

Our approach to climate change

Task Force on Climate-related Financial Disclosures

ACHIEVEMENTS

- On track to deliver our climate change mitigation pledges and our public commitments.
- Science-based targets covering all emission scopes set and submitted for validation by the Science Based Target initiative (SBTi).
- Three 'alternative' scenarios, each one aligned to a specific emissions pathway, developed and used to support strategic planning.
- Impact of climate change now specifically considered as part of corporate risk framework.

SUCSESSES

- CDP is a global disclosure system for environmental reporting. Our CDP climate change rating improved from B to A- in 2020, demonstrating leadership-level reporting and disclosure. We are one of only two companies in the UK water sector achieving leadership level.



- The Sustainability Reporting Performance report by EcoAct measures how businesses are acting and reporting on climate-related sustainability. We have been ranked in the top 20 FTSE 100 list, improving from 17th to 11th position in 2020, and are the highest ranking water company.



Overview

Weather is fundamental to how we deliver water and wastewater services so climate change has been, and always will be, of strategic and operational importance. With advances in climate science, our understanding of climate change and how we respond is ever evolving, as is the external policy environment in which we operate.

Incorporating climate into long-term planning

Building on our long-standing approach to climate change mitigation and adaptation, we now integrate consideration of climate-related risks and opportunities directly into our business planning to influence strategy and behaviours throughout the organisation.

This year, we've enhanced our understanding of the sensitivity of our business risks to climate change and applied Systems Thinking to embed physical and transitional risks into both operational planning and long-term strategy development.

We now have a good understanding of the controls required to adapt to a changing climate, and are building our confidence to recognise and manage cascade impacts where multiple weather events in a short time frame can have a cumulative impact.

Scenario analysis

To support strategic planning, we developed three comprehensive scenarios exploring how multiple drivers of change might evolve and interact over time, compared to a baseline scenario. Each one is aligned to a specific emissions pathway, enabling us to test out scenarios where there is: an effective transition to a low carbon world; a climate crisis due to suboptimal climate change mitigation efforts; and a central case where more moderate impacts of climate change are experienced after slow initial progress is followed by a step change in decarbonisation.

Pledges and commitments

We have made good progress on our six carbon pledges (see page 93), which include science-based emission reduction targets and four specific pledges on how those reductions will be achieved.

Pledge 1 is to reduce our scope 1 and 2 emissions by 42 per cent by 2030. We are on track to achieve this pledge although progress will not be linear year-on-year while we work to reverse the pressures that are driving growth in emissions.

Pledge 2 – Over 94 per cent of the electricity we used in 2020/21 came from renewable technologies. From October 2021, we will meet our pledge for 100 per cent.

Pledge 3 commits us to 100 per cent green fleet by 2028. We have deployed 27 electric vehicles at operational sites, and are trialling a 44-tonne biogas-powered HGV.

Pledge 4 commits us to 1,000 hectares of peatland restoration by 2030. We have proposed five sites for green recovery catchment peatland restoration.

Pledge 5 commits us to 550 hectares of woodland creation by 2030. We have planted 9,783 woodland carbon code compliant trees, established two tree nurseries and identified hundreds of potential sites for new and 'replanted' woodlands.

Pledge 6 commits us to set a science-based target for our scope 3 emissions, which we have done (see page 96).

An important element of our approach is to encourage others to contribute by making public commitments. We joined the global movement of 'Business Ambition for 1.5°C: Our Only Future', with a commitment to setting science-based targets aligned with limiting global temperature rise to 1.5°C above pre-industrial levels. We are signatories to the UN Race to Zero campaign and are proud to be contributing to the UK water industry's commitment to be net zero from 2030.

Transparency and disclosure

We have published carbon and climate change disclosures in our annual report and CDP's Climate Change Programme assessment for over a decade. We report in adherence with the Greenhouse Gas Protocol Corporate Accounting and Reporting Standards (2015) and the 2019 UK Governmental Environmental Reporting guidelines.

We have signed the Statement of Support for the Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD) which was published in June 2017, and we report in line with its recommendations across its four thematic areas.

CORPORATE CITIZENSHIP REVIEW

Corporate Citizenship, a leading sustainability consultancy, reviewed this disclosure and provides an ISAE assurance against the Principles of Effective Disclosure to ensure that it accords with Task Force on Climate-related Financial Disclosures recommendations.



Read more at fsb-tcfd.org/recommendations

TCFD recommendations

This table shows progress this year towards meeting the TCFD recommendations and the areas we will focus on in the future. The table includes cross-references where there is more material within this annual report and financial statements.

<h2>Governance</h2> <p>The organisation's governance around climate-related risks and opportunities</p>		
<p>Progress this year</p> <ul style="list-style-type: none"> Implemented enhancements required to reach overall 'leadership level' in the 2020 CDP assessment. Included special report on climate-related risks in board-level risk review. Created long-term strategy team with primary focus on climate change adaptation and mitigation. 	<p>Future focus</p> <ul style="list-style-type: none"> Further inclusion of climate-related risks and opportunities into all investment decisions, processes and governance. Continue to demonstrate leadership in climate-related disclosure, for example CDP assessment. 	<p>Further information</p> <ul style="list-style-type: none"> Our corporate responsibility committee report on pages 156 to 159 provides a summary of committee discussions on climate change A summary of the board and its management committees can be found on page 120
<h2>Risk management</h2> <p>The processes used by the organisation to identify, assess and manage climate-related risks</p>		
<p>Progress this year</p> <ul style="list-style-type: none"> Enhanced analysis of risks arising from the climate change we are already experiencing and the extent to which that might affect operations. Completed a robust review to identify which corporate risks are vulnerable to climate change and quantified the impact and time sensitivity. 	<p>Future focus</p> <ul style="list-style-type: none"> Further formalisation of climate-related physical and transitional risks into risk management systems. Embed identification of climate-related risks and opportunities throughout the organisation as business as usual. 	<p>Further information</p> <ul style="list-style-type: none"> Read more about the processes for identifying, assessing and managing climate risks on page 90 Read more about our risk management framework on page 100
<h2>Strategy</h2> <p>The actual and potential impacts of climate-related risks and opportunities of the organisation's businesses, strategy and financial planning</p>		
<p>Progress this year</p> <ul style="list-style-type: none"> Extensive preparations for the publication of our third climate change adaptation progress report later in 2021, after widespread stakeholder consultation. This report will include a review of climate impacts and how we will adapt. Updated water resources and flood models to include climate scenario analysis and UKCP18 forecasts. Developed company-wide scenarios to explore how multiple factors (including climate change) interact to provide a structured framework to think about future uncertainty. 	<p>Future focus</p> <ul style="list-style-type: none"> Whole-life costing for capital projects and appraisals to include variable carbon pricing. Implement climate change resilience plans (both physical and transitional) across AMP7, incorporating natural capital solutions. Build relationships with key suppliers to reduce our environmental impact by sharing best practice and collaborating on how to reduce greenhouse gas emissions. Identify and evaluate climate-related opportunities. 	<p>Further information</p> <ul style="list-style-type: none"> Read more about how our climate-related risks, opportunities and commitments are shaping our strategy and financial planning on page 93
<h2>Metrics and targets</h2> <p>The metrics and targets used to assess and manage relevant climate-related risks and opportunities</p>		
<p>Progress this year</p> <ul style="list-style-type: none"> Completed comprehensive review of all scope 3 emissions and set ambitious science-based targets (currently being validated by SBTi). Achieved A- rating in 2020 CDP assessment of targets and emission-reduction initiatives. Updated drought plan triggers to minimise the impact on customers and improve our resilience to periods of prolonged dry weather. 	<p>Future focus</p> <ul style="list-style-type: none"> Secure SBTi validation for science-based targets for all three emission scopes. Implement data improvements for scope 3 emissions so more are supplier and product-based factors rather than spend based. Analysis to understand cascade impacts and our resilience to them where multiple extreme weather events can occur in a single short time frame. 	<p>Further information</p> <ul style="list-style-type: none"> Read more about metrics used to assess climate impact to our key risks on page 92 Read more about setting our science-based targets on pages 92 and 96 Read our energy and GHG emissions report on pages 97 to 99

Our approach to climate change

Task Force on Climate-related Financial Disclosures

GOVERNANCE

Chief Executive Officer Steve Mogford has ultimate responsibility for the group's preparedness for both adapting to climate change and driving our mitigation strategy. As climate change is a significant causal factor for the group's principal risks (see page 103), the executive team is tasked with managing the risks and mitigating actions, for example by ensuring the company has the necessary financial resources and people with the required skills to achieve its climate-related objectives.

Chief Financial Officer Phil Aspin has executive responsibility for risk management and is supported in this role by the head of audit and risk and the corporate risk manager.

The group audit and risk board (GARB) reviews the effectiveness and performance of the governance processes along with the identification of emerging trends, including climate change. The work of the GARB feeds into the information and assurance processes of the audit committee and into the board's assessment of risk exposures and strategies to manage these risks.

There is further board oversight of climate-related issues through the corporate responsibility committee (see pages 156 to 159). Mitigation and adaptation are priority topics for the committee, which plays an important role in challenging and encouraging consideration of climate-related issues. It initiated the review of the company's carbon strategy and endorsed the mitigation policy, defining our corporate ambition and objectives. This led to the development of our mitigation strategy and the establishment of an executive-level steering group. This group has delegated responsibility to embed climate-related issues throughout business planning, to bring consistent focus to the delivery of our climate-related commitments, such as the six carbon pledges, and to provide updates to the board and corporate responsibility committee.

RISK MANAGEMENT

We have a strong track record of risk management and of climate change disclosure. We continually mature our capacity and capability to manage risk and uncertainty to build and maintain long-term resilience across the corporate, financial and operational structures of the group.

Our company risk management framework follows an enterprise-wide approach and covers all principal risk areas such as water service, supply chain and programme delivery.

Climate-related risks are identified, assessed and managed in the same way as any other risk through our embedded risk management framework which is described on pages 100 to 101. Having been identified, each business risk is assessed in two ways. First, we consider the likelihood of the event occurring based on multiple causal factors; secondly, we examine the full range of potential impacts and their severity should the event occur, from a minimum (best case) to a maximum (worst case) scenario.

We take a variety of approaches to identify and assess risks, including using risk breakdown structures and tools such as PESTLE to formalise horizon scanning, as well as complex modelling of the physical impacts of climate change on our water resources and wastewater management.

Horizon scanning such as tracking legal and regulatory changes, emerging technologies and comparison of our strategies with other companies is particularly useful when considering transitional risks. We have found risk breakdown structures and detailed modelling are better suited to acute or chronic physical risks.

Risks sensitive to climate change

Climate change has been identified as a critical cross-cutting driver, so all our 100 event-based risks in our business risk profile were reviewed for their exposure to climate change. Last year we identified seven risks most sensitive to climate change in that their likelihood or the impact will increase with global warming. We have further analysed these risks and now have a good understanding of the controls required to adapt to a changing climate. This is set out on pages 90 to 91. This exercise highlighted a further risk in the potential for cascade impacts where multiple weather events in a relatively short time span can have a more challenging impact.

Looking ahead, we will explore how innovation can help us learn more about the profile of risk events, their causes and consequences and the capacity and capability of our company to manage them. By understanding this, we have the opportunity to be proactive and better prepared by prioritising issues.

By incorporating longer-term climate change impacts more explicitly in our corporate risk framework, we have raised the profile of climate change adaptation, providing the board enhanced insight to consider our risk appetite and capacity from within existing risk management processes and with the same thresholds for materiality. We have identified where climate risks are not well enough understood or where existing controls might be inadequate to manage the risk in the long term.

STRATEGY

Planning horizons

Our planning horizons are illustrated on pages 46 to 49. Climate-related risks are manifesting themselves in the short to medium term and in common with the rest of the water industry, we are also vulnerable to physical climate risks in the long term (ten to 25 years and beyond) as our assets typically have long, even very long, lifespans. Many of our services are based on legacy infrastructure which was designed decades ago to deliver water and wastewater services for the climate we had rather than the one that is ahead of us.

Already seeing climate change in the North West

Five of the top ten wettest years for the North West since 1880 have occurred since 2000, and all of the ten hottest years have occurred since 2002. A top ten coldest year has not been recorded since 1963. These trends, and their impact on local weather conditions, are impacting our climate sensitive risks already.

For example, changes in precipitation and temperature have contributed to changing patterns of river flow in our water supply catchments. There has been an increase in winter flows in almost all catchments, with significant upward trends in ten of the 14 river basins, and a reduction in flows in most catchments in spring, most notably for the strategic Vyrnwy catchment where there has been a significant downward trend over the last 20 years.

Annual average rainfall has not changed significantly, although the year-to-year variability has increased (with more dry and wet years) and some research shows an increase in the probability of heavier rainfall events. The greatest change in seasonal rainfall trends is an increase in winter rainfall, due to an intensification of heavy rainfall events, which leaves us increasingly susceptible to a range of key risks, including sewer flooding, asset flooding and land quality deterioration.

Annual and monthly temperatures in the North West are already higher than those experienced before 1900, largely due to anthropogenic activity, with the rate of warming accelerating.

Application of temperature-based estimates show an increase in potential evapo-transpiration in our region. This may influence the water balance, particularly in spring and summer, leading to a sensitivity to drought, and potentially water network failure and water sufficiency events.

Climate change in the North West



Rainfall

Annual average rainfall has not changed significantly, however year-to-year variability has increased, with more dry and wet years.



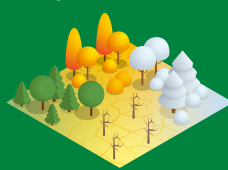
Evaporation

The amount of water lost to evaporation has increased, putting increasing pressure on water resources during spring and summer and potentially increasing the demand for outdoor water use.



River flows

Winter river flows have increased in almost all catchments, with significant upward trends in ten of the 14 river basins, and a reduction in flows during spring in most catchments.



Seasonal variation

Seasonal changes in the North West are projected to be greater than those for England and Wales, with much wetter winters and, under some scenarios, much hotter and drier summers.



Sea level

By 2100 under the likely warming scenarios (3°C-5°C), sea level at Liverpool is projected to rise between 0.3 and 1.0m.



Extreme events

Evidence demonstrates that climate change has exacerbated extreme rainfall and storm events, and will continue to do so, as well as increasing the likelihood of heatwaves.

Physical risks

All seven of the risks identified as being sensitive to climate change are physical risks, so we set about quantifying that vulnerability.

Predicting the effects of climate change is complex, with a large amount of uncertainty involved. Focusing on the predominant downsides, we assessed the potential implications for the seven risks in 2050 and 2100 compared to today, using the latest climate research, the Met Office UK Climate Projections 2018 (UKCP18). This has four pathways to 2100 depending on concentrations of greenhouse gases in the atmosphere and we have used what is widely accepted as the most likely pathway, RCP 6.0, which is consistent with peak emissions occurring in 2080. Best and worst case scenarios will be considered in due course.

The outcomes of the risk assessment were the topic of a special report prepared for a board-level risk review which took place in April 2021. They are presented on pages 90 to 91, together with a summary of assumptions, climate sensitivity and existing controls. In each case the downside effect is quite significant relative to the baseline, and four risks in particular stand out as having the most significant increases in likelihood: water sufficiency event; water network failure; recycling of biosolids to agriculture; and risk of inadequate land management.

Transitional risks

We are also vulnerable to risks associated with the transition to a low-carbon economy. Changing policies, regulation and legislation to address mitigation and adaptation requirements can increase operating costs due to, for example, enhanced emissions reporting. Environmental requirements to meet water quality standards can lead to increased fuel or chemical consumption and legislation such as the Industrial Emissions Directive will result in operational and strategic planning interventions.

One likely consequence of changing legislation is potential asset redundancy, where the case to move to lower carbon technologies might result in the consolidation of assets on a fewer number of sites.

Opportunities

We are a relatively energy-intensive business, typically using around 800 GWh of electricity each year. As well as the risks associated with this dependency we see opportunities in the way we manage energy and have developed an approach to use less, generate more and use our assets and resources smarter while maintaining security of supply.

We have already invested in innovation and research to minimise the total amount of energy we consume, for instance in pioneering UV LED water treatment. We

have increased renewable generation through bioresources, solar and wind, increasing the amount of self-generated energy from 108 GWh in 2012/13 to 205 GWh in 2020/21.

We aim to develop more successful innovation projects and that by meeting more of our own energy demands we can rely less on imports from the grid and mitigate the risks of future energy price fluctuations and uncertainty, as well as bolstering our own security of supply.

Resilience of our organisation to a changing climate

The main climate-related risks to the resilience of our operational assets are uncertainty of the health of ageing infrastructure and the increasing challenges presented by predictions for climate change and population growth over the long term.

Our Water Resources Management Plan 2019 is an example of how our strategy, to achieve a long-term, best value and sustainable plan for water supplies in the North West, has been developed to ensure that we have an adequate supply to meet demand over the 25 years from 2020 to 2045. This will ensure that our supply system is resilient to drought and other hazards, including climate change (using 'stochastic weather' and scenarios from the latest UK climate projections, UKCP18) and demand (population growth, economic trends and patterns of water use).

Our approach to climate change

Climate sensitive risks overview

Below is the outcome of a special risk assessment on the risks identified as sensitive to climate change.

Likelihood and impact are as predicted at 2050 and 2100 using the accepted most likely emission pathway RCP 6.0.

CONTROL EFFECTIVENESS

The effectiveness of controls at 2025 to mitigate the climate-related risk at 2050.

- Largely insufficient
- Somewhat sufficient
- Mostly sufficient

RISK TYPE

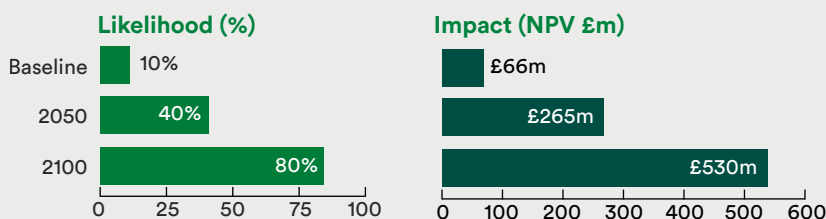
- ⊙ Chronic physical risk – changing trends in weather patterns, such as rising temperatures, sea level, rainfall
- ▲ Acute physical risk – chance of severe weather events, such as storms, heat waves and floods.
- ⊛ Indicates the most significant event-based risks reported to the board (see pages 108 to 109)

Water sufficiency event



When temperatures rise, higher water usage, evapo-transpiration and lower average summer rainfall from associated dry periods, causes supply pressures.

The most likely impact assumes weather patterns similar to 2018 happening twice in five years at 2050, and four times in five years by 2100.



Controls

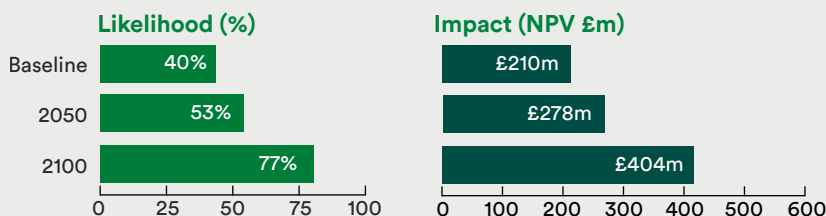
- Development of new sources of water, particularly boreholes.
- Water trading between different regions of the UK.
- Leakage reduction.
- Encourage and inform customers about using less water.
- Installation of more meters on domestic properties.



Failure of wastewater network (sewer flooding)



Increased rainfall (storm) events can result in severe sewer flooding. The frequency of such events is forecast to almost double with climate change. For a storm with a return period of one in 50 years or greater, 15 per cent of our region is currently at risk of internal flooding. By 2050 it is expected 20 per cent of our region would be impacted, rising to 29 per cent by 2100. The cost of an internal flooding incident is assumed to stay constant.



Controls

- Increase sewer capacity and build storm water holding tanks.
- Implement and encourage sustainable drainage solutions.
- Use technology to monitor and better control flows in the sewer system.
- Install flood protection devices to at-risk properties.

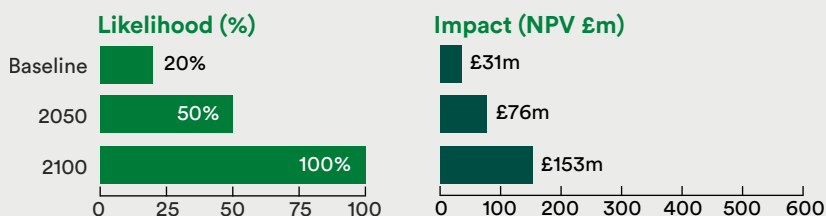


Land management



Deterioration in the quality of land due to climate change will increase the frequency and impact of weather events on our owned land. Such events have led to more fire, flood, subsidence and landslide events which in turn have associated impacts on: health, safety and environmental issues; access to operational and capital activities; corporate reputation; missed opportunities; legal liability and additional unplanned spend associated with invasive species.

The annual likelihood of such events is forecast to increase from 20 to 100 per cent by 2100.



Controls

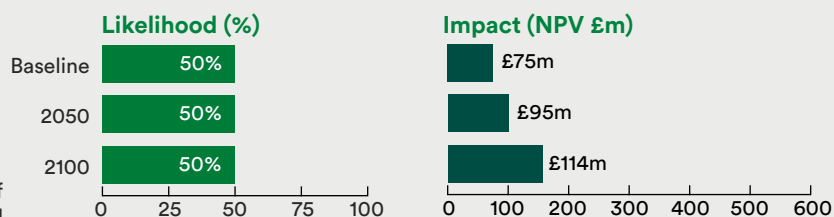
- Proactive land management action to protect quality, including through nature-based solutions.
- Provide net gain in biodiversity from our construction projects.
- Directly restore peatland and woodland.
- Work in partnership with farmers, the Environment Agency and others to improve upland watercourses.



Failure to adequately treat wastewater*



Extreme rainfall events cause overflows and variation between high rainfall and drought periods causes further susceptibility. Likelihood of failure to adequately treat wastewater is expected to remain at one in two years but the most likely impact expects six more failing works (above 2020 baseline) and uses the current ODI penalties as the impact magnitude.



Controls

- Enhancements linked to no deterioration funded through price review.
- DWMP investigations into increased dilution.
- Infrastructure investment to increase resilience to extreme events.

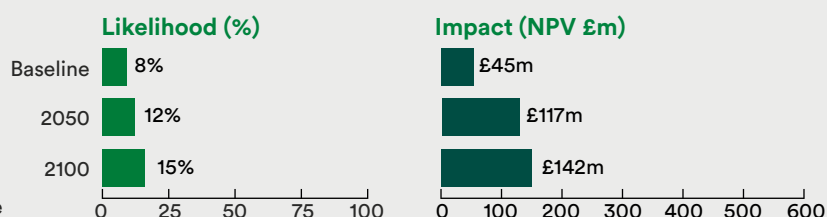


Failure of above-ground water and wastewater assets (flooding)



Average winter rainfall is projected to increase by 6 per cent by 2050, and by 12 per cent by 2100, increasing the likelihood of extreme events where sites are flooded from sea, river or surface water sources.

The impact is estimated based on three modelled events (of likelihood 1:1000, 1:100 and 1:30) each having a 10 per cent annual increase in frequency every 20 years.



Controls

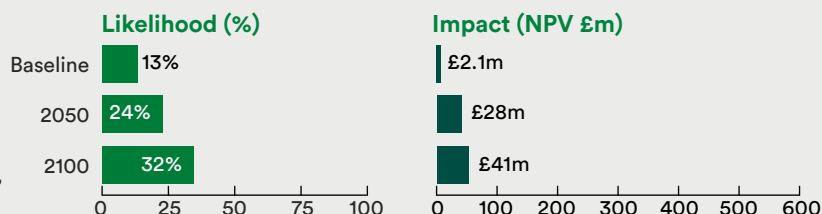
- Install permanent flood defences at most flood-prone sites.
- Improve flood forecasting capabilities.
- Build better network connectivity so that supplies can be maintained from elsewhere if a treatment works is flooded.
- Invest to ensure sites can bounce back quickly once flooding subsides.



Water network failure



Warmer, milder winters will decrease the likelihood of cold snaps/freeze thaws that result in burst pipes. However, these milder winters will result in more precipitation and flood events, causing a risk to assets close to, or crossing, rivers. Increased summer temperatures may result in considerably more heatwaves, which cause a higher peak demand. Such events can result in low pressure and no water for some customers.



Controls

- Already increased the size of our fleet of alternative supply vehicles (ASVs), and introduced a new 24/7 logistics capability.
- New Network Maintenance Services contracts with key third-party suppliers include elements to ensure all can respond effectively in an incident when required.
- Leakage reduction.
- Encourage and inform customers about using less water.
- Installation of more meters in domestic properties.

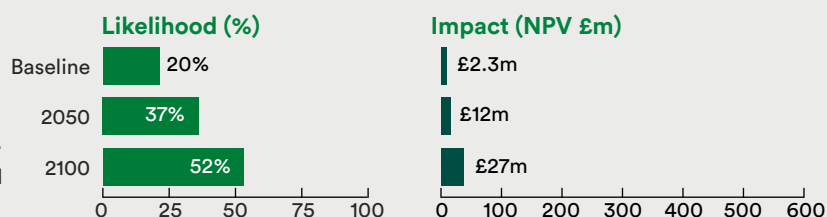


Recycling biosolids to agriculture



Climate change is expected to increase persistent rainfall. The resultant water logging will limit spreading biosolids to land for a greater part of the year and uncovered sludge stores and stockpiles will be more vulnerable in persistent wet, winter weather.

The impact calculation assumes the sludge that cannot be spread to land will be sent to restoration and the impact is the associated ODI and EA fines.



Controls

- Increased sludge storage capability.
- Utilise covered storage.
- Increased distance travelled for disposal of sludge.



Our approach to climate change

Task Force on Climate-related Financial Disclosures

Our WRMP proposals include enhanced demand management activities to offset upward pressures on water suppliers and will enable us to reduce the frequency of needing drought permits to augment supply by 2025.

As well as targeted scenario analysis, we have developed three company-wide alternative scenarios for 2050 incorporating combinations of key factors that are both highly relevant and uncertain. These scenarios, named 'climate chaos', 'green guardianship' and 'public purpose', are plausible narratives, with associated metrics, of a 2050 future for water and wastewater services in the North West.

The scenarios recognise climate change as one of the most critical uncertainties and use RCPs 2.6, 4.5 and 8.5 (GHG concentration pathways adopted by the IPCC) to describe how well climate change has been mitigated in each case.

The scenarios have provided a simple way to understand the interaction of multiple factors so we can enhance resilience, help manage future uncertainty and shape long-term decisions.

Climate change mitigation strategy

Before agreeing our strategy, we developed a matrix to assess and compare our mitigation capabilities with other water companies and brands, to explore principles, priorities and define our objectives. The matrix began with the premise that great carbon management is more than just a number and that our strategy should cover four themes: vision and visibility; ambition and commitment; demonstrating action; and beyond here and now. See figure on page 93.

We already have a strong track record of sustainability reporting and disclosure, having reported our GHG emissions for nearly 20 years. Through this TCFD section, and improvements in our CDP response, we want our carbon reporting to be open and transparent and recognised as among the best in the UK.

Other aspects of our climate mitigation strategy can be summarised as:

- integrating carbon into strategic and day-to-day business planning;
- improving our carbon reporting and climate-related disclosure;
- setting ambitious and comprehensive commitments and greenhouse gas emissions targets to contribute to limiting global temperature rise;
- reducing emissions across water and wastewater processes, sludge process and disposal, fleet management, fuel use, land use, and waste and resources; and

- collaborating to drive innovation and challenge standards to deliver a low-carbon future.

Playing our part

Pages 94 to 95 illustrate and describe how there are climate-related risks and opportunities throughout our organisation. Our approach to managing those risks, and taking advantage of the opportunities, involves all our stakeholders across our value chain.

METRICS AND TARGETS

Metrics to assess climate risks

The metrics which determine the magnitude of our climate risks and opportunities relate mainly to the weather, for instance measures such as temperature and rainfall by season. To manage our climate risks effectively we must track and understand patterns of weather, and weather events, and learn how they can affect us operationally, so we can put into place appropriate controls such as those in the risk table on pages 90 to 91.

We monitor several measures that can affect transitional risks. These include energy pricing (electricity, natural gas, diesel and alternative fuels, such as compressed natural gas and hydrotreated vegetable oil) and carbon pricing through purchasable credits, offsets and certificates (such as REGOs not bundled with electricity). We monitor the marketplace for the availability and pricing of alternative fuelled vehicles, battery storage and for emerging technologies to reduce process and fugitive emissions.

Operational metrics and targets

We have key metrics that assess the effectiveness of the controls for our principal risks and therefore determine our capability to adapt to a changing climate and ensure the resilience of our service. For these operational metrics we have set ambitious targets. For instance, to give us headroom in our water supply demand balance we have set short and long-term targets for leakage and per capita consumption (how much customers use) to reduce the demand for water in all climate scenarios. Recognising the need to maintain service to customers, even in extreme weather events, we have also set targets for supply interruptions, sewer flooding and pollution incidents.

Metric	2020	2025	2045
Per capita consumption	140	135	115
Leakage	---	↓ 15%	↓ 40%
Network interruptions	---	↓ 50%	
Sewer flooding	---	↓ 20%	↓ 70%
Pollution incidents	---	↓ 37%	↓ 64%

Climate commitments and targets

We have made several climate-related public commitments, on our own and with other organisations. Having exceeded the emissions targets we set in 2015, last year we made six pledges to reduce our carbon footprint. Central to these is to set and meet science-based targets for all emission scopes (see figure of greenhouse gas emissions by scope on page 97) and we have joined the global movement of 'Business Ambition for 1.5°C: Our Only Future' and the UN Race to Zero campaign.

Science-based targets

Science-based emission reduction targets are set in line with what climate science says is enough to limit global temperature rise to well below 2°C or 1.5°C above pre-industrial levels. This requires emissions to halve from 2010 levels by 2030 and to hit net zero by 2050.

The Science Based Target initiative (SBTi) defines and promotes global best practice in science-based target setting. We have applied the 'SBTi Criteria and Recommendations' guidance to our policies and greenhouse gas accounting standards and have applied for our targets to be validated.

Pledge 1 is to meet our science-based target to reduce scope 1 and 2 emissions by 42 per cent by 2030 (from the 2019/20 baseline). This ambition is based on the Paris Agreement's highest level of ambition, to limit global temperature rise to 1.5°C above pre-industrial levels. We have a longer-term science-based target for a 100 per cent reduction from the 2019/20 baseline (net zero without purchased offsets) by 2050.

Pledge 6 committed us to set a science-based target for scope 3 emissions and we describe how this was achieved on page 96.

Net Zero 2030 Routemap: Unlocking a net zero future

In November 2020 the UK water sector launched the 'Net Zero 2030 Routemap: Unlocking a net zero future', understood to be the world's first sector-wide plan for net zero. We have committed to contributing by stating our ambition that our water emissions (scope 1, 2 and a small selection of scope 3) will be net zero from 2030. This routemap allows companies to offset residual emissions (using agreed offsetting principles) whereas science-based targets require absolute emission reductions. This explains the difference between our science-based target to achieve a 42 per cent reduction by 2030 and being net zero from 2030 in line with the water industry ambitions.

Our approach to climate change mitigation

A collaborative strategy for a low carbon future: embedding carbon commitments across our processes, technology, culture and beyond.

VISION AND VISIBILITY

Demonstrating integrity and leadership in carbon reporting and disclosure.

Carbon management is integrated into decision-making and driving decisions and behaviours.

Enhanced disclosure aligned to TCFD recommendations.

AMBITION AND COMMITMENT

Delivering ambitious commitments to mitigate climate change and lower our carbon footprint.

Six pledges to reduce our carbon footprint

Science-based targets (SBTs)

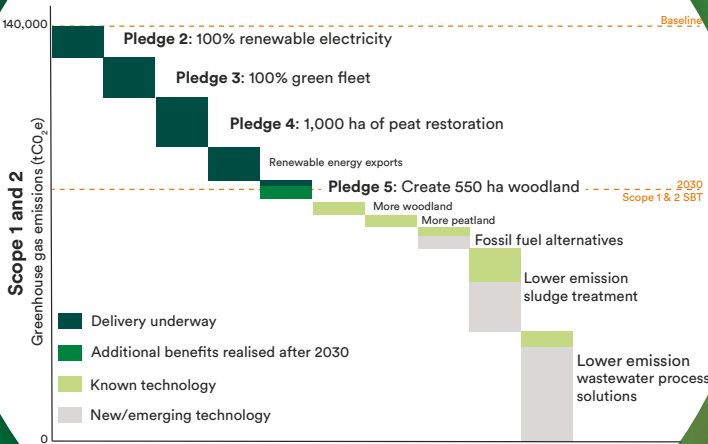
- Pledge 1** Meeting SBTs for scope 1 and 2
- 2** 100% renewable electricity by 2021
- 3** 100% green fleet by 2028
- 4** 1,000 ha peatland restoration by 2030
- 5** 550 ha woodland creation by 2030
- 6** Set SBT for scope 3 in 2021

**Net Zero 2030
Routemap:
Unlocking a
net zero future**
(UK water industry)

Science-based target to reduce scope 1 and 2 emissions by 42% by 2030
(from the 2019/20 baseline)

DEMONSTRATING ACTION

Delivering consistent and prolonged reduction of our greenhouse gas emissions and other environmental impacts.



Delivery approach in our strategy to meet our climate change mitigation commitments

BEYOND HERE AND NOW

Innovation across our processes, technology and culture and beyond.

Beyond here: influencing others, collaboration with value chain.

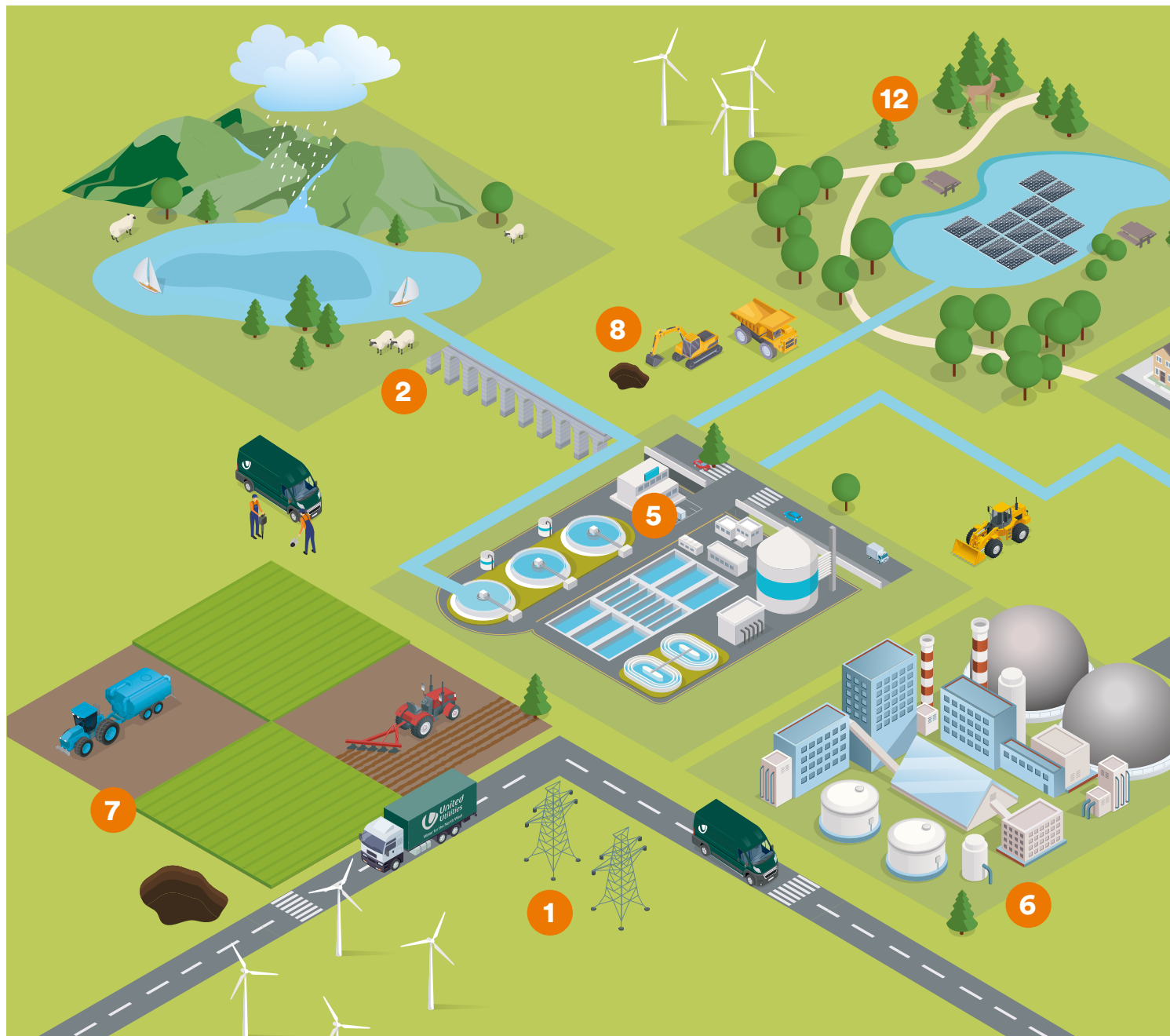
Beyond now: innovative solutions for multi-capital benefits, questioning legacy standards and specifications.

Science-based targets for scope 3
(see page 96)

Our approach to climate change

Playing our part to reduce greenhouse gas emissions across our value chain

This picture illustrates many of the operational sources of greenhouse gas emissions and the ways in which we're tackling them to deliver multiple benefits.



- 1 Grid electricity** – Delivering water and wastewater services is energy intensive but by the end of 2021 all of the electricity we use will be from renewable sources. This is helping to greatly reduce our carbon footprint, and we are going much further.
- 2 Water network** – Moving water to where it is needed can require energy for pumping, but we can use gravity to help. Victorian aqueducts help us to deliver a billion litres of water a day from the Lake District and Wales.
- 3 Wastewater network** – Energy is often needed to pump wastewater out of harm's way. We are working innovatively and in partnership to better

manage surface water to help reduce the need for pumping at the same time as reducing the risk of flooding.

- 4 Wastewater treatment** – Biological processes used to treat sewage can release greenhouse gases. We are working collaboratively with the UK water industry to improve the measurement and control of these process emissions.
- 5 Chemicals** – There is a carbon impact from producing the chemicals used in water and wastewater processes. We want to find innovative ways to minimise the amount and their impact.

- 6 Sewage sludge treatment** – We have invested in digestion technologies to generate renewable energy from sewage 'waste'. Combined with other renewables we now generate 25 per cent of our electricity needs. At our Manchester Bioresources Centre we are also able to export biogas to the national grid.

- 7 Sludge disposal to land** – Sewage contains valuable nutrients that can provide a renewable fertiliser. Greenhouse gases are released as the biosolids decay but there are also benefits from displacing fertilisers that are not reflected in our accounts.



8 Construction services – Around 30 per cent of our scope 3 emissions are related to the construction of new and replacement infrastructure. Our new science-based target seeks to address these.

9 Maintenance services – Maintaining our sites, pipes and pumps has a significant footprint. New techniques can reduce the emissions by using less power, less carbon-intensive materials and by enabling proactive intervention.

10 Transport – We cover many miles across the North West but we are already switching to low carbon vehicles and by 2028, none of our fleet of cars, vans and tankers will run on fossil fuels.

11 Business travel, offices and employee footprint – A relatively small part of our emissions providing the opportunity for employee engagement on climate change.

12 Solar and wind power – We have invested to generate more of our own electricity through hydro, wind and solar photovoltaics, including floating panels on Godley and Langthwaite reservoirs.

13 Woodland creation – We manage a lot of woodland across the North West and continue to plant more. We will create 550 hectares of additional carbon code verified woodland by 2030.

14 Nature-based solutions – We are at the forefront of deploying innovative approaches that work with nature to clean and store water. For example, wetlands can support biodiversity, reduce flood risk and provide recreation opportunities.

15 Peatland restoration – We have 20 years of experience working in partnership to restore and protect large areas of peatland in the North West.

16 Recycling – Our operations produce lots of waste, from the biosolids recovered from our wastewater treatment facilities to the excavated material displaced when we dig holes. We divert over 97 per cent to beneficial use.

Our approach to climate change

Task Force on Climate-related Financial Disclosures

BEING PURPOSE-LED

Scope 3 emissions: beyond our control but not beyond our influence

Working with others to protect the environment we fundamentally rely on.

When we committed to our carbon pledges last year we recognised that we had a limited understanding of the scale of the emissions in our value chain beyond the small number of scope 3 emissions we had reported for over ten years.

We pledged to quantify the emissions and to set a science-based target to reduce them in line with our ambitious targets for scope 1 and 2 emissions (those we own and have control over).

Together with EcoAct, an Atos company (an international sustainability consultancy), we produced an inventory of the relevant emissions using the GHG Protocol guidance and explored the target options recommended by the Science Based Target Initiative.

We have chosen two targets to obtain maximum coverage of our value chain emissions:

- That 66 per cent of our construction services suppliers (by emissions) will set their own science-based target by 2025; and
- To reduce absolute emissions for the remainder of scope 3 categories by 25 per cent by 2030, from a 2020 baseline.

Our supplier engagement target enables us to focus on the important area of carbon in construction. Our current estimate of scope 3 construction emissions is based on spend and this target will help transition to actual emissions reporting for this activity. This target aligns with our drive for efficiency, innovation and collaboration.

The absolute reduction target for the remainder of our scope 3 emissions will ensure we align to a trajectory needed to limit global warming to 'well below' 2°C.

De-carbonisation efforts across society will support further success with this target, as can be seen with the momentum behind low-carbon vehicles and energy sources. We believe we can go further and show leadership in areas of opportunity and challenge specific to our operations and climate change objectives.

Generating value for:



Playing our part for the planet means we must look 'beyond here and now', plan for the long term and influence beyond our company boundary.

Energy and carbon report

Reporting and assurance

We measure and report the greenhouse gases that result from all United Utilities' activities. We have used the financial control approach so our energy and greenhouse gas emissions reports are aligned with the consolidated financial statements for United Utilities Group PLC. This includes its subsidiaries listed in section A8 on page 260.

Our measurement and reporting is aligned to the GHG Protocol Corporate Accounting and Reporting Standard (2015) and the recommendations of the TCFD. As required, we report under the Companies Act 2006 (Strategic Report and Directors' Reports) Regulations and we apply the 2019 UK Government Environmental Reporting Guidelines, including the Streamlined Energy and Carbon Reporting Guidance (SECR). Our reporting is compliant with the international carbon reporting standard (ISO 14064, Part 1) and assured by the Carbon Reduce programme previously known as Certified Emissions Measurement and Reduction Scheme (CEMARS). We hold a Platinum status certificate as we have demonstrated emission reductions over ten years.

How we measure our greenhouse gas emissions

A carbon footprint is calculated by converting all emissions of Kyoto Protocol gases into a carbon dioxide equivalent (tCO₂e). Emissions are categorised as direct, indirect or avoided emissions.

Direct emissions (scope 1 emissions) are those from activities we own or control, including those from our treatment processes, company vehicles, and burning of fossil fuels for heating.

Indirect emissions, known as scope 2 and 3 emissions, result from operational activities we do not own or control. These include emissions produced as a consequence of electricity we purchase to power our treatment plants (scope 2) and other indirect emissions such as products and services we buy and travel on company business (scope 3).

Avoided emissions are reductions from the purchase, or export, of renewable energy. Gross emissions are the sum of all three scopes. Net emissions are the gross emissions minus reductions from avoided emissions and removals.

The GHG Protocol recommends using two methods to quantify emissions

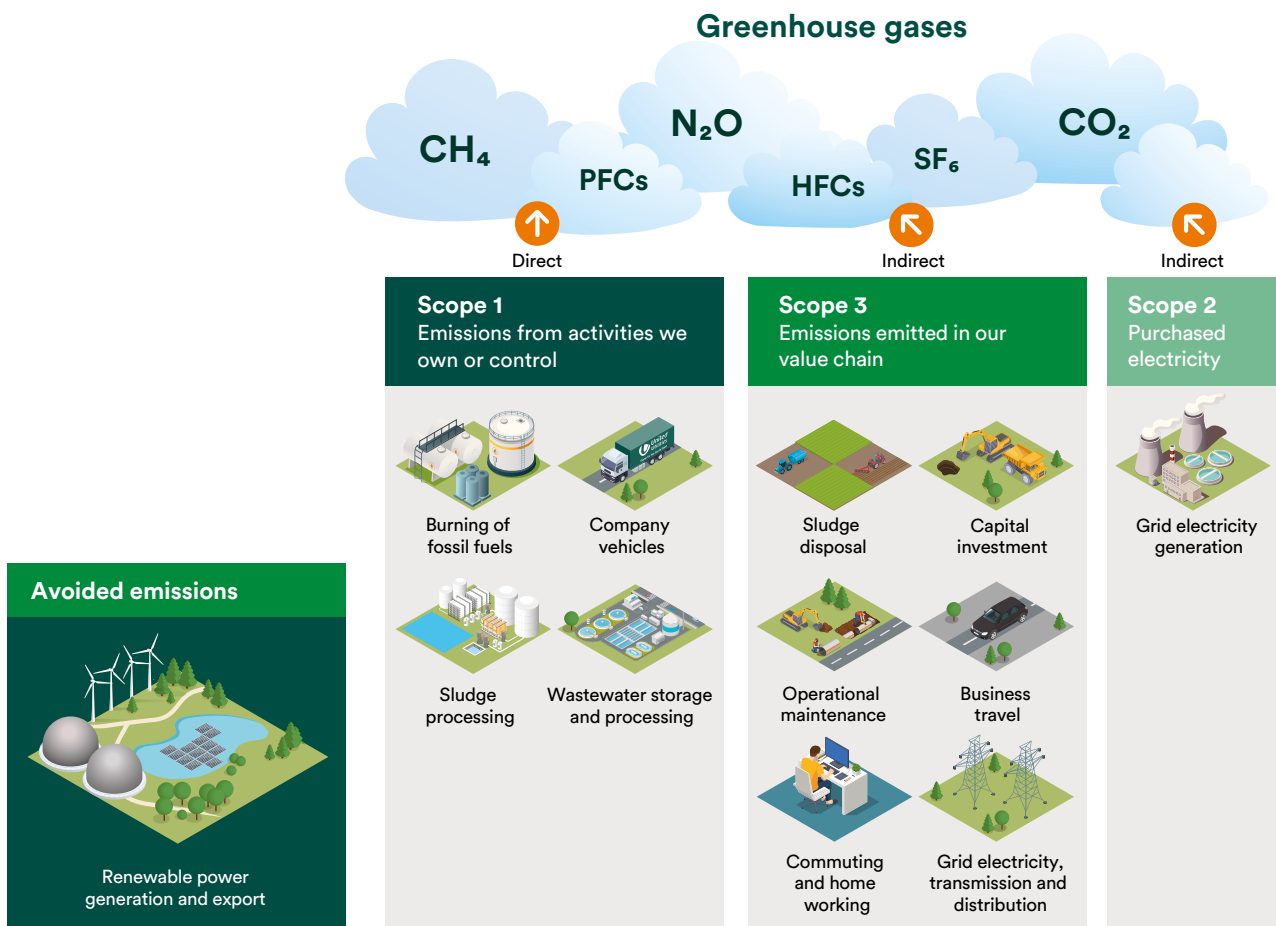
– the 'location-based' method which uses average grid electricity emissions factors and the 'market-based' method which is specific to the actual electricity purchased. Following the GHG protocol recommendation we report results using both methods and use the 'market-based' figures to report our headline emissions.

Greenhouse gas emissions and energy performance in 2020/21

Our investment in renewable energy generation has resulted this year in a further increase to 205.3 GWh, equivalent to a quarter of the electricity we consumed.

Our net scope 1 and 2 greenhouse gas emissions for 2020/21 were 127,173 tCO₂e, 1.5 per cent more than last year. This is due to an increase in fossil fuel use, the volume of wastewater being processed and the subsequent amount of wastewater sludge being produced.

Our scope 3 emissions, covering our new comprehensive inventory, have increased by 4 per cent, due to increased spend in the value chain on goods and services. In the coming years we plan to reduce the reliance on spend-based emissions calculations and will incentivise use of lower emission products, services and suppliers.



Our approach to climate change

Greenhouse gas emissions and energy

The greenhouse gas emissions for the financial year 2020/21 are presented in the table below. Emissions have been estimated using the water industry Carbon Accounting Workbook v15 (CAW v15) which incorporates the UK Government GHG conversion factors for company reporting. 2019/20 data has been restated using CAW v15 to reflect the significant changes from the previous version of the workbook, including improvements to the accounting for biogas and renewable electricity generated and used on site and an increased emission factor for wastewater process emissions (following the recommendation in UK Water Industry Research project report 'Quantifying and reducing direct greenhouse gas emissions from waste and water treatment processes – Phase 1' (20/CL/01/28)).

Scope 1, 2 and 3 emissions have been separated to align with the boundaries of our science-based targets. We now disclose all the scope 3 emissions categories described in the Corporate Value Chain (scope 3) Accounting and Reporting Standard that are deemed relevant to United Utilities. This change in scope 3 emissions reporting boundary has significantly increased our emissions in this area. The increase over the past year is due to variation in supply chain spend on goods and services.

		Current CAW v15 2020/21 tCO ₂ e	SBT baseline		
			CAW v15 2019/20 tCO ₂ e	CAW v13 2020 2019/20 tCO ₂ e	CAW v13 2019 2018/19 tCO ₂ e
Scope 1 Direct emissions					
Direct emissions from burning of fossil fuels		17,371	15,247	17,129	16,809
Process and fugitive emissions from our treatment plants – including refrigerants		98,569	96,186	84,048	88,136
Transport: company-owned or leased vehicles		16,634	15,739	15,739	14,409
Scope 1 Total		132,575	127,172	116,916	119,354
Scope 2 Energy indirect emissions					
Grid electricity purchased – generation	Market-based ⁽¹⁾	8,507	11,789	11,789	18,503
	Location-based	149,030	164,521	164,521	187,171
Scope 2 Total		8,507	11,789	11,789	18,503
SCOPE 1 AND 2 GREENHOUSE GAS EMISSIONS (GROSS)	Market-based	141,082	138,961	128,705	137,857
Avoided emissions from renewable electricity					
Renewable electricity exported		-4,184	-3,979	-3,979	-3,434
Biomethane exported		-9,725	-9,302	-9,302	-8,446
Avoided emissions Total		-13,909	-13,281	-13,281	-11,880
SCOPE 1 AND 2 GREENHOUSE GAS EMISSIONS (NET)	Market-based	127,173	125,680	115,424	125,977
Scope 3 Other indirect emissions					
Purchased goods and services		271,871	213,442	–	–
Capital goods		95,968	128,286	–	–
Fuel and energy-related emissions	Market-based	42,599	45,262	1,007 ⁽²⁾	1,577 ⁽²⁾
Upstream transportation and distribution (sludge transport)		1,119	3,374	–	–
Waste generated in operations (including sludge disposal to land)		26,333	27,936	27,410 ⁽³⁾	26,186 ⁽³⁾
Business travel (public transport, private vehicles and hotel accommodation)		1,226	3,508	2,123 ⁽⁴⁾	2,236 ⁽⁴⁾
Employee commuting and home working		4,108	4,231	–	–
Scope 3 Total	Market-based	443,223	426,039	n/a	n/a
SCOPE 3 GREENHOUSE GAS EMISSIONS (excluding capital goods)	Market-based	347,255	297,753	n/a	n/a
Science based target measure	Market-based	347,255	297,753	n/a	n/a

⁽¹⁾ Market-based figures for electricity purchased on a standard tariff have been calculated using specific emissions factors from published generator fuel mix disclosures, shown in energy use table. Location-based figures use average grid emissions and are shown in blue.

⁽²⁾ Well-to-tank emissions were not included in previous scope 3 inventory. We include well-to-tank emissions for electricity, natural gas and all liquid fuels.

⁽³⁾ Sludge-to-land and grit and screenings only, other business waste was not included in the previous scope 3 inventory.

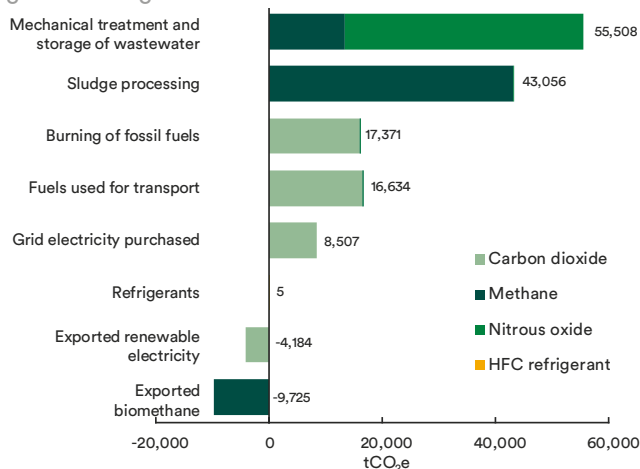
⁽⁴⁾ Hotel accommodation, other travel services and outsourced transport were not included in the previous scope 3 inventory.

United Utilities' greenhouse gas emissions intensity

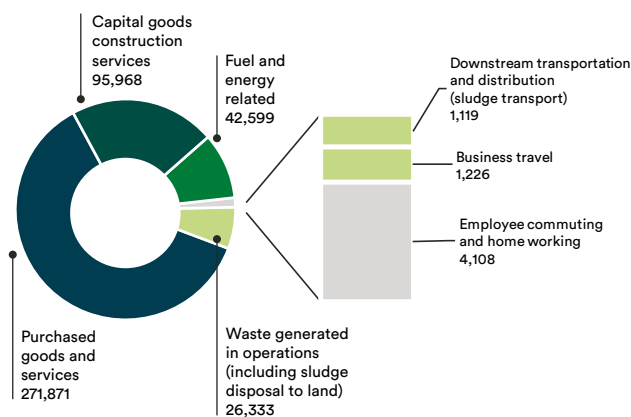
As in previous years we state our emissions as tonnes CO₂e per £million revenue. We include scope 1 and 2 emissions only in this measure. We also report the regulated emissions tonnes CO₂e per megalitre treated (using the location-based method as calculated in the CAW v15), as these are common metrics for our industry. The methodology for this calculation changed from CAW v13 so the figure is not available for 2018/19.

Greenhouse gas emissions intensity measures		2020/21	2019/20	2018/19
Scope 1 and 2 greenhouse gas emissions (gross) per £m revenue	tCO ₂ e	78.0	74.7	75.8
Scope 1 and 2 greenhouse gas emissions (net) per £m revenue	tCO ₂ e	70.3	67.6	69.3
Regulated emissions per megalitre of treated water	kg tCO ₂ e/MI	118.51	131.98	n/a
Regulated emissions per megalitre of sewage treated	kg tCO ₂ e/MI	152.26	168.51	n/a

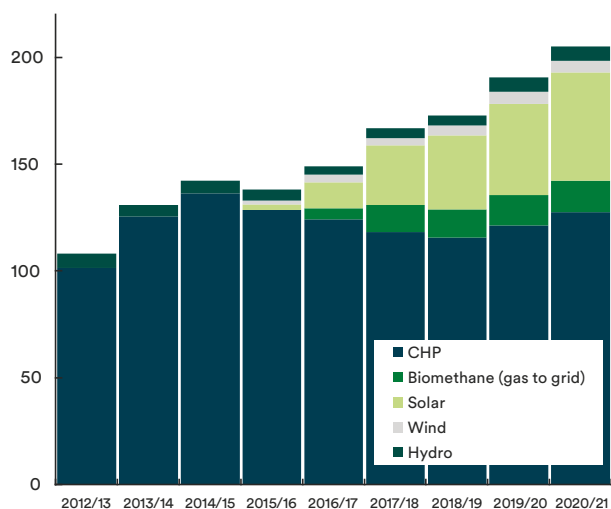
Scope 1 and 2 emissions – breakdown by activity and greenhouse gas



Scope 3 emissions by GHG Protocol category



Renewable energy generated



Energy use, generation and export

	2020/21 GWh	2019/20 GWh	2018/19 GWh
Energy use			
Electricity	807.3	802.3	807.9
Natural gas	40.0	38.3	33.0
Other fuels ⁽¹⁾	104.0	116.3	135.0
Total energy use	951.3	956.9	975.8
Electricity purchased			
Renewable Tariff ⁽²⁾	591.4	602.9	601.5
Supplier Standard Tariff ⁽³⁾	47.8	40.8	59.7
Total electricity purchased	639.2	643.7	661.2
Renewable energy generated			
CHP	127.6	121.5	115.7
Solar	50.7	42.6	34.6
Wind	5.3	5.7	4.8
Hydro	6.9	6.8	4.6
Biomethane ⁽⁴⁾	14.8	14.2	13.2
Total renewable energy generated	205.3	190.8	172.9
Renewable energy exported			
Electricity	22.4	18.1	13.0
Biomethane ⁽⁴⁾	14.8	14.2	13.2
Total renewable energy exported	37.2	32.3	26.2

- (1) Other fuels includes liquid fuel purchased for processing and transport plus business mileage in private vehicles converted to GWh using 2020 UK Government GHG Conversion Factors for Company Reporting.
- (2) Electricity purchased on a renewable tariff had 0 CO₂e/kWh emissions.
- (3) Electricity purchased on our standard tariff had 289 CO₂e/kWh emissions in 2019/20 and 178 CO₂e/kWh emissions in 2020/21.
- (4) Biomethane generated and exported to grid is expressed as an electricity equivalent.

Energy use and emissions

Our energy management strategy aims to achieve an appropriate balance between managing energy consumption, use of renewables and self-generation and being smart about how we operate our assets to get best value while maintaining security of supply. We are a relatively energy-intensive business, consuming 951 GWh in 2020/21. We have increased the amount of energy generated from renewable sources, such as hydro, solar photovoltaics, wind, biomethane and sewage sludge powered combined heat and power (CHP) generators. In 2020/21 we generated the equivalent of 205 GWh of renewable electricity, an increase of 14 GWh on 2019/20. We exported 37.2 GWh back to the national electricity and gas grids, 4.9 GWh more than the previous year. Overall we reduced our electricity purchase by 4.5 GWh.

Energy efficiency action taken

Our energy management programme brings together management processes, asset optimisation and data analytics. We have focused on optimisation of existing operations alongside realising opportunities through our capital programme to improve our use of pumps and how we manage wastewater treatment processes.

A focus area for 2020/21 has been our use of pumps. At Watchgate water treatment works, performance analysis of two key pump types led to the tactical refurbishment of the worst performing pumps and changes to the control philosophy – resulting in better efficiency, saving an estimated £40,500 per year, and a longer asset life.

At Heronbridge water treatment works, analysis of pump operation identified an opportunity to operate two pumps at minimum speed rather than a single pump at maximum speed. Running pumps closer to their best efficiency point reduces energy use and costs and should save approximately £45,000 per year.