

WASTECOSMART

"Optimisation of Integrated Solid Waste Management Strategies for the Maximisation of Resource Efficiency"

D.3.2

Map with existing cluster capacities and research activities of the regional clusters

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ABBREVIATIONS

DSF	Decision Support Framework
EU	European Union
JAP	Join Action Plan
SWOT	Strengths, Weaknesses, Opportunities, Threats
TIS	Technological Innovation System
WP	Work Package

EXECUTIVE SUMMARY

Resource efficiency is an emerging priority at EU level and has recently moved high on the European Agenda. The Wastecosmart-project intends to optimize and integrate waste management strategies for maximizing resource efficiency in priority areas of a “Resource Efficient Europe”. This will be implemented by promoting innovation based on research and technology development in the field of integrated waste management.

Through cross border and international cooperation as well as collaborative research activities between six regions across Europe and three international partners, the project will strengthen regional capacities for investment, research and technological development. The core goal is to help introduce innovation to the market in this sector and as a consequence support economic growth and regional development.

Regional assessments have been planned and implemented by the regional coordinators using a modified and adapted technological innovation System (TIS) analysis. The aim of this work was to identify and recognize specific strengths, weaknesses, threats and opportunities that will be used as input for the Decision Support Framework (WP4) and the Joint Action Plan (WP6).

As part of the assessment, a number of interviews have been held with national stakeholders and experts from each region. The purpose of these interviews was to obtain information related to the socio-political, legal and regulatory framework for waste management in each region and their current trends. Additionally, information about the existing research capacities, knowledge and technological developments, strengths, weaknesses, technological and financial limitations within the environment of each region were extracted during the interviews. Information from the interviews was gathered in SWOT tables as a way of communicating the TIS analysis in a comprehensible manner.

The results of the analysis and a comparison of the barriers revealed that there are numerous weaknesses that are common to all or several regions. Among other things, results indicated that there are weak collaborations between different actors and many regions want to have better cooperation with universities, citizens, research institutes or other urban regions etc. The result also showed lack of knowledge about waste management in several regions and many of them were missing a common vision, which also means a poor common view.

The comparison has also revealed there are weaknesses in the awareness and involvement of both citizens and businesses. It has proved to be a deficient interest in environmental work if there is no personal or financial gain in return. It is thus important that enough incentives are offered, which also has been defined as a lack in many regions. Finally, several regions point out that lack of funding inhibit the development of waste management.

Results from this study will provide structured information for the further development of strategies and a joint action plan that will utilize the regional strengths and counteract the weaknesses. It is important that these results are used as fundamentals in discussions and decision making processes within the regions in order to create efficiency in the waste management processes.

1 INTRODUCTION

Trends such as world population growth, global energy demand and increased urbanization have strong negative impact on the quality of vital ecological services and the availability of natural resources (ECN, 2013). Increased demand and use of materials in Europe makes the continent approaching a lack of important raw materials. Today, Europe import six times more resources than what is exported. A combination of high levels of import and increased use of material affects the amount of waste. The European Union produces about 3 billion tons of waste each year that is mainly generated from household and activities such as manufacturing and construction. Produced waste has a great impact on the environment through pollution, greenhouse gas emissions and large losses of important materials. Loss of materials is a particular problem for the European since the continent is highly dependent on imports of raw materials.

By taking the above into account, resource efficiency has been more intensively discussed in the European Union during the recent years. It has lately become a growing priority issue and moved high on the European agenda. Resource efficiency means using the earth's limited resources in a sustainable manner while keeping environmental impact as low as possible. It allows us to create more with less and deliver higher value with less input. These resources include materials such as fuel, minerals, metals, food, water, etc.

In 2011, UNEP published a brochure entitled “Resource efficiency” in order to underline the fact that existing world’s production and consumption patterns cannot continue on their current path, indefinitely. These inefficient patterns put limits on sustainable economic growth and social development. Globally, more resources to produce goods and services are extracted than our planet can replenish. At the same time, a large share of an increasingly urban population is still struggling to meet basic needs (UNEP, 2011).

By using natural resources more efficiently, companies can obtain more economic benefits such as improved productivity, lower costs and increased competitiveness. It also creates a more attractive and healthier living environment for regions and municipalities. Resource efficiency can also generate innovation and growth by encouraging the emergence of new technologies and create new jobs.

The Wastecosmart-project aims to tackle the increased amount of waste in Europe and finding strategies to maximize resource efficiency. The overall project objective is to strengthen and enhance the innovation capacity of regional research-driven clusters in resource efficiency. To achieve this it requires collaboration, research and technology development in the waste sector. A total of six research-driven regions across Europe participate in the Wastecosmart project: Paphos region (Cyprus),

Budapest region (Hungary), Piedmont region (Italy), Liverpool region, (UK), Amsterdam region (Netherlands), and Stockholm region (Sweden).

Figure 1 shows a map of the six regions across Europe involved in the project. It also shows information about the region's area, population growth (% Y), GDP and MSW. More detailed information about the regions can be found on the project website.

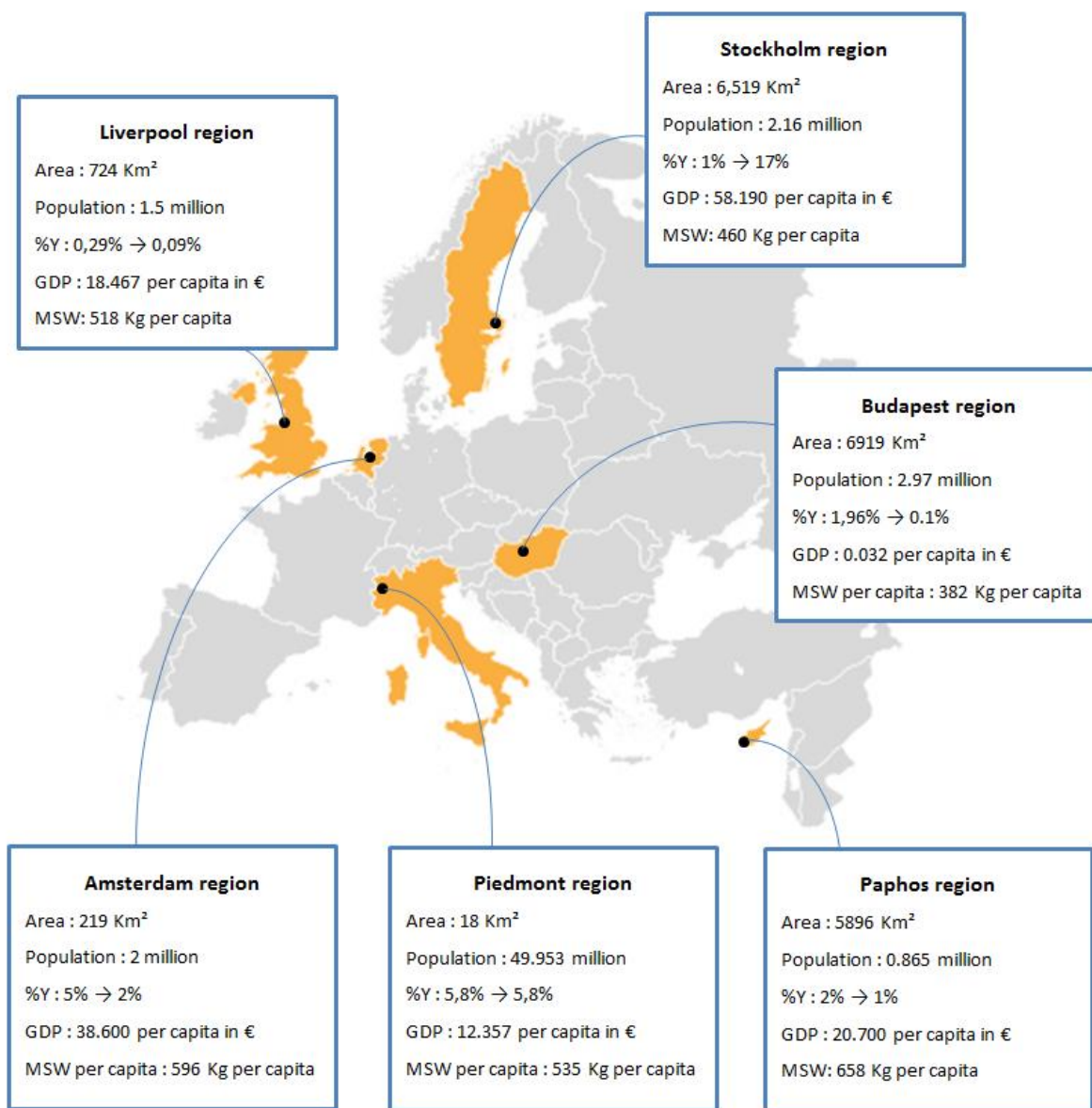


Figure 1: Map of the six regions across Europe

The Wastcosmart-project is carried out mainly to promote transnational cooperation of research-driven regions in waste management. But also to assess regional needs in the waste sector, formulate waste management strategies, develop an action plan to reduce waste, support the less developed regions in waste management and unlock business opportunities in international markets. Each participating region has carefully crafted a triple-helix cluster with a strong interest in boosting research and innovation in resource efficiency and particularly the waste management sector.

This report constitutes deliverable 3.2 of work package 3 (WP3) of the Wastecosmart-project. The objective of this WP is to identify and establish the requirements and gaps related to developing research and technological capacities, resource efficiency needs, and solid waste management strategies. The WP aims to produce a structured analysis of the research capacities and research needs of each of the regions and will set the scene for future research and innovation. To be more specific, this report map the existing regional capacities and research activities in order to identify research barriers and innovation gaps, and to determine the specific technological and research needs of the end users in the consortium partners as well. The results from this WP will then be used as an input for the Decision Support Framework in WP4 and for formulation of the Joint Action Plan in WP6.

The report consists of seven chapters. The first one is the Introduction which consists of background information, problem formulation and purpose of the project. The second one is the Methodology chapter where the methods and procedures applied are described. The third chapter provides an assessment of the current situation of waste management taking into account the six regions under study. The fourth chapter compares the regions by looking at studied concepts and SWOT factors to identify research barriers and innovation gaps. Regional results of strengths, weaknesses, opportunities and threats which can identify and reveal capacities for each region are described in the fifth chapter. Chapter six is an assessment of the most important barriers that the different regions need to address. The last chapter summarizes the final statements from the report.

2 METHODOLOGY

As described earlier in the introduction, the main goal of this WP is to produce a structured analysis of the research capacities and research needs of each of the regions. These results will be instrumental as input for developing the Decision Support Framework in WP4 and to formulate a Joint Action Plan in WP6.

See **Figure 2** below for a more comprehensive understanding of the overall process for the development of the Joint Action Plan. As it can be depicted from **Figure 2**, the current report focuses on the dynamics of the regions (see step 3 in the figure) and ended up in SWOT analyses for each dynamic field as well as an overall summary for the region.

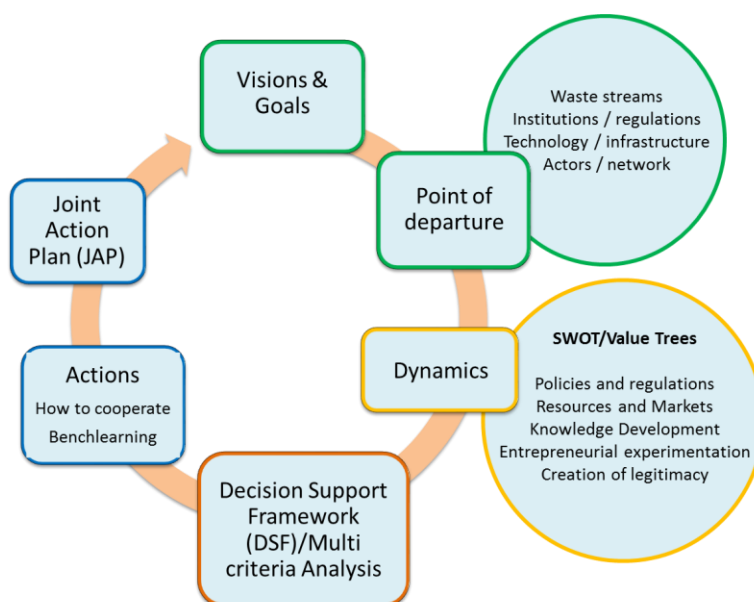


Figure 2: The process of generating the Joint Action Plan

Each region has identified the current situation regarding waste management and resource efficiency status, including current legislation in the region as well as condition and capacity for innovation. The base for the analysis has been the innovation system perspective and the framework used is the Technological Innovation System (TIS) framework.

TIS encompass all actors, institutions and physical parts that influence the development, diffusion and use of a technology or a technological field. Among these structural elements, a defined set of processes occur which create the dynamics of the innovation system. These processes are called innovation

functions and by analyzing the occurrence of these processes it is possible to draw conclusions on what actions are needed in order to develop the innovation system further. Within a the Wastecosmart project the studied subject is defined regionally and concerns the goals and visions of each region as well as their technological and organizational strategies for reaching them. By applying the TIS-approach, it is not only possible to better understand the innovation processes as they take place, it is also possible to act on and influence the direction and speed of the innovation processes.

Several interviews have been held with national stakeholders and experts from each region. A prepared and structured template was used as a basis for interview questions in order to facilitate comparison of results between regions.

The purpose of these interviews was to obtain information related to the socio-political, legal and regulatory framework for waste management in each region and their current trends. This information, structured in six dynamic innovation functions (Policies and regulation, Knowledge development, Entrepreneurial experimentation, Resource mobilization and market formation, and Creation of Legitimacy), were collected and analyzed through the interview process.

To collect the results from the TIS-analyzes in an understandable table and communicate them as input to the Joint Action Plan, a SWOT analysis tool was used. The idea behind the SWOT analysis is to evaluate the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats involved in a project or in a business venture. With this information it is possible to uncover opportunities to exploit, and threats can be managed and eliminated.

By looking internally and externally, a strategy that can help to improve the current status of the organization can be crafted, so that ultimate goals can be achieved. Thus the SWOT Analysis is a useful resource which may be incorporated into an organizations strategic planning model. The SWOT analysis matrix is illustrated in **Figure 3**.

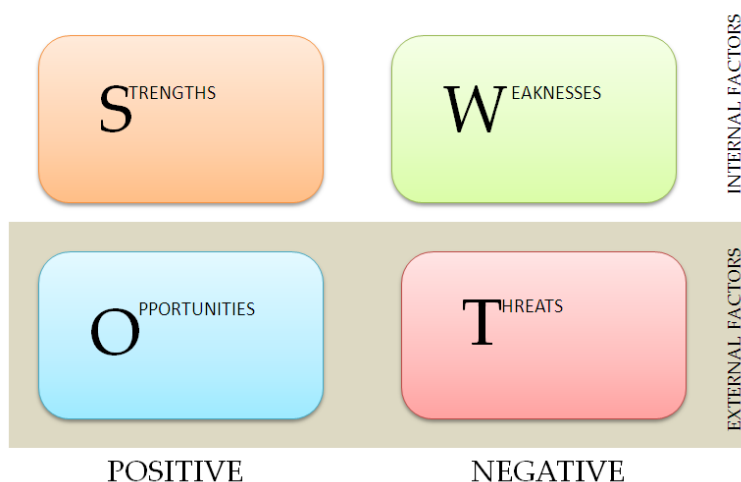


Figure 3: SWOT analysis matrix

The methodology and interview templates are constructed in a way that information from each of the six functions can easily be summoned in a SWOT matrix in order to prepare for taking actions to utilize the strengths/opportunities in the regions and counteract the weaknesses/threats. Thereby, waste management strategies can be developed and resource efficiency in each region can be maximized.

In total 54 interviews were conducted (**Table 1**). The following table shows the number of interviews performed in each region. A compilation of names of interview respondents and relevant organizations are available and can be provided by project's coordinator.

Table 1: Number of conducted interviews per region

Region	Number of interviews
Paphos	8
Budapest	7
Piedmont	4
Liverpool	11
Amsterdam	19
Stockholm	5
Total	54

Part of the interviews are evaluating regionals performance in each innovation function and the respondent were asked to rate the function on a 1 (hindering) to 10 (driving) scale. These results are displayed in spider charts from each region and can be found in section 4.2.

3 EXISTING STATUS OF THE REGIONS

The objective of the “clusters mapping” is twofold: First to provide a detailed mapping of the socio-political, legal and regulatory framework for waste management in each region and of their current trends; and, second to provide a comparison with those of other regions and countries within the EU. A detailed analysis of the relationships of the institutions responsible for the future management of solid waste resources with companies, particularly SMEs and other end users, as well as with the research community is included in this task.

Also included is an analysis of how the regions’ research results, knowledge and technological developments are transferred to companies and end users, as well as analysis of communication channels between the research communities and the different administrations and decision making bodies.

The way in which the regions research results, knowledge and technological developments will be diffused to companies and end users within each region is also analyzed.

3.1 Goals and visions for resources efficiency through waste management practice

The basic concepts and definitions related to waste management have been set through the Waste Framework Directive 2008/98/EC of the European Parliament and of the Council. Definitions of waste, recycling and recovery are covered within the directive. The Directive lays down a number of basic waste management principles. In general, it requires that waste be managed without endangering human health and harming the environment and in particular without risk to water, air, soil, plants or animals, without causing a nuisance through noise or odours, and without adversely affecting the countryside or places of special interest.

According to the article 4 of the Directive, and as illustrated by **Figure 4** below, the following waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy:

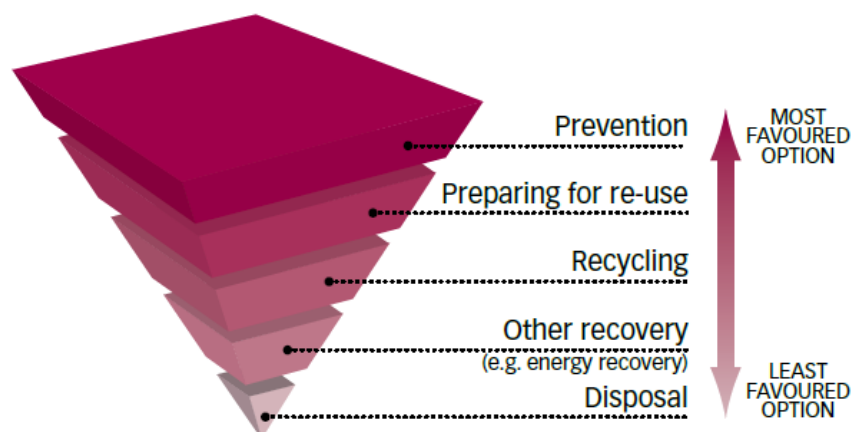


Figure 4: Waste Hierarchy according to the Waste Framework Directive 2008/98/EC

The waste hierarchy makes it clear what the EU commission regard as top priorities within waste management. When looking at the different countries and especially the regions within this project the current conditions from which the regions should develop vary considerably. This is illustrated in **Figure 5**.

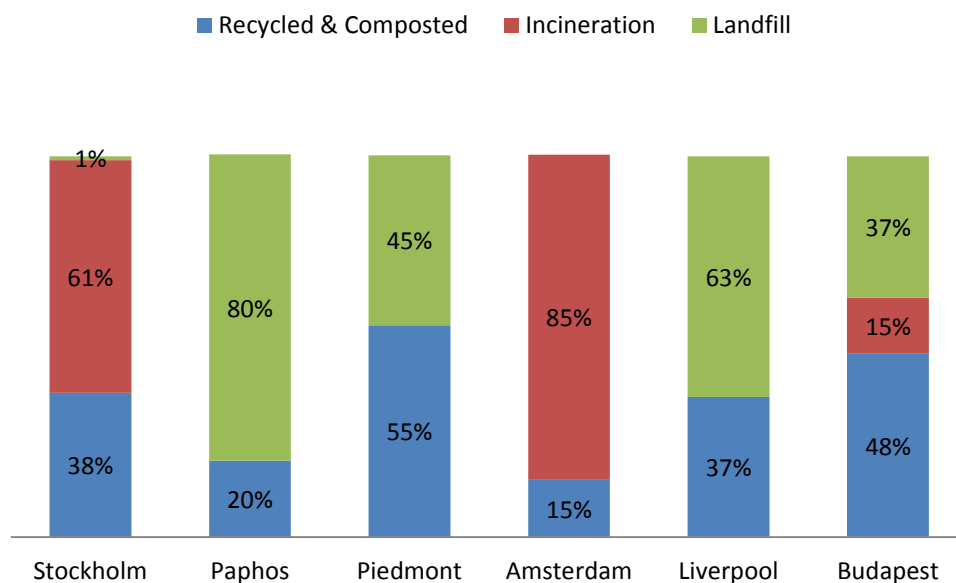


Figure 5: Current waste management practice in the WASTECOSMART regions

Taken from data reported by the WASTECOSMART clusters in the first stage of information gathering within WP3, the graph displays state of play for management of MSW in the different regions. Indeed, the point of departure varies a lot from the different regions and this can also be seen in their goals and visions where emphasis differs between the regions. **Table 2** display the different strategic goals sorted under each EU level.

Table 2: The different strategic goals sorted under each EU level

Prevention	Minimization
Closing the cycles of food, raw materials, energy, water and phosphate -Am	Reduce yearly amount of generated waste by 20% -Bu
Promote culture change to see waste as a resource –Am	Waste Reduction -Pi
Waste Prevention -St	Recycle
Maximise waste prevention –Li	Reduce the climate change/carbon impacts of waste management and the ecological footprint of waste management activities -Li
Reuse	Increase recycling rates. Increase the share of households that engage in recycling. -St
Eco-design and cradle to cradle thinking in product design -Am	Maximise sustainable economic activity associated with waste management -Li
Increase the share of households that trade second hand goods –St	Maximise diversion from landfill and achieve high recycling rates -Li
Energy Recovery	Optimise the collection system adapted to human needs -St
Promote the use of renewable energy –Li	Increase separate collection and recycling rates. Encourage reuse through improving quality of the recyclable / reusable materials –Pi
Energy recovery –Bu	Improve separation at source and increase recycling rates -Pa
Energy recovery -Pa	Improve monitoring and enforcement with regard to recycling -Pa
Other	Introduce pay as you through systems –Pi
Introduce a separate collection system –Bu	Collective composting of food waste –Pi
Integration of municipalities Waste Management Systems to improve efficiency -Pa	Zero tolerance of hazardous waste in the garbage bag -St
Promote resource efficiency –Li	Separate collection of food waste -St
Promote behavioural/cultural change that delivers the Strategy objectives -Li	Maximise recovery of textiles and WEEE -St
Integrate waste management decision making in the Town Planning Process –St	
Optimise utilisation of waste as a resource -St	

Prevention

The need for maximizing waste prevention has long been recognized by all participant clusters. As long as waste prevention sits at the top of the waste hierarchy (**Fel! Hittar inte referenskölla.**), it is the main priority. The Swedish cluster highlights the difficulty to tackle with waste prevention since it is directly connected to lifestyle and controlled mainly by a number of other actors. As far as UK cluster is concerned, waste prevention is among the 10 point headline objectives of the 'Resources' joint strategy for recycling and waste management in Merseyside 2011-2041. The Hungarian cluster underlines the need of strengthening the waste prevention part as well while the same priority is identified within goals and visions of the Cypriot cluster.

Minimization

Among the goals and visions of the six clusters, is the second priority of the pyramid as well. The reduction of the amount of waste generated as well as the reduction of harmful substances in materials and products and the zero tolerance on hazardous waste in garbage bag have been underlined by the Swedish cluster of critical importance. The ninth objective of the Merseyside strategy of the UK cluster entitled 'Promote resource efficiency', promotes the reduction of the amount of scarce resources entering the waste management system, recognizing the value of materials that are produced as waste and supporting opportunities for greater producer responsibility. The private sector in Cyprus strongly emphasizes that municipalities have to realize that waste minimization and sorting at source should be a top priority. Although this is currently not the case, if the option is available, the whole waste strategy has to be revised. Also Italian region Piedmont lifts the ambition to reduce the amount of waste. Hungary states that reducing waste by yearly 20% is an ambition of theirs.

Reuse

Latter priorities of the Stockholm region include increasing the share of households that trade with re-use goods. In the Amsterdam region, the concept of circular economy is forwarded and this includes prioritizing actions towards increasing reuse of goods and cradle to cradle thinking in the product design.

Recycling

Within this area, all regions have stated explicit goals, and recycling seems to be what regions can most easily conceptualize in order to increase management of MSW. It is one area however that all regions face challenges; for instance the paphos region still landfills a large amount of its MSW. Also in the regions that minimized landfilling, challenges sustain since large amounts of MSW goes to incineration and energy recovery which is a lower priority according to the EU waste hierarchy.

Energy recovery

The Hungarian cluster identifies the need to rethink the priorities of the waste hierarchy and emphasizes on the energy recovery priority. Furthermore, more support should be given to the environmental ambitions by raising environmental awareness of local people.

3.2 Actor accordance with regional ambitions and goals

Some gathered results from the interviews provide the respondents view on the regional goals and ambitions as well as strategies put forward. Some regions also rated the accordance with the described goals and provided comments on meaning and further development of the stated goals.

Piedmont region

Some comments from the Italian interviews included:

- The recent construction of energy plants based on the incineration of waste makes it necessary to apply effective methods of control over the waste stream resulting from the collection.
- The need to find rapid solutions with low environmental impact, cost-effective, able to significantly reduce operating costs and quantities of waste products, makes the cluster an Italian living lab capable of testing the critical points of the project and the solutions as well.

Amsterdam

Ambitions and long term goals from the Amsterdam region are concerned solid guidelines by all respondents. There is little skepticism on the possibility to realize these ambitions nevertheless they are concerned good directing guidelines that indicate the direction in which Amsterdam is heading clearly. The respondents rate these ambitions on a scale from 7 to 9.

Following comments were raised during the interviews:

- **Separate collection, new recycling technologies and marketing of commodity streams from waste** all need to reinforce each other to achieve goals
- **How to tackle separate collection** is difficult and depending on citizen involvement and participation.
- All regional cities have their own long term goals and ambitions. The ambitions are not shared locally.

Stockholm

All respondents agree on a level from 8 to 10 (of 10) on the ambitions and long term goals from the Stockholm region. They are quite general in its formulation but the result still give a clear consensus on which direction the region are focusing, according to the development of waste management.

Following comments were raised during the interviews:

- **Several perspectives** such as infrastructure, packaging, food waste etc. should be brought together in a more **holistic solution** to create synergies and value.
- In stated ambitions there needs to be **flexibility** due to the characteristics/ hazardousness of different waste streams and also level of knowledge. Recycling isn't always the best option.
- Long term goal and ambition should better be linked to the **Waste Prevention Program**.
- Ambition should also focus more on **long term climate perspectives**.
- **HOW to tackle** waste prevention is difficult since it is close connected to lifestyle and controlled mainly by other actors.

Liverpool

Respondents interviewed by the UK cluster, in general, were quite favorably minded towards the Merseyside 2011-2041 strategy mentioned before. Comments received from the interviewing procedure welcomed positively the inclusion of references to levers like behavioral change, green public procurement, and producer responsibility in the strategy. A balanced response was gauged (including suggestions and points of emphasis) included perspectives on the most effective use of the Waste Hierarchy, the importance of focusing on value (including growth in social and environmental capital as well as monetary value), linking resource efficiency strategy with regional growth and regeneration strategy, and the opportunity of compatible commercial waste as resources. Critical comments were around the CO₂ objective of the strategy, not so much in terms of its presence (which was welcomed) but expressing reservations about how impactful delivery in this area would actually be.

Budapest

Respondents in the Budapest region scored 8-10 in accordance with the stated goals and visions and gave the following comments on the regional ambitions:

- Rethink the priorities of the waste hierarchy, and its economic impact. Energy recovery should be more emphasized. The consequences of the individual regulations should be examined.
- Strengthen the waste prevention part.
- More support to the environmental ambitions by raising environmental awareness of local people (by communication especially in local papers)

Paphos

In consideration of the scores given in the categories by the interviewees or respondents in the governmental, semi-governmental bodies (municipalities), and one private organization, I would assess that except for the private body (Green Dot), which was neutral (5), all of the other bodies- governmental and semi-governmental- strongly agreed (8, 9 and 10) with these ambitions and long terms goals.

All the municipalities have the same general ambitions and goals mentioned in E.U. laws and directives regarding the waste management and resource efficiency. The DoE, a government body in the MANRE,

was more specific stating that the government should a) prepare suitable legislative framework implementing various economic instruments and tools to promote the goals set by the waste legislation and the waste management plans b) encourage and enforce the municipalities to be more involved in the country's waste management goals and plan c) provide for better enforcement of the legislation d) and implement the waste management plans and prevention programs. On the other hand, Green Dot stated that municipalities have to realise that waste minimisation and sorting at source should be a top priority. Now it's not. If they had the option, they would change the whole waste strategy.

In general, respondents agree to a high extent with stated regional ambitions and goals. A common comment was that the waste prevention activities are difficult to tackle since it concerns behavior from a lot of different actors. Additional comments include that the long term focus needs to be strengthening within the visions and that several different actors must share the same vision in order to make it effective. Moreover, awareness among citizens about waste management needs to be raised in order to better implement certain strategies, for instance around collection and sorting. These and other aspects are also caught in the later sections of this report and presented more in detail with a discussion around possible interventions.

3.3 Strategies for reaching goals and visions

This section presents two tables with strategies to achieve the goals and visions for each region. **Table 3** shows the technical strategies, while **Table 4** illustrates the organizational strategies.

Table 3: Technical strategies for each region

Stockholm	Amsterdam	Liverpool
<ul style="list-style-type: none"> • Wider use of web and information and communication technology (ICT) • Facilitate re-use for example by vacuum system • Find a more efficient system for food waste (separation/prevention) • Urban collection systems based on human behavior to facilitate the user, effective collection, increased source separation and re-use are needed. • Utilize phosphorous in digestate and sludge • Manage ashes from incineration plants 	<ul style="list-style-type: none"> • Post separation using NIR technology • Innovative collection systems like colored or tagged bags (opti bag) • Separation techniques VM press • Improve quality techniques for plastic MDS separation 	<ul style="list-style-type: none"> • Prevention of waste at source by reducing the amount of waste per household • Reuse and repair - new technologies to facilitate disassembly and reuse of components • Material recycling - improve quality and efficiency in material recycling plants • Sustainable design • Energy recovery by CHP
Paphos	Piedmont	Budapest
<ul style="list-style-type: none"> • Campaigns on separate collection 	<ul style="list-style-type: none"> • Waste prevention (fiscal support and 	<ul style="list-style-type: none"> • Learn and adapt international

for recyclables and bio-degradable waste products <ul style="list-style-type: none"> • Invest in EMAS, ISO 14001 and Eco-label • Mechanical biological treatment plants 	widespread use of biodegradable packaging or recyclable paper <ul style="list-style-type: none"> • Infrared rays spectrograph, de-ironing methods and bio-stabilization technologies • Facilitate recycling by doorstep waste collection • Pay as you produce waste • Auto-composter plan - proximity increase composting 	good practices <ul style="list-style-type: none"> • EoW certificates • Door to door collection/bin identification system • Enabling residents to compost on their own. • By sufficient tools and transportation, recycling of bio-waste can be improved • Increase producers responsibility
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Table 4: Organizational strategies for each region

Stockholm	Amsterdam	Liverpool
<ul style="list-style-type: none"> • Waste planning and waste prevention program – National waste plan with common strategy for all municipalities within the region • Include waste management in the urban planning process and make it a natural part of the infrastructure of the city • Clear roles and responsibilities between different actors on the waste market (private, public, and producers) to stimulate the development of waste management. • Regional strategies – regional action program energy and climate • Cooperation between actors to facilitate interaction between different competence 	<ul style="list-style-type: none"> • Common vision development by use of round table sessions or workshops with stakeholders and experts • Centralized vision statements from local central government • Involve all stakeholders from citizens/consumer to producers (participatory design) 	<ul style="list-style-type: none"> • Leadership and policy integration in place to encourage joint working and adoption of local policies • ss - transparency and sharing information to develop a strong and effective relationship between stakeholders and ensuring accountability • New business models (including circular economy) • Procurement • Partnership between local authorities - potential efficiencies available from joint working and shared services of infrastructure
Paphos	Piedmont	Budapest
<ul style="list-style-type: none"> • Close cooperation with the stakeholders involved especially municipalities • Development of appropriate legislative framework to increase 	<ul style="list-style-type: none"> • More support of the new technologies in the waste identification, separation and collection • Legislation to dictate specific rules in 	<ul style="list-style-type: none"> • Introduction of corporate management systems (ISO 50001:2011) • Harsher official action against illegal activities by restructuring

recycling in households <ul style="list-style-type: none"> • Implementation of the extended producer responsibility • Run of pilot projects in cooperation with municipalities, producers of waste and producers of products • Introduction of landfill-tax • Provide incentives and create environmental awareness (educational and informational campaigns) • Attract private companies in the management of green organic waste • Close the uncontrolled landfills • Investigate high landfill rates • Taxation of waste 	waste management plans with regard to new buildings <ul style="list-style-type: none"> • Definition of a waste category for buildings (following the energy efficient model) • Waste recovery system in construction industry 	the supervision of waste organizations <ul style="list-style-type: none"> • Making processing of electronic waste more cost effective through the use of prison labour. • Development of a waste management information and decision support system in order to communicate to local people • Social responsibility in the context of youth environmental education
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3.3.1 Categorization of strategies

Tables 5 and 6 illustrate categorization of the technical and organizational strategies from section 3.2. Note that all regions do not mention the same formulations, without formulations within the same category.

Table 5: Categorization of technical strategies

Collection	
Target regions	Formulations from regional goals
Amsterdam Budapest Piedmont Stockholm	<ul style="list-style-type: none"> • Facilitate re-use for example by vacuum system. • Urban collection systems based on human behavior to facilitate the user, effective collection, increased source separation and re-use are needed. • Innovative collection systems like colored or tagged bags (opti bag). • Facilitate recycling by doorstep waste collection. • Door to door collection/ bin identification system.

Prevention	
Target regions	Formulations from regional goals
Budapest Liverpool Piedmont	<ul style="list-style-type: none"> Waste prevention (fiscal support and widespread use of biodegradable packaging or recyclable paper. Pay as you produce waste Prevention of waste at source by reducing the amount of waste per household. Sustainable design. Increase producer responsibility.
Reuse and recycling	
Target regions	Formulations from regional goals
Budapest Liverpool Piedmont Stockholm	<ul style="list-style-type: none"> Utilize phosphorous in digestate and sludge. Manage ashes from incineration plants Auto-composter plan - proximity increase composting Reuse and repair - new technologies to facilitate disassembly and reuse of components Material recycling - improve quality and efficiency in material recycling plants Enabling residents to compost on their own. By sufficient tools and transportation, recycling of bio-waste can be improved
Technology	
Target regions	Formulations from regional goals
Amsterdam Liverpool Piedmont Stockholm	<ul style="list-style-type: none"> Wider use of web and information and communication technology (ICT) Infrared rays spectrograph, de-ironing methods and bio-stabilization technologies Improve quality techniques for plastic MDS separation Energy recovery by CHP
Separation	
Target regions	Formulations from regional goals

Amsterdam Stockholm	<ul style="list-style-type: none"> Find a more efficient system for food waste (separation/prevention) Post separation using NIR technology Separation techniques VM press
Other	
Target regions	Formulations from regional goals
Budapest Paphos	<ul style="list-style-type: none"> Learn and adapt international good practices Invest in EMAS, ISO 14001 and Eco-label EoW certificates

Table 6: Categorization of organizational strategies

Cooperation	
Target regions	Formulations from regional goals
Amsterdam Liverpool Paphos Stockholm	<ul style="list-style-type: none"> Cooperation between actors to facilitate interaction between different competences. Close cooperation with the stakeholders involved especially municipalities. Run of pilot projects in cooperation with municipalities, producers of waste and producers of products. Involve all stakeholders from citizens/consumer to producers (participatory design). Partnership between local authorities - potential efficiencies available from joint working and shared services of infrastructure.
Roles	
Target regions	Formulations from regional goals

Amsterdam	<ul style="list-style-type: none"> Common vision development by use of round table sessions or workshops with stakeholders and experts. Centralized vision statements from local central government.
Common vision	
Target regions	Formulations from regional goals
Amsterdam	<ul style="list-style-type: none"> Common vision development by use of round table sessions or workshops with stakeholders and experts. Centralized vision statements from local central government.
Legislation	
Target regions	Formulations from regional goals
Budapest Paphos Piedmont	<ul style="list-style-type: none"> Development of appropriate legislative framework to increase recycling in households Introduction of landfill-tax Taxation of waste Legislation to dictate specific rules in waste management plans with regard to new buildings Harsher official action against illegal activities by restructuring the supervision of waste organizations Close the uncontrolled landfills
Support	
Target regions	Formulations from regional goals
Budapest Liverpool Paphos Piedmont Stockholm	<ul style="list-style-type: none"> Regional strategies – regional action program energy and climate. Provide incentives and create environmental awareness (educational and informational campaigns). Attract private companies in the management of green organic waste. More support of the new technologies in the waste identification, separation and collection. Social responsibility in the context of youth

	<p>environmental education.</p> <ul style="list-style-type: none"> • New business models (including circular economy). • Development of a waste management information and decision support system in order to communicate to local people.
Other	
Target regions	Formulations from regional goals
<p>Budapest</p> <p>Liverpool</p> <p>Paphos</p> <p>Piedmont</p> <p>Stockholm</p>	<ul style="list-style-type: none"> • Definition of a waste category for buildings (following the energy efficient model). • Waste recovery system in construction industry. • Introduction of corporate management systems (ISO 50001:2011). • Making processing of electronic waste more cost effective through the use of prison labour. • Procurement. • Waste planning and waste prevention program – National waste plan with common strategy for all municipalities within the region. • Include waste management in the urban planning process and make it a natural part of the infrastructure of the city. • Investigate high landfill rates.

3.3.2 Important Actors and Networks

The most important actors and networks in fulfilling a number of roles in driving innovation in resource efficient waste management in each region have been identified throughout the interviews. The actors have been categorized into five categories which are illustrated in **Table 7**. The table also presents the main actors who have been highlighted in most of the regions in each category.

Table 7: Main actors defined for each category

Categories	Identified main actors
Formulating future visions and initiating projects	<ul style="list-style-type: none"> • National, regional and local authorities (identified by all regions) • Citizens • Press and media • NGOs
Attracting financial resources	<ul style="list-style-type: none"> • Government
First customers	<ul style="list-style-type: none"> • Government • Municipality • Waste management companies
Knowledge development	<ul style="list-style-type: none"> • Universities • Research institutes • NGOs
Entrepreneurial experimentation	<ul style="list-style-type: none"> • Private companies • Municipality

4 A COMPARISON MAP OF THE CONCEPTS AND SWOT FACTORS TO IDENTIFY RESEARCH BARRIERS AND INNOVATION GAPS

This chapter is an integration and mapping of the innovation functions relating to actors, technologies, and institutional structures for all the six regions relative their research activities and capacities. These parameters included Policies & Regulations, Markets, Resources, Knowledge Development, Entrepreneurial Experimentation and Creation of Legitimacy.

In this project, TIS-SWOT analysis was used as an analytical method to identify and categorize significant internal (strengths and weaknesses) and external (opportunities and threats) factors faced in the six regions. As it has been already noted, the SWOT table has been used in order to gather the findings of the TIS analysis in a comprehensible way and communicate them as input to the JAP.

The TIS-SWOT analysis provided information that was helpful in matching the regional resources and capabilities to the competitive environment in which it operates and was therefore an important contribution to the strategic planning process.

4.1 Results of Regional SWOT Analyses

The spider charts in the chapter represent one quantified variable from the TIS-SWOT analysis where the interview respondents were asked to provide a number between 1-10 whether the landscape around the parameter is driving (10) or hampering (1) the goals and ambitions for the region.

The results are displayed in spider charts for all six regions in **Figure 6**.

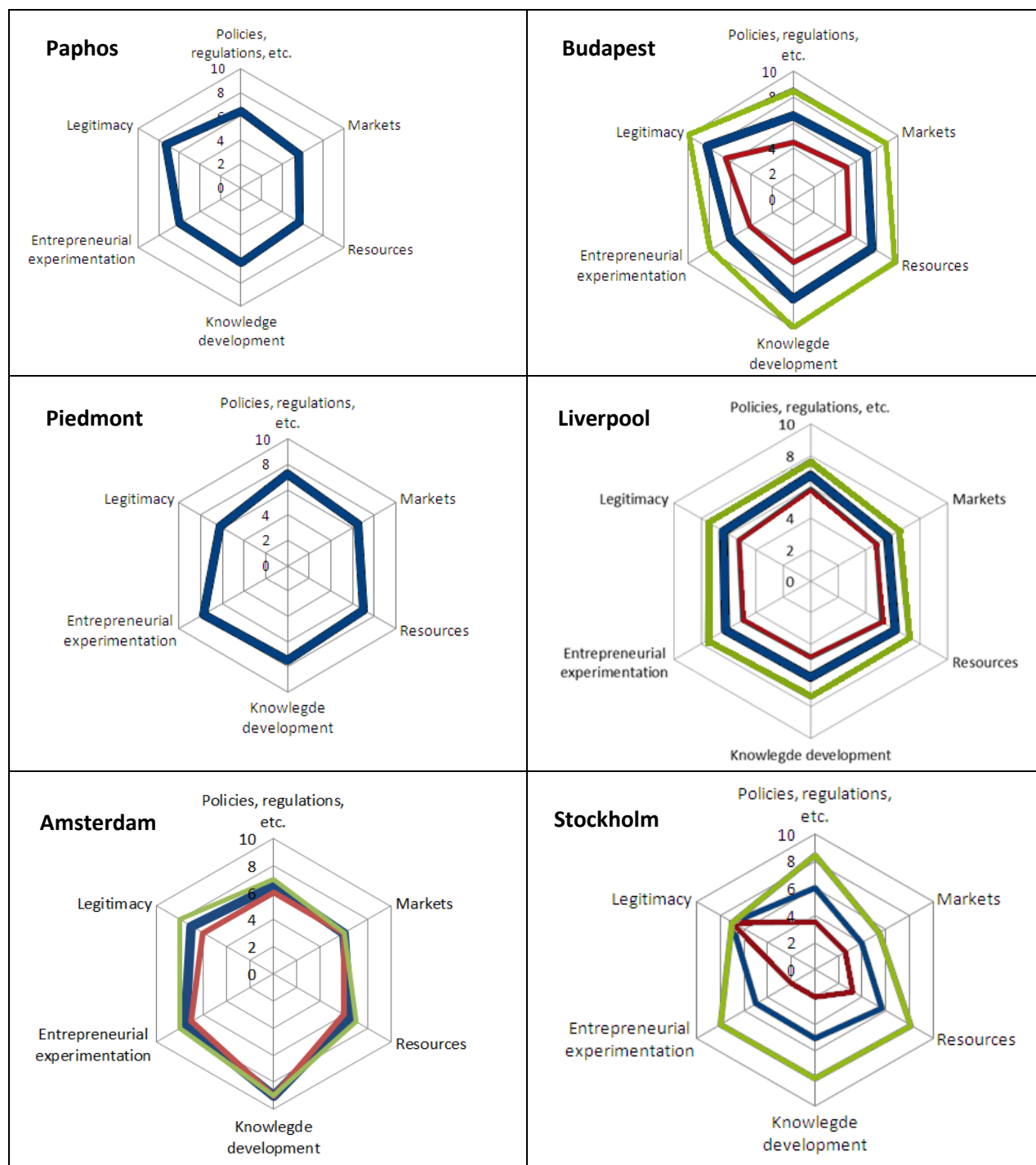
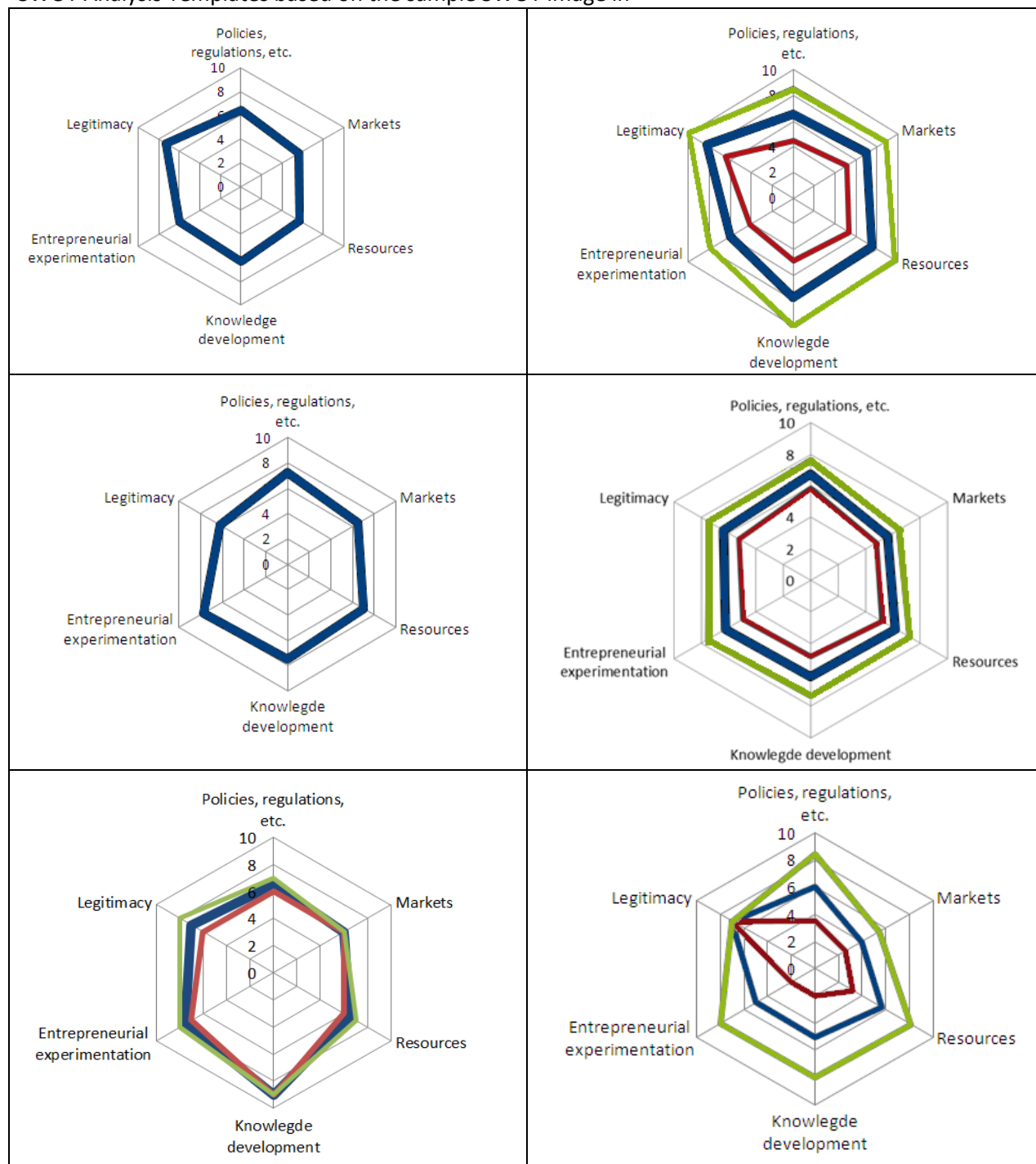


Figure 6: Spider charts for all six regions

These charts are not comparable between regions due to the high subjectivity in the results, and interpretation of the spider charts should only concern relative comparison between parameters within a specific region.

SWOT Analysis Templates based on the sample SWOT image in



6 were also completed for each of the six concepts in all six regions. A determination or identification and a compare/contrast scenario of the factors and trends that were relatively more/most important for each concept or parameter in the following categories were summarized as follows:

- A. Positive and favorable factors (strengths and opportunities)
- B. Negative and unfavorable factors (weaknesses and threats)
- C. Internal factors (strengths and weaknesses)
- D. External factors (opportunities and threats)

Similarities and differences in the [Strengths and Weaknesses] and external [Opportunities and Threats] factors resulting from an integration of the concepts or parameters in the six regions are described in the following sections.

4.2 A comparison of the results of regional SWOT analyses

This section carries a description of the results of the SWOT analysis of the regions studies. While the six regions may have had interviewees with relatively different responses to the concepts or parameters of integrated solid waste management strategies for resource efficiency, they may share similar SWOT-related aspects of their operations. By performing a SWOT analysis on these common business aspects, looking at strengths, weaknesses, opportunities and threats, we can compare the results from the respondents for any public or private body and obtain insights into how they can each improve or optimize their integrated solid waste management strategies for the maximization of resource efficiency.

Usually, the graph of a SWOT analysis is an emanation of the perceptions of the respondents. As can be seen from the spider diagram, when ask to give a numerical rating to the each of the aspects considered by the SWOT analysis, the responses were fairly even or balanced across the board, both in terms of the ratings given and the range of ratings within any one category. Given the relatively low number of responses involved per cluster or region and the inevitable degree of individual subjectivity in using a 10 point rating scale, it would not be possible to ascribe any significance or meaning to minor differences in the “Low” / “High” ranges (which are incidentally not ranges of individual responses but one standard deviation limits around the mean). The only apparent difference of any note is that range of ratings for the strength of Markets (5.5-7.0) is somewhat lower than the other parameters. Adding this score with the interview answers, it is possible to find specific factors that contribute to the difficulties in creating markets.

Perhaps the most useful comparison of these figures is that all of them rate a good deal lower than the respondent’s level of accordance with the aims of the regional waste strategy, hopefully suggesting that delivery on the strategy would provide significant progress in the right direction on a number of fronts.

Comparing the internal [Strengths and Weaknesses] and external [Opportunities and Threats] factors, regional tables given below in section 6, show how the six regions can use different combinations of internal and external factors to chart improvements in their operations. Similar strengths in the regions combined with different opportunities (both favorable factors) may lead to varying but optimum

strategies. Comparing threats may result in ideas of various actions that the two parties could take to address, avoid, or remove their threats.



5 COMPARISON OF REGIONAL RESULTS OF STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS

This chapter presents a comparison of the region's strengths, weaknesses, opportunities and threats. For more detailed information regarding the substrate used in the comparison, see **Appendix 1**.

5.1 The stronger or most favourable sides; internal strengths and external opportunities

Policies and Regulations

Several regions highlighted the external opportunities for resource efficiency. Piedmont region has great opportunity to become more resource efficient by keeping a high level of separations collection of household waste. Although the Stockholm region points out the focus on household waste, especially food waste, that can be seen as an opportunity to become more resource efficient. Both Stockholm and Paphos regions highlights the opportunity for resource efficiency by promoting the development of environmental awareness among citizens. Stockholm's strength is reliable and well established policies and regulations, which facilitate to get a good citizen dialogue and hence raise awareness of the environment. The Liverpool region also highlights that resource efficiency is an important opportunity and the demand for reuse can be seen as a strength in the region

According to Piedmont and Budapest regions, the strength is to reduce the use of landfills. This can be done by preventing waste and minimize non-recyclable waste. Paphos mean that all uncontrolled landfills with no permission should be forced to closure and restoration.

Budapest and Paphos highlights the need and strength of having stricter regulations to reduce the amount of waste in the regions. One possibility is to introduce tariffs and the taxes according to Paphos. Unlike other regions, the Amsterdam region clarifies the strength of having a national waste plan to achieve a common vision to reduce the amount of waste in the region.

Resources

According to Stockholm, Liverpool, and Amsterdam, the strength is the high availability of resources in each region. However it is important to point out that the regions have focused on different types of resources. Both Liverpool and Amsterdam regions believes their strength is resources in form of commodities while Amsterdam also highlights resources such as highly skilled personnel and access to good research institutes.

The regions of Paphos and Piedmont agree that achieving a high level of recycling is an important strength. Paphos provide collection of waste in some areas by deploying recycling bins and thus streamlines waste management and increase the level of recycling.

Based on the results, it was found that Stockholm, Liverpool and Paphos saw value in reuse and thus regarded this as an important opportunity. The Liverpool region highlighted the potential value of an online materials exchange, where citizens can exchange goods with each other while Paphos saw reuse more as an economic profitability that can lead to job opportunities. Unlike the other regions Budapest consider its strength to prioritize green industrial development

Markets

Regions of Budapest, Paphos and Amsterdam believe that there is a world market with great demand linked to reducing the environmental impact. According to Piedmont increases the number of companies operating in new energy fields in the region. This indicates that Piedmont also believes that there is a large potential market focusing on the environment. Paphos also agree there is an expanding market since the region's strength is to encourage new industries and job positions. By implementing several policies on collecting waste at the source, it will gradually lead to the increase of private businesses which will in return gain profit from the management of recyclable streams. The region of Stockholm sees opportunities to create markets.

The Liverpool region highlighted that there are changes of attitude and perceptions about the environment, which is an important opportunity. Since several regions indicate that there exists a world market, it also shows that there are changes in attitudes and there is a growing interest in the environment.

Knowledge Development

Regions of Liverpool, Budapest, Paphos and Stockholm advocated the strength and opportunity of having an active network and shared knowledge. Paphos highlighted that regions can obtain new experiences about waste management in Europe by participating in international cooperation. These types of cooperation can lead to the coordination of knowledge and raising the skill levels of waste across Europe, according to the Stockholm region. Liverpool underlined that it can result in greater understanding of international material and flows, which can facilitate each region's waste management.

The Paphos region advocated the strength of encouraging industry to be more willing to offer more environmentally friendly solutions, i.e. extend producer responsible. Liverpool and Piedmont also referred to this as they believe that improved technology can provide a higher recycling of waste.

Paphos highlighted creating awareness of environmental protection among citizens is a key strength and can be done through education programs available online. Amsterdam, Stockholm and Budapest are agreed that the development of knowledge should come from research networks and universities. These networks can also enable international collaborations in Europe, which previously was mentioned as a strength according to Liverpool, Budapest, Paphos and Stockholm.

Entrepreneurial Experimentation

Openness to innovation and resource management is an important strength or opportunities in regions of Paphos, Budapest, Amsterdam and Stockholm. Paphos and Amsterdam highlighted that green initiative from industry is an important strength. Amsterdam also emphasized the importance of initiatives from citizens and government. Stockholm believes that the government can have great influence. Strong political force that can generate incentive for citizens and companies to take initiatives may cause greater environmental responsibility and is thus an important strength. The Stockholm region also pointed out the strength that companies are responsive to local needs.

According to Budapest, Paphos and Liverpool exchange of knowledge is an important strength and opportunity. Liverpool highlights the opportunity of improving the education program with the aim of raising environmental awareness and knowledge among citizens, while Budapest emphasized that knowledge can be shared by international relations and possible collaborations between scientific institutes. Furthermore, regions of Piedmont, Liverpool and Paphos highlighted that new innovative technical solutions in waste management, is a key strength.

Creation of Legitimacy

Regions of Liverpool, Piedmont and Paphos emphasized that deeper knowledge helps to address societal challenges such as preventing and minimizing waste. Piedmont saw as a strength that various parties can work together to raise awareness about waste while Paphos identified that local NGOs are very active in disseminating information and encouraging people to properly manage their waste and recycle at source. Both Paphos and Amsterdam regions emphasized the potential and opportunity of good cooperation and involvement of citizens in order to raise awareness and get more people to work proactively with waste management. Stockholm and Budapest agreed that strong involvement of the government can be seen as a strength to create legitimacy.

5.2 The weakest or most unfavorable sides; internal weaknesses and external threats

Policies and Regulations

Inadequate knowledge and education of waste was considered as a weakness in the Paphos region, along with stakeholders lack of willingness to provide the right capacity and meet necessary regulations.. Liverpool also highlighted this and referred to absence of business drive and lack of understanding of value in waste.

Piedmont highlighted that citizens often do not follow the instructions given on the municipal level and that it can be seen as a threat to the region. This may be due to lack of motivation or incentives which has been defined as a threat by Paphos. The Paphos region particularly pointed out that by not using the

"pay as you throw system", many people produce great amount of waste without being charged accordingly. The absence of requirements is considered as a weakness in regions of Stockholm.

Paphos and Liverpool also argued that lack of consequences for breach of the environment can be seen as a threat and weakness. Paphos highlighted that regulations are not always followed, which may have implications for the environment. In order to avoid charges, uncontrollable disposal takes place in open secluded areas. For the most part are these waste heavy and possibly hazardous, and have been defined as a threat in the Paphos region.

Budapest however, claims that too strict standards can be seen as a threat since it cannot always be completed. Budapest also believed that rapidly changed rules can present a threat to the region since it is important there is an impact study prepared before introducing of new regulations. Amsterdam agreed about a plan being needed and emphasizes that the lack of an implementation plan and shared vision in the region have been defined as a threat.

Resources

The regions of Paphos, Liverpool, Budapest and Amsterdam have lack of resources of various types. Paphos defined absence of building capacity and lack of human resources as threats in the region, while Amsterdam particularly highlighted lack of good technical personnel. Budapest pointed out lack of resources within government and business sector. There is a poor cooperation with the citizens in the Paphos region, regarding the separation and recycling of waste. Hence there is a constant need to educate citizens. Both Paphos and Liverpool define their weakness as a limitation in funding resources.

According to Stockholm, there are few incentives towards waste prevention in the region, which can be seen as a weakness. There is too much focus on separation at expense of prevention. Piedmont further defined high costs as the biggest weakness in the region.

Markets

The region of Stockholm's weakness is lack of incentives and a weak market with weak demand. Liverpool agreed with this since the region believes the market has not developed sufficiently and described it as immature. Liverpool and Stockholm also defined an uncertain market with unclear rules as a possible threat in the regions. Budapest also highlighted this in terms of the region's lack of domestic market for some types of waste and defined strong monopoly as a threat.

The region of Paphos mentioned costs as a threat and weakness in the area. The region has defined lack of funding as a threat and highlights the high cost of creating facilities for waste management as a weakness. The Piedmont region highlighted that development of industries are only interested in getting incentives provided at the national level. Further, Amsterdam emphasized that development of waste initiatives in other region areas can be defined as a possible threat to the region market.

Knowledge Development

Budapest, Amsterdam and Paphos agreed that education systems were poorly developed in the regions. Budapest and Amsterdam argued that there are weaknesses in the coordination of the education system and that it does not follow changes and technological development. It is thus a serious weakness. Paphos highlighted threat through poorly developed programs and the need for updates and improvements of current programs in order to raise awareness about waste management. Paphos also points out the need for more time and money for education and a grown interest for increased involvement in the waste management.

Budapest, Stockholm, Amsterdam and Liverpool highlighted that lack of resources is a weakness or threat in the regions. Stockholm emphasizes reduced resources in form of funding as a threat and limited budget for R&D as a weakness in the region. Liverpool argued that cost cutting pressure can be seen as a threat. Both Paphos and Amsterdam highlighted the lack of resources in the form of financing for education and Universities. Budapest, Amsterdam and Paphos are agreed that the cooperation with scientific institutions is weak. Budapest and Paphos pointed out that there are weaknesses in the application of research initiatives and new research findings are not used.

According to Piedmont there are high costs to implement new technologies and have thus defined this as a threat in the region. Stockholm advocated that lack of documentation is a possible weakness in the region.

Entrepreneurial Experimentation

According to Paphos and Amsterdam, there is a weakness in the lack of money. Amsterdam advocated primarily lack of money or ideas for experimentation while Paphos region meant there is lack of funding for the application of knowledge that has been developed.

Liverpool defined lack of success stories as a weakness and insufficient entrepreneurship as a threat in the region. Lack of success stories is also something that has been noted by the region of Stockholm. Stockholm noted that innovations do not reach the market, which is a threat to the region. Budapest also mentioned this and highlighted lack of willingness to take risks as a weakness.

Paphos emphasized that innovative solutions that are only executed at experimental scale may fail to deal with real cases or may not be effective enough in order to be obtained in large scales. The region of Piedmont pointed out that it may cause a threat to create to distortion of market.

Creation of Legitimacy

The region of Amsterdam has defined lack of support from citizens for waste policy as a weakness. This has also been noted by the Paphos region who pointed out that some individuals and companies are not interested in participating positively in the environmental work if they do not have a personal or financial gain in return. This may be because not enough work has been done to make citizens aware of

waste management, which also has been noted as a weakness by the Piedmont region. Piedmont emphasized that it is a time consuming activity to inform and raise awareness among citizens.

Liverpool highlights lack of regional structure/leadership and governance as a weakness in the region. The involvement of many government authorities creates conflicts and delays on many occasions, which has been defined as a threat in the region of Paphos. Amsterdam agreed with this since the region emphasizes that many communities with different goals is a weakness. Amsterdam also emphasizes that there is no consistent national or local waste policy in the region. Budapest highlights that legislation without consensus is a threat to the region. Finally, short term decisions have been defined as a weakness in the Stockholm region.

5.3 Interventions

In this chapter presents all regions interventions for each function and which weakness/threat it aims to minimize:

Policies and regulations

Table 8: Regional interventions for policies and regulations

Interventions	Aims to minimize the weakness/threat
Paphos	
Promote the “Pay as you throw” methodology.	<ul style="list-style-type: none"> Many people produce great amount of waste without being charged. Lack of consequences breach of the environment.
Development of good practice manual for governmental sector, companies, and recycling centers.	<ul style="list-style-type: none"> Lack of willingness among stakeholders to provide the right capacity and meet regulations.
Provide economic motives to citizens to recycle and reuse.	<ul style="list-style-type: none"> Lack of motivation or incentives.
The local authorities should work together in order to promote stricter regulations regarding waste management at the source.	<ul style="list-style-type: none"> Regulations are not always followed In order to avoid charges, uncontrollable disposal takes place in open secluded areas.
MoP needs to give motives to those interested for cooperation. For example: systematic information or free supply of recycling bins to all households and businesses.	<ul style="list-style-type: none"> Inadequate knowledge and education of waste Lack of motivation or incentives.

Budapest	
Environmental authorities should help trade associations and market actors in adjusting to the new regulations	<ul style="list-style-type: none"> • Rapidly changed regulations
Piedmont	
Tax concessions mechanisms would be introduced in favour of citizens acquiring recyclable products	<ul style="list-style-type: none"> • Citizens often does not follow instructions from the municipality
Liverpool	
A call for more assertive national policy making and regulatory drive, and measures to strengthen how actors are linked	<ul style="list-style-type: none"> • Absence of business drive
Amsterdam	
Use MRA (Metropolitan Region Amsterdam) platform to create common vision	<ul style="list-style-type: none"> • Lack of shared vision
Stockholm	
Improved cooperation and dialogue	<ul style="list-style-type: none"> • Absence of requirements

Resources

Table 9: Regional interventions for resources

Interventions	Aims to minimize the weakness/threat
Paphos	
Increase of the frequency and detailed information to be more effective for the citizens and businesses	<ul style="list-style-type: none"> • Poor cooperation
Securing economic support and participation of the government	<ul style="list-style-type: none"> • Limitation in funding resources
Budapest	
It is important that producers give preference to secondary raw materials instead of primary ones	<ul style="list-style-type: none"> • Lack of resources within the business sector

Let the demand for secondary raw materials encouragement by e.g. legislation	<ul style="list-style-type: none"> Lack of resources within the government
Piedmont	
Companies and operators must be supported in applying the rules and regulation provided for in the waste management and renewable energy fields, so as to suggest new strategies for a better exploitation of company's resources and to receive all possible benefits provided in favour of both companies and the environment.	<ul style="list-style-type: none"> High cost
Liverpool	
Local authorities need to combine resources better	<ul style="list-style-type: none"> Limitation in funding resources
Amsterdam	
Citizen involvement and participation is included in waste-separation project and pilots	<ul style="list-style-type: none"> Initiatives are mostly in the idea stage and not scaled up
Stockholm	
Policy directives which stimulates repair and re-use	<ul style="list-style-type: none"> There is too much focus on separation at expense of prevention
Customize statistics/benchmarking for source-separated quantities so that prevention measures are rewarded	<ul style="list-style-type: none"> Few incentives towards waste prevention There is too much focus on separation at expense of prevention

Markets

Table 10: Regional interventions for markets

Interventions	Aims to minimize the weakness/threat
Paphos	
Involve the local authorities and ask them to take ownership	<ul style="list-style-type: none"> High cost of create facilities for waste management Lack of funding
Government should stick to their regulatory role towards the markets rather than keep trying to develop the markets	<ul style="list-style-type: none"> Lack of funding

Budapest	
<p>Providing a stable and predictable legal environment for the actors of the market. It is also important that companies operating in economies of scale should be present on the market.</p> <p>Both companies that are responsible for the collection of waste and the companies that rely on the use of waste are important and need each other for the business</p>	<ul style="list-style-type: none"> • Uncertain market with unclear rules • Lack of domestic market for some types of waste and strong monopoly
Piedmont	
<p>In order to strengthen key function, address opportunities and counteract threats in the waste resources and market field, it is preliminary necessary to have an overall knowledge of the rules and regulations applicable to such field and a clear idea of what said rules provide for.</p> <p>Supporting companies should be a common target in applying the rules and regulation provided for in the waste management and renewable energy fields, so as to suggest new strategies for a better exploitation of company's resources and to receive all possible benefits provided in favor of both companies and the environment.</p>	<ul style="list-style-type: none"> • Development of industries are only interested in getting incentives provided at the national level
Liverpool	
Bring stakeholders together to provide innovative solutions	<ul style="list-style-type: none"> • Weak market with weak demand • Lack of initiative
Need to develop research continuum	<ul style="list-style-type: none"> • Uncertain and weak market • Lack of initiative
Amsterdam	
Reshape the producer responsibility and stimulation of the circular economy through different Dutch initiatives, competitions and communities.	<ul style="list-style-type: none"> • Other regions developing green/waste initiatives
Working within triple-helix models to create common interests and incentives between government and the market	<ul style="list-style-type: none"> • Other regions developing green/waste initiatives
Stockholm	
Clarify rules for different actors (private and public) on how to act on the market	<ul style="list-style-type: none"> • Uncertain market with unclear rules
Reshape the producer responsibility	<ul style="list-style-type: none"> • Lack of initiative

	<ul style="list-style-type: none"> • Uncertain market
Forum for including stakeholders relevant for new issues for example in the field of waste prevention (food industry, textile, fashion etc.)	<ul style="list-style-type: none"> • Lack of initiative
Innovation competitions	<ul style="list-style-type: none"> • Lack of initiative • Weak market and weak demand

Knowledge Development

Table 11: Regional interventions for knowledge development

Interventions	Aims to minimize the weakness/threat
Paphos	
Intensive awareness campaigns	<ul style="list-style-type: none"> • Lack of awareness
Take knowledge and experimentation to a practical application level	<ul style="list-style-type: none"> • Education system is poorly developed
Budapest	
Development of research infrastructure	<ul style="list-style-type: none"> • Education system is poorly developed • Weak cooperation with scientific institutions • Weaknesses in the application of research initiatives and new research findings are not used
Strengthening international relations	<ul style="list-style-type: none"> • Education system is poorly developed
Piedmont	
Innovation requires state incentives to be adopted and implemented	<ul style="list-style-type: none"> • High costs to implement new technologies
Liverpool	
<ul style="list-style-type: none"> • Need for leadership and structure in funding and business support. Develop a better understanding of the value of resources that reside in waste, etc. 	<ul style="list-style-type: none"> • Lack of resources
Amsterdam	
Coordination of existing knowledge	<ul style="list-style-type: none"> • Weak cooperation with scientific institutes
Continued improvement of cooperation between universities from different regions and different expertise	<ul style="list-style-type: none"> • Weakness in coordination of education system • Lack of resources

Human capital agenda focused on matching education with resource efficiency discussion	<ul style="list-style-type: none"> • Education system is poorly developed
Stockholm	
Coordination of existing knowledge	<ul style="list-style-type: none"> • Lack of documentation
Display how things are being done in different regions, create a best practice and how-t-do data bank	<ul style="list-style-type: none"> • Lack of documentation

Entrepreneurial Experimentation

Table 12: Regional interventions for entrepreneurial experimentation

Interventions	Aims to minimize the weakness/threat
Paphos	
Develop proper legal and financial tools	<ul style="list-style-type: none"> • Lack of funding for the application of knowledge that has been developed
Budapest	
Development of successful innovation models	<ul style="list-style-type: none"> • Innovations do not reach the market
Cooperation with research institutions and universities	<ul style="list-style-type: none"> • Lack of willingness to take risks
Piedmont	
The Provincial Authority for waste governance in Turin has carried out, in cooperation with Politecnico di Torino, an exploratory inquiry to assess the technical, environmental and economical sustainability for the energetic valorisation of municipal solid waste	<ul style="list-style-type: none"> • Create market distortion
Liverpool	
Develop a better understanding of the value of resources	<ul style="list-style-type: none"> • Insufficient entrepreneurship
Amsterdam	
Many new entrepreneurial experiments taking of in relation to resource efficiency	<ul style="list-style-type: none"> • Lack of money or ideas for experimentation
Stockholm	
Gain understanding of the profits with waste management	<ul style="list-style-type: none"> • Innovation do not reach the market

Improve co-operation between municipalities/municipal companies private companies and universities, institutes, agencies etc. to create conditions for applied research	<ul style="list-style-type: none"> • Innovation do not reach the market
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Creating of Legitimacy

Table 13: Regional interventions for creating of legitimacy

Interventions	Aims to minimize the weakness/threat
Paphos	
Waste management is such an important and costly process that its management, the legislation around it, etc., should be handled by one authority	<ul style="list-style-type: none"> • The involvement of many government authorities creates conflicts and delays on many occasions
Promotion of recycling to be obligatory by the law	<ul style="list-style-type: none"> • Lack of support from citizens for waste policy • Some individuals and companies are not interesting in participating positively in the environmental work since they do not have a personal or financial gain in return
Budapest	
Impact assessment studies in legislation, involving professional organizations into the legislation.	<ul style="list-style-type: none"> • Legislation without consensus
Piedmont	
Involve citizens more in the decision making process through the right communication and accurate information	<ul style="list-style-type: none"> • Not enough work has been done to make citizens aware of waste management (i.e. lack of awareness)
Opportunities connected to legitimacy may be enhanced through deeper involvement of the private operators and advocacy associations in the regional and municipal decision-making process concerning waste management systems.	<ul style="list-style-type: none"> • Not enough work has been done to make citizens aware of waste management (i.e. lack of awareness)
Liverpool	
Structured approaches and leadership are needed to increase opportunities for resource efficiency and raise awareness and participation by residents, businesses and research bodies	<ul style="list-style-type: none"> • Lack of regional structure/leadership and governance
Need for a shift in national policy to provide fresh	<ul style="list-style-type: none"> • Lack of regional structure/leadership and

impetus for resource efficiency (through tough target based legislation and government/industry investment).	governance
Amsterdam	
Market failure – yet to low commodity prices for commodities from waste. This requires first steps in collaborative triple helix initiatives and by government.	<ul style="list-style-type: none"> • No consistent national or local waste policy
Stockholm	
Create greater interaction between actors	<ul style="list-style-type: none"> • Short term decisions
Clearer rules for the market (legislation long-term) in combination with economic instruments and environmental legislation	<ul style="list-style-type: none"> • Short term decisions

6 THE WAY FORWARD

This chapter is an assessment of the most important things (i.e. weaknesses/threats) which the regions need to address, to suggest actions and interventions and identify potentially interesting areas for European level collaboration.

Paphos region

- Lack of funds, funding or money.
- Reduction of public sponsorship and support.
- Absence of funds creates huge delays in repayment of services, which inevitably creates a lack of faith and trust with citizens.
- Poor co-operation with licensed companies for recyclables and organic waste.
- Refusal of citizens to participate in separation at source systems.
- Low rate of closing of sites for uncontrolled landfill of waste.
- Lack of specific knowledge and expertise regarding the detailed design of waste facilities.
- Lack of public awareness.
- High costs of waste management.

Budapest region

- Poor interest from citizens and a lack of awareness.
- Lack of resources, collaboration, education and communication.
- Lack of cooperation, especially with Universities.
- Lack of cooperation with other areas. EU resources and international cooperation opportunities offer new directions, new possibilities.

Piedmont region

- Lack of collaboration to meet the demand for more efficient waste management services.
- Provide more methods and techniques to improve waste management.

Liverpool region

- Unclear policy setting and intervention at the UK national level, and severe pressures on public sector spending
- Lack of investment and funding pressures
- Need more rigour and integration in putting policy into practice, learning from models elsewhere

- Need to develop effective governance structures to ensure the best use of public investment funds in supporting resource efficiency
- Need to integrate city systems and / or look at joint regional waste strategy, with the waste authority taking the lead.
- Improve procurement practice – business guides and public procurement supporting policies.
- Work needed along and across supply chains since resource efficiency requires changes across a complex system
- Need to continue to develop means of demonstrating the effectiveness of public engagement activities around waste prevention.
- .motivation or incentivesmotivation or incentivesOverall a change in mindset is needed in order to move the understanding from "waste" to "resources" with focus on the true value inherent in material resources and the economic activity around it.

Areas where the region wants to see increased cooperation and exchange with other European regions:

- Work to build the understanding of materials flows across borders – to drive independence in resources, or minimization of dependencies on risky supply regions, supply bottlenecks, etc.
- Mapping resource flows.
- Co-ordinate activities of multi-national businesses with operations across member states.
- In practice the markets for UK goods restored for reuse will be overseas (often in developing countries). These markets do not have the necessary recycling infrastructure – so projects to build infrastructure in secondary product markets would be good.
- Activities to increase the business awareness of routes to funding and support within Europe.
- Collaboration on knowledge and science.
- Replicate the model of WRAP style organisations across member states. (something the KTN is working to do).
- Collaboration up-and-down supply chains, and across supply chains. Prioritisation of different materials, sectors, alignment of actions to same.
- Development of models to ensure that linkages are developed between universities, businesses and LAs in order to identify resource efficiency gaps and direct research and development into those areas.
- Development of tools to better assess the impact of public engagement activities on waste prevention.
- Waste Prevention Carbon Benefits Toolkit
- We could help other European countries develop their own sustainable re-use model
- Third sector/charity involvement in textile recycling and reuse

- Collaboration with any other European bodies or organizations to promote best practice and innovative approaches to reuse.

Amsterdam region

- Requires increased involvement of citizens.
- Facilitate the separation of household waste for citizens.
- Requires increased cooperation between municipality and businesses to increase the reuse and recycling of raw materials.

Stockholm region

- Bad times tend to draw focus from environmental initiatives and investments in waste treatment.
- Population growth in the region results in less space for waste disposal and an increasing amount of waste.
- Lack of holistic approach related to waste management.
- Lack of a regional waste management plan. The plan can contribute to a better common view.
- Disposal must be better integrated as a natural part of the details and planning overview.
- Political decisions are often based, and focus on short-term solutions rather than long-term infrastructure changes.
- Uncertainty of roles and responsibilities of the market inhibits the development.
- Lack of cooperation in the waste sector.
- Weak demand for recycled materials.
- Lack of knowledge of certain materials/products.
- More technology development needed.
- Overheated market with pricing pressure risking creating a market for entrepreneurs focusing on short term solutions where it is difficult to offer and getting paid for added value.
- Lack of knowledge about how behavior can be changed.
- Lack of cooperation with other stakeholders to develop the area of waste prevention.
- Lack of feedback of results for waste prevention.
- Need for highlight waste more in public debates as citizens must contribute more.
- Clear and measurable goals required along with clear feedback for the residents.
- More education and inspiration.
- Requires extensive coordination between the municipalities in the Stockholm region and other urban areas (also in other countries) to find solutions that are suitable for urban areas.
- Learning from other places to avoid "reinventing the wheel".
- Increased cooperation with institutes, universities and government agencies that support innovation.

Areas where the region wants to see increased cooperation and exchange with other European regions:

- New/ alternative technology.
- How to work with waste prevention.
- Change of behavior.
- Circular economy.
- Customized collections systems.
- Urban planning, waste management as infrastructure.
- Levels of acceptance for waste disposal facilities etc.

Summary

Based on the above, several main barriers have been identified. The barriers have been mentioned by several regions and can thus be seen as important. The first barrier is lack of collaborations and communication to prevent waste and was noted by all regions. The regions highlighted examples such as lack of collaboration with business, universities, local authorities, citizens, municipalities, urban areas in other countries etc. Some regions also announced there was a weak communication with some of the actors. Stockholm highlights that cooperation between regions should be over areas such as change of behavior, how to work with waste prevention, customized collections systems, etc. Liverpool also noted that partnerships must be made to prevent waste and to develop tools for better assess the impact of public engagement activities on waste prevention.

The second main barrier to be identified was lack of knowledge and education for waste management. Improved knowledge and education can lead to increased awareness of waste. This is substantial since the lack of awareness and involvements of citizens have been highlighted as barriers of several regions. It also appeared that there was a lack of motivation or incentives for citizens and businesses to become more resource efficient. This is something that must be improved in order to change attitudes and to get a more environmentally focused community.

In many regions there is a lack of a common strategy for regional waste as well as a holistic approach. This is the foundation for creating a shared vision in the regions, which is important to facilitate collaboration between different stakeholders and thus achieve regional goals. It has also become clear that there is lack of funding in several regions, which is a barrier that can inhibit the development in the regions.

7 CONCLUSIONS

In this project, six regions across Europe are cooperating to increase resource efficiency in waste management. In work package 3 (WP3), the regional coordinators planned and performed self-assessments for the regions in close cooperation with their regional partners using a modified and tailored Technological Innovation System analysis (TIS). This study aimed to work out the results of specific strengths, weaknesses, threats and opportunities in a SWOT analysis of six concepts that will be used as input for the Decision Support Framework (WP4) and the Joint Action Plan (WP6).

The information and results from the SWOT-analysis gives direction for each region to realize its ambitions and targets in waste management. A structured review of internal and external factors would also help each region transform its strategic direction which needs to be addressed in order to help all the regions jointly to realise their ambitions that have been set by them. The most important barriers i.e. weaknesses/threats in the regions have been taken into account in order to optimize and integrate strategies for waste management.

It has proven to be essential to move the understanding from "waste" to "market" and "resources" in order to see the value in waste. Value also needs to be understood in more than financial terms since it can also be about social value.

Whether it is on a regional level or on a united level, addressing and dealing with weaknesses and threats by taking advantage of strengths and opportunities for more efficient services can be done by providing methodologies and technologies to improve waste management.

Several similarities between the regions regarding weaknesses/threats have been found. Particular, there were weaknesses in collaboration between different actors. This is important to avoid "reinventing the wheel" again and to share knowledge and learn from each other.

It also turned out that there was a lack of knowledge and awareness of waste management, which can inhibit the development of waste management in the regions. Many regions highlighted that universities could be an important actor to minimize the lack of knowledge.

The result shows there is a lack of motivation or incentives for citizens and businesses to become more resource efficient. Some regions pointed out the need for a change in attitude and the willingness of citizens and businesses to participate in preventive work regarding waste. Some individuals and companies are not interested in participating positively in the environmental work since they do not have a personal or financial gain in return. Some regions also pointed out lack of funding and that the government is considered as the main actor for attracting financial resources. There were also missing a common vision and holistic approach in several regions. All regions noted that national, regional and local authorities are an important actor in formulating future vision.

The result shows that there is a weak demand for recycled materials and not sufficient provision for the fractions to be separated for markets. This may be a threat according to resource efficiency in a more unregulated market. Technological development is an opportunity to improve market potential for certain end products. It needs to be kept in mind that some materials aren't suitable for a closed system and a holistic and systems approach is necessary.

It is not realistic to assume that this process or a systems approach can somehow be carried out exclusively from research and development, entrepreneurial experimentation or from the companies, policy makers or competent authorities. However, policy makers and competent authorities should be required to listen to local needs and enable companies to adopt the innovation resulting from research without undue constraints.

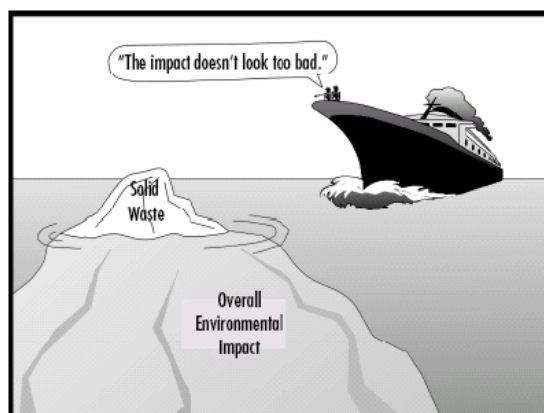


Figure 7: “The impact doesn’t look too bad”

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9 APPENDIX 1

Paphos		Strengths	Weaknesses
Policies and Regulations		Force the closure and restoration of all uncontrolled landfills, which include those who do not have permission (unapproved).	Inadequate knowledge, education and willingness for some stakeholders to acquire the proper capacities or provide the needed local regulations and rules to implement the EU framework.
Resources		In a few municipalities, resources (money and staff) are provided to collect waste in the area and recycling bins are provided in certain locations and in big sources of waste production (i.e., Hotels).	Limited funding sources, material resources, and little or no stability (uncertainty) in resource availability. Lack of building capacity, human resources and legal/fiscal tools.
Markets		Encouragement in the creation of new industries and job positions in the environment industry (waste management, management of green waste).	The high cost to create facilities for waste management
Knowledge development		Encourages industry to be more willing and able to provide solutions - Extending producer responsibility. Creating awareness about protecting the environment among the citizens by providing education, available online and sometimes free. Municipalities can obtain new experiences and knowledge about waste management through European projects.	No economic support from government to the Municipalities and from the Municipalities to the individuals for the whole function of the full waste chain. The need for enough time and money for the education and the increase of interest for involving in the waste management.
Entrepreneurial experimentation		Increases the involvement of NGO's. Industry will be more willing and able to provide solutions.	Innovative solutions that are only executed in experimental scale may fail to deal with real cases or may not be effective enough in order to be obtained in large scales. Lack of funding for the application of knowledge that was development.

Paphos	Strengths	Weaknesses
Legitimacy	Local NGOs are quite active in disseminating information and encouraging people to properly manage their waste and for example recycle at source.	Some individuals and companies are not interested in participating positively in the environmental work since they do not have a personal or financial gain in return.

Paphos	Opportunities	Threats
Policies and Regulations	<p>Promote construction of modern waste facilities</p> <p>Create new job positions</p> <p>Introduce new waste tariffs and taxes</p> <p>Promote the development of environmental awareness and consciousness on waste production and the need to decrease, reuse and recycle</p>	<p>Too many stakeholders involved</p> <p>Because of not using 'pay as you throw system', many people produce great amount of waste without being charged accordingly</p> <p>Uncontrollable disposal in open secluded areas to avoid being charge, especially for massive in size or dangerous material.</p> <p>No penalties or fines apply to those who do not recycle. Lack of incentive.</p> <p>In order to avoid charges, uncontrollable disposal takes place in open secluded areas. Most of the time these wastes are heavy and possibly hazardous</p>
Resources	<p>With the functioning of Green points in certain municipalities, many people will be employed and many useful waste will be reused, utilized and / or bring economic profit</p> <p>Recycling at the source could provide a clean starting material for other uses.</p>	<p>Lack of funding, so investment funds on behalf of the government will be limited for some years</p> <p>Due to the culture of a Cypriot citizen there is a great probability of not cooperating easily with this program of separation and recycling of waste and there is a need for constant education of the public that will cost the Municipality.</p>
Markets	<p>By implementing several policies on collecting waste at the source, it will gradually lead to the increase of private businesses which will in return gain profit from the management of recyclable streams.</p>	<p>Lack of funding these days.</p>
Knowledge development	<p>Increase of knowledge in the already involvement with the sector of waste management gives us the potential of better designing future actions that will work on preventing and minimizing waste</p> <p>Provides potential for better cooperation with individuals and accomplishment of better results with lower economic cost.</p>	<p>The public afraid to learn new knowledge</p> <p>Municipalities have need for redesigning and creating better programs, for improving the existing programs and raising the appropriate funds</p> <p>Lack of applying research initiatives (industrialization of knowledge)</p>

Paphos	Opportunities	Threats
Entrepreneurial experimentation	<p>Launches new innovative technological solutions in waste management.</p> <p>Provides potential for better design of programming in educating the citizens with less cost</p>	Lack of funding
Legitimacy	Increase awareness of the citizens	The involvement of many governmental authorities creates conflicts and delays on many occasions

Budapest		Strengths	Weaknesses
Policies and Regulations		Encourages waste prevention and distract from landfill Regulation effective for all actors of waste management Compatible with EU trends.	There is no impact study prepared before introducing new regulations, lack of professional agreement and consensus.
Resources		In tender decisions green industrial developments have priority.	Tenders do not always consider real needs.
Markets		Demand on the world market Industrial actors with strong lobbying practices.	There is no domestic market and processing industry for some waste types, we export the, unused potentials, secondary raw materials less used so far.
Knowledge development		Traditionally excellent performance in the field of environment sciences and technical sciences Skilled human resources.	Copying of foreign technologies weak cooperation among universities, scientific institutions, market, decision makers and society Educational system does not follow changes and technological developments, innovations.
Entrepreneurial experimentation		Skilled workforce Openness towards innovation and resource management.	Weak marketing Lack of willingness to take risks Copying foreign technologies. It is not linked to domestic knowledge base not adequately regulated.
Legitimacy		Strong government involvement	Weak civil associations, with strong governmental dependence. Implementation of bottom up initiatives is low Industrial lobby, direct lobbies.

Budapest		Opportunities	Threats
Policies and Regulations	Compliance with stricter regulations the goals of Waste Framework Directive can be achieved	Overregulation Quickly changing regulations Too strict standards cannot be completed high degree of nationalisation and centralisation	
Resources	Increasing EU financial funds several kinds of tendering opportunity	Lack of resources in governmental and business sector	
Markets	Unused potentials, secondary raw materials less used so far	Strong monopoly and lobby of a few domestic companies, Limited competitions Illegal activities are not regulated properly	
Knowledge development	Opportunities for international cooperation Research networks	Underdeveloped infrastructural background Lack of resources New research findings are not used in Hungary, researcher leave the country	
Entrepreneurial experimentation	Tender opportunities International relations Possibility of cooperation with scientific institutions	Ooverregulation It is hard to adapt to constantly changing regulations	
Legitimacy	Projects legitimated by industrial and business actors can be implemented	Weak social control over projects Concentration, fewer actors with stronger influence legislation without consensus	

Piedmont	Strengths	Weaknesses
Policies and Regulations	Minimize non-recyclable waste production and decrease landfills and incinerators disposal.	Lack of an overall binding recycling method.
Resources	Achieving high levels of recycling.	Higher costs.
Markets	Increase in the number of undertakings operating in new energy field.	It may happen that few undertakings are really interested in new energy (they may be exclusively interested in obtaining incentives).
Knowledge development	Rise in eco-sustainable culture.	Development of industries exclusively interested in obtaining incentives.
Entrepreneurial experimentation	Development of new technologies at sustainable costs.	Create possible market distortion effects.
Legitimacy	Deeper understanding helps to address societal challenges.	Time consuming activity to inform and raise awareness.

Piedmont	Opportunities	Threats
Policies and Regulations	Reach high level of separate collection of household waste	Citizens often do not follow the instructions set forth at municipal level. Targets aren't achieved and cost keep high
Resources	Align every actor and stakeholder to a common development baseline	Business asymmetry for stakeholder
Markets	Enhancing eco-sustainable culture.	Development of industries exclusively interested in obtaining incentives provided for at national level
Knowledge development	Enhancing new technologies and achieving high levels of waste recycling skills	Implementing such new technologies may require high costs
Entrepreneurial experimentation	Increase the level of the recycled waste	Create market distortion
Legitimacy	Better fit with social needs	Policies'pursuit of societal changes and need can be a loop

Liverpool	Strengths	Weaknesses
Policies and Regulations	Progress made under specific regulation Quality and demand for reuse Textile roadmap.	Unclear national policy Complicated regulation. Lack of consequences for breach. Disconnected actors. Lack of business drive. Lack of understanding of value
Resources	Availability of materials. Large business case studies	Strategic raw materials – UK/EU versus China. Funding and Business Support
Markets	Circular Economy gaining traction with business. Third sector and community reuse. Stable contracts offering scope for investment.	Thinking and markets still immature. No regional mechanism to connect. Large contractors and contracts tie-up materials. Market pressures.
Knowledge development Entrepreneurial experimentation	National R&D – Circular Economy. Design / durability. Reuse projects. Processing technology improvement. R&D Capability. Active networking and knowledge sharing.	Variable coverage. Lack of success stories. Leadership and governance.
Legitimacy	Public buy-in / influence. National level funders / actors working together.	Lack of regional structure / leadership and governance. Risk aversion. Access to funding.

Liverpool		
	Opportunities	Threats
Policies and Regulations	UK Government seeking sector roadmaps Resource Efficiency and Circular Economy	Deregulation / Short termism Export of value as waste (loss to regional economy)
Resources	Online materials exchange	Reduced public sector funding
Markets	Changing attitudes / perceptions More materials recoverable	Materials pricing and availability Overseas competition Market uncertainty / failure
Knowledge development and entrepreneurial experimentation	Understanding international material and value flows Link with regional growth agenda	Fail to map resources Insufficient entrepreneurship Cost cutting pressures
Legitimacy	Topics moving up the agenda Becoming more of a social norm	Spending cuts – dilute efforts / impacts

Amsterdam	Strengths	Weaknesses
Policies and Regulations	A (strong) vision document. One responsible authority. Large network. National waste plan.	No common vision in the region. No execution/implementation plan.
Resources	Bulk stock of commodities. Highly skilled personnel. Good/excellent. Research/knowledge institutes.	Scarcity of good technical personnel. Initiatives mostly in idea stage and not scaled up.
Markets	Big consumer market. Port facilities.	Little chemical industry (developing).
Knowledge development	(Technical) universities and high schools.	Lack of coordination of development programs. Few questions asked to research centers.
Entrepreneurial experimentation	Incubator labs. Green initiatives from citizens, companies and governments.	Lack of money or ideas for experiments.
Legitimacy	A vision document on commodities including waste.	Lack of support of citizens for waste policy Many municipalities with own goals.

Amsterdam	Opportunities	Threats
Policies and Regulations	Use MRA platform for common vision	Loss of economy for scale for projects Goals not optional
Resources	Connecting green initiatives to reach economy of scale	Other regions also developing several green/waste initiatives
Markets	In greater region a lot of chemical industries	Other regions developing green/waste initiatives
Knowledge development	Start up incubator labs AMS (Amsterdam Metropolitan Solutions institute)	Decreasing funding opportunities/ Lack of funds to universities and government for (applied) research
Entrepreneurial experimentation	Matching green deals for innovation projects	Money following higher priorities Restrictive legislation
Legitimacy	More involvement of citizens Clear away restrictive legislation	No consistent national or local waste policy Lack of subsidies to support initiatives

Stockholm	Strengths	Weaknesses
Policies and Regulations	Reliable and well established.	Absence of requirements. Unclear markets. LOU incentivizes low cost.
Resources	Resources exist in region.	Few incentives toward prevention.
Markets	One coherent actor.	Lack of incentives. Weak market. Weak demand
Knowledge development	Applied research. Active branch association	Limited budget R&D. Lack of documentation
Entrepreneurial experimentation	Strong political force. Companies responsive to local needs.	Fractionated responsibility. City can't invest in waste management.
Legitimacy	Politicians drive innovation. Good research	Short term decisions. Polarized.

Stockholm		Opportunities	Threats
Policies and Regulations	Focus food waste	Case of contradiction	
	Citizens dialogue	Suboptimisation Absence of sufficient collection system	
Resources	Profitability	Focus on separation at expense of prevention	
	Increased separation Interest in environmental issues	Recycling of hazardous waste	
Markets	Metropolitan area	Unclear rules on the market	
	Possibilities to create markets Expanding market	Overheated market/pricing pressure, focusing short term solutions	
Knowledge development	Co-operation	Reduced funding	
	Co-ordination of knowledge		
Entrepreneurial experimentation	Triple helix	Innovations don't reach market	
	Reality adaptation Facilitate the user Interest in biogas	Low price market	
Legitimacy	Food waste	NIMBY	
	Prevention Urban systems	Chosen direction proven to be wrong	