BEWOP

TOOL SERIES

Green Utility Toolkit

OPERATIONAL TOOL

TRAINER'S MANUAL

GWOPA Global Water Operators' Partnerships Alliance

UN-HABITAT FOR A BETTER URBAN FUTURE

UNESCO IHE DELFT

A joint initiative of GWOPA/ UN-Habitat and IHE Delft Institute for Water Education

Ministry of Foreign Affairs of the Netherlands

Cooperación Española

Funded by the Dutch Ministry of Foreign Affairs and the Spanish Agency for International Development Cooperation

Principal Author
Andrés Cabrera Flamini, a.cabrera@un-ihe.org

BEWOP

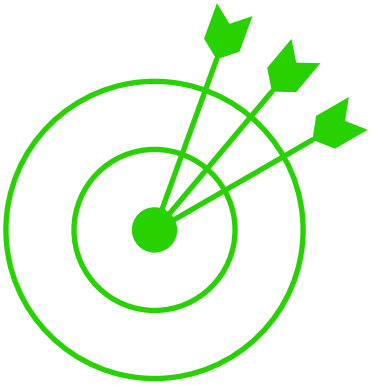
Water Operators' Partnerships are peer support arrangements between two or more water and sanitation operators, carried out on a not-for-profit basis with the objective of strengthening operator capacity.

The Boosting Effectiveness of Water Operators' Partnerships (BEWOP) initiative is producing a series of guidance materials, tools and games to help WOP partners expertly plan and implement WOP partnerships and effectively learn and share knowledge with one another.

Two types of products feature in the second phase of this BEWOP initiative. Process Tools support WOP participants prepare for, design, implement and follow through with their WOPs. Operational Tools support in the transfer of knowledge on specific operational topics relevant for water utilities.

Find out more

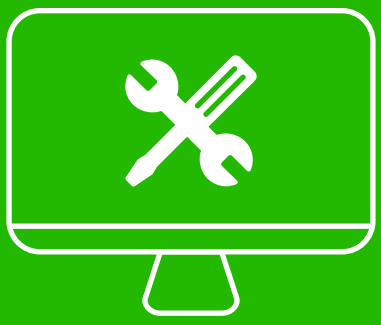
bewop.un-ihe.org | **BEWOP.org** | **#BEWOP**



Objectives

The Green Utility Toolkit is a self-assessment strategic planning and monitoring tool for water and wastewater utilities that are interested and willing to improve their practices in a sustainable and environmentally-conscious manner. As such, the terms 'green' and 'greening' refer to the processes and activities that can be implemented by utilities to support their development along the 3 pillars of sustainability – Social, Environmental, and Economical – while considering a long-term business horizon.

Through a didactic participatory session, identify what being "green" is for your organization and develop a coherent plan of action and monitoring.



How this tool works

The tool contains 7 steps that lead water utilities' staff (and other stakeholders) to define:

(i) What being a Green Utility means for them,

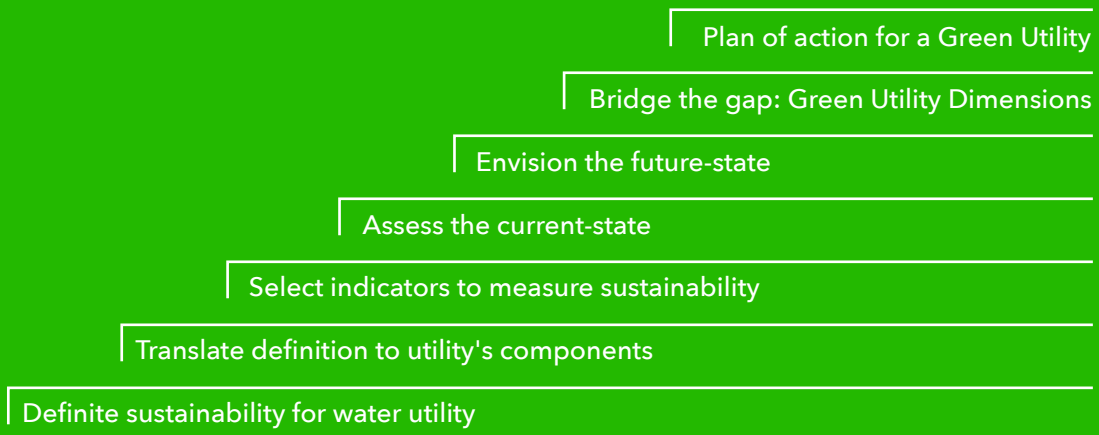
(ii) How they intend to measure its performance,

(iii) Where they envision their utility in the future, and

(iv) How they plan to get there.

By doing so, expectations, definitions and plans are made explicit and can be built upon.

The 7 steps, which together target each of the objectives described above, lead to the development of a Plan of Action for becoming a Green Utility as so:



Ideally, all 7 steps will be completed sequentially; this could take anywhere between ½ to 2 days depending on the knowledge, depth, and time availability of utility staff. If time is restricted, the 7 steps can be carried out in separate sessions during a longer time span. It is of value to ensure participants are continuously reminded that the outcomes will lead to a Plan of Action, as this provides a concrete, applicable outcome to the process.

Alternatively, if the utility has already defined some of the aspects of the tool, such as how the staff should define sustainability and what indicators they are bound to use, steps 1-3 can be skipped[1].

The Green Utility Toolkit can be implemented differently depending on the number of participants and their familiarity with the utility's activities and processes.

If the number of participants is below 5, steps 2-6 can be done individually. If the number of participants is greater, the facilitator can alternate between group and individual work based on time constraints and interests. Additionally, steps 3-7 can be carried out with participants being divided into thematic groups based on their expertise, role within (or in relation to) the organization, and interests.

1. This approach is the least desirable as it does not provide the opportunity for staff to develop a context-adequate, common understanding of sustainability for the water utility. This further hinders defining the most relevant indicators required for monitoring and planning.

The Green Utility Toolkit can also be used with different utilities at the same time, where staff from each utility is grouped together. The added value of doing this is the exchange of experiences and knowledge among utilities, as well as facilitating cross-utility benchmarking schemes.

This Facilitator's Manual is intended to be used in parallel with the Participant's Manual, the Green Utility Presentation, and the Green Utility spider chart application (for steps 4 and 5) from the Green Utility Toolkit. Additionally, the Green Utility Concept Note provides a review of academic and practitioner literature to support the facilitator in preparing for the workshop.

If you wish to share your experiences and/or have points for improvement of the Green Utility Tool, we welcome your insights. You can contact us at a.cabrera@un-ihe.org.

Access the full Tool here

http://bit.ly/BEWOP-GUT_Tool

Contents

1. Defining Sustainability

Estimated run time: 45-70 minutes

This step consists of building a common understanding among participants on what it means to be sustainable, specifically for the case of their water utility. As this is a conceptual exercise, three possible approaches are provided to the facilitator; the facilitator must then choose, if possible with consensus from participants, which of the approaches to use based on participants' capacities.

The first and second approach – Sustainability Synonyms – involve selecting from a wordlist those that more closely relate to what sustainability means for the participants' water utility. Both of these approaches require that participants have a good command of English, or that the words are translated into the local language. To accommodate for varying capacities, two sustainability wordlists are provided – Annex A1: Sustainability Synonyms (full list) and Annex A2: Sustainability Synonyms (short list) – with the short list being a simplified version of the full list. To use these, follow these steps:

1. Divide the participants into groups of 3-5 people and provide each group with a copy of Annex A1: Sustainability Synonyms or Annex A2: Sustainability Synonyms (short list).
2. Individually, each participant selects the 3 words that best represent sustainability for their organization. ***Time allotted: 5 minutes***
3. Within their groups, each participant shares their chosen 3 words and explains why they are the most relevant aspects. The group must then agree on the top 5 words that represent sustainability. ***Time allotted: 15 minutes***
4. In plenary, each group shares their top 5 words and explains why these were selected. The participants together then attempt to consolidate a working definition for sustainability based on the words chosen in by each group. ***Time allotted: 15 minutes***

The third approach – Circles of (Green) Development – provides a more conceptual approach to defining sustainability, with the added value that it readily links to the Stages of a Green Utility: e.g. when Core Tasks are sustainable then the water utility has completed its Early Green Utility stage (see Green Utility Concept Note pg. 14 – 16). This approach also takes a longer time and requires more engaged facilitation. When using this approach, the goal is for participants to identify which tasks and/or areas are vital for developing or strengthening their sustainability. For this approach, follow these steps:

1. Divide the participants into groups of 3-5 people and provide each group with a copy of Annex A3: Circles of (Green) Development.
2. Have each group fill out the three circles. ***Time allotted: 15 minutes***
3. In plenary, have participants come to a consensus on the tasks in each circle, in order to have a common Circles of (Green) Development for the workshop. ***Time allotted: 15 minutes***
4. Based on the plenary's result, have each participant individually come up with 3 words that describe how sustainability should "look like" for their organization. Participants should focus on prioritizing sustainability from the inner circle to the outer circle. ***Time allotted: 10 minutes***
5. Within their groups, each participant shares their 3 words and explains why they are the most relevant aspects. The group must then agree on the top 5 words that represent sustainability. ***Time allotted: 15 minutes***

6. In plenary, each group shares their top 5 words and explains why these were selected. The participants together then attempt to consolidate a working definition for sustainability based on the words chosen in by each group. ***Time allotted: 15 minutes***

Note to Facilitator: Arriving to a common working definition can be challenging. Seek to foster consensus and remind participants that as a ***working definition***, it can (and likely will) be tailored and changed as the workshop moves on. Once the participants have achieved consensus, write the working definition so that it is visible to participants throughout the workshop (on a poster, flipchart, board or screen).

Note to Facilitator on third approach: It can be challenging for participants to take a broader view of the tasks and come up with encompassing or integrating words to describe sustainability. Encourage them to find words that can apply or refer to more than one task.

Alternative application: If participants wish to delve deeper into defining sustainability, in the 2nd step (5th step for the third approach) participants can be asked to identify 3 words that do ***not*** represent sustainability for them. These can support in further tailoring the working definition of sustainability during the plenary session. You should expect this to lead to further discussions and a longer run-time.

2. Translating to Components

Estimated run time: 45-105 minutes

In this step, participants will translate their working definition of sustainability into the different overarching activities and processes carried out by the water utility, termed here as ***components***. To achieve this:

1. Guide participants/groups to the next step in their manuals, and/or provide to each participant/group a copy of Annex B: Sustainability-based Components.

2. Ask the participants/groups to review the components and decide if there are any missing or unnecessary components, based on the activities and processes carried out by the water utility. ***Time allotted: 5 minutes***

3. Based on the working definition of sustainability, each participant/group will further describe how sustainability translates into each of the chosen components. For example, they will provide a description of Organizational Sustainability, Financial Sustainability, and so on, for the relevant water utility. ***Time allotted: 15-30 minutes***

4. In plenary, participants/groups present their descriptions to each other. Participants/groups go through all their components and receive feedback, keeping in mind the working definition set forth. ***Time allotted: 25 minutes***

5. Alternatively, the 1st participant/group presents the 1st component and then in plenary all participants/groups come to a consensus on the 1st component. The next participant/group presents the next component, and so on. This approach facilitates all participants/groups working with a common framework, yet it requires more time to implement. ***Time allotted: 45 minutes***

3. Selecting Relevant Indicators

Estimated run time: 70-110 minutes

During this step, participants will choose the indicators that are deemed most suitable to assess and monitor the sustainability-based components developed in the previous step. For this, the Green Utility Tool has a battery of indicators common to the water sector, compiled from academic and practitioner sources. It can also be worthwhile to incorporate the indicators already being used by the utility, in order to assess whether these indicators are useful for assessing sustainability or they need tailoring/updating. ***This means that before the workshop, the facilitator should obtain the indicators currently in use and include them with the battery of indicators presented in this tool.*** The chosen indicators will form the base for the remaining steps. To achieve this:

1. Provide each participant/group with a copy of Annex C: Clustered Indicators and Annex D: Indicators Detailed, as well as the utility's current indicators. Then guide participants/groups to the next step in their manuals, or provide to the each participant/group a copy of Annex E: Selected Indicators or Annex F: Selected Indicators (full), depending on the workshop approach taken.
2. They will then select from the indicators (approximately) 25 indicators. Each participant/group can define relevant indicators for all components, or each participant/group can be assigned a number of components to which they must assign indicators. ***Time allotted: 30 minutes***
3. Participants/groups will then present the indicators chosen and explain why the indicator is important to measure the sustainability of the water service provider. This can be done for all indicators if time permits, or focus can be given to debated indicators. It is important to find a balance in the number of total indicators (no more than 20-25 are recommended) since too many indicators will be difficult to measure effectively, and too few indicators will not give an integral view on the progress of the utility. ***Time allotted: 30-60 minutes***
4. Participants/groups (or everyone in plenary) will then finalize their list of indicators. ***Time allotted: 10-20 minutes***

Note to Facilitator: In order to compile and select the adequate number of indicators, it is recommended to have a break in the workshop at this point, preferably sufficient time for the facilitator to look over the suggested indicators and compile the most effective ones (this can be done with key staff from the utility). This will make it easier to keep the number of indicators at the recommended level (20-25 total), which will make the workshop and the remaining steps manageable and within the stipulated time.

4. Assessing the Current-State

Estimated run time: 30-60 minutes

Based on the indicators chosen, this step focuses on participants providing a qualitative assessment of the current state of sustainability of the water utility. To achieve this:

1. Define whether each participant/group will assess all chosen indicators, or if groups of indicators will be assigned to specific group(s) or participant(s) based on their interests, expertise and roles within the water utility. ***Time allotted: 5 minutes***
2. Guide participants to the next section of their manual and/or provide each participant/group with a copy of Annex G: Scoring the Indicators (if the indicators will be divided) or Annex H: Scoring Indicators (full) (if each participant/group will evaluate all indicators chosen). Alternatively, (depending on the number of participants) this can be done in a plenary form with the facilitator going through the indicators and tallying how participants vote.
3. Participants/groups assign for each indicator the relevant international, national or organization-specific standard/guideline against which the performance will be assessed. Afterward, they will assess the current state of the water utility (with the letter "C"). This assessment is qualitative during the workshop, ranging from ***Very Low*** to ***Very High***, with participants later translating these qualitative values into quantitative, measurable values based on the standard/guideline selected. ***Time allotted: 10-20 minutes***
4. Assessments are presented among participants in order to reach a consensus on the current state of the water utility. ***Time allotted: 15-30 minutes***

Note to Facilitator: Highlight that participants need to be able to justify how they are assessing/scoring a given indicator, e.g., what is the difference between ***low*** and ***high***, what is this assessment based on: experience, comparison with other sectors, etc.

5. Envisioning the Future-State

Estimated run time: 50-65 minutes

In this step, participants will imagine their ideal green utility. Participants will again score the indicators from the previous step, this time considering what their utility should score in the future in order to be considered a sustainable green utility. To achieve this:

1. Define with the participants how far in time they want to envision their utility. That is, decide on the time frame they want to set to become a Green Utility, e.g. 20 years. ***Time allotted: 5 minutes***
2. Guide participants to the next section of their manual and/or provide participants/groups with a copy of Annex I: Considered Restrictions. Participants/groups will reflect and make explicit the restrictions they have considered when setting their future objectives. For example, weak institutional regulatory capacity or lack of sources of funding. ***Time allotted: 15 minutes***
3. Return to Annex G or Annex H (depending on the one used in the previous step). Participants/groups will mark where their utility should be in the defined time-frame (with the letter "F"). ***Time allotted: 10-15 minutes***
4. Groups/participants discuss in plenary their scores, highlighting where gaps between the current-state and the desired future-state of the utility. ***Time allotted: 20-30 minutes***

Having completed steps 4 and 5, participants will now have a planning and monitoring tool to guide and assess the progress of their utility towards a greener path. To support the visualization and planning of this process, use the Green Utility spider chart application.

Note to Facilitator: Highlight during the presentation of this exercise that the future-state should be challenging yet achievable. The considered restrictions can provide useful inputs to senior-level staff in the utility and relevant public/private sectors on external aspects that need to be addressed for the utility to achieve its green goals.

Alternative application: As an additional step, after the restrictions have been made explicit in the 4th step, participants could be invited to reconsider their ideal green utility if those restrictions were removed. This will provide participants and the utility with a "best-case" scenario that can support in leveraging with external stakeholders that influence the stated restrictions.

6. Bridging the gap: Green Utility Dimensions

Estimated run time: 50-95 minutes

Having identified the differences between the current- and future-state of the utility, participants/groups will now identify and select various approaches to bridge these gaps. This process will be based on the 3 dimensions of the Green Utility framework, namely Current Practices, Pathways, and Green Turn-over. To achieve this:

1. As the facilitator, present and explain the dimensions of a Green Utility. The presentation and concept note in the Green Utility Toolkit will support you in doing so. ***Time allotted: 10-15 minutes***
2. Define whether each participant/group will provide approaches in the 3 dimensions for a group of indicators, or if each dimension will be assigned to specific group(s) or participant(s) based on their interests, expertise and roles within the water utility. ***Time allotted: 5 minutes***
3. Provide each group or participant with a copy of Annex J: Indicators and Green Utility dimensions (if the indicators will be divided among groups or participants) or Annex K: Indicators and Green Utility dimensions (full) (if the dimensions will be assigned to different groups for all the indicators chosen). Groups or participants will then explore and suggest relevant approaches and measures that support them in becoming a Green Utility. ***Time allotted: 20-45 minutes***
4. Groups/participants share in plenary their results, aiming to identify similar or complementary approaches. Time allotted: ***15-30 minutes***

Note to Facilitator: It is possible to have all groups and/or participants go through all the indicators for all the dimensions, however this can be quite time consuming.

7. Planning for a Green Utility

Estimated run time: 50-80 minutes

This last step aims to support participants in strategizing the most effective and feasible approaches to garner support and achieve results towards the development of their Green Utility. As such, participants will develop a preliminary and concrete plan of action for implementing the approaches of the previous steps within their selected time frame. To achieve this:

1. Define whether each group or participant will assess all chosen approaches, or if the approaches will be grouped and assigned to specific group(s) or participant(s) based on their interests, expertise and roles within the water utility. ***Time allotted: 5 minutes***
2. Provide each group or participant with a copy of Annex L: Green Utility Plan of Action, and have them fill it out. ***Time allotted: 15-30 minutes***
3. In plenary, share the different results and work towards creating a single, comprehensive Plan of Action. ***Time allotted: 30-45 minutes***

Congratulations! Having gone through these 7 steps, the participants (and their water utility) will now have achieved the following:

i. A jointly-developed working definition of sustainability translated into the components of activities and processes in their utility, i.e. how they interpret their utility as a Green Utility,

ii. A set of indicators that can be incorporated and used in their utility's activities and processes to measure and monitor their performance towards becoming a Green Utility,

iii. A jointly-developed assessment of where their utility currently stands and where it wants to be in the future,

iv. A chosen set of approaches and measures, with their respective time-frames, financial overview, and responsible parties, to support and guide the path towards becoming the Green Utility they envision.

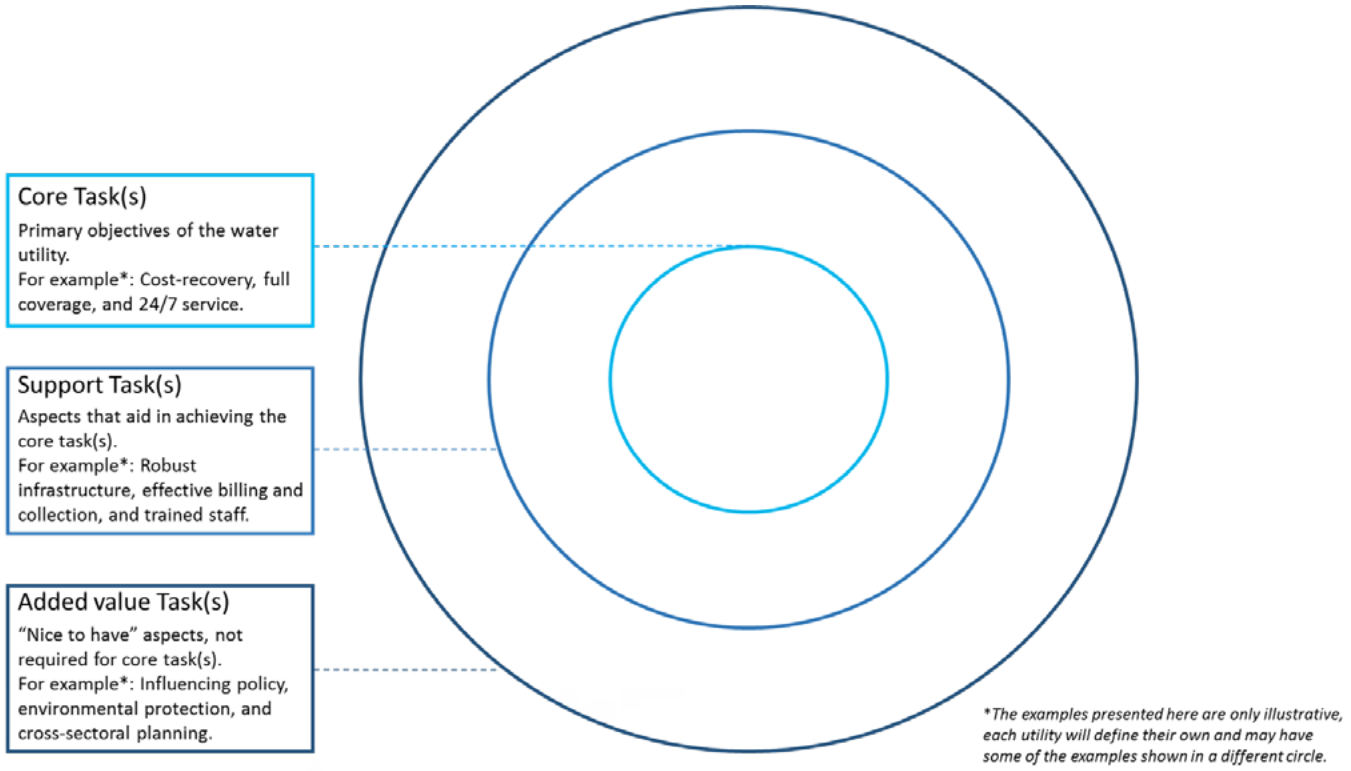
Annex A1: Sustainability Synonyms (full list)

adaptive	alternative	awareness
bio-degradable	circular	clean technologies
climate-resilient	climate-responsive	continuous
cross-cutting	diverse	durable
efficiency	effective	energy conscious
environmental protection	environmentally friendly	environmentally conscious
equitable	ethical	fair
feasible	financially viable	flexible
future-orientated	global	green
green infrastructure	green processes	holistic
imperishable	inclusive	innovative
interdisciplinary	intergenerational	liveable
local	long-term	maintainable
mitigation	multi-sectoral	participatory
political	profitable	reduction of greenhouse gases
renewable resources	resilient	robust
triple bottom line (Economic, Environmental, and Social)		
social	sufficient	supportable
unceasing	unending	variable
viable	workable	worthwhile
other		

Annex A2: Sustainability Synonyms (short list)

adaptive	alternative	awareness
circular	clean technologies	climate-responsive
continuous	cross-cutting	diverse
durable	efficient	effective
energy conscious	environmentally conscious	equity
feasible	financially viable	flexible
future-orientated	green infrastructure	inclusive
innovative	integral	inter-disciplinary
inter-generational	liveable	mitigation
multi-sectoral	participatory	renewable resources
resilient	robust	socially focused
worthwhile	other	

Annex A3: Circles of (Green) Development



Annex B: Sustainability-based Components

Components	Description
Organizational	
Financial	
Operational	
Technological	
Environmental	
Social	
Institutional	
Sectorial	
Other	

Annex C: Clustered Indicators

	Cluster	Description
1	Acceptable drinking water quality	Combination of physical, chemical, biological, and organoleptic characteristics meet established (local, national, international) guidelines/ criteria.
2	Acceptable treated sewage discharge quality	Combination of physical, chemical, biological, and organoleptic characteristics meet established (local, national, international) guidelines/ criteria. Sewage sludge can be safely used for agricultural purposes.
3	Acceptable water quality from source (rainwater, surface, groundwater or re-use)	Combination of physical, chemical, and biological characteristics meet established (local, national, international) guidelines/criteria for water bodies.
4	Safe sanitation practices	Population have sustainable access to sanitation services that are deemed appropriate for public and environmental health
5	Provision of sufficient water quantity	Water provided covers the needs of citizens, businesses, and public organizations (hospitals, parks, etc.) in accordance to established (local, national, international) guidelines/criteria.
6	Sustainable water quantity from source(s)	Ensuring renewable water sources by keeping the amount of water withdrawn from sources below the recharge capacity of said sources, includes groundwater recharge.
7	Water/wastewater system efficiency	The reduction of (unnecessary) losses within the water system as a whole, e.g. for drinking water includes aspects such as non-revenue water and for WW the BOD5 removal capacity.
8	Non-water related system efficiency	The improvement in efficiency of supporting processes, such as energy consumption or consumables used (chemicals, etc.).
9	Resource recovery	Amount of resources used in treatment process that can be recovered and re-used for the same, additional or other processes, such as energy, nutrients, chemicals, or other consumables.
10	Sustainable coverage of a growing population	Capacity to foresee, prepare, and adequately respond to the pace of a changing population with varying and (at times) contradicting needs.
11	Organizational capacity	Organizational structure is arranged and adapted to include environmental sustainability as a priority; staff knowledge is strengthened and updated periodically in environment and sustainability topics.
12	Financial horizon	Financial viability of the system as a whole (technical, operational, infrastructural, organizational) in the short- and long-term.

	Cluster	Description
13	Operations & Maintenance	Processes and activities undertaken to maintain the system functioning to the required standards.
14	Infrastructure / Asset Management	Assessment of existing and future infrastructure and assets, with a focus on decision-making instances.
15	Protection of the natural environment	Processes and activities undertaken to ensure the perennial protection (and recovery) of the natural environment.
16	Development of external networks	Capacity of the organization to develop, maintain, and influence the range needs and requirements of external stakeholders
17	Resilience	System's capacity to withstand and recover from adverse shocks.
18	Carbon neutrality	The system's transformation towards a reduction and/or mitigation of the emission of greenhouse gases.
19	Access to services	Degree of ease with which customers can gain access to the service(s) provided.
20	Strategic Environmental Planning Mechanisms	The development, implementation and monitoring of long-term strategic plans related to the incorporation of environmental sustainability.
	Other:	If there are *relevant* indicators you find missing, include them for the discussion.

Annex D: Indicators Detailed

	Cluster	Indicators (Units *where available*)	Sources
1	Acceptable drinking water quality	1. Quality of water supplied complies with required standards in tests performed throughout the year (% of approved sample tests per year) 2. Water quality complaints (No. of water quality complaints/year (e.g. aesthetics) 3. Risk of infection (Number of affected persons/100,000 population) 4. Exposure to toxic compounds (Number of affected persons/100,000 population) 5. Coliform count below established standards (% of approved sample tests per year) 6. Residual chlorine a. Tests for residual chlorine (% of # required) b. Residual chlorine complies with established standards (% of samples) 7. Number of waterborne outbreaks (#/year) 8. Number of affected people (#/year; # customers affected / customers served)	1 - 4: Foxon et al (2002), 5: Lundin et al (1999), 6: IBNET (2004), 7-8: Hellström (2000), van Leeuwen (2012), European Commission (1998), Vitens (2017)

	Cluster	Indicators (Units *where available*)	Sources
2	Acceptable treated sewage discharge quality	1. Level of treatment: primary, secondary or tertiary. 2. Effluent quality tests in compliance with established standards (%) 3. Parameters for quality of effluent: a. Removal of BOD_5, P and N (%) b. Loadings of BOD_5, P and N discharged to water source. (g/year) c. Removal of toxic components, e.g. Cd, Hg, Cu, Pb. (%) d. Loadings of toxic components to water source, e.g. Cd, Hg, Cu, Pb, discharged to water source (g/p/year) e. Loadings of toxic components to arable soil, e.g. Cd, Hg, Cu, Pb, discharged to water source (g/p/year) f. Oxygen consumption potential OCP (kg O_2/p/year) g. Contribution to acidification H+ -eqv (Mol/p/year) 4. Eutrophication (kg/person/year) 5. Sewage sludge that can be safely used in agriculture based on organic/inorganic micro-contaminants (%)	1: IBNET (2004), 2: Foxon et al (2002), 3a/b: Lundin (1999), 3c-g, 4: Hellström (2000), 5: van Leeuwen (2012)
3	Acceptable water quality from source.	Adjust and select the indicators based on the local regulation guidelines used if they exist or global guidelines instead. If possible, discern between surface and groundwater guidelines, e.g.: microbial risks, nutrients, BOD and organic/inorganic micro-contaminants: 1. River water quality (% of rivers of good or fair quality) 2. Nutrients in water (% of river length with greater than guideline nutrient concentrations) 3. Groundwater quality (% of aquifers of good or fair quality)	van Leeuwen (2012), European Commission (2000) 1-2: Foxon et al (2002)

	Cluster	Indicators (Units *where available*)	Sources
4	Safe sanitation practices	Population covered by sanitation services, disaggregated by type of service (total or %): 1. In-house 2. Communal 3. Public	van Leeuwen (2012), UN (2007), Sustainable Society Foundation (2010)
5	Provision of sufficient water quantity	1. Water Production (total production m^3/year, litres/person/day, or m^3/conn/month) 2. Consumption (litres/person/day; m^3/conn / month, or %) a. Water consumption in households (litres per capita) b. Water consumption for non-households (m^3/ year) c. Total water consumed / total water required *[according to established standards]* d. Residential Consumption i. Connections to mains supply ii. Residential consumption - public water points e. Industrial / Commercial Consumption (ratio) f. Bulk treated supply (m^3/year) 3. Continuity a. Annual down-time for whole network (hours/ year) b. Average down-time for whole network (hours/ day) c. Customers with discontinuous supply (%)	1, 2d1-2f, 3a-c. IBNET (2004); 2a/b. Foxon et al (2002); 2c. Author; van Leeuwen (2012)
6	Sustainable water quantity from source(s)	1. Water scarcity (basin level) (%) 2. Water extracted / system recharge (%) 3. Annual freshwater withdrawal / annual available volume (%) a. Groundwater level (m) b. Contribution to groundwater recharge (m^3 or %)	1-3b: Hellström (2000), Lundin (1999) & van Leeuwen (2012)

	Cluster	Indicators (Units *where available*)	Sources
7	Water/wastewater system efficiency	1. Non-Revenue Water Physical & Commercial - (%, m^3/km/day, m^3/conn/day) 2. Potential for water re-use activities - (% of re-use/ consumed)	1: IBNET (2004) 2: Lundin (1999) & Sunberg (2004) Hellström (2000)
8	Non-water related system efficiency	1. Energy consumption of the system. a. Energy for water supply - Energy use (kWh/ m^3 or GW/year) b. Energy for wastewater - Energy use in treatment (kWh/m^3 or GW/year) or energy use per BOD5 and N removed (kWh/kg of BOD or N, or kWh/population equivalent) c. Annual electric energy costs / Total operating costs (%) 2. Area of land for processes (km^2) 3. Consumables used during treatment processes, e.g. coagulants, flocculants, etc. a. Chemical use per P removed (Tonnes/year) b. Lowering degree of treatment required, i.e. use of cleaner sources (Tonnes/year) c. Amount of Fe & Al used (Tonnes/year) 4. Material use a. Aggregates, plastics, metals - Total material requirement (t/year) 5. Climate-smart buildings: measure of sustainability of heating and cooling of buildings. (LEED standards)	1-4: Foxon et al (2002) 1 & 5: van Leeuwen (2012) 1c: IBNET (2004) 1b & 3a/b: Lundin (1999) 3c: Hellström (2000)
9	Resource recovery	1. Energy recovery, e.g. through WWT biogas processes (% of energy recovered/year or % of energy recovered/process) 2. Nutrient recovery (% of nutrients recovered/year or % of nutrients recovered/process) a. Recycling of phosphorous (g/p/year) b. Amount of sludge re-used for productive purposes (%)	1-2: van Leeuwen (2012) 2a: Hellström (2000) 2b: Lundin (1999)

	Cluster	Indicators (Units *where available*)	Sources
10	Sustainable coverage of a growing population	1. Population with easy access to water services – either with direct service connection or within reach of a public water point – as a fraction of the total population under utility's nominal responsibility. a. Water Coverage – In-house Connections (ratio or %) b. Water Coverage – Public Water Points (ratio or %) 2. Population with sewerage services as a fraction of the total population under utility's notional responsibility. a. Sewerage Coverage – Household Connections (ratio or %) b. Sewerage Coverage – Public Points (ratio or %) 3. Wastewater treatment capacity / required (%) 4. Long-term plans for service expansion, linked with foreseen population change/growth.	1 & 2: IBNET Toolkit, (2004) 3 & 4: Author.

	Cluster	Indicators (Units *where available*)	Sources
11	Organizational capacity	1. Prioritization of Environmental Processes a. Staff involved full-time in environmental/ sustainability aspects (% or total) b. Staff involved part-time in environmental/ sustainability aspects (% or total) c. Role of staff involved for 'a' and 'b' (junior, mid-management, senior, or outsourced) d. Department(s)/area(s) responsible for environmental/sustainability aspects (# of departments/areas over total, overlap and/or integration of activities) e. Internal funding dedicated to environmental aspects (% or total). 2. Human Resources Management (sub-questions can be tailored to Green Unit/Processes) a. Has a skills and training strategy for all staff? b. Has an annual appraisal and target setting system for managers? c. Has an annual appraisal and target setting system for all staff? d. Has a reward and recognition programme for all staff? e. Has the ability to recruit and dismiss staff (within an agreed plan)? 3. Staff training a. Staff trained in the last 1 to 4 years (% or total) b. Staff trained in green (environmental/ sustainability) processes in the last 1 to 4 years. (% or total)	1: Adapted from Brown et al (2007) 2: IBNET (2004) 3: Author.

	Cluster	Indicators (Units *where available*)	Sources
12	Financial horizon	1. Financial risk exposure (see Asset Management) 2. Average Revenue for Water or Wastewater (US$/$m^3$ water sold; US$/W conn. /yr.; % or totals) a. Water/Wastewater revenue – residential b. Water/Wastewater revenue – industrial/ commercial c. Water/Wastewater revenue – institutions & others d. Water/Wastewater revenue – bulk treated supply 3. Operational costs a. Unit Operational Cost – Water and/or Wastewater (US$/$m^3$ sold or produced; US$/ organizational unit; or %) b. Annual Operational Costs (total value) c. Labour vs Operational costs (%) d. Operational cost coverage ratio (Total annual operational revenues / Total annual operational costs) 4. Fixed Assets a. Gross value of existing assets b. Unit value of total assets or per asset (US$ / W or WW population served) 5. Sources of capital (%): a. Grants or Government transfers to the utility. b. Borrowing from International Financial Agencies (multi or bi laterals) c. Government owned banks d. Commercial banks e. Bondholders f. Revenue 6. Collection ratio (Cash income / Billed revenue as a ratio or %)	1: Foxon et al. (2002) 2-6: IBNET (2004)

	Cluster	Indicators (Units *where available*)	Sources
13	Operations & Maintenance	1. Development and implementation of a strategic long-term O&M Plan (yes/no/status) 2. O&M Standard Operating Procedures: Establishment, periodic review, dissemination and training of staff (yes/no/status). 3. Incorporation of green approaches to O&M (yes/no/status) 4. Classification (and proportion of) types of maintenance (%): a. Preventive Maintenance (regular inspection and servicing to preserve assets and minimize breakdowns) b. Corrective Maintenance (minor repair and replacement of broken and worn out parts to sustain reliable facilities) c. Crisis Maintenance (unplanned responses to emergency breakdowns and user complaints to restore a failed supply) 5. Formally agreed upon roles and responsibilities for O&M (service provider, public sector or civil organization) 6. Adequate resources for O&M, including finance, data, skills, technology, safety equipment, trained staff, etc. (current resource / required resource) 7. Staff capacity for O&M (current staff / required staff)	1-3, 5-7: Based on Sohail, Cavill & Cotton (2005) 4. Based on Davis & Brikke (1995)

	Cluster	Indicators (Units *where available*)	Sources
14	Asset Management	1. Life-cycle costs: cover all stages of the life cycle from resource extraction to production, end-use and end-of-life (Average costs $ per year or infrastructure; Total cost $ per infrastructure). a. Capital costs b. Operational costs c. Maintenance costs d. Decommissioning costs 2. Financial Risk exposure: relates to the risk of loss to the company associated with particular kinds of investment (Average costs $ / year or infrastructure; Total cost $ per infrastructure). a. Capital investments b. Environmental harm, damage, and/or restoration c. Other investments 3. Number of infrastructure and technologies that fail to function as desired (# of Failures / infrastructure or technology) 4. Number of infrastructure and technologies that function to the end of their design life (%)	1, 2a&c: Foxon et al. (2002) 2b, 3-4: Author
15	Protection of the natural environment	1. Biodiversity of resource's natural environment, e.g. aquatic ecosystems according to Water Framework Directive. (% comparing pre-intervention biodiversity / post-intervention biodiversity) 2. Attractiveness of natural landscape (qualitative, based on citizens' perspective) 3. Environmental impacts (aligned with previous goals): a. Impact on water - Loads of biological oxygen demand, phosphorus (P) and nitrogen (N) b. Impact on land: i. Sludge reuse - Tonnes of sludge reused ii. Recovery of nutrients - P and N recovered/ total incoming P and N iii. Quality of sludge - Heavy metal content c. Impact on air, e.g. CO2, sulphur dioxide, nitrous (Tonnes oxide emissions /year) d. Impact on biological diversity - Number of key species at risk	1-2: Based on van Leeuwen (2012) 3: Foxon et al. (2002)

	Cluster	Indicators (Units *where available*)	Sources
16	Development of external networks	1. Perception of organization by stakeholders: a. Acceptability to stakeholders (# of complaints/100,000 population) b. Perceived health and safety (% of 'users' with concerns about injury, drowning, risk of infection) c. Perceived environmental (% of 'users' perceiving a positive environmental impact, e.g. reduced flood risk, habitat creation, amenity benefits) 2. Participation and responsibility of stakeholders: a. Participation in sustainable behaviour (# of people participating in sustainable initiatives / population within catchment) b. Individual action (# of Local Agenda 21 meetings) c. Willingness to change behaviour (# of people willing to change behaviour / population within catchment) 3. Public awareness and understanding: a. Awareness of implications of behaviour (% of awareness in local community) b. Information made readily available and easy-to-understand for customers and other stakeholders (qualitative, based on perception of stakeholders). 4. Social inclusion: covers poverty alleviation, voluntary activity and access to watercourses. a. Social inclusion (% of population with (easy) access to information) b. Voluntary activity (% of population involved in voluntary activities led or supported by the organization) c. Community spirit (# of local community groups supported by organization) d. Access to watercourse (% of population with (easy) access to watercourse) 5. National/Local authority commitments: those related to general oversight of the utility's services and prices. 6. Public participation (inclusion in decision-making and other activities) 7. Method used for gaining customers' views on the utility (letters, telephone calls, views on media, questionnaires, others)	1-4: adapted from Foxon et al. (2002) 5-6: van Leeuwen (2012) / IBNET (2004) 7: IBNET (2004)

	Cluster	Indicators (Units *where available*)	Sources
17	Resilience	1. Financial risk exposure* (see Asset Management cluster) 2. Reliability: a. Water availability and distribution (water supply) i. Raw water availability (DG1) - Population whose calculated water resource availability is below the reference level (%) ii. Water use restrictions (DG4) Population who have been subject to water usage restrictions (%) iii. Restriction or interruption complaints (# of restriction or interruption complaints in a year) iv. Mains water pressure (DG2) (# of customers' properties that are at risk of receiving mains water pressure below reference level) v. Pressure complaints (# of pressure complaints in a year) b. System failure (wastewater) i. Flooding from sewers (DG5) (# of customers' properties where risk of flooding is greater than the reference level) ii. Risk of failure to meet consent conditions due to treatment process malfunction (qualitative) 3. Durability (# of years the system is expected to operate successfully) 4. Flexibility and adaptability a. Flexibility of the system - Level of accommodation in design: potential and ability to accommodate future changes (qualitative) b. Ability to add to or remove from system - Cost ($) of adding or removing from system in response to future changes 5. Pipe breaks (in- or out-leakage) (breaks/km/year) 6. Sewer System Blockages (blockages/km/year)	1-4 Foxon et al. (2002); DG refers to OFWAT level of service indicators (OFWAT, 2000). 5-6: IBNET (2014)

	Cluster	Indicators (Units *where available*)	Sources
18	Carbon neutrality	1. Contribution to global warming CO2-eqv (Kg/p/year) 2. Use of electricity and fossil fuels (MJ/p/year) 3. Total energy consumption (MJ/p/year) 4. Transportation for daily operations a. Type of transportation, e.g. diesel, gasoline, electric (% or ratio of each type)	1-3: Hellström (2002) 4: Lundin (1999) 4a: Author
19	Access to services	1. Availability of service (see Sustainable Coverage cluster) 2. Willingness to pay a. for the product ($/unit of service delivered) b. for environmental benefits ($/unit of benefit) c. for safety ($/unit of reduced risk) d. for health ($/unit of reduced risk) e. for other attributes 3. Affordability a. Connection fee *excluding subsidy if it exists* (% of household budget) b. Connection fee for lowest-income households *excluding subsidy if it exists* (% of household budget) c. Average monthly bill (% of household budget, can be per socio-economic sectors) d. Average monthly bill for lowest-income households (% of household budget) e. Total revenues per service pop/GNI (% GNI per capita) 4. Distance to service provider (m or km)	2: Foxon et al. (2002) 3: Adapted from Foxon et al (2002) and IBNET (2004) 4: IBNET (2004)

	Cluster	Indicators (Units *where available*)	Sources
20	Strategic Environmental Planning Mechanisms	1. Environmental Impact Assessments (yes/no; periodicity; inclusion in strategic plans): a. infrastructure (# of infrastructures with EIAs, %) b. operation & maintenance (# of processes with EIAs, %) c. natural sources withdrawal/disposal (# of sources with EIAs, %) 2. Strategic Environmental Assessments – country, city and/or sector-level a. awareness of existing SEAs (yes/no/partial) b. participation in development of SEAs (yes/no/partial) c. incorporation of SEAs into strategic plans and decision-making arenas (yes/no/partial)	1-2: Author
	Other:	Feel free to consider and include indicators not mentioned above that you consider are more relevant for your Green Utility.	

Annex E: Selected Indicators

#	Indicator	Unit of measurement
1		
2		
3		
4		
5		

Annex F: Selected Indicators (full)

#	Indicator	Unit of measurement
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

#	Indicator	Unit of measurement
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

Annex G: Scoring the Indicators

Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
1						
2						
3						
4						
5						

Annex H: Scoring Indicators (full)

Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						

Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
15						
16						
17						
18						
19						
20						
21						
22						
23						
24						
25						

Annex I: Considered Constraints

Considered constraints

Annex J: Indicators and Green Utility dimensions

Ind. #	Curent Practices	Pathways	Green turn-over
1			
2			
3			
4			
5			

Annex K: Indicators and Green Utility dimensions (full)

Ind. #	Curent Practices	Pathways	Green turn-over
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

Ind. #	Curent Practices	Pathways	Green turn-over
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Annex L: Green Utility Plan of Action

Activity / Approach	Time-frame			Estimated Investment Cost	Potential Source of funding	Respon-sible
	Quick-win	Mid-term	Long-term			

Created under
BEWOP

Supporting the implementation of
SUSTAINABLE DEVELOPMENT GOALS

IMPLEMENTING THE NEW URBAN AGENDA

GWOPA
Global Water Operators' Partnerships Alliance

UN HABITAT
FOR A BETTER URBAN FUTURE

UNESCO IHE DELFT

Ministry of Foreign Affairs of the Netherlands

Cooperación Española