

# **Supplementary Information**

**Governance challenges and opportunities for implementing resource recovery from organic waste streams in urban areas of Latin America: insights from Chía, Colombia**

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# 1 Documents reviewed in the desk study

CATEGORIES	CONTRIBUTION	REFERENCE
<b>Governance Capacity Framework</b>	Studies that apply the GCF as a governance capacity assessment method	(Brockhoff et al., 2019; Kim et al., 2018; Koop et al., 2017; Madonsela et al., 2019; Schreurs et al., 2017; Šteflová et al., 2018; van Leeuwen et al., 2018)
<b>Waste Management and Sanitation in the LAC region</b>	Wastewater governance challenges in Latin America and the Caribbean	(Rodriguez et al., 2020)
	Solid Waste Management	(Hettiarachchi et al., 2018b; Kaza et al., 2018; UNEP, 2018)
	Case studies of resource recovery from waste	(Moya et al., 2019; Otoo and Drechsel, 2018)
	Biowaste treatment technologies	(Lohri et al., 2017)
<b>Colombian national strategies and policies</b>	Water governance in the LAC region	(Akhmouch, 2012)
	Solid waste Management, Sanitation Services, sludge management, subsidies for waste pickers	(Official Journal of the Colombian Government, 2015a)
	Regulative basis to recover energy from waste	(Official Journal of the Colombian Government, 2015b)
	Regulation for recovery from solid waste and legal basis for transforming the informal sector or waste pickers	(Official Journal of the Colombian Government, 2016)
	Policy for Solid Waste Management	(Departamento Nacional de Planeación, 2016)
	Review of national regulations of solid waste management	(Ochoa, 2018)
	Strategy to Implement the Sustainable Development Goals	(Departamento Nacional de Planeación, 2018a)
	Strategy of Circular Economy	(Gobierno de la República de Colombia, 2019)
	Guidelines and goals for the environmental sector based on the National Development Plan	(Muñoz et al., 2015)
	Green Growth Policy	(Departamento Nacional de Planeación, 2018b)
<b>Resource recovery in Colombia</b>	Technical guidance for composting	(Universidad Nacional de Colombia, 2015)
	Government Incentives for Energy from Waste	(Alzate-Arias et al., 2018)
<b>Chía local strategies and policies</b>	Solid Waste Management Plan	(Alcaldía Municipal de Chía, 2016; Consultoría y Dirección de Proyectos SAS, 2016)
	Sanitation and Discharge Management Plan	(Sánchez, 2015)
	Spatial Plan	(Municipio de Chía, 2016)
	Risk Management Plan	(CMGRD, 2015)
<b>Resource recovery in Chía and Cundinamarca</b>	Analysis of resource recovery alternatives from organic waste streams	(Mosquera, 2019)
	Recovery of solid urban organic waste in Cajicá	(Hettiarachchi et al., 2018a)

	Suspension of the Spatial Plan in Chía	(Bogotá, 2019)
	Creation of the Committee of Territorial Integration	(Cámara de Comercio de Bogotá, 2017)
	Waste pickers sector in Chía	(Extrategia, 2017)
<b>Grey literature</b>	Newspaper of the landfill of Bogotá City	(UAESP, 2019)
	Corruption in the wastewater treatment plan of Chía	(Rubiano, 2018)
	Pollution in the Bogotá River	(Taborda, 2019)
	Public health emergencies and open landfills	(Sarralde, 2018)
<b>Others</b>	Local Public Utility Competences	(EMSERCHÍA, 2019)
	Chía Population trends	(Alcaldía Municipal de Chía, 2015)

## 2 Categorization of stakeholders involved in the interviews

The Categorization used in the selection of stakeholders for the interviews and number of interviewees per category are shown in the table below, derived from García Aguilar (2020). Interviewees were classified by stakeholder role, type and the stage of the waste service chain to which their work belonged.

Category	Description	Stakeholders represented among the interviewees from the category	Number of interviewees from within the category
<b>Stakeholders as categorized by role</b>			
<b>Decision maker</b>	Stakeholders that have explicit responsibility for policies or measures related to sanitation, waste management, circular economy, bioeconomy, water, energy, agriculture, and related sectors.	CAR (Regional Environmental Authority), Parliament of Chía, Secretariat of Environment	3
<b>Implementer</b>	Stakeholders responsible for implementing policies or measures/actions/initiatives.	EMSERCHÍA, Private cleaners in a residential area, Asoambiental, Secretariat of Health, Secretariat of Environment, Greenfuel, Secretariat of Economic Development, Ecocracking, Bioambientar	11
<b>Coordinator</b>	Stakeholders that coordinate other actors for the implementation of policies or measures/actions/initiatives.	Secretariat of Environment, Office of Citizen Participation in Chía, Ecociclus	3
<b>Expert</b>	Stakeholders that provide research, knowledge and information.	Institute of Health and Environment, Blog El Río – El Espectador Newspaper	2
<b>Affected</b>	Stakeholders who are beneficiaries or victims of policies or measures/actions/initiatives.	Jumbo Supermarket, Junta de Acción Comunal de Yerbabuena Baja	2
<b>Total</b>			<b>21</b>
<b>Stakeholders as categorized by type</b>			
<b>Regional public authority</b>	Ensuring policy, regulatory support, the introduction of support measures, as well as technical and financial support at the regional level.	CAR (Regional Environmental Authority),	1
<b>Local public authority</b>	Ensuring policy, regulatory support, the introduction of support measures, as well as technical and financial support at the local level.	EMSERCHÍA, Secretariat of Environment, Secretariat of Health, Secretariat of Economic Development, Office of Citizen Participation in Chía, Parliament of Chía,	10

Category	Description	Stakeholders represented among the interviewees from the category	Number of interviewees from within the category
Private sector - large	Developing and investing in new sustainable businesses, business models, products and services based on circularity principles.	Jumbo Supermarket, Blog El Río – El Espectador Newspaper	2
Private sector - SME	Developing and investing in new sustainable businesses, business models, products and services based on circularity principles.	Private cleaners in a residential area, Asoambiental, Greenfuel, Bioambientar, Ecocracking, Ecociclus	6
Research & innovation institution	Cooperating with authorities, SMEs and industries in developing new solutions and scoping visions of regions, towns, communities.	Institute of Health and Environment,	1
Citizen groups	General citizens and user groups.	Junta de Acción Comunal de Yerbabuena Baja	1
<b>Total</b>			<b>21</b>
<b>Stakeholders as categorized by stage of waste service chain</b>			
Waste generation	Involved in the generation and containment of waste at the site	Jumbo Supermarket, Junta de Acción Comunal de Yerbabuena Baja	2
Emptying & transport	Involved in emptying, collection, and transport of waste	Private cleaners in a residential area, Asoambiental, Greenfuel, EMSERCHÍA	4
Treatment & processing	Engaged in the treatment and processing of waste and the production of resource recovery products	EMSERCHÍA, Secretariat of Economic Development, Bioambientar, Ecocracking	5
Disposal/End-use	Disposal of end-products, distribution and use of resource recovery products	Ecociclus	1
Policy/Overarching	Other stakeholders not directly involved in activities in the waste service chain	Secretariat of Environment, CAR (Regional Environmental Authority), Secretariat of Health, Institute of Health and Environment, Blog El Río – El Espectador Newspaper, Office of Citizen Participation in Chía, Parliament of Chía,	9
<b>Total</b>			<b>21</b>

### 3 Pre-defined questions and scoring guide for GCF indicators

Pre-defined questions and Likert-type scoring guide for each of the 27 indicators of the Governance Capacity Framework (Koop et al., 2017), as adapted and used for guiding the literature review and the interviews in the case of Chía, Colombia.

#### Condition 1: Awareness

##### Indicator 1.1: Community knowledge.

**Predefined question: What is the level of public knowledge in the community regarding resource recovery from organic waste streams?**

Score		Description
<b>++</b>	<b>Balanced awareness</b>	Nearly all members of the community are aware of and understand resource-oriented sanitation and waste management systems. Resource recovery is addressed at the local level. Local communities and stakeholders are familiar with or are involved in the implementation of resource recovery initiatives.
<b>+</b>	<b>Overestimation</b>	The community is knowledgeable and recognise the many opportunities of resource-oriented sanitation and waste management systems. Consequently, they often overestimate the benefits and trade-offs. Resource-oriented sanitation and waste management systems have been raised at the local political level and policies/plans may be co-developed together with local communities.
<b>0</b>	<b>Underestimation</b>	Most communities have a basic understanding of resource-oriented sanitation and waste management systems. However, the current opportunities, benefits, and trade-offs are often not fully known and underestimated. Future opportunities, benefits, and trade-offs are often unknown. Some awareness has been raised amongst or is being created by local stakeholders and communities.
<b>-</b>	<b>Fragmented knowledge</b>	Only a small part of the community recognizes resource-oriented sanitation and waste management systems. The most relevant stakeholders have limited understanding of resource-oriented sanitation and waste management systems. As a result, the issue is hardly or not addressed at the local governmental level.
<b>--</b>	<b>Ignorance</b>	The community, local stakeholders and decision-makers are unaware or ignore resource-oriented sanitation and waste management systems. This is even demonstrated by the absence of articles on the issue in local newspapers, on websites or local action groups addressing the issue.

**Indicator 1.2: Local sense of urgency.**

**Predefined question: To what extent do local stakeholders have a sense of urgency about resource recovery from organic waste streams?**

Score		Description
<b>++</b>	<b>Strong demand for action</b>	There is a general sense of importance regarding resource-oriented sanitation and waste management systems. There is continuous, active, public support and demand to undertake action and invest in innovative, ground-breaking solutions. This is evident since the issue receives much media attention and action plans are implemented.
<b>+</b>	<b>General sense of urgency</b>	There is an increasing understanding of the causes, impacts, scale, and urgency of resource-oriented sanitation and waste management systems. It leads to general sense of urgency of the need for long-term sustainable approaches. However, measures requiring considerable efforts, budget, or substantial change with sometimes uncertain results are often receiving only temporal support. Resource-oriented sanitation and waste management systems is a main theme in local elections.
<b>0</b>	<b>Moderate willingness for small changes</b>	There is growing public awareness and increasing worries regarding resource-oriented sanitation and waste management systems. However, the causes, impact, scale, and urgency are not widely known or acknowledged leading to the support for only incremental changes. It is a side topic in local elections.
<b>-</b>	<b>Raising of awareness by small groups</b>	A marginalized group (e.g. the most vulnerable, environmentalists, NGOs) express their concerns, but these are not widely recognised by the general public. Measures for implementing resource-oriented sanitation and waste management systems are not an item on the political agenda during elections.
<b>--</b>	<b>Resistance</b>	There is generally no sense of urgency and sometimes resistance to spending resources on issues regarding resource-oriented sanitation and waste management systems. It is not an item on the political agenda during elections, as is evident from the lack of (media) attention.



**Indicator 1.3: Behavioural internalization.**

**Predefined question: To what extent do local communities and stakeholders try to change their behaviour in order to implement resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Full internalization</b>	Because actors are fully aware of resource-oriented sanitation and waste management systems, their causes, impacts, scale, and urgency, there is integrated into long-term and joint strategy, practices, and policies. All actors are encouraged to participate. Presently, resource-oriented sanitation and waste management systems are integrated into everyday practices and policies.
<b>+</b>	<b>Moderate internalization</b>	Awareness has evolved into mobilization and action. There are various incentives for actors to change current practices and approaches regarding resource-oriented sanitation and waste management systems. Resource-oriented sanitation and waste management systems, however, is not yet fully integrated into clear strategy, practices, and policies.
<b>0</b>	<b>Exploration</b>	There is a growing awareness, often as a result of local, exploratory research regarding the causes and solutions of resource-oriented sanitation and waste management systems. There are only incremental changes in actions, policy and stakeholders' behaviour.
<b>-</b>	<b>Recognized as an external pressure</b>	Resource-oriented sanitation and waste management systems are partly recognised, mainly due to external pressure instead of intrinsic motivations. There is no support to investigate potential approaches to implementation or to proceed to action or changing practices.
<b>--</b>	<b>Unawareness</b>	There is unawareness of resource-oriented sanitation and waste management systems with hardly any understanding of necessity and benefits or how current practices impact resource-oriented sanitation and waste management systems, the city or future generations.

## Condition: 2 Useful knowledge

### Indicator 2.1: Information availability.

**Predefined question: How well is useful information regarding resource-oriented sanitation and waste management systems readily available in the local context?**

Score		Description
<b>++</b>	<b>Comprehensive information is available</b>	Comprehensive and integrated documentation of resource recovery from waste can be found on local websites and policy papers. It is characterized by adequate information, integrated description of social, ecological and economic processes regarding resource-oriented sanitation and waste management systems, as well as goals and policies. Furthermore, progress reports on effective implementation can be found.
<b>+</b>	<b>Information enhancing integrated long-term thinking</b>	Strong effort is put in providing integrated information from various fragmented sources. Information gaps are identified and attempted to be bridged. This may be clear from extensive documentation on the long-term process. Also, citizen knowledge may be taken into account.
<b>0</b>	<b>Information fits demand but with limited exploratory research</b>	Information on resource-oriented sanitation and waste management systems is available. Knowledge on understanding or tackling resource-oriented sanitation and waste management systems is progressing and is produced in a structural way. Knowledge gaps are hardly identified due to lock-in into existing disciplines and policy. This is apparent from the quantity of factual information, but the causes, risks, and impacts of long-term processes are lagging behind.
<b>-</b>	<b>Information scarcity and limited quality</b>	Limited information is available which does not grasp the full extent of resource-oriented sanitation and waste management systems. In some cases, not all information is of sufficient quality to generate a comprehensive overview
<b>--</b>	<b>Lack of information</b>	No information on resource-oriented sanitation and waste management systems can be found. Or the scarce available information is of poor quality

**Indicator 2.2: Information transparency.**

**Predefined question: To what extent is information on resource-oriented sanitation and waste management systems accessible and understandable for interested stakeholders, including experts and non-experts?**

Score		Description
<b>++</b>	<b>Easy access to cohesive knowledge</b>	Information is easily accessible on open-source information platforms. There are multiple ways of accessing and sharing information. Information is often provided by multiple sources and is understandable for non-experts.
<b>+</b>	<b>Sharing of partly cohesive knowledge</b>	All interested stakeholders can access information. Action has been taken to make knowledge increasingly understandable. Still, it is a time-consuming search through a maze of organizations, protocols, and databases to abstract cohesive knowledge and insights.
<b>0</b>	<b>Sharing of very technical knowledge</b>	There are protocols for accessing information; however, it is not readily available. Although the information is openly available, it is difficult to access and comprehend because it is very technical. Resource-oriented sanitation and waste management systems are reported on local websites and reports.
<b>-</b>	<b>Low sharing of fragmented knowledge</b>	Information is sometimes shared with other stakeholders. However, information is inaccessible for most stakeholders. Furthermore, knowledge is often technical and difficult to understand for non-experts. Resource-oriented sanitation and waste management systems may be addressed on local websites.
<b>--</b>	<b>Not transparent and inaccessible knowledge</b>	Information is limitedly available, and sharing may be discouraged. The available information is difficult to understand. Resource-oriented sanitation and waste management systems are not addressed on local websites.

**Indicator 2.3: Knowledge cohesion.**

**Predefined question: To what extent is information about resource-oriented sanitation and waste management systems cohesive in terms of using, producing and sharing different kinds of information amongst different policy fields and stakeholders?**

Score		Description
<b>++</b>	<b>Implementation of cohesive knowledge</b>	Stakeholders are engaged in long-term and integrated strategies. Information can be found that is co-created knowledge and will contain multiple sources of information, multiple and mixed methods taking into account the socio-ecological and economic aspects of resource-oriented sanitation and waste management systems.
<b>+</b>	<b>Substantial cohesive knowledge</b>	Sectors cooperate in a multidisciplinary way, resulting in complete information regarding resource-oriented sanitation and waste management systems. Besides multiple actors, multiple methods are involved to support information. Too many stakeholders are involved, sometimes in an unbalanced way. Knowledge of effective implementation is often limited.
<b>0</b>	<b>Insufficient cohesion between sectors</b>	Data collection within sectors is consistent and is sustained in multiple projects for about two to three election periods. Knowledge of resource-oriented sanitation and waste management systems, however, is still fragmented. This becomes clear from different foci of the stakeholders as stated in their organization's strategies and goal setting.
<b>-</b>	<b>Low-cohesive knowledge within sectors</b>	Information that is found is sector-specific and information is inconsistent within and between sectors.
<b>--</b>	<b>Non-cohesive and contradicting knowledge</b>	A lack of data strongly limits the cohesion between sectors. Information that is found can even be contradictory.

### Condition 3: Continuous learning

#### Indicator 3.1: Smart monitoring.

**Predefined question: To what extent is the monitoring of resource-oriented sanitation and waste management processes able to quickly recognize alarming situations, identify underlying trends and have predictive value?**

Score		Description
<b>++</b>	<b>Useful to predict future developments</b>	Monitoring system is adequate in recognizing alarming situations, identifying underlying processes and provides useful information for identifying future developments. Reports of monitoring will display discrepancies between fundamental beliefs and practices. The monitoring is changed to act upon these findings by altering the fundamental beliefs. Often regulatory frameworks are changed, new actors are introduced, new risk management approaches are used.
<b>+</b>	<b>Useful to recognize underlying processes</b>	The abundant monitoring provides a sufficient base for recognizing underlying trends, processes, and relationships. Reports of monitoring will display discrepancies between assumptions and real process dynamics. Acting upon these findings by altering the underlying assumptions characterizes this level of smart monitoring. Often also system boundaries are re-defined, new analysis approaches introduced, priorities are adjusted, and new aspects are being examined.
<b>0</b>	<b>Quick recognition of alarming situations</b>	The monitoring systems cover most relevant aspects. Alarming situations are identified and reported. This leads to improvement of current practices regarding the technical measures. There is only minor notification of societal and ecological effects.
<b>-</b>	<b>Reliable data but limited coverage</b>	Monitoring occurs; however, the monitoring system does not cover all facets of resource-oriented sanitation and waste management systems, with sometimes incomplete descriptions of the progress and processes of technical and policy measures. Monitoring is limited to singular effectiveness or efficiency criteria and cannot identify alarming situations.
<b>--</b>	<b>Irregular, poor quality or absent</b>	There is no system to monitor resource-oriented sanitation and waste management systems or monitoring is irregular.

**Indicator 3.2: Evaluation.**

**Predefined question: To what extent is current policy and implementation regarding sanitation, waste and natural resource management continuously assessed, evaluated and improved?**

Score		Description
<b>++</b>	<b>Exploring the fitness of the paradigm</b>	Frequent and high-quality evaluation procedures fully recognize long-term processes. Assumptions are continuously tested by research and monitoring. Evidence for this is found in sources (primarily online documents) that report on the learning process and progress. Uncertainties are explicitly communicated. Also, the current dominant perspective on governance and its guiding principles are questioned.
<b>+</b>	<b>Changing assumptions</b>	There is continuous evaluation, hence continuous improvements of technical and policy measures and implementation. Innovative evaluation criteria are used. This is evidenced by reports containing recommendations to review assumptions or explicitly indicating the innovative character of the approach.
<b>0</b>	<b>Improving routines</b>	The identified problems and solutions are evaluated based on conventional (technical) criteria. Current practices are improved. This becomes clear from the information of the used and existing criteria, the small changes recommended in reports and short-term character.
<b>-</b>	<b>Non-directional evaluation</b>	Evaluation is limited regarding both frequency and quality. Evaluation occurs sometimes, using inconsistent and even ad-hoc criteria. Also, the evaluation is not systematic. There is no policy on the performance of evaluations, only the evaluation(s) itself is reported.
<b>--</b>	<b>Insufficient evaluation</b>	There is no evaluation of technical or policy measures regarding resource-oriented sanitation and waste management systems. Otherwise, it is not documented.

**Indicator 3.3: Cross-stakeholder learning.**

**Predefined question: To what extent do stakeholders connected to resource-oriented sanitation and waste management have the opportunity to interact with each other and deliberately choose to learn from each other?**

Score		Description
<b>++</b>	<b>Putting cross-stakeholder learning into practice</b>	There is a recognition that resource-oriented sanitation and waste management systems are complex, and that cross-stakeholder learning is a precondition for adequate solutions and smooth implementation. This is evidenced by broad support for policy measures and implementation. Moreover, continuous cross-stakeholder learning programs are in place or may be institutionalized.
<b>+</b>	<b>Open for cross-stakeholder learning</b>	Stakeholder interaction is considered valuable and useful for improving policy and implementation. Various initiatives for cross-stakeholder learning have been deployed, yet the translation into practice appears difficult. The programs may not be structural, and the learning experience may not be registered and shared.
<b>0</b>	<b>Open for stakeholder interaction</b>	Stakeholders are open to interaction, though not much learning is going on due to the informative character of the interaction. Often, many stakeholders, that do not necessarily share interests or opinions, are involved in the decision-making process.
<b>-</b>	<b>Small coalitions of stakeholders with a shared interest</b>	Interaction occurs in small coalitions based on common interests. Opinions of those outside the coalition are generally withheld. Only information for the shared point of view is sought. This is evidenced by the finding of only one perspective regarding resource-oriented sanitation and waste management systems or few perspectives that are supported by means of circle-referencing
<b>--</b>	<b>Closed attitude towards cross-stakeholder learning</b>	There is no contact with other parties, contact may even be discouraged. This is apparent from the limited sharing of experience, knowledge, and skills. No information is shared outside the organisation and sector, nor is external information used

## Condition 4: Stakeholder engagement process

### Indicator 4.1: Stakeholder inclusiveness.

**Predefined question: To what extent are all relevant stakeholders able to join any decision-making process concerning resource-oriented sanitation and waste management systems? Are the engagement processes transparent and are stakeholders able to speak on behalf of their interest group?**

Score		Description
<b>++</b>	<b>Transparent involvement of committed partners</b>	All relevant stakeholders are actively involved. The decision-making process and the opportunities for stakeholder engagement are clear. It is characterized by local initiatives specifically focusing on water, sanitation, waste management, recycling and resource recovery among others with contractual arrangements, regular meetings, workshops, focus groups, citizen committees, surveys, etc.
<b>+</b>	<b>Timely, over-inclusive and active involvement</b>	Stakeholders are actively involved. It is still unclear how decisions are made and who should be involved at each stage of the process. Often too many stakeholders are involved. Some attendants do not have the mandate to make arrangements. Stakeholder engagement is abundantly done for often overlapping issues.
<b>0</b>	<b>Untimely consultation and low influence</b>	Stakeholders are mostly consulted or informed. Decisions are largely made before engaging stakeholders. The frequency and time-period of stakeholder engagement are limited. Engagements are mainly ad hoc consultations where stakeholders have low influence on the end result.
<b>-</b>	<b>Non-inclusive involvement</b>	Not all relevant stakeholders are informed and only sometimes consulted. Procedures for stakeholder participation are unclear. If involved, stakeholders have but little influence.
<b>--</b>	<b>Limited supply of information</b>	No relevant stakeholders are included, or their engagement is discouraged. Information cannot be found in the extant decision-making process. Many interests are unheard, and the incorporated representatives lack authority.



**Indicator 4.2: Protection of core values.**

**Predefined question: To what extent do stakeholders feel confident that their core values will not be harmed during their engagement in any decision-making process concerning resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Maximal protection of core values</b>	Stakeholders are actively involved and have a large influence on the end result. There are clear exit possibilities and leading to more stakeholders more committed to the process. The participation opportunities and procedures of implementation are clear.
<b>+</b>	<b>Requisite for early commitment to output</b>	Stakeholders are actively involved and expected to commit themselves to early outcomes in the process. Hence relevant stakeholders may be missing in contractual arrangements as they do not want to commit themselves to decisions to which they have not yet contributed. At this point, involved stakeholders have influence on the end result and therefore the output serves multiple interests.
<b>0</b>	<b>Suboptimal protection of core values</b>	As stakeholders are consulted or actively engaged for only short periods, alternatives are insufficiently considered. The influence on end-result is limited. Decisions comply with the interests of the initiating party primarily. There are no clear exits in the engagement process.
<b>-</b>	<b>Non-inclusive and low influence on results</b>	The majority of stakeholders are engaged, but the level of engagement is low (informative or sometimes consultative). There is a low influence on the result which invokes resistance, for example on internet platforms and newspapers.
<b>--</b>	<b>Insufficient protection of core values</b>	Because stakeholders are hardly engaged or informed, core values are frequently being harmed. Implementation and actions may be contested in the form of boycotts, legal implementation obstructions and the invoking of anti-decision support. There may be distrust and an absence of participation.

**Indicator 4.3: Progress and variety of options.**

**Predefined question: To what extent do stakeholders have the prospect of gain during their active involvement in any decision-making process concerning resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Active engagement with choice selection at the end of the cooperation</b>	There is an active engagement of all relevant stakeholders and clarity of participation procedure and realistic deadlines. The range of alternatives is fully explored, and selection of the best alternatives occurs at the end of the process. Reviews of stakeholder meetings provide the alternatives addressed. Stakeholders are engaged throughout the whole process as specified in contractual agreements.
<b>+</b>	<b>Active involvement with an abundant choice variety</b>	Stakeholders are actively involved and there is sufficient room for elaborating alternatives. Procedures, deadlines, and agreements are unclear. There are no or few specifications on deadlines in terms of dates. Due to inexperience with active stakeholder engagement, decisions are taken too early in the process leading to the exclusion of arguments and solutions. Hence, decisions may not be fully supported.
<b>0</b>	<b>Consultation or short active involvement</b>	There is a clear procedure for consultation or short active involvement of stakeholders, but the opportunities to consider all relevant alternatives are insufficient. Decisions are therefore still largely unilateral and solutions suboptimal. The suboptimal character of a solution can be observed from evaluations or differences in opinions.
<b>-</b>	<b>Rigid procedures limit the scope</b>	Informative and consultative approaches are applied, according to rigid procedures with low flexibility. The period of decision-making is short with a low level of stakeholder engagement. These unilateral decision-making processes may lead to slow and ineffective implementation. The latter can be observed from critique via public channels.
<b>--</b>	<b>Lack of procedures limit engagement and progress</b>	The lack of clear procedures hinders stakeholder engagement. This unilateral decision-making limit progress and effectiveness of both decision-making and implementation. It might result in conflicting situations. Often, much resistance can be found online, and implementation may be obstructed.

## Condition 5: Policy and Management Ambitions

### Indicator 5.1: Ambitious and realistic goals.

**Predefined question: To what extent are goals for resource-oriented sanitation and waste management systems ambitious and yet realistic (supported by realistic intermittent targets that adequately deal with uncertainties)?**

Score		Description
<b>++</b>	<b>Realistic and ambitious strategy</b>	The available policies are based on modern and innovative assessment tools and policy objectives are ambitious. Support is provided by a comprehensive set of intermittent targets, which provide clear and flexible pathways. Assessment tools and scenario analyses identify tipping points that may be found in policy documents.
<b>+</b>	<b>Long-term ambitious goals</b>	There is a long-term vision that incorporates uncertainty. However, it is not supported by a comprehensive set of short-term targets. Hence, achievements and realistic targets are difficult to measure or estimate. Visions are often found online as an organization's strategy. They often entail a description of resource-oriented sanitation and waste management systems and the need for action.
<b>0</b>	<b>Confined realistic goals</b>	There is a confined vision of resource-oriented sanitation and waste management systems. Ambition is mostly focused on improving the current situation where unchanging conditions are assumed, and risk and scenario analyses are lacking.
<b>-</b>	<b>Short-term goals</b>	Actions and goals mention sustainability objectives. Actions and goals are "quick fixes" mainly, not adhering to a long-term vision or sustainable solutions. Uncertainties and risks are largely unknown.
<b>--</b>	<b>Short-term, conflicting goals</b>	Goals consider only contemporary waste and resource challenges, are short-sighted and lack sustainability objectives. Goals are arbitrary and sometimes conflicting, and the character of policy is predominantly reactive.

**Indicator 5.2: Discourse embedding.**

**Predefined question: To what extent are ambitions regarding resource-oriented sanitation and waste management systems interwoven in the historical, cultural, normative and political context of the city?**

Score		Description
<b>++</b>	<b>Embedding of sustainable implementations</b>	Local context is used smartly to accelerate policy implementation. Innovations are subdivided into suitable phases that are more acceptable and effectively enable sustainable practices. Effective policy implementation is enabled by a general consensus that long-term integrated policy is needed to address resource-oriented sanitation and waste management systems.
<b>+</b>	<b>Consensus for sustainable actions</b>	There is a consensus that resource recovery from waste is required, but substantial effort is necessary as there is little experience in implementing resource-oriented sanitation and waste management systems in a long-term integrated approach. Furthermore, the decision-making periods are long as trust relations with new unconventional partners need to be built.
<b>0</b>	<b>Low sense of urgency embedded in policy</b>	The current policy fits the local context. Resource-oriented sanitation and waste management systems are increasingly identified, framed and interwoven into local discourse, but the disregard of uncertainty prevents a sense of urgency that is necessary to adopt adequate measures towards resource recovery from waste. Decision making often results in very compromised small short-term policy changes.
<b>-</b>	<b>Persistent reluctance and poor embedding</b>	Actors feel reluctant to execute current policy as it conflicts with their norms and values. Policy hardly takes the local context and existing discourses into account. And the policy does not correspond with societal demands. This may lead to distrust between actors, inefficient use of resources and ineffective overall implementation.
<b>--</b>	<b>policy mismatch</b>	The cultural, historical and political context is largely ignored, leading to difficult policy implementation. Actors may not understand the scope, moral or to whom it applies or how to implement it hence leading to total confusion.

**Indicator 5.3: Policy cohesion.**

**Predefined question: To what extent are policies relevant for resource-oriented sanitation and waste management systems and coherent across geographic, administrative, sectoral boundaries and government levels?**

Score		Description
<b>++</b>	<b>Cohesive synergetic policies</b>	Policies are coherent and comprehensive within and between sectors. There is an overarching vision resulting in smooth cooperation. Goals are jointly formulated, evaluated and revised to adapt to new challenges in waste and resource management smoothly. This is evidenced by thematic instead of sectoral approaches. Many inter-sectoral meetings, interdisciplinary reports, and cohesiveness in goals and strategies are formulated.
<b>+</b>	<b>Overlapping comprehensive policies</b>	There is cross-boundary coordination between policy fields to address resource-oriented sanitation and waste management systems. Policies are cohesive but have not yet resulted in broad multi-sectoral actions. Efforts to harmonize different sectors are evident by employee functions or assignments and protocols.
<b>0</b>	<b>Fragmented policies</b>	The policy is fragmented and based on sector's specific scope and opportunities for co-benefits are hardly explored. However, effort may be made to balance the resource allocation between sectors.
<b>-</b>	<b>Opposing sectoral policies</b>	Overall policy on sanitation, waste and natural resource management is characterized by fragmentation and imbalance between sectors. The majority of resources are spent on the dominant policy field and overlaps between sectors lead to inefficient use of resources.
<b>--</b>	<b>Incompatible policies</b>	Policies between and within sectors are strongly fragmented and conflicting. This is evidenced by contradicting objectives and the squandering use of resources.

## Condition 6: Agents of change

### Indicator 6.1: Entrepreneurial agents.

**Predefined question: To what extent are the entrepreneurial agents of change able to gain access to resources, seek and seize opportunities and have an influence on decision-making regarding resource-oriented sanitation and waste management?**

Score		Description
<b>++</b>	<b>Long-term support for entrepreneurship</b>	There is recognition of the need for continuous innovation, hence applied research is enabled that explores future risk management and supports strategy formulation. The experiments yield increased benefits and new insights. This is recognized by other actors, thereby providing access to new resources. Continuous experimentation is secured by long-term and reliable resource allocation.
<b>+</b>	<b>Tentative experimental entrepreneurship</b>	There is a growing understanding of resource-oriented sanitation and waste management systems' uncertainty, complexity, and need for innovative approaches that entail a certain level of risk. Tentative experimental projects set in but are paid by conventional resources. Projects are small-scale pilots.
<b>0</b>	<b>Conventional and risk-averse entrepreneurship</b>	Entrepreneurial agents of change are better able to seize low-risk opportunities. Therefore, opportunities for innovative approaches and synergies are hardly pursued. Small changes can be observed.
<b>-</b>	<b>Room for short-sighted entrepreneurship</b>	Agents of change struggle to gain access to resources to address sanitation, waste and natural resource management challenges. Windows of opportunity to identify and to act upon perceived risks are limited. Opportunities to address stakeholders with potential access to resources are rarely seized.
<b>--</b>	<b>Insufficient entrepreneurship</b>	Ignorance for risk and threats leads to ineffective rigid governance and a lack of opportunity for entrepreneurial agents to enable improvements. Moreover, distrust by other actors and potential investors further decrease access to resources.

**Indicator 6.2: Collaborative agents.**

**Predefined question: To what extent are stakeholders enabled to engage, collaborate with and connect business, government and civil society actors to implement resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Agents of change enhance wide-spread synergetic collaboration</b>	There is an on-going build-up of productive and synergetic collaborations. Facilitators may even be administered to coordinate this through mediation and authority. There is a conception of the ideal collaboration composition.
<b>+</b>	<b>Agents of change can push for collaboration between new stakeholders</b>	There is an understanding that implementing resource-oriented sanitation and waste management systems requires long-term and integrated solutions. Hence, wide-spread collaborations between a variety of stakeholders and sectors are being established. New collaborations with unconventional actors, result, more and more, in valuable new insights and effective networks
<b>0</b>	<b>Agents are enabled to enhance conventional collaboration</b>	Traditional coalitions are preserved to maintain the status quo. There is trust within these coalitions. There is limited space to create new collaborations. If new collaboration occurs solutions are still mostly sectoral and short- to mid-term.
<b>-</b>	<b>Insufficient opportunities for collaborative agents</b>	There is an insufficient opportunity for agents of change to go beyond conventional collaboration. The current collaborations are deemed sufficient to deal with resource-oriented sanitation and waste management systems whereas the vision is limited to ad hoc command and control approaches.
<b>--</b>	<b>Lack of collaborative agents</b>	Collaboration is discouraged, because of a strong hierarchical structure. There is distrust between stakeholders and the willingness and thereby opportunities for collaborative agents are largely lacking.

**Indicator 6.3: Visionary agents.**

**Predefined question: To what extent are visionary actors in the city able to effectively push forward and manage long-term integrated strategies for resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Long-term vision supported by short-term targets</b>	Visionary agents of change in different positions and with different backgrounds actively and successfully promote a sustainable and long-term vision regarding resource-oriented sanitation and waste management systems, that is communicated clearly. Short-term targets fit long-term visions. There are interests and employment in trend analysis.
<b>+</b>	<b>Long-term vision with flawed communication</b>	There is a clear long-term, integrated and sustainable-oriented vision. There is still some discrepancy between short-term targets and implementation strategies and the long-term vision from visionary agents of change. This means that agents are not always clear in their formulation regarding the effect and impact of envisioned strategies.
<b>0</b>	<b>Defence of status quo</b>	The visions of the existing agents of change are limited to promoting the business as usual. They do not oppose nor promote long-term, integrative thinking. Interest or employment in trend analysis is limited.
<b>-</b>	<b>Unilateral and short-term vision</b>	There is a unilateral vision regarding resource-oriented sanitation and waste management systems, which considers a limited group of actors. The vision often has a short-term focus, with a maximum of 3 to 4 years.
<b>--</b>	<b>Deficient sustainability vision and short-term focus</b>	There is a lack of visionary agents that promote change towards a long-term, sustainable vision regarding resource-oriented sanitation and waste management systems. Diverging the expectations and objectives of stakeholders is the result. This may be evidenced by indecisiveness or even conflicts. Long-term and integrative initiatives may also be blocked.



## Condition 7: Multi-level network potential

Indicator 7.1: Room to manoeuvre.

Predefined question: To what extent do actors have the freedom and opportunity to develop a variety of innovative approaches and fit-for-purpose partnerships that can adequately address the implementation of resource-oriented sanitation and waste management systems)?

Score		Description
<b>++</b>	<b>Freedom to develop innovative solutions</b>	There is a common and accepted long-term vision for developing resource-oriented sanitation and waste management systems. Within the boundaries of this vision, actors are given the freedom to develop novel and diverse approaches and partnerships, resulting in continuous improvements and exploration. These partnerships are most likely institutionalized.
<b>+</b>	<b>Redundancy to address uncertainty</b>	There is a recognition that a high degree of freedom is necessary to deal with complex situations in the form of experiments and looking for new unconventional collaborations. There is a dynamic mix of cooperative partnerships and a redundant set of diverging alternative solutions. A clear overall vision to steer research is however lacking.
<b>0</b>	<b>Limited room for innovation and collaboration</b>	Actors are given the means to perform predefined tasks for dealing with problems that are framed with a narrow, short-term and technical-oriented scope. There is limited room to deviate. Solutions are sought in own sectoral field and expertise.
<b>-</b>	<b>Limited autonomy</b>	Only a few actors receive some degree of freedom, there are limited opportunities to develop alternatives, and there is hardly any opportunity to form partnerships with unconventional actors.
<b>--</b>	<b>Strictly imposed obligations</b>	The actions of stakeholders are strictly controlled and there are rigid short-term targets. Freedom to form new partnerships is strongly limited as actor-network composition is fixed and small. There are no resources made available for exploring alternatives that might be more effective or efficient whereas many actors that are affected by resource-oriented sanitation and waste management systems do not have a voice.

**Indicator 7.2: Clear division of responsibilities.**

**Predefined question: To what extent are responsibilities clearly defined and allocated, to effectively address the implementation of resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Dynamic, fit-for-purpose cooperation</b>	There is a lot of synergetic cooperation within the urban stakeholders that can provide solutions for resource-oriented sanitation and waste management systems. The roles and responsibilities are clearly divided amongst actors. The cooperation is dynamic and results in fit-for-purpose problem solving necessary to solve complex, multi-level and unknown challenges.
<b>+</b>	<b>Innovative cooperative strategies</b>	Actors recognize that knowledge and experience are scattered within the local network. Therefore, extra effort is made to bundle the scattered expertise and to reach fit-for-purpose division of clear roles and responsibilities. New cooperation compositions are explored.
<b>0</b>	<b>Inflexible division of responsibilities</b>	Responsibilities are divided over a limited set of conventional actors. Opportunities for new cooperation and more effective division of responsibilities are not seized or even recognized. Sometimes conventional actors get more tasks to deal with new sanitation, waste, and resource management challenges.
<b>-</b>	<b>Barriers for effective cooperation</b>	Authorities are fragmented or they lack interest. Moreover, miscommunication and lack of trust are causes that block effective sanitation, waste and natural resource governance.
<b>--</b>	<b>Unclear division of responsibilities</b>	There is an unclear division of responsibilities and often the relationships are over-hierarchical. Everybody expects someone else to make the required effort and trust is hardly found.

**Indicator 7.3: Authority.**

**Predefined question: To what extent are legitimate forms of power and authority present that enable long-term, integrated and sustainable approaches for implementing resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Strong well-embedded authority</b>	Long-term, integrated approaches regarding resource-oriented sanitation and waste management systems are well embedded in policy and regulatory authorities. Authoritative figures receive much support both politically and by society. Their opinions and statements also receive much media attention.
<b>+</b>	<b>Stirring authority</b>	There is recognition of the need for long-term and integrated approaches by both the public and the political arena. Sustainability approaches regarding resource-oriented sanitation and waste management systems are now implemented as declarations of intent and sustainability principles in policy and regulation. Legitimate authorities are assigned to coordinate long-term integrated policy and implementation.
<b>0</b>	<b>Restricted authority</b>	Resource-oriented sanitation and waste management systems is addressed as long as the status quo is not questioned. Long-term policy visions are limited, and new policy mainly needs to fit into existing fragmentized structure. This means small (technical) changes are occurring.
<b>-</b>	<b>Unfruitful attempts</b>	Resource-oriented sanitation and waste management systems are put forward by individuals or groups of actors, but there is only little interest which is also fragile due to poor embedding of sustainability principles in current policy mechanisms, interests, and budget allocation. The challenge may have been mentioned in reviews or reports but left unaddressed.
<b>--</b>	<b>Powerlessness</b>	The addressing of resource-oriented sanitation and waste management systems is regularly overruled with contradicting and competing interests and so it is hardly included in policy, regulation or administrative principles.

## Condition 8: Financial viability

### Indicator 8.1: Affordability.

**Predefined question: To what extent are resource-oriented sanitation and waste management services available and affordable for all citizens, including the poorest?**

Score		Description
<b>++</b>	<b>Sanitation &amp; waste management services and resources are affordable for all</b>	Programs and policies ensure resource-oriented sanitation and waste management services for everyone. This includes public infrastructure and private property protection. The solidarity principle is clearly percolated in policy and regulation
<b>+</b>	<b>Limited affordability of services</b>	Serious efforts are made to provide resource-oriented sanitation and waste management services for everyone, including vulnerable groups. There is often recognition that poor and marginalized groups are disproportionately affected by insufficient sanitation and waste management systems. This is increasingly addressed in policy and regulation
<b>0</b>	<b>Unaffordable services</b>	Basic resource-oriented sanitation and waste management services are affordable for the vast majority of the population, however poor people and marginalized communities have much difficulty to afford these services.
<b>-</b>	<b>Limited affordability of basic services</b>	A share of the population has serious difficulty to pay for basic sanitation and waste management services and essential resources such as neighbourhoods with low-income or marginalized groups. There is hardly any social safety net regarding these services and resources
<b>--</b>	<b>Unaffordable basic services</b>	Basic sanitation and waste management services and essential resources are not affordable or even available for a substantial part of the population. This may be due to inefficient or obsolete infrastructure, mismanagement or extreme poverty

**Indicator 8.2: Willingness to pay.**

**Predefined question: How is expenditure regarding resource-oriented sanitation and waste management systems perceived by relevant stakeholders?**

Score		Description
<b>++</b>	<b>Willingness to pay for resource-oriented sanitation and waste management systems</b>	Resource-oriented sanitation and waste management systems is fully comprehended by decision-makers. There is political and public support to allocate substantial financial resources. Also, expenditure for non-economic benefits is perceived as important. There is clear agreement on the use of financial principles, such as polluter-pays- and user-pays- or solidarity principle
<b>+</b>	<b>Willingness to pay for provisional sanitation and waste management services</b>	Due to growing worries about the sanitation and waste management crisis, there are windows of opportunity to increase funding. Financial principles, such as polluter-pays principle, may be introduced. Due to inexperience, implementation is often flawed. Focus groups decide on priority aspects regarding resource-oriented sanitation and waste management systems, but there is confusion regarding how to do actual implementation
<b>0</b>	<b>Willingness to pay for business as usual</b>	There is support for the allocation of resources for conventional tasks. There is limited awareness or worries regarding resource-oriented sanitation and waste management systems. Most actors are unwilling to financially support novel policies beyond the status quo. Generally, there is sufficient trust in local authorities
<b>-</b>	<b>Fragmented willingness to pay</b>	Willingness to pay for resource-oriented sanitation and waste management systems are fragmented and insufficient. The importance is perceived differently by each stakeholder. Generally, their estimates of the costs are substantially lower than the actual costs
<b>--</b>	<b>Mistrust and resistance to financial decisions</b>	There is a high level of mistrust in decision making of resource allocation. At this level financial decisions are based on prestige projects, projects that benefit small groups or specific interests. As expenditures often do not address the actual sanitation, waste and resource management challenges, there is a high degree of resistance regarding resource allocation

**Indicator 8.3: Financial continuation.**

**Predefined question: To what extent do financial arrangements support the long-term implementation of resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Long-term financial continuation</b>	There is secured continuous financial support for long-term policy, measures and research regarding resource-oriented sanitation and waste management systems. These costs are included into baseline funding. Generally, both economic and non-economic benefits are considered and explicitly mentioned
<b>+</b>	<b>Abundant financial support with limited continuation</b>	Abundant financial resources are made available for project-based endeavours that are often exploring new solutions but lack long-term resource allocation or institutionalized financial continuation. Hence, long-term implementation is uncertain
<b>0</b>	<b>Financial continuation for basic services</b>	Financial resources are available for singular projects regarding basic services of resource-oriented sanitation and waste management systems. The allocation of financial resources is based on past trends, current costs of maintenance and incremental path-dependent developments. Costs to deal with future sanitation, waste and resource management challenges are often not incorporated. Limited resources are assigned for unforeseen situations or calculated risks
<b>-</b>	<b>Inequitable financial resource allocation</b>	There are potential resources available to perform basic management tasks regarding resource-oriented sanitation and waste management systems, but they are difficult to access, are distributed rather randomly and lack continuity. No clear criteria can be found on the resource allocation. Resources allocation is ad hoc and considers only short-time horizons
<b>--</b>	<b>Lack of financial resources</b>	There are insufficient financial resources available to perform basic tasks regarding resource-oriented sanitation and waste management systems. Financing is irregular and unpredictable leading to poor policy continuation

## Condition 9: Implementing capacity

### Indicator 9.1: Policy instruments.

**Predefined question: To what extent are policy instruments effectively used and evaluated, to stimulate desired behaviour and discourage undesired activities and choices in the city?**

Score		Description
<b>++</b>	<b>Effective instruments enhance sustainable transformations</b>	There is much experience with the use of policy instruments. Monitoring results show that the current use of instruments proves to be effective in achieving sustainable behaviour. Continuous evaluation ensures flexibility and fit-for-purpose use of policy instruments
<b>+</b>	<b>Profound exploration of sustainability instruments</b>	Instruments to implement principles such as full cost-recovery and polluter-pays principle, serve as an incentive to internalize sustainable behaviour. The use of various instruments is explorative and therefore not yet optimized and efficient. The use of instruments is dynamic. There are a lot of simultaneous or successive changes and insights
<b>0</b>	<b>Fragmented instrumental use</b>	Policy fields or sectors often have similar goals, but instruments are not coherent and may even contradict. Overall instrumental effectiveness is low and temporary. There is sufficient monitoring and evaluation leading to knowledge and insights in how instruments work and actors are getting a more open attitude towards improvements
<b>-</b>	<b>Unknown impacts of policy instruments</b>	Instruments are being used without knowing or properly investigating their impacts on forehand. The set of instruments actually leads to imbalanced development and inefficiencies that are hardly addressed
<b>--</b>	<b>Instruments enhance unsustainable behaviour</b>	Policy instruments may enhance unwanted or even damaging behaviour that opposes sustainability principles. There is hardly any monitoring that can be used to evaluate the counterproductive effects of these policy instruments

**Indicator 9.2: Statutory compliance.**

**Predefined question: To what extent do stakeholders in the city respect agreements, objectives, regulations and legislation?**

Score		Description
<b>++</b>	<b>Good compliance to effective sustainable legislation</b>	Legislation is ambitious and its compliance is effective as there is much experience with developing and implementing sustainable policy. Short-term targets and long-term goals are well integrated. There is a good relationship among local authorities and stakeholders based on dialogues.
<b>+</b>	<b>Flexible compliance to ambitious explorations</b>	New ambitious policies, agreements and legislations are being explored in a "learning-by-doing" fashion. Most actors are willing to comply. Some targets may be unrealistic and requires flexibility
<b>0</b>	<b>Strict compliance to fragmented legislation</b>	Legal regulations regarding resource-oriented sanitation and waste management systems are fragmented. However, there is strictly compliance to well-defined fragmented policies, regulations and agreements. Flexibility, innovations and realization of ambitious goals are limited. Activity may be penalized multiple times by different regulations due to poor overall coordination
<b>-</b>	<b>Moderate compliance to incomplete legislation</b>	The division of responsibilities of executive and controlling tasks is unclear. Legislation is incomplete meaning that certain gaps can be misused. There is little trust in local authorities due to inconsistent enforcement typically signalled by unions or NGOs
<b>--</b>	<b>Poor compliance due to unclear legislation</b>	Legislation and responsibilities are unclear, incomplete or inaccessible leading to poor legal compliance by most actors. If legislation is present, it enjoys poor legitimacy. Actors operate independently in small groups. Fraudulent activities may take place



**Indicator 9.3: Preparedness.**

**Predefined question: To what extent is the city prepared for both gradual and sudden uncertain changes and events regarding resource-oriented sanitation and waste management systems?**

Score		Description
<b>++</b>	<b>Comprehensive preparedness</b>	Long-term plans and policies are flexible and bundle different risks, impacts and worst-case scenarios. They are clearly communicated, co-created and regularly rehearsed by all relevant stakeholders. The required materials and staff are available on short-term notice in order to be able to respond adequately. Evaluations on the rehearsals or reviews on dealing with calamities are available
<b>+</b>	<b>Fragmented preparedness</b>	A wide range of threats is considered in action plans and policies. Sometimes over-abundantly as plans are proactive and follow the precautionary principle. Awareness of risks is high, but measures are scattered and non-cohesive. They may be independent or made independently by various actors. Allocation of resources, staff and training may therefore be ambiguous
<b>0</b>	<b>Low awareness of preparation strategies</b>	Based on past experiences, there are action plans and policies addressing resource-oriented sanitation and waste management systems. Actions and policies are clear but actual risks are often underestimated and the division of tasks is unclear. They are not sufficient to deal with all imminent calamities or gradually increasing pressures. Damage is almost always greater than is expected or prepared for
<b>-</b>	<b>Limited preparedness</b>	Action plans are responsive to recent calamities and ad hoc. Actual probabilities and impacts of risks are not well understood and incorporated into actions or policies. Reports can be found on how the sanitation, waste and natural resource management sectors deal with recent calamities
<b>--</b>	<b>Poor preparedness</b>	There are hardly any action plans or policies for dealing with (future) calamities, uncertainties and existing risks. The city is highly vulnerable

## **4 Narrative substantiation for GCF scores and governance capacity factors**

The information below provides a detailed narrative on the factors enhancing and limiting governance capacity to implement resource recovery of organic waste streams in Chía, on which the summarised results in the paper are based.

### **4.1 Factors enhancing governance capacity to implement resource recovery of organic waste streams.**

At the county level, there are actors working in successful initiatives linked to resource recovery from organic waste streams such as the private companies *GreenFuel*, *BioAmbientar*, *Ecocracking*, *Biolodos* and *Ecociclus* (indicator 6.1). Stakeholders involved in these initiatives exhibit knowledge

about the technologies and processes required for integrating waste management and sanitation into CE (indicator 1.1). They are also aware of the environmental, economic, and social benefits and trade-offs of implementing CE in Colombia, which motivates their involvement in these initiatives (indicator 1.3).

Furthermore, there are collaborations among stakeholders and institutions working together to implement resource recovery from organic waste streams at local and county level (indicator 6.2). Most of these collaborations are public-private partnerships (PPPs). In Chía, several secretariats, EMSERCHÍA, private companies, and citizens have been involved in the *Circuito Verde* program. In the municipal nursery, liquid and solid fertilizer is made from organic waste coming from the market, the desludging of domestic on-site septic tanks and the slaughterhouse. In Cajicá, a neighbouring town within the county, the municipal authorities have implemented a composting program through an agreement with a private company which transforms organic waste into compost and delivers it to citizens. In Cota, another private company (Ecocracking), has engaged with 11 municipalities within Cundinamarca County to collect their waste and generate energy in the form of biofuel.

The existing initiatives for resource recovery from organic waste streams have led to citizens and other stakeholders in the waste management chain becoming aware of the potential ways to reuse organic waste (indicator 1.1, indicator 1.3). Residents in some areas of Chía are interested in learning about household-scale fertilizer or compost production. Farmers growing commercial flowers have also demonstrated interest in using organic waste as fertilizer since they noticed positive impacts like thicker plant stems. Waste pickers also recognise the value of resource recovery approaches since they are concerned about the status of the Mondoñedo landfill, which has already exceeded its capacity (Sarralde, 2018).

Training activities and events linked to sanitation and waste management provide a variety of stakeholders with opportunities to collaborate, interact and learn from each other (indicator 4.1, indicator 6.2). For instance, EMSERCHÍA and other secretariats working in the waste management service chain have implemented training programs for citizens and waste pickers. Common topics of these programs include source separation of waste and enforcement of waste management regulations. In addition, certain entrepreneurs with knowledge about composting or the management of used vegetable oil frequently offer trainings to waste generators including citizens and other companies, hence contributing to community knowledge (indicator 1.1).

In Chía, almost the entire population have access to municipal solid waste collection and sanitation services (Ruiz, 2015). This is in part due to Colombian regulations which stipulate that high-income sectors of the society must pay higher taxes to subsidize public services like waste management and sanitation for the lower-income sectors (Official Journal of the Colombian Government, 2015). These taxes also cover the service of transformation of recyclable waste (CRA, 2016). Actions led by municipal authorities in recent years have contributed to the improvement of sanitation and waste management services for most of the citizens in the municipality (indicator 8.1). For example, citizens from the most vulnerable areas of the municipality have had access to financial support to clean dirty ditches and other areas where waste was typically disposed of. Furthermore, the existing resource recovery products are available and affordable for all the citizens e.g. the fertilizer produced within the municipal nursery which is delivered free of charge to all the farmers that want it (indicator 8.1).

There are mechanisms, institutions, and spaces that promote citizen participation in decision-making in Chía, including on waste management and sanitation matters (indicator 4.1). There is a Citizen Participation Office through which the municipal authorities empower citizens by providing tools

and information to actively engage them in any public decision-making processes, hence making these processes more transparent (Alcaldía Municipal de Chía, 2020). There are also 59 neighbourhood associations (*Juntas de Acción Comunal*) that serve as a transparent communication channel between citizens and the public institutions. In this regard, several neighbourhood associations played a key role in involving citizens in the decision-making process about the project for connecting the sewerage network to the surrounding areas of Chía.

#### **4.2 Factors limiting governance capacity to implement resource recovery from organic waste streams.**

It was observed that there is not enough information publicly available from the municipal authorities of Chía and other related public institutions to promote the implementation of resource recovery from organic waste streams (condition 2). Municipal authorities do not have sufficient information on the quantities, types and sources of organic waste (solid and liquid) generated nor on the potential uses of the resources available in the waste. The national strategy to implement the sustainable development goals (Departamento Nacional de Planeación, 2018a) also points out that public institutions in Colombia have an information gap regarding the collection and disposal of urban solid waste as well as the amount of treated wastewater in the cities (indicator 2.1). Furthermore, transparency and access to environmental information is generally limited (indicator 2.2). In Chía, any information available regarding waste management and sanitation appeared to be fragmented among municipal authorities such as Secretariat of Environment, Secretariat of Health, EMSERCHÍA or the *Corporación Autónoma Regional de Cundinamarca* (CAR) – the regional authority responsible for sanctioning environmental practices. Consequently, obtaining information seems to always require a lot of time and effort to navigate the bureaucracy.

Most of the stakeholders within the public sector in Chía seem to be unaware of the environmental, social and economic benefits that implementing resource recovery from organic waste streams may bring to the municipality (condition 1). There is limited understanding of potential revenues that can be obtained from products of resource recovery from organic waste streams, as well as of the costs associated with linear approaches to waste and resource management. This contributes to the general perception within the public sector that implementing resource recovery entails more costs than benefits (indicator 8.2). Besides, wastewater and sludge reuse appear to be a concept that still holds negative connotations and stakeholders are more aware about resource recovery from solid waste e.g. via recycling, than about wastewater (condition 1).

Regular monitoring, follow-up, and assessment of outcomes of environmental policies, programs and actions seems to be insufficient at the local and regional level (indicator 3.1, indicator 3.2). For instance, few of the local management plans for solid waste within the municipalities in Cundinamarca County are evaluated by the CAR, the institution responsible of their assessment. This is in part because there are no proper assessment methods to evaluate ongoing processes and outcomes of environmental projects or strategies. Besides, Chía does not have a proper system to monitor local resource recovery processes. The absence of monitoring activities linked to the fertilizer production initiative in the municipal nursery, and of data about the quantities of resource recovery products generated in the *Circuito Verde* program are examples of these issues. In contrast to public sector initiatives, there seems to be more active monitoring and evaluation activities in the private sector, especially to recognize underlying trends or alarming situations that could affect their economic benefits or to ensure that they comply with regulations. For example, several supermarkets monitor the amount of organic waste generated at their premises and check that it is effectively managed to comply with health regulations. The organization of waste pickers also monitors the type and quantity of recyclable waste that they collect to comply with the national

laws. However, this information is rarely publicly available nor easily accessible to other potentially interested stakeholders (indicator 3.3).

Within the Colombian public sector, responsibilities for sanitation, waste management and resource recovery are fragmented across different sectors (Indicator 7.2). This is also reflected at the local level in Chía. For example, the policies that affect these issues are fragmented across different sectors such as health, environment, and urban planning. Furthermore, although the roles of some institutions and the responsibilities of stakeholders are clearly defined in theory, there is confusion about what those responsibilities imply in practice. This results in no specific institution taking the lead in making concrete actions for implementing resource-oriented sanitation and waste management (indicator 7.3). This is exacerbated by the absence of multidisciplinary teams and cross-sectoral platforms that could bring together multiple stakeholders with an interest in resource recovery practices (indicator 3.3). While local stakeholders linked to resource recovery initiatives can meet occasionally at training events, none of these opportunities has been developed into a formalized platform for cross-sectoral collaboration and knowledge exchange.

National plans and strategies established in recent years include some goals to increase both organic waste reuse and wastewater treatment in the country. For instance, the national strategy for circular economy (Gobierno de la República de Colombia, 2019) mentions that the goal for 2030 is to increase reuse of organic waste by 30% compared to the baseline. A 10% increase in energy generation from organic waste is also included, as well as increasing the portion of treated urban wastewater to at least 54%, all by 2022. The national strategy for the implementation of the sustainable development goals (Departamento Nacional de Planeación, 2018a) also contains targets for waste reuse and wastewater treatment. Although these strategies are quite ambitious, specific action steps for resource recovery from organic waste streams and clear paths for how to achieve the specified targets are absent from the plans (indicator 5.1). Furthermore, none of these strategies contains long-term goals for horizons up to 2050. Short-term vision also influences initiatives at municipal level where stakeholders, such as those involved in the local resource recovery initiatives, are often not able to push forward long-term strategies in Chía beyond four-year election cycles. Therefore, the implementation of resource-recovery highly depends on the political will of elected officials like the mayor (indicator 1.2).

In Chía, medium-and long-term goals that consider resource recovery strategies and clear paths to achieve sustainable sanitation and waste management are missing within municipal plans and strategies (indicator 5.1). Municipal resources are channelled largely into the upstream stages of the waste service chain e.g. improving waste collection services, extending the coverage of the sewer network and separating stormwater from wastewater (condition 8). It is assumed that investing in infrastructure that is tangible and visible to citizens brings more benefits to the community than investing in long-term solutions for resource recovery. Similarly, ad hoc repairs to the WWTP have been the trend for several decades rather than updating the infrastructure and investing in new technologies that could boost resource recovery from wastewater. The Sanitation and Discharge Management Plan (Sánchez, 2015) does not include goals for wastewater reuse, even for non-potable purposes, nor the use of sludge for energy production and nutrient recovery. Furthermore, the Solid Waste Local Management Plan (Consultoría y Dirección de Proyectos SAS, 2016) includes no plans for scaling up the two local resource recovery initiatives and reusing all the organic waste generated in the municipality.

Despite the existence of resource recovery initiatives promoted by the private sector, entrepreneurs with a vision of a circular economy often have insufficient support or incentives from the state to develop their businesses (indicator 8.3). For this reason, many private sector actors perceive

investing in resource-oriented sanitation and waste management in Colombia, and in Chía by extension, as a risk. Furthermore, several of them needed to get support from international stakeholders to start their projects (indicator 8.2).

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