Water Infrastructure Criteria under the Climate Bonds Standard

Criteria Document

Version 3

January 2021

Document revision number	Date	Summary of changes
4. Minor revisions to Version 3	March 2022	Addition of missing question in A&R scorecard, reclarification of scorecard completion for Desalination assets.
3. Update to criteria to include desalination assets	January 2021	Specific criteria were developed and added for desalination plants. A separate low carbon energy threshold is set for plants, along with an extra section for brine disposal and feedwater in the A&R checklist.
2. Formal update to criteria (phase 2)	May 2018	Criteria added for nature-based and hybrid water infrastructure covering such purposes as water collection, storage, treatment and distribution, flood protection and drought resilience.
1. First publication of original Criteria (phase 1)	Oct 2016	

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We would also like to thank all members of the Technical Working Group and Industry Working Group for their time and valuable expertise that helped shape these Criteria. A full list of all TWG and IWG members is available here.

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1. Definitions

Climate Bonds Initiative (CBI): An investor-focused not-for-profit organisation promoting large-scale investments that will deliver a global low carbon and climate resilient economy. The Initiative seeks to develop mechanisms to better align the interests of investors, industry, and government to catalyse investments at a speed and scale sufficient to avoid dangerous climate change.

Climate Bond: A climate bond is a bond used to finance – or re-finance - projects needed to address climate change issues. They range from wind farms and solar and hydropower plants, to rail transport and building sea walls in cities threatened by rising sea levels. Only a small portion of these bonds have actually been labelled as green or climate bonds by their issuers.

Certified Climate Bond: A Climate Bond that is certified under the Climate Bonds Standard as meeting the requirements of the Climate Bonds Standard, as attested through independent verification.

Climate Bonds Standard (CBS): A screening tool for investors and governments that allows them to identify green bonds where they can be confident that the funds are being used to deliver climate change solutions. This may be through climate mitigation impact and/ or climate adaptation or resilience. The CBS is made up of two parts: the parent standard (Climate Bonds Standard V3) and a suite of sector specific eligibility requirements (Sector Criteria). The parent standard covers the certification process and pre- and post-issuance requirements for all certified bonds, regardless of the nature of the capital projects. The Sector Criteria detail specific requirements for assets identified as falling under that specific sector. The latest version of the CBS is published on the Climate Bonds Initiative website.

Climate Bonds Standard Board (CBSB): The CBSB is responsible for approving i) Revisions to the Climate Bond Standard, including the adoption of additional sector Criteria, ii) Approved verifiers, and iii) Applications for Certification of a bond under the Climate Bonds Standard. The CBSB is constituted, appointed and supported in line with the governance arrangements and processes as published on the Climate Bonds Initiative website. Collectively, the CBSB represents $34 trillion of assets under management.

Climate Bond Certification: Allows the issuer to use the Climate Bond Certification Mark in relation to that bond. Climate Bond Certification is provided once the independent Climate Bonds Standard Board is satisfied the bond conforms with the Climate Bonds Standard.

Green Bond: Labelled green bonds are bonds designated such that proceeds be used for green projects, mostly climate change mitigation and/or adaptation projects. In theory, green bonds proceeds could be used for a wide variety of environmental projects, but in practice they have mostly been applied to the same use of proceeds as climate bonds, with proceeds going to climate change projects.

Nature-based water infrastructure: Water infrastructure that reflects the intentional use of ecological assets and/or ecosystem-based features, processes, and functions as an integral

part of addressing water needs. Such infrastructure is intended to serve these functions in a manner that protects, manages, restores, and/or enhances natural features, processes, and systems in a functioning and sustainable manner.

Natural features: Nature-based solutions, including natural processes and functions, that developed or evolved through biological, geo-chemical, or similar processes; these may be left intact or restored through use of proceeds.

Nature-based solutions: A term referencing the explicit, planned, and intentional use of ecosystems to meet human needs.

Nature-based features: Nature-based solutions that mimic characteristics of natural features but are created by human design, engineering, and construction to provide specific services such as groundwater recharge or water filtration.

Technical Working Group (TWG): A group of key experts from academia, international agencies, industry and NGOs convened by the Climate Bonds Initiative. The TWG develops Sector Criteria - detailed technical criteria for the eligibility of projects and assets as well as guidance on the tracking of eligibility status during the term of the bond. Their draft recommendations are refined through engagement with finance industry experts in convened Industry Working Groups (IWG) and through public consultation. Final approval of Sector Criteria is given by the CBSB.

Water Infrastructure Assets: Engineered, nature-based and hybrid water infrastructure for the purposes of water collection, storage, treatment or distribution, or for flood protection or drought resilience.

2. Introduction

2.1. Objectives

Investor demand for green and climate bonds is strong and will increase in line with the delivery of quality products into the market. Standards, assurance and certification will be essential to improved confidence and transparency, which in turn will enable further strong growth in the market.

The Climate Bonds Standard and Certification Scheme is an easy-to-use screening tool that allows investors and intermediaries to assess claims for the climate integrity of bonds. It provides a set of transparent, verifiable compliance measures that all Certified Climate Bonds must meet. A key part of the Standard is a set of Sector Criteria that can screen assets and capital projects for the purposes of identifying and certifying only those whose climate claims have integrity, either through their contribution to climate mitigation and/ or to adaptation and resilience to climate change.

In terms of the Water Infrastructure Criteria, the contribution to adaptation and resilience has two significant components: the ability of the asset to be robust and flexible in the face of ongoing and potential climate impacts, and the sustainability of the relationship between the asset and upstream and downstream ecosystems as climate shifts continue to evolve.

Sector Criteria are determined through a multi-stakeholder engagement process, including Technical and Industry Working Groups (TWG, IWG), convened and managed by the Climate Bonds Initiative, and a period of public consultation. The Climate Bonds Standard Board reviews and approves Criteria prior to release to the market.

This document details:
The current scope of water infrastructure assets eligible for certification under the Climate Bond Standard – Section 3;
The specific Sector Criteria under which these water infrastructure assets are eligible for certification – Section 4.

In addition, all bonds certified under the Climate Bonds Standard must also comply with the common requirements set for all certified bonds. These common requirements are contained in the Climate Bond Standard V3.

2.2. Supplementary information available

For more information on the Climate Bonds Initiative see www.climatebonds.net. For an overview of the Climate Bond Standard & Certification Scheme, see https://www.climatebonds.net/standards/brochure. The current version of the overarching Climate Bond Standard is available at https://www.climatebonds.net/standards/standard_download.

For further information on the Water Infrastructure Criteria specifically, the following package of supplementary documents is available at http://www.climatebonds.net/standard/water:

- Water Infrastructure Criteria brochure: a 2 page summary of these Criteria
- FAQs introducing the Water Infrastructure Criteria
- Water Infrastructure Criteria Background paper: summarising the discussions and decisions of the TWG and IWG that gave rise to these Criteria.
- Guidance to Issuers and Verifiers: guidance on the application of the Criteria laid out in this document, including the nature of evidence and disclosure required for compliance.

2.3. Revisions to these Criteria

Certification will not be withdrawn retroactively from bonds certified under earlier versions of the Criteria.

That said, these Criteria represent a significant shift in how the bonds market view water-related investments and the best mechanisms for communicating risk, confidence, and relevance between issuers, investors, and other key audiences that may also be important.

These Criteria will be reviewed annually by the Climate Bonds Initiative and other guiding partners. They are likely to be revised and refined over time as more information and insight becomes available — both as we learn more about the application of the Criteria to growing numbers of bonds, and how these Criteria relate to other sectoral areas.

In particular, we expect that some new applications such as nature-based solutions will become more mainstream and widespread, leading to more and more robust asset classes such as aquifer storage and groundwater recharge. Our hope too is that these Criteria themselves can help lead to a wider appreciation and more consistent application of climate vulnerability assessments and the development of adaptation plans.

In all cases, we appreciate suggestions and observations that we can consider during the revision process. Please contact us if you have questions or recommendations.

3. Scope of the Water Infrastructure Criteria

3.1. Three stages of development - one set of Criteria

The Water Infrastructure Criteria of the Climate Bond Standard were developed in three phases. Phase 1 focused on engineered or "grey" infrastructure bond issuances, with final Criteria released in October 2016. Typical investments in this category include water infrastructure for the purposes of water collection, storage, treatment or distribution, or for flood protection or drought resilience. A total of five bonds were issued against this original set between the initial release of the Criteria and early 2018.

Development of additional, supplementary criteria to incorporate nature-based solutions began in late 2016, spanning green and hybrid water infrastructure.

Box 1 provides further guidance on the nature of green and hybrid water infrastructure.

Box 1: Green and hybrid water infrastructure assets: Sorting through Terminology

The terms used to describe the explicit and planned use of ecosystems and ecological processes to deliver services for humans are both highly variable and confusing and continue to proliferate. Rather than create new terms with these Criteria, we have focused on a handful of key concepts and selected what seem to be widespread phrases promoted by established and credible organisations.

Ecosystem services, ecological engineering, green and hybrid infrastructure (or more rarely "blue infrastructure"), ecosystem-based adaptation, green adaptation, and natural capital are some of the many phrases used to refer to the use of ecosystems to provide infrastructure services. Here, we refer to nature-based solutions (NBS), which is less widespread and newer than some of the other terms listed here but that has a growing following. The definition we developed derives from two organisations that have gone far in developing and implementing NBS in recent years.

IUCN defines NBS as "actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits."[1] The US Army Corps of Engineers has taken a distinctly applied approach to the use of ecosystems as infrastructure through what they call "natural features" and "nature-based features," collectively called NNBF. These terms distinguish between projects that make use of existing ecosystems (natural features) versus engineered or "designed" components (nature-based features). They state:

Natural features are created through the action of physical, geological, biological and chemical processes over time. Nature-based features, in contrast, are created by human design, engineering, and construction (in concert with natural processes) to provide specific services such as coastal risk reduction and other ecosystem services (e.g., habitat for fish

[1] Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S. (eds.) 2016. Nature-based Solutions to address global societal challenges. Gland, Switzerland: IUCN.

and wildlife). Nature-based features are acted upon by processes operating in nature, and as a result, generally must be maintained by human intervention in order to sustain the functions and services for which they were built.[2]

Given that background, the TWG chose the following terms and definitions. Nature-based solutions is a general category, referencing the explicit, planned, and intentional use of ecosystems to meet human needs. Natural features are nature-based solutions that include natural processes and functions, that developed or evolved through biological, geo-chemical, or similar processes; these may be left intact or restored through use of proceeds. In contrast, nature-based features mimic characteristics of natural features but are created by human design, engineering, and construction to provide specific services such as groundwater recharge or water filtration.

Thus, a pre-existing wetland may be protected or enhanced to improve water quality as a natural feature, while a designed "new" wetland built as an adjunct to a water treatment facility would be a nature-based feature. The Criteria favour the inclusion of natural features but nature-based features are not excluded (and may even be the norm for hybrid nature-based solutions).

Therefore, an asset should be considered a nature-based or hybrid asset if:

A. It reflects the intentional use of natural and/or nature-based features, processes, and functions (see Section 1) as an integral part of addressing a human need and doing so in a manner that protects, manages, restores, and/or enhances natural features, processes, and systems in a functioning and sustainable manner.

B. Where feasible, the project prioritises natural features over nature-based features. Such features include the protection, restoration, expansion, and/or creation of natural systems and processes as an explicit component of the desired project outcomes.

A third phase of criteria development was completed in January 2021. This added specific requirements for desalination plants that were not sufficiently covered in the previous phases. This current, third version of the Criteria spans all three phases of development and the Criteria enable the certification of both engineered and/ or nature-based solutions.

3.2. Assets covered (or not covered) by the Criteria

Broadly speaking, investments related to water infrastructure assets are subject to these Criteria, noting a number of exceptions described below. This includes built, engineered, and nature-based assets designed to provide infrastructure services across a wide range of sectors, including but not limited to healthcare and sanitation, natural resource management, storage, flood and drought management, mining, manufacturing, refinery systems, and general cooling uses. The "water sector" is a broad term, and many of water infrastructure

[2] USACE. 2015. North Atlantic Coast Comprehensive Study: Resilient Adaptation to Increasing Risk. Washington, DC: US Army Corps of Engineers.

assets may not necessarily be easily labelled within the sector but overlapped with other areas, such as storage and cooling systems that are water intensive.

Of course, the inherently interconnected nature of terrestrial, freshwater, and marine ecosystems creates challenges for developing crisply delineated sectoral eligibility criteria for water infrastructure, land use, and marine assets and activities. As noted above, investments in freshwater resources can be implemented in many sectors including agriculture (e.g., irrigation), forestry, aquaculture, and many other industrial sectors.

In addition, in some cases, the same land base, asset, or bond may be used by different operators for a variety or combination or purposes. For example, a single bond may cover wetlands restoration for the purposes of either or both restoring water services and a broader array of ecosystem services such as ecosystem restoration and carbon sequestration.

It is proposed that the basic underlying principle is that issuers are guided to either the relevant Forestry/Agriculture Criteria or Water Infrastructure Criteria depending on the purpose of their primary use of proceeds and responsibility. That is, projects and assets related to nature-based infrastructure are eligible for certification under these Criteria where water services are the leading consideration in the asset management or use of proceeds. Examples include forests and wetlands being managed to filter water, aquifers that store water for drinking or for flood control, and wetlands managed to attenuate storm surge or process wastewater effluent. Where water benefits might be classified as co-benefits or supplemental components and functions, the forthcoming Forestry and other Criteria for ecosystem restoration should instead be applied.

So, entities with primary responsibility for land use activities (e.g. agriculture, forestry, terrestrial conservation) seeking to increase the sustainability of productive and conservation activities in terrestrial ecosystems (e.g. producing food, feed, fiber, fuel and supporting ecosystem services such as soil fertility, terrestrial biodiversity), while reducing net GHG emissions or ideally increasing sequestration should ensure compliance with the forthcoming Forestry/Agriculture Criteria per that document.

Issuers with primary responsibility for management of water infrastructure assets such as increasing the sustainability of high-quality water supply (e.g. community water systems, aquifers, forested watersheds) against threats of depletion and contamination, treating water, flood or drought mitigation, increasing / reducing flow transport of sediment, or managing water resources for aquatic conservation, while reducing net GHG emissions when appropriate, will need to comply with the Water Infrastructure Criteria per this document.

The requirements in the relevant Forestry/Agriculture Criteria for water infrastructure assets will be designed for compatibility and consistency with the Water Infrastructure Criteria per this document, simply adapted to different contexts.

Additionally, specific exceptions to the application of these Criteria are identified as follows.

- The Climate Bonds Standard and Certification Scheme does not support investments in the fossil fuel, nuclear or mining sectors, and water infrastructure for these sectors is not covered by these Criteria, or any others.

- Assets related to water-driven energy, for example through hydropower, wave and tidal installations are not eligible under these Criteria. Readers are referred instead to the specific Hydropower Criteria (due later in 2021) and Marine Renewable Energy Criteria released in October 2017 respectively. For more information, see https://www.climatebonds.net/hydropower and https://www.climatebonds.net/standard/marine respectively.
- Water infrastructure assets used in the Land Use sector, such as irrigation systems for agriculture, are subject to the forthcoming requirements of the Forestry/Agriculture Criteria.

Further guidance on these distinctions is given in Section 3.2. If in doubt, please reach out to the Climate Bonds Initiative for support.

3.3. Key elements to the Criteria

As a general principle, bonds will meet the climate requirements of the Climate Bonds Standard if the underlying assets and/or projects meet all the following requirements:

- Promote GHG Mitigation through reduced emissions or increased carbon sequestration; and
- Promote adaptation to climate change and facilitate increased climate resilience in the systems in which they are located; and

Complete details of these requirements for the Water Infrastructure Criteria are in Section 4 of this document.

In addition, any bond-issuing entity seeking certification under these Criteria is expected to be aware of and adhere to best practice guidelines or standards related to social and human rights and broader environmental considerations in the context of water development. The Criteria described in this document are intended to supplement and complement these other criteria rather than overlap and compete with them.

4. The Water Infrastructure Criteria

4.1. Broad framework of the Criteria

Tables 1 & 2 indicate water infrastructure assets that may be eligible for inclusion in a Certified Climate Bond, subject to meeting the Criteria laid out in this document. In general terms, these assets cross two broad categories (noting that one or both may be present in a single issuance):

- Engineered water infrastructure or water-use systems that collect, treat and distribute water, or that protect against floods or drought. Table 1 provides illustrative examples though it is not a comprehensive list of every possible engineered water asset that would be eligible. This table includes desalination plants.
- Nature-based water resources management systems that are managed to collect, store, treat, or distribute water or to buffer floods or drought. These systems include natural and nature-based features, processes, and functions as an integral part of addressing water-related needs. Table 2 provides illustrative examples though it is not intended to be a comprehensive list of eligible assets or projects.

Tables 1 and 2 also specify for each of these illustrative assets and projects their eligibility for certification under the Climate Bonds Standard through the following symbols:

- A green circle indicates these assets and projects are eligible for certification by the nature of the asset or project, with no further disclosure or documentation required.
- An orange square indicates where eligibility is conditional on meeting specific requirements. These requirements are described in more detail in Section 4.2 and Section 4.3.
- A red triangle indicates where the asset or project is not eligible for certification under any circumstances.

To be eligible for inclusion in a certified bond, assets and projects must meet both the requirements of the Mitigation and the Adaptation & Resilience components. Section 4.2 details the requirements of the Mitigation Component. Section 4.3 details the requirements of the Adaptation & Resilience component.

For example, if a project has a green circle under Mitigation but an orange circle under Adaptation & Resilience, it must meet the requirements of the Adaptation & Resilience component before it can be certified. If a project has an orange circle under Mitigation and an orange circle under Adaptation & Resilience, it must meet the requirements of both the Mitigation and the Adaptation & Resilience components before it can be certified.

Table 1: Illustrative built infrastructure assets covered by the Water Infrastructure Criteria

Assets	Example projects*	Mitigation	Adaptation & Resilience
Water monitoring, including but not limited to: smart networks early warning systems for droughts, floods water quality monitoring processes	• Stormwater warning systems	●	●
	• Floodwater warning systems		
	• Dam failure warning systems		
	• Remote water quality/quality monitoring systems, including snowpack and remote sensing systems		
	• Drought warning systems		
Water storage, including but not limited to: Rainwater harvesting systems Storm water management systems Water distribution systems (excluding irrigation) Infiltration ponds Aquifer storage Groundwater recharge systems Sewer systems Pumps Sand dams	• Improving energy efficiency or shifting to low carbon fuel sources	■	■
	• Improving water management and efficiency, e.g., by reducing leaks, reducing urban run-off		
	• Installation or upgrade of water capture and storage infrastructure (excluding the examples listed above)		
Water treatment, including but not limited to: Water recycling systems Wastewater treatment facilities Manure/ slurry treatment facilities	• Shift from anaerobic to aerobic wastewater treatment or separate solids from wastewater management systems	■	■
	• Generating electricity from sewage methane or biogas production from thermal hydrolysis		
	• Waste energy recovery	●	■

Assets	Example projects*	Mitigation	Adaptation & Resilience
	• Improving energy efficiency or shifting to low carbon fuel sources	■	■
	• Installation or upgrade of water treatment infrastructure (excluding the examples listed above)		
Water Desalination – the construction and/or operation of: Seawater desalination plants Brackish water desalination plants	• Reverse osmosis desalination with onsite low carbon energy	■	■
	• Forward osmosis desalination with a renewable energy private purchase agreement		
	• Multi-effect distillation desalination plants using waste heat from a Concentrated Solar Power (CSP) plant		
	• Integrated Water and Power Plants (IWPP)	▲	▲
	• Desalination plants powered by waste heat from fossil fuel power plants or industrial processes		
	Desalination plants supplying water explicitly for: • Fossil fuel power stations • Nuclear power stations		
Water distribution, including but not limited to: Rainwater harvesting systems Gravity fed canal systems Pumped canal or water distribution system Terracing systems	• Installation or upgrade of water irrigation systems, such as high-efficiency drip, flood, and pivot irrigation systems.	■	■

Assets	Example projects*	Mitigation	Adaptation & Resilience
Flood defence, including but not limited to: Surge barriers Pumping stations Levees Gates	• Construction or upgrade of flood defence infrastructure	●	■
	• Installation or upgrade of flood monitoring and warning systems	●	●

Table 2: Illustrative nature-based-solutions and hybrid infrastructure covered by these Water Infrastructure Criteria

Assets	Example Projects	Mitigation	Adaptation & Resilience
Water storage, including but not limited to: Rainwater harvesting systems Aquatic ecosystems (lakes, wetlands) Aquifer storage Snowpack Runoff Groundwater recharge systems Riparian wetlands Storm water management	• Active snowpack management program	■	■
	• Using parks, natural areas for storm water management		
	• Creating groundwater recharge areas for aquifer storage		
Flood defences, including but not limited to: Ecological retention, current force reduction mechanisms Relocation of assets from floodplains / “room for the river”	• Restoration of riparian wetlands for flood storage	■	■
	• Creation of safe delta flood zones as natural habitat for the river to expand into		
	• Altering flow mechanics to reduce the force of flood stage flows		

Drought defences, including but not limited to: Aquifer / groundwater storage (pumped) Recharge zone management Wetland storage Snowpack management Evaporation reduction efforts	• Use of pumps to transfer waters to / from natural aquifers	■	■
	• Metering / monitoring systems to detect and warn against flow, snowpack, or groundwater systems for water management and drought warning		
	• Planting / removing vegetation explicitly to modify water temperatures, evaporation rates, runoff patterns		
Water treatment, including but not limited to: Natural filtration / recycling systems (e.g. wetlands, watersheds, forests) Engineered natural filtration / settling systems Forest and forest fire management for water quality / quantity management	• Wetland using native plants for water filtration, nutrient management	■	■
	• Explicit integration of existing natural features and ecosystems for water quality treatment, including land cover management		
Storm water management, including but not limited to: Permeable surfaces (parks, roads, etc.) and evapotranspiration systems Groundwater recharge Rainwater harvesting Constructed ecological retention ponds Forests for water quality management? Erosion control systems	• Removal of pavement, creation of new substrate to improve groundwater absorption & reduce runoff	■	■
	• Creation of wetland retention ponds		
Ecological restoration / management	• Development of an environmental flows regime	■	■

Erosion control systems Hydrological restoration	• Restoration of hydrological function, aquatic species / communities		
	• Sediment transport to reduce / restore downstream deposition		

4.2. Mitigation Component

The Mitigation Component of the Water Infrastructure Criteria is intended to provide transparency over the impact that the use of proceeds will have on GHG emissions and the degree of mitigation that will be delivered over the operational lifetime of the project or asset.

4.2.1. All water projects and assets (except for desalination)

For use of proceeds subject to a Mitigation Assessment as indicated by an orange circle in Table 1, they are eligible for certification only if either:

a. No net GHG emissions impact is expected, and the issuer discloses the justification for this decision with supporting documentation; or
b. A negative net GHG emissions impact is expected, and the issuer has estimated the GHG mitigation impact that will be delivered over the operational lifetime of the project or asset. This impact should be defined in terms of the decreased emissions or increased sequestration relative to a business as usual baseline.

Baselines can be determined using credible methodologies such as (but not limited to) the UNFCCC's Clean Development Mechanism (CDM), Climate Action Reserve, American Carbon Registry or national and state/provincial approved approaches or any other credible, robust methodology used by a relevant national or international rating agency or authority (e.g., US Environmental Protection Agency standards).

If the asset or project relates to wetlands, the GHG assessment should be carried out with reference to the methodologies described in the IPCC guidelines for evaluating wetlands greenhouse gas inventories (http://www.ipcc-nggip.iges.or.jp/public/wetlands/).

Under the requirements of the methodology selected, the issuer must describe

- The calculations and assumptions used to arrive at the baseline;
- Projected emissions over the life of the project and associated estimated GHG emissions reduction;
- A credible, independently verifiable method of tracking actual emissions and mitigation impact over the life of the bond;
- If the asset or project relates to nature-based solutions, details of the management plan for the asset and any associated monitoring system in place to deliver and evaluate ongoing mitigation impacts.

These assumptions, values, and procedures must be conservative to ensure that the GHG emission reductions or removals are not overestimated.

Further information on how to conduct a Mitigation Assessment is given in the *Guidance Note to Issuers and Verifiers* available at http://www.climatebonds.net/standard/water

4.2.2. Desalination projects and assets

Desalination plants are eligible for meeting certification if meeting the criteria below:

The average carbon intensity of the electricity that is used for desalination is at or below 100g CO2e/kWh

Methodological notes:

- This threshold is to be met for every year of the bond lifetime.

- Emissions may be scope 1 or scope 2, depending on whether the facility sources its electricity from onsite or offsite generation.

- Offsite generation may factor into the calculation of emissions intensity in the following ways:

    a) If entirely sourcing electricity from a wider electrical grid, the grid factor (or grid emissions intensity) is demonstrated to be at or below 100g CO2e/kWh[3].

    b) Private Purchase Agreements (PPAs) that demonstrate the facility will source electricity from generation at or below 100g CO2e/kWh.

[3] See the Electrical Grids and Storage Criteria for acceptable sources or methodology for grid factor.

4.3. Adaptation & Resilience Component

The Adaptation & Resilience Component of the Water Infrastructure Criteria is intended to provide transparency over the asset's resilience to climate change as well as its impact on other stakeholders' resilience to climate change. Such stakeholder impacts include their access to water in sufficient quantity and sufficient quality. From this perspective, ecosystems are also considered a stakeholder.

Assets and projects that are (a) demarcated with an orange circle in the Adaptation and Resilience column in Table 1, and (b) have an expected or remaining operational lifespan of more than 20 years, are subject to a Vulnerability Assessment / Adaptation Plan Evaluation.

In order to apply the Criteria, the issuer will need to have a Vulnerability Assessment - an assessment or diagnosis of realised climate impacts and potential climate risks. If the Vulnerability Assessment finds that climate change will significantly impact the project or asset, the issuer will also need to supply a corresponding Adaptation Plan - a management response plan to the conclusions and findings of the Vulnerability Assessment, noting how identified climate risks will be addressed. As such, the Vulnerability Assessment and the Adaptation Plan are paired documents.

Although Vulnerability Assessment and Adaptation Plans remain somewhat new to the finance community, they are used routinely by water managers, engineers, and planners. They are not expected to be long documents and can be quite concise narrative statements. They are likely to refer to and depend on documents produced by other organisations or partners, including ones that do not explicitly refer to the issuance or issuer but that can inform the assessment of climate vulnerability.

Taken together, the Vulnerability Assessment and Adaptation Plan (if required) and their supporting documents serve as the basis for applying the Criteria and determining the eligibility of the bond for certification.

Eligibility for certification depends on the efficacy and thoroughness of the issuer's Vulnerability Assessment and Adaptation Plan and the underlying climate risk assessment and management plans that they capture. Eligibility is assessed via a Scorecard or checklist consisting of a series of binary questions.

This Scorecard is given in Appendix 1. It lists a series of questions that must be reported on, where "evidence" of action, analysis or research should be sought, or where "disclosure" of relevant regulatory, governance, or legal documentation is required.

The Scorecard adopts a definition of climate vulnerability in terms of technical qualities of the assessment process and specific eco-hydrological and climate indicators, as well as aspects of governance and conflict negotiations and how effectively water users share resources under shifting hydrological conditions. The Scorecard determines whether the issuers' Vulnerability Assessment and Adaption Plan sufficiently address these factors.

To achieve this, the questions in the scorecard are grouped into six sections.

The first four are used to evaluate the issuer's Vulnerability Assessment. Of these, the first three are: 1) Allocation, 2) Governance, and 3) Technical Diagnostics. Together, these sections address how water will be shared, negotiated, governed and allocated among different stakeholders, and evaluate how the project will affect and be affected by current and future eco-hydrological conditions, the potential risks for an asset or project posed by current and future climate impacts, and how the impact of that asset on relevant ecosystems may change as the climate continues to evolve. These sections should be completed for all water infrastructure assets – engineered, nature-based and hybrid.

The fourth section (Nature-Based Solutions) needs to be completed only for nature-based and hybrid infrastructure. It is made up of five subsections. These subsections are intended to document (i) the state of knowledge around the site and existing services; (ii) ecological management baselines; (iii) the extent and credibility of available data; (iv) broader ecological impacts beyond the project itself; and (v), and ongoing monitoring and management capacity.

The fifth section (Desalination Plants) needs to be completed only for desalination projects and assets. It is comprised of two questions. The questions are intended to ensure that the issuer has addressed brine disposal and feedwater intake issues.

The sixth section relates to the assessment of the Adaptation Plan. This section is briefer and focuses on the adequacy of the coping mechanisms to address identified climate vulnerabilities, including potential or uncertain vulnerabilities that arose from the vulnerability assessment.

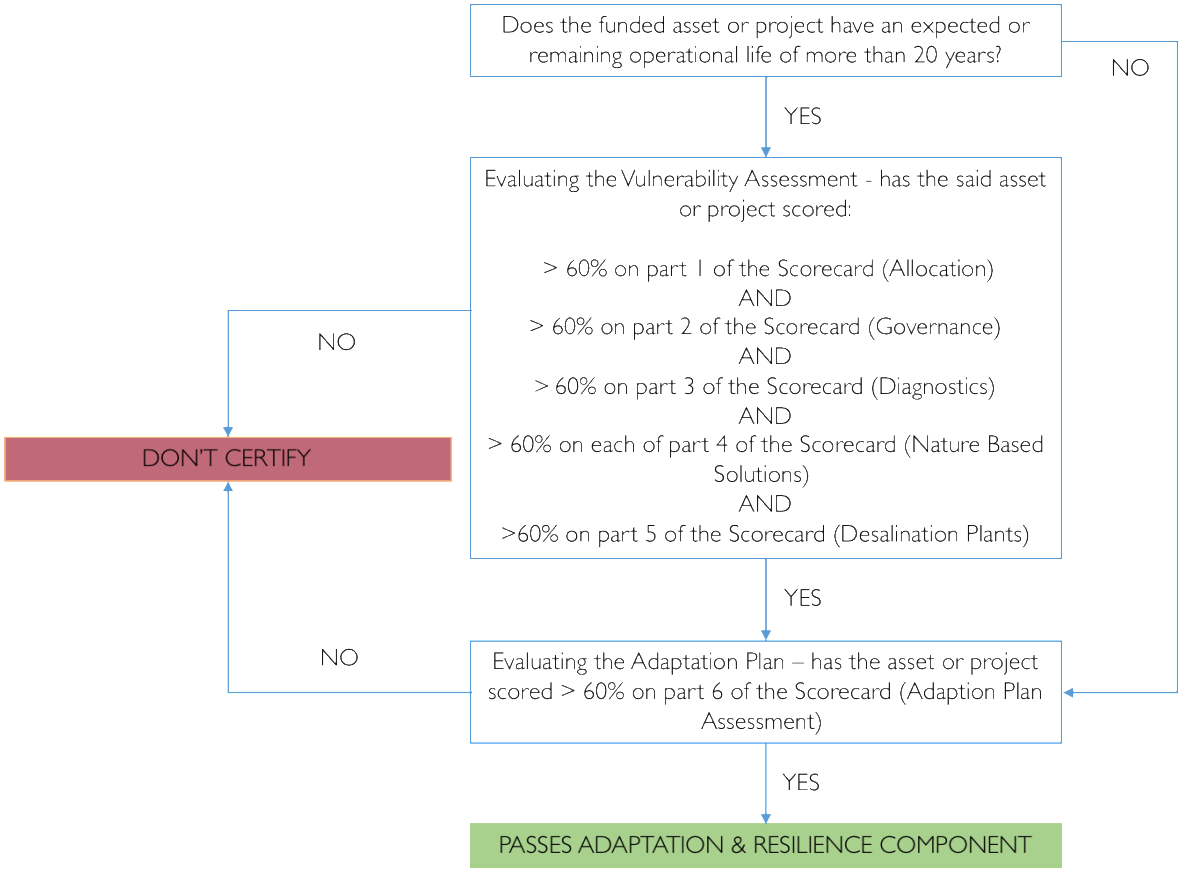
For each question in the scorecard, a 'yes' scores 1 point and a 'no' scores 0. In case of a 'n/a,' please specify why the question is not applicable and reduce the potential sectional score appropriately. To meet the requirements of the Climate Bonds Standard Adaptation and Resilience component:

The project must score at least 60% of the maximum potential score in all parts of the Scorecard. (That is, must score >= 60% for Allocation, >=60% for Governance, >= 60% for Technical Diagnostics, >= 60% for each subsection of Nature-Based Solutions, >= 60% for Desalination Plants, and >= 60% in the Adaptation Plan Assessment). See Box 2 on the next page for extra information regarding the Adaptation & Resilience Scorecard for Desalination.

It is the issuers' responsibility to self-assess and self-score against the Scorecard the project or asset being funded by the bond proceeds in the first instance. Verifiers are required to check this using the information and evidence provided to them by the issuers.

See Figure 1 for a summary of this Adaptation & Resilience component. Further information on how to conduct an Adaptation & Resilience Assessment, including guidance on the nature of the evidence required to support scoring and where that might be sourced, is given in the *Guidance Note to Issuers and Verifiers* available at http://www.climatebonds.net/standard/water

Figure 1: Decision tree for the Adaptation & Resilience component of the Water Infrastructure Criteria



Box 2. Supporting guidance the Adaptation & Resilience Scorecard for Desalination plants is available at https://www.climatebonds.net/standard/water in the resources box.

Appendix 1: Scorecard for evaluating the Issuer's Vulnerability Assessment & Adaptation Plan

		Requirement E = Provide evidence D = Disclose	Max score	Actual score
FOR EVALUTION OF THE ISSUER'S VULNERABLITY ASSESSMENT				
SECTION 1: ALLOCATION (To be completed for all water infrastructure assets)				
1.1	Are there accountability mechanisms in place for the management of water allocations that are effective at a sub-basin and/or basin scale?	D	1	
1.2	Are the following factors considered in the definition of the available resource pool? • Non-consumptive uses (e.g. navigation, hydroelectricity) • Environmental flow requirements • Dry season minimum flow requirements • Return flows (how much water should be returned to the resource pool, after use) • Inter-annual and inter-seasonal variability • Connectivity with other water bodies • Climate change impacts	E	7	
1.3	Is there a distinction between the allocation regimes used in "normal" times and in times of "extreme/severe" water shortage?	E	1	
1.4	Are arrangements in place to accommodate the potentially adverse impacts of climate change on the resource pool? (E.g., using best available science to plan for future changes in availability, undertaking periodic monitoring and updating of plans as climate science improves.)	E	1	
1.5	Do plans define responses to "exceptional" circumstances, such as an extended drought, that influence the allocation regime? (E.g., triggers water use restrictions, reduction in	E	1	

	allocations according to pre-defined priority uses, suspension of the regime plan, etc.)			
1.6	For international / transboundary basins, is there a legal mechanism in place to define and enforce water basin allocation agreements? Is it flexible enough for increased variability in water supplies due to more frequent climate extremes?	D	1	
1.7	Are water delivery agreements defined on the basis of actual in situ seasonal/annual availability instead of volumetric or otherwise inflexible mechanisms?	E	1	
1.8	Has a formal environmental flows (e-flows)/sustainable diversion limit or other environmental allocation been defined for the relevant sub-basin or basin? (If there is a pre-existing plan, then has the environmental flows program been updated to account for the new project?)	E	1	
1.9	Have designated environmental flows / allocation programs been assured / implemented?	E or D	1	
1.10	Has a mechanism been defined to update the environmental flows plan periodically (e.g., every 5 to 10 years) in order to account for changes in allocation, water timing, and water availability?	E	1	
1.11	Is the amount of water available for consumptive use in the resource pool linked to an active, guiding public planning document? (E.g., a river basin management plan or another planning document – please indicate)	E	1	
1.12	If present, is the water management plan a statutory instrument that must be followed rather than a guiding document?	D	1	
	TOTAL ALLOCATION SCORE		Max = 18	
SECTION 2: GOVERNANCE (To be completed for all water infrastructure assets)				

2.1	Have water entitlements been defined according to one of the following? • Purpose that water may be used for • Maximum area that may be irrigated • Maximum volume that may be taken in a nominated period • Proportion of any water allocated to a defined resource pool	D	1	
2.2	Is the surface water system currently considered to be neither over-allocated nor over-used? How might climate change affect this? N.B. Over-allocated would be if e.g. current use is within sustainable limits but there would be a problem if all legally approved entitlements to abstract water were used. Over-used would be if existing abstractions exceed the estimated proportion of the resource that can be taken on a sustainable basis.	E	1	
2.3	If the investment uses groundwater, is the groundwater water system currently considered to be neither over-allocated nor over-used? N.B. Over-allocated would be if e.g. current use is within sustainable limits but there would be a problem if all legally approved entitlements to abstract water were used. Over-used would be if existing abstractions exceed the estimated proportion of the resource that can be taken on a sustainable basis.	E	1	
2.4	Is there a limit to the proportion (e.g. percentage) of water that can be extracted? How might this need to change if water supplies become more variable due to climate change? (e.g. will having sufficient amounts to meet basic human needs take precedence over others?)	E	1	

2.5	Are governance arrangements in place for dealing with exceptional circumstances (such as drought, floods, or severe pollution events), especially around coordinated infrastructure operations?	D	1	
2.6	Is there a process for re-evaluating recent decadal trends in seasonal precipitation and flow OR recharge regime, in order to evaluate “normal” baseline conditions?	D	1	
2.7	Is there a formal process for dealing with new entrants?	D	1	
2.8	For existing entitlements, is there a formal process for increasing, varying, or adjusted use(s)?	D	1	
2.9	Is there policy coherence across sectors (agriculture, energy, environment, urban) that affect water resources allocation, such as a regional, national, or basin-wide Integrated Water Resources Management (IWRM) plan?	E	1	
2.10	Are obligations for return flows and discharges specified and enforced?	D	1	
2.11	Is there a mechanism to address impacts from users who are not required to hold a water entitlement but can still take water from the resource pool?	D	1	
2.12	Is there a pre-defined set of priority uses within the resource pool? (E.g., according to or in addition to an allocation regime)	D	1	
2.13	If there are new entrants and/if entitlement holders want to increase the volume of water they use in the resource pool and the catchment is open, are these entitlements conditional on either assessment of third party impacts, an Environmental Impact Assessment (EIA) or an existing user(s) forgoing use?	D	1	
2.14	Are withdrawals monitored, with clear and legally robust sanctions?	E	1	
2.15	Are there conflict resolution mechanisms in place?	E or D	1	

	TOTAL GOVERNANCE SCORE		Max = 15	
SECTION 3: TECHNICAL DIAGNOSTICS (To be completed for all water infrastructure assets)				
3.1	Does a water resources model of the proposed investment and ecosystem (or proposed modifications to existing investment and ecosystem) exist? Specify model types, such as WEAP, SWAT, RIBASIM, USACE applications). Scale should be at least sub-basin.	E	1	
3.2	Can the system model the response of the managed water system to varied hydrologic inputs and varied climate conditions?	E	1	
3.3	Are environmental performance limits (ecosystem, species, ecological community) and/or ecosystem services specified?	E	1	
3.4	Can these performance limits be defined and quantified using the water resources?	E	1	
3.5	Have these limits been defined based on expert knowledge and/or scientific analysis?	E	1	
3.6	Are these performance limits linked to infrastructure operating parameters?	E	1	
3.7	Are these limits linked to an environmental flows regime?	E	1	
3.8	For new projects, is there an ecological baseline evaluation describing the pre-impact state?	E	1	
3.9	For rehabilitation / reoperation projects, is there an ecological baseline evaluation available before the projects was developed?	E	1	
3.10	Has there been an analysis that details impacts related to infrastructure construction and operation that has been provided?	E	1	
3.11	Are lost species and/or lost or modified ecosystem functions specified for restoration in the environmental evaluation?	E	1	
3.12	Have regional protected areas / nature reserves been included in the analysis for	E	1	

	impacts from the investment asset and future climate impacts?			
3.13	Does the model include analysis of regression relationships between climate parameters and flow conditions using time series of historical climate and streamflow data?	E	1	
3.14	Does the model include climate information from a multi-modal ensemble of climate projections (e.g., from the Climate Wizard or the World Bank's Climate Portal) to assess the likelihood of climate risks for the specified investment horizon(s)?	E	1	
3.15	Are changes in the frequency and severity of rare weather events such as droughts and floods included?	E	1	
3.16	Are sub-annual changes in precipitation seasonality included?	E	1	
3.17	Is GCM climate data complemented with an analysis of glacial melt water and sea level rise risks, where appropriate (e.g., high or coastal elevation sites)?	E	1	
3.18	Is paleo-climatic data (e.g., between 10,000 and >1000 years before present) included?	E	1	
3.19	Is the number of model runs and duration of model runs disclosed?	E	1	
3.20	Has a sensitivity analysis been performed to understand how the asset performance and environmental impacts may evolve under shifting future flow conditions?	E	1	
3.21	Is directly measured climate data available for more than 30 years and incorporated into the water resources model?	E	1	
3.22	Has evidence demonstrated that climate change has already had an impact on operations and environmental targets? Are these impacts specified and, to the extent possible, quantified? These impacts should be responded to directly in the Adaptation Plan.	E	1	

3.23	Does the evidence suggest that climate change will have an impact on operations and environmental targets over the operational lifespan? Are these impacts specified and, to the extent possible, quantified? These impacts should be responded to directly in the Adaptation Plan.	E	1	
3.24	Is there a discussion of the uncertainties associated with projected climate impacts on both operations and environmental impacts?	E	1	
	TOTAL DIAGNOSTIC SCORE		Max = 24	

SECTION 4: NATURE-BASED SOLUTIONS (To be completed for nature-based-solutions and hybrid water infrastructure only)

That is, this section only needs to be completed if:

A. As a nature-based solution, the asset reflects the intentional use of natural and/or nature-based features, processes, and functions (see Box 1) as an integral part of addressing a human need and doing so in a manner that protects, manages, restores, and/or enhances natural features, processes, and systems in a functioning and sustainable manner.
B. Where feasible, the asset prioritises natural features over nature-based features. Such features include the protection, restoration, expansion, and/or creation of natural systems and processes as an explicit component of the desired project outcomes.

SECTION 4.1: SITE INVENTORY

How well do we understand the systems and processes at the project site?

4.1.1	Is this a “greenfield site” (i.e., undeveloped land used for agriculture, landscape design, or left to evolve naturally)? If so, will existing ecosystem services be expanded / supported / maintained?	E	1	
4.1.2	Has an eco-hydrological model been developed? Specify model type, such as WEAP, SWAT, RIBASIM, USACE. Is this a quantitative model? Has it been calibrated against site data? Does the model include water quantity?	E	4	
4.1.3	Has the calibrated eco-hydrological model been reviewed by an independent expert?	E	1	

4.1.4	Have sources of pollution been analysed for the following (even if none have been found)? • Point source • Nonpoint source	E	2	
	TOTAL SITE INVENTORY SCORE		Max = 8	
SECTION 4.2: ECOLOGICAL BASELINES FOR MANAGEMENT *Do we understand how the ecological characteristics of the site will evolve over time?*				
4.2.1	Is there an inventory of species that can be used as a baseline for vegetation and animal species?	E	1	
4.2.2	If there is an inventory of species that can be used as a baseline for vegetation and animal species, does it specify or identify endangered / threatened species, ecological communities, or categories of species?	E	1	
4.2.3	Have studies on current or potential climate impacts on key species (e.g., endangered or threatened species) been included?	E	1	
4.2.4	Is the flow regime used as a basis for ecological management?	E	1	
4.2.5	Is there a climate trends analysis for the site or region based on at least 30 years of climate data?		1	
4.2.6	Is there an assessment of exotic invasive species?	E	1	
4.2.7	If there is an assessment of exotic invasive species, has a plan been developed to cope with exotic invasive species?	E	1	
4.2.8	Has there been an assessment of tradeoffs between reliability vs environmental benefits to support decision making processes?	E	1	
	TOTAL ECOLOGICAL MANAGEMENT SCORE		Max = 8	
SECTION 4.3: DATA INVENTORIES OF LOCALISED & INDIGENOUS ASSETS *Do we have access to adequate, credible data about the project site?*				
4.3.1	Is there an inventory of existing water-related ecosystem services based on 30 or more years of data?	E	1	

4.3.2	Does any existing inventory of water-related ecosystem services related to runoff / land-use include the following data? • Fire regime • Sediment / erosion load • Nutrient load • Land-use change	E	3	
4.3.3	Do inventories of water-related ecosystem services related to water *quality* include the following data: • Water quality for environmental services (e.g., habitat, ecological communities, erosion) • Water quality for human needs / services (e.g., drinking water, agriculture)	E	2	
4.3.4	Is there an existing inventory of water-related ecosystem services related to water *quantity*? • Water quantity for environmental services (e.g., habitat, flow regime) • Water quality for human needs / services (e.g., service reliability)	E	2	
	TOTAL EXISTING INVENTORIES SCORE		Max = 8	
SECTION 4.4: BROADER ECOSYSTEM IMPACTS *Do we understand how the project's impacts may extend beyond the site?*				
4.4.1	Has there been a determination of proposed / estimated impacts from project construction and operations regarding local, upstream, and downstream species / ecological communities?	E	1	
4.4.2	Has there been a determination of proposed / estimated impacts on existing local, upstream, and downstream eco-hydrological systems from modification regarding: • Pollution • Downstream flow regime • Groundwater impacts • Land tenure (e.g., public vs private)		4	

4.4.3	Has there been a determination of proposed / estimated impacts and benefits on eco-hydrological systems from changes in allocation via the following? • Relevant environmental flows management plans • Groundwater management plans		2	
4.4.4	Has the monitoring system contributed to the development and goals of the basin management plan?		1	
	TOTAL BROADER IMPACTS SYSTEMS SCORE		Max = 8	
SECTION 4.5: MONITORING & MANAGEMENT SYSTEMS *Do we have effective management processes and tools to maintain ecological integrity over time?*				
4.5.1	Have target performance indicators been explicitly defined for: Infrastructure services Ecosystem services	E	2	
4.5.2	Is there a monitoring plan in place for infrastructure performance indicators?	E	1	
4.5.3	Is there a monitoring plan in place for ecosystem performance indicators?	E	1	
4.5.4	Are monitoring outcomes connected to the decision making and management / operations process?	E	1	
4.5.5	Is there a multi-stakeholder basin management plan?	D	1	
	TOTAL MONITORING & MANAGEMENT SYSTEMS SCORE		Max = 6	
SECTION 5: DESALINATION PLANTS (To be completed for all desalination projects and assets)				
5.1	Are there measures in place to manage brine discharge which minimise impacts on the ecosystem into which the brine is disposed? For example: • Diffuser systems for seawater desalination	E or D	1	

	• Use of computer modelling to determine the optimal brine discharge point(s) and length of outfall or the number of openings • Regulatory compliance with maximum allowable levels of water salinity around discharge points • Continuous / frequent water quality monitoring around the brine discharge point(s) • Mixing of brine with cooling water before discharge • Recovery of metals and / or salt from brine			
5.2	Are there measures in place to manage feedwater intake which minimise impacts on the ecosystem from which the feedwater is extracted? For example: • Subsurface intake wells for seawater desalination • Use of computer modelling to determine the optimal intake point(s) and the number of openings • Compliance with feedwater intake regulations • Continuous / frequent water quality monitoring around the intake point(s)	E or D	1	
	TOTAL DESALINATION SCORE		Max = 2	
FOR EVALUTION OF THE ISSUER'S ADAPTATION PLAN				
SECTION 6: ADAPTATION PLAN				
AP. 1	Is there a plan to restore or secure lost/modified ecosystem functions/species?	E	1	
AP. 2	Is the adaptation plan for environmental targets / infrastructure robust across specified *observed* / recent climate conditions? Confer VA	E	1	
AP. 3	Is the adaptation plan for environmental targets / infrastructure robust across specified *projected* climate conditions? Confer VA	E	1	
AP. 4	Is there a monitoring plan designed to track ongoing progress and impacts to inform future decisions?	E	1	

AP. 5	Is there a plan to reconsider on a periodic basis the VA for operational parameters, governance and allocation shifts, and environmental performance targets?	E	1	
	TOTAL ADAPTATION PLAN SCORE		Max = 5	

Appendix 2: Experts engaged in development of the Water Infrastructure Criteria

Water Infrastructure Criteria development has been led by a consortium consisting of the Climate Bonds Initiative, AGWA, Ceres, CDP and the World Resources Institute (WRI). To develop the Water Infrastructure Criteria, focusing on engineered or built or engineered water infrastructure, the consortium convened a Technical Working Group (TWG) and an Industry Working Group (IWG), with representatives from investors, public utilities, water NGOs and international policy bodies from around the world.

Technical Working Group Members:
Lead: John Matthews, Alliance for Global Water Adaptation (AGWA)
Ania Grobicki,RAMSAR
Aparna Sridhar, The Nature Conservancy (TNC)
Ari Raivetz, Organica Water
Betsy Otto, World Resource Institute (WRI)
Benjamin Denjean, Beijing Forest University
Bill Stannard, American Water Works Association (AWWA)
Bob Zimmerman, Charles River Watershed Association
Casey Brown, University of Massachusetts, Hydrology
Cate Lamb, Water Program, CDP
Cedo Maksimovic, Urban Water Research Group, Imperial College London
Cees van de Guchte, Deltares
Christian Severin, Global Environment Faciilty (GEF)
Charles B Chesnutt, USACE
Christine Chan, Alliance for Global Water Adaptation (AGWA)
Cynthia Lane, American Water Works Association (AWWA)
Dan Christian, Tetra Tech
Dave Hole, Conservation International
Debbie Larson-Salvatore, USACE
Elena Lopez-Gunn, Complutense University of Madrid
Erica Brown, Association of Metropolitan Water Agencies (AMWA)
Guy Pegram, Pegasys, South Africa
James Dalton, IUCN
Janet Cushing, USGS
Jason Fairbairn, Arup
John Joyce, Stockholm International Water Institute (SIWI)
Jorge Gastelumendi, The Nature Conservancy (TNC)
Junguo Liu, IIASA, Chinese Academy of Sciences
Karen Yacos, Ceres
Larry Band, University of Virginia
Laurna Kaatz, Denver Water
LeRoy Poff, Colorado State University, Stream Ecology Lab
Lisa Hair, US EPA
Maija Bertule, UNEP-DHI
Manisha Singh, WiseLion LLC
Marco Follador, Way Carbon

Margot Hill Clarvis, Earth Security Group
Matt Ries, Water Environment Federation
Melinda Massey, DC Water
Michael McClain, UNESCO-IHE
Monika Freyman, Ceres
Musonda Mumba, UNEP
Nancy Saich, European Investment Bank (EIB)
Peter Streit, California Organised Investor Network (COIN)
Rob Cadmus, RAMSAR
Rochi Khemka, 2030 Water Resources Group
Sebastian Hyzyk, European Investment Bank (EIB)
Sharlene Leurig, Sustainable Water Infrastructure Program, Ceres
Stefanie Lindenberg, European Investment Bank (EIB)
Tatiana Fedotova, WBCSD
Ted Grantham, University of California, Berkeley
Thomas Panella, Asia Development Bank
Todd Gartner, World Resources Institute (WRI)
Torgny Holmgren, Stockholm International Water Institute (SIWI)
Valerie Hickey, The World Bank
Will Sarni, Water Foundry
Xavier Leflaive, OECD

Industry Working Group members:
Adam Carpenter, American Water Works Association
Anais Blasco, WBCSD
Arturo Buenaventura Pouyfaucon, Abengoa Water
Bob Morgan, Beaver Water District
Cameron Ironside, International Hydropower Association
Chris Webb, HERRERA
Eric Schellekens, Arcadis
Gary Sharkey, PwC UK
Hannah Leckie, OECD
Jessica Robinson, Asria
Manisha Singh, Wiselion LLC
Martin Geiger, DEG
Matthew Kuzma, Organica Water
Mike Brown, San Francisco Public Utilities Commission
Monica Reid, Kestral Consulting
Nicole Hardiman, Illinois River Watershed Partnership
Paul Fleming, Seattle Public Utilities
Paul Wood, Water Fund LLC
Piet Klop, PGGM
Roman Gomez, IFC
Simon Petley, independent consultant

Appendix 3: Experts engaged in development of the Desalination Criteria

The addition of Criteria for Desalination to the Water Criteria has been led by a separate TWG comprised of desalination technical experts. These experts similarly included representatives from public utilities, water NGOs and international policy bodies from around the world.

Technical Working Group Members:
Paul Buijs, King Abdullah University of Science and Technology (KAUST), Water Desalination & Reuse Centre (WDRC)
Angelina Galiteva, President for NEOptions / Chair, California Independent System Operator (ISO)
Edward Jones, University of Utrecht
Heather Cooley, Pacific Institute
Molly Walton, Independent / formerly of the International Energy Agency (IEA)

Special thanks go also to Tom Pankratz, independent consultant and Global Water Intelligence, for valued input from an industry perspective.

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