

CLIMATE RISK REPORTING

—
2022



Dŵr Cymru
Welsh Water

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INTRODUCTION

CLIMATE CHANGE AND OUR BUSINESS

Our commitment to our customers and the environment involves us both mitigating and adapting to the impacts of climate change. This is embodied in our mission statement, set out in our long-term strategy document Welsh Water 2050, “to become a world-class, resilient, and sustainable water service for the benefit of future generations”. Welsh Water 2050 identified that climate change presents significant strategic challenges for Welsh Water.

In February 2022, the latest Intergovernmental Panel on Climate Change (IPCC) report¹ stated that “...climate change is a grave and mounting threat to our wellbeing and a healthy planet. Our actions today will shape how people adapt and nature responds to increasing climate risks”. The 2022 Global Risks Report² from the World Economic Forum again highlights that the environmental risks are perceived to be the five most critical long-term threats to the world as well as the most potentially damaging to people and planet, with “climate action failure”, “extreme weather”, and “biodiversity loss” ranking as the top three most severe risks.

We are already seeing the physical impacts of climate change in Wales. Increasingly frequent extreme rainfall events are causing greater risks of flooding and pollution, and hotter, drier summers and increasing water demand are resulting in water supply deficits. Discharges into water courses during periods of drought present risks of greater environmental impact, and rising sea levels are putting our coastal assets at greater risk of storms and floods.

More broadly, the impacts of society's transition to a lower carbon and greener future are already altering the policy, technological and consumer preference landscape within which we provide our services. In 2019, the Welsh Government declared a climate emergency and set a target to reach net zero carbon by 2050. Our March 2022 review of our long-term strategy, Welsh Water 2050, the report of which is published on our [website](#), concluded that “climate change is the pre-eminent challenge that we face” and that “Protecting our service against the impacts of climate change is a top priority”.

Climate change and our response, however, also provide opportunities to put greater emphasis on reducing our carbon and resource footprint and making our infrastructure resilient to extreme weather. We will do this by promoting nature-based solutions and collaborative working across sectors and with customers, and by embracing the circular economy through reducing waste and recycling more. This Task Force for Climate-related Financial Disclosures (TCFD) report is a welcome continuation of our focus on these issues and demonstrates our commitment ‘to earn the trust of our customers every day’ through responsible, transparent and integrated long-term planning across our business and with our delivery partners.

THE TCFD FRAMEWORK AND PROGRESS TO DATE

The Task Force for Climate-related Financial Disclosures (TCFD) is an industry led group formed by the G20's Financial Stability Board with the aim of bringing climate risk reporting into the mainstream.

From 6 April 2022, over 1,300 of the largest UK-registered companies and financial institutions must disclose climate-related financial information on a mandatory basis – aligned to the recommendations from the TCFD. This includes many of the UK's largest traded companies, banks, and insurers, as well as private companies with over 500 employees and £500 million in turnover. Welsh Water views corporate governance as a core discipline and as such has taken the decision to report in line with these requirements by following the recommendations of the TCFD. We have worked with Jacobs to produce a climate risk disclosure, covering the four key disclosure areas of the TCFD: Governance, Strategy, Risk Management, and Metrics & Targets, and recognising that this is our first year of reporting we are taking steps towards future full compliance with the 11 TCFD recommended disclosures.

The framework's approach to Risk Management involves assessing the materiality of climate-related risks, defining a range of future scenarios, evaluating business impacts, and identifying potential responses.

STATEMENT OF COMPLIANCE

This is our first TCFD-aligned climate risk and opportunities assessment and we have included in our TCFD Report climate-related financial disclosures consistent with the four recommendations and the eleven recommended disclosures set out in the June 2017 report, Recommendations of the Task Force on Climate-related Financial Disclosures and the October 2021 additional guidance from the TCFD (the 2021 TCFD Annex). Given the detailed and technical content of the TCFD Report, we have published this as a standalone report, however an excerpt from this report will appear in our Annual Report and Accounts 2022. Progress to date on our climate-related Governance, Strategy, Risk Management, and Metrics and Targets is summarised in Figure 1, and our assessment builds on the transparent disclosure of greenhouse gas emissions targets and reductions, and extensive long-term planning which is integral to our business. Some recommendations in the 2017 report and the 2021 TCFD Annex will require more time for us to fully consider and implement, and we intend to enhance our compliance with the recommendations of both documents in our next TCFD Report.

1. <https://www.ipcc.ch/report/ar6/wg2/>

2. <https://www.weforum.org/reports/global-risks-report-2022>

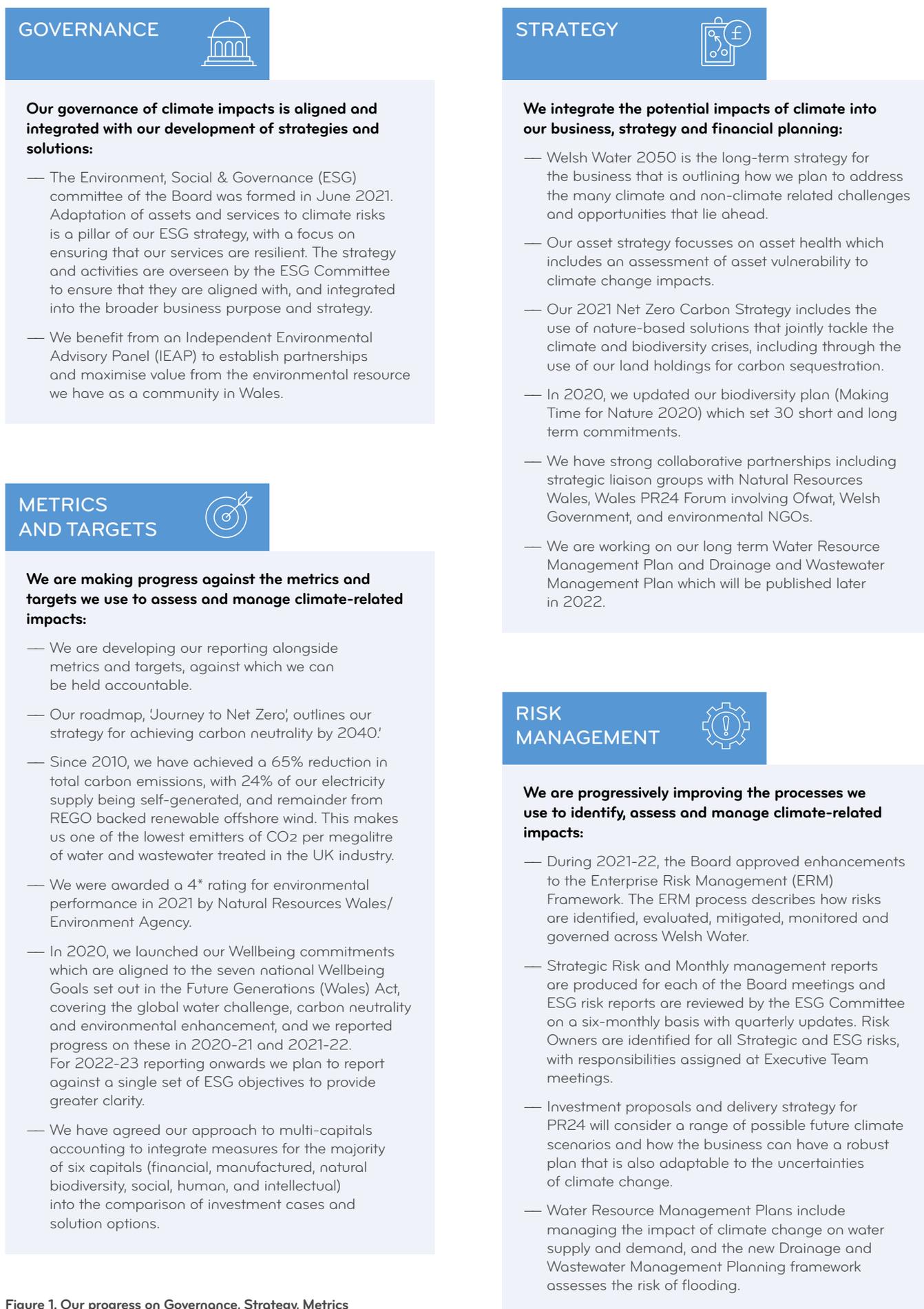


Figure 1. Our progress on Governance, Strategy, Metrics and Targets, and Risk Management

Our work to date has established a broad and firm foundation that recognises climate change adaptation, cutting carbon emissions, and addressing major service risks in our business planning for the 2024 regulatory Price Review process (PR24) and beyond. Our engagement in effective stakeholder collaboration – with regulators, government, landowners, and other interested parties, particularly those focussed on the environment – puts us in a strong position to deliver improved outcomes in a cost-effective and carbon-efficient manner. We will set our next five-year business plan robustly in the context of a 25-year long-term delivery strategy.

This TCFD report represents the next step in the formalisation and integration of the assessment of and planning for climate-related risks and opportunities across our business. It has provided us with the opportunity to examine more closely both the potential physical (e.g., extreme weather) and transitional (e.g., move to carbon net zero) impacts we may face. In preparing the disclosure, we have extensively engaged senior managers across the business, further embedding consideration of climate-related impacts across our strategic and tactical planning. We will use this TCFD analysis to support the continued development of the long-term delivery strategy that will accompany our PR24 plan.

Physical impacts of climate are experienced most directly through our weather and environment.

The floods in February 2020 saw a major water treatment works (Mayhill) flooded for a number of days, putting supplies at risk for thousands of customers. We also saw many wastewater treatment works flooded. In both 2018 and 2020 we saw extended dry periods that reduced reservoir levels.

Transitional impacts of climate can appear more indirectly, as our society changes strategies, policies or investments in a move towards a low carbon future.

To date, we have worked with other organisations to make available £15m of funding to help improve river habitats and water quality in several SAC (Special Areas of Conservation) rivers in Wales. We also hope to leverage funds and resources from other sources, including the Welsh Government's new land use reforms and payments for public goods such as biodiversity.

Figure 2. Case studies exploring physical and transitional impacts of climate change



CLIMATE-RELATED DRIVERS, IMPACTS AND FINANCIAL EXPOSURE

APPROACH TO THE ASSESSMENT

The TCFD assessment was structured around a series of externally facilitated workshops with representatives from teams across the business.

The workshops provided a forum to review the interconnected risks and opportunities driven by climate change. We began by applying a climate lens to the Welsh Water 2050 review of Political, Economic, Social, Technological, Legal and Environmental (PESTLE) challenges and opportunities. From there, the material impacts were taken forward to the next workshop in the sequence. Building upon our extensive work to date and applying the TCFD recommendations, we have deepened our qualitative and quantitative awareness and understanding of climate-related risks and opportunities. Our agreed next steps will make Welsh Water more resilient to climate change.

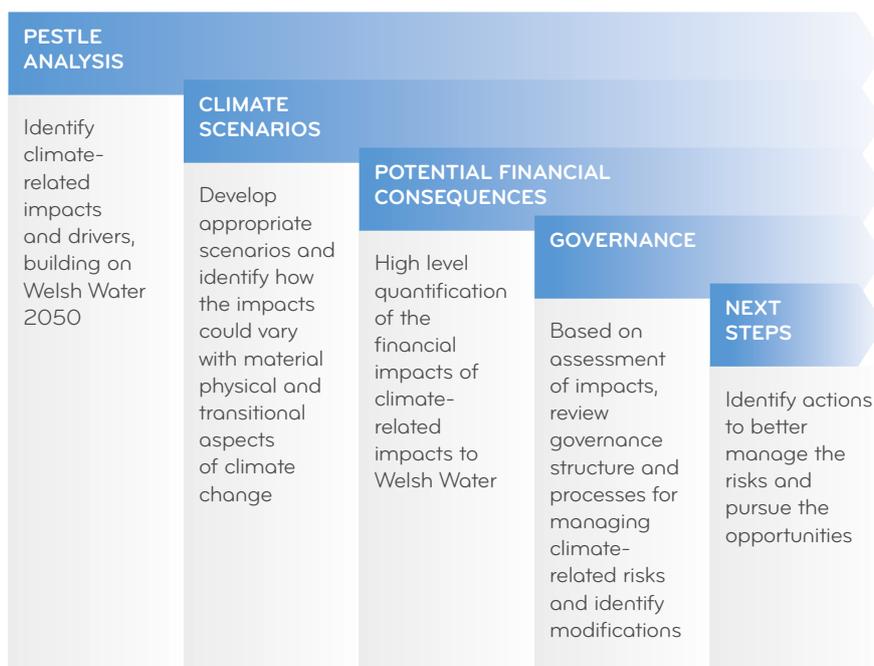


Figure 3. Our methodology flowchart for producing the TCFD report

PESTLE IDENTIFICATION OF CLIMATE IMPACTS AND DRIVERS

In 2021, we asked a team from Cardiff University to review the long-term challenges and opportunities which could impact our business, building on those already identified in our original Welsh Water 2050 strategy document. The review provided a thorough description of all challenges and opportunities, whether climate-related or not, within a PESTLE framework.

Building on the Welsh Water 2050 analysis to identify organisational risk for this TCFD assessment, we applied a climate lens to the challenges and opportunities in the PESTLE framework to distil the following:

- Drivers, i.e., what physical (mostly direct impacts) or transitional (mostly indirect impacts) aspects of climate change are likely to be material for Welsh Water.

- Influence, i.e., how could these climate drivers manifest themselves to materially influence our business.
- Impact, i.e., how could these influential changes impact our business as measurable risks or opportunities.

The material climate-related drivers shown in Figure 4 are based on the categories recommended by the TCFD, which include physical (acute, chronic) and transition (policy & legal, technology, market and reputation) risks. We developed 'logic chains' to demonstrate how the climate drivers could manifest to influence our business and how the resulting impacts could present risks or opportunities for us. Through our definition of future scenarios (see next Section), we broadly considered how the impacts may occur in the short-term (i.e. through AMP8 from 2025-2030), medium-term (up to 2040) and long-term (up to 2050 and beyond).

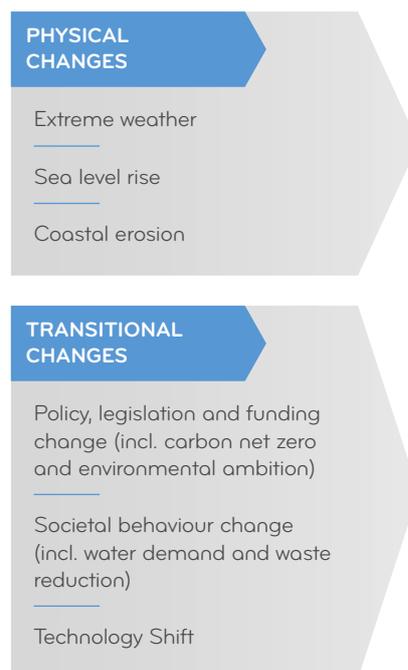


Figure 4. Material physical and transitional Drivers

Many of the climate-related drivers, influences and impacts are interconnected, not only within our business, but with other sectors and stakeholders. For example, the speed and effectiveness of decarbonisation in the energy sector, the resilience of the local authority highways drainage network to extreme weather, or the external establishment of a green economy for us to trade in are only partly within our control but could have significant cascading impact on our business.



Figure 5. Logic chain used to link climate drivers to impacts on our business

The PESTLE approach aligns with our emerging multi-capitals approach to incorporate a broader range of costs and benefits into our investment decisions and reporting. This could be integrated into broader climate risk and opportunity analysis and reporting which will help build resilience.

OUR MULTI-CAPITALS APPROACH

Financial, manufactured, natural, social, human and intellectual are six capitals, or resources, which we have as a business that can provide a holistic description of our resilience to the physical and transitional impacts of climate change. Our resilience to climate will improve as we drive increases in the six capitals. These multi-capital metrics can be used as a measure of the business' increasing resilience.

These resilience metrics are brought together within our 'Services Measures Framework' (SMF) which assesses the cost of any asset not meeting its business objective (e.g. through failure) and the benefits of potential solutions. We plan to integrate the multi-capital metrics into the SMF.

CAPITAL	DESCRIPTION	IMPACT METRICS
FINANCIAL 	The pool of funds available to an organisation obtained through financing or generated through operations or investments.	Private costs, private benefits.
MANUFACTURED 	Refers to physical objects, infrastructure or assets owned or controlled by an organisation that contribute to service provision or goods production (e.g. water treatment works).	Not appropriate to represent as the value of assets should be captured within costings, and represented at the level of the asset stock.
NATURAL 	The elements of nature that either directly or indirectly provide value to people.	Water quality, water resources, greenhouse gases, air quality, agricultural pollution, renewable energy, water regulation, noise mitigation, recreation, aesthetics, intrinsic value.
SOCIAL 	The relationships and networks within or between communities with shared norms, values and understanding facilitating co-operation. It refers to community or societal level of value.	Trust, stakeholder relationship, quality of place, local economy.
HUMAN 	Refers to the competencies, skills and attributes embodied in individuals that facilitate improved performance and well-being.	Skills and knowledge, health and wellbeing, safety and security.
INTELLECTUAL 	Refers to organisation, knowledge based intangibles (e.g. intellectual property) and organisational capital (e.g. knowledge, systems procedures).	Routine and practices, structural resources.

Table 1. Our Multi-Capitals approach

DEFINING FUTURE CLIMATE SCENARIOS

Scenario analysis in the TCFD context aims to assess the resilience of an organisation and its strategy to different future scenarios. We have defined two scenarios below that represent the material drivers of business impacts which were identified as: extreme weather and sea level rise, policy, legislation and funding change, societal behaviour change and technology shift. The framing of the analysis within two diverse scenarios has enabled us to explore the transitional impacts, which may be greater in a rapid orderly transition to a low carbon economy, as well as the physical impacts which may be greater in a delayed and disorderly transition.

For our TCFD focus on organisational resilience, we have modified and combined Ofwat's Common Reference Scenarios³ proposed for longer-term planning in PR24 to create two plausible and coherent scenarios representing diverse futures relevant to Welsh Water. These scenarios represent both the potential physical (i.e., sea level and weather) and transitional (i.e., societal response) drivers of change through to 2050:

- A rapid and orderly transition to decarbonisation, with strong collaboration (including with government, regulators, and society) and an emphasis on nature-based solutions that promotes beneficial societal behaviours and technological advances.
- A delayed and disorderly transition to decarbonisation, with little collaboration between sectors (including other Risk Management Authorities dealing with outdated legislation) which distracts our focus from nature-based solutions and technological advances and is not well aligned with societal behaviours.

Rapid and orderly transition to a low carbon future

In this scenario, stringent measures are introduced now to reduce greenhouse gas emissions, alongside a unified political, regulatory and societal shift to a more environmentally-focussed way of living. By the middle of the century, we will have achieved carbon net zero but those physical impacts of climate change that are already 'locked-in' are still evident. This maximises our chances of limiting global temperature rise to 2°C by 2100, as represented in the UKCP18 RCP2.6 scenario.

Delayed and disorderly transition to a low carbon future

In this scenario, business as usual greenhouse gas emissions and broader political, regulatory and societal behaviours continue for a few more decades, before a more abrupt and chaotic transition to a low carbon economy occurs by the end of the century. The lack of unified purpose makes it difficult to realise many potential opportunities and the physical impacts of climate are severe. This is most likely to result in global temperature rise of 4°C by 2100, as represented in the UKCP18 RCP8.5 scenario.

The physical aspects of these two holistic future scenarios are represented by the UK Climate Projections (UKCP18), where RCP (Representative Concentration Pathway) 2.6 and RCP8.5 represent projections for the lowest and highest plausible global greenhouse gas emissions. Although it is appropriate to use the stringent emissions-reduction future scenario RCP2.6 in this TCFD scenario analysis, for planning investment into the design and management of assets we have set a core planning pathway of the medium-high scenario based on RCP6.0 and will test against the more extreme RCP8.5 scenarios wherever possible. In line with current Ofwat guidance, this will minimise the risk of under-adaptation of infrastructure in our PR24 planning.

The scenarios clearly highlight the benefits to society, as well as to Welsh Water, of a rapid and orderly transition to a low carbon and greener future. However, this scenario presents major challenges, and the following were emphasised in the workshops:

- Physical impacts, already locked-in as a result of past emissions, are likely to continue to increase towards the middle of the century. Extreme high and low river flows from the increasing likelihood and severity of storms and dry periods are notable impacts likely to cause flooding of wastewater treatment works and reduced water availability and quality. These were experienced in the flooding of Mayhill treatment works in February 2020 during Storm Dennis followed by extended dry periods that reduced reservoir levels.
- In a rapid transition with a focus on achieving carbon net zero and major environmental ambitions, legislation and policy changes may occur suddenly and with significant impact. Although through our Welsh Water 2050 focus we are anticipating and preparing for these as far as possible, the Covid-19 pandemic and energy price shock has demonstrated that shocks which are more difficult to foresee can occur.
- A holistic approach to innovation should encompass new funding and business opportunities, as well as advances in technologies which complement nature-based solutions. This is why we are already exploring the issue of Green Bonds based on our environmental credentials, developing new digital services, and are anticipating enhanced techniques for the recovery of nutrients and other products from bioresources to emerge in the next 3-5 years.

We cannot predict which future scenario is most likely. Instead, we used the scenarios to explore how they could influence the occurrence of the material climate impacts on our business.

The need for ongoing monitoring and review of changes, and how they could trigger impacts to our business, is fundamental to us adapting to climate change, in parallel with reducing our emissions to mitigate further climate change. This focus on adaptation aligns with our existing strategy for future challenges which includes the use of adaptive planning to take account of future uncertainties.

Figure 6. Two future scenarios representing the potential physical and transitional drivers of change

3. <https://www.ofwat.gov.uk/publication/pr24-and-beyond-final-guidance-on-long-term-delivery-strategies/>

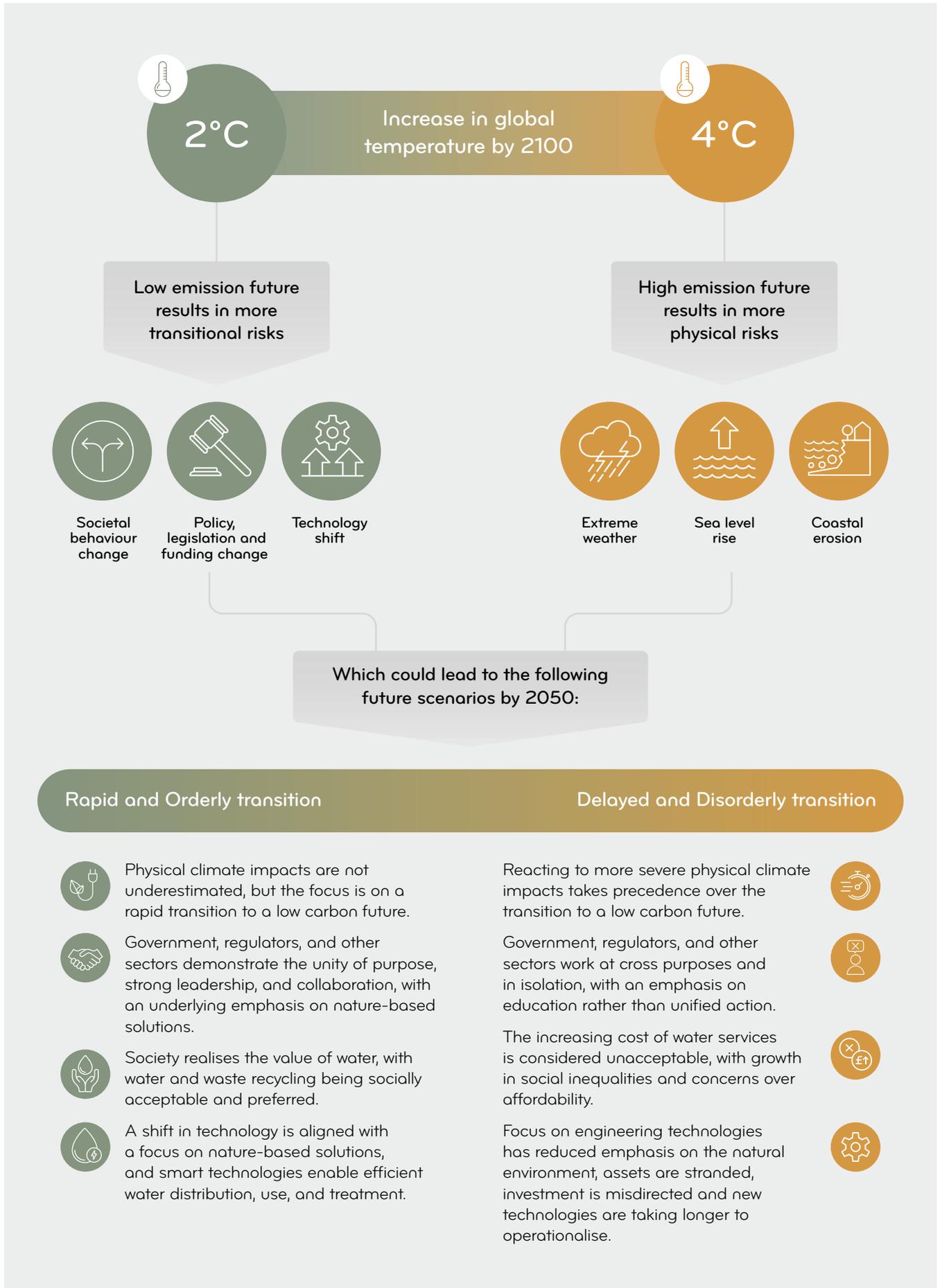


Figure 7. Summary of Two Future Scenarios used to assess Climate Impacts

SCENARIO ASPECT	STRINGENT MEASURES SCENARIO FOCUSSED ON ORDERLY TRANSITION	BUSINESS AS USUAL SCENARIO FOCUSED ON DELAYED TRANSITION
PHYSICAL CLIMATE BY 2050	<p>Focus on transitional planning but physical events are not underestimated:</p> <ul style="list-style-type: none"> • Winter total rainfall has increased by 4%, with a 10% rise in rainfall intensity • Summer total rainfall has decreased by 14%, there are more periods of water scarcity but intense storms still occur • Peak river flows are 5-10% higher • Winter temperatures are 1.2° warmer, with 2° rise in summer temperatures • Mean sea level has risen by 0.2m 	<p>Reacting to physical events takes precedence over transitional planning:</p> <ul style="list-style-type: none"> • Winter total rainfall has increased by 6%, with a 20% rise in rainfall intensity • Summer total rainfall has decreased by 20%, there are more periods of water scarcity but intense storms still occur • Peak river flows are 30-40% higher • Winter temperatures are 1.6° warmer, with 2.4° rise in summer temperatures • Mean sea level has risen by 0.3m
TECHNOLOGY SHIFT BY 2050	<p>Aligned with a focus on nature-based solutions, smart technologies have enabled efficient water distribution, use and treatment, including:</p> <ul style="list-style-type: none"> • Water supply network is 'smart' by 2035 and smart meter coverage is 100% by 2050 • Vehicle fleet has low emissions by 2030 • National Grid baseload electricity is carbon-free by 2035 	<p>Technologies have shifted focus away from the environment, but assets are stranded, investment was misdirected and new technologies are taking longer to operationalise, including:</p> <ul style="list-style-type: none"> • Water supply network is 'smart' by 2040 but smart meter take-up is incomplete • Vehicle fleet has low emissions by 2040 • National Grid baseload electricity is carbon-free by 2035
SOCIETAL BEHAVIOUR CHANGE BY 2050	<p>Society appreciates the value of water, with water and waste recycling being socially acceptable and preferred:</p> <ul style="list-style-type: none"> • Population has grown by +4% in Wales • Mandatory measures in place to reduce water use • Wales is zero waste 	<p>Increasing cost of water services are considered unacceptable, with growth in social inequalities and concerns over unaffordability:</p> <ul style="list-style-type: none"> • Population has grown by +6% in Wales • No additional measures in place to reduce water use • No change to waste policies and practice
POLICY, LEGISLATION AND FUNDING CHANGE BY 2050	<p>Unity of purpose, collaboration across sectors, strong government and regulatory leadership and underlying emphasis on nature-based solutions:</p> <ul style="list-style-type: none"> • Wales has achieved carbon net zero • Tighter measures in place to reduce abstraction to support the environment 	<p>Little collaboration between sectors or with government/ regulators, with an emphasis on education rather than action:</p> <ul style="list-style-type: none"> • Wales is not carbon net zero • No change to abstraction regime or successful focus on environmental enhancement

Figure 8. Details of the two future scenarios used to assess climate impacts

POTENTIAL FINANCIAL COSTS

2022 is the first reporting season where the TCFD requirements, including considering the scale of potential financial costs to our business from material climate-related impacts, have applied to premium listed companies and their equivalents. We recognise that our TCFD reporting will continue to be developed over the next several reporting periods.

In producing this report, impacts that could lead to both risks and opportunities were considered in terms of how they may result in acute or one-off costs, long term operational costs as well as capital investment. For example, flooding of the drainage and wastewater network could result in short-term costs of dealing with outages (such as tankering) as well as requiring longer term investment to increase our sewer network capacity. Through this TCFD disclosure we have begun to unpick each risk and opportunity to understand the scale of these potential financial impacts, which has helped us to define their severity (see Section 3 for further detail).

To begin quantifying the financial impacts of the climate-related risks and opportunities, we drew from currently available information, estimates and assumptions. It is important to note that any quantification should not be interpreted as performance forecasts. Instead, they intend to capture the range of potential impacts of the future scenarios on our business as relatively 'high' 'medium' or 'low' without attempting at this stage to quantify fully financially.

We focused on quantifying the impacts up to 2050, conscious that the differences in global emissions trajectories will largely translate into transitional impacts by the middle of the century, while the physical impacts may become more extreme beyond 2050, depending on the global emissions trajectory.

Our approach involved identifying existing data where relevant/available, such as from previous outage events, and to identify potential data sources and metrics to quantify better future financial impacts. For example, we have sensors across our network to detect issues that could be combined with data on storm intensity/timing to quantify the relationship between storm events and the cost of breakdowns. Evidence to support some of the analysis will be published in the upcoming Water Resource Management Plan (WRMP) and Drainage and Wastewater Management Plan (DWMP) which will be finalised for inclusion in next year's disclosure.

When considering the potential scale of financial implications on our business we came across several challenges:

- The interconnected nature of climate-related impacts meant that we must be careful to avoid double-counting
- The consequences of many of the impacts are strongly linked to actions which are the responsibility of others, and therefore it is challenging to separate out the financial impacts on our business
- The consequences of risks materialising are typically better understood than the opportunities, although we are working towards a deeper understanding of the climate-related opportunities which will provide evidence for future TCFD reports

Our workshop approach sought to maximise engagement across the business and has identified how more detailed estimates can be produced in subsequent disclosures.

EMBEDDING ADAPTATION PLANNING FOR CLIMATE ACROSS OUR BUSINESS

Our Asset Planning Directorate integrates business processes and systems, supported by robust governance activities that enable us to deliver Asset Management Plans (AMPs) in accordance with our commitments to customers, regulators and other stakeholders. Our strategy for future challenges includes the use of adaptive planning to account for plausible scenarios to at least 2050 for climate change, population growth, technology and environmental ambition, based on the same Ofwat Common Reference Scenarios. We have embedded consideration of climate change scenarios in the work underpinning our Water Resource Management Plan (WRMP), and we are developing this approach with work on the new Drainage and Wastewater Management Plan (DWMP).



CLIMATE-RELATED RISKS, OPPORTUNITIES AND GOVERNANCE

OVERVIEW OF RISKS AND OPPORTUNITIES

We have framed our material climate-related risks in terms of their potential to lead to service failures. From there, we can identify the potential costs and investment required to mitigate against those risks.

As a highly regulated organisation, the ultimate climate-related risk is that we become unable to deliver our services and fail to fulfil our purpose as a company, or that we invest heavily to mitigate climate-related risks but pay insufficient attention to those who struggle to pay, and that this leads to significant increases in customer debt and an erosion of customer trust.

Similarly, climate change presents a crucial opportunity for us to achieve our mission set out in Welsh Water 2050 "to become a world-class, resilient, and sustainable water company water service for the benefit of future generations". This could be more effectively achieved under a rapid and orderly transition scenario, and we recognise that we must play our part as society moves toward a low carbon, green future. The material climate-related opportunities we have analysed, as detailed below, could all generate financial benefits to help offset the costs of some of the risks we have identified, as well as allowing us to accomplish more and at a faster pace. The material risks and opportunities identified span the generic categories recommended by the TCFD which include policy & legal, technology, market, reputation, resource efficiency, energy source and products/ services. We analysed the risks and opportunities identified using a severity/ sensitivity model based on that used within ESG risk reporting where:

- Severity is based on financial costs – an initial estimate of the scale of monetary impact. In Figure 9, the size of the circle represents the estimated relative magnitude of the cost as low, medium, or high.
- Sensitivity refers to how dependent the risk or opportunity is on the physical and transitional changes described in the future scenarios. In Figure 9, risks with low sensitivity are towards the left along the axis whereas risk with high sensitivity are towards the right.

A low sensitivity to climate change scenarios does not mean that the risk or opportunity has a low likelihood of occurring; instead, it suggests that the impact could be largely the same regardless of the future scenario and planned for appropriately. Conversely, a high sensitivity indicates that the changes anticipated in the scenarios should be closely monitored so that the impact can be better anticipated and appropriately managed.

The risk circles range from low to high sensitivity whereas the opportunity circles are all more towards the right of the axis indicating that they are more sensitive to the scenarios and are, therefore, particularly dependent on an orderly transition for them to be realised. As we continue to align our business to support wider society's orderly transition to a low carbon future, the opportunities could become significant and may contribute to offsetting some of the costs of the risks. This demonstrates the benefit to Welsh Water as well as to society of our contribution to limiting global temperature rise.

ANALYSIS OF RISKS

We have analysed our material climate-related risks according to the combination of potential financial cost and sensitivity to future scenarios. This will help to inform how we prioritise and manage these risks going forward.

Wastewater infrastructure requires increasing investment to improve resilience. Meeting water discharge quality standards is challenging during storm events. These physical climate impacts would increase under both future scenarios, although they would be greater with a delayed transition. Collaboration with stakeholders and other sectors upon which we depend is fundamental to climate resilience, and successful collaboration is more likely to be achieved through an orderly transition.

We have analysed the remaining risks according to the relative scale of their potential financial cost, and by decreasing sensitivity to future scenarios.

The following risks are estimated to give rise to medium level financial costs as depicted in Figure 9. In order of decreasing sensitivity to future scenarios, they are:

Risk of not supplying sufficient high-quality water to meet increasing demand.

Capturing, storing, treating, and transferring water of sufficient quality has already proved challenging at times, and will get more challenging with less total rainfall falling during dry summer periods when demand on catchment areas is strongest. The extent and speed with which rainfall patterns change, compared with our ability to fund infrastructure upgrades, will strongly influence the likelihood of this risk materialising. Collaborative working in an orderly transition to help reduce customer demand during dry periods will be an important element of mitigating this risk.

Risk of insufficient funding to upgrade assets and infrastructure to ensure climate resilience.

Insufficient funding to ensure resilience would impact our ability to deliver our services. The willingness of our regulators to approve funding to enable us to invest in resilience, as anticipated in an orderly transition, will help mitigate this risk. Maintaining our environmental credentials and our high credit-rating will also be important to ensure we can sustain investor confidence and continue to access cost-efficient borrowing.

Risk of not securing the required energy supply at a reasonable cost.

Energy accounts for a significant proportion of the cost of providing water services. Energy costs are forecast to rise in the short to medium-term due to a variety of factors, some of which are related to climate change mitigation and the move to renewable sources. These transitional impacts will have a strong influence particularly under the 'Orderly Transition' scenario. Power outages may increase in the future, causing operational challenges and cost. Energy companies are regulated separately to Welsh Water and operate a 10-year planning cycle which does not align with water company investment planning. This makes collaboration more challenging and has led to issues being solved in isolation which is typically more expensive and could lead to lower system resilience. We are committed to creating a more resilient energy supply, through a mix of self-generating and private wire supplied renewable energy, by 2050. This will mitigate the risks around energy supply and costs in the future.



Figure 9. Summary illustration of material climate-related risks and opportunities

Risk of not meeting the 2040 carbon net zero target, or interim targets in 2030.

We are already committed to decarbonisation as demonstrated by our significant investment in renewable energy and electricity supplies coming from REGO backed renewable energy sources. Reducing the fugitive emissions (scope 1) that arise from our wastewater treatment works and the embodied carbon associated with our capital investment program (scope 3), are our largest challenge to meet net zero. There is a proportion of our scope 3 that we do not directly control, and we are reliant on our supply chain following a similar decarbonisation trajectory. There is a risk that our suppliers either do not adopt low or zero carbon practices or that we incur increased supply chain costs as a result of those practices.

ANALYSIS OF OPPORTUNITIES

Our mission is “to become a world-class, resilient and sustainable water service for the benefit of future generations”. The opportunities we have identified have the potential to contribute to delivering on our mission statement, and to achieve this more efficiently. Over the long term this could lead to our ability to offset foreseen rising costs identified in the risks above but could result in more initial short-term expense.

Relative to climate-related risks, all the opportunities we have analysed are highly sensitive to society achieving a rapid and orderly transition to a low carbon future. This is a key finding as it reinforces the benefits both to Welsh Water and to society of working towards a rapid and orderly transition which limits global temperature rise.

The opportunity to help develop Wales' green economy and trade in markets emerging in response to climate change could be considered as the most significant climate-related priority, given the potential scale of financial benefits and high sensitivity to future scenarios.

Already being driven through the green recovery, an orderly transition will emphasise that economic growth should be underpinned by sustainable use of natural resources, smart and innovative technologies, renewable energy generation, sustainable procurement, and nature-based solutions. We already procure energy from community groups and use our land for carbon in-setting purposes. We could further use our land for development of wind and solar farms, and develop additional energy parks on



Claeuwen Dam, Elan Valley.

a commercial basis as part of an orderly transition. Improved sludge recycling could enable the production of fertiliser for export and water itself could be exported to regions of scarcity.

As with climate-related risks we have analysed the remaining opportunities according to the relative scale of their potential financial benefit, and by decreasing sensitivity to future scenarios.

The following opportunities are estimated to give rise to medium level financial benefits as depicted in Figure 9. In order of decreasing sensitivity to future scenarios, they are:

Opportunity to seek funding to fulfil our environmental obligations through new government laws and regulations.

An orderly transition could rapidly introduce legislation and regulation to benefit the environment, as anticipated through the proposed Agriculture (Wales) Bill and Sustainable Farming Scheme. This could refocus funding for farming and land management towards the delivery of 'public goods' including carbon sequestration, biodiversity, and water quality. In the future, legal and regulatory frameworks may enable us to develop relationships with the agricultural sector and other landholders, leverage this funding, and contribute to delivery through catchment management solutions and carbon sequestration schemes. A disorderly transition could substantially reduce the likelihood of similar opportunities.

Opportunity to implement circular economic principles, as part of society realising the value of water and wider drive for waste reduction and recycling.

Our recent research noted that customers support additional investment to address long-term risks such as climate change, even if that means a modest increase in bills. Already, recycling of biosolids reduces our net energy costs. We may be able to find uses for the biogenic CO₂ that is emitted in our processes, either as a product in itself or employed in 'biorefinery' processes to make other products. In an orderly climate transition with society increasingly recognising the benefit of reducing consumption and greater recycling, revenues generated from bio-solids and other circular economy models could increase.

Opportunity to develop innovative technological or nature-based solutions to improve water treatment processes and operations through industry leadership and collaboration.

In an orderly transition with a collaborative focus on technology, we could be a lead partner able to generate revenue from our innovations. The Water sector in England and Wales has established Spring as a new organisation which aims to accelerate UK water sector transformation through innovation and collaboration. We are already cutting energy and maintenance costs of wastewater treatment through schemes such as RainScope, which uses green innovative sustainable drainage solutions to manage the amount of surface water entering our sewers.

Opportunity to access future green investment funds because of our sustainable business credentials.

We are in a strong position to continue to raise finance at attractive rates because of our ESG credentials, as well as our corporate structure. In line with other water companies, an orderly transition will create further opportunities – for example, enabling us to issue Green Bonds whilst continuing to deliver on our environmental commitments.

Opportunity for education and awareness campaigns to improve water usage if society's appreciation of the value of water increases.

Given our existing strong investment in engagement and education, the relatively low additional costs of expanding our programme could generate substantial financial value. For example, a modest reduction in per capita consumption would significantly reduce our energy consumption as well as indirectly reduce household water heating bills which comprise the majority of carbon emissions associated with the water cycle. We are already working towards realising this dual benefit for society and Welsh Water, but the social environment is likely to be more conducive within an orderly transition where people's appreciation of the value of water and the potential to reduce both water and energy bills as a result of heating less water, substantially improves.

GOVERNANCE OF CLIMATE-RELATED RISKS AND OPPORTUNITIES

Climate change is not an isolated issue but underpins many risks and opportunities across the business.

We have recognised that climate adaptation and mitigation need to be strengthened as core pillars of our Environmental reporting, and that consideration of climate impacts would benefit from:

- Clearer links between asset and enterprise risk and between the overall climate strategy and risk management.
- A more developed set of Key Risk Indicators (KRI) for climate, that breaks down the overall risk of failure to adopt sites, infrastructure and/or processes for climate change into the contributory impacts
- A review of the appetite and tolerance associated with climate risk

We plan to integrate climate planning more into our operational thinking by undertaking a gap analysis of climate action across the organisation. Elevating consideration of climate impacts beyond PR24 planning and articulating our Climate Strategy for our customers could help to achieve a broader understanding and mitigation of climate-related risks and recognition of potential climate opportunities for the business.

DISCLOSURES

Table 2 represents the recommended disclosure framework put forward by the TCFD. In each section, we present links to the disclosures we have published.

DISCLOSURE	SUMMARY	LINKS
GOVERNANCE		
<p>A) Describe the Board's oversight of climate-related risks and opportunities</p> <p>B) Describe management's role in assessing and managing climate-related risks and opportunities</p>	<p>The Environment, Social & Governance (ESG) committee was formed in June 2021. Adaptation of assets and services to climate risks is a pillar of our ESG strategy, with a focus on ensuring that our services are resilient. The strategy and activities are overseen by the ESG Committee, on behalf of the Board, to ensure that they are aligned with and integrated into the broader business purpose and strategy. Meetings are conducted quarterly, with verbal and written updates issued to the board after each session. Furthermore, every Director has access to the minutes and papers of these meetings.</p>	<p>Welsh Water 2050</p> <p>Our Plan PR19 Business Plan 2020-2025</p> <p>Annual report 2022</p> <p>ESG Strategy</p> <p>ESG Terms of Reference</p> <p>Compliance Code</p>
STRATEGY		
<p>A) Describe the climate-related risks and opportunities the organisation has identified over the short-, medium-, and long-term.</p> <p>B) Describe the impacts of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning</p> <p>C) Describe the resilience of the organisation's strategy, taking into consideration difference climate-related scenarios, including a 2°C or lower</p>	<p>This assessment of our business has identified material risks and opportunities arising from extreme weather and sea level rise, changes to policy, legislation and funding, changes in societal behaviour and shifts in technology. We have initially quantified the potential financial impacts on our business and estimated how sensitive the impacts are to the future scenarios we have explored. The opportunities are likely to be greater if the global economy transitions rapidly and in an orderly manner to carbon net zero. In parallel with ongoing reduction of our emissions to mitigate further climate change, we plan to broaden our use of adaptive planning to manage future challenges and realise opportunities.</p>	<p>Welsh Water 2050</p> <p>Our Plan PR19 Business Plan 2020-2025</p> <p>Annual report 2022 (this report)</p> <p>Making time for Nature 2020</p> <p>Our Journey to Net Zero</p> <p>Final Drought Plan 2020</p> <p>Drainage and Wastewater Management Plan (Published in 2022)</p> <p>Water Framework Directive Schemes</p> <p>Final Water Resources Management Plan 2019</p> <p>Draft Water Resources Management Plan 2024</p>

DISCLOSURE	SUMMARY	LINKS
RISK MANAGEMENT		
<p>A) Describe the organisation's processes for identifying and assessing climate-related risks</p> <p>B) Describe the organisation's processes for managing climate-related risks</p> <p>C) Describe how the processes for identifying, assessing, and managing climate-related risks are integrated into the organisations overall risk management</p>	<p>Strategic Risk and Monthly management reports are produced for each of the Board meetings and ESG risk reports are reviewed by the ESG Committee on a six-monthly basis with quarterly updates. Investment proposals and delivery strategy for PR24 will consider a range of possible future climate scenarios and how the business can have a robust plan that is also adaptable to the uncertainties of climate changes. However, we plan to integrate climate planning more into our operational thinking by undertaking a gap analysis of climate action across the organisation. Elevating consideration of climate impacts beyond PR24 planning and articulating our Climate Strategy for our customers could help to achieve a broader understanding and mitigation of climate-related risks and recognition of potential climate opportunities for the business</p>	<p>Welsh Water 2050</p> <p>Our Plan PR19 Business Plan 2020-2025</p> <p>Annual report 2022</p> <p>Final Water Resources Management Plan 2019</p> <p>Draft Water Resources Management Plan 2024</p> <p>Drainage and Wastewater Management Plan</p> <p>Risk report set out in our Annual Report & Accounts 2022. Available on this link from early July 2022</p>
METRICS AND TARGETS		
<p>A) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management processes</p>	<p>We have assessed material impacts that could lead to both risks or opportunities up to 2050 in terms of how they could result in acute or one-off costs, long term operational costs as well as requirements for capital investment. We have presented the relative estimates of the scale of monetary impact and identified how more detailed estimates can be produced in subsequent disclosures. This will include definition of multi-capital metrics to incorporate a broader range of environmental and social costs and benefits into our investment decisions and reporting.</p>	<p>Our Journey to Net Zero.</p> <p>Carbon Accounting Workbook</p> <p>Performance Metrics in Annual report 2022 (page 48)</p> <p>Wellbeing Commitments 2020</p>
<p>B) Disclose Scope 1, 2 and (if appropriate) 3 GHG emissions and related risks</p>	<p>In 2020-21, our total carbon footprint for Scope 1,2 and 3 emissions was 106kt CO₂e versus a 2010-11 baseline of 335 106kt CO₂e. This represents a 68% reduction.</p>	
<p>C) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets</p>	<p>As well as developing new metrics, we will consider existing metrics, currently used by our organisation, to manage climate-related risks and opportunities e.g. pollution incidents per 10,000km of sewer and internal sewer flooding.</p>	

Table 2. Summary table of disclosures for the TCFD report

AGREED NEXT STEPS

This TCFD assessment of climate-related impacts has enhanced our understanding of the risks and opportunities that Welsh Water faces. The additional insight has strengthened our commitment as a business to support wider society's orderly transition to a low carbon and environmentally focussed future which will benefit our business as well as our customers.

Our contribution to limiting global temperature rise through mitigating our emissions, and involvement in society's broader adaptation to the impacts of climate, will help us achieve our mission to become a world-class, resilient, and sustainable water and wastewater company for the benefit of future generations.

Beyond our ongoing commitment to reduce carbon emissions and transparency in climate risk assessment, we have agreed the next steps as seen in Figure 10.



Figure 10. Agreed next steps



Dŵr Cymru
Welsh Water