containers. If a resident wishes, he can also offer his VFG in small individual bins. Some residual waste and VFG is collected via sorting points where customers can dispose different kinds of waste in underground containers. However, the amount of waste collected via this sorting points is rather small to date and can be improved.

To conclude, in the Z-zone separate collection is not mandatory, so most households do not opt for separate collection of VFG, e.g., because it takes a lot of space, in densely populated areas. Even in zones where people are obliged to separate VFG, proper sorting is often missing. Thus, much VFG-waste is collected as residual waste. This results in a substantial loss of resources with higher valorisation potential. It is crucial to inform the waste generators in the focus area of the usefulness of separation of VFG. Incentive for a better separation can reduce the cost for collection. This solution may include the provisioning of additional collection points or collection systems. Eventually, collection routing in the focus area could be optimized as well. See also Figure 6.

LOCATION OF THE EIS: Ghent municipality

PROCESS SCHEME:

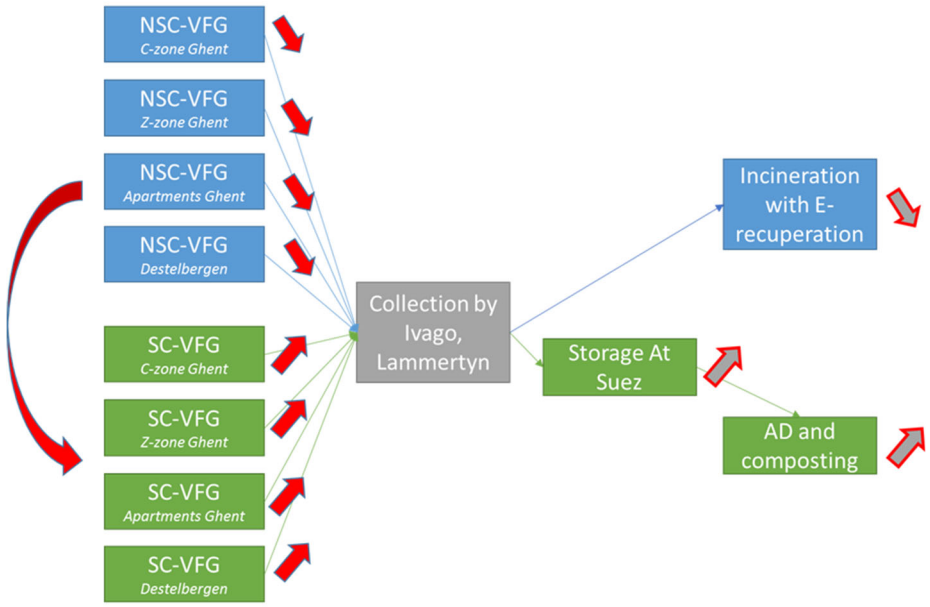

Figure 27 Process scheme related to EIS "compulsory separate collection of VFG in the entire focus area, to optimize the valorisation potential". NSC-VFG= Non-Separately Collected vegetables, Fruit and Garden Waste, SC-VFG= Separately Collected vegetables, Fruit and Garden Waste.

STAKEHOLDERS INVOLVED/AFFECTED:

Important stakeholders for the realisation of this solution are IVAGO, City of Ghent and its citizens. Affected stakeholders are mainly IVAGO, SUEZ, IVVO, and potentially other treatment facilities.

SOLUTION OR STRATEGY:

Solution. It entails following aspects:

- Optimized collection of VFG, also in densely build area
- Identification of best practice to collect the VFG (bins, (de)centralised collection units, underground or above,...)
- Reduction of residual waste fraction (NSC-VFG)
- Increased separate VFG collection (SC-VFG)
- More VFG that can be higher valorised (and less wet low caloric material in the waste to energy plant)
- Quality waste fraction

A potential strategy is a combination with other 'small' solutions such as the provisioning of different sizes of bins or other types of bins, an adapted frequency, and for larger housing units underground or collective containers. This because the main obstructions for sorting today are numerous: limited amount of VGF produced, especially by small families, singles, people of age, storage issues, odour, ...

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https://www.ovam.be/sites/default/files/atoms/files/UitvoeringsplanHuishoudelijkenGelijkaardigBedrijfsafval_LR_2017_Engelstalig.pdf

3.3.2 (LM2) Increase frequency of organic waste collection for SMEs and households

KEYWORDS: Organic waste, household waste, waste treatment

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

The assumption is that in urban areas the volumes of organic waste produced are rather small (linked to demographics, housing, consumption patterns). There are also physical limitations, such as a place to store the bin, odour issues, etc. We also notice that people who do have a recipient, don't put it outside frequently. The objective is to stimulate households and SMEs to participate in separate collection of organic waste (less odour, insects, .) by increasing frequency of collection. Adjusted fleet for collection of VFG in the same truck as another waste stream (residual waste, PMD, glass, …).

CATEGORY OF OUTCOME: social, economic

DESCRIPTION OF THE EIS:

Facilitate collection of biowaste by increasing the frequency of VFG collection to a weekly collection, combined with smaller recipients (bags/ bins of 10 liter). Increasing the collection frequency can be done by adjusting the fleet for VFG collection.

- By using trucks with separate compartments for different waste streams. The challenge is to see which other fraction has a similar volume/weight ratio to carry out a joint collection.
- By using smaller vehicles: while they still have to go through all the streets, there is a gain on fuel/CO2 and it is easier for smaller trucks to enter the dense inner city.

The separate collection at home of SME can be with a dual garbage truck (one container with 2 compartments) or with 2 different containers (of other recipient). This practice could be combined with reducing the frequency of residual waste. Study of the amounts of waste, number of trucks etc. is necessary.

Figure 28 A dual garbage truck, potentially to be used for the collection of waste streams in the focus area, the inner-city center, to increase the frequency of collection. (Source: IVAGO)

LOCATION OF THE EIS: Focus of the increased collection of organic waste is the Z-zone.

PROCESS SCHEME:

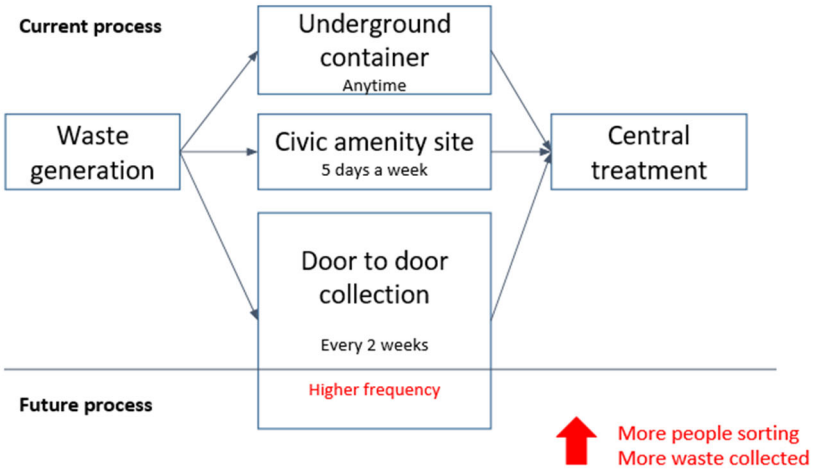

Figure 29 Increased frequency of collection organic waste through the door-to-door system in the focus area.

STAKEHOLDERS INVOLVED/AFFECTED: IVAGO, IVVO, SUEZ, citizens.

SOLUTION OR STRATEGY: Solution.

REFERENCES:

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https://www.weert.nl/Ophalen-afvalcontainers-(duobak)
https://www.almere.nl/wonen/afval/afval-scheiden/wat-gebeurt-er-met-het-rest-en-bioafval-uit-uw-duobak/

3.1.3. (LM3) Collect and deliver system for food leftovers

KEYWORDS: waste-to-resource, platform, supply, demand

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Facilitate and optimise the use of waste as a resource by identifying and connecting waste generators and secondary resource consumers through an online platform. This way waste can be reduced, material and resources will not get lost and resources can be saved since the food that otherwise would be purchased (e.g. by people, state or charities providing people in need) is avoided.

CATEGORY OF OUTCOME: environmental, social, economic

DESCRIPTION OF THE EIS:

The platform allows both waste generators as sec. resource consumers to register themselves and create an account. They can be private companies, social institutions, public authorities, citizens, etc. Location, type of waste, quantity, quality, etc. can be provided as information by the supplier. The potential receiver certainly also provides his location and characteristics of the secondary resource(s) of interest. From there on, supply and demand actors can interact and finally settle the transaction. Logistic needs is discussed between them.

Today, we have already The 'Schenkingsbeurs' (market for donations) which is a Belgia digital platform bringing food companies that have unsold goods in connection with food aid and social organisations that are looking for donations. While the platforms connects supply and demand, it also offers a logistic solution, as it connect to the transport platform Vengo. Also own logistics can be chosen. An efficient logistics is needed to reduce the number of movements to and in the focus area. However, this platform is restricted in the sense that 1) it is limited by edible food leftovers, and other organic streams are not considered and 2) supply and demand actors are limited as well.

Another digital platform is ShareWaste, worldwide spread, to stimulate people to provide their kitchen leftovers to neighbours that have chickens, pigs, etc. or local composting units. It is restricted to citizens and specific small scale applications.

This EIS should aim for a digital platform that connects supply and demand of multiple organic streams, for multiple applications and involving multiple types of actors, eventually also providing logistics solutions.

LOCATION OF THE EIS: FA level or region or beyond.

PROCESS SCHEME:

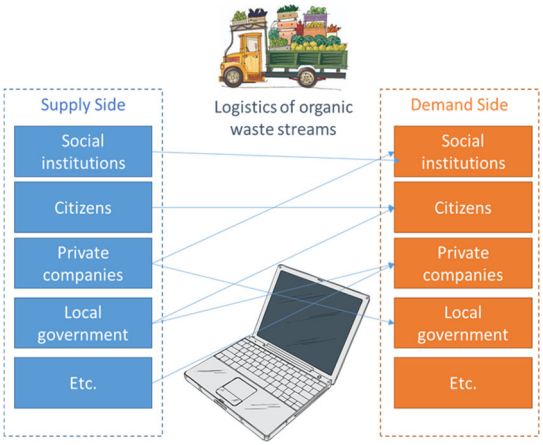

Figure 30 EIS Platform to allow a better optimisation of waste streams.

STAKEHOLDERS INVOLVED/AFFECTED:
Supplier and receiver, platform developer, logistic companies

SOLUTION OR STRATEGY: Solution.

REFERENCES:
Voedseldistributieplatformen en logistiek. TWOL-studie in opdracht van OVAM en Departement Omgeving - 1/06/2019
https://sharewaste.com/
https://www.werflink.com/

3.3.4. (LM4) Waste transport over water

This EIS is not further developed because 1) it is partially covered in section 3.3.5 and 2) some local stakeholders mentioned this EIS is only valuable for bulk streams, and organic waste from the city is not considered as such a stream.

3.3.5. (LM5) Collection on demand (automated)

KEYWORDS: On call/ demand Efficiency Automation Digitalisation

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

IVAGO does not know at the moment whether or not the citizen provides VFG. This is mostly difficult in the inner city, where VGF containers are on a voluntary base. An automated system could help IVAGO know where and how many bins are on the kerbs. Next to that you need dynamic routing with a system able to support this. This system is also useful for less densely populated areas such as the harbor area.

CATEGORY OF OUTCOME: economic, environmental

DESCRIPTION OF THE EIS:

The customers alert IVAGO when their bin is full and on the kerb. This is done via an app/mobile website of a sigfox IOT button. Such devices exist, but what is needed is a platform to transmit this data to IVAGO and a software package creating dynamic routings. Thus an on call, routing is created instead of fixed routings. Thus improving the collection efficiency could also facilitate the step increase the collection frequency.

LOCATION OF THE EIS:

A system of on demand collection exists for company clients of IVAGO, however not via a button, but on demand via mail/ call/ website. Location: in the Z-zone, where VGF is optional, but could be extended to the whole area

PROCESS SCHEME:

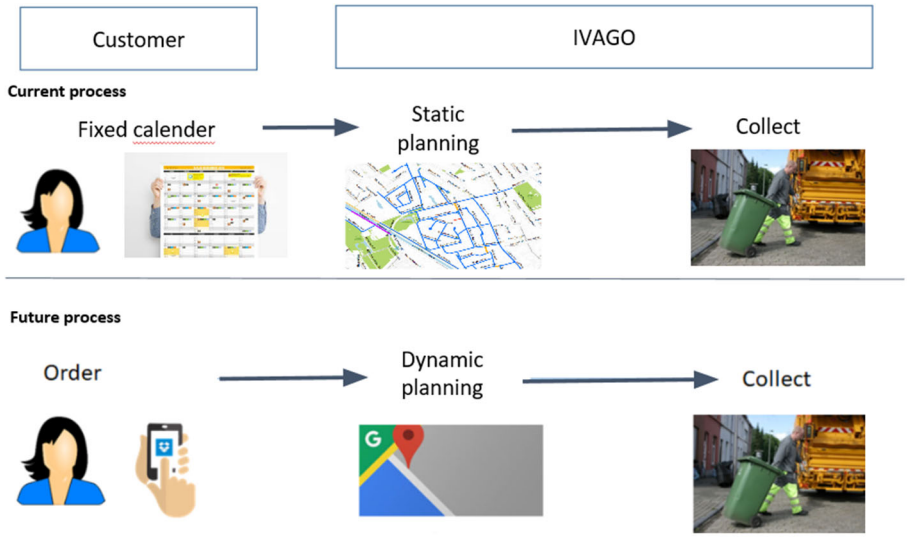

Figure 31 Process scheme of collection on demand by IVAGO.

STAKEHOLDERS INVOLVED/AFFECTED: Involved: IVAGO, IT supplier, citizens.

SOLUTION OR STRATEGY: Solution.

REFERENCES:

https://www.amcsgroup.com/newsroom/blog/agile-on-demand-waste-collection/
https://www.rts.com/services/waste-management-app/
https://www.therecycler.com/posts/new-mobile-app-created-for-waste-collection/

3.3.6. (LM6) Water based Waste Transport (cfr bread to beer, over water)

KEYWORDS: waterways, bread-to-beer, bakery and supermarket, separate collection

AUTHOR: TUD students (Emma Lucassen, Luuk Goossen, Qiaojia Zhang)

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT: A better separation of bread waste from bakeries and supermarkets in combination with an innovative collection and transportation system via the inner-city waterways and aiming for higher valorisation as a beer ingredient.

CATEGORY OF OUTCOME: technological, environmental, organizational

DESCRIPTION OF THE EIS:

With an annual production of about 270 kilotons of bread per year in Flanders[1], you could confidently say that bread is baked into Belgian culture. In Flanders, the average person consumes 38kg of bread at home per year. However, where there is a lot of consumption, there is also a lot of waste. On average, 34% of bread is wasted, of which 16% is lost during distribution and retail, but still suitable to be reused. This brings us to Ghent and Destelbergen, a focus area with breweries and a lot of small scale bakeries having to manage their own waste streams. Linking the two of them together might is challenging regarding logistics because of the already busy inner city, jam-packed with traffic. But the solution could entail the use of the inner-city waterways. A "green" method of transportation over water has recently been piloted by MIT and AMS in the city of Amsterdam. They proposed using automated "RoBoats" for small scale logistic operations on the city's canals. Instead of unsold bread going into municipal waste we propose bakeries walk to the one of the Roboats located less than 200m walking from their front door to dispose of their bread waste for free in floating containers. These containers cannot drive themselves but when full will be picked up by the RoBoat. The boats are autonomous so drive by themselves taking into account other drivers, heights of bridges etc. The boats have the potential to be used for transportation, sightseeing, waste collection, food delivery and infrastructure (eg. temporary bridge). The RoBoat will have a standard dimension of of 2x3m and will be able to hold about 5 persons (equivalent to 400kg). The floating containers used for bread collection will be moved by a RoBoat. Because the RoBoat can work during the night one RoBoat should be enough to move all the containers. The containers will be collected at least once every 2 or 3 days to make sure the bread doesn't go bad. The assumption is made that the RoBoats will be powered by renewable electricity and therefore not cause any direct emissions. The RoBoat brings the bread to the brewery who will get a notice a RoBoat is on its way so they can be ready to empty it upon arrival. The bread will be crushed and heated till the croutons are ready to put in the beer tank.

LOCATION OF THE EIS: Bakeries and supermarket in the radius of 200m from inner-city waterways in the focus area.

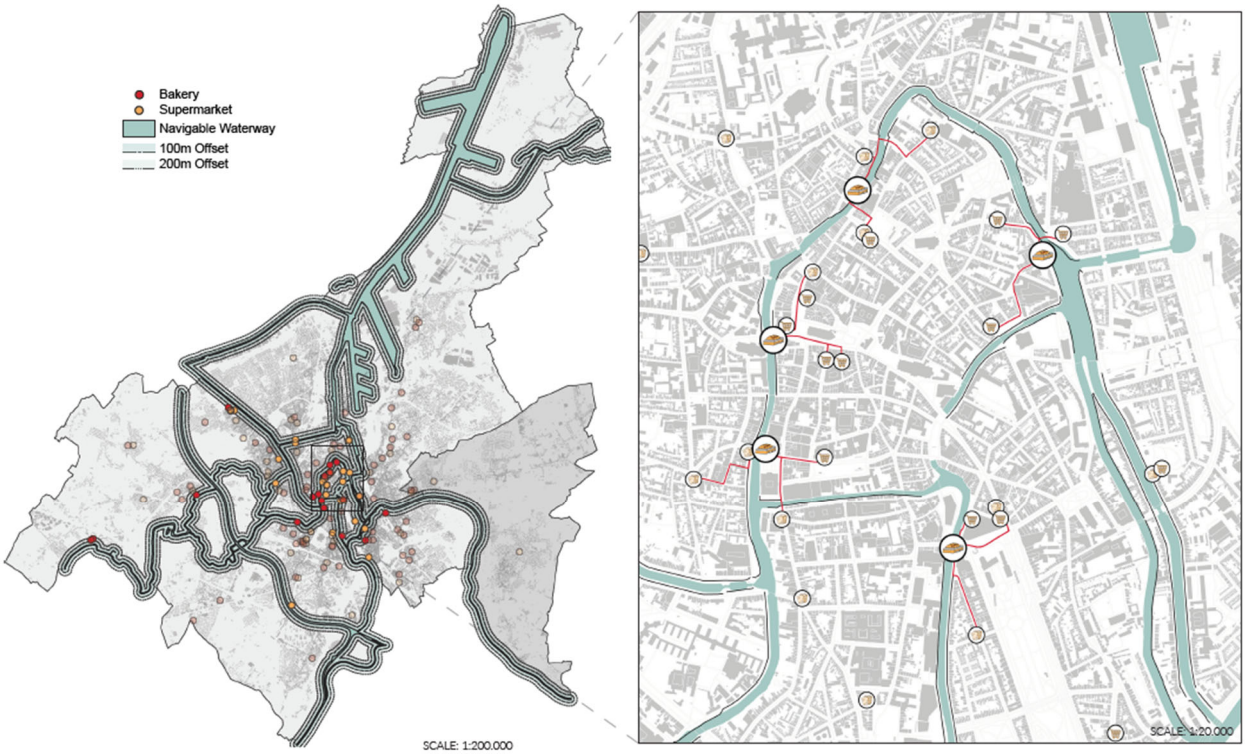

Figure 32 EIS bread to beer, over water. Bakeries and supermarkets in a radius of 200m near waterways in the focus area (left) and hotspots for the RoBoats (right). (Source: TUD students)

PROCESS SCHEME:

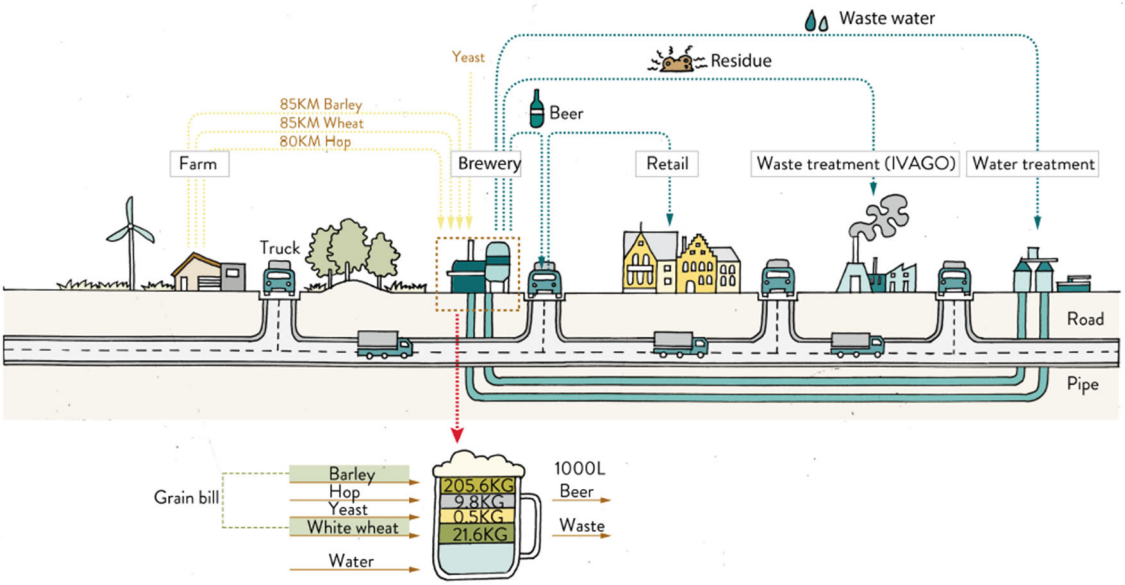

Figure 33 Beer production in the status quo scenario. (Source: TUD students)

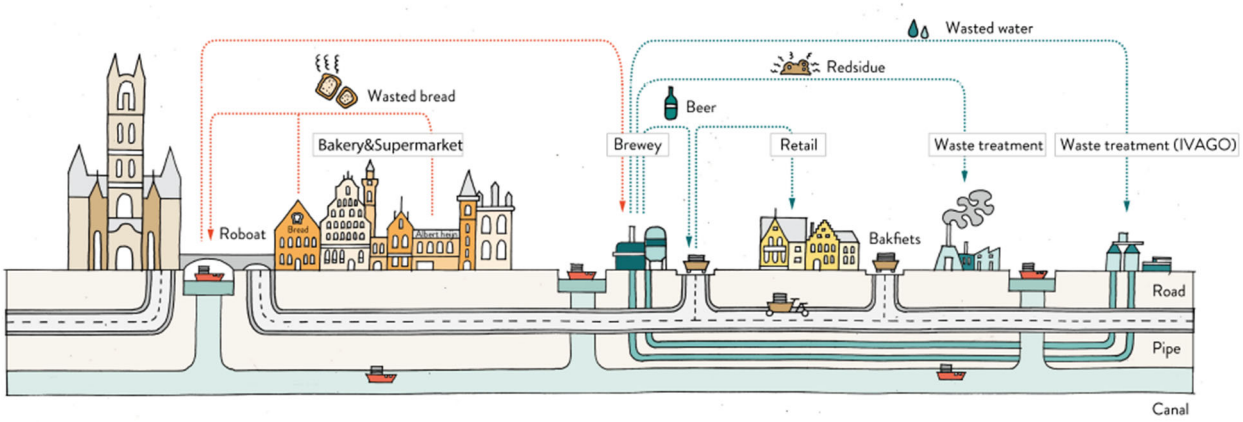

Figure 34 Beer production from bread of retail (formerly a waste product, now a beer ingredient). (Source: TUD students)

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: breweries, bakeries and supermarket within 200m from waterways, consumers, IVAGO
Affected: beer ingredient suppliers

SOLUTION OR STRATEGY: Strategy. Increased separation, waste-to-beer ingredient valorisation, other logistics and collection system, ..

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3.4. Circular Economy

3.4.1. (CE1) Use of wastescapes to build a CE center for SME's

KEYWORDS: Wastescapes, supporting environment for CE initiatives

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Create a stimulating environment for start-ups and small enterprises working towards circular economy.
Create a learning network for circular economy. Reuse of wastescapes by e.g. re-integrating local entrepreneurship in the urban/peri-urban fabric.
In several cities (Rotterdam, Copenhagen, Brussels…), large industrial sites that have been abandoned for years, are given a new destination, as Circular Economy hubs, where upcoming companies get the opportunity to develop their ideas and business models in a 'safe' and innovative environment. While sharing facilities and services against favourable conditions, they can concentrate on the development of their business models. Reusing former industrial sites for new business initiatives can give a boost to long-time abandoned areas, bringing business activities back to city centres and revitalizing entire areas.

CATEGORY OF OUTCOME: political, economic, social, legal

DESCRIPTION OF THE EIS:

CE is not limited to using materials differently, it demands a new way of thinking about materials, business models and consumer behaviour. Creating a favourable environment for starting and young companies engaging in the transition to CE, will accelerate this transition.
Bringing these companies together in a CE-hub where innovative ideas can grow and be exchanges, where services and facilities are shared, can give upcoming businesses the necessary boost to engage in a circular approach.
In 2017 Ghent adopted its '2030 Structural Vision', focussing on the following principles: smart densification and aerating, cleverly interweaving functions, stimulating sustainable mobility, providing green and water, and the human factor. One of the pillars of the vision is to have housing, work and facilities in close proximity to one another. These principles are already applied while looking at new destinations for abandoned buildings.
In the southeast of Ghent, a 13 ha site (Arsenaal-site), owned by the NMBS (Belgian Railway Company), is soon to be abandoned. The 2030 Structural Vision of Ghent "Space for Ghent" designates this site as a future urban hub, a place with a highly developed mobility network and intended as a public utility zone.

LOCATION OF THE EIS:

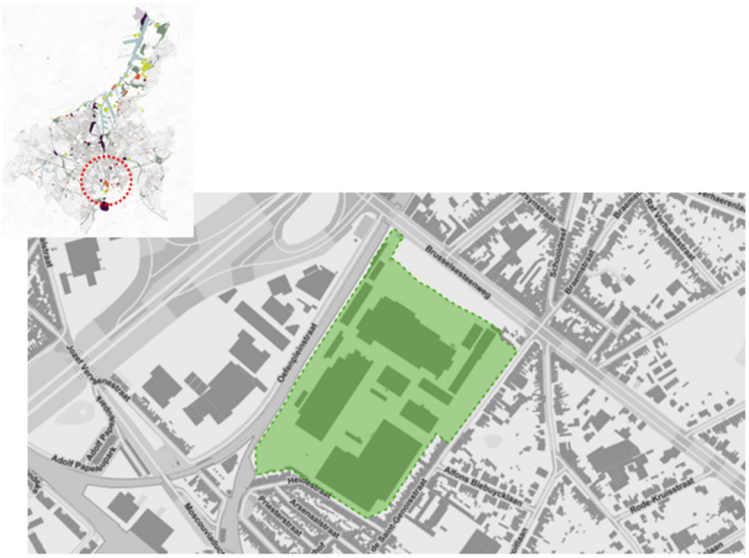

Figure 35 Potential location of EIS SME CE center, the Arsenaalsite. (Source: GDSE)

PROCESS SCHEME:

The Arsenaal-site, the former central workshop of the Belgian Railway Company, located in the district of Moscou (Genbrugge), is a potential urban junction in the 20th century outskirts of Ghent with a highly developed mobility network (cycle route and multiple tram and bus lines with high frequency connections to the city centre). The site is bounded by the railway line between Gent-Sint-Pieters and Gent Dampoort and is located in the vicinity of the E17 Viaduct.

Beginning 2019 the Flemish urban renewal fund offered a concept subsidy to the city to prepare the development of the site. The concept subsidy focuses on the development of this area into an urban hub with a focus on economic activity like CE start-ups and cleantech-companies.

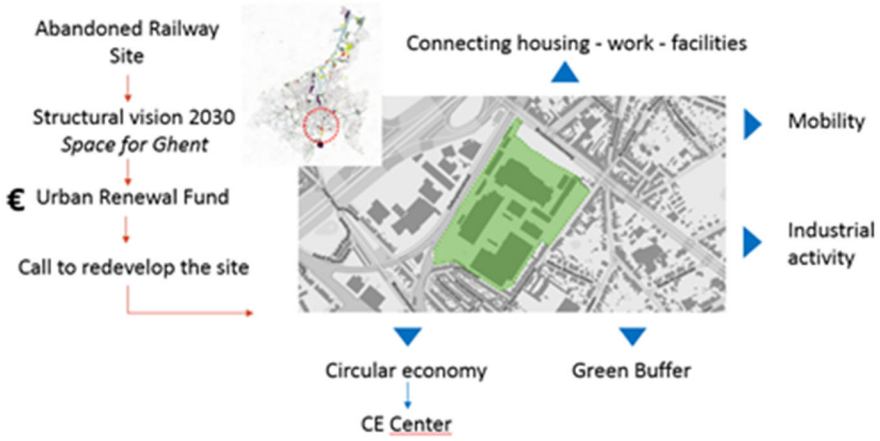

Figure 36 CE center at the Arsenaalsite in the focus area, a process scheme.

The availability of the Arsenaal-site offers the city an ideal opportunity to connect housing, work and facilities, bring industrial activities back to the urban fabric and create favourable conditions for CE-initiatives. The vicinity of living areas, the easy accessibility and togetherness of CE-initiatives can facilitate cooperation along the value chain and multi-stakeholder participation.

STAKEHOLDERS INVOLVED/AFFECTED: Urban planners, upstarting circular businesses, investors, local community, waste management company

SOLUTION OR STRATEGY:

Strategy. The creation of an CE-hub on former wastescapes is a set of EIS solutions, integrated in the broader strategy as formulated in the structural vision 2030 for Ghent. See also EIS: Enabling environment for circular start-ups and business in transition to a CE

REFERENCES:

https://stad.gent/over-gent-en-het-stadsbestuur/nieuws-evenementen/stadsbouwmeester/conceptstudie-arsenaalsite-gentbrugge
http://www.stedenbeleid.vlaanderen.be/sites/default/files/atoms/files/2_SV_Gent_Presentatie_Arsenaalsite.pdf
http://www.stedenbeleid.vlaanderen.be/sites/default/files/atoms/files/Projectfiche_Gent_Arsenaalsite.pdf
Stad Gent, Departement van Urbanisme en Ruimtelijke planning, 2018, Structuurvisie 2030. Ruimte voor Gent.

3.4.2. (CE2) Enabling environment for circular start-ups and business in transition to a CE

KEYWORDS: Transition to CE, enabling measures for circular business models

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

Support beginning circular economy initiatives/business in transition. Develop tailor made (funding) possibilities for circular business models. Develop (financial) incentives for innovative and/or beginning circular business projects. Companies joining the transition to a circular economy face many challenges: rethinking their business, engaging in circular processes, but also getting their circular approach accepted and financed in a world dominated by linear business processes. To help companies overcome some of the initial challenges a favourable environment needs to be created, providing financial or other incentives.

CATEGORY OF OUTCOME: political, social, legal, economic

DESCRIPTION OF THE EIS:

The transition to a more circular economy demands many adaptations in the value chain – from product development aiming at recovery and a long lifetime to new business and market models, new ways of transforming waste in resources and new consumers behaviour. Such transition demands a complete and systematic change, with innovation not limited to technology but also involving the organisation of business and society, alternative financial means and an integrated policy covering many domains.

Local and regional governments have several tools to stimulate (linear) economic activities in their region: from financial and tax incentives, to the development of well-equipped and accessible industrial areas, or the required legal context. To stimulate circular economy in the city, they need to make sure that these tools are also available for circular economy projects and a circular economy approach.

The government can play an important role to create enabling conditions for frontrunners and start-ups to prosper. While subsidies and tax regulations might seem an obvious choice, creating the necessary space, cooperative platforms and regulatory frame are as important.

LOCATION OF THE EIS: Focus area. Settlements in crisis.

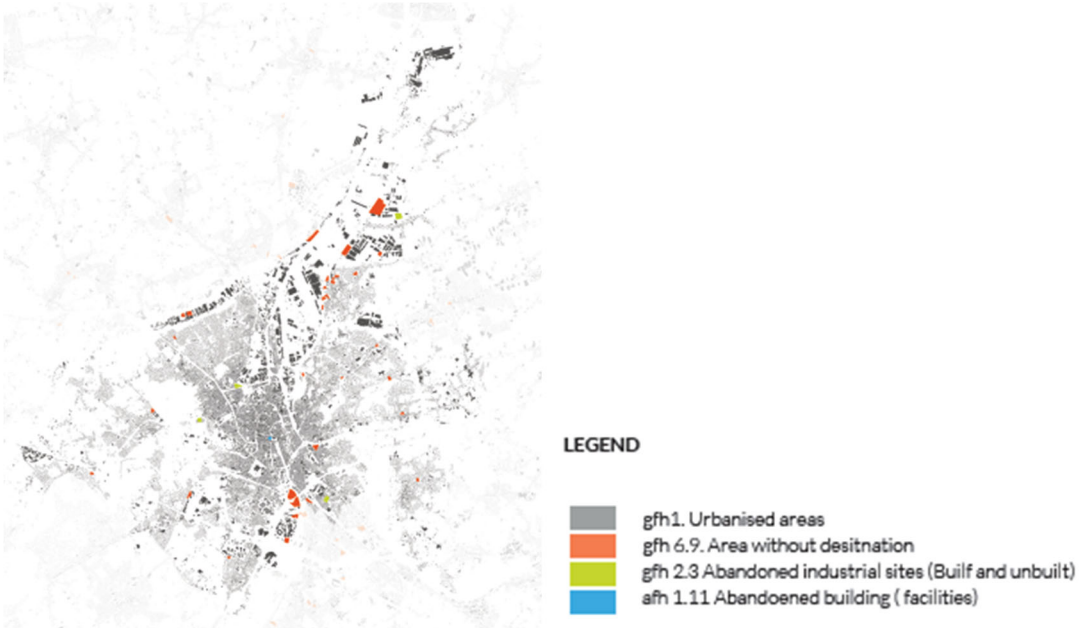

Figure 37 Enabling context of Ghent and Destelbergen. Urbanised areas and abandoned areas or areas without destination are indicated. (Source: GDSE)

PROCESS SCHEME:

Local and regional authorities have several tools to stimulate and favour economic activities in their region. These tools can be financial, legal, spatial or even social. While most of these tools have been developed to fit a linear economy context, experience and knowledge is needed to see how these tools can also stimulate a circular economy approach.

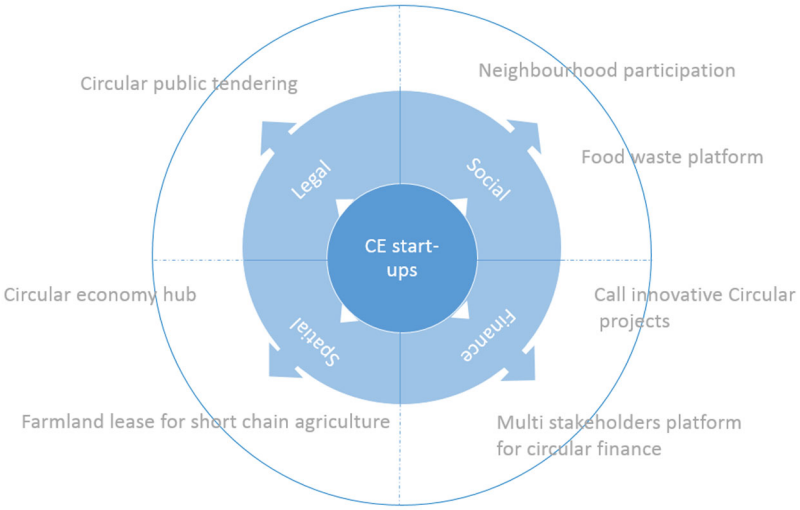

Figure 38 Framework to support CE start-ups.

Creating the required space to experiment with these tools, monitoring and sharing experiences among projects and between several disciplines is essential to stimulate a circular approach. Measuring the impact of supportive measures can lead the way to new legislation an long(er) term policies.

STAKEHOLDERS INVOLVED/AFFECTED: Regional and local authorities, professional federations, investors, banks, circular start-ups…

SOLUTION OR STRATEGY: Strategy: a combination of different legal/financial/spatial incentives can accelerate the transition to a circular economy.

REFERENCES:

https://ec.europa.eu/commission/sites/beta-political/files/circular-economy-factsheet-production_en.pdf
https://circulareconomy.europa.eu/platform/sites/default/files/the_eib_circular_economy_guide.pdf

3.4.3. (CE3) Circular Kick Start Region Ghent

KEYWORDS : Knowledge sharing, Circular Economy, incentives for beginning companies

AUTHOR: PULL Ghent team

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

- Create a learning network for Circular start-ups
- Knowledge sharing/transfer for starting business
- Assist pioneers
- Stimulate innovation and policy relevant research
- Ensure that principals and best practices of the CE are used and embedded within companies, civil society organisations, education, administration…

Ghent is a city of entrepreneurs. With yearly 2850 new starters, many of them student-entrepreneurs, the city is buzzing with entrepreneurial activity. With an active start-up policy, whereby start-ups are given access to finance and a powerful matchmaking platform, numerous start-up initiatives are grouped and events are organised. Encouraging starting enterprises to develop a circular business model from the start, and provide the necessary support and conditions, will accelerate the transition to a Circular Economy.

CATEGORY OF OUTCOME: political, social, economic

DESCRIPTION OF THE EIS:

The transition to a circular economy offers many challenges, not in the least to acquire insight, knowledge and experience about the circular approach. Supporting businesses by facilitating knowledge sharing among entrepreneurs, stimulating research to get better insight in circular business models and integrating circular economy principles is the curricula of upcoming entrepreneurs are essential measures to ensure that the circular economy becomes embedded in society. The city of Ghent decided to support a coaching project for companies to accelerate the transition to CE. It combines a process of coaching and financial incentives.

LOCATION OF THE EIS: Focus area

PROCESS SCHEME:

Convinced that every starter can opt for circular enterprising, Circular Kick Start Ghent wants to inspire and stimulate starters to make circular business choices and as such create a mindshift in entrepreneurship, with a focus on positive circular impact.

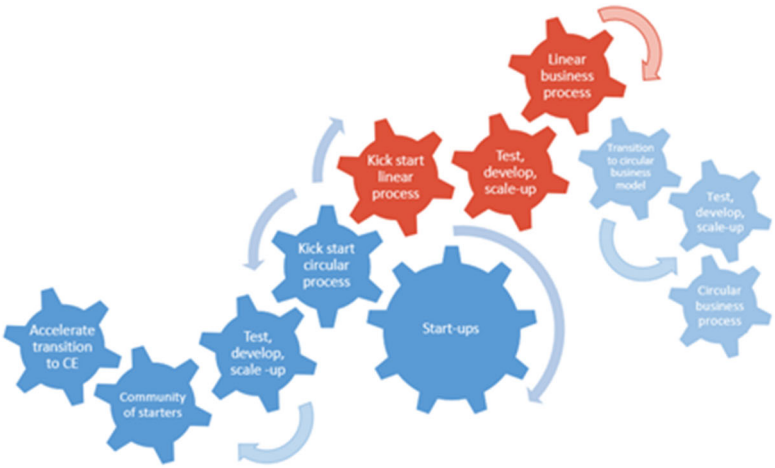

Figure 39 Sharing knowledge and a platform to support CE start-ups.

Its aim is to create a community of at least 100 circular starters, to design and test a unique program for coaching, training and supporting circular starters in addition to providing the right context factors: incubation, community, access to finance, access to networks, access to research… Thus maximizing the chances of success of starting with a circular value proposition and business model. At least 10 circular starters will be supported and encouraged through the programme to take into account the principles of the circular economy from the start. This will give the opportunity to 10 circular starters to build their idea into a powerful business proposition that is launched on the market.

The process follows the following steps:
1. Build up new concept.
2. Make circular start accessible to everyone.
3. Continuous improvement of the trajectory by evaluation and adjustment.
4. The sustainable development of a circular starter community.
5. Structural training pathway for circular starters and entrepreneurs.

These starters will act as the 'ambassadors' of circular entrepreneurship in Ghent.

STAKEHOLDERS INVOLVED/AFFECTED: Regional and local authorities, professional federations, investors, banks, circular start-ups…

SOLUTION OR STRATEGY: Strategy: a combination of different legal/financial/spatial incentives can accelerate the transition to a circular economy.

REFERENCES:

https://vlaanderen-circulair.be/nl
https://stad.gent/werken-ondernemen/producten/starterscontract
https://startersfabriek.gent.be/
http://theglobalpicture.be/
https://klimaat.stad.gent/nl/energiecoaching

3.4.4. (CE4) Waste-to-Bee (cfr. black soldier fly)

KEYWORDS: food waste, increased household participation, insects, feed ingredient

AUTHOR: TUD students (Marije Doolaard, Yulin Song, Philippe Chazee)

SPECIFIC OBJECTIVES AND POTENTIAL IMPACT:

A cooperative collaboration in which students of the FA are responsible for the collection, transporting and processing of their VFG waste, where subsequently the VFG waste that is processed by Black Soldier Flies and used as food for salmon production in a smart urban farming setting. Developing such a cooperative is beneficial for the community as it is known for being managed by its members to create common social, economic and environmental benefits [3]. It is a business that is driven by values, not merely by profits. In this case, students are part of this cooperative by investing their time and effort into the processes, and as with a cooperative, they receive the benefits of the cooperative in return.

CATEGORY OF OUTCOME: social, technological, organizational, legal, economic, environmental

DESCRIPTION OF THE EIS:

Currently, the VFG waste of most parts of the municipality of Ghent is collected and used for digestion that produces biogas and compost. However a big part of the city center is not collecting their VFG waste separately, whereby this food waste ends up in the waste incineration plant. A huge loss of potential resources one could say. Obviously there is a reason why the VFG waste is not separately collected in the inner city. This reason is one of both a spatial and economic dimension. Spatial because picking up waste with trucks in the city center requires extra waste trucks driving around to pick up both residual and VFG waste. This poses issues related to maneuverability of trucks in the small streets, additional pollution of the concerned trucks and spatial issues resulting from extra garbage bags or containers on the street for the separate VFG waste. Regarding the economic dimension, increased VFG separation in the inner-city would require investments in underground containers and an extension of the (electric) truck fleet.

A group of inhabitants with large potential for separating VFG waste is the student population of Ghent. They reside mostly in the city center, do not separate their waste yet, and feel a great urgency for tackling issues related to climate change. Also, students in Ghent mainly life in large student houses, which benefits setting up a waste collection system on house-level. For this reason it was chosen to find a way to encourage students to separate their waste, especially by doing so in a way where they actively contribute to using their VFG waste as a resource for a new product and by feeling part of a movement.

Students will be informed by the urgency of producing salmon sustainably and locally and therefore will feel the need to do so. As salmon is one of the most imported fish in Belgium, it leaves huge potential for focusing on salmon in the living lab. To produce salmon in a more sustainable way, the fish can be fed with Black Soldier Fly larvae, that on their turn are fed with biowaste. Moreover, and extra incentive is created by rewarding the students for their active participation in the cooperative. This way, the spatial and economic issues from collecting VFG waste in the city center can be overcome.

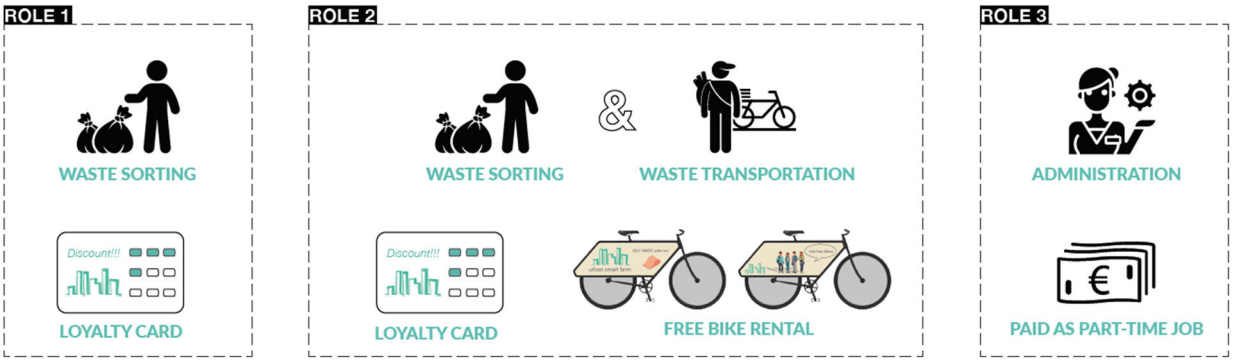

Figure 40 EIS waste-to-bee: increasing the separation behaviour of students and a higher valorization of VFG towards feed ingredients. (Source: TUD students)

REMARKS:
The cooperative is merely using specific pre-consumer waste for feeding the BSF. One might wonder if municipal kitchen waste can be used as input, containing oily and animal food. Nguyen et al. (2015) prove that this is doable, by means of an experiment showing that kitchen waste was best processed by the BSF (Nguyen et al., 2015) . However, the risk of contamination via this kitchen waste is still there and should be taken into account by setting strict regulations.
Another point of consideration with regard to the process, is the fact that the BSF process is not completely circular concerning resources, seeing the residue that remains from the process of feeding waste to the fly larvae. However, it is claimed that his residue can be used for compost, since it still contains nutrients and organic matter. Also, the residue might still be used as fuel for a biogas plant (Dortmans et al., 2017).

LOCATION OF THE EIS:

Figure 41 Potential location of the urban farm and general cycling routes from student housing. (Source: TUD students)

This figure shows the spatial intervention needed for applying the idea. There are two locations of existing Smart Urban Farming in ghent and most students are located within 3 kilometers buffer zone which is a

suitable cycling distance. This shows the feasibility for getting students involved in the living lab by transporting the VFG waste to the location of Urban Smart Farming or even for more intense participation at the farm. Some cycling routes which connect students housing to the Smart Urban Farm are highlighted. As the bikes will contain images and information about the project, these routes can serve as social awareness creation among people on the street or other student houses. Some potential places are chosen according to the wastescapes, which includes places such as abandoned territories, underused areas, former and polluted industrial areas, bare lands and so on. Most of them are located around the inner city and they could be used wisely like accommodating the containers for salmon as well as planting the herbs which can clean the polluted lands.

PROCESS SCHEME:

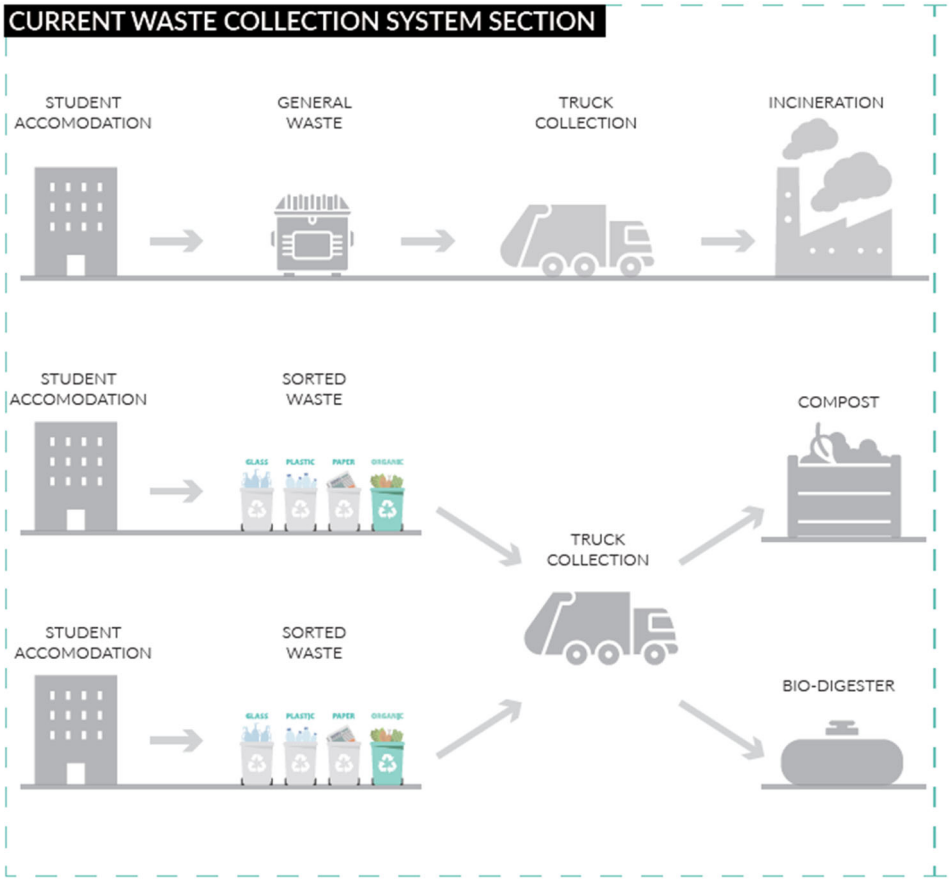

Figure 42 Current VFG collection from students in the FA and further treatment. (Source: TUD students)

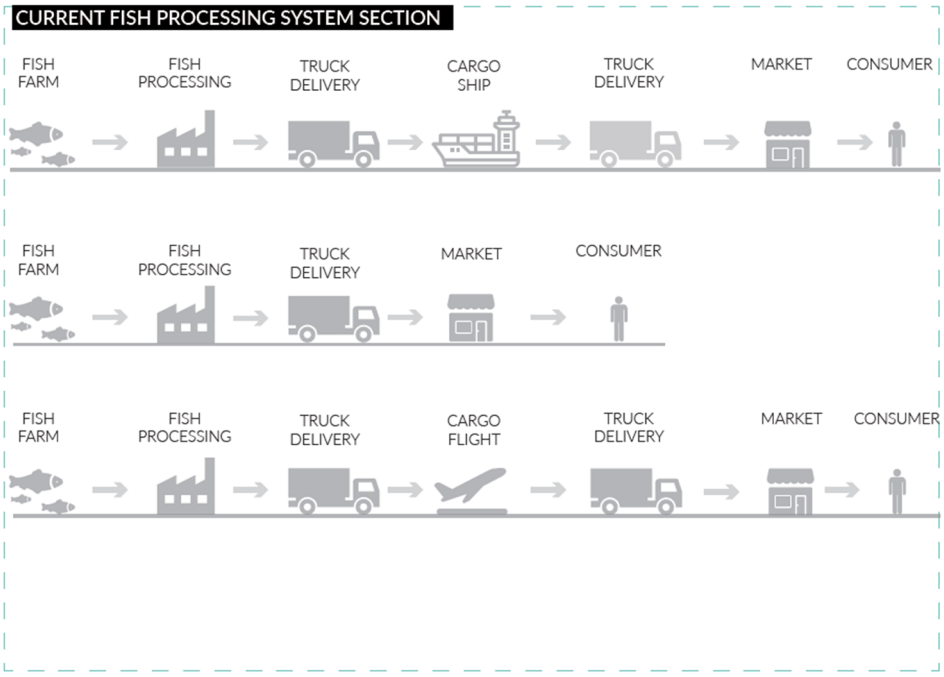

Figure 43 EIS waste-to-bee process scheme: VFG collection from students in the FA and further treatment in the fish farm. (Source: TUD students)

STAKEHOLDERS INVOLVED/AFFECTED:

Involved: Importantly, students are involved from a sense of a community in which they are encouraged to separately collect their VFG waste and transport it to a central place. Furthermore, organizations that manage student housing will be involved to organize the inhouse separate collection. The university of Ghent might play a role in providing (industrial) design students that can design (Deliveroo-like) bags to transport the waste by bike. And obviously the municipality and the smart urban farm are involved in the system as well.

Affected:The waste company (IVAGO) is part of the system, since part of the waste they currently process will now be processed within cooperative.

SOLUTION OR STRATEGY: Strategy, combination of other collection system, increase in separation behaviour, valorisation of waste to feed ingredients, etc.

REFERENCES:

Dortmans, B., Diener, S., Verstappen, B., & Zurbrüggm, C. (2017). Black soldier fly biowaste processing. A step-by step guide .

Nguyen, T. T., Tomberlin, J. K., & Vanlaerhoven, S. (2015). Ability of black soldier fly (Diptera: Stratiomyidae) larvae to recycle food waste. Environmental entomology , 44 (2), 406-410.

3.5. Knowledge Transfer

Out of the 5 EIS from the category knowledge transfer, only 2 EIS (from Hamburg) were chosen by the stakeholders and further explored. The full description of these EIS can be found in D5.7, the deliverable dealing with a catalogue of solutions and strategies from Hamburg. Therefore, in this section, focus was led on the transferability of the solutions towards the case of Ghent and Destelbergen.

3.5.1. (KT1) Rewarding good waste avoidance and separation behaviour

Author: PULL Hamburg team

Short summary: The idea is to incentivise good waste avoidance and separation behaviour. Cooperation with e.g. schools. Engage kids in competition events, offering medals for kids who perform well. They can influence the behavior of the parents. Engage the community with friendly competitions for good waste separation, in collaboration with the quarter service centres (with vouchers or bonus cards as a reward). - Work in collaboration with scouts, NABU youth, other youth organizations, and sports clubs to engage the neighborhood through messages that effectively appeals to the inhabitants.

Transferable: The EIS is not particularly place-specific so it can work almost anywhere in Gent focus area. Especially in certain problem areas with low awareness of the need to separate waste.

Secondary schools have freedom in the curriculum to organise this sort of activities combining disciplines. So there is a platform for this.

What aspects are transferable: In Ghent, because the waste collection is based on payment per bag, the problem is different. People put the wrong kind of waste in VFG bags/containers to save money. Hence one of the stakeholder groups suggested that there was a need for punishing/discouraging bad behaviour, rather than rewarding (need fines).

The solution was deemed not very relevant for organic waste. The scope for transfer was considered low by one of the groups, because there are already competitions in schools, for instance for battery collections. Schools currently focus more on prevention and reuse. However, two other groups were more positive about the scope for transfer of this solution, particularly if coupled with Quarter Service Centre EIS.

Where could it be applied: in schools or in cooperation with an integrated Quarter Service Centre.

What barriers: Local composting is difficult. Expertise on composting is missing among school staff. There are also limitations regarding food safety (risk of disease, difficult to reuse discarded food on food safety grounds). Schools are also confronted with a lack of space.

What adaptations: Mixed waste should be the least possible encouraged. Reward where the least waste is produced. Also look at the quality of waste. Promote behaviour to separate better, but also consider fines for misbehaviour.

Make kids understand how much effort is needed to recycle as to discourage waste generation. It is not fine to create waste because it is recycled, try to avoid waste in the first place.

Focus on collective achievements rather than the individual.

Reward class where all kids have their own bottles, consider an app for monitoring and rewarding individual behaviour (e.g. offering vouchers).

Who should be involved: Schools; Klasse (news bulletin for teachers in Flanders); City of Ghent; province: need to integrate this into a programme for ecological activities in schools (subsidies); OVAM: might be too big of an actor; Inter-municipal services (IVAGO): they already do some prevention actions (they would benefit from it – higher quality of waste, less waste, raising the next generation…).

How to improve: Shouldn't we start to make less waste? Why reward waste generation? The proposal was made to reward waste avoidance instead. Use waste as material for medals rather than metal.

3.5.2. (KT 2) Quarter Service Centre

Author: PULL Hamburg team

Short summary: the Quarter Service Center resulted from the stakeholders defending that spaces within the neighborhood should present a higher multifunctionality, combining standard neighbourhood services (postal service/supermarkets) with waste related services (more accessible depot (public) containers, repair cafes, second-hand shops, etc)

Transferable: There is no integrated quarter service centre in Ghent, however the different services exist, spread over different locations. Dissenting opinions on the need for an integrated location. However, the available space is an essential factor. At present, there are five recycling centres in Ghent. The municipality wants to bring them closer to the neighbourhoods. A mobile recycling service might be an option should the EIS be transferred to Ghent.

What aspects are transferable: whole/most of the EIS is transferable, provide the spatial demands are met.

Where could it be applied: in more peripheral neighbourhoods there is more space, the city centre is too dense; nearby student areas since they have a high demand for second-hand products and repair; in the 19th century areas: dense, multi-ethnic, lower-income neighbourhoods, often with higher waste production (cheaper food has a lot of packaging, cheap products break earlier than more expensive ones).

What barriers: spatial: currently recycling services are at the outskirts because there is a lack of space near the centre. Also in the (poorer) 19th-century neighbourhoods, while there is a need, there is a shortage of space. Coaching citizens to improve sorting or recycling is a labour intensive activity, too labour intensive for the current staff of Kringwinkels (second-hand shop). It should also be taken into account that some goods (pianos or large wooden furniture) are difficult to resell (saturation).

What adaptations: Need to consider where there is demand for repair and reuse of products (point of discussion). The solution could be combined with an online peer-to-peer sharing or reuse system to overcome the lack of space for an integrated physical centre. An online platform could also be used to improve the visibility of a network of centres for such services.

Consider the idea when developing new areas. Consider integrating the EIS with virtual currency solutions whereby citizens can use the 'coins' to buy local services. This could work for repair in particular. Consider a pop or mobile integrated quarter service overcome the lack of space in dense neighbourhoods.

Who should be involved: Social enterprises, Planning authorities and relevant municipal departments (the EIS needs a public subsidy to be viable), LETS (virtual currency system), OVAM, Kringwinkel (second-hand shops), Municipality of Ghent, Repair cafés, Netwerk Bewust Verbruiken.

How to improve: Consider incentivising repair and reuse rather than recycling, build awareness of how labour-intensive recycling is and how it is environmentally advantageous to reuse. Consider shared facilities and the use of pop-up centres, rather than stationary ones in areas where there is no space available.

Possible reuse of wastescapes, depending on the context of each area. Organise pop-up facilities, collecting things that people can carry (not with a car, because they can drive to the far away collection point).

Cargo bike repairmen circulating in the area.

Ghent Made is a second-hand shop where they reuse textiles to make bags, etc. This could be integrated with the EIS.

4. Conclusion and next steps

The Deliverable D.5.5 presents the organization and results of the consecutively organized PULL workshops in Ghent and lists and describes the Eco-Innovative Solutions (EIS) and preliminary strategies.
The different PULL workshops in Ghent had a good and balanced representation of different concerned sectors, involved in waste management and with knowledge of the focus area. For reasons of continuity and to steer the PULL-process, it was important to have stakeholders participating in the consecutive meetings: from identifying challenges, over prioritizing objectives and developing EIS. While most of the EIS were initiated during the PULL workshops by the local stakeholders, their development often required additional and specialized research and input to develop into fully fledged solutions. Knowledge transfer on the solutions from other (comparable) focus areas and the debate on transferability and barriers was clearly considered as inspiring and an added value for the stakeholders. On top, TUD students worked on EIS for Ghent as well, which were evaluated by the stakeholders as very innovative. During the 4th PULL workshop, the participants could use the GDSE themselves, which clearly showed the potential of the tool; to get insight in the different waste flows, but also as a support system for the decision making process.
Balancing the timeframe within the context of the Living Labs, to make sure the goals are reached but equally provide sufficient time to debate solutions and strategies, proved challenging. The REPAiR team from Ghent (OVAM, Ghent University, IVAGO) guaranteed the follow-up of action also in between PULL workshops since it proved sometimes difficult to additionally involve stakeholders.
This Deliverable lists and describes in detail a total of 22 EIS, categorized in five themes: prevention, valorisation, logistics and mobility, circular economy, knowledge transfer. As some EIS are quite complex, they are identified as strategies rather than EIS because they can be unraveled in multiple 'smaller' EIS. Apart from these strategies, a first exercise was done in the 4th PULL workshop to make strategies from single EIS, however, these preliminary strategies need further development as the time was limited to thoroughly investigate them. The PESTELO model (section 2.2) has been followed, which means that the EIS description focuses on the following aspects, when relevant: political, economic, social, technological, environmental, legal, organizational. Process schemes were added to show the change due to implementing the EIS (hypothetically) compared to the current situation or status quo.
Next steps include a selection of EIS/strategies (selection based on certain crucial criteria, such as data-availability) and further development of strategies. Consequently, WP4 will provide sustainability assessment results for those carefully selected strategies. These results will be imported in the GDSE and available to be used in a 5th and final PULL Ghent, which is expected to take place in springtime 2020.

References

(there are references listed with each EIS described, and do not appear in this overview again)

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Annex

Minutes First PULL workshop

Locatie

UNIVERSITEIT GENT
Faculteit bio-ingenieurswetenschappen
Coupure links 653, 9000 Gent
Academieraadzaal, Blok A, Lokaal A0.1

Programma

13.30 – 13.40	Verwelkoming door Universiteit Gent Prof. Dr. Ir. Jo Dewulf (UGent)
13.40 – 14.00	Inleiding tot REPAiR: Resource Management in Peri-Urban Areas: Going beyond Urban Metabolism Bob Geldermans (TuDelft)
14.00 – 14.20	Visie stad Gent over het beheer van organisch afval Tine Heyse (Schepen van milieu, klimaat, energie en Noord-Zuid, Stad Gent, Voorzitter IVAGO)
14.20 – 14.45	Uitdagingen en kansen voor een efficiënt beheer van organisch afval. Kennismaking en toelichting bij de methodologie van het living lab. Arianne Acke (OVAM)
14.45 – 15.30	Ronde tafel 1: Uitdagingen voor een meer efficiënt beheer van organisch afval in Gent.
	Koffiepauze
15.45 – 16.30	Ronde tafel 2: Uitdagingen voor een circulair toekomstmodel.
16.30 – 17.00	Besluit en volgende stappen

Deelnemerslijst

	NAAM	ORGANISATIE
1	Acke Arianne	OVAM
2	Baro Adinda	Stad Gent
3	Claeys Tom	IVAGO
4	Cools Sven	Stad Antwerpen
5	Dehaene Michiel	UGent, architectuur en stedenbouw
6	Del'haye Johan	IVVO
7	Dewulf Jo	UGent, Duurzame organische chemie en technologie
8	François Filip	Team duurzame ontwikkeling, Vlaamse overheid
9	Geldermans Bob	TUDelft
10	Heyse Tine	Stad Gent, Milieu en Klimaat
11	Lauwaert Jasmin	Stad Gent
12	Scheirlinck Alderik	UGent
13	Six Lasse	OWS
14	Spapen Jeroen	I-clean tech Vlaanderen
15	Steeman Greet	Stad Gent, Milieu en klimaat
16	Taelman Sue-Ellen	UGent, Duurzame organische chemie en technologie
17	Van Caimere Koen	IVAGO
18	Vandenbroucke Ann-Maria	Het spilvarken
19	Van der Ha David	UGent, Duurzaamheidcoördinator
20	Van Goethem An	UGent, Milieu
21	Van Wesemael	Myriam EM
22	Wante John	OVAM
23	Wildemeersch Jasmien	FoodWIN
	Verontschuldigd	
24	Casteleyn Griet	
25	GruwezRobert	IVAGO
26	Snauwaert Nathalie	Het spilvarken
27	Van De Werf Kathleen	BUUR
28	Van Timmeren Arjan	TU Delft
29	Verbeke Katrien	Gent en garde

PLENAIR

- Bob Geldermans (TuDelft)

Bob was plaatsvervanger voor Arjan Van Timmeren wegens ziekte. Bob besprak de vele doelstellingen van het REPAiR project, waaronder het ontwikkelen van een 'geo-design decision support environment (GDSE)', een potentieel beleidsinstrument. Werkpaketten 3 tem. 5 hebben hierin een belangrijke rol te vervullen: van data collectie, duurzaamheidsanalyse tot het ontwikkelen van eco-innovatieve oplossingen en scenario's.

- Tine Heyse (Stad Gent)

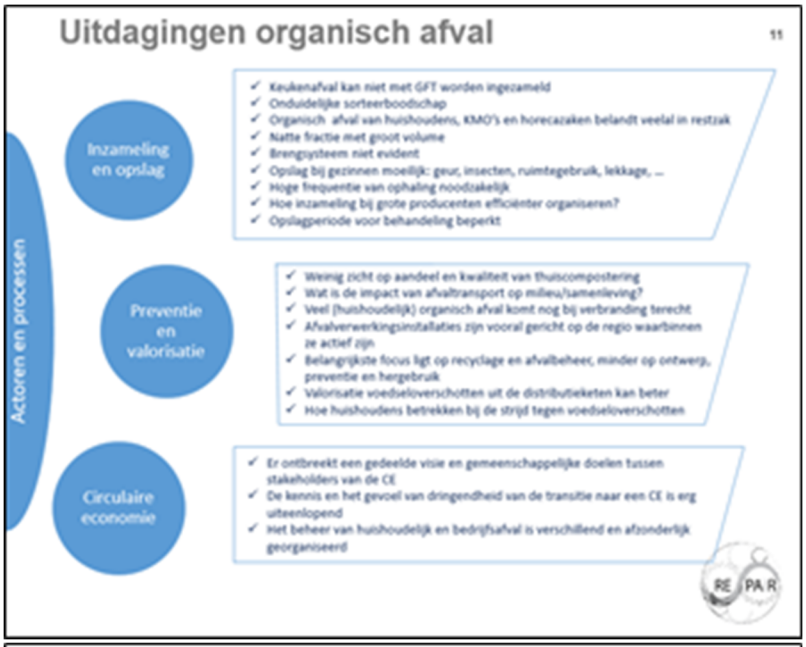
RONDE TAFELS : workshop

OPDRACHT 1

Op basis van interviews met stakeholders uit de focus regio rond circulaire economie en de uitdagingen voor het beheer van de organische materiaalstroom, en de visie van het PULL-team Gent werden de uitdagingen in kaart gebracht en gegroepeerd rond:

- actoren en processen en

- beleid en regelgeving.



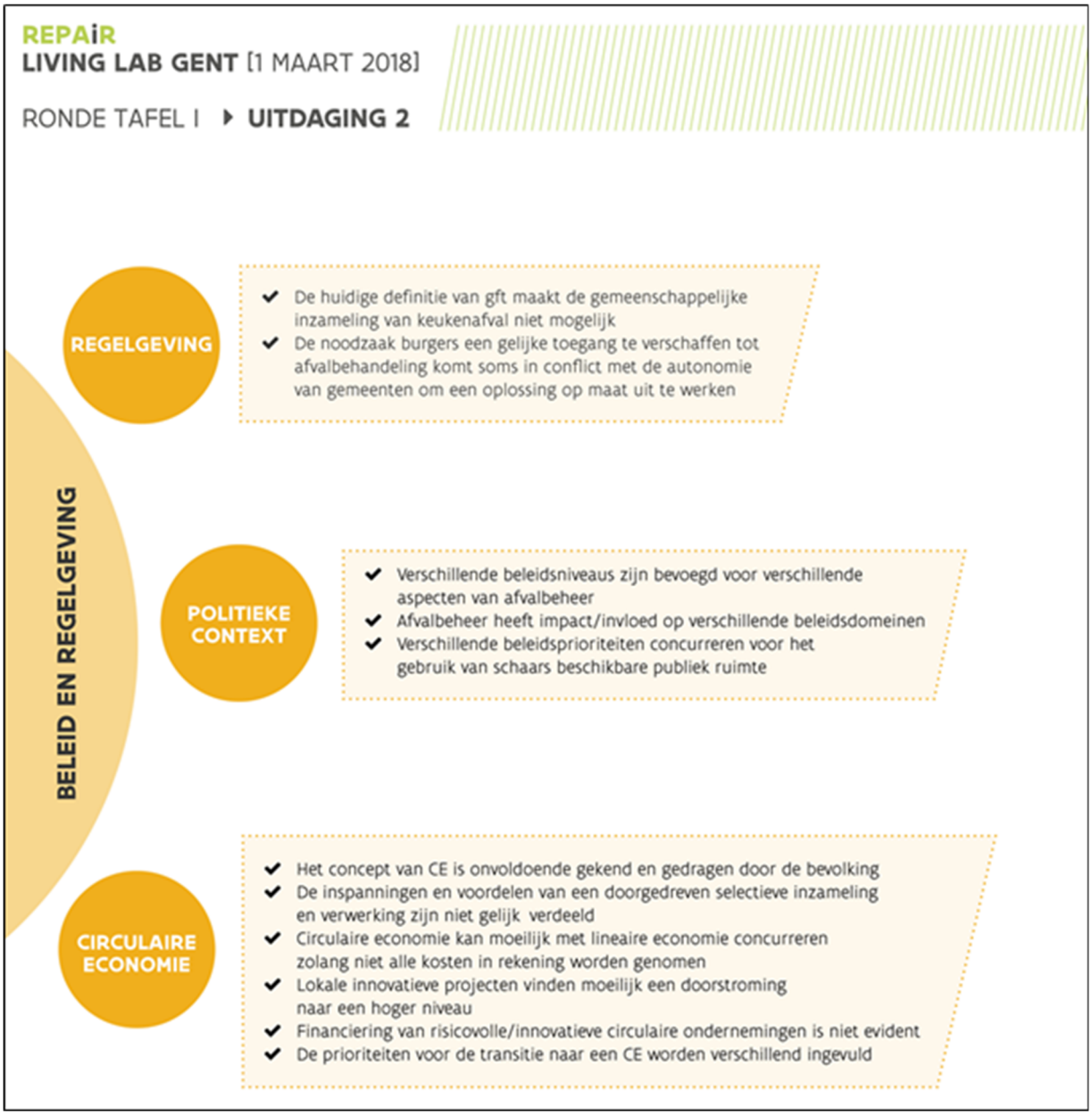
De deelnemers kregen als opdracht volgende vragen te beantwoorden:

- Komt deze probleemanalyse overeen met jullie ervaringen?
- Zijn bepaalde aspecten onderbelicht of afwezig?

- Bepaal op basis van deze analyse de prioritaire uitdagingen

BESPREKING

Tafel A: Beleid en regelgeving



De definitie van GFT staat de verbetering van gescheiden verwerking in de weg.

De exclusie van sommige voedselstromen, die momenteel nog als 'dierlijk bijproduct' worden gezien (wettelijk), maakt dat organisch afval onderbenut blijft als bron voor vergisters en composteringsinstallaties. Dit probleem is in januari 2019 van de baan, aangezien dan een

aangepaste regelgeving ingaat. De aanpassing van de GFT definitie vraagt voor sommige vergistings- en composteringsbedrijven een aantal aanpassingen. Er moeten voldoende garanties zijn dat de processen de hygiënisatie van de extra voedselstromen kunnen garanderen. Momenteel worden de controles van de installaties uitgevoerd.

Naast de gevolgen voor de verwerking, moet bij de wijziging van de definitie ook rekening worden gehouden met andere effecten: zo spelen aspecten van voedselveiligheid bij de verwerking van voedsel in de nabijheid van afval, een groter aanbod van organisch materiaal kan ook een impact hebben op de ophaalfrequentie, mobiliteit… Indien men het plaatsen van ondergrondse containers overweegt, moet worden nagegaan in welke mate dit de concurrentie tussen de publieke en private sector niet in het gedrang brengt. Ook voor deze domeinen kan een toetsing van het juridisch kader noodzakelijk zijn.

Uit onderzoek bij horecazaken over hun problemen en/of motivaties voor gescheiden inzameling van GFT wordt als belangrijk obstakel de plaatsing van de recipiënten opgegeven. Een andere bezorgdheid is ook de voedselveiligheid van het voedsel dat in de nabijheid van het afval moet worden verwerkt. Geurhinder, maden, vliegen, etc… die onvermijdelijk zijn bij GFT opslag dragen bij tot beide problemen.

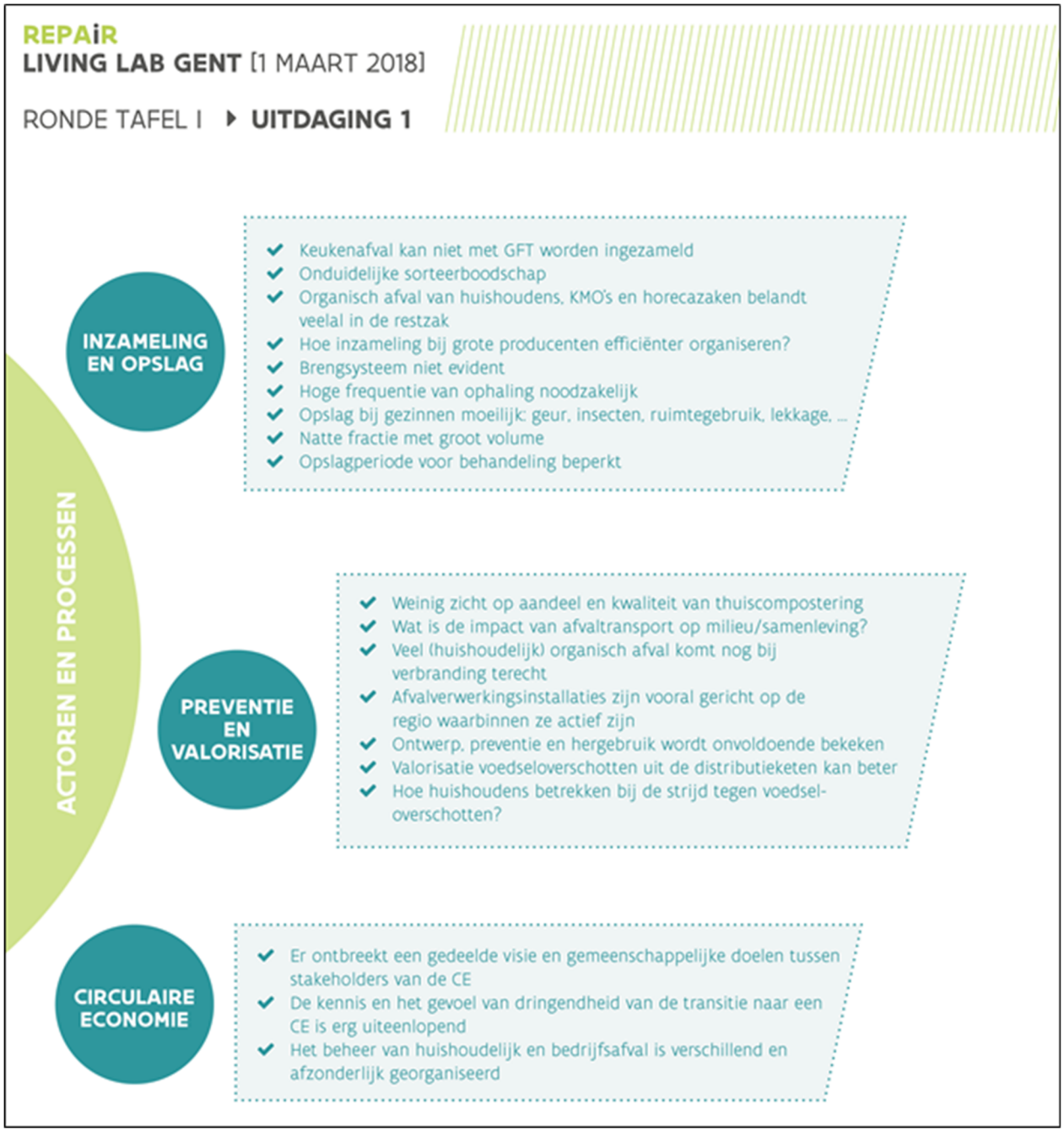
Om gescheiden inzameling van GFT bij horeca-zaken werkelijkheid te laten worden, moet een prijsdifferentiatie nog verder worden doorgedreven. De perceptie bestaat nog steeds dat het goedkoper is GFT bij het restafval te voegen, gezien het restafval per afhaalbeurt wordt verrekend (volume) en GFT per gewicht.

De verplichte afzonderlijke inzameling van GFT voor bedrijven kan een veelvoud aan afvalwagens van verschillend afvalverwerkers met zich mee brengen, wat op zijn beurt een negatieve impact heeft op de mobiliteit in de Gentse binnenstad. Enkele afvalverwerkers het gelijkaardig organisch afval van horeca- en andere zaken op zich laten nemen, zou een oplossing kunnen bieden. Zo bestaan nog steeds verschillende niches maar kan men toch efficiënter te werk gaan.

In vergelijking met het debat over de invloed van fossiele brandstoffen op het milieu, vindt het begrip ‘circulariteit’ veel sneller ingang bij de bevolking. Toch blijft dit heel vaak vooral op afval-inzameling en verwerking gericht.

Opm.: is hier een enquête naar gebeurd? De essentie van een circulaire economie leidt ons immers steeds naar de vraag: “Wat is belangrijk voor het Gentse huisgezin? ”Hoe ver kan je gaan in het streven naar gescheiden inzameling, samen met de consument. Mag een betere inzameling duurder zijn? Is zoiets politiek onmogelijk of niet? Is de consument belonen met meerwaardige alternatieven de sleutel tot succes? M.a.w. ‘the road to change’ is het bestuderen waard om het probleem bij de consument aan de pakken.

Tafel B + C: Actoren en processen



- Het feit dat keukenafval niet met GFT kan worden ingezameld, is problematisch, bijvoorbeeld in de grootketen van Universiteit Gent met categorie 3 keukenafval, aangezien dit om grote hoeveelheden gaat. Valorisatie-waarde kan verhogen als hergebruik wordt aangemoedigd (probleem: wetgeving laat dit nauwelijks toe). Hoe dichter bij de bron te verzamelen, hoe beter te valoriseren.
- Vanaf januari 2019, uitbreiding GFT gepland: deel gekookte resten mogen ook bij de gescheiden inzameling.
- Uitdagingen worden grotendeels onderschreven, wel soms nood om scherper te formuleren. Bv. Definitie 'keukenafval'? = bereid voedsel?
- Centrum, stedelijk gebied: moeilijk voor verwerking afval, daarvoor is het peri-urbaan gebied ideaal. Daar is ruimte om stromen te behandelen. Differentiatie is dus belangrijk. Er zullen

verschillende oplossingen zijn voor stedelijk en peri-urbaan gebied. Decentraal versus centraal werken.

- Belangrijk: vaak ontbreekt nodige expertise/kennis om processen zoals vergisten, composteren tot een goed einde te brengen rekening mee houden bij opzet van lokale verwerkingsunits!
- Bij nieuwbouw: gemakkelijker om circulair te denken (bv. project Zawent) in tegenstelling tot oudere, bestaande stedenbouw.
- Sensibilisering kan beter (voor de verschillende stakeholders) voor een correctie opslag en inzameling, maar hoe? Social Media?
- Te veel stromen met een te lage valorisatie : bv. koffiegruis apart inzamelen, en gebruiken als champignon substraat nodig: moderatoren, sensibilisering, win-win situatie burger/KMO, afnemer, korte keten, …
- Voorlopig dure ophaling van GFT in stedelijk gebied (want is op vrijwillige basis). breng systeem?
- Valoriseren nu in Ieper kan dit in regio Gent? Waarbij de secundaire producten ook weer gebruikt worden in Gent?
- Beter valoriseren, wat betekent dit? Uitgaande van kwaliteit afval/grondstof of eerder kijken naar de markt en de potentiële afnemer?
- Onduidelijkheid rond bio-plastic zakjes voor in GFT boodschap moet duidelijk zijn, wat kan, wat niet, heldere communicatie is belangrijk, maar hoe?
- GFT containers met deksel vaak weinig attractief, gemakkelijker om org. afval bij de rest te gooien (wat geen deksel heeft) bij UGent. Dit moet worden voorkomen.
- Huishoudens hebben veel eetbaar keukenafval (bv. te veel appelen van eigen fruitbomen, noten, ed.) waar kan dit heen? Uitwisselingsplatform voorzien? Een app op de smartphone? Fysieke winkel?
- GFT moet steeds goedkoper dan rest kunnen worden ingezameld!
- Probleem zuiverheid GFT fractie (selectief ingezameld) dit bevat nog te veel onzuiverheden: oplossing = sensibiliseren?
- Retail verkoopt fruit, groenten, en dergelijke, maar neemt geen verantwoordelijkheid voor ‘afvalverwerking’. Een take-back scheme zou oplossing bieden, retailer-responsibility kan hoger. Consument kan organisch afval eventueel (net als glas) terug bij retailer brengen.
- Grote producenten meenemen: UGent, ziekenhuizen, retail, horeca, …
- Brengsysteem kan wel evident zijn indien het kleinschalig en dichtbij georganiseerd is bv. buurtcompostering. Evaluatie ondergrondse containers aan hoogbouw?
- Kwaliteit van het het compost soms een probleem. Begeleiding nodig bij buurtinitiatieven.
- Is er een hiërarchie in de valorisatie van organisch afval? Bestaat hierover een gedeelde visie? Wie moet die kennis hebben?

- Veel definities van circulaire economie (CE). Preventie is de eerste prioriteit en wordt vaak onderbelicht bij CE.
- Bijkomende uitdagingen:
  - Meer aanbod nodig voor kleinschalige inzameling van GFT (alleenstaanden, studenten, …)
  - Vraag en aanbod beter op elkaar afstemmen.
  - Zoeken naar meerwaarde of surplus, niet enkel het sluiten van de kring maar ook nieuwe producten bv. kweken van insecten op GFT stroom.

OPDRACHT 2

De deelnemers krijgen 2 stellingen die de bestaande (huidige) context grondig wijzigen. Zij worden uitgedaagd na te denken over de maatregelen die noodzakelijk zijn om dit op korte termijn te realiseren, en dit voor de verschillende stakeholders in de keten.

Stelling I	Stelling II
In 2020 valoriseren Gent en Destelbergen hun organisch afval enkel nog binnen de regio.	In 2020 wordt organisch afval niet meer verbrand en krijgt het een zo hoog mogelijke valorisatie (cascade van waarde behoud).

BESPREKING

Tafel A: stelling II

Er is geen eensgezindheid over de betekenis van ‘een zo hoog mogelijke valorisatie’

- Afval vermijden door te produceren in functie van behoefte
- Preventie van voedselresten en afval: Gent-en-garde verhaal
- Verbod GFT in restafval voor bedrijven en burgers
- Verbrandingsinstallaties mogen geen organisch afval aanvaarden: wetgeving aanpassen
- Verbod gebruik kunstmest
- Meer samenwerking tussen bedrijven en universiteiten voor een hogere valorisatie
- Goedkoper organisch afval valoriseren
- Afzetmarkt creëren voor gevaloriseerd product, afzetmarkt compost
- Informeren over verschillende doe-het-zelf verwerkingsmethodes
- Oplossing zoeken voor praktische problemen
- Bio-methaan op aardgasnet faciliteren
- Zawent systeem veralgemenen in nieuwbouw
- Definieer duidelijk wie goed valoriseert

- Stimuleer goed gedrag: wedstrijd, betaal voor groen afval, gamificatie sorteren…
- Betalen wat je eet: prijs per gram/kg
- Ontwikkel fruit zonder schil
- Insectenkweek op gft
- Nieuwbouw stenen maken met organisch afval

Tafel B + C: stelling I

- Benefit systeem op poten zetten: welke stromen apart te valoriseren (beter dan vergisten/composteren?), sensibiliseren, afnemer vinden, moderator aanduiden, incentives, ed.

  Consument zamelt bv. koffiegruis apart in en krijgt daarvoor een goed of dienst in de plaats (kortingsbonnen, champignons, virtuele munt, eco-purse, statiegeld, …). Zelfde bij brengsystemen (naar retailer, of ondergrondse containers, ..)
- Beter gebruik (hergebruik) van distributieketen
- Eventueel kringwinkel van organisch biologisch herbruikbare /eetbare stukken
- Verticale landbouw stimuleren, dakmoestuinen, insectenkweek, ed. GFT afval/compost dan lokaal te gebruiken
- Biogas/elektriciteit gebruiken voor huishoudens, hoe distributie opzetten?
- IVAGO eerder als facilitator, meer circulair, ipv ophaling en verbranding (te lineair).
- Systemen als free-go (UGent) opzetten (eetbare gerechten gratis meegeven aan ouders)
- Vele kleintjes maken één groot: waarschijnlijk een netwerk aan kleine initiatieven voor verschillende stromen eerder haalbaar in nabije toekomst, lokale partnerships
- Groenafval? Waar te verwerken? Door wie?
- Meer stadsvernieuwing in kader van circulaire economie (bv. zawent project)
- Beter benutten peri-urbaan gebied
- Meer preventie, hergebruik, samenwerking nodig retailer, consument, producent transparantie en contacteerbaarheid kan helpen (platform)!
- Terminologie belangrijk! Ipv. het woord ‘afval’, en spreken van ‘reststroom’, ‘grondstof’,…
- Niet vertrekken vanuit het aanbod, maar vanuit de nood om doelstellingen te formuleren. Wat hebben we nodig?
- Er zijn veel afzetmarkten voor organische reststromen (vergisting, compostering, fermentatie, …), deze vragen verschillende schaalniveaus.
- Afvalpreventie is niet meegenomen in deze stelling!
- Er zijn veel initiatieven die van onderuit groeien. De stad kan een rol spelen in de coördinatie, in het samenbrengen en delen van de kennis, alsook in het voorzien van een ‘duurzaamheidscheck’.

VOLGENDE PULL GENT

Wij verwelkomen jullie graag op onze 2de PULL op 5 juni 2018, in AC Portus, start om 13u30. Dit 2de Living Lab zal eerder gericht zijn op mogelijke eco-innovatieve oplossingen, in de vorm van concrete scenario's, als vervolg op de 1ste PULL dat focuste op uitdagingen, doelstellingen en problemen rond organisch biologisch (en rest)afval van huishoudens, KMO's en horeca in regio Gent.

PICTURES 1ste PULL Workshop GHENT


Vive Stad Gent op
organisch afval

Minutes Second PULL Workshop

Locatie

AC Portus
Keizer Karelstraat 1
9000 Gent

PROGRAMMA

13.00 - 13.30 *Registratie*
13.30 – 13.40 Verwelkoming
Tom Claeys, IVAGO

13.40 – 13.50 Living Labs binnen het REPAiR-traject
Sue Ellen Taelman, UGent

13.50 – 14.10 Doelstellingen REPAiR Gent
Arianne Acke, OVAM

14.10 – 14.25 Bepalen van prioriteiten
Sue Ellen Taelman, UGent

14.25 – 15.05 Eco-innovatieve oplossingen: inspirerende voorbeelden
- Inzameling gft bij horeca
  Ann Desagher, IVVO
- Stadsgerichte landbouw in Afsnee
  Eva Naessens, Dienst Milieu en Klimaat, Stad Gent

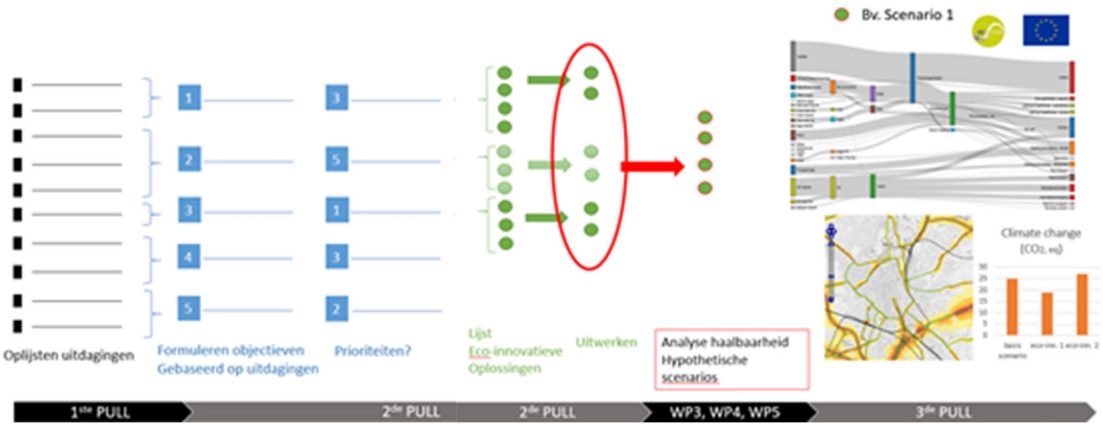
15.05 – 15.25 *Koffiepauze*
15.25– 16.45 Workshop eco-innovatieve oplossingen
16.45 – 17.00 Besluit
Jo Dewulf, UGent

Deelnemerslijst

	NAAM	ORGANISATIE
1	Acke Arianne	OVAM, Beleidsinnovatie
2	Claeys Tom	IVAGO
3	Dehaene Michiel	UGent, Architectuur en stedenbouw
4	Desagher Ann	IVVO
5	Dewulf Jo	UGent, Duurzame organische chemie en technologie
6	De Mets Steven	OWS
7	Francois Filip	Team duurzame ontwikkeling, Vlaamse overheid
8	Hoorens Mieke	Suez
9	Lauwaert Jasmin	Stad Gent, kabinet Milieu, klimaat, energie en Noord-Zuid
10	Martens Annemie	Consultant
11	Naessens Eva	Stad Gent, Milieu en Klimaat
12	Raulo France	Stad Gent, Milieu en Klimaat
13	Spapen Jeroen	I-clean tech Vlaanderen
14	Steeman Greet	Stad Gent, Milieu en klimaat
15	Taelman Sue-Ellen	UGent, Duurzame organische chemie en technologie
16	Vanaken Nico	OVAM, team Bio
17	Van Goethem An	UGent, Milieu en Klimaat
18	Van Wesemael Myriam	EM
19	Verbeke Katrien	Gent en garde
20	Wandle Alex	TUDelft
21	Wante John	OVAM, Beleidsinnovatie
22	Wante Steven	Suez
	Verontschuldigd	
23	Bol Kristof	Consultant
24	Claessens Guy	Agroplantconsulting
25	Del'haye Johan	IVVO
26	Six Lasse	OWS
27	van der Ha David	UGent, Duurzaamheidcoördinator
28	Van Echelpoel Jan	Suez

LIVING LABS BINNEN HET REPAIR TRAJECT

Toelichting van doelstelling en verloop living labs in Gent binnen het H2020 project REPAiR.



Doelstellingen en prioriteiten

Op basis van de uitdagingen die tijdens de 1ste PULL in maart 2018 werden geformuleerd, identificeerde het REPAiR PULL-team een aantal concrete doelstellingen voor de regio Gent. De doelstellingen werden via a plenaire sessie besproken op de workshop waarna vraagstelling mogelijk was. Hierbij weorden een aantal aandachtspunten geformuleerd:

- Het belang van de wisselwerking tussen het urbane en peri-urbane stadgebied als mogelijke oplossing voor bepaalde uitdagingen;
- Hhet belang van waardenbehoud en innovatieve verwerkingsmethoden;
- Dde rol van preventie en hergebruik in het verhaal.

Vervolgens worden de doelstellingen naar prioriteit gerangschikt. Er werd gebruikt gemaakt van een online applicatie (www.mentimeter.com), waarbij de aanwezigen via hun smartphone, tablet of computer hun prioriteiten inzake doelstellingen konden aanduiden. Dit door middel van het verdelen van 100 punten over 13 doelstellingen. De resultaten werden onmiddellijk anoniem verwerkt en gevisualiseerd.

Uitdagingen	Doelstellingen	Prioriteit
Valorisatie voedseloverschotten uit de distributieketen kan beter Hoe huishoudens betrekken bij de strijd tegen voedseloverschotten	De distributie, horeca en huishoudens zetten zich in om voedseloverschotten te voorkomen en te verminderen of een bestemming te geven via hergebruik	**1**

Uitdagingen	Doelstellingen	Prioriteit
Weinig zicht op aandeel en kwaliteit van thuiscompostering Veel (huishoudelijk) organisch afval komt nog bij verbranding terecht Belangrijkste focus ligt op recyclage en afvalbeheer, minder op ontwerp, preventie en hergebruik	Er wordt maximaal ingezet op een zo hoog mogelijk waardenbehoud van organisch materiaal, rekening houdend met de noden in Gent (focus-area)	**2**
Organisch afval van huishoudens, KMO's en horecazaken belandt veelal in restzak	Meer huishoudens, kmo's en horecazaken nemen deel aan de gescheiden inzameling van organisch afval.	**3**
Lokale innovatieve projecten vinden moeilijk een doorstroming naar een hoger niveau Financiering van risicovolle/innovatieve circulaire ondernemingen is niet evident	Innovatieve initiatieven in het kader van CE krijgen kansen om zich tot volwaardige oplossingen te ontwikkelen	**4**
Keukenafval kan niet met GFT worden ingezameld De huidige definitie van gft maakt de gemeenschappelijke inzameling van keukenafval niet mogelijk	De wet en regelgeving maakt het mogelijk keuken- en etensresten samen met GFT in te zamelen	**5**
Brengsysteem niet evident Hoge frequentie van ophaling noodzakelijk Hoe inzameling bij grote producenten efficiënter organiseren? Het beheer van huishoudelijk en bedrijfsafval is verschillend en afzonderlijk georganiseerd	Er is een efficiënt inzamelsysteem voor organisch afval in de regio	**6**

Uitdagingen	Doelstellingen	Prioriteit
Wat is de impact van afvaltransport op milieu/samenleving? De inspanningen en voordelen van een doorgedreven selectieve inzameling en verwerking zijn niet gelijk verdeeld		
Opslag bij gezinnen moeilijk: geur, insecten, ruimtegebruik, lekkage, …	Er is een oplossing voor de praktische problemen die huishoudens, kmo's en cateringbedrijven ondervinden bij de inzameling en opslag van organisch afval	**7**
Natte fractie met groot volume Opslagperiode voor behandeling beperkt	Er is een oplossing voor de praktische problemen die verband houden met de verwerking van organisch afval	**8**
Het concept van CE is onvoldoende gekend en gedragen door de bevolking	Sensibilisering over organisch afval maakt deel uit van de bredere communicatie rond circulaire economie	**9**
Onduidelijke sorteerboodschap Gedrag Kennis	De regels rond opslag, inzameling en thuisverwerking van organisch afval zijn duidelijk voor de volledige doelgroep en vinden naleving	**10**
Afvalverwerkingsinstallaties zijn vooral gericht/afgestemd op de regio (intercommunale) waarbinnen ze werkzaam zijn: uitdaging voor optimale benutting capaciteit Verschillende beleidsprioriteiten concurreren voor het gebruik van schaars beschikbare publieke ruimte: parkeerruimte, ruimte ondergrondse containers, parken…	CE is een uitgangspunt voor de ruimtelijke planning	**11**

Uitdagingen	Doelstellingen	Prioriteit
Er ontbreekt een gedeelde visie en gemeenschappelijke doelen tussen stakeholders van de CE De kennis en het gevoel van dringendheid van de transitie naar een CE is erg uiteenlopend Verschillende beleidsniveaus zijn bevoegd voor verschillende aspecten van afvalbeheer Afvalbeheer heeft impact/invloed op verschillende beleidsdomeinen De prioriteiten voor de transitie naar een CE worden verschillend ingevuld Verschillende beleidsprioriteiten concurreren voor het gebruik van schaars beschikbare publiek ruimte	Er is afstemming over CE tussen verschillende beleidsdomeinen in de focus area	**12**
De noodzaak burgers een gelijke toegang te verschaffen tot afvalbehandeling komt soms in conflict met de autonomie van gemeenten om een oplossing op maat uit te werken	Lokale besturen kunnen binnen het (Europese en regionale) kader van afvalverwerking maatregelen op maat nemen.	**13**

De 6 hoogst geplaatste prioriteiten worden tijdens de bespreking in de workshops rond eco-innovatieve oplossingen verder meegenomen.

Voor het volledige resultaat van de prioritering: zie bijlage 1

eco-innovatieve oplossingen: inspirerende voorbeelden

Ter inspiratie voor de workshops worden een aantal eco-innovatieve voorbeelden voorgesteld.

- Inzameling keukenresten bij de horeca, Ann Desagher, IVVO

  Tijdens een proefproject in de regio Ieper werd getest op welke manier kleine horecazaken overtuigd kunnen worden om mee te stappen in de gescheiden inzameling van gft en keukenresten.

  Meer info: http://www.ivvo.be/horeca

- Stadsgerichte landbouw in Afsnee, Eva Naessens, Stad Gent

  Via een samenwerking tussen Stad Gent en het OCMW van Gent werd een stadsgericht landbouwproject opgezet in Afsnee op 10 ha landbouwgrond

  Meer info: http://persruimte.stad.gent/163089-duurzame-landbouwproject-het-boerencollectief-van-start-in-afsnee

Workshop eco-innovatieve oplossingen

In drie werkgroepen gingen de deelnemers aan de slag om eco-innovatieve oplossingen te bedenken voor de 6 meest prioritaire doelstellingen (2 per werkgroep). Vertrekkend van de resultaten van de brainstorm in de eerste PULL worden nieuwe ideeën aangedragen en een aantal meer in detail uitgewerkt.

- *De distributie, horeca en huishoudens zetten zich in om voedseloverschotten te voorkomen en te verminderen of een bestemming te geven via hergebruik*

  Om voedselverlies en –verspilling tegen te gaan is een groter respect voor voeding noodzakelijk. Hiervoor bestaan verschillende hefbomen:

  - Door de band met productie en producent te versterken: *korte keten, stadslandbouw,…*
  - Via een prijzenbeleid: *voeding is te goedkoop / verspilling te goedkoop*
  - Door sensibilisering en educatie

  Er werd ingezoomd op huishoudens die verantwoordelijk zijn voor een belangrijk aandeel van het voedselverlies en op de schoolomgeving omwille van hun belangrijke sensibiliserende en educatieve rol. Via de ontwikkeling van een tool/app die het ‘voedselverspilling/-wegwerpprofiel’ in beeld brengt, wil men werken op bewustmaking maar ook nuttige tips aanreiken om verspilling/verlies te voorkomen, zowel voor huishoudens als voor de schoolomgeving. Bij de schoolomgeving komt zowel het aanbod van warme maaltijden als broodtrommels in beeld. Naast een financieel voordeel (minder overschot en verspilling) kan een wedstrijdelement een extra incentive voor scholen bieden.

  Andere belangrijke aspecten: verduidelijken houdbaarheidsinformatie op producten, huishoudens confronteren met wegwerpgedrag, incentives bij minder verspilling

  Daarnaast wordt ook het belang van samenwerking met kenniscentra benadrukt.

- *Er wordt maximaal ingezet op een zo hoog mogelijk waardenbehoud van organisch materiaal, rekening houdend met de noden in Gent (focus-area)*

  Een zo hoog mogelijk waardenbehoud van organisch afval volgt het valorisatieschema zoals hieronder aangegeven:

Bron: Actieplan Duurzaam beheer van biomassa(rest)stromen 2015-2020 (OVAM)

Inzet op voeding, diervoeding, chemicaliën, cosmetica, etc. wordt best nagestreefd in functie van waarde, waarbij een kleiner volume verreist is dan bv. voor energie-recuperatie doeleinden.

Eco-innovatieve oplossingen kort besproken:

- Verplicht maken van gescheiden inzameling GFT, ook in de stedelijke kern, zodat een hogere valorisatie van GFT mogelijk is dan verbranden
- Het inzetten van een wijkmakelaar, die de opportuniteiten bekijkt per wijk (welke actoren zijn er aanwezig, wat zijn hun afvalstromen, welke actoren kunnen deze afvalstromen gebruiken/valoriseren, welke ruimtelijke mogelijkheden zijn er voor nieuwe constructies, wat is de beste collectie-strategie per wijk, etc.) en overleg tussen wijkmakelaars. Differentiatie per wijk aan oplossingen.
- Promoten en duidelijk advies verstrekken rond thuiscomposteren
- Subsidies voor het houden van kleinvee, kippen, .. die organisch afval rechtstreeks opnemen
- Fermentatie eerder dan composteren (minder CO2 generatie), wel geen E-recuperatie
- Volkstuintjes met composteerinstallatie
- Regelgeving aanpassen: 'ten minste houdbaar tot' afschaffen

- Projecten zoals ZAWENT (Nieuwe dokken Gent) waarbij organisch materiaal wordt verzameld via pijpsysteem naar lokale vergister voor E-recuperatie

- Mappen van actoren in focus area en regio om te zien hoe een uitwisseling van stromen mogelijk is (afval voor de ene is een grondstof voor de ander), dit in korte keten verband, om logistiek te beperken. Uitbouwen van cases.

- Projecten zoals Blue City waar ondernemers waarde zien in elke reststroom. http://www.bluecity.nl/ In gebruik name van oude gebouwen waar verschillende KMO's in gevestigd zijn die circulair werken.

- To-good-to-go app is een app waarmee je (overtollig) eten kunt kopen van restaurants, bakkerijen, supermarkten, ... tegen een gereduceerde prijs. Je bestelt en betaalt via de app en haalt het eten op in de winkel.

- Soepcafé's: samen met buurtbewoners voedseloverschotten verwerken in een vegetarisch buffet, tegen een vrijwillige bijdrage. Om dit te verwezenlijken, moeten er voedseloverschotten opgehaald, groenten gekuist, gekookt, en opgeruimd worden. Ook mensen die de bar willen bedienen of die voor randanimatie willen zorgen zijn erg welkom. Vrijwilligers nodig.

- Retail overschot wordt opgehaald en vergist/gecomposteerd. Welk deel van die stroom kan hoger gevaloriseerd worden?

- Projecten zoals 1) 'foodsavers': het OCMW Gent en de Stad Gent startten een logistiek platform dat voedseloverschotten uit de Gentse regio recupereert en herverdeelt. Voedseloverschotten die nog geen bestemming hadden, worden verdeeld naar Gentse sociale organisaties (cfr. Het is ook een sociaal tewerkstellingsproject) of 2) Let's save food: initiatieven op wijkniveau die voedselverlies tegengaan door ophalingen bij warenhuizen en andere winkels en door het gebruik van complementaire munten. Transport per fiets of te voet tot aan centraal punt in de wijk.

Meer uitgewerkte oplossingen:

- In de buurt van Heusden, potentieel voor in gebruik name van terrein. Daar kan een hub opgezet worden gelijkaardig aan het Blue City project waarbij KMO's zich vestigen die een meerwaarde betekenen voor elkaar, en het circulair gedachtegoed waarmaken. Peri-urbaan/landelijk gebied. Inspelen op de korte afstand.

- Meer GFT gescheiden inzamelen: testfase opzetten om bepaalde wijken/straten om te schakelen van vrijwillige basis naar verplichte gescheiden inzameling. Test gebeurt met 3500 gezinnen.

- Mappen van actoren in focus area en regio Vlaanderen adhv data van OVAM, IVAGO en Europese databases (e.g. orbis database, NACE codes, ..). Op die manier een goede casus opzetten waarbij reststromen op korte afstand beter gevaloriseerd kunnen worden.

- Wijkmakelaar aanstellen die verbindingen maakt en oplossingen zoekt voor verschillende organische reststromen. Zal gedeeltelijk gesubsidieerd moeten worden.

- *Meer huishoudens, kmo's en horecazaken nemen deel aan de gescheiden inzameling van organisch afval*

Om deelname van huishoudens en kleine horecazaken te stimuleren en tegemoet te komen aan een aantal praktische problemen kan ingezet worden op een hogere frequentie van ophaling. Hierbij moet worden gedacht aan lokale verwerkingstechnieken op buurtniveau: wijkcompostering, insektenhotels…. Er moet ook geïnvesteerd worden in (professionele) ondersteuning van deze initiatieven om de kwaliteit van het eindproduct te waarborgen.

- *Innovatieve initiatieven in het kader van CE krijgen kansen om zich tot volwaardige oplossingen te ontwikkelen*

Oplossingen voor deze doelstelling creëren vooral voorwaarden of reiken middelen aan.

- Wetgeving: enerzijds dient wetgeving fiscaal te stimuleren (vb ander BTW tarief voor recyclaat, voor hergebruik) anderzijds dient wetgeving een aantal beperkingen weg te halen om circulair te kunnen gaan werken

- Expertise en ondersteuning: opzetten van specifieke netwerken, bedrijven of overheidsdiensten die expertise en ondersteuning aanleveren aan innovatieve initiatieven. Dit bestaat reeds voor start ups en innovatie, het circulaire verdient meer aandacht. (Vlaio, VITO, Vlaanderen Circulair, Start@KBC, ….)

- Reproduceerbaarheid: het is niet altijd van belang om op te schalen, maar soms kan het ook zinvol zijn iets gewoon meerdere keren te reproduceren (voorbeeld circulaire initiatieven op wijkniveau) binnen een stad.

- Testen, living labs, experimenteren: fundamenteel in de eerste fase van innovatieve initiatieven is de kans om te testen, met partners doorheen de keten.

- Wetenschappelijk bewijs: samenwerkingen met kennisinstellingen en initiatieven kan 'wetenschappelijk bewijs' geven, de geloofwaardigheid helpen ondersteunen om een idee (financieel) vooruit te helpen.

<u>Meer uitgewerkte oplossingen</u>

- Innovatieve ideeën kunnen ook groeien als er **brede partnerships** zijn, waar men samen de lasten en opbrengsten draagt en het netwerk gebruikt. Nuttig hierbij zou het uitwerken zijn van **platforms** waar vraag en aanbod samen komen. Initiatiefnemers in contact brengen met bedrijven en kennisinstellingen die de expertise hebben om projecten te optimaliseren en op te schalen. Stad Gent kan een belangrijke rol spelen in het samen brengen van stakeholders. In dergelijke partnerships moet de win-win geëxpliciteerd worden.

- Financiering: Proefprojecten kunnen opgestart worden met behulp van **subsidies of crowdfunding** maar moeten daarna zonder deze financiële ondersteuning zelfstandig kunnen draaien om van een volwaardige oplossing te kunnen spreken (economische leefbaarheid op lange termijn). Ook banken of bedrijven moeten bereid gevonden worden om te investeren in beloftevolle projecten om een doorstart te maken. Initiatiefnemers kunnen ook ondersteund worden om te komen tot een ijzersterk dossier en een succesvolle business-case.

- CE moet een thema zijn in de ondersteuning van startende ondernemers.

- *De wet en regelgeving maakt het mogelijk keuken- en etensresten samen met GFT in te zamelen*

Het uitvoeringsplan huishoudelijk afval en gelijkaardig bedrijfsafval (2016) voorziet onderzoek naar de haalbaarheid van deze uitbreiding. Momenteel vinden de laatste besprekingen plaats om deze aanpassing in VLAREMA (Vlaams Reglement voor het duurzaam beheer van materiaalkringlopen en afvalstoffen) op te nemen. Acht GFT verwerkers voeren momenteel valideringstest uit voor het aanvaarden van gezamenlijke inzameling keukenafval en GFT. Deze doelstelling zal dus zeer binnenkort geïmplementeerd worden. Verder onderzoek naar eco-innovatieve oplossingen binnen deze doelstelling werd weinig relevant beschouwd.

- *Er is een efficiënt inzamelsysteem voor organisch afval in de regio*

  - Schaal: opschalen is vaak een noodzaak, dit vooral naar prijs alsook naar de kwaliteit van de materie. Denken we bijvoorbeeld bij ophaling aan huis aan de vervuiling van de stromen waarbij voldoende volume dit een deel kan nivelleren. Ook voorbeeld bij thuiscompostering is de kwaliteit een aandachtspunt.

  - Diversificatie: het is duidelijk dat ondanks het element schaal een diversificatie te onderzoeken is, dit kan een combinatie zijn van kleine lokale brengmogelijkheden (ondergrondse container, buurtcompostering, iets zoals ZAWENT, zeer kleine composteringsinstallatie https://www.youtube.com/watch?v=TTdreS_HN2Y , …) met thuiscompostering en inzameling.

  - Inzameling on demand: vandaag rijdt IVAGO de volledige stad door en weet niet of de burger zijn GFT bak buiten staat. Zeker als er nog niet veel mensen GFT aanbieden, is de efficiëntie lager. Oplossing kan zijn een app/ sensor waarmee burger aangeeft dat hij buiten staat, gekoppeld aan semi-dynamische routing (deel ligt vast, deel dynamisch).

- Nachtinzameling (elektrisch)
- Reversed logistics (gebruik bestaande logistieke stromen): niet eenvoudig voor bio-waste. Eventueel samenwerking/ piloot met Gent Levert
- Vervoer via tramlijnen (eventueel 's nachts)
- Veel langere termijn: onbemande voertuigen of zelfs drones. Op vraag van burger of op specifieke momenten (notificatie op telefoon/ recycle app: ik kom langs op dat moment) https://www.ft.com/video/60ab7727-f9ca-465a-97f7-13cfd770e5b7 of https://www.youtube.com/watch?v=-9YKt-SbMm4
- Gezamenlijk inzamelen alle fracties: cf Oslo of Lommel met optische nasortering. Hogere frequentie van ophaling, drempel verlagen. https://vimeo.com/123730824
- Lokaal circulair werken: vb zelf inleveren van GFT afval, krijgt er compost of zelfs eten voor terug.

Meer uitgewerkte oplossingen

- Kleinschalige brengsystemen: Het doel is het voor de burgers gemakkelijker te maken om kleine afvalfracties aan te bieden. Mobiele sorteerstraatjes of decentrale inzamelpunten voor bepaalde afvalstromen moeten zorgen voor minder transport. Dit kan op het openbaar domein, al of niet ondergronds, of op druk bezochte plaatsen op privaat domein bv. in winkel of aan de school. Voor GFT kunnen buurtcomposteerplekken een oplossing zijn, maar de nood aan controle is vaak het probleem.
- Transport over water: Als alternatief voor de klassieke inzameling over de weg. Boten kunnen 's avonds of 's nachts aanmeren in het centrum. Met kleinschalige, elektrische wagens kan het afval aangeleverd worden. Via een kraan wordt het afval in de boot geladen. Deze kan gecompartimenteerd zijn, zodat meerdere afvalfracties mee kunnen. Suez past dit reeds toe in buitenlandse steden. Ook in Vlaanderen wordt al afval vervoerd via het water (project Inter-Leuven). Distributie via het water wordt meegenomen in de visienota Water in de Stad van Stad Gent en de Vlaamse Waterweg. IVAGO ligt langs het water, maar oever maakt deel uit van RUP Groenas 4 of rechtstreeks naar Suez (Hulsdonk 1).

Wegens de beperkt beschikbare tijd, werden slechts enkele eco-innovatieve oplossingen of scenario's meer in detail besproken. Daarom zullen, op basis van de discussie tijdens de workshop, de infofiches voor eco-innovatieve oplossingen (bijlage 2) verder aangevuld en uitgewerkt worden door het REPAiR PULL-team van Gent.

Minutes Third PULL Workshop

Introduction

The 3rd Peri-Urban Living Lab (PULL) workshop in Ghent took place on May 15th 2019, on the premises of the city of Ghent. Participants included local authorities, policy makers, waste management companies, research institute and the REPAiR team from Ghent (OVAM, UGent, IVAGO). Some members from the REPAiR team of TU Delft joined the Living Lab for the aspects of Knowledge Transfer and the demonstration of the GDSE. In addition, students taking the course 'Geo-design for Circular Economy' at TU Delft participated in the PULL meeting to present their Eco-innovative Solutions (EIS) for the focus area Ghent-Destelbergen.

The objective of this PULL event was to collect feedback from the different stakeholders on

- the EIS developed during the previous PULL workshops in Ghent by local stakeholders,
- the EIS proposed by the TU Delft students,
- the transferability of EIS developed for other focus-areas in the REPAiR project (Amsterdam, Naples, Hamburg)

These EIS were categorized into 5 themes:

- Prevention
- Valorisation
- Logistics and mobility
- Circular Economy
- Knowledge Transfer

First, in plenary the GDSE tool was shown for the first time to the stakeholders from Ghent and surroundings and some highlights of the EIS were presented. A round table workshop followed the plenary in smaller groups, of which each group addresses one of the 5 themes. Feedback from (local) stakeholders was provided on the EIS, based on a pre-selection of questions. At the end, the moderators of each table/theme summarized briefly the key results of the workshop.

Location

De Stroom
Franklin Rooseveltlaan 1
9000 Gent

PROGRAMMA

12.30 - 13.00 Registration + lunch

13.00 – 13.15 Welcome
Arianne Acke, OVAM

13.15 – 14.00 Introduction to the Geodesign Decision Support Environment (GDSE)
Alexander Wandl, TU Delft

14.00 – 14.30 Eco-innovative solutions: highlights and workshops details
Sue Ellen Taelman, UGent
Presentations EIS students TUDelft

14.30 – 16.30 Interactive workshop eco-innovative solutions
- Prevention
- Valorisation
- Logistics and mobility
- Circular Economy
- Knowledge transfer

doorlopend koffie/thee

16.30 – 16.45 Plenary debate on the results of the round table

16.45 – 17.00 Conclusion and next steps

	NAME	ORGANISATION
1	Acke Arianne	OVAM
2	Braekevelt Ann	OVAM
3	Chazee Philippe	TU Delft
4	Dabrowski Marcin	TU Delft
5	De Jonghe Thomas	Stad Gent
6	De Mets Steven	OWS
7	Del'haye Johan	IVVO
8	Doolaard Marije	TU Delft
9	Dylst Yannick	i-Cleantech Vlaanderen
10	Furlan Cecilia	TU Delft
11	Guild William	TU Delft
12	Gonzales Valente	TU Delft
13	Goossen Luuk	TU Delft
14	Habets Sanne	Stad Gent
15	Käller Eva	TU Delft
16	Kuhk Annette	Humanarc Research
17	Lauwaert Jasmin	Stad Gent
18	Lucassen Emma	TU Delft
19	Marin Julie	KULeuven
20	Míková Daniela	TU Delft

21	Raulo France	Stad Gent
22	Reijtenbagh Quirin	TU Delft
23	Sanjuan Delmas David	UGent, STEN group
24	Song Yulin	TU Delft
25	Spapen Jeroen	i-Cleantech Vlaanderen
26	Speelberg Guus	TU Delft
27	Steeman Greet	Stad Gent, Milieu en klimaat
28	Taelman Sue Ellen	UGent, STEN group
29	Vandenbroucke Ingrid	Vlaco
30	Van Goethem An	UGent, Afdeling Milieu
31	Van Wesemael Myriam	EM Belgium
32	Versluijs Vincent	TU Delft
33	Wandl Alexander	TU Delft
34	Westveer Fenna	TU Delft
35	Zhang Yobi	TU Delft

Excused	Bamelis Lies	Consulent milieu en energie
	Claeys Tom	IVAGO
	Dewulf Jo	UGent
	Hoorens Mieke	Suez
	Van Echelpoel Jan	Suez
	Wante John	OVAM

Plenary session

This Living Lab is the third meeting with stakeholders and expert for the focus area Ghent-Destelbergen. During the first PULL, the aim was to identify challenges related to the bio waste flow in the area. At the second PULL objectives were formulated en prioritized and a first reflection took place on EIS. Since this meeting, the initially proposed solutions have been elaborated more in detail, while at the same time information has been gathered on the waste flow in the area and the socio-economic context, to feed the GDSE.

GDSE

The GDSE was introduced by Alexander Wandl (TU Delft). The features of the tool were explained in detail and shown on the screen. Data of both the Amsterdam pilot case and the case of Ghent was used to visualize the current results. The GDSE is built upon 5 units: study area, status quo, targets, strategy, conclusions. The study area is visualized by basic maps of the focus area especially, e.g. roads, rivers, monuments, etc.. In addition, also wastescapes are shown, e.g. noise pollution areas, brownfields, … The status quo includes a visualization of the organic waste stream in Flanders, both at the municipality level and industrial level. On the one hand, Sankey diagrams appear, on the other hand, the flows (and quantities) are shown geographically. The targets are related to the objectives defined in the 2nd PULL event. The strategy section entails the (combination of) eco-innovative solutions. In this context, the 3rd PULL event is set up, to acquire knowledge from stakeholders to further develop the proposed solutions. The conclusions will be tackled in a later stage of the project and will include, among other, sustainability results of both the status quo and strategies.

Highlights of the EIS

One example from the solutions developed in the 2nd PULL workshop was highlighted (Urban and Industrial Symbiosis, UIS), in addition to one from the knowledge transfer (Rewarding good waste avoidance and separation behaviours, Hamburg). Furthermore, the students presented their 5 solutions briefly to the participants based on posters.

Round table: results

There were five tables in total, each one addressing a different theme and steered by a moderator. The participants could indicate their preference for one theme to start with, and through a fixed rotation system, they participated in 3 themes in total. The duration of one session was approx. 40 minutes. Per table/theme, the participants could choose one EIS to explore further and give feedback on. They could work alone or in pairs.

For each EIS the participants addressed the following questions

- *What is the relevance of the practice (why valuable): in general, for the focus area?*
- *Where in the focus area can the solution be applied:*
- *Who are the actors that should be involved?*
- *For whom would it be a business model / other way of funding?*
- *Does this involve policy changes?*
- *What changes does it imply for the current practice?*

The questions for the EIS in the knowledge transfer group focused on the transferability of the eco-innovative solutions from other areas and were slightly different than the ones in the other themes:

- *Is the EIS transferable to Ghent region? If not, why?*
- *If yes, what aspects of EIS are transferable and which are not? Why?*
- *Where could the EIS be applied (location in Ghent)*
- *What are the barriers for transferability of this EIS?*
- *What adaptations are needed to enable transfer to Ghent?*
- *Who should be the actors involved?*

Prevention

The following EIS were presented (see annex). However, not all were chosen by the participants during the break-out sessions.

- P1. Food waste scan for schools
- P2. Mobile app for food waste reduction
- P3. App for the intelligent use of 'use by/ best before' expiring date on food products
- P4. Local restaurants that use 'food waste' for their preparations
- P5. Collect and delivery system for food leftovers
- P6. City Hunt. The Journey to food waste reduction

The solutions developing an app for the reduction of food waste and for the intelligent use of 'use by/best before' were often discussed together, given they both focus on food waste prevention and have somewhat overlapping functionalities and/or the same target group.

Behaviour is considered an essential factor for the success of all preventive solutions. As such the solutions need to be part of a larger strategy, raising awareness for the consequences and impact of our (current) behaviour.

P5 should be categorized in theme logistics and mobility as it is not focussing on preventing waste.

Specific feedback of stakeholders on the different EIS chosen:

P2. Mobile app for food waste reduction

Relevance: The app is seen as a relevant tool to make people/households aware of their food waste behaviour. However, the actual use of the app will depend on many factors: not all household are that familiar with or in favour of the use of smartphone apps. It is essential that the app measures our behaviour in a simple way without adding efforts for the users. At the same time it would be an added value if the app would make suggestions to avoid wasteful behaviour: suggest recipes, connect to local sharing platform.

Location: this could be used throughout the entire city

Actors: households, app developers, supermarkets, chefs

Business model: for app developers, sponsors

Policy change: not necessarily

Change for current practise: change of behaviour. Incentives will be needed to convince people to us the app

P3. App for intelligent use of 'use by/best before' expiring date on food production

Relevance: An app (correctly) reading expiring dates on food products and at the same time keeping stock of the existing supplies in cupboards and fridges, could prove its value as a shopping assistant. As for the previous solutions, its use will very much depend on the familiarity and willingness of households to use apps. The suggestion is made to link this to the membership card of a supermarket which already collect a lot of data on products. In this sense, this data would also serve the customers as well as the supermarket. This app should contribute to the prevention of food waste and avoid an all too strict reading of expiring dates. It would be combined with tips on the conservation of food products.

Location: not linked to a specific area. Is defined by the relation of customers with their (super)market.

Actors: Supermarkets, users (households), app-developer, device developer, wholesales, food production.

Business model: /

Policy change: Check whether this conforms data collection rules and protection of privacy.

Changes for current practise: make info on expiring dates of products accessible for other data reading systems: apps, existing membership cards, scanners in supermarkets.

P4. Local restaurants that use 'food waste' for their preparations

Relevance: There is limited enthusiasm to create a second distribution network for food leftovers from retail, next to the already existing practice between the retail sector and social organisations. If social organisations have no destination for the products they receive, they could consider opening their service to a larger public, while differentiating their price policy. Students in need could also benefit from their offer. An essential question that popped up is whether there are sufficient leftovers to supply a dual system. Wouldn't it be more useful to prevent the quantities of leftovers

Location: entire focus area

Actors: supermarket, social organisations. If there is interest from restaurants to work with leftovers, the Horeca federation needs to be involved.

Business model: /

Policy change: could be the case if restaurants were to work with leftovers.

Changes for current practise: extend the capacity of social organisation to serve a larger public

P5. Collect and delivery system for food leftovers

Relevance: relevant to coordinate transport, to avoid a multitude of transport actions

Location:

Actors: social organisations, wholesale, shops

Business model:

Policy change: is combined transport possible: food – non-food products?

Changes for current practise:

P6. City Hunt. The Journey to food waste reduction

Relevance: raising awareness,

Location: entire city, connect guided tours not only with waste management but also with geography and history of the city

Actors:

Business model:

Policy change: no changes needed

Changes for current practise:

valorisation

The following EIS were presented:

- V1. A district facilitator for local waste management
- V2. Urban and Industrial Symbiosis
- V3. Neighbourhood composting
- V4. Local digesting unit for new buildings
- V5. Bokashi at home
- V6. Waste-2-go

All of the above EIS were addressed one or multiple times by the stakeholders. However, V6 was covered only as part of V2.

<u>Specific feedback of stakeholders on the different EIS chosen:</u>

V1. A district facilitator for local waste management

Relevance: Because of the difference in population and infrastructure (building/road) density, a tailor-made collection (and treatment) system for each neighbourhood or clusters of neighbourhoods with similar characteristics must be envisioned, organised and steered by a district facilitator. Surveys, workshops, etc. can be organized per

district to understand the needs of the citizens better. The facilitator must have expertise and knowledge of waste management practices.

Location: (cluster of) neighbourhoods in the entire focus area

Actors: the facilitator should have close contact with (in the first place) the residents, waste management companies, municipality, local government

Business model: unclear by who the facilitator must be paid. Local government, independent private company, other?

Policy change: Could be needed in order to organize the different facilitators per municipality.

Changes for current practise: More tailor-made (local) collection and treatment strategies will be applied, based on residents requests, and environmental and economic feasibility.

V2. Urban and Industrial Symbiosis

Relevance: Reduction in the amount of VFG waste which goes to IVVO or incineration at IVAGO but is used for added-value purposes (such as pharma, cosmetic, chemical, food/feed etc. ingredients). Increased VFG separation/collection in the Focus Area (FA) could help in this context. The harbour of Ghent is an industrial network and could be the potential purchaser of VFG as a secondary resource. Also, the surroundings of the Focus area and the region Flanders have many higher valorisation sectors available. As VFG is a mixed stream, there are two options to valorise: or you aim for a bio-refinery concept, where VFG is sorted and specific sub streams are treated differently, or you aim for a high value treatment of mixed VFG (e.g. into bio-plastics). One must verify the possibilities of the VFG stream of the FA based on its composition and quantity and available treatment options and companies in Flanders.

Location: VFG collected in the FA, either from households or industry. The final chosen application of the VFG determines the treatment company of which the location is fixed (somewhere in Flanders at least, for reasons of short-chains).

Actors: Policy-makers, waste generators, waste management companies, waste consumers: companies that use sec. resources (VFG), logistics companies

Business model: for the waste generators (they need to pay less for treatment of waste) and the waste consumer companies as their feedstock is now 'waste' instead of virgin raw materials. Logistic companies are involved as well, when deemed relevant.

Policy change: Current regulations need to be altered/new regulations need to be developed regarding the use of 'waste' in/as secondary products (e.g. in food/feed/other). Redefining VFG waste is important so it can serve multiple purposes.

Changes for current practise: difference in logistic and treatment companies involved (higher value products than energy and fertilizer). Policy changes needed. Increased separation/collection of VFG.

V3. Neighbourhood composting

Relevance: As many VFG still ends up in the residual waste fraction in the FA (especially the Z-zone), it might be interesting to identify districts where local collection and composting can be installed to better valorise the waste. The compost can be used in the community gardens in the FA. Specific logistic systems need to be set up to collect the waste over the collection points frequently. Operators of the composting units must have the right skills (need training, or are professionals). Otherwise, the compost can be of bad quality.

Location: In the FA, in some districts. Collection point have to be close, as people to not intend to carry smelly and heavy waste fractions over large distances. E.g. where you can buy organic food, you must be able to drop off your VFG waste as well. Community gardens are the compost consumers.

Actors: local waste generators, community gardens, local government, logistic companies, composting process operators

Business model: local government, logistic companies, waste collection points (as they can be shops, retail...)…

Policy change: /

Changes for current practise: change of collection infrastructure, logistic system, installation of local composting units, etc.

V4. Local digesting unit for new buildings

Relevance: local treatment of VFG waste in FA. Must have a certain treatment capacity, knowing that an average family in Flanders needs +/- 3500 kWh/yr. The operator of the digester unit must have expertise and knowledge about the process. Maintenance is required. Impurities in the VFG stream are a problem. Raising awareness of the waste generators to separate carefully is important. Also important: safety regulations regarding digesting of VFG in a residential area.

Location: FA, per district one must identify the added value of installing a local digesting unit. Infrastructure and design of the AD unit must fit within the overall environment. The AD unit must be compact and efficient.

Actors: local government, contractor/building industry, waste generators (residents, SME's...), digester operator.

Business model: mainly for the digester company involved, and the waste generators.

Policy change: The digestate cannot be used in Flanders as fertilizer to the soil as it is not hygienic. New regulations may steer the use of digestate locally.

Changes for current practise: Change to current waste management where VFG is treated centralized. Now AD units are installed locally in the FA (where deemed relevant), so more VFG will be treated decentralised and products (energy) used locally in buildings. The minimum scale needed to keep is economically and technically feasible.

V5. Bokashi at home

Relevance: Proposed to be used in small residential housing (e.g. apartments). Fermentation of VFG (no smell), end-product can be used as fertiliser at home or in city gardens (volkstuintjes). REMARK: some stakeholders debated the quality of the end-product and raised concerns about the instability of it. If bokashi has no smell, so no gaseous constituents, it might be the case because the fermentation process is stopped. This could be bad for the quality of the product as it can start to be composted when it gets in contact with air (e.g.by applying it to the soil). Then an uncontrolled composting happens, with odour and emissions, plus it raises acidity to the soil.

Location: FA (intention to use the end-product locally)

Actors: residents, SME's with VFG waste, waste treatment companies of VFG streams (if the bokashi product is mixed with the organic waste stream).

Business model: Bokashi producer, bokashi end-product user

Policy change: /

Changes for current practise: potential need for logistics to user of bokashi end-product.

V6. Waste-2-go (*)

(*) covered as specific example of V2

Relevance: Use of VFG waste for higher value products such as feed. Proposal to feed insects with VFG, which on their turn are used to feed pigs/chicken/.. which are food to humans. After the discussion, it was noticed that it would be even more efficient to use insects fed with VFG directly in the human food supply chain. This required change of attitude in Flanders towards eating insects. EIS is set up whereby VFG from the FA is used as a secondary resource for insect producer companies in Flanders.

Location: FA (VFG generators), region ('waste' consumers)

Actors: VFG generators, consumers, policy-makers, logistic companies...

Business model: for the waste generators (they need to pay less for treatment of waste) and the waste consumer companies as their feedstock is now 'waste' instead of virgin raw materials. Logistic companies are involved as well, when deemed relevant.

Policy change: Current regulations need to be altered/new regulations need to be developed regarding the use of 'waste' in/as secondary products (e.g. in food/feed/other). Redefining VFG waste is important so it can serve multiple purposes.

Changes for current practise: difference in logistic and treatment companies involved (higher value products than energy and fertilizer). Policy changes needed. Increased separation/collection of VFG.

Logistics and mobility

The following EIS were presented:

- LM1. Extend separate VFG-collection to the entire territory of Ghent
- LM2. Increase frequency of organic waste collection for SMEs and households
- LM3. Waste collection over water
- LM4. Collection on demand (automated)
- LM5. Water based Waste Transport – Bread to Beer

All EIS were chosen but LM3 and LM5 discussed jointly

Specific feedback of stakeholders on the different EIS chosen:

LM1. Extend separate VFG-collection to the entire territory of Ghent

Relevance: In the inner city of Ghent (Z-Zone) the separate collection of VGF waste is voluntary, in contrast to other areas where citizens need to buy a separate bin for the collection of VFG-waste. In the Z-Zone most of the VFG waste ends up in the residual waste. This results in a substantial loss of resources with higher valorisation potential. Therefore, the solution is seen as very relevant. However, stakeholders discussed whether this is feasible, without any form of local 'pre-collection' like underground containers or community-based forms of organic waste collection and treatment. There is little space in the flats to collect GFT separately. As an incentive for better and more separating, it was discussed to distribute specifically designed containers or bags. As well as decreasing the frequency of residual waste collection.

Stakeholders were concerned if the extra collection would not cause additional traffic in anyways already congested areas.

Location: Z-zone

Actors: VFG generators, IVAGO, local communities

Business model: not really a business model but perhaps a way to reduce costs. For the waste generators (they need to pay less for GFT in comparison to residual waste) and IVAGO could achieve a higher utilisation rate of their waste treatment facilities.

Policy change: stakeholder discussed whether it would be an advantage to oblige separate collection instead of a collection on voluntary basis.

Changes for current practise: /

LM2. Increase frequency of organic waste collection for SMEs and households

Relevance: Organic waste is only collected every second week and in some areas only separated on voluntary bases, therefore increasing the collection frequency is seen as a worthwhile solution to increase separation and collection rate of organic waste. Stakeholders discussed, which frequency is also financially reasonable and has the most impact. Because in areas where people have their own containers, the existing frequency seems enough, with the exception of a higher frequency during the gardening season. While in the Z-zone collection would have to take place at least every week and then it is still unclear if the inhabitants have enough space for an extra waste pin and if specifically in warmer periods the waste would not lead to odour in the flat.

Location Z-zone, and other areas with higher population density and flats as predominant housing typology; at specific times in the year also in the single-family house areas with gardens.

Actors: VFG generators, IVAGO, ..

Business model: not really a business model but perhaps a way to reduce costs. For the waste generators (they need to pay less for GFT in comparison to residual waste) and IVAGO could achieve a higher utilization rate of their waste treatment facilities.

Policy change: stakeholder discussed whether it would be of advantage to oblige separate collection instead of making it obligatory

Changes for current practise: difference in logistic and treatment companies involved (higher value products than energy and fertilizer). Policy changes needed. Increased separation/collection of VFG.

LM4. Collection on demand (automated)

Relevance: Seen as very relevant, as it would not only make GFT collection in the Z-zone more efficient, but also avoid the frustration of citizens, who separate waste GFT and whose pins are overlooked at the curb. Ideas were discussed to combine the app with tips for waste avoidance.

Location Z-zone, at specific times in the year also in the single-family house areas with gardens.

Actors: VFG generators, IVAGO, APP programmers

Business model: not a business model but perhaps a way to reduce costs. For the waste generators (they need to pay less for GFT in comparison to residual waste) and IVAGO could achieve a higher utilisation rate of their waste treatment facilities.

Policy change: stakeholder discussed whether it would be of advantage to oblige separate collection instead of having it voluntary.

Changes for current practise: IVAGO would have to shift to an on-demand route collection system for specific zones.

LM5. Water-based Waste Transport – Bread to Beer students EIS

Relevance: These two EIS were discussed together and the stakeholders agreed that the bread to beer has a higher relevance, as it focuses on a specific uniform waste stream which is easier to reuse instead of collecting VFG in total. The following concerns, therefore, this EIS.
Location: along the navigable canal system with several hubs and easy accessible locations were the concentration of bakeries and other bread waste-producing.
Actors: VFG generators, IVAGO, APP programmers
Business model: Breweries pay less for raw materials, bakeries pay less for waste collection and treatment.
Policy change: legislation would need to change to allow bread waste to be used for beverage production.
Changes for current practise: complete new practice.

Stimulating environment for Circular economy

The following EIS were presented:

- CE1. Use of wastescapes to build a CE center for SME's
- CE2. Enabling environment for circular start-ups and business in transition to a CE
- CE3. Circular Kick-Start Region Ghent
- CE4. Waste to Bee

Specific feedback of stakeholders on the different EIS chosen:

For each working group, one of the EISs was selected and discussed together. However, the three groups that participated selected the same EIS. As can be observed below, some of the points discussed were common to all three groups, but there were variations in each discussion.

One group selected an additional EIS proposed by students from TUDelft (Waste to Bee), which was briefly discussed.

CE1. Use of wastescapes to build a CE center for SME's (group 1)

Relevance: Since there is not much space available in the city of Gent, it is relevant to foresee new areas for companies, especially for the ones involved in circular economy.
Location: The harbour of Gent would be an appropriate area to conduct the solution. There are different plots of land unused and contaminated due to hazardous waste. This might be an opportunity to upgrade this area.

Actors: The main actor involved would be the city council, both organising the spatial distribution of the CE centre and conducting the decontamination of the land affected. There might be other public actors involved, such as OVAM, but also the owners of the land.

Business model: The CE centre should include companies that are related to the most relevant waste flows in the city (e.g. the most abundant flows). Also, the socio-economic positive externalities of the project should be considered. There are different existing examples of similar projects in other Belgian cities (LAB20 in Antwerp or plus office in Brussels). The companies located there might have different types of links with waste management: they might receive waste for treatment, generate waste that will need to be treated or a third approach related to waste. Thus, the logistics will be a key issue in the CE centre, and a relevant decision to make is if this is going to be centralised or decentralised. Moreover, it is important that the centre is adaptable/modular, since it might require to be refurbished or moved in the future to adapt to the needs.

Policy change: The land regulations of the city might need to be affected to modify the use of the port. Moreover, the compatibility with nearby uses should be taken into account.

Changes for current practise: This solution would link the waste management of the city with the problem of wastescapes and the enhancement of circular economy

CE1. Use of wastescapes to build a CE center for SME's (group 2)

Relevance: The solution can help to address the problem of wastescapes in Gent, and also stimulate companies to contribute to CE. Ghent offers unique conditions, since there are many start-ups in the city and holds an important university. The centre should include a place for start-ups. This might generate a stimulating environment.

Location: The harbour and the outskirts of Ghent might be appropriate. Although there is not so much space, the solution might also apply to some abandoned buildings in the centre of Ghent that might be considered wastescapes.

Actors: The city of Ghent, students from the university, private owners of buildings and wastescapes and start-up facilitators (business agents).

Business model: There are different actors that might contribute to funding this project. Starter companies in CE might be interested due to the location (stimulating environment) and the facilities provided. The city of Ghent might also aim at enhancing local economy. The owners of the wastescapes might be interested to have temporary or permanent activities in their land.

Policy change: None

Changes for current practise: Mainly refurbishment of wastescapes and enhancing CE.

CE1. Use of wastescapes to build a CE center for SME's (group 3)

Relevance: It is relevant to deal with wastescapes in the city, particularly in the harbour, abandoned churches and industrial buildings.

Location: Would depend on the approach of the centre. If the aim is to enhance social positive impacts, then it would be located in the centre of the city. If the aim is to deal with industrial processes, then it would be at the outskirts.

Actors: Different kinds of professionals such as artists, designers, construction companies and regional entities such a Vlaanderen Circulair or VITO.

Business model: The solution might create a centre that attracts SME's, creative minds and resource supply companies, and that is also beneficial for the owner of the land.

Policy change: Might need modifications to deal with the improvement of contaminated land.

Changes for current practise: More companies would be located in the city.

CE1. Waste to bee (group 1)

Relevance: Although the application of the solution might be complex in Ghent (traffic and wide streets), there might be potential to improve the shading in the summer.

Location: Market square and other squares could be of interest for this solution.

Actors: The two main actors involved are the municipality and the company producing or delivering the solution.

Business model: The implementation of the solution will require to consider it either as a product or as a process. This might change completely the way to apply the solution.

Policy change: None.

Changes for current practise: Could improve the current pergolas. Would help to adapt to the warmer and sunnier conditions during the summer in the city of Ghent.

Knowledges Transfer

The following EIS were presented:

- KT1. Hamburg: Rewarding good waste avoidance and separation behaviour
- KT2. Hamburg: Quarter Service Centre
- KT3. Hamburg: Guideline for new quarters
- KT4. AMA: Smart bio refinery
- KT5. Naples: Recompost

Only the EIS from Hamburg were chosen by stakeholders for further discussion.

Specific feedback of stakeholders on the different EIS chosen to provide a summary of the discussion:

KT1. Rewarding good waste avoidance and separation behaviour

***Transferable*:** The EIS is not particularly place specific so it can work almost anywhere. Especially in certain problem areas with low awareness of the need to separate waste.

Secondary schools have freedom in the curriculum to organise this sort of activities combining disciplines. So there is a platform for this.

***What aspects are transferable*:** the idea is to incentivise. In Ghent because the waste collection is based on payment per bag, the problem is different. People put the wrong kind of waste in VFG bags/containers to save money. Hence one of the stakeholder groups suggested that there was a need for punishing/discouraging bad behaviour, rather than rewarding (need fines).

The solution was deemed not very relevant for organic waste. The scope for transfer was considered low by one of the groups, because there are already competitions in schools, for instance for battery collections. Schools currently focus more on prevention and reuse. However, two other groups were more positive about the scope for transfer of this solution, particularly if coupled with Quarter Service Centre EIS.

Where could it be applied: in schools or in cooperation with an integrated Quarter Service Centre.

What barriers: Local composting is difficult. Expertise on composting is missing among school staff. There are also limitations regarding food safety (risk of disease, difficult to reuse discarded food on food safety grounds).

Schools are also confronted with a lack of space.

What adaptations: Mixed waste should be the least possible encouraged. Reward where the least waste is produced. Also look at the quality of waste. Promote behaviour to separate better, but also consider fines for misbehaviour.

Make kids understand how much effort is needed to recycle as to discourage waste generation. It is not fine to create waste because it is recycled, try to avoid waste in the first place.

Focus on collective achievements rather than the individual.

Reward class where all kids have their own bottles, consider an app for monitoring and rewarding individual behaviour (e.g. offering vouchers).

Who should be involved: Schools; Klasse (news bulletin for teachers in Flanders); City of Ghent; province: need to integrate this into a programme for ecological activities in schools (subsidies); OVAM: might be too big of an actor; Inter-municipal services (IVAGO): they already do some prevention actions (they would benefit from it – higher quality of waste, less waste, raising next generation…).

How to improve: Shouldn't we start to make less waste? Why reward waste generation? The proposal was made to reward waste avoidance instead. Use waste as material for medals rather than metal.

KT 2. Quarter Service Centre

***Transferable*:** There is no integrated quarter service centre in Ghent, thought the different services exist, spread over different locations. Dissenting opinions on the need for an integrated location. However, available space is an essential factor. At present, there are five recycling centres in Ghent. The municipality wants to bring them closer to the neighbourhoods. A mobile recycling service might be an option should the EIS be transferred to Ghent.

***What aspects are transferable*:** whole/most of the EIS is transferable, provide the spatial demands are met.

Where could it be applied: in more peripheral neighbourhoods there is more space, the city centre is too dense; nearby student areas since they have a high demand for second-hand products and repair; in the 19th century areas: dense, multi-ethnic, lower-income neighbourhoods, often with higher waste production (cheaper food has a lot of packaging, cheap products break earlier than more expensive ones).

What barriers: spatial: currently recycling services are at the outskirts because there is a lack of space near the centre. Also in the (poorer) 19th-century neighbourhoods, while there is a need, there is a shortage of space.

Coaching citizens to improve sorting or recycling is a labour intensive activity, too labour intensive for the current staff of Kringwinkels (second-hand shop). It should also be taken in to account that some goods (pianos or large wooden furniture) are difficult to resell (saturation).

What adaptations: Need to consider where there is demand for repair and reuse of products (point of discussion). The solution could be combined with an online peer-to-peer sharing or reuse system to overcome the lack of space for an integrated physical centre. An online platform could also be used to improve the visibility of a network of centres for such services.

Consider the idea when developing new areas. Consider integrating the EIS with virtual currency solutions whereby citizens can use the 'coins' to buy local services. This could work for repair in particular. Consider a pop or mobile integrated quarter service overcome the lack of space in dense neighbourhoods.

Who should be involved: Social enterprises, Planning authorities and relevant municipal departments (the EIS needs a public subsidy to be viable), LETS (virtual currency system), OVAM, Kringwinkel (second-hand shops), Municipality of Ghent, Repair cafés, Netwerk Bewust Verbruiken.

How to improve: Consider incentivising repair and reuse rather than recycling, build awareness of how labour-intensive recycling is and how it is environmentally advantageous to reuse. Consider shared facilities and the use of pop-up centres, rather than stationary ones in areas where there is no space available.

Possible reuse of wastescapes, depending on the context of each area. Organise pop-up facilities, collecting things that people can carry (not with a car, because they can drive to the far away collection point).

Cargo bike repairmen circulating in the area.

Ghent Made is a second-hand shop where they reuse textiles to make bags, etc. This could be integrated with the EIS.

Conclusions and next steps

The results of this PULL workshop will be used for the further development of the Eco-innovative solutions, their integration in the GDSE and the knowledge transfer and comparison with the other focus areas.

Beginning of September 2019 (5-6) the consortium of REPAiR meets in Ghent. At this occasion, we hope to invite you and give more insight into the use of the GDSE and its use for the city of Ghent.

The REPAiR project continues until August 2020. As of 2020 most of the deliverables will be finalised and public on the website of the project: http://h2020repair.eu/

Pictures

Minutes Fourth PULL Workshop

Introduction

The 4th Peri-Urban Living Lab (PULL) workshop in Ghent took place on September 6th 2019, at the University of Ghent at the Faculty of Bioscience Engineering. The group with local stakeholders was smaller than on previous occasions. For this PULL, a thorough knowledge of the focus area and/or waste management was essential.

Since the PULL took place during the 7th Consortium meeting of REPAiR in Ghent we could count on the support of other REPAiR partners for the use of the Geo-design Decision Support Environment (GDSE) and input from other focus areas.

The objective of this PULL was to develop eco-innovative strategies, based on the eco-innovative solutions developed during the previous PULLs. It was also the first occasion for the participants to work with the GDSE.

During the first plenary part, an introduction was given on the process from EI-Solution to EI-Strategy, and how the different steps taken during the previous PULLs are integrated in the GDSE. During the second participative part the participants were challenged to develop EI-Strategies, using the GDSE.

Program

13.30 Welcome

13.40 From eco-innovative solution to eco-innovative strategy

- *Where do we start?*
- *Some examples*
- *Ambitions for Ghent*

14.00 Getting started with the GDSE

15.00 Presentation of eco-innovative strategies

15.20 Conclusion and next steps

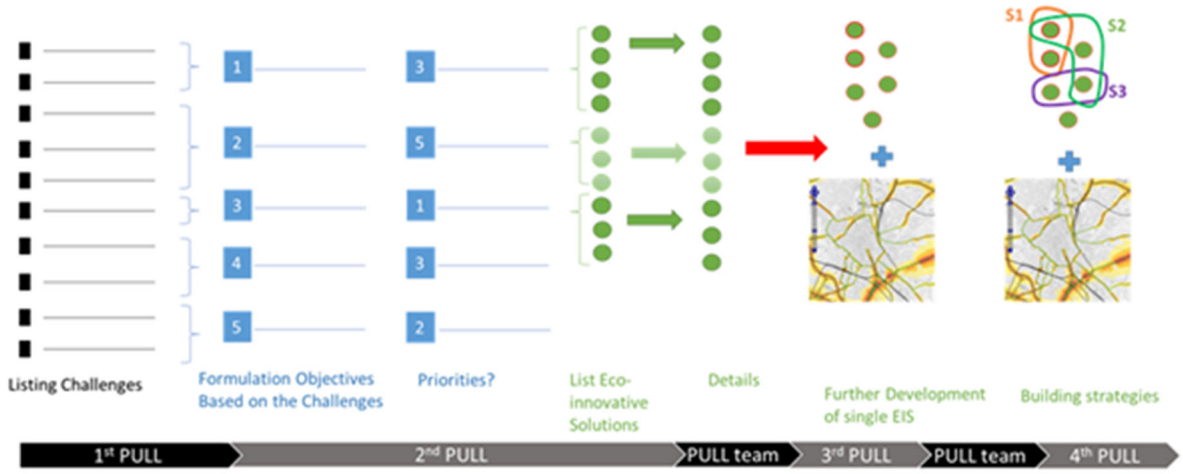
Participants

	NAME	ORGANISATION
1	Acke Arianne	OVAM
2	Amenta Libera	DiARC UNINA
3	Arciniegas Gustavo Lopez	Geo-Coll
4	Braekevelt Ann	OVAM
5	Claeys Tom	IVAGO
6	De Mets Steven	OWS
7	Franke Christoph	GGR
8	Furlan Cecilia	TU Delft
9	Obersteg Andreas	HafenCity Universität Hmburg

10	Remoy Hilde	TUDelft
11	Song Yan	TUDelf
12	Spapen Jeroen	i-Cleantech Vlaanderen
13	Steeman Greet	Stad Gent, Milieu en klimaat
14	Van Echelpoel Jan	Suez
15	Wante John	OVAM

Plenary session

This Living Lab is the fourth meeting with stakeholders and experts for the focus area Ghent-Destelbergen. During the first PULL, the aim was to identify challenges related to the bio waste flow in the area. At the second PULL objectives were formulated en prioritized and a first reflection took place on EIS. Since this meeting, the initially proposed solutions have been elaborated more in detail, while at the same time information has been gathered on the waste flow in the area and the socio-economic context, to feed the GDSE.



For the 4th PULL the results of the previous PULLs in Ghent were integrated in the GDSE: challenges, objectives, stakeholders, Eco-innovative solutions.

From Eco-innovative solution to Eco-innovative strategy

REPAiR defines Eco-innovative strategies as:

"*an alternative course of action aimed at addressing both the objectives and challenges identified within a PULL developing a more Circular Economy in peri-urban areas.*

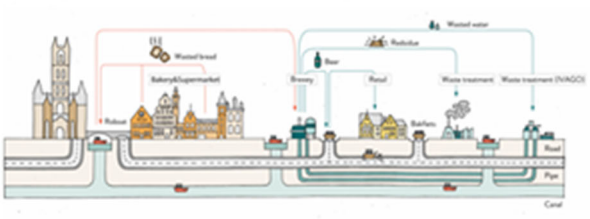
The eco-innovative strategy can be composed of a systemic integration of two or more elementary actions, namely Eco-innovative solutions."

Eco-innovative solutions refer, in particular, to all forms of innovation – technological and non-technological – that create business opportunities and benefit the environment by preventing or reducing their impact, or by optimizing the use of resources.

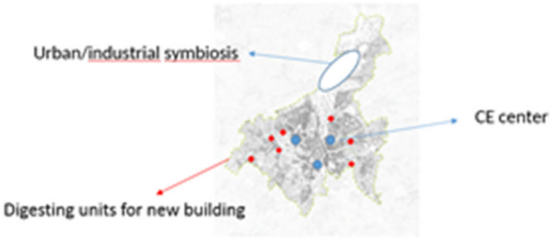
The eco-innovative solutions in REPAiR are classified according to the PESTEL model. Referring to political, economic, social, technological, environmental and legal solutions. Since participation between stakeholders from different disciplines and different levels are considered an essential condition for the transition to circular economy, the classification 'organizational' was added.

Two examples were given as an illustration of possible strategies

- **BREAD WASTE AND BEER PRODUCTION**
  - Food waste
  - Logistics-mobility
  - Valorisation
  - Participation to separate GFT colletion



- **CIRCULAR ECONOMY IN URBAN FABRIC**
  - Urban and industrial symbiosis
  - Local digesting unit for new building units
  - CE center on former wastescapes



Ambition for the City of Ghent

Prior to developing strategies, it is important to set the ambition and targets for the different objectives. Based on policy papers at European, Flemish or municipal level some target related to the different objectives are proposed.

The targets were set to be realised by 2030. While the different policy papers apply different timeframes, for the calculations in the GDSE it is necessary to work with one single date. 2030 was chosen as reference year since this is also the date put forward in many policy papers of Ghent.

Objective	Target by 2030
Prevent, reduce and reuse food surplus	Reduce food waste with 50%
Favour highest possible value creation/retention	Reduce CO2 emission with 40 % (treatment)
Increase participation of households, SME's and catering businesses in separate collection of VFG	80 % of HH and companies participate in the separate collection of VGF
Efficient collection system for organic waste	Reduce CO2 emission of waste collection with 40% (collection)

Collect kitchen and food waste with VFG	Reduce kitchen and food waste from residual waste

While identifying the target for the objective concerning the participation of household, SME's and catering business, due consideration needs to be taken of home composting by households. However there is limited information about the number of households engaged in home composting. The proposed target seems to be achievable.

Getting started with the GDSE

The participants were divided in 2 groups, one named 'ACADEMIA', the other 'PRACTISE'. Since the limited number of stakeholders, the participants in the groups were not entirely representative for the scientific and practitioners world.

Both groups were challenged to reconsider and rank the objectives and to develop one (or more) eco-innovative strategies:

- Using the Eco-innovative solutions already developed during previous PULLs (GDSE)
- Looking for the best possible location to implement this strategy (GDSE)
- Taking into account how EIS impact on each other and the different stakeholders.

Some guiding questions helped the participants on their way:

- How does this EIS influences/impacts
    - other solutions
    - other stakeholders
- Where can this strategy be applied ? On which condition?
- Who is involved in the implementation?

Ranking the objectives

Both groups ranked the objectives in an almost similar way.

Eco-innovative strategies

The following strategies were developed

	Strategy 1	**Strategy 2**	**strategy 3**
EIS	Food waste scan for schools	Increase frequency of organic waste collection for SME's and households	Food waste scan for schools
	Mobile app for food waste reduction	Compulsory separate VFG-waste collection for households in the entire focus area	Mobile app for food waste reduction
	District facilitator for local waste management		Collection on demand

The output of the work in groups to build a strategy, but also additional remarks concerning missing stakeholders and the area indicated to implement the strategy, are safeguarded in the GDSE and will be used to finalise the strategies and perform the LCA analysis.

Conclusions and next steps

The timeframe of this PULL was too short to develop fully fledged strategies. However, these first results will be used to further feed the GDSE with data for the area Ghent-Destelbergen, and finalise the strategies.

A final PULL workshop will take place to present the results of the comparative LCA analysis for the status quo and the eco-innovative solutions.

The REPAiR project continues until August 2020. As of 2020 most of the deliverables will be finalised and public on the website of the project: http://h2020repair.eu/