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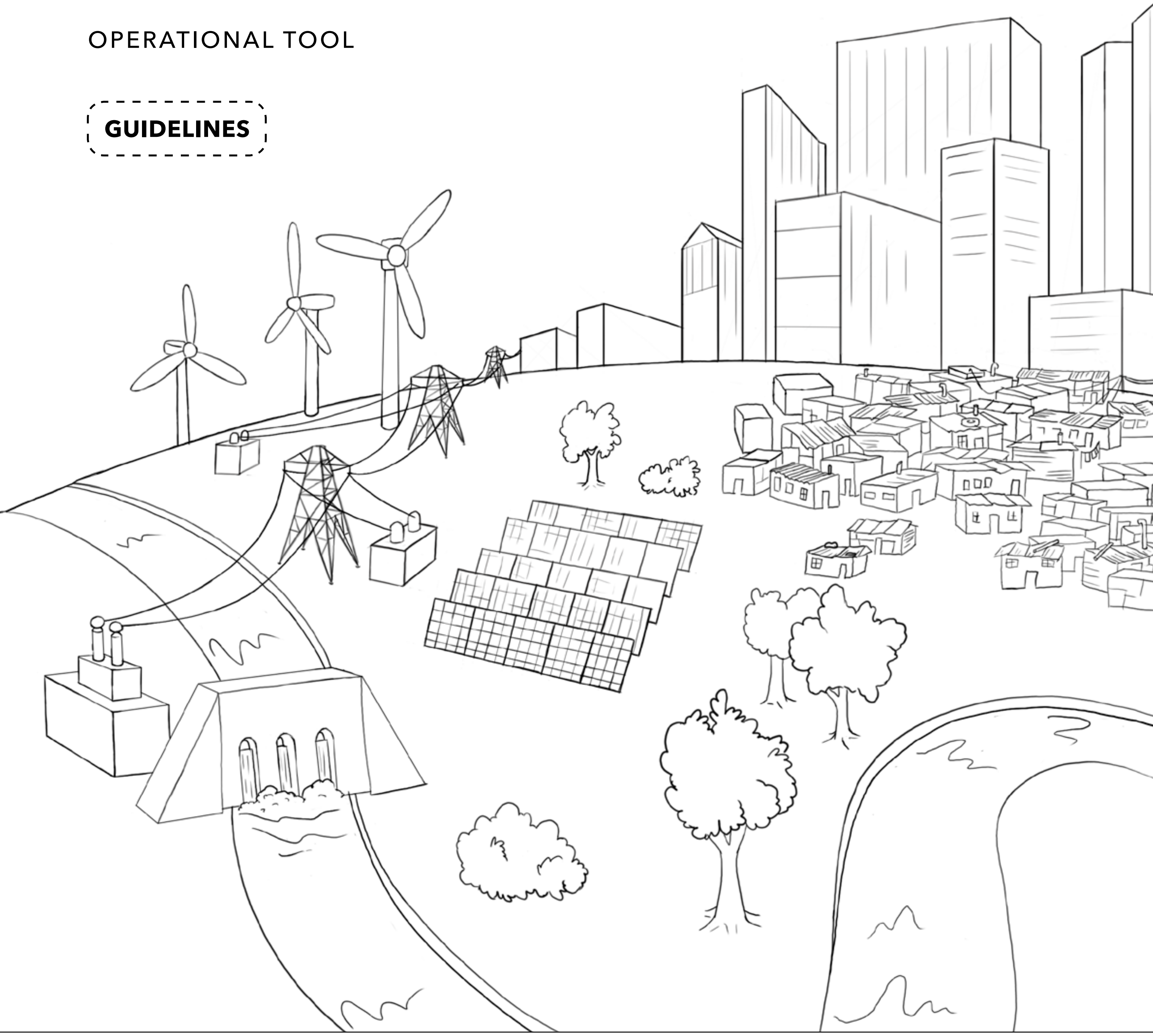
TOOL SERIES

Green Utility Toolkit
Concept Note

OPERATIONAL TOOL

GUIDELINES



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

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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

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The Green Utility (GU) Concept Note is primarily intended for facilitators of the GU Tool. It can also be shared with participants (and a broader audience) if time and interest allow.

The Concept Note begins with a summary of academic and practitioner literature to situate the emergence, and need for, a GU. This section provides facilitators with a historical explanation of sustainability/"greenness" in the water sector, so as to foster a broader view and guide participants engaged with the tool in their utility.

Further, this Concept Note explains the theoretical dimensions of a GU, the evolution of GUs, and the respective benefits and challenges of becoming a GU. A thorough understanding of the GU dimensions is **fundamental for facilitators**, as these need to be explained to participants. The GU evolution and benefits/challenges are presented to support staff in garnering support for the implementation of the GU Tool through a broad benchmarking scheme, selling points, and opportunities for growth.

Most of the topics covered in this Concept Note have corresponding presentation slides in the Green Utility Presentation contained in the GU Toolkit. These are provided at the end of the presentation. It is to the discretion of the facilitator which topics are relevant to present during the implementation of the GU Tool.

The following boxes provide a concise summary of the topics covered in order to highlight the connection between them and the implementation of the GU Tool, as well as streamline the use of this Concept Note:

> *Boxes in this format highlight key information for the facilitator regarding the section's topic and its relation to the GU Tool.*

One of the main underlying notions of the GU Toolkit is that water utilities around the world are at different development stages. The GU Tool is intended to be flexible enough to be used by these different water utilities at different stages. Considerations for local contextual factors, particularly between the Global North and South, are presented in the *Background* section in sets of boxes like these:

> North vs South: These boxes provide insight into some of the local considerations for water service providers from different parts of the world.

We welcome your experiences, suggestions, and questions. Broader dissemination and the lessons learned thereon will provide valuable information for academics and practitioners alike. Becoming a Green Utility, is an ongoing process.

Access the full Tool here

http://bit.ly/BEWOP-GUT_Tool

Contents

Introduction

"[T]here is an increasing clash between the demand for and limits to resources that result in ecological, economic and cultural 'strains' (Vlachos and Braga, 2001). From an urban water perspective, these strains have led various authors to suggest that the current model of service provision is no longer appropriate (Pahl-Wostl, 2002; Ashley et al., 2003; Milly et al., 2008; Pearson et al., 2010; Brown et al., 2011)."

Marlow et al. (2013, p. 7150)

"[W]e need to ensure that in striving to achieve water and sanitation access [SDG] targets (6.1 and 6.2) we do not inadvertently undermine the achievement of related water resource management targets (6.3-6.6) or other SDGs with explicit environmental sustainability agendas (such as clean energy, sustainable cities and communities, climate action, life below water, and life on the land). This requires considering interconnections when designing our approaches."

Carrard and Willetts (2017, p. 223)

The already existing pressures on water service[1] providers (WSP) to achieve coverage and adequate levels of services are being compounded by the global discourse on achieving development sustainably, as exemplified by the Sustainable Development Goals set forth by the UN. Faced by this, what can water service providers do? How are they to respond to these various pressures? And, can becoming 'green'[2] support them in engaging and solving these complex issues?

This concept note aims to present the driving factors that have led WSP discourses to incorporate environmental consideration, and from here offer the foundations for a conceptual framework for assessing a Green Utility in the water service sector. Taking into account the activities of water utilities, three foundations for a Green Utility are proposed: *Green 'turn-over'*, *Pathways*, and *Current Practices*. These 3 foundations can serve as a guide in identifying, prioritizing, and implementing green changes for water service providers. From here, the benefits and challenges for maturing into a Green Utility are discussed. Finally, a planning and monitoring framework is presented to facilitate WSP interested in beginning or continuing to advance their greening process.

Overall, greening a water utility aims to improve its performance in terms of long-term sustainability and increased efficiency, while fostering resilience through incorporating the natural environment and their communities in their operations.

1. Water services refers to potable water, wastewater, and sanitation services.

2. For the Green Utility Toolkit, the terms 'green' and 'greening' refer to the processes and activities implemented by utilities along the 3 pillars of sustainability – Social, Environmental, and Economical – while considering a long-term business horizon.

Background

The following section overviews the various factors that have influenced the development of a Green Utility concept. It first elaborates on the current state of water services and the main foreseen challenges for providers. Further, the future horizon of the sector and expected global goals are discussed. Specific considerations for water service providers in the Global South[3] are addressed at the end of each sub-section.

Historical overview of urban water services

The emergence of the *Green Utility* can be linked to the broader historical context of the development of urban space. As cities have grown and progressed, so have the type and scope of water services offered to the population. The evolution of citizens' knowledge and values, along with respective government policies, have catalysed the development of broader and more ambitious service delivery functions. The historical evolution of water services is chronologically portrayed by R. R. Brown, Keath, and Wong (2009) as:

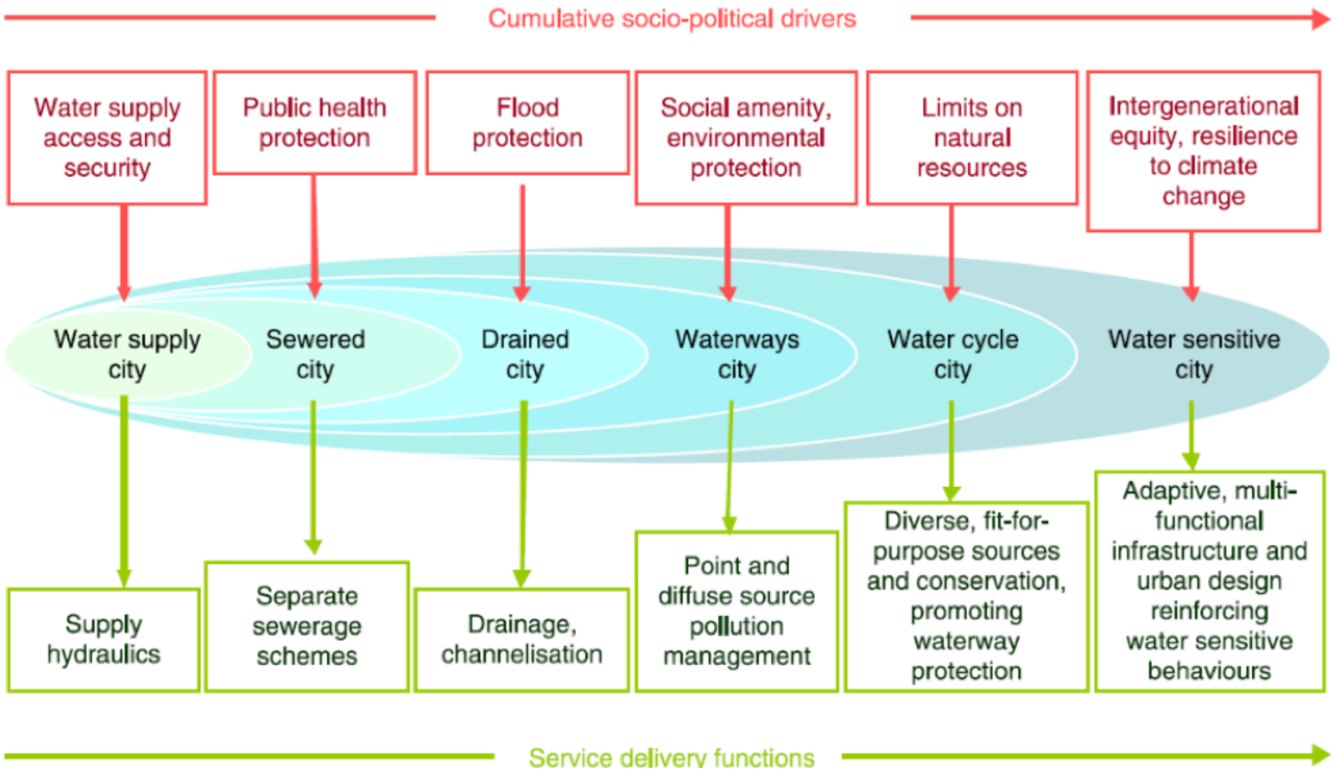

Figure 1: Urban water management transitions framework

Source: R. R. Brown et al. (2009)

This 'cumulative' process progressively escalates from fixed service delivery functions – providing water supply, improving public health, and managing run-off water – towards a broader, environmentally-centric service delivery dealing with issues of environmental protection, limited resource availability, long-term sustainability and resilience. In parallel, this process assumes a change in citizen involvement. Shifting from limited citizen

3. "The terms Global North and Global South (or Northern and Southern countries) refer to the comparative degree of socio-economic development of countries, rather than their geographical location. Northern countries are those with high levels of development, such as Western Europe, U.S., Australia, and Japan, while Southern countries are those considered to have medium and low levels of development, such as Latin America, Africa, Middle East and South-East Asia. For further information on this terminology see Mimiko (2012); Therien (1999)". (Bichai & Cabrera Flamini, 2018, p. 7)

involvement towards an (envisioned) integrated process validated through active citizen participation – an evolution of what R. R. Brown et al. (2009) call the *hydro-social contract*. Whether active citizen participation can be achieved, or is even necessary for a resilient city, in terms of water service provision, remains a point of contest[4]. Further, citizens' choices have been found to run counter to the achievement of a sustainable, resource efficient water scheme (Carrard & Willetts, 2017).

> *When defining sustainability in Step 1, it may be useful to briefly explain the local historical context of water service provision, so participants can situate where they are and where they want to go.*

Two points are worth noting on the above framework. First, a city's movement along this framework is not necessarily forward or linear. Cities may regress, jump, or simultaneously experience various stages. These service provision stages are shaped by the existing socio-political drivers, the viable technical approaches, and their inter-related nature. For example, citizens' demands and expectations may 'regress' in the face of a disaster, opting for public health over future equity or resilience. This narrows the number of potentially feasible technologies. Alternatively, through the exchange of innovative socio-political and technical arrangements, cities may be able to 'jump' towards tackling later stages in service delivery while implementing solutions to current demands. Different areas within cities may receive varying levels of service, i.e. residential vs slums. Second, developed countries are currently (mainly) in the Waterways city phase, with progress from the Water Cycle city onwards remaining largely academic and theoretical (R. R. Brown et al., 2009). Further research and reflection from academics and practitioners are vital to coherently address the wicked problems of evolving urban water management paradigms.

Transitioning in the Global South: The framework in Figure 1 was developed based on Australian cities; that is, it describes the transition as experienced in the Global North. Countries in the Global South – which still have considerable gaps in achieving water and sanitation coverage – may engage various stages at the same time, **having to tackle varying challenges simultaneously**.

Potential impacts of this ongoing transition for the Global South include:

Pros: Lower 'overall' investment costs, as lessons learned and more efficient technologies and processes can be 'imported' from developed countries.

Cons: Each Southern country has unique characteristics which may render Northern processes inapplicable. Additionally, the priority in Southern countries, both from government and citizens, is to accomplish basic service provision; this can diminish interest and allocation of resources in achieving the later stages of the framework.

4. In the Netherlands, where consumer participation is largely facilitated by free-of-charge voting via postmail, 22% and 44% of eligible voters participated in the 2008 and 2015 Waterboard elections, respectively.

Climate change and urban population growth

The challenges faced by water utilities in providing adequate levels of service will be exacerbated by the foreseen impacts of climate change and urban population growth (Burn, Maheepala, & Sharma, 2012; Koop & van Leeuwen, 2017; McDonald et al., 2014).

The effects of climate change related impacts to water services are numerous and often inter-related, generally affecting the predictability and quality of the resource. Scenarios of future climate change impacts highlight the probability of increased and erratic precipitation – leading to intense floods and protracted droughts (Keath, 2008) – and impacts on hydrological systems. Both changes haphazardly affecting the quality and quantity of water resources (IPCC, 2014). These extreme climate events increase the risk of degrading water quality and, consequently, of potential health impacts on the consumers (Delpla, Jung, Baures, Clement, & Thomas, 2009). Floods can increase sediment loads in water sources. Prolonged droughts can impact the quality of water resources due to changes in evaporation rates, salinity, and temperature (Levine, Yang, & Goodrich, 2016). Zwolsman and Van Bokhoven (2007) found that summer droughts degraded water quality in terms of eutrophication, major ions, and heavy metals. The driving factors were higher water temperatures and an increase in concentration loads. Treating degraded water quality requires integrated flexible adaptation measures and processes, particularly during treatment processes. In addition, it must be ensured that adequate and efficient responses to these extreme climate events occur (Delpla et al., 2009; Levine et al., 2016).

A continuously growing population. A multitude of demands for adequate services. Catering to existing and future generations. These factors will intensify the pressure on existing water resources and their availability (McDonald et al., 2014). The expected population growth for the next 40 years is projected to be concentrated in urban areas, with 86% and 64% of the population living in urban areas of developed and developing countries, respectively (Van Leeuwen, 2013). The demand for water services will continue to grow. Water withdrawals in 2025 are expected to increase by 18% and 50% in developed and developing countries, respectively (UNESCO, 2012). Additionally, the quantity available and quality of water resources will be impacted by urban and industrial developments that alter and destroy existing habitats (UNEP, 2007). Considering these current growth trends, it is expected that by 2030 there will be a 40% shortage in supply for water resources (2030 Water Resources Group, 2009). As such, water service providers will be faced with the double challenge of an increasing demand for water and an overall reduction in the availability of the resource.

> *When evaluating the constraints towards a Green Utility in Step 5, climate change and urban population growth will likely be mentioned. The potential magnitude of their impact can be presented to facilitate insight into local impacts and perceptions.*

As described above, water service providers, particularly those in urban settings, will have to reckon with the impacts of climate change and population growth. This requires water service providers, and the stakeholders involved in their processes, to adapt and prepare adequate measures – such as the rehabilitation and expansion of infrastructure, as well as the adaptation of their current practices – in order to effectively deal with these challenges (Bertule et al., 2014; Delpla et al., 2009; Levine et al., 2016).

Greater challenges for the Global South: Although the impacts of climate change events and urban population growth will be felt by all countries, **these impacts will be considerably more pronounced in countries in the Global South**. Climate change impacts – generated largely by countries of the Global North (Althor, Watson, & Fuller, 2016) – already, and increasingly, continue to disproportionately affect the poor in developing countries (IPCC, 2014). The poor have fewer resources available for coping, and generally inhabit areas at higher risk of adverse climate impacts (OECD, nd.; United Nations, 2016). Urban population growth is also expected to be considerably higher in developing countries (McDonald et al., 2014).

These conditions exacerbate the existing challenges of both meeting basic services coverage, and furthering the consideration and implementation of environmentally sound practices. As highlighted by Carrard and Willetts (2017, p. 215), the WASH sector as a whole has focused on achieving social and economic development, neglecting environmental protection as it is deemed "'too hard'…[and] something to be resolved or 'dealt with later'". Under current development discourses, such as the SDGs, service providers in t**he Global South will likely be pressed to achieve all three objectives simultaneously**.

Evolving urban water management (UWM) paradigms[5]

Over the past decades, in response to the growing concerns of 'unfit' urban water service provision models, various water management paradigms have emerged. This section highlights some of the most relevant paradigms found in literature and practice, along with their commonalities. Most of these paradigms approach the broader water management context, rather than specifically focusing on water utilities. Considering their influence over policy, discourse and decision-making arenas, they are considered in their potential impact to water service providers' plans and operations.

> *The UWM paradigms can be useful for generating discussions about concepts and approaches to sustainability (Steps 1 & 2). These paradigms expose participants to various 'ideal' city-level approaches where they can situate their current and future Green Utility (Steps 4 & 5).*

Integrated Urban Water Management (IUWM)

The emergence of IUWM took place in the 1960's when engineers and planners found similar recurrent problems. These problems were attributed to the operations of the pervading *linear centralized* treatment systems. In response to this, they began to promote circular, integrated approaches to urban water management as a solution (Mitchell, 2006). IUWM posits that sustainable triple-bottom line[6] benefits can more readily be achieved, through the resource-efficiency gains of a circular, integrated approach (Barton, Smith, Maheepala, & Barron, 2009). This transition is exemplified by Pinkham (1999, p. 5) (Figure 2 below) when he compares the shift between the 'old' and 'emerging' paradigms.

Sustainable Urban Water Management (SUWM)

In face of the growing challenges for water service provisioning, the concept of Sustainable Urban Water Management (SUWM)[7] has risen under the premise that the current approach to service provision is unfit when considering relevant environmental, social, and economic criteria (R. Brown, Ashley, & Farrelly, 2011; Milly et al., 2007; Pahl-Wostl, 2002). SUWM is a manifestation of a growing awareness – within the historical development of

5. See further: Bichai & Cabrera Flamini (2018)

6. Social, economic and environmental

7. For a review of the concept and challenges for SUWM, see Marlow et al. (2013)

urban water services – towards "community wellbeing, ecological health and sustainable development", i.e. the green movement (Marlow et al., 2013, p. 7151).

The two central aspects of SUWM are: i) the shifts towards decentralized systems and ii) 'fit-for-purpose' water schemes. The first aspect aims to reduce the dependence on expensive infrastructure. The large financial capital required for this infrastructure can range between 50-75% of a water system's operating and capital expenses (Marlow et al., 2013). As these large investments are 'sunk' (and therefore relatively permanent), they have an impact on the future generations of consumers (Burn et al., 2012). These younger generations rarely play a role in defining the type of water system they find most suitable. The second aspect emerges considering that, currently, "only a relatively small percentage of potable water supplied to customers is actually used for potable purposes", and implementing re-use processes can lower water demand and improve environmental conditions (Marlow et al., 2013, p. 7152). Thus, 'fit-for-purpose' schemes can lead to decreasing wasted costly treated water and mitigating the pressure on the natural environment.

Water Sensitive Cities (WSC)

During the Millennium drought in Australia, the concept of Water Sensitive Cities became prominent in academia. WSC supports a significant innovation turn-over towards alternative systems that can cope with severe water stresses (Bichai, Grindle, & Murthy, 2016; Bichai et al., 2015; Wong & Brown, 2009). As described by the CRC for Water Sensitive Cities (2016), a WSC is characterized by four aspects:

1. *Liveable* – a city that "create[s] public spaces that collect, clean, and recycle" water flows,
2. *Resilient* – a city that is aware and pro-active in "mitigate[ing] flood risk and damage",
3. *Sustainable* – a city committed to "enhance and protect the health of waterways and wetlands, the river basins that surround them, and the coast and bays",
4. *Productive* – a city that can "provide the water security essential for economic prosperity through efficient use of diverse available resources".

For cities to achieve these aspects, WSC's proposes three pillars of action. First, cities must be viewed as water catchments where diverse sources complement the existing supply through fit-for-purpose and alternative systems. Second, promote the recognition of urban ecosystem services that benefit the environment and the citizens. Third, foster empowered water-aware communities where water professionals and decision-makers work across a range of disciplines (re)shaping the existing institutional context. In the historical evolution of water service provision, the WSC is considered the final stage of the continuum, remaining an academic and theoretical horizon to strive for.

The Old Paradigm	The Emerging Paradigm
Human waste is a nuisance. It is to be disposed of after the minimum required treatment to reduce its harmful properties.	*Human waste is a resource.* It should be captured and processed effectively, and put to use nourishing land and crops.
Stormwater is a nuisance. Convey stormwater away from urban areas as rapidly as possible.	*Stormwater is a resource.* Harvest stormwater as a water supply, and infiltrate or retain it to support urban aquifers, waterways, and vegetation.
Build to demand. It is necessary to build more capacity as demand increases.	*Manage demand.* Demand management opportunities are real and increasing. Take advantage of all cost-effective options before increasing infrastructure capacity.
Demand is a matter of quantity. The amount of water required or produced by water end-users is the only end-use parameter relevant to infrastructure choices. Treat all supply-side water to potable standands, and collect all wastewater for treatment in one system.	*Demand is multi-faceted.* Infrastructure choices should match the varying characteristics of water required or produced by different end-users: quantity, quality (biological, chemical, physical), level of reliability, etc.
One use (throughput). Water follows a one-way path from supply, to a single use, to treatment and disposal to the environment.	*Reuse and reclamation.* Water can be used multiple times, by cascading it from higher to lower-quality needs (e.g. using household graywater for irrigation), and by reclamation treatment for return to the supply side of the infrastructure.
Gray infrastructure. The only things we call infrastructure are made of concrete, metal and plastic.	*Green infrastructure.* Besides pipes and treatment plants, infrastructure includes the natural capacities of soil and vegetation to absorb and treat water.
Bigger/centralized is better. Larger systems, especially treatment plants, attain economies of scale.	*Small/decentralized is possible, often desirable.* Small scale systems are effective and can be economic, especially when diseconomies of scale in conventional distribution/collection networks are considered.
Limit complexity: employ standard solutions. A small number of technologies, well-know by urban water professionals, defines the range of responsible infrastructure choices.	*Allow diverse solutions.* A multiplicity of situation-tuned solutions is required in increasingly complex and resource-limited urban environments, and enabled by new management technologies and strategies.
Integration by accident. Water supply, stormwater, and wastewater systems may be managed by the same agency as a matter of local historic happenstance. Physically, however, the systems should be separated.	*Physical and institutional integration by design.* Important linkages can and should be made between physical infrastructures for water supply, stormwater, and wastewater management. Realizing the benefits of integration requires highly coordinated management.
Collaboration = public relations. Approach other agencies and the public when approval of pre-chosen solutions is required.	*Collaboration = engagement.* Enlist other agencies and the public in the search for effective, multi-benefit solutions.

Figure 2: IUWM: 'Old' vs 'Emerging' Paradigms – Source: Pinkham (1999)

Common threads between UWM paradigms

An overview of these UWM paradigms reveals a common overarching goal and similar approaches proposed. Their common goal: to cover the water demand of current and future consumers through effectively engaging an integral water cycle, while considering the health and protection of the surrounding environment. These paradigms jointly approach this goal by i) actively engaging and improving the efficiency of the various water flows throughout the city, and ii) by stressing the importance of engaging with a broader range of stakeholders, including the end-user of the water system(s). Through these approaches, these paradigms are thought to improve the overall sustainability of the water systems by fostering context-adequate and consensus-generated solutions.

> *Refer to the previous paragraph to facilitate a discussion of the city-level goals for the water utility. This is useful for Step 5, Vision towards a Green Utility.*
> *The following five sustainability guidelines can guide and inspire potential approaches.*
> *These are useful for Step 6, Dimensions towards a Green Utility.*

Among proponents of these urban water management paradigms, the benefits of adopting them are broadly considered to be:

1. A more 'natural' water cycle, particularly in regards to stormwater, and hence a more environmentally-sound flow of water.

2. Increased water security through local source diversification, highlighting the role of fit-for-purpose approaches.

3. Greater efficiency through fit-for-purpose water use. Higher-cost treated water (usually potable) is used solely for essential uses shifting towards full resource recovery.

4. A broader approach to water systems' sustainability through awareness of customers' values and needs, enhancing socially aligned long-term plans and investments.

5. The uptake of decentralized systems allows for more 'radical' innovation which may lead to higher efficiency, improved community well-being, and source protection.

However, it is worth taking these benefits with a grain of salt. Regarding the technical aspects, for example, the 'nearly-permanent nature' of the infrastructure of water services renders complete system innovation impractical in political, financial and technical terms. This leads water systems to opt for 'system hybridisation' (Marlow et al., 2013). Only components of the technical system, not the technical system itself, can be innovated at a time. This allows only small, constrained innovations to occur. This limitation in the water system goes beyond the 'technical' aspects, and also includes forms of social and economic innovation, as these are influenced by cultural and political externalities. For example, decentralized systems require the coordination of (and establishment of accountability for) the administrative, organizational, and institutional aspects. Who would be responsible for each decentralized solution implemented, and how would they be supported/facilitated in fulfilling this role?

An additional hurdle for these paradigm shifts is that the decision-makers and investors of urban water schemes – who are held accountable for the projects implemented – do not wish to risk heavy investments into innovative (and therefore uncertain) solutions. Particularly, for systems that currently do not affect the reliability of the service or have large support from consumers (as these do not want to spend resources on an 'invisible' problem) (Marlow et al., 2013).

Being aware of these challenges, water service providers can harness the potential of these paradigms. These can provide guidance and alternatives when upgrading parts of the current system. They can be used to generate the space and political will for piloting innovative approaches. If this process becomes incorporated into a long-term vision/plan, it can lead to a full greening of existing infrastructure. Second, fostering the awareness for (and development of) decentralized systems increases the set of potential service delivery options for both service providers and consumers. This facilitates mapping and arriving at consensual "fit-for-purpose", cost-effective solutions. Further, by adopting a broader view of the urban water flows, water service providers can strategize and gain support from key stakeholders in other sectors, such as the agriculture and energy sectors.

UWM paradigms, a dream of the North? UWM paradigms are actively discussed in countries that have already achieved an adequate level of service, i.e. those in the Global North. Developing countries, on the other hand, are still struggling with service coverage mainly focused on the dealing with the impact of urban pollution on water systems and public health (Marlow, Moglia, Cook, & Beale, 2013). Few Northern countries have actually gone beyond these discussions, with the limited actions implemented being dispersed and lacking a systematic approach (Marlow et al., 2013). **To date, there is not a single city in the world that can be considered a Water Sensitive City (Wong & Brown, 2009)**. Thus, the implementation of UWM paradigms in developing countries remains a relatively uncharted territory (one of the few attempts has been documented by Poustie and Deletic (2014). While this does provide the international community with the opportunity to mainstream UWM approaches in developing countries – through its involvement in local policy, technological investments, and societal programmes – the question remains, if developed nations have yet to successfully embody it, does the imminent call for paradigm shifts in UWM remain a dream of the North?

Sustainable Development Goals (SDGs)

With the closure of the Millennium Development Goals in 2015, the world's governments, international organizations, and citizens embarked in a consultative process to define the global developmental goals for the next 15 years (United Nations, 2015b). Sustainable development was the driving and transversal factor for these new goals, 17 in total and aptly called the Sustainable Development Goals (SDGs).

The SDGs are a global call to action intended to solve various issues – including poverty, gender equality, environmental conservation, and water and sanitation – by providing common development goals for governments, organizations, and communities. At least until 2030 (the deadline set forth for the SDGs) global, national, and local development efforts will focus and be monitored in their contribution towards achieving the SDGs. As such, understanding the SDGs becomes paramount for all stakeholders involved in development processes, including those regarding water and sanitation.

> *Sustainable Development Goal 6 serves as a common axis for water sector goals: it facilitates the interaction of potentially relevant/interested stakeholders; it provides a common ground for selecting potential indicators; it sets a horizon in 2030. Useful in Steps 3, 5 & 6.*

Goal 6: *Ensure access to water and sanitation for all*, states the following specific targets for the sector (United Nations, 2015a):

1. By 2030, achieve universal and equitable **access to safe and affordable** drinking water for all.
2. By 2030, achieve **access to adequate and equitable** sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations.
3. By 2030, **improve water quality** by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially **increasing recycling and safe reuse** globally.
4. By 2030, substantially **increase water-use efficiency** across all sectors and **ensure sustainable withdrawals and supply of freshwater** to address water scarcity and substantially reduce the number of people suffering from water scarcity.
5. By 2030, implement **integrated water resources management at all levels**, including through transboundary cooperation as appropriate.
6. By 2020, **protect and restore water-related ecosystems**, including mountains, forests, wetlands, rivers, aquifers and lakes.
7. By 2030, **expand international cooperation and capacity-building** support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
8. Support and strengthen the **participation of local communities** in improving water and sanitation management.

As highlighted by the bolded sections, water services providers will have a crucial role to play in achieving these targets. From increasing service coverage in an affordable and equitable manner (Targets 1 and 2), to implementing activities that ensure the quality and quantity of water resources in the long-term (Targets 3, 4, and 6), while engaging with a broader range of stakeholders in different social, environmental, and political arenas (Targets 5, 7, and 8). Political and social pressure will likely increase for water service providers in the search for achieving the SDG's. It is worth recalling the warning provided by Carrard and Willetts (2017), that in seeking to achieve some of these targets, our efforts do not inadvertently hinder or harm other SDG goals and targets. For water service providers, this requires continuous awareness and evaluation of the impacts their processes and practices have in the broader development environment.

The boxer against the ropes: Over the last decades, water service providers have increasingly had to **balance differing and (at times) conflicting objectives** – for example increasing access to low income areas while achieving cost-recovery in their operations. The addition of "sustainable access" by 2030 troubles the existing challenges of water service providers, particularly in the Global South. Considering this, it becomes necessary for water services providers to **discuss and debate within and across sectors**, i) what roles and responsibilities they want to undertake and which they have to bear, ii) how they will fulfil these roles, and iii) what they need to get there.

The Green Utility

Having examined the factors that fostered the emergence of sustainable and green discourses in the water sector, we arrive at the focal point of this concept note: the water utility[8]. This section begins with an overarching framework that suggests different stages in the evolution of a Green Utility. As each water utility will have unique interests and challenges in these stages, the dimensions of a Green Utility are presented to allow for flexibility in designing relevant approaches. These dimensions facilitate exploring which stakeholders, current processes and future significant changes the water utility could engage with in order to foster sustainability. Further, some of the challenges and benefits water utilities may encounter in becoming green are described.

The stages of a Green Utility

When does a water utility become a Green Utility? Is there a specific point when a utility becomes green, or rather, is it more of a continuous process, which (re)develops as internal and external circumstances change?

From the Background section, it is evident that every water utility has a unique internal and external context, making a universal or standard definition (and threshold) for 'greeness' unlikely and impractical. To help situate utilities that engage with greening processes, a three-stage green continuum (Figure 3) is proposed, comprised of the Early, Emerging, and Mature stages. These stages are meant to serve as a guide for water utilities in self-assessing the internal capacity to implement green processes, and use it as a starting point for planning their green goals and activities.

Figure 3: Stages of a Green Utility – Source: Author

These stages have been distinguished by considering the following variables, based on Rebekah R Brown (2008): the organizational commitment, the political capital, the internal expertise and capacity, and the organizational structure and culture.

8. Recognizing the variety of water service providers that exist (formal vs informal, large- vs. small-scale providers, urban vs rural vs peri-urban vs small towns, emergency response, etc.) this concept note primarily considers formal urban water utilities, where the Green Utility Toolkit is designed for. It is hoped that the approaches and tools discussed here can also serve other water services providers in their processes towards becoming green.

> *The three-stage green utility continuum facilitates identifying the current internal organizational capacity devoted to greening process. It also suggests potential avenues for strengthening this capacity. These stages can be used to broadly benchmark a utility's progress towards streamlining sustainable green processes. Useful in Steps 2 to 5.*

Early Green Utility

For an Early Green Utility, the uptake and implementation of greening processes occurs solely from the need to comply with external regulations, e.g.: environmental regulations regarding resource protection or pollution control. Internally, the Early Green Utility does not consider greening as a priority or part of their mandate, and therefore lacks the political, financial, and human resource capitals to enact change. When green processes or projects *must* be carried out, these are handed to junior staff members and/or outsourced to a consultant. As such, there is no internally dedicated department or group within the utility for advancing greening processes; instead, ad-hoc assignments are handed to staff members with relatively little (if any) structural influence on the utility. Additionally, there is no (or barely any) engagement with a broader external network of key stakeholders for greening processes, including local government and consumers.

Emerging Green Utility

During the Emerging Green Utility stage, greening process has been recognized as a relevant aspect of a utility's functioning. A staff member or a team within a department of the utility (e.g. operations, commercial, human resources) has been designated solely for this purpose. Although at times the team may count with input and participation from other departments, the majority of work is carried out independently by the assigned staff member or department. This situation results in two particular challenges for the individual or team: i) as greening planning and processes have not been established utility-wide, there will likely be uncertainty and friction over roles and responsibilities across and within departments, and ii) the green unit will need to compete with other departments for limited internal funds. These situations can generate barriers within the utility, which require competent and transparent guidance from management. At this stage, members of the green unit should focus on communicating across the utility the potential risks and benefits of greening approaches to the utility's reputation and performance.

Aside from staff time, the majority of financial resources used for greening processes come from proposals submitted to external funding organizations. As the green unit grows in experience, influence, and capacity, larger and more strategically structured funding mechanisms can be achieved. During this stage, engagement of external stakeholders becomes more prominent, mainly in order to gain the political backing necessary to strengthen and firmly demonstrate the need for a dedicated green organizational unit. The main stakeholders most likely to be engaged will be the local government and the consumers.

Mature Green Utility

The Mature Green Utility has integrated greening considerations and approaches throughout the utility. Progressively, greening is seen as a competitive advantage that harnesses the interest and will of higher level staff, as they believe it is a vital component of the utility's development plans. Thus, the utility's mandate and strategic plans explicitly prioritize greening process by establishing relevant green goals in a mid- to long-term frame, and devoting the necessary financial and human resources to achieve them. Whereas before the resolve towards greening was located within a single team or department, the Mature Green Utility has green champions nested in various departments. These green champions are actively and continuously working together to further streamline the utility's green objectives.

Further, developing and testing greening processes becomes central to the utility. This occurs as the utility evolves from seeking internal legitimacy for green processes, towards becoming recognized as a leading expert in the field. As part of this, the Mature Green Utility strategically broadens its network of stakeholders to include research institutions and environmental organizations. In parallel, the utility becomes active in supporting local governance efforts as due to the recognized benefits and need for consensual actions. As greening becomes an intrinsic part of the utility's culture, the development of staff's capacity regarding sustainable practices (social, financial, and technical) is pro-active and continuous.

> *The stages above are broadly indicative of the utility's internal capacity for the uptake of greening processes. Each utility should consider for itself what each stage entails for them, to ensure challenging yet achievable goals – the Circles of (Green) Development exercise can be useful for this. This is worth highlighting when using the GU tool, to avoid employing benchmarking metrics that are not applicable or relevant in the local context.*

The above stages present a heuristic tool for water utility staff members to assess their progress in becoming green. In each stage, the utility's internal commitment, external outreach, and organizational structure are considered. It is worth noting that utilities may find themselves spread across these stages, and at times jumping backwards or forwards from them. These situations should inform the utility's decision-makers on which areas need to be further developed. Having looked at these different stages, the following section proposes a set of foundations that utilities can use in order to support their advancement across these stages.

The dimensions of a Green Utility

The driving concept underlying a Green Utility is the recognition that water utilities have current challenges and demands to meet, which must now be tailored towards sustainability within their broader surrounding context. As such, three dimensions have been identified to support streamlining this process, as shown in Figure 4. These dimensions contribute to the three Water-Sensitive Cities' pillars of action (see page 9).

Current practices recognizes the multitude of processes and activities water utilities commonly engage in (business-as-usual) and seeks to reflect on ways to evolve these tried-and-tested approaches towards greater sustainability. *Pathways* highlights the connections and influences that water utilities (and their potential green units) can have, and are subject to, within a broad range of external stakeholders. Finally, *Green 'turn-over'* addresses the novel approaches and principles that can be supported (particularly in key decision-making instances) by water utilities, such as green-grey infrastructure, resource efficiency, and environmental finances.

These dimensions are not intended to separate and categorize different green approaches. Instead, they are intended to assist utilities in conceiving innovative approaches from a common ground. As such, some potential green activities and processes may overlap between dimensions. These overlaps point towards synergies between processes, stakeholders and goals that can be taken advantage of by water utilities.

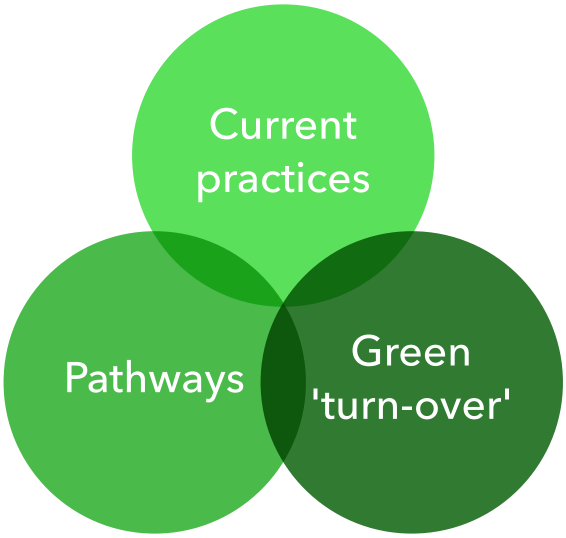

Figure 4: Foundations for a Green Utility - Source: Author

Current Practices: Building on water utilities' experience

When considering the way forward towards a Green Utility, it is vital to analyse the current practices that water utilities have tried-and-tested for decades. These provide both an initial baseline and the possibility of identifying quick-wins, which can garner support from within the utility. Water utilities have a wealth of local experience and, in some aspects, already practice potentially green approaches towards water service provision. Each utility needs to further decide how and when each practice can be deemed *green*. A good starting point can be to create a checklist of all relevant current practices, and discuss if, how and to what degree these can be greened.

As each water utility will need to identify its own processes, the examples presented below are in no way exhaustive or restrictive. These examples are intended to present some common practices that can be greened, in order to serve as a starting ground for staff to reflect on their current practices.

Asset Management: Ongoing asset management allows utilities to periodically and methodically evaluate their infrastructure's capacity and condition. This can foster strategic planning towards the rehabilitation and replacement of the water system's components, such as treatment plants, conduction lines, and pumping equipment. By nature of its continuous monitoring and time-bounded assessments, asset management can facilitate in judging when, how, and what components and processes – such as maintenance, procurement, and replacement – can be 'greened', as well as incorporate the consideration of full lifecycle costs for all components (EPA, 2012). It is worth noting that through full lifecycle costs, a longer time-frame for balancing costs and benefits occurs; this can support shifting a water utility's decision-making process from short- to long-term.

Non-Revenue Water (NRW): "Nothing makes a utility system more resilient than controlling its wanton leakage… Being sustainable means managing water resources responsibly, and controlling NRW should be part of that needed response but so far is not" (Workman, Feb. 29, 2016). NRW, if framed adequately, has the potential of covering multiple aspects of a water utility's objectives. NRW is mostly discussed in issues of cost-efficiency for the water utility, ensuring that the investment costs from extraction, treatment, and distribution are not leaked along the way. However, improving NRW can also be considered as a green practice: by reducing losses along the way, less raw water must be extracted from the natural source and, overall, pumped through the water system. If the natural resource is over-exploited, or nearing this, an effective NRW strategy has the potential of improving conditions significantly. As such, tackling NRW can be one of the most sustainable approaches a water utility can take: it makes sure every drop is used as efficiently as possible.

Operation & Maintenance: O&M activities cover the day-to-day processes carried out by water utilities. They can serve as a core area for the uptake of green initiatives as actions and their results are readily visible. For example, take the assessment and implementation of resource and energy efficient activities, such as using alternative energies or environmentally-friendly chemicals for water treatment. Comparing alternatives and implementing small pilots of these changes can be relatively simple and time-effective. This facilitates the uptake, dissemination and testing of green approaches.

Customer Service (Awareness and Water Demand Management): The water utility, in most cases, already engages its customer base through their Customer Service. With an adequate communication strategy, Customer Service can be used to highlight the value of each drop of water to consumers and utility staff. Alternatively, Customer Service can act as the first line of contact for consumers and thus serve as a base for engaging them more actively (as discussed in the *Pathways* section below).

Water Safety Plans: Water Safety Plans (WSPs) have the potential of supporting greening a water utility in two distinct ways. One, as WSPs aim at reducing risks throughout the whole water cycle (from source to tap), they identify and can provide measures for protecting vital environmental resources. Second, the development of a WSP requires the involvement of a broad range of stakeholders. Thus, through their implementation, they generate an arena for various different stakeholders to work together around a common goal, strengthening the water utility's links.

The above alternatives highlight how small changes in current approaches can support water utilities in achieving their usual goals while improving their greenness. **Quick-wins, which can garner support, can be identified at an early stage by framing current practices in a green lens.** Additionally, discussing current practices provides water utilities with the opportunity to reassess their approaches in order to incorporate green initiatives. For example, ensuring adequate rate structures for sufficient funds of green O&M and infrastructures in the long-term, as well as gauging the support from the community in implementing these rate structures.

Pathways: Fostering a utility's (potential) networks

Water utilities are connected to their social, economic and natural environment from source to tap. As shown in Figure 6, water utilities can engage with diverse stakeholders in various arenas of the urban space. From this framework, it can be seen how different groups (citizens, businesses, and public services) and different sectors (energy, industry, and agriculture) interact with water utilities. These pathways, and those involved in them, are influenced by the local context's existing regulations and prevalent values.

Actively fostering water utilities' relationship with their communities (geographical and institutional) becomes necessary in order to harness adequate support (EPA, 2012). This is particularly relevant when considering utilities' space in the existing and emerging UWM paradigms. Whether in managing and negotiating the flows of water in the urban space with other stakeholders (IUWM and WSC), or in fostering and participating in the implementation of a decentralized service provision scheme (SUWM and WSC), the networks of water utilities become vital. Clarity and accountability, between a water utility and its broader community, are a necessary foundation for pursuing sustainable changes. It is worth emphasizing that these *pathways* run in both directions: towards the water utility as well as emerge from it. Considering this, water utilities can also benefit from transparently showing and communicating the actual value of their services, as well as setting themselves as sector leaders in green processes.

Figure 5: Water Pathways – Source IWA (2016)

These pathways can provide a framework with which to seek potential synergies for greening water utilities, not only in terms of joint projects and processes, but also by building a network that provides internal and external political support and renders accountability. The following aspects, drawn from IWA (2016), are worth considering when exploring a water utility's connections within its context:

1. Consumers are progressively becoming more involved in demanding and designing how a service is provided. Greater environmental awareness can act as a driving factor for consumers. Thus, as citizens become more aware of their choices and impacts (which are strongly trending towards sustainability), they can become advocates or adversaries to how services are provided. With the emergence of water-wise communities, the utility will need to actively involve and engage their communities if they wish to count on their support.

2. Currently, most sectors are dealing with social, political, and economic pressures to lower environmental footprints and degradation. As such, water utilities need to be aware of changing demands and regulations, as well as seize the opportunity to learn from other sectors' processes and innovations. This can potentially lead to i) sharing responsibility for infrastructure between sectors (e.g. water & energy, agriculture, or tourism), ii) improvement in resource and energy efficiency through sector-wide coordination, and iii) full life-cycle considerations (cradle-to-cradle).

3. The natural environment is not a passive resource bank, but rather as an active player in the chain of water services provision. Understanding the different aspects in which water utilities can engage with their natural environment requires basin- or city-level approaches, such as IWRM or IUWM. These approaches can promote the use of "natural" infrastructure, with the potential added benefit of closing the loop between water services and water resources management practices.

Historically, the consumer may have seemed like the (passive) end-point for water utilities' processes. However, their role in the political process is becoming increasingly prominent, even reaching the point "that [the] individual decisions of cities' inhabitants are, collectively, more powerful than their governments' ability to intervene"(Economist Intelligence Unit, 2009, p. 17). Thus, it is paramount for a water utility to streamline the engagement with local communities into their processes to safeguard their sustainability. This process can be approached through continuously considering community's goals (within and outside of the water sector), including them in the utility's planning, and ensuring that the utility's work supports these goals (EPA, 2012). The *Handbook for Water and Wastewater Utilities* (EPA, 2012) adds the following advantages regarding the active involvement communities in their water utilities' planning processes:

a. Communities can provide input early in the process (prior to heavy infrastructure investment) and support choosing no-regret measures.

b. Understanding the community's goals and values allows for aligning water utilities' strategic planning with an analysis of alternative solutions/approaches.

c. Support from the community can facilitate changing service levels and/or necessary revenues for ongoing operations.

The pathways discussed so far take an outwards view from the water utility, considering the broader networks that UWM approaches stress are vital. Looking inwards towards the water utility, a complementary set of pathways appear. As shown by the evolution of the GU stages, the integration of green goals and processes across horizontal (departments) and vertical (senior to junior staff) organizational sections is paramount for a Mature Green Utility. Particularly during the Emerging stage, the support obtained from internal pathways can impact the credibility and buy-in (and therefore the future) of the green unit. As such, staff's awareness of the current GU stage can support in selecting which pathways should be prioritized at a given moment.

By being aware of their internal and external pathways, water utilities can generate new business models that foster i) societal support to their plans, ii) synergies and shared responsibilities with other sectors, iii) an integrated approach with the natural environment, and iv) the internal and external leverage necessary to prioritize and endorse the uptake of greening processes.

Green 'turn-over': Key moments for change

The Green 'turn-over' dimension considers the important decision-moments that allow a water utility to make a significant, if not radical, shift to 'green approaches'. The decision-moments – for example: development of new infrastructure, selection of new technologies, etc. – potentially allow the utility to introduce novel approaches and principles. The driving logic behind the Green 'turn-over' is for water utilities to minimize their water, carbon, and ecological footprint in a cost-effective manner and enhance their resilience to climate change and disasters. Potential ways to achieve this are through the consideration and incorporation of eco-system services, decentralized processes and broader funding sources, as discussed below:

Resource efficiency: This approach runs parallel to the Current Practices dimension as it is intended to highlight key decision-moments were current practices can progressively or radically be shifted towards more efficient processes. Such activities may target the large investments in non-revenue water, technical innovations in nutrients recovery, increasing energy efficiency through alternative sources or state-of-the-art innovations, or implementing reuse capabilities within a treatment plant. It is clear that resource-efficient utilities are able to combine greater productivity with lower costs and reduced environmental impact. The Green 'turn-over' dimension highlights that although these processes may require higher-cost initial investments, with an adequate long-term strategy and coherent decision-moments the overall costs will eventually be lower.

> *The dimensions of a Green Utility presented in this section can guide water utilities in becoming more sustainable by: i) improving and building on their existing expertise and practices, ii) emphasizing the importance of identifying and fostering their networks, and iii) taking advantage of key decision-moments to strategically shift long-term investments and developments.*

Green-grey infrastructure solutions: This concept refers to optimizing the current provision of water services through the integration of built, 'grey' infrastructure with environmental green eco-system services (Figure 5). For example, wetlands restoration can be implemented as a form of source protection, which can support the improvement of water quality and thus reduce operating costs. The creation of green spaces for bio-retention and infiltration can be developed as part of the water utility's practices in integrating with urban planning (providing support and direction for UWM paradigms). Such nature-based solutions namely contribute to restoring the 'natural' water cycle in urban settings, providing climate change resilience and cost-effective benefits to water utilities through improved water quality and quantity (IUCN, 2015). Additionally, they can increase a water utility's reserve capacity, which can serve as a climate adaptation strategy (Levine et al., 2016).

The integration of green infrastructure with grey infrastructure can also bring additional social and environmental benefits (such as: recreational, aesthetic, and ecosystem health) that are increasingly more valued and demanded by citizens. Green-grey infrastructures can facilitate the implementation of "fit-for-purpose" (R. R. Brown et al., 2009) waters, diversifying the number of sources and fostering thoughtful use of higher-cost treated water. Overall, green-grey infrastructure is thought to have the potential to support the achievement of SDGs 2, 6, 8, 11, 13, 15, and 17 (Green Utility Network, 2016).

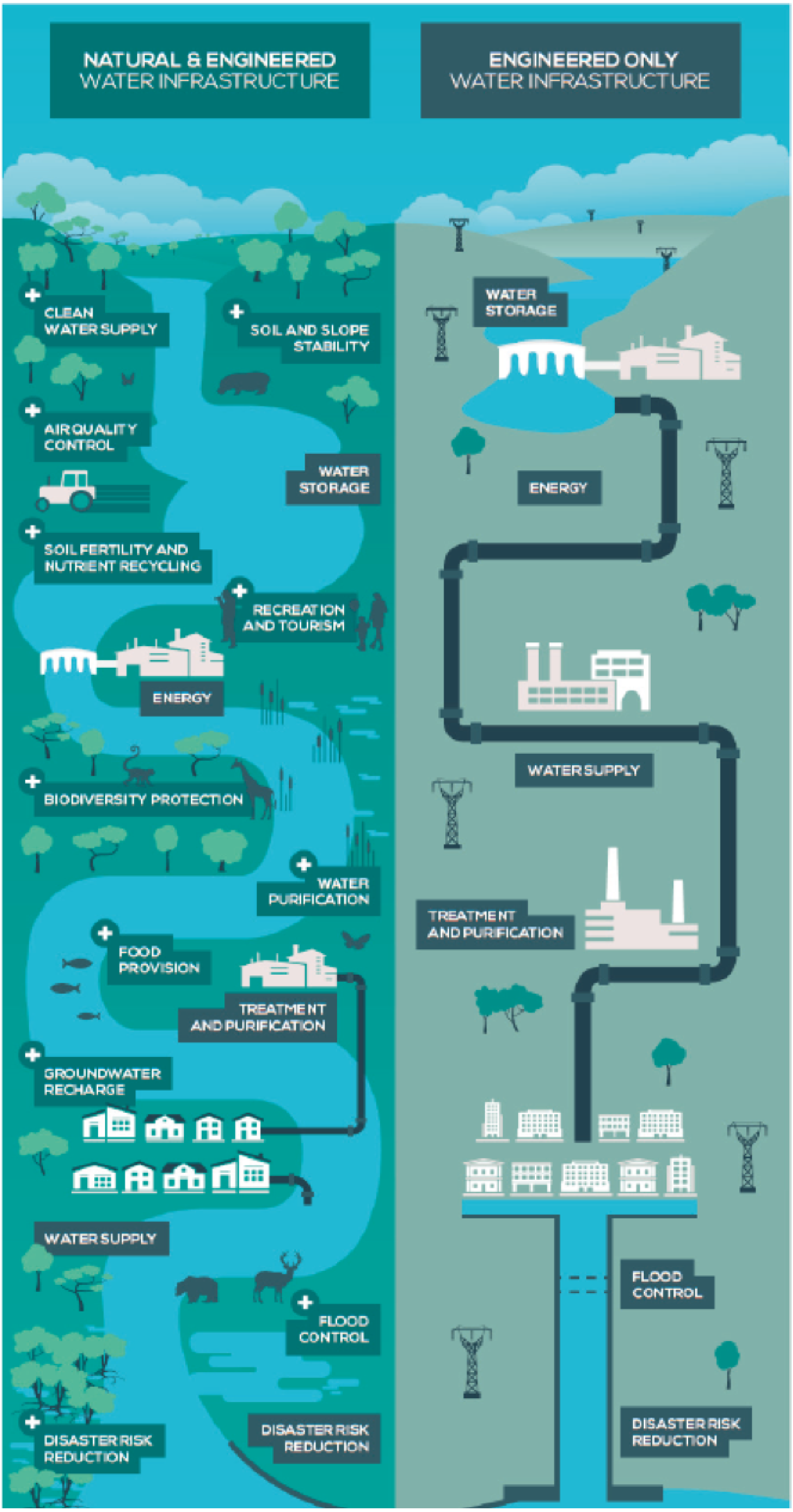

Figure 6: Services provided by natural & engineered water infrastructure - Source: IUCN (2015)

Decentralized infrastructure solutions: Along with green-grey infrastructure, the decentralization and diversification of sources for water supply, as prominently suggested in UWM paradigms, can provide lower process-related footprints and increase resilience of the overall system, especially by securing supply throughout periods of drought. Alternative sources – such as rainwater, grey water and wastewater reuse – offer the potential to develop decentralized supply schemes that allow planning for supply augmentation in a progressive, flexible and preventive manner, while reducing the pressure on traditional water sources. By being developed at smaller, local scales, such decentralized alternatives allow greater flexibility in the overall system design, which may prove especially useful in improving services to the poorest who are disproportionately located in difficult-to-reach areas. Water utilities that manage a diversified range of water systems are also proactively reducing risks to natural or man-made disasters, thus improving water supply security.

Green funding: An additional aspect of the Green 'turn-over' relates to utilities seeking and employing broader financial streams coming from local and global environmental funds. Aspects such as green-grey infrastructure or the implementation of alternative energy sources (such as solar power), are potentially eligible to these funds (see for example https://www.climatebonds.net/about). Accessing these new additional funding sources lowers the financial pressures utilities face to kick start green initiatives alongside their daily operations and yearly strategies. It is recommended that the search and application to green funds occur in the Emerging and Mature Green Utility stages, as knowledge of the utility's green potential and demonstrated organizational buy-in are required.

Overall, engaging in a Green 'turn-over' can **broaden a water utility's capacities, performance, and resilience**, while at the same time ensuring adequate consideration and care for the natural environment and the integrity of the water cycle. Again, this dimension becomes particularly relevant as water utilities become more invested in greening processes, i.e. Emerging and Mature Green Utility phases.

> *The dimensions of a Green Utility presented in this section can guide water utilities in becoming more sustainable by: i) improving and building on their existing expertise and practices, ii) emphasizing the importance of identifying and fostering their networks, and iii) taking advantage of key decision-moments to strategically shift long-term investments and developments.*

Potential benefits for Green Utilities

Having covered the stages and dimensions of a Green Utility, some of the potential benefits derived from its uptake are highlighted here. These benefits are in no way exhaustive. They aim to provide staff of water utilities with arguments to gain support across the utility for shifting towards green processes. Some of the expected benefits specific to the water utility, as adapted from those identified by EPA (2012), include:

1. **Cost saving:** through investment choices that support more efficient resource use, integrating the natural environment in processes, and seeking urban and sector-wide synergies, all of which can potentially drive the utility's operating costs down.
2. **Longer financial horizons**, which allow for a broader analysis of returns on investment. With sustainable processes in mind, the costs of investment over a life-time will be lower hence increasing Return on Investment (ROI). This will support the development of long-term operational and financial planning, as well as support staff in making more comprehensive investment decisions.
3. **More options:** the Green Utility considers a broader range of alternatives, including decentralized systems and green-grey infrastructure. This allows the utility's staff and community members to find the ¬most

adequate solution for their local situation. Additionally, it can provide utilities with space and political will to explore innovative and state-of-the-art approaches.

4. **Stronger support:** through developing social and sector-wide networks. The Green Utility identifies the various stakeholders and actively engages with them, particularly their communities. As citizens and governments become more concerned with environmental issues, water utilities can ensure their work is valued and supported by actively and regularly taking into account their stakeholders' values and needs.

5. **Diverse funding sources:** the variety of funds a water utility can potentially access broadens to green/environmental funds. This is particularly relevant considering global commitments towards the SDG's. That is, donors and governments are increasingly shifting or conditioning their funds to programmes and projects that demonstrate a commitment to sustainability.

6. **Resilience:** through an increase in diversity of sources, treatment options, and support from stakeholders, water utility's engaged in greening processes increase their capacity to withstand adverse events.

Greening a water utility also provides benefits for the broader context of the utility. Implementing environmentally-sound integrated approaches to water systems can improve water security and availability for the city as a whole (Daigger & Crawford, 2007; Marlow et al., 2013). Additionally, if the water utility opts towards implementing decentralized schemes, these have the advantage of delivering better water quality at the consumer (Peter-Varbanets, Zurbrügg, Swartz, & Pronk, 2009), as well as improving the utility's technical, economic, environmental, and resilience aspects (Poustie et al., 2015).

> *The benefits presented here intend to provide momentum for change within the water utilities, as they provide examples and potential quick-wins for evolving into a Green Utility. These can be used to obtain the necessary buy-in from decision-makers to implement the GU Tool in their utility.*

As water utilities continue changing and innovating practices towards more sustainable, green approaches, further benefits (particularly long-term) will likely emerge. Although there is still a knowledge gap in terms of the advantages and impacts of green approaches, **the pro-active involvement of water utilities is paramount in order to further understand and develop the sustainability of the water sector**.

Challenges for the uptake of Green Utilities

Considering the context in which water utilities transition towards a Green Utility, several barriers innate to the water sector, and particularly to water provision, are foreseen as potential challenges. It is worth noting that water utilities core mandate revolves around adequate service levels and coverage to its population, which can at times run counter to implementing green practices. However, in order to achieve their goals now and in the future, the water sector and water utilities must incorporate environmentally-sounds practices in order to avoid "transgressing planetary boundaries or embarking on a path that will do so in the future" (Carrard & Willetts, 2017, p. 225).

> *The macro-, utility-, and consumer-level challenges presented below are in no way exhaustive. They are presented so that proponents of the Green Utility can prepare and adapt their strategies accordingly. These can be useful to cover in Step 5 when discussing constraints.*

Table 1: Challenges for the uptake of Green Utilities

Level of challenge	Identified challenges
Macro-level	• A slow-paced impeding regulatory environment. Practices such as re-use and alternative water sources cannot be implemented or included in a timely manner to a utility's development and strategic plans due to a restricting regulatory environment. • Rigid funding policies attached to traditional approaches. Without adequate financial support to foster innovative approaches, the implementation of green approaches is heavily hindered. This is particularly for water utilities that depend on foreign funds to carry out any development programmes. • Aiming for long-term objectives and processes in short-term investment cycles. A shift towards becoming a Green Utility requires time. If political will cannot support long-term developments and objectives, investments will be sporadic and inconsistent with the water system's requirements. • Lack of awareness from decision-makers. Without the understanding and support from decision-makers, staff in water utilities will lack the political support to implement change. • Donor-driven expansions of water services that do not take into account local drivers and barriers. • The intrinsic complexity of coordinating interdisciplinary and multi-organizational arenas with regards to an overarching topic, such as sustainability.
Utility-level	• Water utility senior staff tend to have an aversion to innovations as their advantages are uncertain at the time and their implementation risks impacting public health. • There is considerable complexity in analysing the costs and benefits of green alternatives. For one, there are conflicting approaches to what greening processes entail. Additionally, some of the benefits provided are difficult to quantify or measure monetarily, making it challenging to objectively compare traditional and new approaches. • Actively engaging with a broader set of stakeholders poses challenges of defining roles and responsibilities, broader section coordination, and developing channels of communication. As this will likely be a new area for water utilities, resources will need to be devoted to its development. • Generally, staff tend to have biases towards current systems, as they are familiar with their scope of operations and already know how to operate and maintain them. • With regards to implementing decentralized systems, two additional challenges emerge. First, water utilities aim to achieve cost-recovery in order to be financially sustainable. The implementation of decentralized schemes would potentially remove part of the (potential) customer base for water utilities as these consumers would have a separate source for water access. Second, a decentralized scheme would likely require establishing a responsible party for coordination and regulation of the various service provision schemes. Whether this is an additional task for the water utility or must be assumed by the relevant governmental authority, the institutional landscape will require resources and trials before it can successfully be implemented.
Consumer-level	• Resistance from citizens to support alternative approaches to the provision of water. This can occur because citizens see other sectors as priority for funding, they do not see a need to change as long as they receive the delivery of the service, or they have aspirational perceptions towards the current system (as a symbol of status). • Consumers may not be interested or willing to engage with the water utility.

Based on Bertule et al. (2014); (R. R. Brown & Farrelly, 2009); Green Utility Network (2016); IWA (2016); Marlow et al. (2013)

Overall, **there is currently a lack of information and understanding of how a Green Utility can, or is meant to, function**. This leads to i) uncertainty in the benefits and costs that can be generated (particularly short-term wins that can facilitate uptake), ii) a vacuum in staff and stakeholder knowledge regarding evaluation, monitoring, and implementation of green projects, and iii) a gap in existing funding mechanisms and political will to support water utilities greening projects. With these issues in mind, the following section provides a guidance framework for water utilities, in order to provide an assessment and way-forward towards becoming green.

Conclusion and Way Forward

The need for water utilities to continue evolving into sustainable, environmentally-friendly organizations is paramount. The increasing pressures of population growth and climate change threaten the capacity to provide adequate levels of service while ensuring a healthy environment for current and future populations. Global and city-level water management paradigms have been set forth to provide guidance on how to achieve this. However, the path for water utilities to integrate and support these initiatives, while continuously and effectively providing their services, remains challenging due to the diversity of local contexts (e.g. North vs South) and lack of a systematic approach. As global and local sustainability challenges continue to evolve and change, water utilities will need to habitually reflect on their capabilities in order to improve their processes and be able to respond accordingly.

The Green Utility Toolkit aims to support addressing these challenges by providing an overarching framework with which to consider and guide utilities towards greener processes. It does so by helping water utilities internally and consensually define what a sustainable, green utility means for them. This provides the necessary ground for steering their development plans in a manner that is context-adequate for them. Through the Green Utility Toolkit, staff members also define how they will measure their progress, as well as design approaches to achieve it based on the Green Utility's three dimensions. Through this process, water utilities will construct a starting point and action plan that can serve as points of reflection in each utility's sustainability journey.

Becoming a Green Utility is a continuous and necessary process that utilities, communities and other stakeholders must engage with in order to face the development and water sector challenges of today and tomorrow.

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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

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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.

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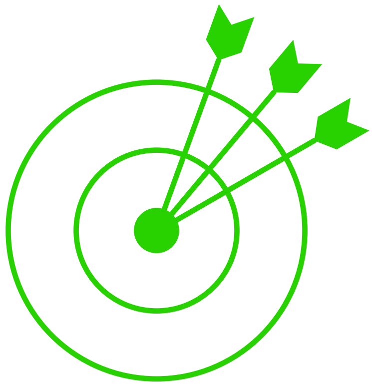


Objectives

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:

Plan of action for a Green Utility

Bridge the gap: Green Utility Dimensions

Envision the future-state

Assess the current-state

Select indicators to measure sustainability

Translate definition to utility's components

Definite sustainability for water utility

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.

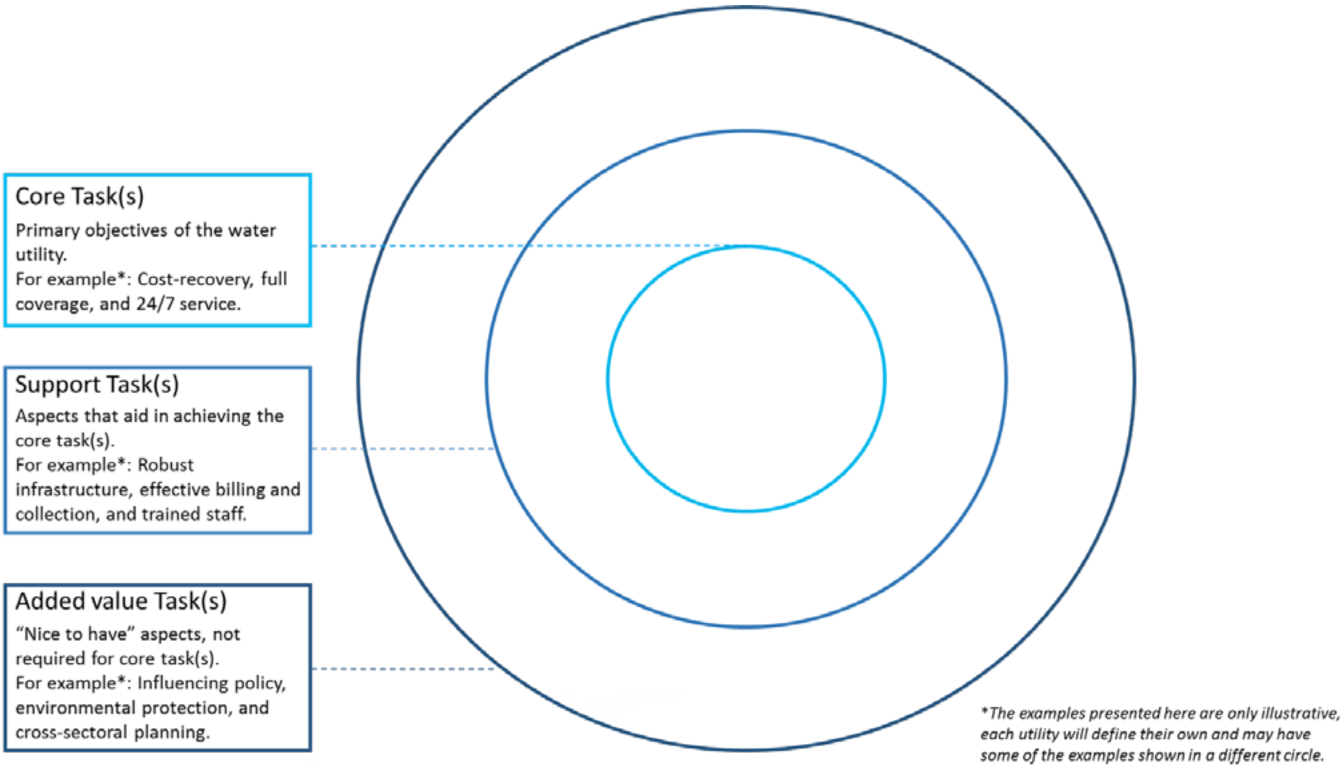
Annex A1: Sustainability Synonyms (full list)

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$/m³ water sold; US$/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$/m³ sold or produced; US$/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		
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5		

Annex F: Selected Indicators (full)

#	Indicator	Unit of measurement
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#	Indicator	Unit of measurement
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Annex G: Scoring the Indicators

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

Annex H: Scoring Indicators (full)

Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
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Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
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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			
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Ind. #	Curent Practices	Pathways	Green turn-over
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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			

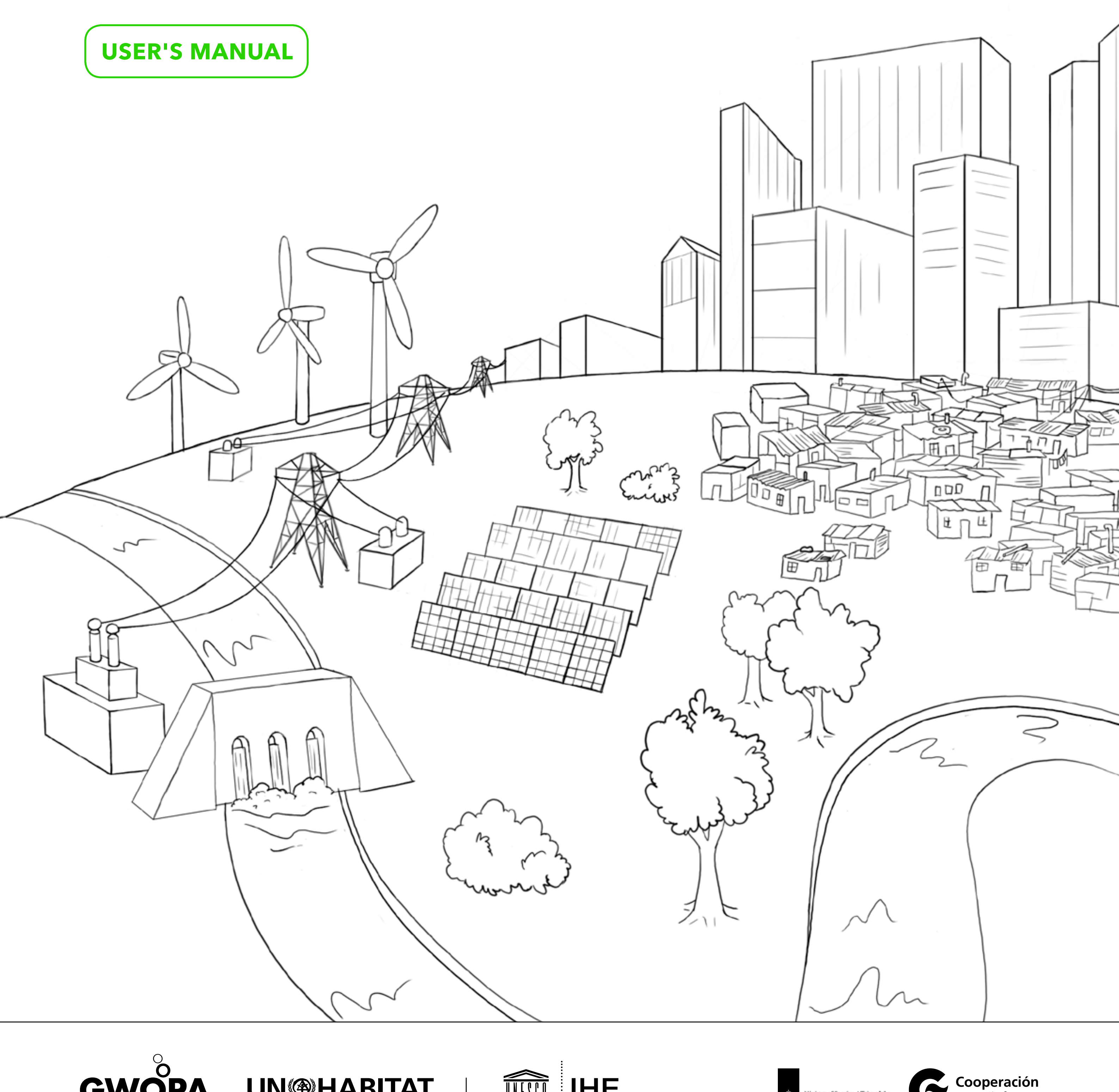
BEWOP

TOOL SERIES

Green Utility Toolkit

OPERATIONAL TOOL

USER'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

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BEWOP

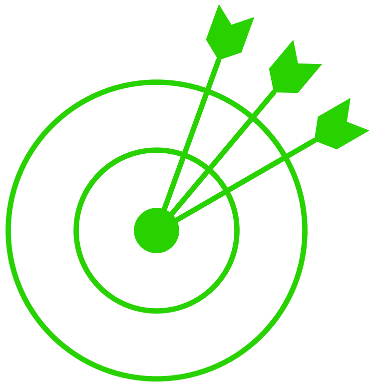
Water Operators' Partnerships are peer support arrangements between two or more water and sanitation operators, carried out on a not-for-profit basis with the objective of strengthening operator capacity.

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

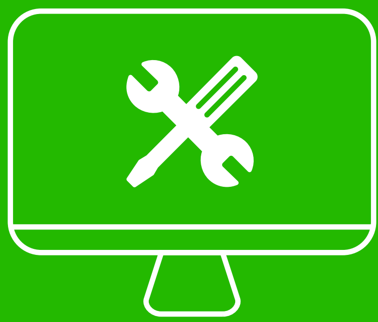
bewop.un-ihe.org | **BEWOP.org** | **#BEWOP**



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:

Plan of action for a Green Utility

Bridge the gap: Green Utility Dimensions

Envision the future-state

Assess the current-state

Select indicators to measure sustainability

Translate definition to utility's components

Definite sustainability for water utility

If your water utility already has defined certain aspects, such as how sustainability is understood and operationalized, some steps may be skipped by your facilitator.

Depending on the number of participants, the Green Utility Tool can be carried out in groups or by individuals depending on their expertise, roles and interests. This aspect can be defined before the workshop by the facilitator or at the beginning with the whole group of participants.

Regardless of the form in which the tool is implemented, the key factor to success is the commitment from the participants and the water utility in being honest, realistic and committed to implementing the results from this exercise.

We hope this tool supports you and your utility's journey towards becoming a more sustainable and environmentally-friendly utility today and for the future.

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

This step consists of building a common understanding among participants on what it means to be sustainable, specifically for the case of your water utility. Your facilitator will provide you with an exercise, to support you and your group in creating a working definition of sustainability for your utility.

Your Top 3 Sustainability-Words		

Your Group's Top 5 Sustainability-Words		

Your Working Definition of Sustainability

2. Translating to Components

In this step, you will translate your working definition of sustainability into the different overarching activities and processes carried out by your utility. These have been grouped here as components:

Sustainability-based Components:

Components	Description
Organizational	
Financial	
Operational	
Technological	
Environmental	
Social	
Political (Institutional)	
Sector-wise	
Other	

Milestone #1

Having completed steps 1 and 2, you and your utility now have a common working definition for sustainability and jointly-developed definitions of how this working definition translates into the utility's different overarching activities and processes.

Well done!

3. Selecting Relevant Indicators

During this step, the facilitator will provide you with a battery of indicators. You will select the ones that are deemed most suitable to assess and monitor the sustainability-based components developed in the previous step. In choosing your indicators, keep in mind that they will be more useful if they achieve the following 4 criteria (based on Foxon et al. 2002):

1. **Comprehensive:** The group of indicators should cover economic, environmental, social (and potentially technical) aspects, in order to ensure that progress towards sustainability objectives is being accounted for on all fronts.
2. **Applicable:** The indicators chosen should reflect the working definition of sustainability and its translation into sustainability-based components.
3. **Traceable:** The utility has, or can have, the capacity to collect sufficient reliable numerical or qualitative data to enable comparison over time and locations.
4. **Practical:** The indicators should be relatively simple to implement, based on the current capacity of the utility.

In the table below, write down the final set of indicators that have been decided upon, including how you will measure them. You do not need to select a total of 25 indicators if you and your group find fewer indicators to be sufficient; alternatively, you can go beyond 25 indicators if you find it necessary.

#	Indicator	Unit of measurement
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#	Indicator	Unit of measurement
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4. Assessing the Current-State

5. Envisioning the Future-State

In this step, you will assess your utility's current and future (desired) state based on the indicators chosen from the previous step. The first part of this step will focus on assessing the current state, for which you can assign a "C" under the different categories: Very Low, Low, Medium, High, and Very High.

Although these categories result in a qualitative assessment, to support their later translation (post- workshop) into tangible and relevant targets, the STANDARD / GUIDELINE column should be filled with the relevant measurement mechanism, e.g. WHO Guidelines, National Legal Standards or your utility's Internal Guidelines. As such, you will be expected to be able to explain why you (or your group) have selected the given score. For example, explain what the difference is between low vs high for a given indicator.

Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
1						
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Ind. #	Standard / Guideline	Very low	Low	Med.	High	Very high
11						
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Once all indicators have been agreed upon and assessed, you will choose and discuss where your utility should score in the future. That is, provide the scores for your (ideal) green utility. As a first step, you will decide how far you are looking into the future:

Time-frame for your Green Utility: ________ years.

Now, you will explicitly define the constraints faced by your utility in considering future scenarios. For example: A slow-changing legal framework or lack of dedicated funding to address a specific issue.

Considered constraints

Based on the definitions in steps 1 and 2, assign an "F" for each indicator for its future-state score. When assigning future-state scores, it is important to be challenging, yet realistic.

Milestone #2

Having completed steps 3 to 5, you and your utility now have selected the relevant indicators to measure your "greenness", coupled with a planning and monitoring tool to guide and assess your progress towards a greener path within a specific time-frame.

Well done!

6. Bridging the gap: Green Utility Dimensions

Having identified the differences between the current- and future-state of the utility, you will now identify, develop 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:

Current Practices: The identification and development of potential, or already existing, 'green' approaches in service provision based on current day-to-day processes and activities.

Pathways: The potential synergies that utilities can seek with external initiatives and stakeholders to develop and further 'greener' approaches, both within and outside the water sector.

Green Turn-over: Key decision making moments (e.g. large investments or legislative actions) where water utilities can significantly minimize their water, carbon, and/or ecological footprint in a cost-effective manner. Also considers enhancing resilience to climate change and disasters through incorporating eco-system services in operations.

Ind. #	Curent Practices	Pathways	Green turn-over
1			
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Ind. #	Curent Practices	Pathways	Green turn-over
7			
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7. Planning for a Green Utility

In this last step, you (and your group) will strategizing in selecting the most effective and feasible *activities / approaches* from the previous step. When selecting the *time-frame*, keep in mind that quick-wins will help you in fostering support towards greener approaches, while long-term approaches will likely involve more radical changes in your utility. *Estimated Investment Costs* should support you in assessing which activities can be done internally and which will require external funding. *Potential Sources of funding* are intended to aid you in identifying where usual and innovative partnerships will need to be developed. Finally, *Responsible(s)* will help you and the utility define the person or group within the utility that will undertake the development and implementation of the chosen activity / approach.

Green Utility Plan of Action

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

Milestone #3

Having completed steps 6 and 7, you and your utility now have identified the potential approaches to becoming greener, as well as set forth a plan of action to achieve your envisioned Green Utility.

Congratulations!

Created under

BEWOP

Supporting the implementation of

SUSTAINABLE DEVELOPMENT GOALS

IMPLEMENTING THE NEW URBAN AGENDA

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