cardano

Sustainable Investment Policy

Appendix E3: Cardano's Water Strategy

Cardano's investor perspective on how to address water risks and opportunities

December 2023

Preface

At Cardano, we believe that the financial sector has the fiduciary duty to drive the transition towards a sustainable society. Society has reached a point of no return, where challenges such as climate change, natural resources scarcity, biodiversity loss and pollution will have severe social and economic consequences if insufficient action is being taken. The pressure on natural resources must be reversed to sustain the quality of life on the planet now and for future generations. To align our investment solutions with this notion, we have developed a holistic Sustainable Investment Policy. Based on the aim to encourage companies to make the transition towards a sustainable society, this policy also defines a set of long-term targets for our investment portfolios. Our investment solutions are designed in such a way that they contribute to these targets. The Sustainable Investment Policy is underpinned by a series of documents that describe in detail how we consider sustainability risks and impacts in our financial decisions, including separate strategy documents that focus on particular challenges in isolation.

> **Water stress and water pollution are among the most pressing challenges that must be solved.**

The current document details the steps we take to work towards one of our key targets, to achieve a water-neutral investment portfolio by 2030. Water stress and water pollution are among the most pressing challenges that must be solved. The financial sector is likely to suffer from the consequences of inaction on these topics and, therefore, plays an important role in encouraging companies and authorities to prioritize the problem.

In this document, we first discuss how the global freshwater crisis impacts the environment, societies and businesses. In Part A, we show the magnitude of the impacts and that the problems are felt globally and by societies around the world. We also show that these impacts will not spare the financial sector but may create material risks if insufficient action is taken. This part provides the background information necessary to understand the urgency of the global water crisis and how it creates risks for the financial institutions. In Part B, we discuss our strategy to reduce water-related risks for our portfolios and how we can contribute to solving the freshwater crisis. We identify the main water-related risks for our portfolio and describe the steps we take to mitigate the financial water-related risks, how we embrace water-related opportunities and what role we take to help reverse the pressure on the earth's water resources.

Contents

Part: A The global freshwater crisis

1. Introduction

Freshwater is an essential resource. It has critical social and economic value and access to water and sanitation is a human right. Yet, its availability and its quality are increasingly becoming an issue, thereby impacting the economy, people and biodiversity. About two billion people do not have access to safe drinking water and almost twice as many people lack safe sanitation, causing numerous social and gender inequality issues.[1] Therewith, the world is not on track to reach Sustainable Development Goal 6 (SDG 6) – 'ensure access to water and sanitation for all'. In addition, it is estimated that the number of freshwater species has declined by 84 percent since 1970, and one in three freshwater species are threatened with extinction.[2] This pace of degradation is far greater than for land and ocean species. In the past 50 years, around 35 percent of wetlands have been lost and only one-third of the world's largest rivers are still free flowing, in this way further impacting fish stocks. Freshwater is also an essential resource for companies, either as direct input, for washing or cooling, for transport, or as essential input upstream in the supply chain of, especially, agricultural commodities. Water shortages directly impact agricultural yields, may limit production capacities or may lead to increased production costs. Similarly, water pollution may constrain productivity or impact production costs. Water crises have therefore been listed within the top 5 risks with the biggest potential global impact for nine consecutive years by the World Economic Forum.

On a global level, current levels of freshwater use may not exceed water availability, but these global figures mask severe water stress on a regional or local level. In 2018, Northern Africa and Central and Southern Asia reported water stress levels above 70 percent, while Western Asia and Eastern Asia experienced stress levels of 60 percent and 45 percent, respectively.[3] These stress levels are expected to further increase due to climate change, overconsumption and pollution. Countries contributing the most to the water stress are generally not among those that feel the strongest impacts. This makes the freshwater crisis an important topic that requires urgent action, albeit on a more localized nature than some of the other environmental challenges.

In the next two chapters, we explain the urgency for dealing with the global freshwater crisis. We show how central the freshwater crisis is for society and for a multitude of global sustainability challenges. We also show how urgent the problem is for the global economy and for businesses across multiple sectors. In addition, we discuss which sectors are most exposed to water-related risks, and how this may create risks and opportunities for financial institutions.

> **Freshwater is an essential resource. It has critical social and economic value and access to water and sanitation is a human right.**

1 United Nations Department of Economic and Social Affairs (2021). Progress towards the sustainable development goals.
2 WWF & ZSL (2020). A deep dive into freshwater. Living planet report 2020.
3 United Nations Department of Economic and Social Affairs (2021). Progress towards the sustainable development goals.

2. The freshwater crisis

2.1 Introduction

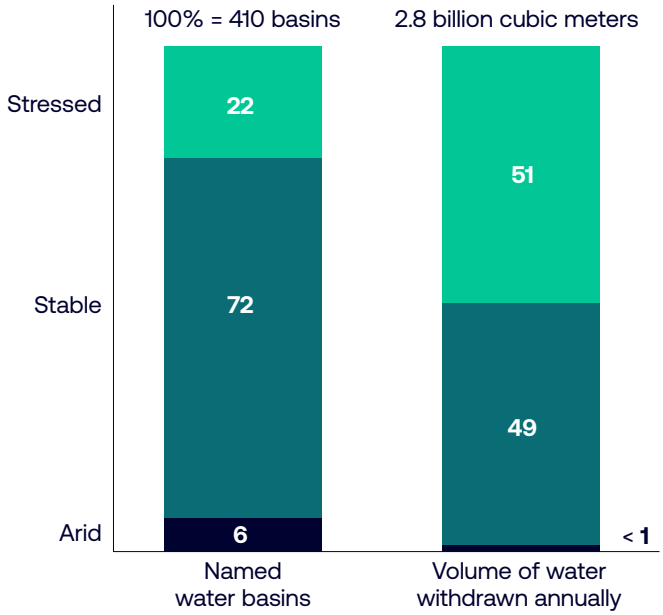
For understanding the steps needed to address the water crisis, it is helpful to separate the water crisis into several sub-crises. On the one hand, there is a water quantity crisis, which is related to SDG 6.4 – 'increase water use efficiency and ensure freshwater supplies'. In some regions there are insufficient freshwater resources available to meet local demand, while other areas are affected by too much water in the form of flooding. Another type of water crisis is that of water quality, which prevents available freshwater resources from being used. This crisis is related to SDG 6.3 – 'improve water quality, wastewater treatment and safe reuse'. It is possible to also identify a third water-related crisis that relates to access to drinking water and inadequate sanitation – see SDG subgoals 6.1 and 6.2. This paper focusses on the water quantity and water quality crises.

2.2 A crisis of quantity and quality

The first water crisis is one of water stress. While much of our planet is covered by water, less than 1 percent of all water is available as freshwater for consumption. The remainder is saltwater or stuck in the form of glaciers. Over the past years, the supply of freshwater has been steadily decreasing while demand has been increasing. By 2030 the global gap between supply and demand is projected to be 40 percent, assuming no further efficiency gains.[4] Population growth and economic development are increasing the amount of water required for irrigation, industry and domestic purposes, while climate change and deforestation increasingly strain available water resources.

The volume of water used globally – about 4.600 cubic kilometers a year – is already close to the maximum the earth can sustain without dangerously shrinking supplies.[5] The availability of freshwater varies by location. Just nine countries account for 60 percent of all freshwater supplies.[6] The majority of the world's freshwater is stored in 410 basins.[7] About a quarter of these basins, accounting for more than half of all water withdrawals, already face water stress – see Figure 1.[8] Yet, many of the world's water basins are projected to be confronted with an even further decline in water supply of around 10 percent by 2030 and up to 25 percent in 2050.[9] This reduction in supply is not evenly distributed, and some regions could be facing a reduction in supply of more than 70 percent by 2050.

Figure 1: Origin of water supply: percentage of basins and withdrawals by stress level



Source: World Resources Institute

The second water crisis is posed by the degrading quality of the available freshwater resources. Deteriorating water quality is a major factor in increasing global water stress as it reduces the quantity of water available for use without requiring significant treatment costs. Water pollution occurs when harmful substances – such as chemicals or pesticides – contaminate a stream, river, lake, ocean, aquifer, or other body of water, degrading water quality and rendering it toxic to humans or the environment. Of 2,300 large lakes assessed globally in 2019, nearly a quarter recorded high to extreme turbidity (water cloudiness), which can cause adverse impacts on ecosystems and human health.[10] An assessment of 10 percent of the world's large lakes showed that at least 21 million people live within a 5-kilometre radius of lakes with high turbidity

Two broad categories of pollution can be distinguished. First, point-source pollution can be linked to one particular source. Industry and power plants are important sources of point-source pollution when they discharge effluent - wastewater containing harmful chemical pollutants such as heavy metals, solvents, toxic chemicals, or other substances from industrial and commercial activities - into waterbodies that end up in ground- and/or surface water. Research estimates that a total of 380 billion m3 of wastewater is globally produced on an annual basis – about five-fold the volume of water passing through Niagara Falls annually. Wastewater production is expected to increase by 24

4 McKinsey (2009). Charting our water future. Economic frameworks to inform decision-making.
5 The Economist (2019). Special report: water. The Economist, March 2nd 2019.
6 Brazil, Russia, Canada, Indonesia, China, Colombia, United States of America, Peru and India
7 The Alliance for Water Stewardship (AWS) defines a catchment (or watershed or basin) as the area of land from which all surface runoff and subsurface waters flow through a sequence of streams, rivers, aquifers, and lakes into the sea or another outlet at a single river mouth, estuary, or delta. While some catchments are relatively small, others encompass thousands of square kilometres. More than 60% of global freshwater flow comes from catchments that cross national borders and there are many interconnections between catchments – see https://unstats.un.org/sdgs/report/2020/goal-06/.
8 McKinsey (2020). Water: a human and business priority.
9 McKinsey (2020). Climate risk and response: physical hazards and socioeconomic impacts.
10 United Nations Department of Economic and Social Affairs (2021). Progress towards the sustainable development goals.

percent by 2030 and 51 percent by 2050.[11] The pollution in wastewater can be reduced by effective treatment; however, 80 percent of all wastewaters remains untreated or is treated to an insufficient level before being discharged in waterways.[12] Leaches, leaks and spills can exacerbate the problem. Another form of point-source pollution is so-called thermal pollution, when the discharge of heated water - after being used as coolant by utilities or industry - creates a (sudden) increase in water temperature affecting oxygen levels and impacting life below water.

Second, non-point-source or diffuse pollution occurs when polluting substances leach into surface waters and groundwater as a result of rainfall, soil infiltration and surface runoff. An important source of diffuse pollution is nutrient pollution from agricultural runoff. Excess nutrients, such as nitrogen or phosphorus, in water lead to algal growth and are the primary cause of eutrophication of surface waters, thereby threatening the existence of both fresh - and saltwater species and limiting the capacity of the world's lake and oceans to provide sustainable food sources and act as carbon sinks. But also wastewater effluent, untreated sewage, or runoff from cities, industry, mines and oilfields can be important causes of diffuse pollution. Furthermore, synthetic fibres or (micro)plastics increasingly make their way into waterways. In Europe, 18 percent of surface waterbodies are exposed to point source pollution, compared to 38 percent that are threatened by diffuse pollution.[13]

> **The water crisis can be characterized as a complex problem as it is interconnected with several other global sustainability challenges...**

The water crisis can be characterized as a complex problem as it is interconnected with several other global sustainability challenges. Climate change and ecosystem decline tend to aggravate the water crisis. But reversely, failing to adequately manage water resources has its impact on biodiversity and human health. It is essential, therefore, that any actions taken to mitigate water risks are assessed in a holistic manner, considering the many linkages of water with other sustainability problems, such as:

- **The water-food-energy nexus:** Agriculture accounts for 70 percent of global freshwater use, while estimates are that already 7 percent of total cropland is irrigated with untreated or partially treated wastewater.[14] Using untreated wastewater for irrigation could limit plant growth, have negative environmental effects, and impact human health. Energy production accounts for about 75 percent of global industrial water use. Withdrawal for power plant cooling is a main beneficiary of this water use, but also extraction, mining, processing and refining of fossil fuels requires water. To cater population and welfare growth, both energy and agricultural production are expected to expand and thus put an increasing strain on water. The World Bank estimates that global agricultural production will need to expand by 70 percent towards 2050.[15]

- **The relation between water and climate:** Climate change manifests itself, amongst others, through changes in the water cycle, thereby putting additional strain on water availability and quality. Global warming is disrupting weather patterns, resulting in more frequent and severe floods, droughts, and storms. Increased intensity of precipitation causes greater peak runoffs and less groundwater recharge. Sea-level rise causes saltwater intrusion, thereby threatening the availability of freshwater in coastal regions and leading to the loss of wetlands and other natural barriers against flooding. In addition, increasing temperatures lead to higher water demand, for example through increased irrigation. Such effects are likely to continue regardless of mitigation measures applied. However, they could be further aggravated if society fails to act. Projections indicate that if global warming is not kept below 1.5°C, there will be severe consequences on the availability of sufficient and clean water for basic human needs, such as the production of food and energy.[16] Incorrect management of water consumption, on the other hand, can further aggravate climate change. Energy is used to extract, transport, distribute and treat water. Saltwater desalination heavily relies on energy.

11 Qadir, M., Drechsel, P., Cisneros, B. J., Kim, Y., Pramanik, A., Mehta, P., & Olaniyan, O. (2020). Global and regional potential of wastewater as a water, nutrient and energy source. Natural Resources Forum, Volume 44 - Issue 1.
12 UNESCO World Water Assessment Programme (2017). The United Nations world water development report. Wastewater: the untapped resource, facts and figures.
13 European Environment Agency (2019). Water use and environmental pressures.
14 Jiménez, B. & Asano, T. (2008). Water reuse: an international survey of current practice, issues and needs.
15 The World Bank (2020). Water in agriculture.
16 WWF & ABInBev (2019). Climate change & water. why valuing rivers is critical to adaptation.

And finally, methane emissions from untreated or partially treated wastewater are estimated to account for 4.5 percent of global non-carbon dioxide emissions.[17] The level of success in fighting climate change will be a major determinant in the size of the water crisis. A report from the Intergovernmental Panel on Climate Change (IPCC) concluded "with medium confidence" that a temperature rise of 2°C above pre-industrial levels will expose an additional 8 percent of the world's population to new or aggravated water scarcity by 2050.[18] If we manage to constrain temperature rise to 1.5°C, this number could be limited to 4 percent.

- **The relation with land use:** Forest canopy, branches and roots play an important role in storing and releasing water vapor, controlling rainfall and impacting micro-climate in a region. Replacing forests by farmland disrupts the cycle of precipitation, evaporation and water flow, potentially leading to more irregular rainfall patterns. Such consequences reach far. Greenpeace predicts that Amazon deforestation could increase the annual rainfall on the Arabian Peninsula by 45 percent and African deforestation decreases rainfall in Midwest USA by 5 to 35 percent.[19] Maintaining healthy ecosystems also serves as a natural source of water treatment.

> **One of the biggest problems related to water is that it is vastly under-priced relative to its actual value.**

- **The relation with human rights and social cohesion:** The water crisis also has an impact on human rights and social cohesion. One of the biggest problems related to water is that it is vastly under-priced relative to its actual value. This is partially caused by the fact that water is seen as a fundamental human right. The consequence of this under-pricing is that there are little financial incentives to reduce water use, but also that the poorest may lose from those that are more powerful. Often, residential and agricultural consumers rely on the same water source as industrial conglomerates and overextraction and/or degradation due to industrial water use regularly negatively affects those residing there. A lack of freshwater tends to lead to economic decline and food price spikes. Competition over stressed resources can additionally spark community unrest, migration or even conflicts. Adverse health effects from environmental pollution kill more people each year than war and all other forms of violence combined.[20] If addressed inadequately, management of water resources has the potential to jeopardize progress on poverty reduction and sustainable development.

An integrated view on water, biodiversity and climate change is necessary. Measures to move towards more sustainable forms of agriculture and the combat of climate change can help in protecting water availability as well as reducing water pollution. Simultaneously, sustainable water management can be part of the solution for other environmental problems. It can help the preservation of ecosystems and protect against the worst consequences of climate change. Peatlands and mangroves store large amounts of carbon – more than forests – and are among the biodiversity hotspots of our planet. Just as forests and the ocean, also freshwater lakes serve as natural carbon sinks and help to reduce greenhouse gas concentrations in the atmosphere.

2.3 Water management

Water management is becoming an increasingly prominent topic on national and international policy agendas. The UN has declared the period 2018-2028 as the International Decade for Action – 'Water for Sustainable Development'. The aim of the program is to put a greater focus on water and aid for the sustainable development and integrated management of water resources, as well as further cooperation to achieve internationally agreed water-related goals and targets. The EU has recently enforced the target of the Water Framework Directive to have all EU's freshwater ecosystems in good health by 2027, at the very latest. The European Green Deal, which was launched in 2020, establishes a transition path leading to a climate-neutral Europe in 2050. Proper water management is an inherent part of the plans and among its priorities are the protection of (water-related) ecosystems and the reduction of water pollution.

17 WBCSD (2020). Wastewater zero: a call to action for business to raise ambition for SDG 6.3.
18 IPCC (2018). Special Report on Global Warming of 1.5°C.
19 Greenpeace (2013). An impending storm.
20 Landrigan, et. al. (2017). The Lancet Commission on pollution and health. The Lancet, Volume 391, Issue 10119.

Important for all water management initiatives is that the water crisis is one of localized nature for which a bottom-up perspective is needed. Solutions should consider the hydrological characteristics within a catchment along locally relevant variables, such as local water supply, local demand and its aggregated impacts, (changes in) weather conditions, the vulnerability of the ecosystem, the political situation and jurisdiction, etcetera. A top-down perspective does not show the magnitude of the crisis and is not effective for managing it. Simultaneously, taking solely a bottom-up approach does not necessarily reflect the global urgency of the crisis. Combining the top down with a bottom-up approach defines the local limits to the water system, as well as provides information about potential external impacts and interdependencies that merge the local and global context.

> **Wastewater could serve as a cost-efficient and sustainable source of water.**

The relationship between water and companies works in two directions. On the one hand, companies are dependent on a sustainable supply of (clean) freshwater in the production of their products and services. On the other hand, through their consumption and discharge of water, they have an impact on the availability of freshwater resources. Overconsumption can lead to resource scarcity, while pollution can render resources useless.

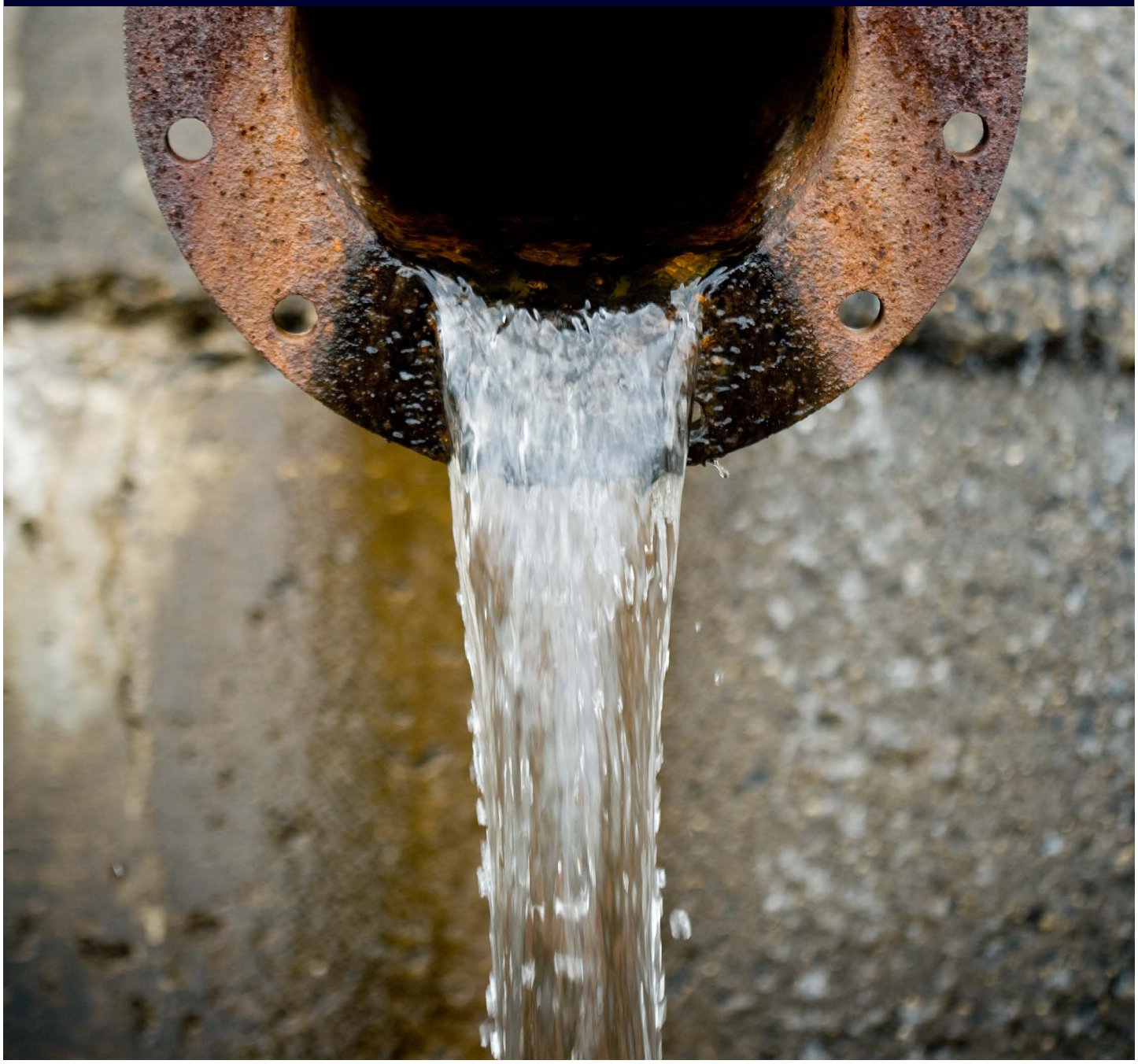
For companies and investors to adequately protect catchments from the impacts of economic activities, water stewardship is an important approach to managing water issues on a local level. Water stewardship is defined by the CEO Water Mandate as "the use and treatment of water in ways that are socially equitable, environmentally sustainable, and economically beneficial."

Even though each individual company in a catchment manages its consumption to remain within the local boundaries of supply, this does not necessarily mean that the total consumption within a catchment stays within such limits. An essential component of water stewardship is therefore the collaboration of a company with external stakeholders, such as local communities, authorities and non-governmental organizations (NGOs), to ensure that the available water resources are managed to everyone's needs and satisfaction. This also includes transboundary and inter-catchment cooperation. As company operations can have material implications downstream of where the initial activity took place, defining the appropriate scale of the catchment is crucial in a company's water management plans. According to Alliance for Water Stewardship (AWS) a company must, at least, include in its water management upstream areas as far as the company's activities are materially impacted by the actions of upstream stakeholders, as well as downstream areas within which a company's water management practices materially impact the state of water resources, ecosystems, and/or other stakeholders.

Many corporate and investor efforts to address water insecurity focus primarily on addressing quantity issues, thereby running the risk to overlook the issue of declining water quality. The Climate Disclosure Project (CDP) concludes from its annual questionnaire that more than halve of the companies monitor the quality of wastewater discharges at their facilities, but only a small minority set targets against pollution or report on their progress. In contrast, more than halve of the companies have set targets on water quantity on which progress is monitored.

Such neglect is remarkable as wastewater could serve as a cost-efficient and sustainable source of water. Industry could reuse wastewater for different processes and operations. For example, water from cooling and heating can be recycled for cleaning and washing. This would reduce the intake of freshwater. Also, there is a market to trade wastewater as a resource. Depending on the content of wastewater, materials can be recovered from it or organic compounds in the water could be converted into biogas. Qadir et. al. have estimated that the amount of nitrogen, phosphorous and potassium that is embedded in wastewater could supply more than 13 percent of the global agricultural demand for fertilizer nutrients. The recovery of these nutrients could result in a revenue generation of USD 13.6 billion. Converting wastewater to biogas would be sufficient to provide electricity to 158 million households. Although part of the energy would be needed to sustain the wastewater treatment process, wastewater has the potential to produce up to five times the amount of energy needed in the process. In addition, the global wastewater recovery systems market may exceed USD 50 billion by 2024.

3. Risks and opportunities of the freshwater crisis for the financial sector



3.1 Economic risks and opportunities of the freshwater crisis

The freshwater crisis can have severe economic consequences. The World Bank estimates that in the Middle East, Sahel and Asia, GDP growth could decline by as much as 6 percent by 2050 as a result of water-related impacts on agriculture, health, income and prosperity.[22] In regions downstream of heavily polluted rivers, GDP growth could be lowered by a third.[23] The World Resources Institute estimated that it would cost 1 percent of worldwide GDP to secure water for our societies by 2030.[24] The estimated annual cost to eliminate industrial pollution is USD 87.4 billion, which is about 0.1 percent of global GDP.[25] Adding also agricultural and domestic pollution, the costs of elimination are estimated to increase to USD 291 billion per year.

> **...the costs of inaction could be over five times higher than the cost of action.**

To mitigate the economic impacts of the water crisis, companies should analyze and adequately manage associated risks. According to CDP, for companies, the costs of inaction could be over five times higher than the cost of action. In 2020, companies reported a potential impact of water risks of USD 301 billion and only USD 55 billion to mitigate those risks.[26]

We distinguish four types of risks.

- **Operational disruption:** many companies are reliant on an uninterrupted supply of freshwater in their operations. Restrictions on this supply, either physical or government-imposed, could cause disruptions in production processes and value chains. Companies that depend on a specific region have little opportunity to escape from unfolding risks. It is largely impossible and very costly to import water from elsewhere when a specific region runs dry. Water shortages in Chile, caused by rainfall decreases of almost 30 percent over the last 20 years, have hampered mining companies' operations, forcing them to reduce water use and build desalination plants. Some miners have even announced cuts in their copper targets. Antofagasta lowered its production forecast for the year by 20.000 tonnes.[27] Companies can also be affected via their value chain. A large part of water use occurs downstream in the supply chain of a company's own operations and might therefore not be directly visible as a risk for companies. However, adverse effects in the supply chain could work its way all the way up to a company's direct performance, as proven by the recent crisis in the semiconductor industry.[28]

- **Reputational risk, stakeholder conflict and threats to 'license to operate':** in regions where demand for water is greater than supply, competition for scarce resources can impact company operations. Companies can compete amongst themselves, but also with local communities or nature. This could lead to societal opposition. In 2015 Coca-Cola was forced to abandon plans to build a USD 81 million new bottling plant in India after fierce resistance from local farmers fearing reduced water availability. This happened only a year after the company was forced to abandon plans for a new bottling line at another one of its plants in India, also after protests from local farmers. More recently, in 2020, Constellation Brands suffered a USD 900 million loss after the construction of one of their breweries was halted by a public referendum on concerns over the effects on local water supply. Such examples are not only isolated to water scarce regions, as for instance in the Netherlands, datacentres received opposition as their water consumption would be equivalent to the consumption of 28.000 households annually and they would pollute catchments and groundwater.[29]

- **Legal and regulatory risks:** many countries have legal frameworks in place that determine how much water companies can extract from and discharge to specific areas. Also, the required quality of discharge is often confined in regulations. Emerging quality standards are one way in which regulatory risks could increase compliance costs for companies. In 2016, Suncor Energy estimated that it would need to push its total R&D costs above USD 165 million over the next few years to keep up with emerging water quality standards.[30] Additionally, when exceeding emission limits, companies can be fined or confronted with extensive clean-up costs. Following the 2011 tsunami,

22 The World Bank (2016). High and dry: climate change, water, and the economy.
23 World Bank Group (2019). Quality unknown. The invisible water crisis.
24 WRI (2020). Achieving abundance: understanding the cost of a sustainable water future.
25 idem
26 CDP (2020). A wave of change. The role of companies in building a water-secure world.
27 Glacier Media Group (2021). Chile's drought forces Antofagasta to cut copper guidance.
28 In 2021 Taiwan's worst drought in 50 years exposed how reliant chipmakers are on the availability of water. The drought conditions worsened the global shortage of chips. Water shortages impacted not only chip manufacturers, such as TSMC and Micron, but due to interdependencies also car manufacturers and producers of consumer technologies were among the industries affected. These industries had to cut down on production and could not answer demand. According to an analysis by Goldman Sachs a total of 169 industries were affected. https://www.goldmansachs.com/insights/pages/the-semiconductor-shortage-of-2021.html
29 NOS (2021). Datacenters in Noord-Holland kunnen leiden tot drinkwatertekort.

the Japanese power giant Tepco had to make a USD 9.7 billion provision to address groundwater pollution from the Daiichi nuclear power plant.

- **Increased cost price:** governments may raise the price of water or reduce allocations if drought risks increase. Many authorities currently offer water at very low cost, leaving little incentive for companies to reduce water use. To incentivize efficiency, trading schemes in water rights are being introduced in an increasing number of water-scarce regions. In 2015, the Kellogg Company reported that water prices charged to its manufacturing facilities in Mexico had risen 300 percent since 2012.[31] Increases of such magnitude have a direct impact on operating costs. The impact could also be more indirect when a situation of water stress makes it more difficult to extract the required water, increased pollution levels require a higher level of pre-treatment, or when changes in drought or temperatures require more water to be used for irrigation or cooling.

These risks also cause risks for investors. As water risks often unfold locally, water-related risks for investors are likely to affect only a specific part of their investment portfolio. Contrary to climate change, which impacts the global economy, water risks are less likely to affect the entire investment portfolio simultaneously and can for now partially be mitigated through diversification. This, however, does not mean that the impacts are small. In 2020, companies reported financial implications totalling USD 16.6 billion according to CDP.

The water crisis also provides investment opportunities. Global Water Intelligence predicted in 2015 that the water services industry would grow globally at around 4 to 6 percent per year. The additional investment needed until 2030 to achieve SDG6, is estimated to be USD 1.7 trillion implying that the current level of investments needs to triple.[32] Additionally, estimated global investment needs for water infrastructure range from USD 6.7 trillion by 2030 to USD 22.6 trillion by 2050, and every dollar invested in water access and sanitation is expected to yields an average USD 6.80 in returns.[33] The International Food Policy Research Institute (IFPRI) estimates that the average annual costs of expanding irrigation across all developing countries are USD 7.87 billion, taking into consideration climate change and increased demand for food.[34] Compared to investments in climate change solutions, companies that focus on water management have not seen astronomical share price increases yet.

3.2 Water quantity related risks

3.2.1 Sectors most related to water stress

All industries rely on water in some way. On average, 70 percent of all water withdrawals are for agriculture, 19 percent for industry and the remaining 11 percent is used for consumption by households. Percentages vary per region, as in high-income countries industry tends to be the largest water user, whereas in low- and middle-income countries agricultural water use dominates. These percentages, however, can paint a skewed picture, as agricultural products are a key input for many economic sectors, such as the food and beverage industry, the apparel sector and for producing biofuels or biochemicals. Experts use the term "virtual water" to describe the hidden flow of water embodied in the production of products.[35] Many industries have a supply-chain water footprint and/or an end-user footprint that is much larger than their operational water footprint. Virtual water does not necessarily have to be extracted at the point of production of the end-product but can be imported from areas with different levels of water stress.

Considering each sector's water withdrawals and consumption, both directly and via its supply chain, and the average percentage of operations within a sector in areas that are water stressed, the eleven main high-risk sectors are.[36]

The priority sectors are the following:

- Metals & Mining
- Chemicals
- Semiconductors & Semiconductor Equipment
- Paper, Forest Products + Containers & Packaging
- Food, Beverage & Tobacco
- Restaurants
- Hotels & Travel
- Casino's & Gaming
- Electric Utilities
- Multi-Utilities
- Oil, Gas & Consumable Fuels

Note that the sectors that are not part of the list of high-risk sectors may still face water challenges. Although manufacturing activities are not included in the priority list of high-risk sectors, manufacturing specific products could still be reliant on water, and it is recommended to assess these risks on a case-by-case basis. Also, in the apparel industry water is needed to produce fabrics, but for this sector, the main exposure to water risks is through its supply chain, as cotton production requires large amounts of water. We have not included the water utilities sector in the priority list as it

30 CDP (2016). Thirsty business: why water is vital to climate action.
31 Ceres (2015). Feeding ourselves thirsty. How the food sector is managing global water risks.
32 OECD (2018). Financing water. Investing in sustainable growth.
33 https://www.copenhagenconsensus.com/sites/default/files/water_sanitation_assessment_-_hutton.pdf
34 IFPRI (2017). Investments in irrigation for global food security.
35 See for example the explanation of the Water Footprint Network at https://waterfootprint.org/en/water-footprint/national-water-footprint/virtual-water-trade/
36 Sources consulted are, amongst others, from CERES, SASB, CDP, WRI, and data providers such as MSCI and Sustainalytics.

does not necessarily consume much water itself but extracts large amounts of water to transport to its consumers. Therewith, they are both dependent on local water supplies, and can have a large impact thereon.

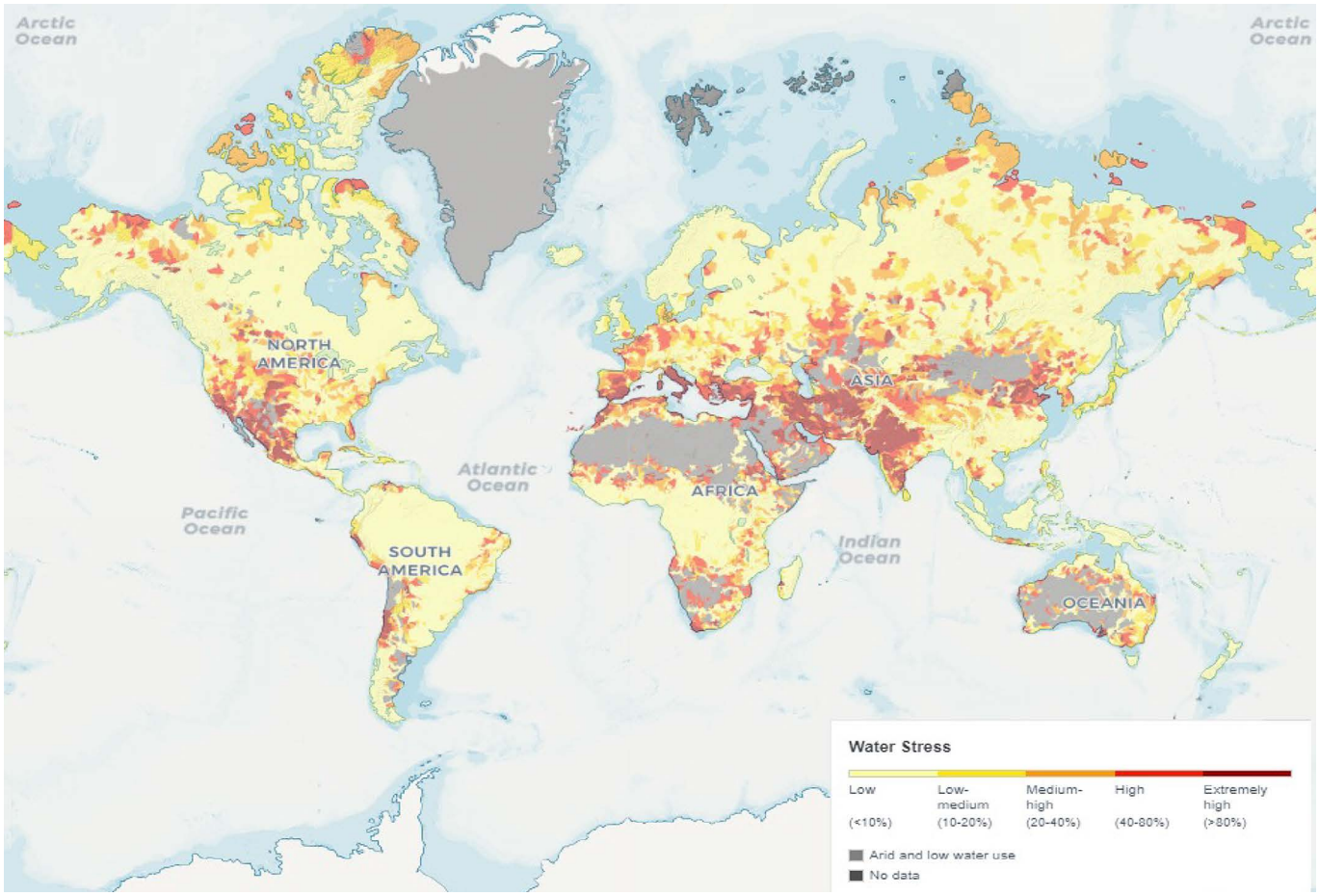
Different sectors use water for different purposes. Therewith, the type and magnitude of risk differs per sector, as well as what companies can do to reduce, reuse and/or replace their freshwater use. For instance, agricultural companies use water to grow crops for which they can use more efficient irrigation techniques or (partially) replace blue with green water,[37] but they cannot reduce their water consumption to zero. A shortage of freshwater will immediately impact harvests. As another example, industry uses most water for cooling purposes. Even though water intensity of electric utilities is high, they can relatively easily source other water sources, such as seawater, for specific processes. They also do not consume water and a large part of the water withdrawn can be returned to its original source after usage, provided that the quality of wastewater is sufficiently taken care of.

Another way to distinguish between sectors is the moment in the value chain where water is used. Many of the above-mentioned sectors rely on freshwater for their own operations. They, for example, use water for cooling, cleaning, washing, or heating purposes, or as a solvent or carrier media. If insufficient water is available, they risk having to (partially) stop their production. For other industries, the majority of their water use is located within the supply chain. Their main water-related risk is an interrupted supply of materials, which could also affect production.

3.2.2 Regions most impacted by water stress

As already argued above, the water crisis is a location specific crisis. The Aqueduct Water Risk Atlas from the World Resources Institute (WRI) shows which regions are most susceptible to water stress. Aqueduct shows per region the ratio of water withdrawal and consumption to available renewable surface and groundwater supplies. The higher the value, the more a region is put under stress. Data are shown on a regional and aggregate country level. Figure 2 shows a concentration of hotspots just north of the Tropic of Cancer; in the Middle East, the South of Asia, Northern Africa, the South of Europe and Central America.

Figure 2: Geographic water stress

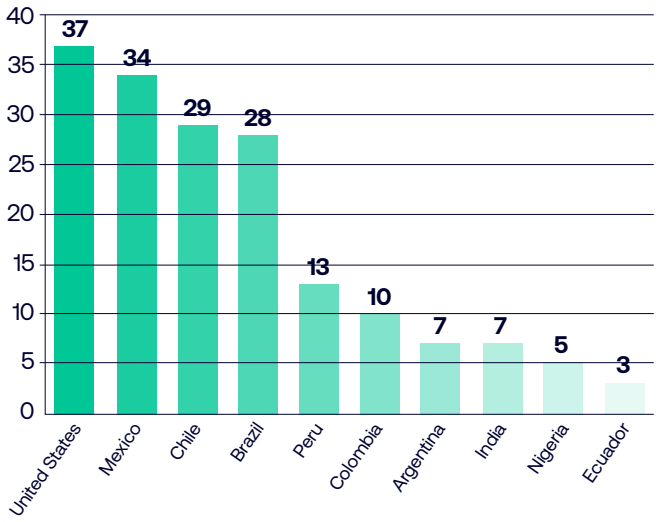


Source: WRI. Aqueduct water risk atlas.

37 Blue water is the water extracted from surface or groundwater resources and is either evaporated, incorporated into a product or returned to a different water body or at a different time. Green water is water from precipitation that is stored in the root zone of the soil and evaporated, transpired or incorporated by plants.
38 ISS (2018). Dealing with water scarcity – an ESG perspective.

ISS provides an additional perspective, by showing company involvement in water rights related controversies.[38] Eight of the top ten countries with water-related reported controversies are in the Americas. This awareness serves as an additional red flag regarding geographic risks, especially because not all these countries are being flagged as water stressed.

Figure 3: Top 10 countries with water-related corporate controversies



Source: ISS-Ethix Global Norms Research

3.3 Water quality related risks

3.3.1 Sectors most related to water pollution

Sectors that are dependent on clean water in their operations are not necessarily the sectors that have the biggest (negative) impact on water quality. Adequate management of wastewater is material for sectors that a) have an impact on water quality, either directly via emissions to water, or indirectly via runoff, leaching or waste disposal, and b) sectors that depend on a continued supply of clean freshwater for production. The mining sector, for example, potentially has a big impact on water quality. However, for many purposes in its operations lower-quality industrial water can be used. When mismanaging emissions to water, the first group of companies – those that have an impact on water quality – risk community opposition, threats to their license to operate, increased legislation, or pollution-related fines. The complexity of the problem is explained for the apparel industry in the textbox below. For sectors that are dependent on clean freshwater in their production processes risks are more of operational nature, such as disruptions in the production process or increased production costs. In such sectors water of stringent purity standards is needed to prevent end products from becoming contaminated (for example the food, beverage and tobacco, pharmaceutical, and medical equipment industries) or to protect products and equipment from being damaged (such as the electronic components - mainly semiconductors - and power generation industries).

Based on the above considerations and in line with expert opinion,[39] thirteen high-risk sectors can be distinguished in terms of water quality. Both impact and dependency are taken into account in a company's direct operations and supply chain.

The priority sectors are the following:

- Metals & Mining
- Chemicals
- Semiconductors & Semiconductor Equipment
- Paper, Forest Products + Containers & Packaging
- Consumer Durables & Apparel
- Household & Personal Products
- Pharmaceuticals & Biotechnology
- Food, Beverage & Tobacco
- Restaurants
- Hotels & Travel
- Electric Utilities
- Oil, Gas & Consumable Fuels

It must be noted that almost all sectors require water of a certain quality for some activities. The car manufacturing industry, for example, needs high quality water in the production of one-way glass and in the oil and steel industries the quality of water used largely determines the quality of their end product. Also, all industries produce wastewater. This wastewater is polluted to different degrees, depending on the activities, and substances used, and the possibilities to reduce or reuse wastewater differ. The high-risk sectors are the sectors where risks are most likely, based on quality needs and volumetric data of wastewater produced.

> **Eight of the top ten countries with water-related reported controversies are in the Americas.**

38 ISS (2018). Dealing with water scarcity – an ESG perspective.
39 Sources consulted are, amongst others, WBCSD, CERES, SASB, CDP, WRI, and data providers such as MSCI and Sustainalytics.

Water pollution in the apparel industry

The apparel industry is a major polluter of water. The industry is responsible for around 20 percent of total industrial water pollution.[40] Eliminating the negative health impacts emanating from poor chemicals management in the textile industry is said to yield an economic benefit of about USD 8 billion per year.[41] Water pollution occurs at all stages of the apparel value chain. 63 percent of fibers used to produce clothing are of synthetic origin and require 70 million barrels of oil to be pumped annually.[42] Oil production generates wastewater contaminated with lead, arsenic benzenes and other pollutants. An additional 29 percent of fibers produced are plant-based, with the main source being cotton. Cotton production is estimated to account for 6 percent of the pesticides and 16 percent of insecticides used worldwide which, through agricultural runoff, can enter the water cycle.[43] Wastewater from manufacturing plants, additionally, is found to contain substances like arsenic, chromium and mercury. The effect of this is shown by the fact that the Delhi State Government had to shut down supply from water treatment plants for more than 33 days in 2020 because the ammonia levels generated by industrial waste were higher than they could treat.[44]

Apparel manufacturing requires a large amount of chemicals, although precise estimates differ. The Swedish Chemical Agency identified over 3.500 types of chemicals that can be used in apparel manufacturing.[45] Of these, 750 have been classified as hazardous for human health and 440 as hazardous for the environment. Textile dyeing is one of the most polluting phases of the manufacturing process; the World Bank identified 72 toxic chemicals ending up in wastewater from the dyeing process alone.[46] Also finishing – the application of chemicals or treatment to fabric, such as bleaching, softening, or making garment water resistant or anti-wrinkle - has a big impact. Water pollution does not contain itself to the apparel sourcing and production processes as the washing of clothes in the use-phase also releases microfibers. These fibers are estimated to contribute up to 35 percent of the plastic pollution in oceans.[47] Also through washing, hazardous dyes and chemicals remaining on the products from manufacturing could be released into wastewater. Textiles sent to landfill can cause leachate containing microfibers, dyes and other toxic substances that seep into local water sources, while incineration can lead to harmful emissions.

According to CDP, disclosure of the sector on water risks is low and of the companies that do disclose only just over 20 percent reports that pollution risks can pose a substantive financial or strategic risk to their business.[48] The majority of reported risks are associated with the supply chain – mostly in the wet processing and manufacturing stages. Less than 10 percent of companies reported pollution risks related to raw material sourcing and not a single company acknowledged pollution at the product use and disposal phase as a risk to their business operations. Most of the reported risks are physical or regulatory, with reputational impacts being considered less of a risk. Less than half of the reporting companies says they monitor their discharges and less than a quarter have set pollution-related goals or targets. Only a quarter of companies say to engage with their value chain on water-related metrics.

Several initiatives have been initiated to reduce water pollution. More than 150 fashion brand, chemical suppliers and textile manufacturers, for example, collaborate in the Roadmap to Zero, which aims to reduce the chemical footprint of the apparel industry.[49] The signatories committed to a joint roadmap to reduce adverse environmental impacts throughout the value chain, with a focus on reducing air and water pollution due to the release of hazardous chemicals. The initiative keeps a Zero Discharge of Hazardous Chemicals Manufacturing Restricted Substances List, publishes guidelines on implementation and provides information on wastewater testing and treatment technologies.

Also, circular business models are increasingly being implemented. Currently, less than 1 percent of the material used to produce clothing is recycled and over 73 percent of clothing ends up in landfills or is incinerated at the end of its life.[50] Figure 4 illustrates the key components of a circular business model.[51] Circular business models enable recycling and reuse, both of the products and of the materials used in the products. Increasingly, apparel companies offer leasing arrangements, repair services or resale models to their clients. Also, fashion items are increasingly being designed to be disassembled and recycled, for example by using only one type of material and minimizing the use of glue and solvents. Additionally, the choice of (renewable) raw materials is a key part of circular fashion design. There are ways to produce cotton in a more environmentally friendly way and synthetic fibers can be extracted from natural sources, but also alternative fibers, such as hemp, sisal and jute are becoming more popular.

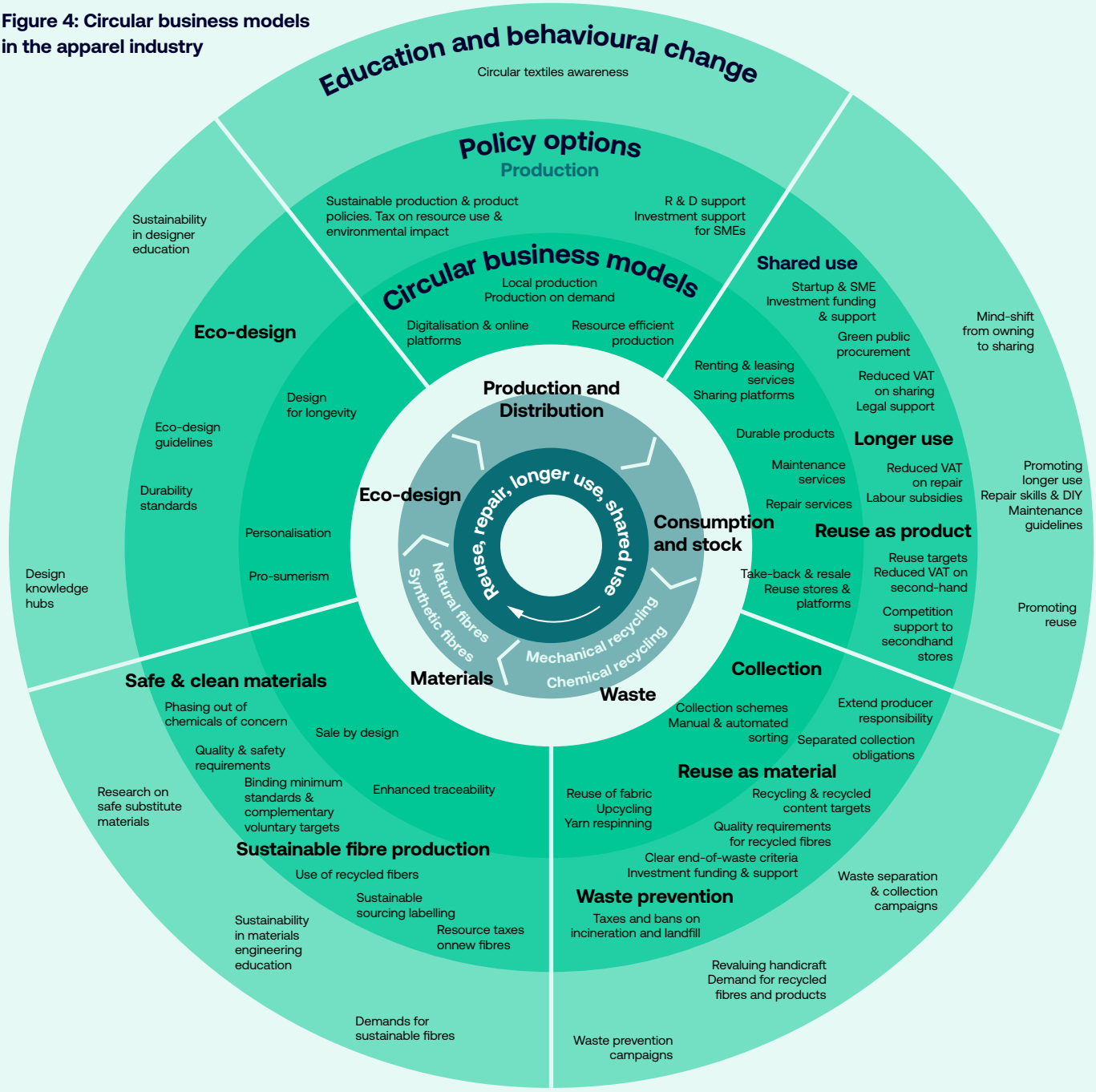
Circular business models need support from policy action and societal change. The European Commission has identified textiles as a priority product category for the circular economy. As part of the Green Deal, the EU launched

40 Ellen MacArthur Foundation (2017). A new textiles economy: redesigning fashion's future.
41 United Nations Environment Programme (UNEP) (2019). Global chemicals Outlook II.
42 CDP (2020). Interwoven risks, untapped opportunities. The business case for tackling water pollution in apparel and textile value chains.
43 Pesticide Action Network UK (2017). Pesticide concerns in cotton.
44 Aljazeera (2021). The high cost of India's cheap garment exports.
45 Swedish Chemical Agency (KEMI) (2016). Chemicals in textiles. Risks to human health and the environment.
46 The World Bank (2014). The Bangladesh Responsible Sourcing Initiative. A new model for green growth?
47 Plastic Soup Foundation (2021). Clean laundry, dirty ocean.
48 CDP (2020). Interwoven risks, untapped opportunities. The business case for tackling water pollution in apparel and textile value chains. and CDP (2019). Cleaning up their act. Are companies responding to the risks and opportunities posed by water pollution?
49 https://www.roadmaptozero.com/about
50 Ellen MacArthur Foundation (2017). A new textiles economy: redesigning fashion's future.
51 European Environment Agency (2019). Textiles in Europe's Circular Economy.

a new Chemical Strategy in 2020 and has a dedicated Textile Strategy. Key emphasis is placed on eco-design and circularity, sustainable supply chains and increased transparency for consumers. 60 percent of the value of clothing in the EU, however, is produced elsewhere, often in markets where environmental regulations are less robust. The UN estimates that 80 percent-90 percent of water used in the apparel industry is returned to the environment untreated. To increase pressure throughout the value chain, legislation on chemical use, wastewater management and environmental pollution must be strengthened also in these countries.

Finally, society must change its approach towards fashion. Europeans consume on average 26 kilograms of textiles per person per year.[52] The rise of fast fashion is expected to increase the annual retail value of apparel and footwear by 30 percent between 2017 and 2030. This will only exacerbate the problem further. The adoption of more sustainable consumption methods, such as the purchase of more durable items and increasing the purchase of circular, second-hand or recycled items, can help counter the problem. Consumers should also request increased transparency from companies to hold them accountable for their production methods.

Figure 4: Circular business models in the apparel industry



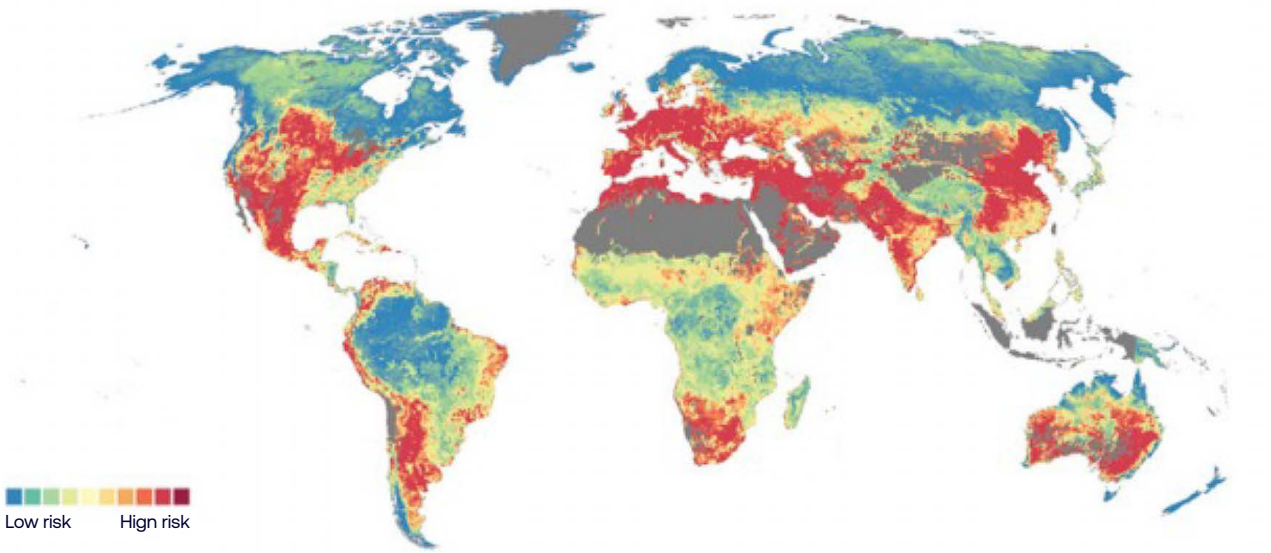
52 European Environment Agency (2019). Textiles in Europe's circular economy.

3.3.2 Regions most impacted by water pollution

Different sources of water pollution impact different geographies and to paint a complete picture there are a large multitude of parameters that need tracking. Global water quality monitoring therefore proved to be difficult and there is no complete picture of high-risk geographies. The World Bank assembled one of the most comprehensive databases on water quality in 2019.[53] Their database includes biological oxygen demand, electrical conductivity (salinity), and nitrogen. See figure 5 for the results of this study.

Even though a concentration of risks is seen on the horizontal line of the United States, Europe, the Middle East and South-West Asia, one of the important conclusions of the map is that water pollution can be an issue everywhere. Regional differences can be seen though as the range of pollutants tend to increase along with economic developments. New pollutants, including nutrients, chemicals, plastics, and pharmaceuticals, present significant challenges mainly in developed markets.

Figure 5: Geographical overview of water quality risks for Biological Oxygen Demand, Nitrogen, and Electrical Conductivity[54]



Source: www.worldbank.org/qualityunknown

53 World Bank Group (2019). Quality unknown. The invisible water crisis.

54 This map shows a water quality index for the period 2000-10, summarizing global predictions for biological oxygen demand, electrical conductivity and nitrogen. Values are scaled to a common support for comparability and then summed together. Grey areas have no data for one or more parameters. Biological Oxygen Demand (BOD) is a widely used umbrella proxy for water quality. BOD refers to the amount of oxygen needed by bacteria to break down organic matter present in a given water sample under aerobic conditions. Electrical conductivity measures the ability of a waterbody to pass electrical flow. This ability directly relates to the concentration of ions in the water. Sudden changes in conductivity can indicate pollution. When entering the water, salts, chemicals or other inorganic materials dissolve into conductive ions which increases conductivity value. Oil spills or other organic compounds on the other hand do not break down into conductive ions and would decrease conductivity. The amount of nitrogen in waterbodies indicates the presence of inorganic fertilizer, manure and waste discharge from sceptic tanks. It was chosen to include nitrogen in the assessment as this is an impactful pollutant in terms of scale, scope, trends, and impacts.

Part: B Cardano's water strategy

4. Introduction

In Part A, we demonstrated the relevance of sustainable water management for investors. In this part we will further elaborate on how we consider the freshwater crisis in our investment policy. We see it as our fiduciary role to drive the transition towards a sustainable society. In our Sustainable Investment Policy – see figure 6 – we describe how we assesses whether entities have the adaptive capacity to make the transition towards a sustainable society where they operate within the Planetary Boundaries and (Rockström et al., 2019) and respect the social foundations. This reflects a state where entities generate financial returns, without negatively impacting their surroundings. Entities classified in our framework as 'adapting', 'sustainable' or 'positive impact' operate within the planetary boundaries and respect the social foundations or have concrete and verifiable strategies to do so within an acceptable time frame. They are, for example, on a science-based pathway towards climate and water neutrality, do not contribute to deforestation, provide their employees with a safe and healthy workspace, are not involved in bribery and do not source their raw materials from controversial suppliers.

Figure 6: Cardano's Sustainable Investment Framework

Sustainable investment framework
Positive impact
Sustainable
Adapting
At risk
Non-adapting
Harmful
International standards

> **"Water use and water pollution contribute to several global challenges and may create severe risk for many companies.**

Water use and water pollution contribute to several global challenges and may create severe risk for many companies. It may contribute to water stress, biodiversity loss, climate change, social inequality, health problems, poverty, conflict, etc. Water issues can materialize in and overlap with several of the sustainability challenges we consider in our policy. Inaction on, for example, fossil fuel use to mitigate climate change or land use conversion to prevent further biodiversity loss tends to aggravate the water crisis. Additionally, failing to adequately manage water resources impacts biodiversity and human health. The water crisis also impacts human rights and community relations. It is essential, therefore, that any actions taken to mitigate water risks are assessed in a holistic manner. As such, we do not assess water use related risks separately from the other sustainability topics.

Water has already played a key role in our activities for many years. Already in 2017, we have set the target to work towards a water neutral investment portfolio by 2030. Progress against this target has been made by selecting especially those issuers for the investment portfolios that implement adequate water management strategies, by engaging with issuers to improve upon their policies, and by divesting from those issuers that are involved in the unsustainable exploitation of water resources. To better understand the remaining water-related risks in our portfolio and to prioritize future action, we have conducted a risk assessment. In the remainder of this paper, the results of the risk assessment are shared and, based on these results, our ambitions in the field of water are formulated. The strategy to reach the water neutrality target is discussed and a pathway towards water neutrality is described.

5. Water risk assessment: baseline measurement of the Cardano investment portfolio

To better understand our exposure to water-related risks, we conducted a water risk assessment of our listed equity portfolio in 2022. This assessment focussed on water quantity, due to limitations on water pollution data. In addition, not all geographic risks could be properly considered due to incomplete oversight of company production and supply chain locations. The results of the risk assessment are used to prioritise screening and engagement efforts towards a water neutral portfolio.

5.1 Water quantity risks

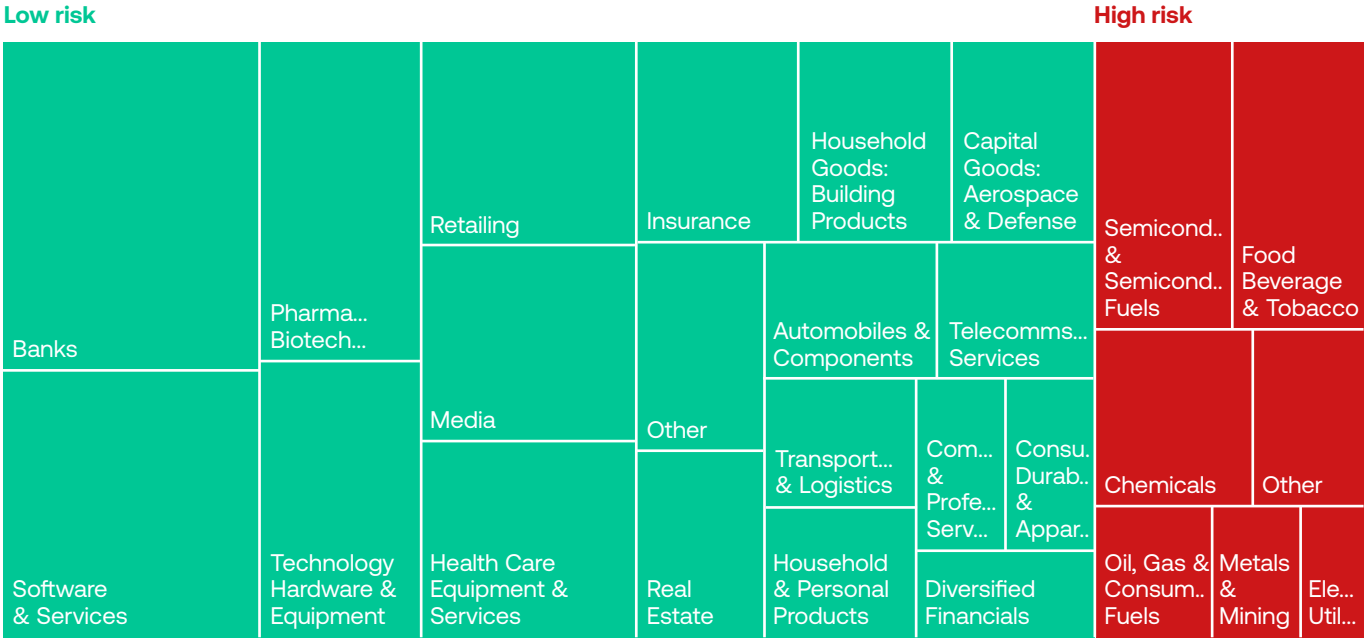
Exposure

We draw three conclusions from our analysis on the exposure to water quantity risks. First, slightly under 20 percent of our assets under management (AUM) – around 300 companies - are invested in industries that are exposed to high water stress risks. Semiconductors, food and beverage and the chemical industry form the biggest exposure therein. These industries also have a large position in our benchmarks.

Second, our sustainable investment policy reduces water risks considerably. The water footprint of portfolio companies in high-risk sectors is in the order of 59 thousand liters per million Euro invested, which is considerably lower than the benchmark water footprint for these sectors of 89 thousand liters per million Euro invested.[56] The chemical sector is the biggest contributor to the water footprint, followed by metals and mining. Our portfolios have a relatively large exposure to the chemical sector, whereas we have excluded many metals and mining companies.

Third, we have a relatively modest share of our investments in high-risk sectors in high-risk geographies. Slightly less than a quarter of the companies that are exposed to high water stress risks, representing almost 6 percent of our AUM, earn more than 10 percent of their revenues from high-risk geographies. When raising the bar, the number quickly drops, with only 10 percent of companies, representing just over 2 percent of AUM, earning more than 50 percent of their revenues in such geographies. These are mainly companies in emerging markets and especially those in the semiconductor, metals and mining and electric utilities sector.

Figure 7: Exposure to high-risk industries on water stress[55]



Note: high-risk sectors in red, low risk sectors in green
Other high-risk categories: Restaurants, Paper & Forest Products + Containers & Packaging, Hotels & Travel, Multi-Utilities
Other low risk categories: Food & Staples Retailing, Electric Distribution & Transmission, Construction Materials, Renewable Energy, Gas Utilities, Airlines, Water Utilities, Diversified Consumer Services, Energy Equipment & Services

55 Tobacco and related companies are excluded from our investment portfolio. The industry group 'Food, Beverage and Tobacco' thus solely reflects food and beverage companies.
56 The portfolio water footprint is an aggregation of our equity portfolios. The benchmark water footprint reflects the aggregated footprint of the different benchmarks – MSCI ACWI, MSCI Europe, MSCI North America, MSCI Emerging Markets and MSCI Pacific - tracked by our equity portfolios.

Table 1: Geographic exposure high-risk industries

Sector	Percentage of companies with more than 50 percent of revenues in high-risk regions
Semiconductors & Semiconductor Equipment	21.6%
Metals & Mining	15.2%
Electric Utilities	13.3%
Chemicals	9.7%
Food, Beverage & Tobacco	7.8%
Restaurants	7.7%
Oil, Gas & Consumable Fuels	5.6%
Paper & Forest Products + Containers & Packaging	5.3%

Management

It is important to note that a company that is highly exposed to water-related risks does not necessarily manages these risks badly. In fact, about 60 percent of companies from high-risk industries in high-risk areas assess and monitor their water risks and almost half of them set reduction targets. There are large differences between industries though. About 80 percent of the metals and mining companies have a risk assessment and monitoring system in place, whereas this is only 17 percent for the chemical industry. Across sectors more work is needed on supply chain water management. Less than 15 percent of companies have implemented water management programs focusing on their supply chain. Supply chain programs are mainly found in the food, beverage and tobacco sector, for which this topic is highly material.

Table 2: company's water management in high-risk industries[57]

Sector	Issuers with water risk monitoring	Issuers reporting consumption data	Issuers reporting withdrawal data	Issuers with reduction targets	Issuers with management programs - own operations	Issuers with management programs - supply chain
Food Beverage & Tobacco	50%	50%	33%	67%	67%	33%
Metals & Mining	80%	40%	100%	40%	60%	0%
Semiconductors & Semiconductor Equipment	73%	55%	73%	55%	73%	18%
Chemicals	17%	17%	33%	50%	50%	0%
Total	**58%**	**36%**	**61%**	**16%**	**67%**	**12%**

Next to management, also corporate disclosure of water consumption still needs to improve. Only 24 percent of the portfolio companies in high-risk sectors report on their water consumption, where the larger ones disclose more than the smaller ones. Disclosure of high-risk companies in high-risk geographies is slightly higher with 36 percent of companies reporting on their water consumption. For CDP Water disclosure, the numbers are more hopeful, with 52 percent of the companies reporting. Disclosure differs greatly per sector with the semiconductor and food, beverage and tobacco industries disclosing more, and the oil and gas and metals and mining industries lagging the spectrum.

> **"It is important to note that a company that is highly exposed to water-related risks does not necessarily manages these risks badly…**

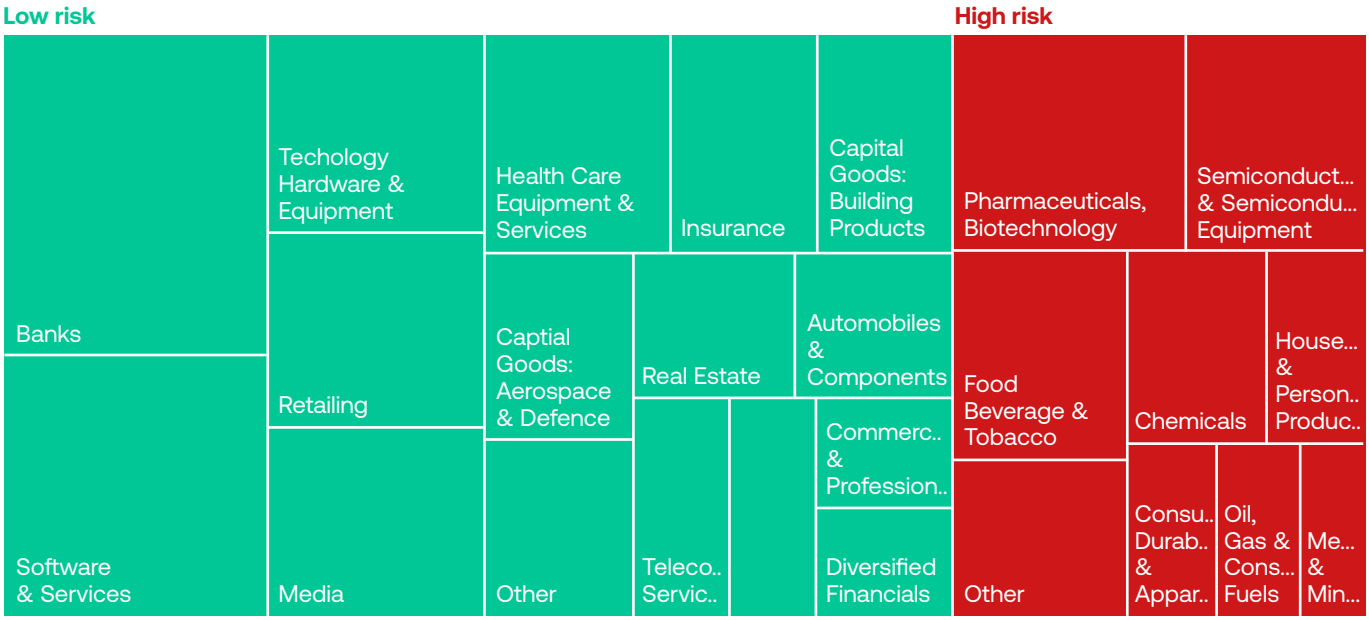
57 Only the companies in priority sectors that have more than 50% of revenues coming from high-risk regions are taken into account. The table only shows those industries for which a material number of companies (>10) are in Cardano's portfolio. The total line does include companies from all priority sectors that have more than 50% of revenues coming from high-risk regions.

5.2 Water quality risks

Slightly under 30 percent of our assets under management is invested in high-risk industries on water pollution. The biggest industry exposure overlaps with the exposure to water quantity risks and includes the semiconductor, food, beverage and tobacco and chemical industries. The pharmaceutical industry is high-risk on water pollution, but not on water quantity. These industries also have a large position in the different benchmarks.

Corporate disclosure on water pollution lags behind disclosure on water quantity. Only 26 percent of companies in high-risk sectors report on their emissions to water, especially the paper and packaging and chemical industries. Due to the lack of standardization of metrics to disclose emissions to water, it is difficult to compare the actual performance of companies. On average, 50 percent of companies in high-risk sectors disclose data via the CDP Water questionnaire. The semiconductor and food, beverage and tobacco industry are examples of industries with high CDP disclosure rates, but they are lagging on disclosing their emissions to water. This could indicate that these industries are more focused on risks stemming from water quantity than from water quality, as the CDP water questionnaire integrates both topics.

Figure 8: Exposure to high-risk industries on water pollution*



Note: * high-risk sectors in red, low-risk sectors in green
Other high-risk categories: Electric Utilities, Restaurants, Paper & Forest Products + Containers & Packaging, Construction Materials, Hotels & Travel
Other low risk categories: Food & Staples Retailing, Electric Distribution & Transmission, Multi-Utilities, Renewable Energy, Gas Utilities, Airlines, Water Utilities, Diversified Consumer Services, Energy Equipment & Services

5.3 Positive impact on water availability in Cardano's portfolio

The water crisis also presents opportunities for companies that are involved in the development of solutions to the crisis. A total of 100 companies in our equity portfolio earn an estimated USD 38.5 billion in revenues from products, services and technologies that help resolve water quantity and/or water quality issues. Many of these companies focus on wastewater treatment facilities or services, but other examples relate to desalination plants, water recycling equipment, smart metering technologies, rainwater harvesting, etcetera.

The intentionality of companies in generating positive impacts on water resources differs. For some companies, the generation of positive water-related impacts is part of their core strategy. Besides the traditional water utilities, Xylem is an example with its core business focusing on a wide range of smart water-related technologies and solutions related to the transport, treatment, testing and efficient use of water. The company generates over 40 percent of its revenues from water-related solutions. For some other companies the water-related impact is more of secondary nature and presents a significantly lower percentage of total revenues. An example is Texas Instruments that designs and manufactures semiconductors and integrated circuits and uses its knowledge and capabilities to also produce integrated circuits for water meters. The sectors most commonly involved in positive water-related impact are (water) utilities, capital goods – predominantly buildings products and aerospace and defence, commercial and professional services and the chemical sector

6. Water targets

6.1 Targets

To mitigate water related risks in our investment strategies, we define water targets. The overall aim of our water policy is to encourage companies to consume no more water than nature can replenish and cause no more pollution than is acceptable for the health of humans and natural ecosystems. This translates into the following targets:

- **For freshwater use,** in our directly managed assets, we aim to achieve water neutrality by 2030, where companies in water-scarce areas do not use more water than nature can replenish.[58] To measure progress towards the target, we monitor the water footprint of our investment

- **For water quality** no international pathway has been designed to remain within the planetary boundaries and corporate water pollution data is mostly missing or inaccurate.[59] Yet, SDG 6 cannot be successfully achieved without adequately protecting water quality and the lack of data should not further impede progress on this topic. Therefore, for now, we aim to move towards an economy with zero water pollution by 2050, with an intermediate aim to improve ambient water quality by eliminating, minimizing and significantly reducing emissions of polluting substances into water bodies by 2030. To move towards this point, we expect companies to adequately treat their wastewater and follow best practice in their wastewater discharges. Additionally, companies are expected to adapt their processes towards a circular business model thereby reducing, recycling and reusing wastewater where possible, as well as preventing the use of (hazardous) chemicals and other damaging substances as much as technically feasible.

Water risks, both quantity and quality related, are likely to affect specific sectors and regions more than others. We therefore focus our water targets on those areas where the risks are highest. We explained in part A of this paper which sectors and geographies are prioritized.

6.2 Water neutrality

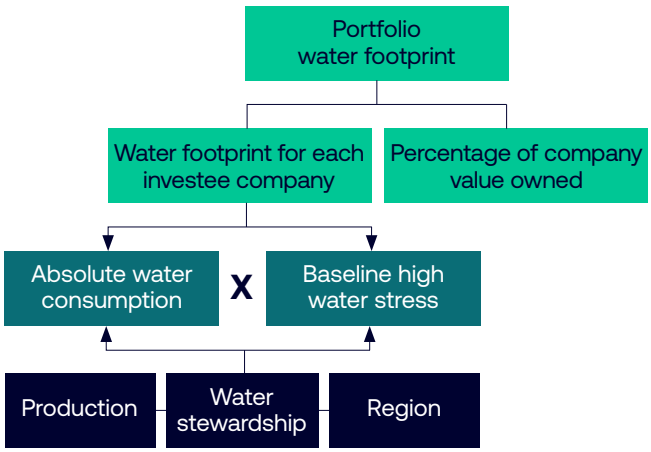
Water neutrality implies that investee companies in water-scarce areas should consume no more water than nature can replenish. The concept of water neutrality was introduced in 2002 at the World Summit for Sustainable Development. The concept shows similarities with the concept of carbon neutrality, but water neutrality does not mean that water use is reduced to zero.

Hoekstra (2008) argued that to be water neutral, companies must reduce their water consumption and pollution as far as reasonably possible and must make reasonable investments to offset the negative impacts of the remaining water consumption and pollution. Such investments should promote the sustainable and equitable use of water within the environment and communities affected, so in the same hydrological unit as the one affected by negative impacts. Key is to align the investments with the characteristics of the region impacted to fully offset these impacts. Impacts in water stressed catchments or periods require a larger offset effort than in water abundant catchments or periods. Moreover, offsets depend on the speed of aquifer recharge, vulnerability of the ecosystem, competing claims on water rights, and even the time of the year.

We use the Aqueduct tool from the World Resources Institute (WRI) to learn which regions are water stressed and therefore cause high water-related risk in our portfolios. Aqueduct provides information about current and predicted future levels of water stress and water depletion per catchment. Water stress refers to the ratio of total water withdrawals to available renewable surface and groundwater supplies. Water depletion does the same for water consumption. The difference between water stress and water depletion is the amount of water that is discharged back into the environment.

Progress towards our water neutrality target is measured through the water footprint of our portfolios. The portfolio water footprint measures the absolute water consumption by all portfolio companies from high-risk sectors in high-risk areas, considering the share of each company we own – see Figure 9. The footprint is based on self-reported data by companies or estimated using sector averages and company activities.

Figure 9: Portfolio water footprint



58 The focus of this target is a company's own operations. Even though we acknowledge the importance of good water management throughout the supply chain, water consumption within the supply chain is currently too far outside our sphere of control to be taken into account in the water neutrality goal. Upon periodic reassessment of the targets, we will review the inclusion of the supply chain in the water neutrality goal. In the meantime, we will continue to promote sustainable supply chain water management among portfolio companies.

59 For that reason, we participate in and collaborate with sector initiatives such as the WBCSD Wastewater Zero Initiative to learn about approaches to influence company behaviour regarding wastewater discharge and freshwater pollution. Enhanced knowledge, measurements and disclosure are important themes that we aim to promote through our participation in such initiatives.

6.3 Zero water pollution

It is our ambition to only invest in companies that cause no water pollution by 2050, in other words that emit no more substances to water than the carrying capacity of the water body can handle.[60] The intermediate ambition is to significantly improve ambient water quality by 2030, by eliminating, minimizing and significantly reducing emissions of polluting substances into water bodies, in alignment with SDG 6.3.

Quantifying water pollution is complex. Many different substances pollute waterways, which vary widely per industry, and which are not well reported. Each hazardous substance has a different pollution potential, depending on its toxicity, degradability, and solubility in water, but also depending on the carrying capacity of the catchment. Data on water pollution will likely remain unreliable, not in the least because of the emergence of new pollutants.

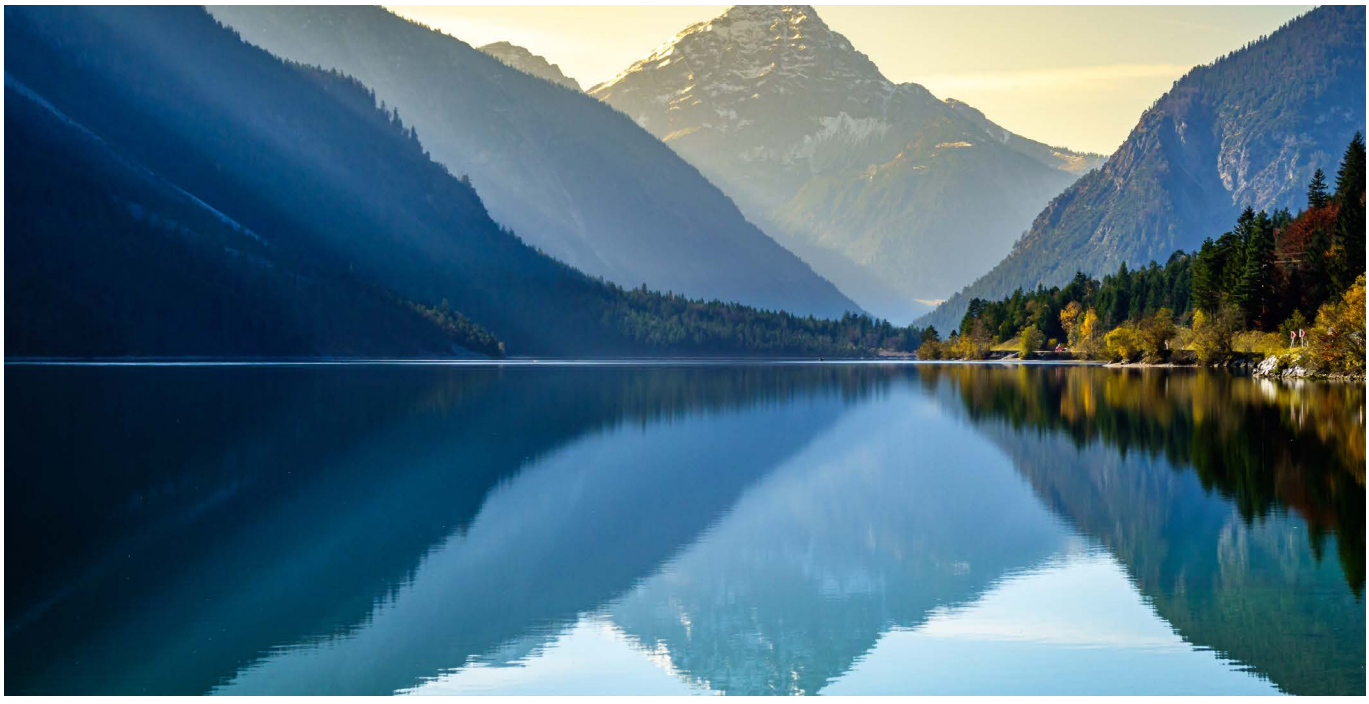
Our strategy will initially be process-oriented, requesting portfolio companies to conduct a risk assessment to identify their most material water pollutants. Focus should first be on the pollutants with the highest impact on water bodies, considering the amount of pollution emitted, their toxicity, as well as - to the extent reasonably possible - their solubility and the vulnerability of the water body to which they are discharged. With this information, companies are expected to set impact reduction targets and formulate strategies to prevent polluting emissions or replace the most impactful chemicals as much as technically feasible.

Also the transition towards more circular business models plays an important role in reducing the negative effects of wastewater discharges. Our initial focus will be on companies in high-risk sectors. At a later stage, companies from other sectors will also be expected to formulate water pollution strategies.

6.4 Periodic review

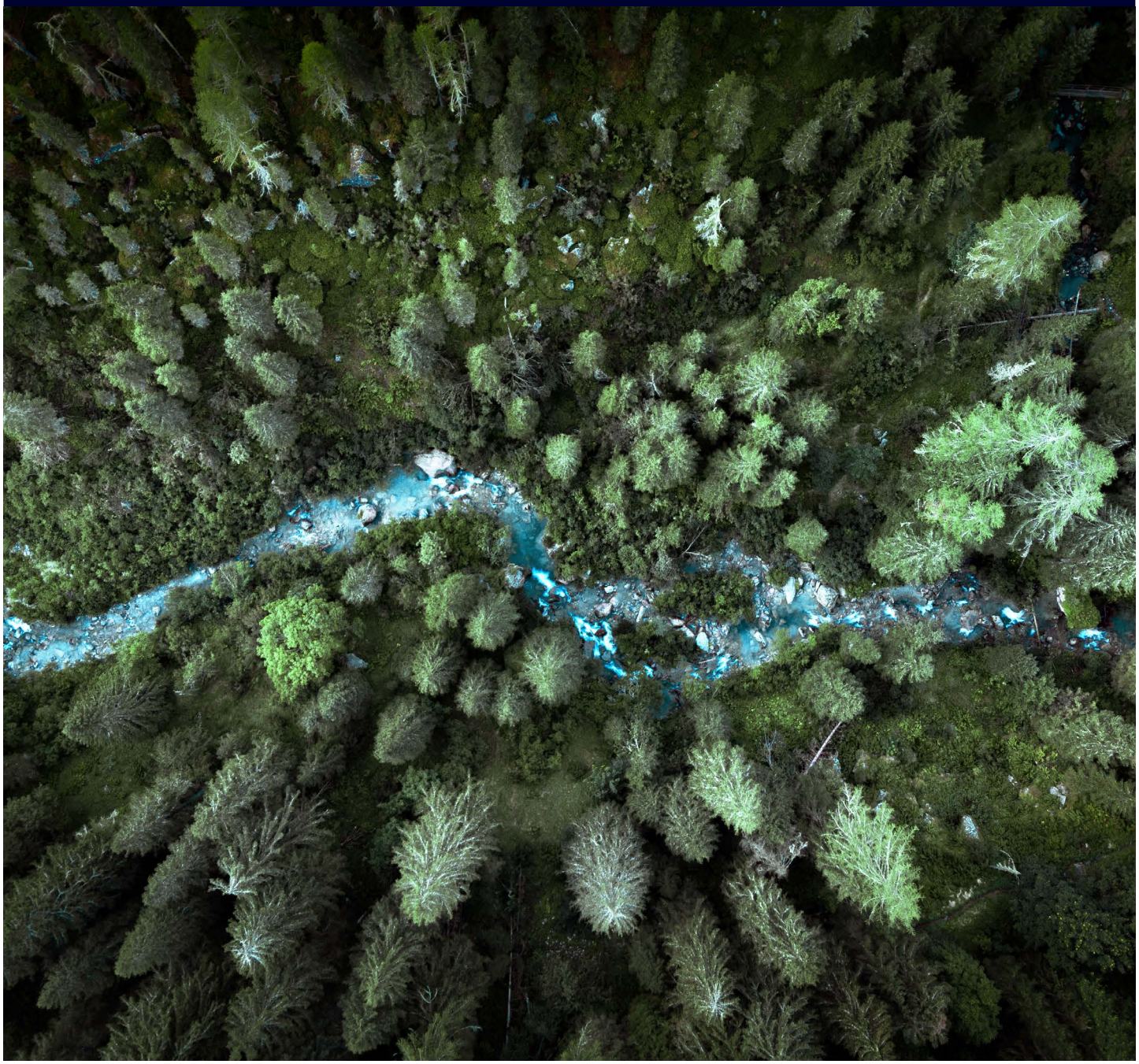
At least every five years, we further specify and reassess the required ambition level of our water strategy, considering the developments of the global water challenge, for example by further quantifying targets and/or by redefining timeframes. We will actively work on and participate in industry initiatives, such as the Valuing Water Investor Working Group led by Ceres, and the Wastewater Zero Initiative from the WBCSD. These initiatives focus on understanding water stress and pollution, on improving disclosure and on raising business ambitions.

> **“It is our ambition to only invest in companies that cause no water pollution by 2050...**



60 The carrying capacity of pollution load in water resources refers to the ability of a water resource to bear specific concentrations of pollution without causing adverse effects on aquatic life. If pollution loads discharged surpass this capacity, a water body can no longer purify itself and might become a dead water body.

7. Water Strategy



To achieve our water targets, the economy and society need to transition. In this chapter, we discuss which key levers of change are required for this transition and we define the steps we shall take to align our investment portfolio with the expected transition.

7.1 Key levers of change to reach a water neutral economy

Based on the work of the Water Footprint Network[61] and following the guidelines of the mitigation hierarchy from the International Finance Corporation, we define four key levers of change that are necessary to achieve water neutrality – see figure 10. All levers touch upon multiple sectors and activities.

To reach water neutrality it is important to avoid water consumption and pollution as much as possible, especially in vulnerable, high-risk and/or water-stressed geographies. In many parts of the world, water is regarded as an abundant and cheap resource, giving water users no financial incentive to reduce water use. Fines and penalties for polluting water are often low and immaterial to financial performance, due to which water resources have not adequately been taken care of. Water consumption and pollution can be avoided through the following strategies:

- Relocate water-intensive economic activities from water stressed to water abundant areas. This does not reduce water consumption or pollution and could transfer problems elsewhere, but it reduces problems in the most stressed regions.
- Change production methods and increase the focus on circularity to avoid extraction of water. Also harmful chemicals in agriculture and industrial processes should be replaced with less harmful alternatives.
- Shift consumption from water-intensive products and activities towards more sustainable alternatives. This requires behavioural changes in society, such as the shift away from animal proteins to plant-based alternatives.[62]

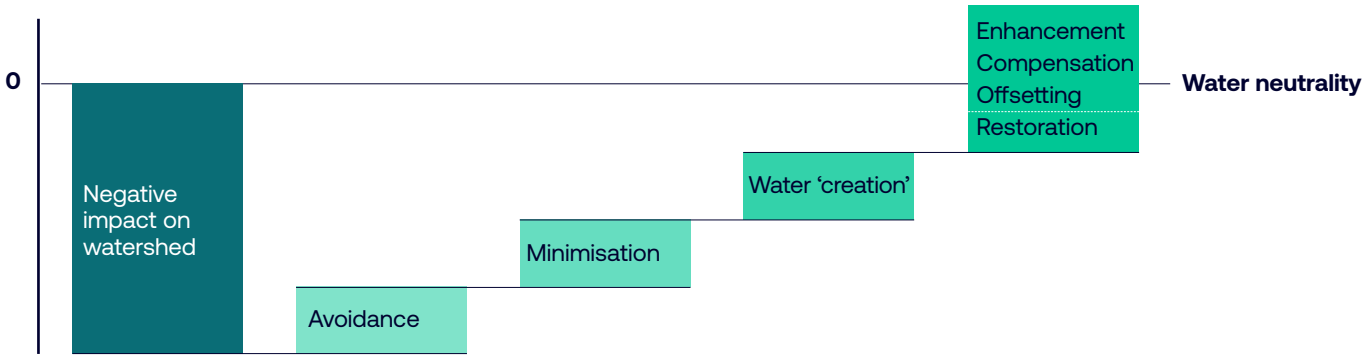
If water use cannot be avoided, it must be minimized as much as possible, for example through operational improvements, the implementation of technologies that enhance water-use efficiency, fixing leaks and spills, a reduced use of hazardous chemicals, or adequate wastewater treatment.

On the supply side, 'water creation' can reduce the water challenges. The most straightforward way is via wastewater treatment that enables water to be reused. "New" supplies of freshwater can also be created by capturing and storing rainwater. This solution becomes more important now climate change impacts the frequency and intensity of rainfall patterns. Also desalination, where seawater is transformed into freshwater, harvesting water from the air through solar power or using vertical nets to collect fog can enhance the stock of freshwater availability.

Finally, negative impacts can be compensated, e.g. by investing in improved catchment management or catchment restoration. Impacts that cannot be restored should be offset, for example through the support to vulnerable communities that do not have access to clean water to set up and maintain their own water supply system. By improving a catchment beyond its original state, one could even become water positive.

We expect investee companies to base their water strategies on this mitigation hierarchy. A detailed overview of our expectations is outlined in the Appendix. Steps taken will differ per sector, or even per company, depending on how they can reduce, recycle or replace their freshwater use, among others. The textbox below shows some of the major risks and best-practice strategies adopted by companies in the mining sector.

Figure 10: Mitigation hierarchy of water-related impacts



61 Hoekstra, A.Y. (2008). Water neutral: reducing and offsetting the impacts of water footprints. and Hoekstra, et. al. (2011). The water footprint assessment manual. Setting the global standard.
62 For the water footprint of different food products please see the overview of the Water Footprint Network, to be found at https://waterfootprint.org/en/resources/interactive-tools/product-gallery/

Sustainable water management in the mining sector

As a provider of essential materials, the mining sector is connected to almost all industry value chains. The sector is, however, highly exposed to water risks because of its reliance on large quantities of water and its impacts on water pollution. Also, mining activities are often located in water-stressed countries. Yet, mining companies cannot simply relocate to water-abundant regions. About 12 percent of companies in the sector earn more than 50 percent of their revenues from water-stressed regions and an additional 6 percent earn between 25 and 50 percent of their revenues from such areas. In the 2020 CDP questionnaire, more than 75 percent of the mineral extraction respondents reported exposure to substantive water risks, either in direct operations or in their value chain. 22 percent of respondents reported having more than halve of their facilities at risk.

Such risks are material. According to a 2019 CDP study, almost 50 percent of mining companies reported water-related financial losses between 2014 to 2018, compared to a cross-sector average of 27 percent.[63] These losses have increased since 2015. Especially disruptions in production, fines, penalties and enforcement orders, impacts on company assets and sales disruptions are among the biggest risks. Also, the mining sector is the sector with a large number of water-related controversies, especially related to adverse impacts on local communities or the environment, either through pollution or through excessive use of water.

Management of water-related risks

Water is an essential input for the mining sector. It is used for the separation of minerals through chemical processes, for cooling purposes, in a miner's tailings disposal activities, for the control of dust on haul roads, and for the transport of ore and waste slurry. Also, large amounts of water are extracted to dewater mines. To manage water responsibly, mining companies are expected to conduct a detailed water risk assessment of their direct operations and their supply chain. This should also consider the local conditions in a catchment in terms of supply, vulnerabilities and other stakeholders.

The mining sector is aware of its water-related risks. Many mining companies monitor their water-related risks and a reasonable number of companies have implemented water management programs in their own operations. CDP reports that significantly more mining companies measure and monitor their water use than companies in other sectors (80 percent versus 59 percent in 2018).[64] Unfortunately, as indicated by the number of controversies, maintaining positive relationships with local communities and adequately protecting the environment remains a challenge.

Mining companies should therefore also develop action plans and set targets on water management for each mine site individually. They are expected to draft such plans in collaboration and consultation with affected stakeholders, local communities, local regulators, and NGOs. While the most intensive period of stakeholder engagement may be before commencing operations, concerns and observations are important throughout the life cycle of operations, all the way until closing and rehabilitation. Water management plans should be guided by leading international standards (ICMM, IRMA, etc.) and external auditing can provide extra confidence in the correct implementation of such plans. Focus should be placed on those mine sites where the environmental risks and/or impacts are highest. This will often be the mine sites in the most water-stressed regions. As water availability also depends on the vulnerability of the ecosystem surrounding a mine, water plans should be complemented with plans on biodiversity, environmental restoration, rehabilitation and mine closure.

Water use reduction

Most mining activities only require low quality water, such as recycled or alternative water sources. Production can in many cases use closed-loop systems, which continuously recycle and reuse water. Anglo-American currently meets two thirds of its operational water requirements through closed-loop systems.[65] Alternative water supplies are groundwater, rainwater, stormwater or even seawater. Agnico Eagle Mines focusses on rainwater harvesting to meet its water demand on sites that are in a more arid environment. Boliden withdraws the majority of its water from seawater. Both Agnico and Boliden also have a high water-recycling rate. The downside of using seawater is that energy is required for desalination and transportation from the coast to the mine sites and that its use may have negative environmental effects. Alternatively, dry processing is a technique that avoids water use to process the extracted material. Vale processes about 60 percent of their iron ore using this method and claims the technique can reduce water consumption by 93 percent on average.[66] This technique does not generate tailings that have to be stored until long after the mine's operations have ceased.

Water can also be recovered later in the process. The operational lifespan of an average mine may be over 50 years and is usually followed by several years of rehabilitation and post closure management. Water-related issues are the most common environmental effects when closing mines, and pollution can continue for decades. Tailing dams are used to store the by-products of mining operations, toxic chemical reagents and process water used to extract the commodity. Failure of tailings dams can result in significant impacts on the surrounding environment and water resources. As such, a high degree of surveillance and maintenance is needed until long after the mine has shut down.

Dry stacking solutions dewater tailings material before being stored, limiting water loss and decreases the environmental risks. It can reclaim up to 90-95 percent of processed water for re-use.[67]

63 CDP (2019). In too deep. Analysis for institutional investors of critical water security issues facing the metals and mining sector.
64 CDP (2019). In too deep. Analysis for institutional investors of critical water security issues facing the metals and mining sector.
65 https://www.angloamerican.com/futuresmart/stories/our-industry/technology/picture-this-the-waterless-mine
66 http://www.vale.com/brasil/EN/aboutvale/reports/atualizacoes_brumadinho/Pages/dry-processing.aspx
67 According to FLSmith (2021), who provides sustainable solutions to the global mining and cement industries.

7.2 Key Performance Indicators

We have drafted a roadmap to align our investments with the expected transition and reach the water neutrality target. To guide and measure progress, we set Key Performance Indicators (KPIs). Given the uncertainty of future developments, KPIs are more specific for the coming years than for the years after 2025. As indicated before, KPIs on water pollution are process oriented. Our strategy will be re-evaluated every five years, to ensure it continues to meet the most ambitious standards and aligns with relevant developments.

> **Our focus will mainly be on incentivizing issuers in high-risk sectors and with more than 50 percent of their revenues from water-stressed areas to reduce their water consumption and water pollution.**

7.2.1 2021-2025: Awareness-raising and initial action

Where they have not done so already, companies are expected to use the initial period until 2025 to become aware of their main water risks and start acting upon these. Informed by local water challenges, companies should commit to improve their catchment management, reduce water use and prevent pollution. We will be particularly strict on companies active in the high-risk sectors and regions, as listed in chapter 3 in part A of this paper. As far as reasonably possible, measures taken should include both a company's own operations as well as its supply chain. In this first period, our focus will be on activating behavioural change through engagement and through stepwise stricter ESG integration. The results of our risk assessment, as discussed in chapter 2, guide our actions.

7.2.1.1 Reduce water consumption and pollution, with a focus on high-risk areas

Our focus will mainly be on incentivizing issuers in high-risk sectors and with more than 50 percent of their revenues from water-stressed areas to reduce their water consumption and water pollution. In 2025 at the latest, we expect a 50 percent increase of issuers that:

- have assessed water quantity impacts and have developed high-risk actions;
- measure and report on their water consumption;
- have set water-related targets, science-based to the extent reasonably possible;
- have started implementing realistic plans to achieve their targets.

For this, we engage companies on these topics, will vote in favour of such activities at AGMs and contribute to activities to improve awareness of the global water challenge. We plan to:

- Engage with at least 10 issuers from high-risk sectors on water quantity-related issues;
- Start an engagement with one focus sector on water pollution. With this engagement we want to learn about the topic and how companies can best manage pollution related impacts and risks. Conversations will take place both with leaders and laggards within the sector, to learn about challenges encountered and how companies have solved such challenges.

In 2025 Cardano will assess to what extent issuers have reached the above-mentioned expectations. If issuers show insufficient progress, they might be considered at-risk or non-adaptive.

7.2.1.2 Divest from at-risk and non-adapting issuers

Even though we focus on promoting behavioural change, issuers that lack the capacity or willingness to adapt to a water neutral economy may be divested from.

- Issuers involved in severe and recurring water-related controversies may be divested from. This can, for example, related to companies overusing their water rights, depleting basins at the expense of other

68 This may refer to targets that have been approved by SBTi or by another relevant independent third party. Current guidance is for targets to be context-based. A guidance on how to draft science-based targets for water is currently being developed by the Science Based Targets Network. Cardano expects companies to closely monitor the developments and align to their best knowledge and capacity possible.

69 Stakeholders negatively impacted by overuse of water resources by companies can express their concerns to us, following our Grievance & Remedy policy as discussed in Appendix A of our Sustainable Investment Policy.

stakeholders, or polluting water bodies. The root cause, severity and recurrence of controversies will be assessed on a case-by-case basis, as well as whether engagement or divestment is the most suitable solution to the situation;

- Issuers with lagging water management policies or issuers that show insufficient progress on our expectations may be divested from. Focus will be on companies from high-risk sectors with a significant share of revenues from high-risk geographies. Lacking insight in water risks, insufficient monitoring of water consumption, increasing water consumption, insufficient attention for efficiency measures and/or lacking reduction or recycling targets are all signs of lagging water management. The precise definition of laggards will evolve over time, wherefore the quality of an issuer's water management will be assessed on a case-by-case basis. Both an issuer's own operations as well as the supply chain will be taken into account, depending on where the impact of a company's water footprint lies.

Limits applied in our screening methodology will be tightened step by step to assure that issuers lacking the capacity or willingness to transition to a water neutral economy are divested.

7.2.1.3 Invest in solutions

To reduce their water footprint and speed up the transition towards a water neutral economy, issuers need new technologies and solutions. We invest in companies that provide such solutions to the water challenges. These could be technological solutions that help others achieve water efficiency, provide alternative sources of water, or contribute to efficient wastewater treatment. It may also relate to the development of more water-efficient or water neutral products or to projects to improve water catchment management. To monitor this, we adopt the following KPI:

- Engage at least 5 issuers with a focus on the adoption of water-related solutions (either targeting water efficiency or water pollution), EU Taxonomy aligned to the extent reasonably possible, by 2025.[70]

7.2.2 2025-2030: Shifting towards a water neutral world

By 2025, issuers in high-risk sectors are expected to have a comprehensive idea of their most important challenges in the field of water management and have addressed such challenges with targets and implementation plans. Increasingly, technologies that help reduce water consumption and pollution are expected to be available. At the same time, it is expected that more action will be needed to arrive at a water neutral economy. Pressure on issuers will be increased to follow up their management plans with real reductions in water consumption and pollution and extend plans beyond their own operations to also include the supply chain. Proxy voting and the issuance of shareholder resolutions are tools that help increase pressure on issuers. Issuers from high-risk sectors that lack progress will be divested from.

7.2.2.1 Reduce water consumption and pollution, with a focus on high-risk areas

We have formulated corporate expectations also for this follow-up period. For companies that are active in high-risk sectors and generate more than 50 percent of their activities from water-stressed areas, we expect:

- All issuers to have assessed their most material water risks, act upon these and to be on track to reach water neutrality;
- Issuers to have started implementing plans to reduce water risks in their supply chain.

Additionally, for this period the scope is extended towards companies with lower exposure to water stressed regions. For issuers from high-risk sectors that generate between 10 and 50 percent of their revenues from water-stressed areas we expect the following:

- An increase of 50 percent of issuers that have assessed water quantity impacts and have developed high-risk actions;
- An increase of 50 percent of issuers that measure and report on their water consumption;
- An increase of 50 percent of issuers generating more than 10 percent of their activities from water-stressed areas that have set science-based water-related targets;[71]
- An increase of 50 percent of issuers that started implementing realistic plans to achieve their targets.

70 Engagements will focus on companies that positively contribute to clean water availability. Through their products and services, companies involved avoid freshwater use or contamination. The emphasis is on the additionality of the impact generated, companies that merely reduce their own water consumption or restore the negative impacts of their own production processes are not eligible for this engagement. Examples of eligible activities are the sales of water-efficient products or technologies, facilitating the use of alternative water sources, the treatment of wastewater or provision of related products or technologies, or involvement in largescale catchment protection and enhancement programs. Focus of the engagement is to enhance the understanding and disclosure of the positive impact companies may have on clean water availability, to expand this impact and to motivate more companies to become leaders in the field of water management.

71 This may refer to targets that have been approved by SBTN or by another relevant independent third party. Current guidance is for targets to be context-based. A guidance on how to draft science-based targets for water is currently being developed by the Science Based Targets Network. We expect this guidance to be ready in time for companies in this second phase to be able to align.

During the follow-up period engagement and monitoring will continue to play an important role in encouraging issuer progress on the corporate expectations. We strive for the following KPIs:

- Engage with at least 10 additional issuers from high-risk sectors on issues related to water quantity;
- Use proxy voting and shareholder resolutions on water neutral models in case of unsuccessful engagement with high-risk sector issuers.
- Extend engagement activities on water pollution to other high-risk sectors, using and implementing the learnings acquired during the previous period.

7.2.2.2 Divest from at-risk and non-adaptive issuers

After 2025, we shall continue to divest from issuers with comprehensive and/or structural water-related controversies and companies with lagging performance. Additionally, we may also divest from issuers that do not meet the transition requirements. Issuers we are likely to divest from include:

- issuers in high-risk sectors and geographies that do not set appropriate and ambitious reduction targets or lack credible implementation plans. Increasingly, companies that fail to comply with their own targets will be divested from as well;
- companies in high-risk sectors with a water consumption that is significantly larger than the sector average;

We hope that by 2025 sufficient progress has been made to reliably and consistently measure emissions to water. We intend to also divest from issuers that emit pollutants to water bodies above permissible levels and that show insufficient progress to reduce such emissions.

7.2.2.3 Invest in solutions

We shall continue and expand our approach towards investing in solutions through the following actions:

- Engage an additional 5 issuers with a focus on the adoption of water-related solutions (either targeting water efficiency or water pollution) that are EU Taxonomy aligned by 2030.
- 25 percent of the fixed income portfolio invests in green bonds by 2030;[72]
- Increased revenues at portfolio companies stemming from the offering of water-related solutions by 2030;
- Increased investments in compensatory measures, such as catchment restoration and enhancement (technical or nature-based) or sanitation by 2030.

Due to evolving future developments, the KPIs set for the period 2025-2030 are less concrete than for the prior period. We will use the coming period to conduct further research on what is needed to reach water neutrality in our investment portfolio by 2030 and specify the KPIs accordingly.

7.2.3 2030: Achieving water neutrality

Companies with the highest water risks are expected to have become water stewards by 2030. They are expected to successfully cooperate with other stakeholders in stressed catchments to have reached a collective water management scheme that aligns with local circumstances, such as the needs and rate of replenishment of that specific catchment. Additionally, companies are expected to be involved in catchment restoration and enhancement programs for those catchments that have been negatively impacted by the company's operations in the past. All new operations properly take account of the local situation in a catchment and can only commence in stressed areas if the water balance can be adequately protected and maintained. We expect that by 2030 societal expectations as well as the political and regulatory framework have developed in such a way that proper water stewardship is no longer optional for companies operating in water stressed geographies.

Also after 2030, we will continue to promote water stewardship among portfolio companies. The approach will be extended to also include companies active in sectors and geographies with lower risk levels. On water pollution, an updated approach and KPIs will be established on how to reach the 2050 target of zero water pollution.

> **"After 2030, we will continue to promote water stewardship among portfolio companies.**

72 Note: all investments in green bonds, sustainable bonds, sustainability-linked bonds, KPI-linked bonds are included in this target. Bonds focussing on the ICMA category Sustainable Water and Wastewater management have a direct impact on water availability. However, also bonds contributing to biodiversity conservation, the sustainable management of natural resources and countering climate change, will positively contribute to the achievement of water targets. Therefore, all such UoP categories are being taken into account. Cardano uses its own Sustainable Bonds Assessment Framework to define the label and contributions of such bonds. Cardano will further develop methods to make the positive impacts of these bonds measurable.

7.3 Monitoring and reporting

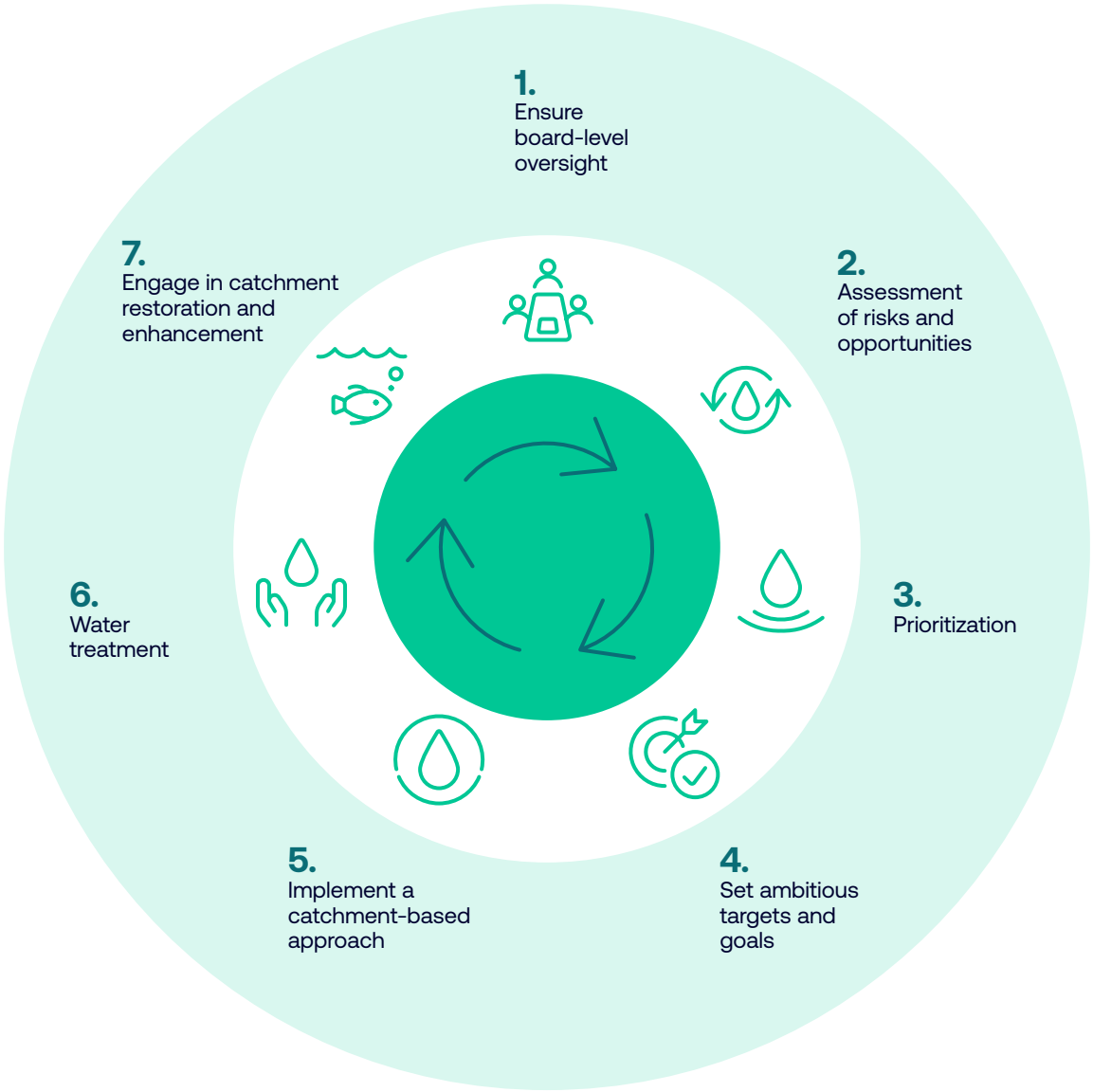
> **We will actively monitor (changes in) disclosure regulations, to make sure our reporting continues to adhere to applicable standards.**

We calculate the water footprint of our investments as described in section 3.2. Due to limited reporting, the footprint is currently available for 75 percent of the assets under management in high-risk sectors. The footprint for about 45 percent of AUM in high-risk sectors is based on data that is self-reported by companies. The remainder is based on extrapolations based on sector averages and company activities. We expect the reported percentage to improve over time as the focus on water management, both from companies, investors as well as society in general, increases. Moreover, we will be actively engaging companies to publish their water consumption, which serves as a basis for our footprint calculations. We monitor and report the water footprint of our investments, and the progress on our water target annually. Next to that, we annually monitor the progress of our investment portfolio in reaching the KPIs set in chapter 7.

The water-related target will be recalculated and revalidated every 3 to 5 years and if necessary, it will be strengthened. It is our intention to add water quality metrics over time. It is expected that data quality and standardized reporting by corporations on emissions to water will improve over time to enable these assessments. We will actively collaborate with other parties and engage in initiatives to increase the availability and quality of data on this topic. Initiatives such as the EU Taxonomy, the Non-Financial Reporting Directive for companies and the Sustainable Finance Disclosure Regulation for investors also play an important role as they require investors and companies to report on their impact on water resources. We will actively monitor (changes in) disclosure regulations, to make sure our reporting continues to adhere to applicable standards.

Appendix:
A guide to company's water management

In line with expert recommendations from parties as the CEO Water Mandate, WWF, WBCSD and Ceres, we identify seven essential steps in a company's water management:



Step 1. Ensure board-level oversight
As a most basic step, companies must ensure board-level oversight to integrate water risks and opportunities into the business strategy. As part of their role to protect the long-term performance of a company, boards play a critical role in ensuring that companies are aware of and act upon the ever-evolving risk landscape. Oversight at board-level ensures a proper understanding of and the right commitment and accountability to water risks. A cross-sectoral team must be established for policy development and day-to-day water management. Ideally, executive compensation is linked to a company's performance in the field of water management.

Step 2. Assessment of risks and opportunities
As a second step a company should assess its dependencies and impacts, both positive and negative, on water. Part of this is an assessment that links economic activities with geographic risks. The assessment should include a company's own operations and well as its value chain (including both its supply chain and end-of-life management). The assessment should return an overview of water consumption in different types of geographies. The output of this assessment informs further decision-making.

Step 3. Prioritization
Based on the outcomes of step 2 a company should prioritize key locations for action. Prioritized should be those locations that contribute most, either via extractive and/or pollutive pressures, to the total impact and dependencies of the company. These are most likely locations in water-stressed areas that either directly or indirectly have a high water consumption or are of highly pollutive nature. Also the degree of influence a company can exert can be of influence in the final prioritization. Per priority location an assessment should be made of the site's needs and the most effective measures. These could range from enhanced efficiency, the reclaim and reuse of wastewater, improved technologies, the replacement of the most hazardous chemicals and a search for alternative water sources, to nature-based solutions and catchment replenishment.

Step 4. Set ambitious targets and goals
Once priority locations are defined, plans can be drafted on how to best address their needs. Such plans should be supported by ambitious and science-based targets that align with the local context. The needs of other stakeholders, as explained in step 5, must be taken into consideration. Ideally, targets are being set at the local level to take into account the local context of operations and align with catchment needs as much as possible, thereby maintaining a sustainable level of river flow. A guidance on how to draft science-based targets for water is currently being developed by the Science Based Targets Network. Both targets and performance monitoring should be disclosed publicly.

Step 5. Implement a catchment-based approach
As companies are rarely the sole consumers of water in a catchment, companies are requested to work closely with other stakeholders within a given river basin or catchment area. Potential stakeholders are other companies, but also the local population, farmers and landowners, local (water) authorities, policy makers and regulators, NGOs, scientists, etc. A catchment-based approach is key to responsibly managing water resources. The approach requires companies to look at activities and issues in the catchment as a whole. It holistically considers competing demands for water resources and tries to resolve such demands in an equitable and non-competitive way so that not only the company's own water consumption but that of the entire basin fits within the replenishable reserves of the water catchment. Ideally, the approach covers not only the water body in which a company has its operations, but also the landscapes, seascapes, and catchments that are geographically adjacent to or further downstream of value chain sites. This wide approach should be taken as in nature there are many interdependencies, and changes in one waterbody could have a much broader impact.

Step 6. Water treatment
Water that is withdrawn but not consumed by the company is often discharged back into the environment. An example of a sector with a high level of discharge is the power sector, which withdraws water mainly for cooling purposes. Industrial water discharge is an important cause of degraded water quality all around the world. Ideally, water is discharged back to the same catchment area and as close to the withdrawal location as possible. Discharged water must be of sufficient quality, comparable to the quality of the water withdrawn. Also the temperature of discharge must be adequately regulated. Both quality and temperature of discharge, if relevant, must be monitored and publicly disclosed. In some cases wastewater could be treated and recycled for reuse, either within the same company or by other businesses. If water cannot be treated to sufficient standards, companies could still consider it for use in other processes where a lower quality of water suffices.

Step 7. Engage in catchment restoration and enhancement
Even if managed carefully, economic activities will leave their imprints on ecosystems everywhere around the world. To keep catchments healthy, local water users must replenish the water they use. Good water stewards engage in catchment restoration and enhancement. These are activities that return the ecosystem as close as possible, or even beyond, its state prior to a company's activities in the region. Such actions positively impact the quantity of water available, but also the quality of that water and the climate and biodiversity surrounding the catchment. Examples of restorative measures are the implementation of nature-based solutions such as reforestation, landscape and wetland restoration, or the restoration of waterflow and ecosystem connectivity.

Glossary

Definitions have been taken from renowned institutions in the field of water, such as the CEO Water Mandate, the Alliance for Water Stewardship, the World Resources Institute, and the Water Footprint Network.

Blue water: fresh surface and groundwater, in other words, the water in freshwater lakes, rivers and aquifers.

Catchment: the area of land from which all surface runoff and subsurface waters flow through a sequence of streams, rivers, aquifers, and lakes into the sea or another outlet at a single river mouth, estuary, or delta; and the area of water downstream affected by the site's discharge. Catchments, as defined here, include associated groundwater areas and may include portions of water bodies (such as lakes or rivers). In different parts of the world, catchments are also referred to as watersheds or basins (or sub-basins).

Green water: the precipitation on land that does not run off or recharge the groundwater but is stored in the soil or temporarily stays on top of the soil or vegetation. Eventually, this part of precipitation evaporates or transpires through plants.

Grey water: the water that becomes polluted during production.

Non-point-source (diffuse) pollution: pollution from widespread activities with no one discrete source. Primarily associated with run-off and other discharges related to different land uses such as agriculture and forestry, from septic tanks associated with rural dwellings and from the land spreading of industrial, municipal and agricultural wastes.

Point-source pollution: any contaminant that enters the environment from an easily identified and confined place.

Virtual water: the hidden flow of water embodied in the production of products. The global trade in goods has allowed countries with limited water resources to rely on the water resources in other countries to meet the needs of their inhabitants. As food and other products are traded internationally, their water footprint follows them in the form of virtual water.

Wastewater: water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity, or time of occurrence. Wastewater from one user can be a potential supply to a user elsewhere. Cooling water is not considered to be wastewater.

Water consumption: the volume of water that is extracted (withdrawn) from a freshwater source and not returned to that source after use. Water is consumed due to evaporation or being incorporated into a product.

Water depletion: water depletion refers to the ratio of total water consumption to available renewable water supplies. Water depletion is similar to water stress; however, instead of looking at total water withdrawal (consumptive plus non-consumptive), baseline water depletion is calculated using consumptive withdrawal only.

Water discharge: water effluents discharged to subsurface waters, surface waters, or sewers that lead to rivers, oceans, lakes, wetlands, treatment facilities, and groundwater.

Water footprint: an indicator of freshwater use that looks at both direct and indirect water use of a consumer or producer. The water footprint of an individual, community or business is defined as the total volume of freshwater used to produce the goods and services consumed by the individual or community or produced by the business. Water use is measured in terms of water volumes consumed (evaporated or incorporated into a product) and/or polluted per unit of time.

Water neutrality: a process, product, consumer, community or business is water neutral when: (i) its water footprint has been reduced where possible, particularly in places with a high degree of water scarcity or pollution; and (ii) when the negative environmental, social and economic externalities of the remaining water footprint have been offset (compensated).

Water risk: the possibility of an entity experiencing a water-related challenge (e.g., water scarcity, water stress, flooding, infrastructure decay, drought).

- **Physical risk:** having too little water, too much water, water that is unfit for use, or inaccessible water.
- **Regulatory risk:** changing, ineffective, or poorly implemented public water policy and/or regulations.
- **Reputational risk:** stakeholder perceptions that a company does not conduct business in a sustainable or responsible fashion with respect to water.

Water scarcity: the volumetric abundance, or lack thereof, of freshwater resources. "Scarcity" is human-driven; it is a function of the volume of human water consumption relative to the volume of water resources in a given area. As such, an arid region with very little water, but no human water consumption would not be considered "scarce," but rather "arid." Water scarcity reflects the physical abundance of fresh water rather than whether that water is suitable for use.

Water stewardship: the use of fresh water that is socially equitable, environmentally sustainable and economically beneficial, achieved through a stakeholder-inclusive process that involves site- and catchment-based actions.

Water stress: the ability, or lack thereof, to meet human and ecological demand for fresh water. Water stress refers to the ratio of total water withdrawals to available renewable surface and groundwater supplies. Compared to scarcity, "water stress" is a more inclusive and broader concept. It considers several physical aspects related to water resources, including water availability, water quality, and the accessibility of water

Water withdrawals: The volume of freshwater extracted from a surface or groundwater source, without accounting for how much is returned to the freshwater source after use.

cardano

Cardano UK
9th Floor
6 Bevis Marks
London
EC3A 7BA
United Kingdom

T: +44 (0)20 3170 5910
E: info@cardano.com
W: cardano.com

Cardano NL
Weena 690
21st floor
3012 CN
Rotterdam
The Netherlands

T: +31 10 206 1300
E: info@cardano.com
W: cardano.com