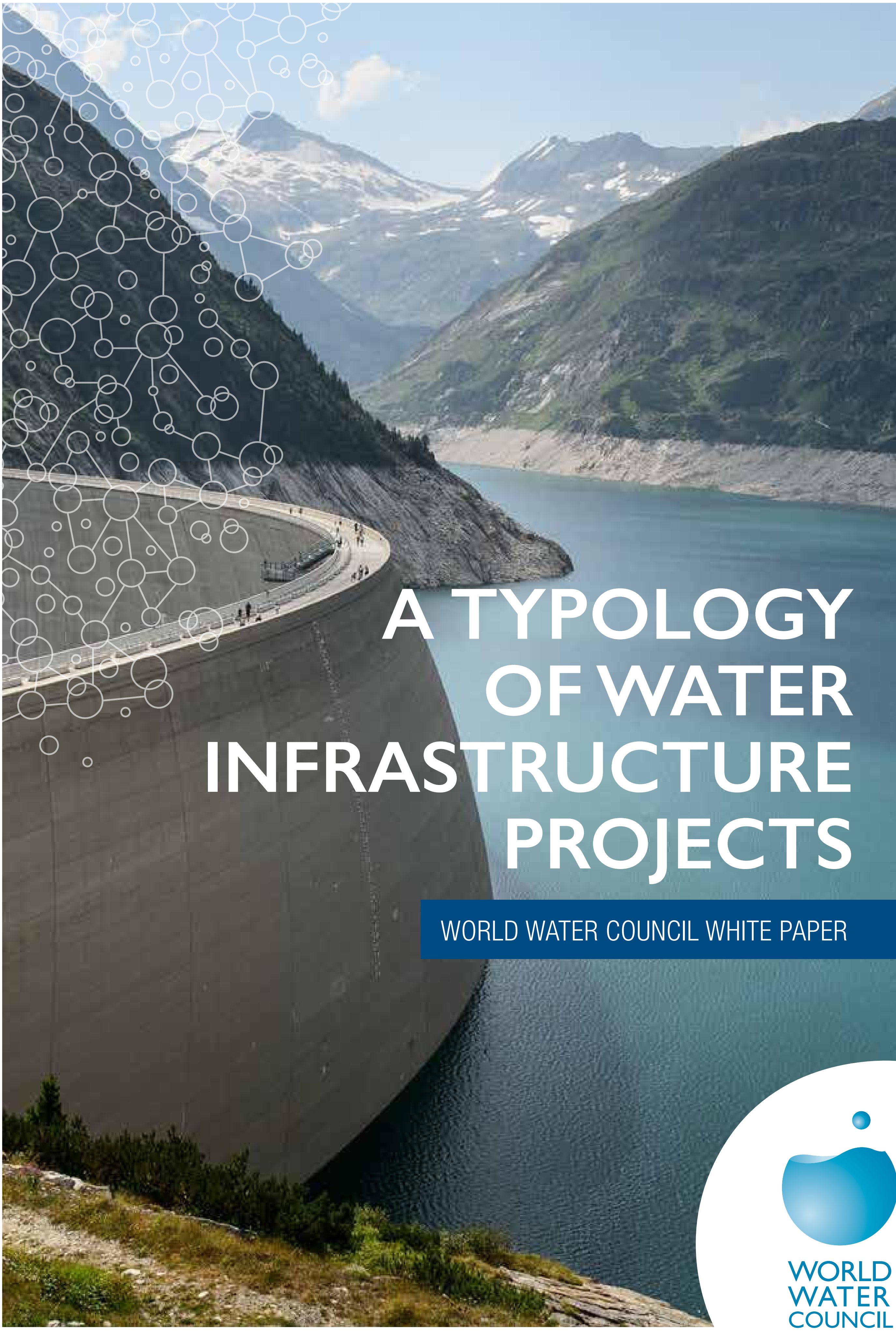


A TYPOLOGY OF WATER INFRASTRUCTURE PROJECTS

WORLD WATER COUNCIL WHITE PAPER

WORLD WATER COUNCIL

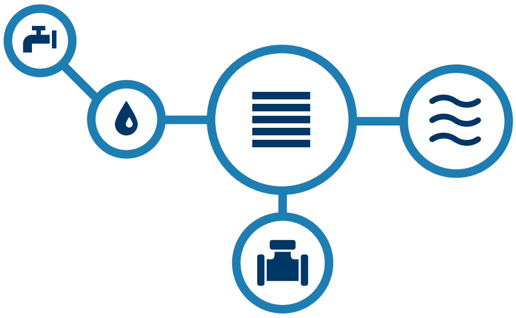
WORLD
WATER
COUNCIL

The World Water Council is an international multi-stakeholder platform organization, the founder and co-organizer of the World Water Forum. The Council's mission is to mobilize action on critical water issues at all levels, including the highest decision-making level, by engaging people in debate and challenging conventional thinking. The World Water Council, headquartered in Marseille, France, was created in 1996. It brings together over 300 member organizations from more than 50 different countries.
www.worldwatercouncil.org

Published in November 2018 by the World Water Council.

Cover photograph: Raphael Biscaldi/unsplash.com

A TYPOLOGY OF WATER INFRASTRUCTURE PROJECTS



WORLD WATER COUNCIL WHITE PAPER

NOVEMBER 2018

Prepared by
Alex Money

The World Water Council would like to thank its Task Force on Financing Water Infrastructure, and in particular the former Chair, Mr. Bernard Guirkinger. The author is grateful for his guidance and advice. We also wish to thank the OECD and Aquafed for providing substantial input on an earlier draft of this paper.

CONTENTS

7 Summary

7 Overview

8 Contextual Framework

9 Water's share of infrastructure investment

11 The investment case for water projects

12 Classifying water projects

13 Project risk

15 Project return

17 A typology of infrastructure projects

18 Next steps

SUMMARY

Water infrastructure projects could be made more 'bankable' by improving how their investment case is made. To reduce the information asymmetries that exist between projects and finance, a typology of water projects is proposed. Through an outcomes-based approach to evaluate risk and return, the framework draws on models that are increasingly being used to measure progress against the Sustainable Development Goals (SDGs). A classification that is adaptive to the varying expectations of project investors, based on the *scope, system, structure, security* and *sustainability* of different projects is presented.

OVERVIEW

There is broad consensus that it will be impossible to achieve the targets of SDG 6 unless there is a step change in the quantum of investment in water infrastructure, particularly across the developing world. Estimates of the gap between current levels of investment compared to what is necessary to meet the goals, range between US$ 150 billion and US$ 300 billion per annum. These are big numbers by any measure, particularly as the gap does not appear to be closing. A lot of time and effort has already been expended by various organisations to evaluate the impediments to funding water infrastructure. This work has helped to yield a much better understanding of the problem, and indeed has led to improvements in many areas. However, for three in ten people worldwide – over two billion people -   the quality of access to water supply and other services still remains woefully inadequate [1]. From the perspective of the SDGs, which emphasise the requirement of universality ('leaving no one behind'), this sober fact has a particular resonance.

Recognising the important role that finance and investment should play as part of the solution, the World Water Council established a task force to investigate what practical measures could be taken to lower the barriers to financing water infrastructure, and to unlock new sources of capital investment. A framing paper [2] was published that identified a series of actions, including developing a typology of water infrastructure projects. This white paper sets out the rationale for the typology.

1 Progress on drinking water, sanitation and hygiene, JMP (2017)

2 Ten Actions for Financing Water Infrastructure, WWC (2018)

CONTEXTUAL FRAMEWORK

First-order classifiers of infrastructure from a financing perspective have historically involved a determination of scale – and whether a project is sufficiently material to require dedicated financing. For projects that are deemed material, typologies have typically converged on methods of risk management for developers and financiers. Classifiers include transparency (who has the ultimate authority to make decisions); capital (where will the money come from to fund the project); revenue (what are the income sources that cover operating and maintenance expenditure); and governance (what is the legal status of the project, and the recourse available). In addition to project-specific typologies, classifiers typically highlight the attributes of the operator, such as its size and experience; operational mandate; and financial stability.

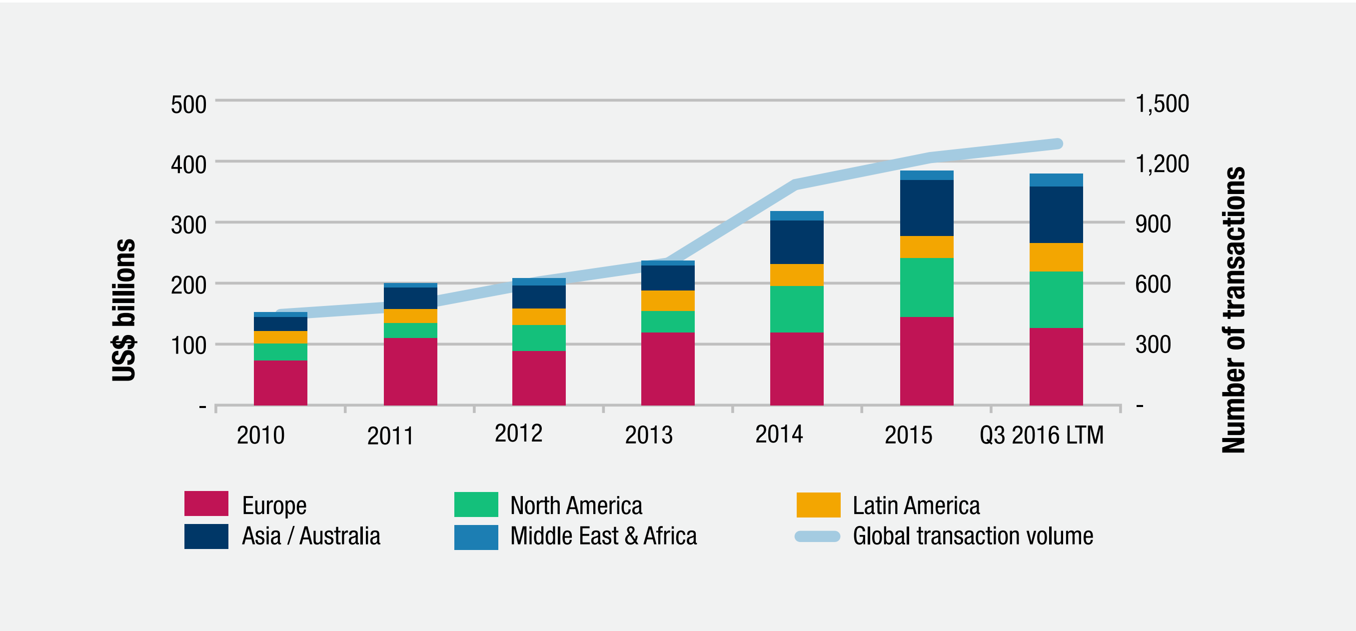
These classifiers all require a contextual framework that considers whether the project will operate within a credible planning environment, that sets out strategic objectives and deliverables for water infrastructure at different scales. Evidence of a 'master plan' can engender confidence amongst investors, although this may be tempered depending on the authorities' track record of execution. Establishing the appropriate delivery vehicle for the scale of the project – for example through one or more dedicated subsidiaries serving parts of a city – may also be a prerequisite. Potentially, a follow-up to this white paper could explore this contextual framework in more detail, through the use of case studies.

WATER'S SHARE OF INFRASTRUCTURE INVESTMENT

Recent underlying trends around infrastructure investment as an asset class are positive. Since the global financial crisis, there has been a sharp rise in the volume and value of privately financed infrastructure transactions [3] across most parts of the world [Fig 1].

But if this is indicative of a renaissance in infrastructure as an investable asset, there remains a high risk that water will miss out. The sector has long been plagued by the perception that investment returns on a risk-adjusted basis are low. The water industry is capital intensive, and the underlying physical assets require continual monitoring, regular maintenance, periodic repair and occasional replacement. Charges to consumers for water supply and services are usually regulated by government, and the rates are often set below the full economic replacement cost of the underlying assets. The governance and political economy of water and sanitation services are also highly context-dependent. Analysis of how this issue contributes to project delays and policy uncertainty has generally focused on the developing world, but the sensitivities are universal.

Fig 1: Global Infrastructure Transaction Activity

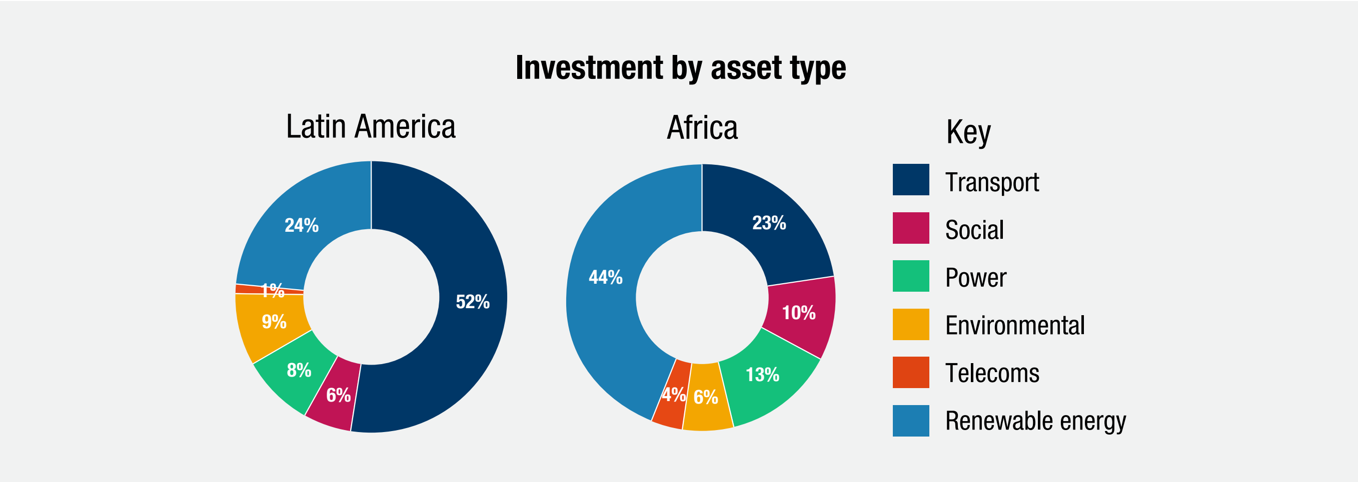


Source: Infradeals

3 Global Infrastructure Investment, PwC (2017)

There is evidence that the water sector is indeed receiving a smaller allocation of incremental investment, relative to its share of total infrastructure. In the USA, the overall share of federal spending on transport infrastructure has remained broadly steady over the last 40 years. However, public spending on water infrastructure decreased from US$ 76 per person in 1977, to just US$ 11 per person in 2014, according to the Congressional Budget Office [4]. Meanwhile, in Latin America and Africa it is the transport and renewable energy sectors that account for over two-thirds of private sector investment in infrastructure [Fig 2]. Non-public investments in water projects are sometimes not even material enough to warrant their own asset classification [5], as the charts below indicate.

Fig 2: Non-Public Sector Investments by Asset Type: Latin America and Africa



Source: PwC

4 The Economic Benefits of Investing in Water Infrastructure, Value of Water Campaign (2017)
5 Global Infrastructure Investment, PwC (2017)

THE INVESTMENT CASE FOR WATER PROJECTS

We suggest that one of the ways in which the water sector could access a greater share of private sector capital is by improving how the 'supply side' (e.g. project developers) makes its investment case to the 'demand side' (e.g. project investors). In order for this investment case to be made effectively, we believe that there is the need to develop and use a typological framework of projects that recognises the heterogeneity of water infrastructure as an asset class.

At present, water infrastructure is usually characterised in the policy-facing literature in unitary and fungible terms. This approach effectively reduces the investment gap to a common set of problems that simply require a generic solution. In reality, the opportunities and challenges of financing water infrastructure need to be understood from the project level, as that is the unit of account for investment. We believe that without a project-level typology, knowledge asymmetries between the supply side and the demand side are inevitable.

These asymmetries can create a form of market failure where unsuitable or inappropriate sources of finance are pursued to fund projects, while investors whose objectives are better aligned with the projects are either not identified or not approached. We suggest that by matching projects with their most appropriate funding sources, it could be possible to reduce the frictional costs associated with project financing. These sources may be new or synthesised from a 'blend' of existing pools. Better alignment may unlock funding for projects that may have hitherto been considered unbankable, such as nature-based solutions. Blending should therefore help to accelerate the pace at which projects are funded; which in turn could increase the probability of a broader spectrum of water infrastructure projects finding appropriate funding.

CLASSIFYING WATER PROJECTS

Traditional classifications of water infrastructure include scale, function, operating environment and ownership model. As we have described in our framing paper, infrastructure exists at every scale, from the river basin or catchment, to networks of pipes, to the household tap. Scale is typically correlated with capital commitment and project complexity. Frequently, it is also material to the attributes of a project. Large scale projects such as flood defence usually exhibit the non-rivalrous and non-excludable characteristics associated with a public good, with ownership correspondingly within the public sector. Small scale projects such as water kiosks are more likely to operate as private enterprises and present a different profile as an investment prospect.

Classification by function may cover upstream components including pumping, diversion, transportation, storage, treatment and distribution; and downstream functions such as sewerage, treatment and sanitation services. However, functional typologies may be applied to distinguish by design, such as 'green' and 'grey' projects. There are distinctions to be made between water services and water functions, particularly when identifying and attributing economic value. Projects as diverse as water supply and sanitation, flood protection, irrigation and reservoirs embed different levels of capital intensity and repayment periods. They bear distinct credit, commercial and legal risks; and offer varied economic, financial and social return.

The operating environment for water infrastructure varies widely between (and often within) countries. At the sector level, the ownership of water utilities, regulatory and governance arrangements, municipal water provision and non-governmental organisations activities are some of the many issues that influence the bankability of water projects. At the country level, factors such as tax rates, development allowances, devolution to local government, sovereign creditworthiness and so on are all important aspects of the operating environment.

There is extensive and excellent literature already available on these classifications, and our objective here is not to reinvent the wheel [6]. Instead, we propose that the value of classifications in getting infrastructure financed could be enhanced by embedding them within a project typology that recognises the heterogeneity of the asset class and helps to reduce information asymmetries. The aim of our approach is to improve how the supply side makes its investment case to the demand side. Our contribution comes through applying a novel approach to evaluating project risk and return.

6 See e.g. Private Sector Participation in Water Infrastructure, OECD (2009)

PROJECT RISK

Private sector investments in infrastructure projects are governed by the perceived risk and return attributes [7] of those projects. The practitioner literature around financing infrastructure consistently emphasises the importance of de-risking projects in order to make them bankable. Infrastructure risk can be an amorphous concept, but we suggest that it can be helpful to decompose risk into four components: project development, off-taker, political and regulatory, and currency risk. Of these, political and regulatory risk and currency risk will be familiar as 'top-down', country level measures. The other two risk components are 'bottom-up', or project level measures. Project development incorporates the risk of a project's delay or failure due to technical, operational, environmental, governance or other factors. Off-taker risk is more commonly associated with the energy sector, but it refers to the credit-worthiness of the entity who pays for the project – which may be a government, a utility, or indeed consumers.

Variations of this risk decomposition include a taxonomy developed by the Organisation for Economic Co-operation and Development (OECD) that combines top-down risk attributes such as political and macroeconomic risk, with bottom-up attributes such as the project lifecycle phase, and technical risks of implementation (Fig 3).

Fig 3: Risks linked to infrastructure assets over the project lifecycle

<table>
<tr><th>Risk Categories</th><th>Development Phase</th><th>Construction Phase</th><th>Operation Phase</th><th>Termination Phase</th></tr>
<tr><td rowspan="8">Political and regulatory</td><td>Environmental review</td><td>Cancellation of permits</td><td>Change in tariff regulation</td><td>Contract duration</td></tr>
<tr><td rowspan="3">Rise in pre-construction costs (longer permitting process)</td><td colspan="2" rowspan="2">Contract renegotiation</td><td>Decommission</td></tr>
<tr><td>Asset transfer</td></tr>
<tr><td></td><td colspan="2">Currency convertabillity</td></tr>
<tr><td colspan="4">Change in taxation</td></tr>
<tr><td colspan="4">Social acceptance</td></tr>
<tr><td colspan="4">Change in regulatory or legal environment</td></tr>
<tr><td colspan="4">Enforceability of contracts, collateral and security</td></tr>
<tr><td rowspan="7">Macroeconomic and business</td><td>Prefunding</td><td colspan="3">Default of counterparty</td></tr>
<tr><td colspan="2" rowspan="3">Financing availablity</td><td colspan="2">Refinancing risk</td></tr>
<tr><td colspan="2">Liquidity</td></tr>
<tr><td colspan="2">Volatility of demand/market risk</td></tr>
<tr><td colspan="4">Inflation</td></tr>
<tr><td colspan="4">Real interest rates</td></tr>
<tr><td colspan="4">Exchange rate fluctuation</td></tr>
<tr><td rowspan="6">Technical</td><td colspan="3">Governance and management of the project</td><td rowspan="5">Termination value different from expected</td></tr>
<tr><td colspan="3">Environmental</td></tr>
<tr><td>Project feasibility</td><td rowspan="2">Construction delays and cost overruns</td><td rowspan="2">Qualitative deficit of the physical structure/ service</td></tr>
<tr><td>Archaeological</td></tr>
<tr><td colspan="3">Technology and obsolescence</td></tr>
<tr><td colspan="4">Force majeure</td></tr>
</table>

Source: OECD (2015)

7 The Oxford Guide to Financial Modelling (2014)

The OECD taxonomy works well at a conceptual level, though it was not explicitly designed to evaluate project risk in practice. Nevertheless, we believe there is a strong case to be made for an applied typology that enables investors to identify, evaluate and compare project-specific risk. A good starting point would be to unpack project development and off-taker risk into a series of constituent elements. Here again, there is some excellent literature [8] to draw upon, without reinventing the wheel. Incorporating this bottom-up risk typology with the traditional country-level measures of economic and political risk would give a more textured perspective on the heterogeneity of the water infrastructure asset class.

This may seem like a challenging undertaking. Measurement of risk is subjective, and the approach is sensitive to the critical observation that 'the devil is always in the detail'. However, there is inspiration to draw from the energy sector, where the rapid growth of investment in renewables has prompted the development of iterative models to address project risk. As methodological approaches become familiar, best practices will emerge, and over time, it is likely that new datasets will develop. This is important: according to a recent report from the OECD [9], improving the availability and quality of data could transform the prospects of infrastructure financing. One of the most commonly cited reasons for the dearth of bankable infrastructure projects is the lack of comparable data. A typology that incorporates project-specific risk could potentially help to bridge this knowledge gap.

8 See e.g. Managing Cost Risk and Uncertainty in Infrastructure Projects, IRG (2013)

9 Breaking Silos: An agenda for G20, OECD (2017)

PROJECT RETURN

In contrast to infrastructure risk, which features extensively in the literature, comparatively little is written about the return to investors on infrastructure investment. In generic terms, returns accrue to countries through gains in productivity, economic growth, trade, connectivity and inclusion. In specific terms, returns accrue to investors through the economic rents or cash flows that are generated through the use of this infrastructure. Examples of these rents include road tolls, electricity tariffs and water rates. For assets that have the attributes of public goods, these returns are usually only indirectly monetised, for example though municipal charges and airport departure taxes. In countries where installed infrastructure is predominantly a public good, the state is typically the largest investor.

For private sector investors, then, financial return has traditionally been the only metric that appears to matter. On this basis, it is not difficult to see why water infrastructure does not attract a larger share of capital. Unlike for most other scarce resources, there is a non-linear relationship between the value of water and its price. Returns on investment for what is substantively the same end product therefore vary widely, based on a complex matrix of social, cultural, political and economic drivers that exhibit inconsistent dynamics over both time and space.

While it is beyond the ambitions of this paper to solve the perennial water pricing conundrum, we believe that there is an argument to be made for a typology of water infrastructure that incorporates a broader perspective on measures of return. Indeed, we propose that growing numbers of private sector investors have a mandate that extends beyond purely financial returns, on at least some models of infrastructure investment. We expand on this idea in our white paper on the Typology of Water Infrastructure Investors, but for our purposes here, we simply suggest that while non-financial returns may not be salient to mainstream private sector investors, they are attractive to a growing niche of capital providers.

Whereas we decomposed risk into four components, we apply a different lens to non-financial return. This image [Fig 4] of the 17 Sustainable Development Goals has perhaps inevitably already featured in so many reports that we include it here with some trepidation. Nonetheless, the SDGs are invaluable in contextualising the concept of non-financial return that we propose.

The SDGs provide an 'out of the box' framework to evaluate and compare returns on water infrastructure investment, at all levels of scale from country down to single project. While SDG 9 (industry, innovation and infrastructure) is the most obviously connected, fully twelve of the seventeen goals are underpinned by the quantity and quality of infrastructure investment [10]. And while it is fairly intuitive to explain how and why improved water infrastructure should in principle contribute to reduced poverty, better health, less inequality, decent work, sustainable cities, and so on – the SDGs provide a framework to empirically test and validate these hypotheses.

As to the question of which investors beyond the public sector are interested in such returns – the list is growing. The commitments from COP 21 alone on climate finance imply that US$ 100 billion per annum of additional investment could eventually be mobilised by developed country governments. In the near term, impact funds, sovereign wealth funds, development finance institutions and other investors with mandates beyond non-financial returns are already well established. A nascent but rapidly growing segment is the corporate sector, where

10 International Institute for Sustainable Development (2015)

investment in sustainable infrastructure may be an attractive option for reducing Scope 3 emissions [11], for example.

We consider the role of investors in more detail in our white paper on the Typology of Water Infrastructure Investors, but in short, there are new and emerging investors for whom water infrastructure may be (or become) an attractive asset class. But as these are largely not the same investors who have traditionally funded water infrastructure, there are likely to be knowledge asymmetries on both the demand side and the supply side. A typology of infrastructure projects could lower these asymmetries and make water infrastructure more accessible as an asset class to investors.

Fig 4: The Sustainable Development Goals

Source: United Nations

11 Scope 3 emissions are all indirect emissions that occur in the value chain of the reporting company, including both upstream and downstream emissions

A TYPOLOGY OF INFRASTRUCTURE PROJECTS

We propose a model of classification that is based on the *scope, system, structure, security and sustainability* of different types of projects. Each element is underpinned by a set of common questions, which are summarised in general terms below. The questions are in development and will be validated through stakeholder review.

- **Scope** incorporates a range of traditional classifiers described above, including the size and scale of a project, i.e. likely levels of capital commitment, project complexity and government involvement; and its stage in the lifecycle, i.e. from development through to termination.

- **System** incorporates the operating environment for the project, including the role of the public sector in provision, governance and regulatory arrangements, environmental standards, fiscal arrangements, access to local capital, sovereign creditworthiness, devolution, etc.

- **Structure** incorporates project-specific attributes such as ownership arrangements and models of operation, levels of equity and debt, project guarantees, private sector participation, access to financial instruments including green bonds and blended finance.

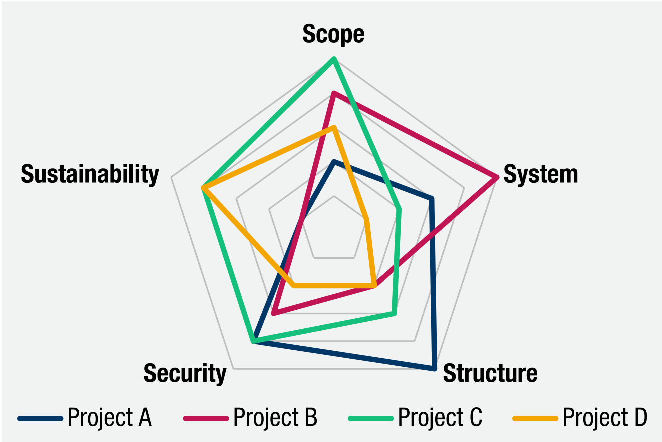
- **Security** incorporates measures of risk including project development risk, off-taker risk, political and regulatory risk, and currency risk. Includes enforceability of contracts, risk of construction delays and cost overruns, volatility of demand, counterparty and liquidity risk, etc.

- **Sustainability** incorporates measures of return including financial and non-financial return. Framing could include how the project contributes to the SDGs including reduced poverty, better health, less inequality, decent work, industry and innovation, sustainable cities, etc.

Different projects would score differently on each of these measures, not just because of the individual project's attributes, but also because of the different expectations of each scorer. The typology is adaptive to both dynamics. Its purpose is not to create a universal scorecard of all projects – but instead to create a common basis of comparison for investors to evaluate different projects.

We consolidate these attributes through a stylised example in Fig 5:

Fig 5: Typology of Projects



Source: author

The framework is extensible, in that it allows a comparison at different scales. Just by way of example, we suggest that Projects A through D could potentially represent:

i) individual projects of a single functional type (e.g. treatment plants)
ii) consolidated projects across different countries
iii) current projects across an investor's portfolio
iv) projects applying for purposed finance (e.g. green finance, blending)

Various other combinations are obviously also possible. The examples here are purely illustrative.

NEXT STEPS

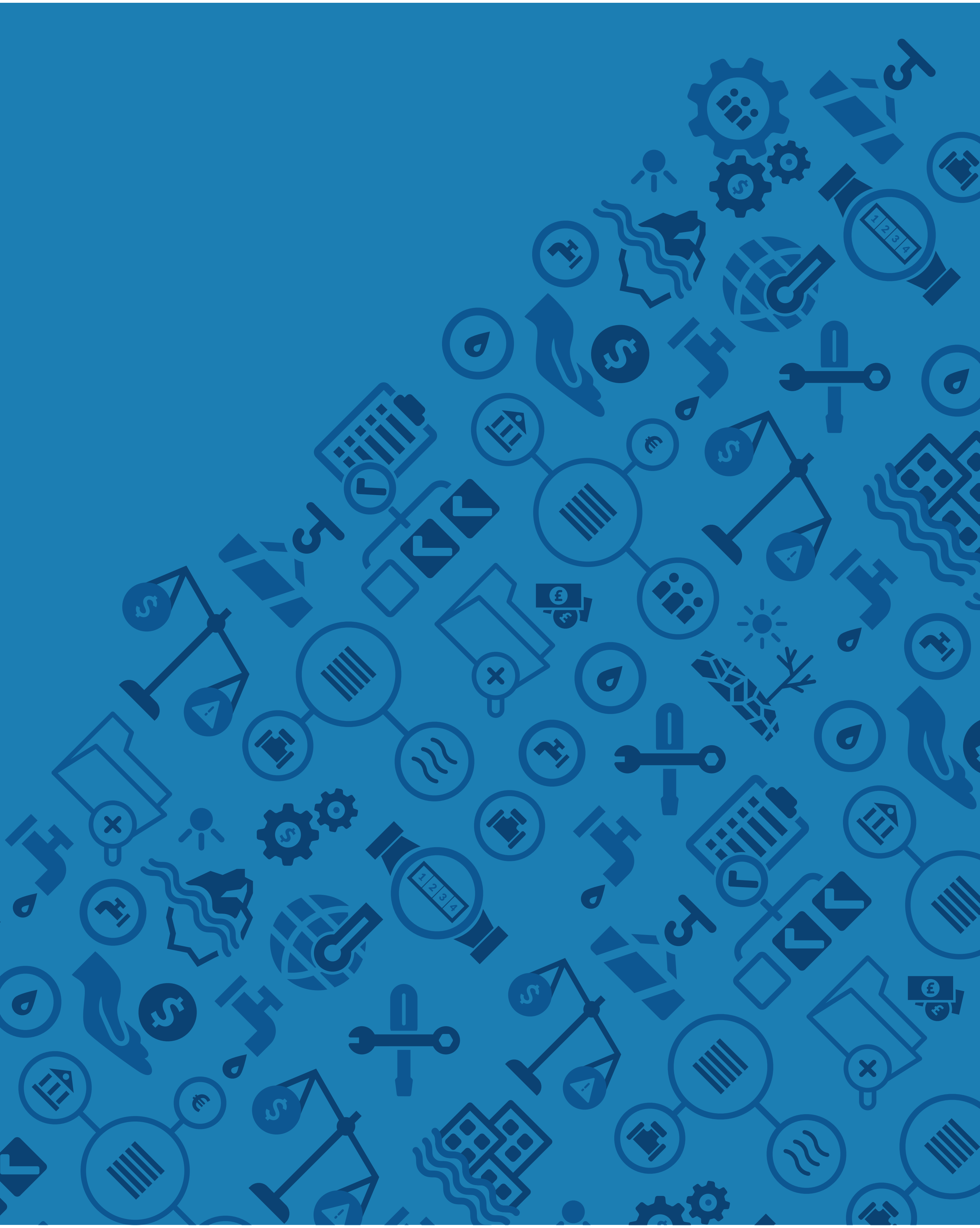
In our framing paper [12], we set out ten discrete issues that we associated with barriers to investment in water infrastructure. The absence of an adequate typology of projects was one of those issues, and the purpose of this paper is to set the terms of reference for discussion, debate and engagement with informed stakeholders.

Excellent recommendations have already been published in this field. The value or otherwise of this typology will eventually boil down to three questions. First, does it help to lower the knowledge asymmetries that exist between projects and investors? Second, are there sustainable models to collect the information necessary, and to keep it up to date? Third, exactly what are the improved outcomes that can be credibly be attributed to using the framework?

To answer those questions and to advance best practices on financing water infrastructure, an applied approach was taken, hereby seeking to engage an extensive network of stakeholders. Critical and constructive comments from all parties are welcome and desired. These inputs will determine if and how we can convert conceptual frameworks into an applied programme of change.

When it comes to financing sustainable water infrastructure, the scale of the challenge leaves no room for complacency. But nor can pessimism be justified. Over two billion people still lack access to adequate water supply and sanitation due to insufficient infrastructure. The financing gap must be fixed.

12 Ten Actions for Financing Water Infrastructure, WWC (2018)



WORLD
WATER
COUNCIL

World Water Council
Espace Gaymard
2-4 Place d'Arvieux
13002 Marseille - France

Phone : +33 (0)4 91 99 41 00
Fax : +33 (0)4 91 99 41 01
wwc@worldwatercouncil.org

worldwatercouncil.org
facebook.com/worldwatercouncil
twitter.com/wwatercouncil
linkedin.com/world-water-council