The City Blueprint® Approach
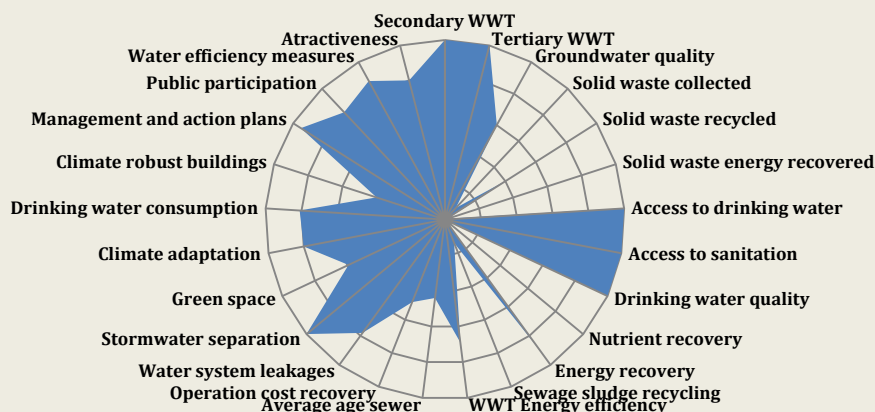
Improving Implementation Capacities of Cities and Regions by sharing best practices on Urban Water Cycle Services

**An EIP Water Action Group of the European Commission**

1. INTRODUCTION

Approximately 80% of the world's GDP is produced, and 75% of the global energy and material flows are consumed in cities. Cities are concentrated centres of production, consumption, and waste disposal that drive land change and a host of global health and environmental challenges. Cities are highly dependent on other cities and hinterlands to supply materials (including water), energy, and to dispose waste. Urbanization takes place at an unprecedented rate of almost 200,000 people per day and therefore, most of our global challenges, i.e. the Sustainable Development Goals can best be addressed at the level, where these problems will concentrate, i.e., in cities.

Megatrends in cities

Urbanization

Urban areas of the world are expected to absorb all the population growth expected over the next four decades.
By 2050, urban dwellers will likely account for 86 % of the population in the more developed regions and for 64 % of that in the less developed regions.

Climate change

Climate change may worsen water services and quality of life in cities.

Water use & water scarcity

Water withdrawals have tripled over the last 50 years. In 2030, there will be a 40% supply shortage of water.

Sanitation

Currently, 2.5 billion people are without improved sanitation facilities.

Human health

Currently, 3.4 million people - mostly children – die from water-borne diseases every year.

Hazards

Water-related hazards account for 90% of all natural hazards.

2. THE CITY BLUEPRINT® APPROACH

The City Blueprint® Approach is a diagnosis tool and consists of three complementary frameworks. The main challenges of cities are assessed with the *Trends and Pressures Framework* (**TPF**). How cities are managing their water cycle is done with the *City Blueprint® Framework* (**CBF**). Where cities can improve their water governance is done with the *Governance Capacity Framework* (**GCF**). **Two short videos** have been made about the City Blueprint Approach (CBA1 about the TPF & CBF and CBA2 about the GCF). The GCF is a new framework and has been applied in Quito (Ecuador), Amsterdam and Melbourne. It is currently also applied in New York City.
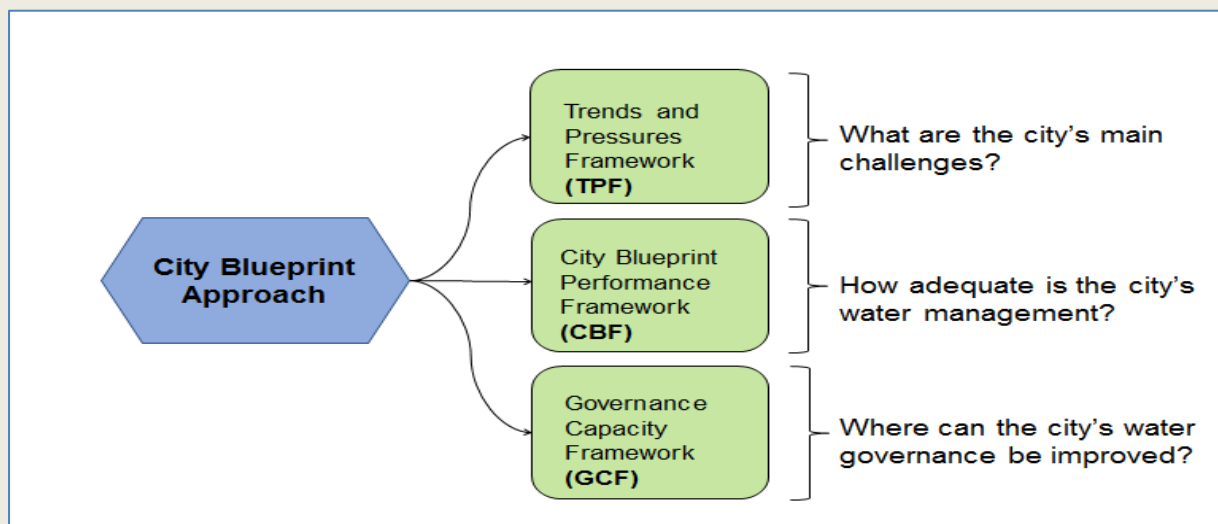

2.1 Short history

The challenges in cities are the reason why we developed the City Blueprint methodology. We have done this in a learning-by-doing fashion. In 2011 we assessed our first city: Rotterdam. The City Blueprint is a baseline assessment of the sustainability of water management in a municipality (or other dominantly urban region). It allows a city to quickly understand how advanced it is in sustainable water management and to compare its status with other cities. This project is part of the European Commission Innovation Partnership on Water and is also tightly linked to the European Innovation Partnership on Smart Cities. With this approach we have assessed 45 municipalities and regions and detailed reports are available for 7 cities (Rotterdam, Dar es Salaam, Hamburg, Istanbul, Ho Chi Minh City, Amsterdam, and Melbourne). Climate adaptation options have been reviewed for the City of Malmö.
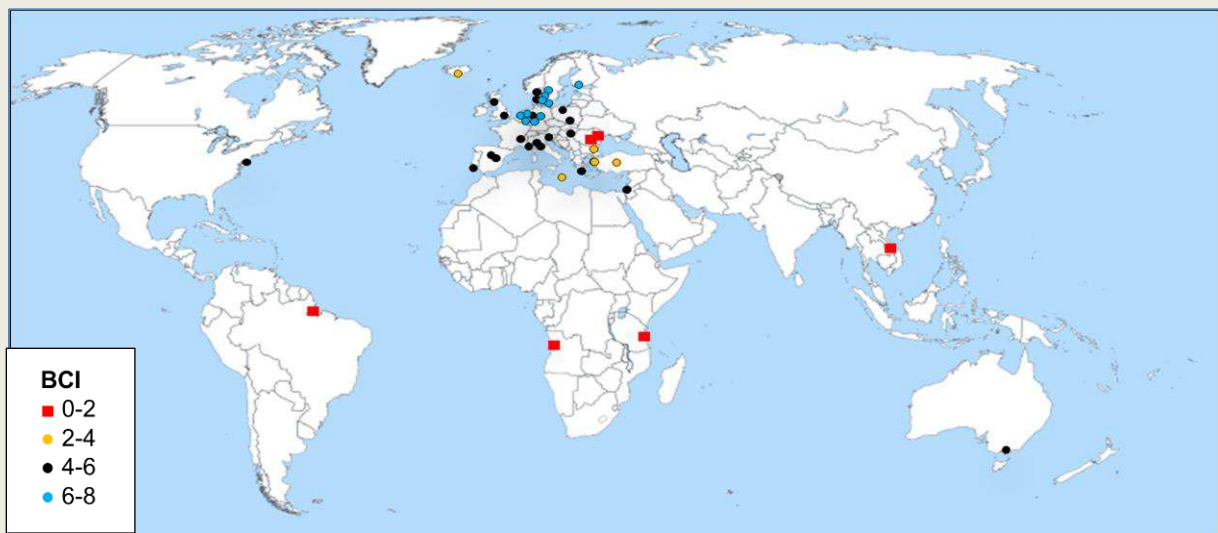
2.2 The TPF and CBF

In 2015, we published a critical review of the City Blueprint® methodology. Based on constructive feedback from cities we decided to distinguish a Trends and Pressures Framework (TPF) and the City Blueprint Framework (CBF). The TPF summarizes the main social, environmental and financial aspects on which cities have hardly any influence, whereas the CBF provides a clear overview of Integrated Water Resources Management (IWRM) performance and its bottlenecks in municipalities and regions. The CBF indicators are divided over the following seven categories: water quality, solid waste treatment, basic water services, wastewater treatment, infrastructure, climate robustness and governance. Data have been gathered and we have applied it again on the 45 municipalities and regions, mainly in Europe. Key results of the analysis of these 45 municipalities and regions are shown below. The financial (red), environmental (green) and social (blue) pressures are shown together with the Blue City Index® (BCI), the geometric mean of the 25 indicators of the City Blueprint. The BCI can vary from 0 (concern) to 10 (no concern). The geographical distribution of the BCI is given as well. Currently we have assessed about 60 cities in more than 30 different countries.

The prospect of increased urban flooding, water scarcity, heat stress, and pollution (waste water including solid waste) as reported by the European Environment Agency ([EEA]) and the Organisation for Economic Co-operation and Development ([OECD]) emphasizes the need for adaptive and reliable urban water infrastructures. According to OECD, water infrastructures are often old and require refurbishment to meet current standards, whereas standards to withstand future conditions of increased storm events and urbanization are often not accounted for. According to the United Nations Environment Programme ([UNEP]), an estimated US\$ 41 trillion (41×10^{12}) is needed to refurbish the urban infrastructure in the period 2005-2030. Over 50% will be needed to refurbish the water systems. This is roughly 60% more than is spent on infrastructure in the same period until now. In developed countries water infrastructure investments amount to 1% of the GDP every year. For developing countries this is even more substantial, i.e. about 3.5% with extremes up to 6% or more.
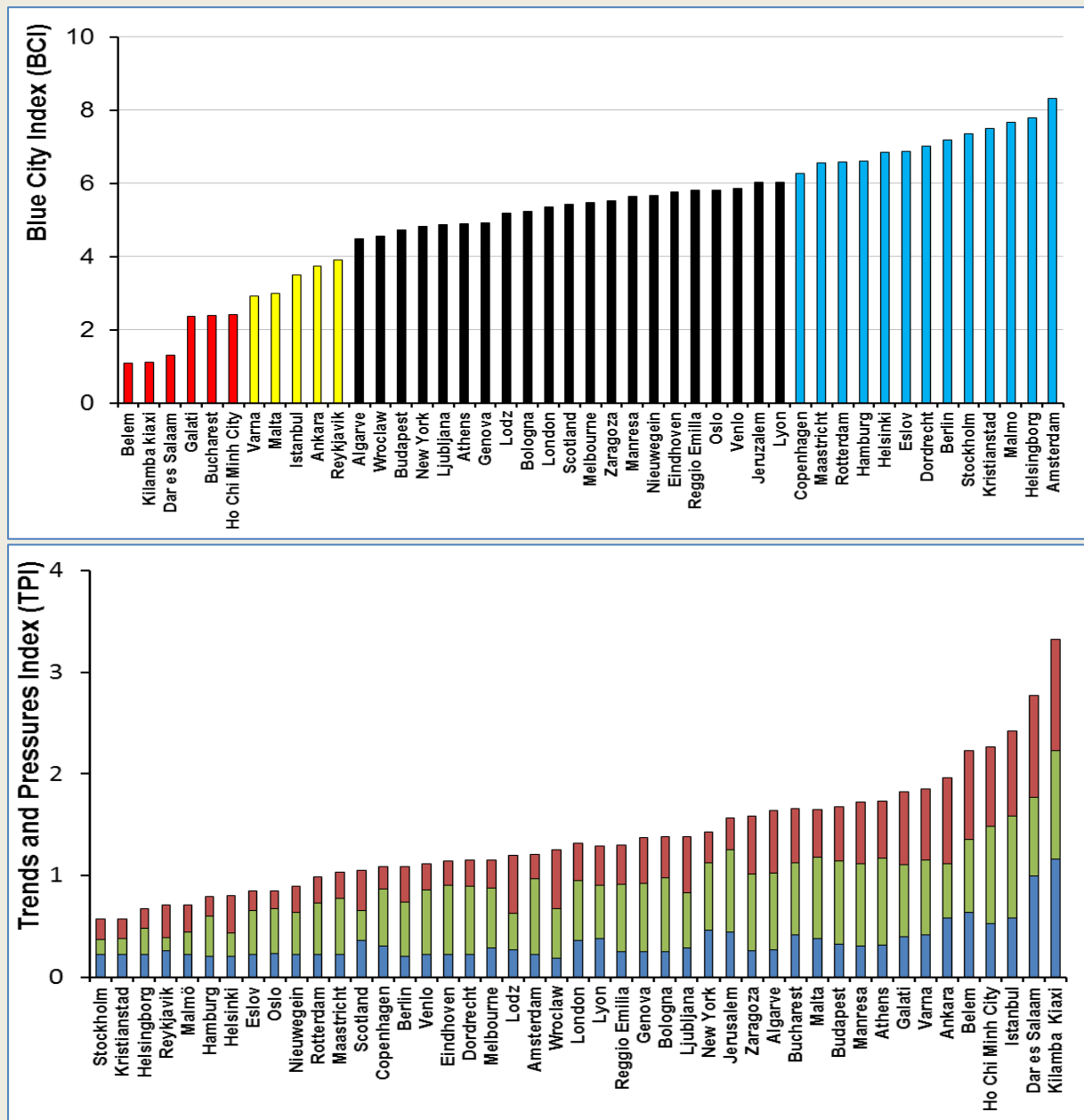

Results of the City Blueprint analysis of 45 municipalities and regions in 27 different countries. Bottom TPI (arithmetic average of 12 indicators), where green, red and blue represent the share of the environmental, financial and social indicators, respectively, to the overall TPI. Top BCI (geometric mean of 25 indicators) of the City Blueprint according to [Koop and Van Leeuwen (2016)].

Municipalities and regions assessed with the TPF and CBF (Koop and Van Leeuwen, 2016). Red, orange, black and blue represent municipalities and regions with a geometric BCI between 0–2 (cities lacking basic water services), 2–4 (wasteful cities), 4–6 (water-efficient cities), and 6–8 (resource-efficient and adaptive cities), respectively. Most cities are from north-western Europe. Cities assessed outside Europe are: Ankara and Istanbul (Turkey), Jerusalem (Israel), Kilamba Kiaxi (Angola), Dar es Salaam (Tanzania), Ho Chi Minh City (Vietnam), Belém (Brazil), Melbourne (Australia) and New York City (USA).

2.3 The Governance Capacity Framework (GCF)

According to the OECD, water governance is the set of rules, practices, and processes through which decisions for the management of water resources and services are taken and implemented, and decision-makers are held accountable. Good water governance is the real challenge. The City Blueprint Approach (TPF+CBF+GCF) is just the first step (the baseline assessment) in a long-term journey of communication and co-operation within and between cities.
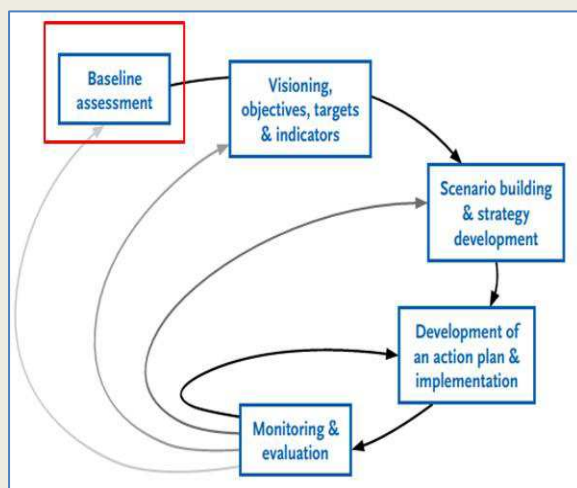
A City Blueprint Approach is just the first step (the baseline assessment) on a journey of communication and cooperation within and between cities (Source: SWITCH)
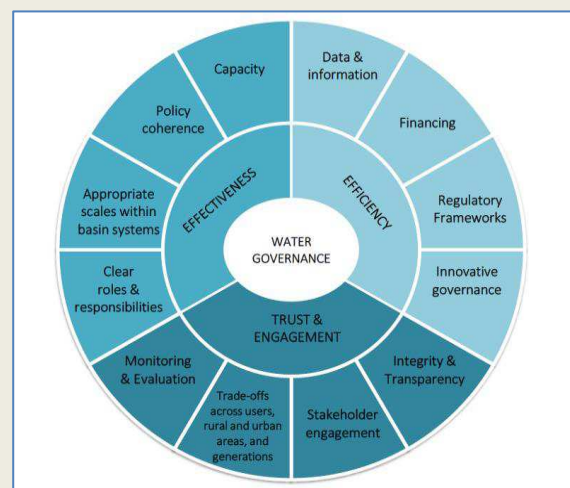

The OECD Principles on Water governance (Source: OECD)

Development. The list of identified governance gaps, barriers and capacities is seemingly endless and partly overlap or contradict. They are fragmented, case-specific and reflect a disciplinary scope that limit our understanding of more generic underlying processes and our ability to identify transferable lessons. Based on an extensive literature study, we have proposed a *Governance Capacity Framework* that focuses on 5 water-related challenges: 1) flood risk, 2) water scarcity, 3) urban heat islands, 4) waste water treatment and 5) solid waste treatment. These are amongst the most reoccurring issues that will steadily increase in importance due to global trends of climate change and urbanization.

Operationalization. The GCF is the first result of operationalization the capacity of urban water governance into a balanced framework divided over three main *dimensions* of **knowing, wanting** and **enabling**. The GCF comprises nine overarching governance *conditions* which each consist of three *indicators*. For each of the twenty-seven indicators, a Likert-type scoring scale has been developed, that ranges from very encouraging (++) to very limiting (--). The GCF has been further operationalized by developing specific questions linked with Likert-type scoring.

Dimensions	Condition	Indicators
Knowing	**1 Awareness**	1.1 Community knowledge 1.2 Local sense of urgency 1.3 Behavioural internalization
	2 Useful knowledge	2.1 Information availability 2.2 Information transparency 2.3 Knowledge cohesion
	3 Continuous learning	3.1 Smart monitoring 3.2 Evaluation 3.3 Cross-stakeholder learning
Wanting	**4 Stakeholder engagement process**	4.1 Stakeholder inclusiveness 4.2 Protection of core values 4.3 Progress and choice variety
	5 Policy ambition	5.1 Ambitious and realistic goals 5.2 Discourse embedding 5.3 Policy cohesion
	6 Agents of change	6.1 Entrepreneurial agents 6.2 Collaborative agents 6.3 Visionary agents
Enabling	**7 Multi-level network potential**	7.1 Room to manoeuver 7.2 Clear division of responsibilities 7.3 Authority
	8 Financial viability	8.1 Affordability 8.2 Consumer willingness-to-pay 8.3 Financial continuation
	9 Implementing capacity	9.1 Policy instruments 9.2 Legal compliance 9.3 Preparedness

Application. The GCF has been used to assess the five governance capacities of Amsterdam. We have also used the GCF to assess Quito's drinking water security. We are about to complete GCF analyses of New York City, Melbourne and Ahmedabad (India). The GCF analysis is based on interviews with the main stakeholders in the city. Below we present the empirical results from the city of Amsterdam for the five complex water-related challenges and for Quito's drinking water security.
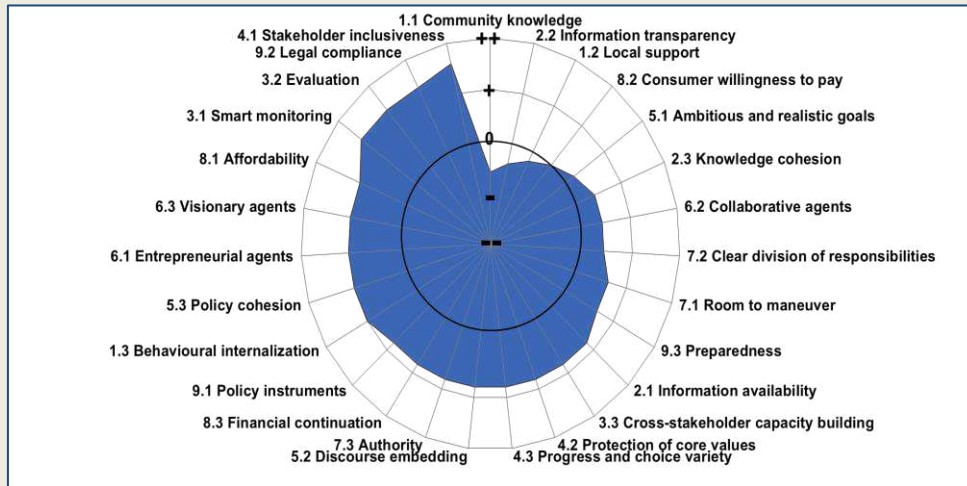
Results of the GCF analysis of Amsterdam. This is the average score for five different governance capacity assessments (flood risk, water scarcity, urban heat islands, waste water treatment and solid waste treatment). Community knowledge, Information transparency, local support and consumer willingness to pay are points of attention for the city of Amsterdam as they have a score of 0 or lower (Paper submitted for publication).
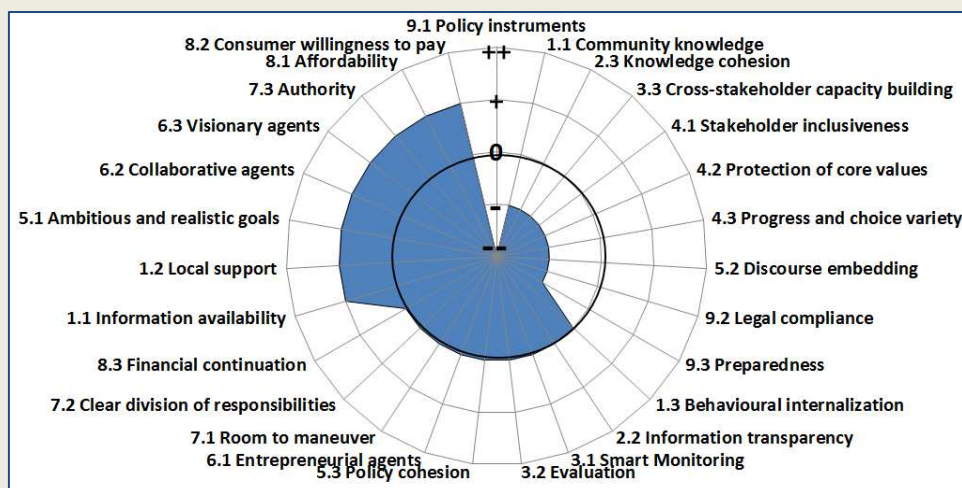
Results of the governance capacity of drinking water security of Quito (Ecuador). It reveals that cooperation between stakeholders, implementing capacity and citizens' awareness are the most important conditions for further development to find adequate solutions for Quito's long-term drinking water security. We also suggest that more attention should be drawn to the TAP-principles (transparency, accountability and participation).

The GCF shows large potential to provide empirical cross-city comparisons that contributes to the deeper understanding of the most important set of conditions needed to overcome emerging governance barriers. The assessment also provides valuable pragmatic insight to facilitate local decision-makers in finding dynamic solutions to achieve their sustainable development goals.

3. SMARTER CITIES

Ideally, cities should develop a clear set of long-term objectives that should be SMART: Specific (target a specific area for improvement), Measurable (quantify or at least suggest an indicator of progress), Assignable (specify who will do it), Realistic (state what results can realistically be achieved, given available resources), Time-related (specify when the result(s) can be achieved). Very often clear objectives are not set and - as a result - many cities are neither smart nor future-proof.

Cities should realize that the [cost of inaction](#) is generally very high. This has been clearly demonstrated by Lykke Leonardsen for the City of [Copenhagen](#).

Smarter cities are:
- Cities with a coherent long-term social, economic and ecological agenda.
- Water-wise cities that implement a circular economy, focus on social innovation and, last but not least, greatly improve on governance.
- Cities that explore co-benefits (win-win's) by cleverly integrating topics such as water, waste water, energy, solid waste, transport, ICT, climate adaptation, biodiversity (blue-green infrastructure), and housing. This saves time and money and makes cities attractive places to live.
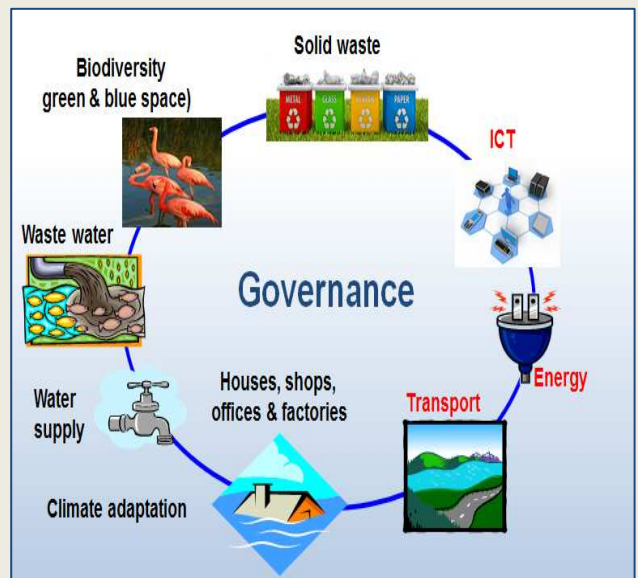
4. EIP WATER -EXPLAINED

The European Innovation Partnership on Water ([EIP Water](#)) is one of the European Innovation Partnerships of the European Commission. The aim is to promote innovation that contributes to solve social challenges, enhance Europe's competitiveness and create employment and economic growth. EIPs help to pool expertise and resources by bringing together public and private actors at EU, national and regional levels. The overall objective of the EIP Water is to support and facilitate the development and implementation of innovative solutions to deal with the many water related challenges Europe and the World are facing, as well as to promote economic growth by bringing such solutions to the market in Europe and further afield. The [City Blueprint Action Group](#) of EIP WATER is coordinated by Kees van Leeuwen (KWR Watercycle Research Institute, the Netherlands) and Richard Elelman (Eurecat-CTM, Spain).

5. GET INVOLVED

All cities are different. Some are advanced in a few or many subject areas. Our research demonstrated positive correlations of the Blue City Index with: (a) the ambitions of the local authorities regarding the sustainability of their IWRM, (b) the Gross Domestic Product (GDP) per person, (c) public participation, (d) climate adaptation, and (e) all governance indicators according to the World Bank. This shows that the variability in IWRM of cities offers great opportunities for short-term and long-term improvements, provided that cities share their best practices. Some cities, especially in developing countries, have much work to do. The goal of the City Blueprint Approach is not to highlight failures, but instead to encourage cities to become smarter in IWRM and Governance by identifying areas for improvement and by sharing their best practices by active participation in learning-alliances, (*"winning by twinning"*). Recently, we published our Compendium of Best Practices.

5.1 What is the commitment for municipalities?

Agreeing to take part in the City Blueprint survey does not commit a city to any further steps. However, taking the right adaptive and preventive measures is often cheaper than inaction. In fact, it is a business case that will work out well for your citizens! Therefore we hope that cities will take action to become more resilient and liveable.

5.2 What is the potential use for consulting and construction companies?

The City Blueprint is the first step in a process to improve the sustainability of cities. It is a tool and process to bring stakeholders together and to develop a long-term strategy on the basis of which cities decide to develop and implement long-term action plans. The focus here is on the integration of water, waste and climate adaptation with other aspects in a city. The co-benefits or win-win's will make cities a more attractive place to live and save time and money too.

5.3 What does the City Blueprint Survey involve?

You will be involved in a survey, where you will be asked to complete the 25 CBF indicators for your municipality or region. We will take care of the TPF indicators. The answers will be reviewed by us and shown on the final radar chart or City Blueprint. So, the city is requested to provide answers and data sources for most of the CBF indicators, while technical experts answer the remaining issues. Each indicator requires some element of data collation and/or research. For each CBF indicator, a simple formula is provided to convert the response to a score between 0 and 10, which can then be plotted on the relevant spoke of the radar chart for which software is available on the Watershare website. We expect 1-3 man-days of time for your municipality or region by an appropriate engineer(s)/employee(s) to coordinate, research and provide the responses. If you would also like an analysis of the Governance Capacity of your municipality or region, that can be organized as well. This is a separate activity for which we will need to select and interview a relevant number of stakeholders. The completion of the GCF analysis will take a couple of weeks.

5.4 Please contact us

The City Blueprint is also one of the tools of Watershare, *Expert Tools for the Water Sector*. We would like cities to develop a long-term coherent strategy based on the completion of our questionnaire. You can contact us, without any obligation, at: city.blueprint@kwrwater.nl or +31 306069649. We, a small group of independent technical experts at KWR Watercycle Research Institute, will review the data, generate the radar chart and prepare a short accompanying report comprising the TPF, CBF and GCF. The technical expert of KWR may visit your city and work with your team for several days. Alternatively, the work can be completed by phone, email, Skype, etc.

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6. FURTHER INFORMATION

http://www.eip-water.eu/City_Blueprints (click on documents to get reports, presentations & publications).
http://www.watershare.eu/
http://www.netwerch2o.eu
http://www.eip-water.eu/ & http://ec.europa.eu/eip/smartcities/
http://www.bluescities.eu/
http://www.power-h2020.eu/