Scottish Water
Trusted to serve Scotland

NET ZERO EMISSIONS ROUTEMAP

ANNUAL UPDATE 2023 – YEAR THREE

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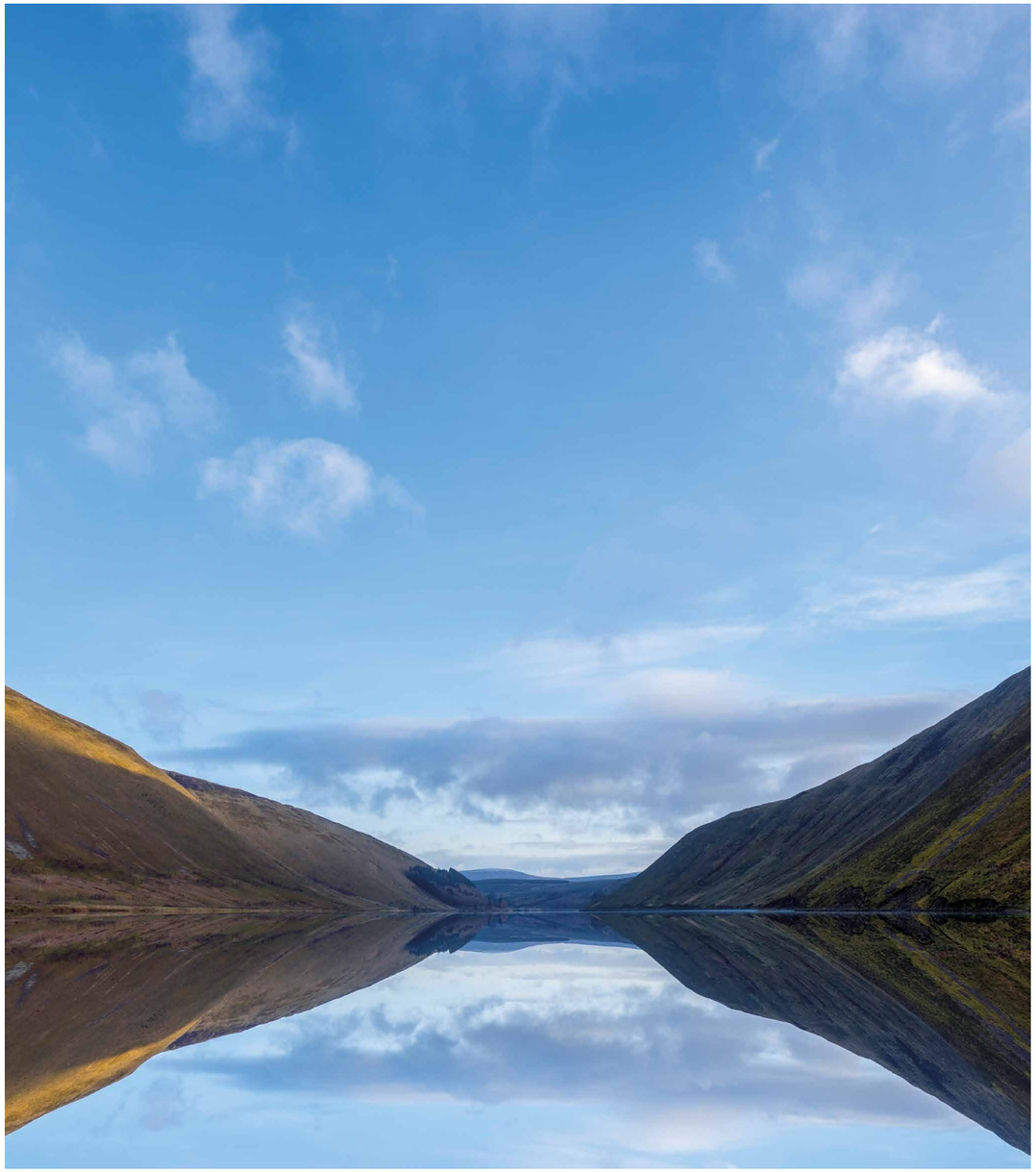
YEAR THREE OVERVIEW

We continued to deliver actions to reduce our emissions and build our knowledge in key areas over the last year.

Our annual operational greenhouse gas emissions fell by 14,000 tonnes to 217,000 tonnes CO_2e, down 6% from 2021/22 and we are on track to deliver net zero before 2040.



DELIVERY

Progress was achieved across all areas of the routemap, delivering actions to eliminate, reduce or capture emissions.

Highlights include:

- Progressing delivery of energy efficiency projects, including our first use of artificial intelligence to optimise water pumping and distribution.
- Switching on our two largest ever renewables schemes.
- Installing our first waste water process emissions analysers and beginning trials to understand and reduce process emissions.
- Reducing the emissions associated with our fleet and travel, introducing more electric vehicles and charging points and exploring alternative fuels.
- Actively increasing use of low carbon materials and low carbon construction site set up across our investment programme.
- Establishing an inventory of carbon, natural capital and biodiversity across our landholdings, helping us target where we can increase carbon capture.
- Progressing peatland restoration and woodland creation, and working with Forestry and Land Scotland to submit an ambitious Land Management Plan for Loch Katrine.

LEARNING

Developing our knowledge to maximise future opportunities and learning from our experience to date to reduce emissions is an important element of our approach.

This year we had planned several projects to restore peatland. However due to issues with agreeing land entry we were only able to restore 20.6 ha. For this year's peat and woodland creation programmes we are engaging earlier with tenants and landowners, giving us more time to address their concerns to allow the work to progress.

We surveyed 2,094 ha of peat of which we found 615 ha to be in better condition than we first thought. This has allowed us to update our emissions inventory and we have changed how we carry out future surveys, so we capture data better. We initially thought we might have to restore around 4,000 ha of poor condition peat on our land but now think it will be around half that. This year we are surveying most of our remaining peatland to understand these emissions better. We have shared the learning on what we are finding with NatureScot and other partners.

Global supply chain issues for key components impacted our energy efficiency and renewables programmes and delivery of new electric vehicles. To minimise the potential impacts, we are placing earlier orders for long lead time items to de-risk these programmes.

As we use more low carbon construction materials, we have realised that we will have to update the emission factors we use for calculating carbon – this is a long term challenge we are working on with our supply chain partners and wider construction sector.

PARTNERSHIP

Partnership is vital to achieve the emissions reductions we are committed to.

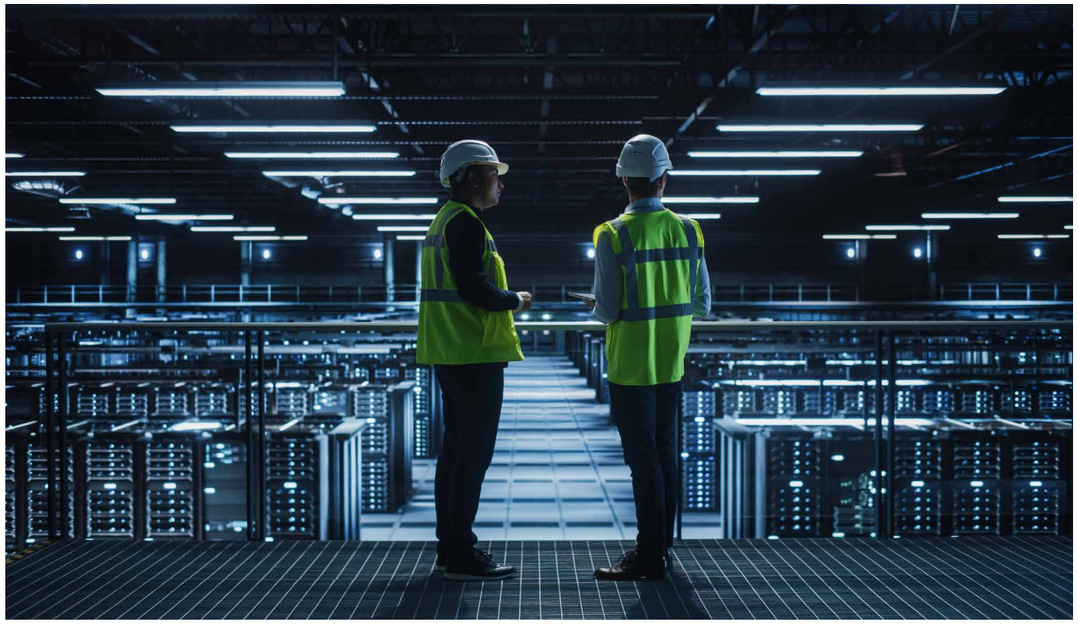
We have engaged with other major infrastructure businesses in Scotland – Network Rail, Transport Scotland, Scottish Power, SSE and the M Group development – to develop a partner ecosystem to expand the use of low carbon concretes across the country.

With our supply chain partners, we have focused on the adoption of lower carbon concrete alternatives, sustainable hydrotreated vegetable oil (HVO) to replace diesel in construction, reduced excavated material being removed from site and low carbon site set up.

With Forestry and Land Scotland, we have developed a 10-year land management plan for Loch Katrine that will capture up to one million tonnes of carbon over 60 years as well as increase biodiversity by up to 40%. It will create 4,600 ha of new woodland and restore peatland. Scottish Forestry is currently reviewing the plan for approval.

Scottish Water Horizons has been working with hydrogen producers to explore water supply options for key hydrogen projects. They are exploring potable water supplies and investigating the possible use of water from redundant reservoirs or recovered final effluent from waste water treatment works to ensure they make the most efficient use of Scotland's precious water resource. The first project for Scottish Power's Whitelees wind farm south of Glasgow is forecast to start construction later this year.

Scottish Water Horizons are also working in partnership on renewable energy projects. They are developing a hydro project on our assets that will supply renewable energy to an adjacent business. On solar energy we are working in partnership with Strathclyde University to develop a 5MW solar project at Ross Priory on their land to power the raw water pumping station there.



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COMMUNICATION AND ENGAGEMENT

Many of our investment projects are making good progress on reducing emissions, and we plan to do more. To help share knowledge and best practice we established a "Net Zero Heroes" network. This brings together our supply chain partners to share their experiences on "the art of the possible". This is proving effective at sharing best practices.

We regularly share our learning and experience with the wider public sector through the Sustainable Scotland Network, with the water sector through Water UK and UK Water Industry Research programme projects and through our Hydro Nation Chair and research fellows.

Reducing waste water process emissions is a global challenge for the water sector. We have worked with other water companies on how to measure these emissions and have installed our first on-site analysers. We have shared learning with Singapore, New Zealand and American companies that has ensured the analysers were installed in the optimum position to monitor these gases. We will continue to engage with the sector to grow our experience in this key area.

NET ZERO EMISSIONS ROUTEMAP | **ANNUAL UPDATE 2023 – YEAR THREE**

PROGRESS IN YEAR

During 2022-23 good progress was made across all 4 key strategic activity areas of our routemap:

BECOMING MORE ENERGY EFFICIENT

Saved 6.8GWh of electricity in our water and waste water services through energy efficiency projects.

Deployed artificial intelligence to optimise water distribution in central Scotland and reduce electricity demand.

Delivered the first phase of one of our major transformation projects at waste water sites to improve control and reduce energy use.

USING LOWER-CARBON ENERGY PRODUCTS

Installed 7.8GWh pa of solar renewable energy.

Commissioned our largest ever solar panel project at Balmore Water Treatment Works in Glasgow, which will generate 4.4GWh pa of renewable energy to be used on site.

Introduced 79 new electric vehicles and expanded the vehicle charging infrastructure. We now have 171 charge points across Scotland. As we replace our diesel vehicles, we will have over 800 electric vehicles in our fleet.

Reduced fleet mileage through deployment of new digital camera technology, allowing us to avoid home visits and deliver better customer service.

Deployed sustainable hydrotreated vegetable oil (HVO) with 8 of our partners in our investment programme and on 2 sites for standby power generation. This reduces emissions by 90% compared to using diesel.

EMBRACING LOW CARBON CONSTRUCTION

Increased understanding of low carbon construction materials and techniques, piloting their use on projects. Examples include lower carbon concretes, alternative to plastic kiosks and reducing material movements.

All new projects are using low carbon construction site set up and electric plant and hand tools where available.

Where used, low carbon alternatives are typically reducing carbon emissions by 60-80% from conventional approaches.

Through quarterly Net Zero Heroes events with our construction partners, shared best practices to grow understanding with 23 companies round the table.

Built intelligence on the potential costs to deliver net zero construction to inform our long-term investment planning.

Identified opportunities to improve data to assist investment decision-making.

STORING AWAY EMISSIONS THAT CANNOT BE AVOIDED

Restored 20.6 ha of peatland and created 29 ha of new woodland.

Carried out field studies to better understand the condition of peat on our land.

Submitted a 10-year land management plan with Forestry and Land Scotland for the Loch Katrine estate, forecast to save 1 million tonnes of carbon over 60 years.

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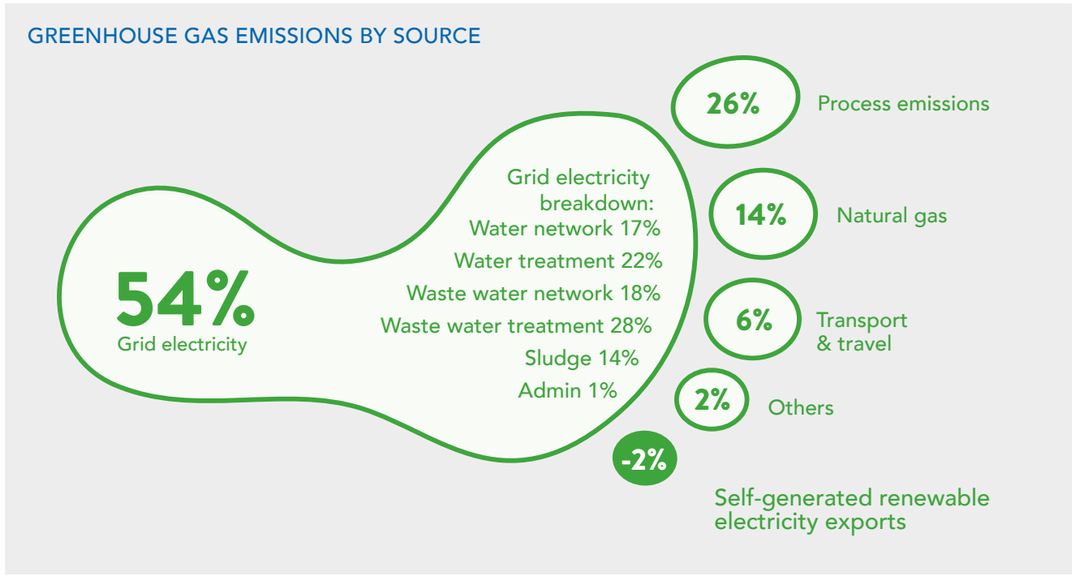
KEY OBJECTIVES FOR 2023/24

Our Year Four plan is to further increase our rate of delivery and deliver more carbon reduction than was achieved in 2022/23.

We will act across all key strategic goals in our routemap to:

- Increase the rate of energy efficiency delivery and extend the programme across more asset systems to deliver our 2030 goal of 90GWh efficiency.
- Deliver a further 7-9GWh of renewable energy capacity on operational sites.
- Progress appraisal of options for a new bioresource processing plant to recover energy.
- Expand deployment of process emissions monitors at 5 waste water treatment sites to expand our knowledge and progress trials.
- Pilot the use of diesel fuel alternatives in our heavy transport fleet, expand the use of elective vehicles and further reduce mileage.
- Deliver 300-500 ha of peatland restoration and 100-200 ha of woodland creation.
- Commence work on woodland creation and peatland restoration at Loch Katrine.
- Progress surveys of all poor condition peatland to update our carbon inventory and better target the peatland in need of restoration.
- Continue to pilot and adopt innovative designs and construction materials to reduce emissions in current projects.

OPERATIONAL CARBON FOOTPRINT 2022/23



Our operational greenhouse gas emissions fell to 217,000 tCO_2e, a 6% reduction from 2021/22.

This is a 53% reduction from our 2006/07 baseline (462,000 tCO_2e).

There were increases and decreases across the different carbon footprint categories this year.

The continued greening of the grid coupled with increased energy efficiency and renewables delivery has made a significant contribution to this progress, but at 54% of emissions, electricity remains our biggest source.

At 26% process emissions from waste water treatment are the next biggest source, which is driving much of the focus on innovation and research to minimise these emissions in the future.

The footprint report continues to support the focus set in the routemap for the key emissions we need to eliminate. As in previous years the footprint was verified externally to ISO 14064-1.

PROGRESS UPDATE

Our routemap highlighted key milestones on the way to net zero, covering all aspects of our emissions. These are supported by commitments to a range of actions and activities to build capacity and capability, and to deliver specific goals we would undertake over defined timescales to reach net zero.

Progress across each can be viewed in the sections below.

ELECTRICITY

Electricity consumption remains our largest single source of emissions at 54%. We must reduce our consumption to reduce emissions and deliver financial benefits, while enabling us to support other goals such as generating all the electricity we consume.

1) Reducing our consumption of electricity

GOAL: Reducing our consumption of electricity – Goal 20% by 2040

- 6.8GWh of energy efficiency projects delivered with a >5GWh targeted for 2022/23 as part of our transformation programme.

2) Maximising the energy we recover from bio resource

- 35.4GWh of energy was generated from bioresource in year.
- The year saw continued co digestion of whisky and brewery co-products at Nigg to generate more energy. Co-digestion is planned to start at our Seafield site in Edinburgh later this year.

3) Generating or hosting all the energy we use

GOAL: 100% of energy used is our own or hosted renewables by 2040

- Delivered 7.8GWh of additional solar renewable capacity.
- 66GWh of renewable energy was generated on our assets in the year.
- Commissioned our largest project so far, a 4.4GWh scheme at Balmore Water Treatment Works in Glasgow.
- Started construction on two novel hydro power schemes that will generate 1.2GWh pa.

CASE STUDY: BALMORE PV – BIGGEST SOLAR PROJECT DELIVERED TO DATE

Over the last year we have constructed our largest photovoltaic (PV) scheme, with 8,448 solar panels at Balmore Water Treatment Works in East Dunbartonshire.

This scheme is forecast to deliver 4.45GWh of renewable energy annually which will be used to power the site.

We have been installing renewable energy projects for over a decade and almost 80 of Scottish Water's water and waste water treatment works are now either self-sufficient or partly sufficient in their power requirements.

PROCESS EMISSIONS

Process emissions, particularly nitrous oxide (N_2O) remain the most challenging area for the water sector to address, requiring a focus on the science, measurement and management of emissions, as well as on technologies to reduce or eliminate the production of emissions.

1) Reducing our production of process emissions.

GOAL: 20% reduction

- Installed our first nitrous oxide monitors at two sites in Glasgow.
- Piloted innovative artificial intelligence software to reduce emissions.
- Reviewed all our waste water treatment works to understand the risk of nitrous oxide production at all sites.

GAS AND FUEL OIL

Reducing our reliance on fossil fuels across all our sites is a key part of getting to net zero.

1) Maximising the energy we recover from bioresource

2) Eliminating consumption of gas and fuel oil

GOAL: 100% reduction in gas and fuel oil consumption

Key Achievements:

- Roll out of sustainable hydrotreated vegetable oil (HVO) on construction projects to replace diesel.
- Adopted HVO at two operational sites for temporary power generation.
- Ceased thermal drying of waste water sludge at Meadowhead Waste Water Treatment Works reducing gas consumption.
- Installed air source heat pumps at 15 operational sites to replace fossil fuel systems.
- Surveyed the heating systems at all our offices and depots to identify replacement net zero technology and have initiated projects to scope replacement technology at 4 of our key offices.

TRANSPORT AND TRAVEL

Our fleet travelled 18.4 million miles for business reasons. Our strategy aims to minimise the miles we travel and find zero emissions ways to travel.

1) Reducing fleet mileage and business travel

GOAL: 50% reduction in the distance we travel

- Several transformation projects led to reduced fleet mileage- from a trial using customers mobile phone cameras to triage customer calls, avoiding up to a third of home visits, reducing the number of sludge tanker journeys and avoiding journeys following proactive clearing of sewer blockages.

2) Transitioning our fleet to zero emissions vehicles

GOAL: 100% Zero Emissions Fleet

- Taken delivery of 79 electric vans and lease vehicles as part of wider programme to replace diesel vehicles.
- Expanded EV charging stations across our assets and offices, with 171 now operational.
- 59 employees have taken delivery of an EV through our salary sacrifice scheme for to support them in EV purchase.

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INVESTMENT

We were the first UK water company to include investment emissions as part of our net zero goal. Investment emissions are now our biggest source of emissions each year.

1) We enable zero emission construction

GOAL: 75% reduction in carbon intensity of investment

- Launched our new system for calculating carbon on projects which will give us a clearer view of carbon in our investment programme.
- Grown the focus on carbon in our project appraisal process to better inform low carbon option selection, with more projects being able to demonstrate that the lowest carbon option is being taken forward.

2) Delivering zero emission investment with supply chain

GOAL: 75% reduction in carbon intensity

- Our Net Zero Heroes group has shared best practice from projects on reducing carbon, leading to wider adoption across our programme.
- Standardised the use of low carbon construction site set up, with the use of eco cabins, low carbon on site power generation and wider adoption of the use of electric plant and hand tools.
- Issued updated technical guidance to our project teams to drive the use of low carbon concrete mixes.
- Our procurement team have been adding low carbon materials to our frameworks, making it easier for our partners to access the materials.
- Grown the “art of the possible” to reduce carbon on projects, with an expanding range of low carbon approaches. Typically, we find that we can reduce carbon by 60-80% on an aspect of a project. Over time we are finding we can address a growing number of areas but recognise we have a long way to go to reduce investment emissions.
- Worked with our partners to develop low carbon alternatives for plastic kiosks.

CASE STUDY: HVO USE IN CONSTRUCTION

Scottish Water has established a framework for the supply of sustainably sourced hydrotreated vegetable oil that can be used by both Scottish Water and its construction partners. It's a drop in fuel replacement that reduces emissions by 90% compared to conventional diesel.

Over the last year it has been widely adopted by our construction partners, displacing diesel use in excavators, cranes and other heavy plant. It is also being used to fuel generators to provide power for remote construction sites.

On our water mains rehabilitation programme its adoption is expected to reduce emissions by nearly 30%.

CASE STUDY: LOW CARBON KIOSKS AND ENCLOSURES

Scottish Water installs many glass reinforced plastic kiosks on its assets to house a wide variety of equipment- from chemical dosing skids to electrical panels. There is a high carbon content in the kiosk- often more than the equipment in the kiosk. Two of our construction partners have been exploring alternative low carbon materials. Three new kiosk types have now been designed and built with low carbon materials and we are starting to deploy them on projects. One is made from recycled plastic bottles, one is made from engineered timber and the third is made from light gauge steel. The carbon reduction ranges from 60 to 85%, depending on the material used and the security rating of the kiosk. As well as being used by Scottish Water, other utility companies are also looking to use them on their projects.

SUPPORTING A FLOURISHING SCOTLAND

Across the 23,219 ha of our land, we can contribute to the natural, social and economic sustainability of Scotland's landscape by working to increase carbon storage and biodiversity.

1) We will capture and store more carbon dioxide than we produce

GOAL: Improve carbon dioxide storage on our land to support net zero emissions

- Extensive field surveys of land identified as in need of restoration has demonstrated that much of our peat is in better condition than we thought. We will update our land carbon emissions inventory to improve the carbon balance and enable us to target more accurately those areas in need of restoration.
- We have progressed screening of our landholdings for tree planting potential, to promote projects that deliver carbon capture and biodiversity benefits whilst not impacting our tenant farmer incomes.
- With Forestry and Land Scotland developed and submitted for approval by Scottish Forestry a 10-year land management plan for our Loch Katrine estate that will see the creation of 4600 ha of woodland and peatland restoration within the Loch Lomond and Trossachs National Park.
- Surveyed 21 of our operational sites to understand the existing biodiversity and what we could do to improve local habitats. This has led to interventions at 7 sites, with the installation of bird and bat boxes, hedgerow planting, tree planting, meadow creation and invasive species removal.

CASE STUDY: MILESTONE FOR KATRINE CARBON CAPTURE

This year we achieved a key milestone for our plans to improve carbon capture and biodiversity at Loch Katrine, the source of water for Greater Glasgow. We have been working closely with Forestry and Land Scotland to prepare a 10-year land management plan for the 9,500 ha estate around the loch and this has now been submitted to Scottish Forestry for approval.

The plan looks at how we increase tree cover and biodiversity and focuses on natural regeneration using Scottish native trees including birch, rowan, oak and alder. This approach has a minimal impact on the catchment and water quality. We will also be restoring peatland at the site.

The project is set to deliver a 40% increase in biodiversity on the estate and capture nearly a million tonnes of carbon over the next 60 years.

ENABLERS

We cannot achieve our ambitious goals alone and we assume that required future investment funding is available. On our journey to net zero there are some key enabling activities which we have progressed in the last year.

PEOPLE

- Growing use of Carbon Academy to share best practice and be a focal point for learning activities both within Scottish Water and across our supply chain.
- All of our leaders are being encouraged to complete the Scottish Governments Climate Solutions course.
- Engaging leadership in our delivery partners to focus on driving behaviour change to deliver net zero.

CUSTOMERS AND COMMUNITIES

- Engaged communities on woodland creation scheme development.
- Continued our Nature Calls campaign to bin all wipes and call for a ban on those made with plastic.
- Increased the number of our Top Up Taps to more than 100 across the country.

PROCUREMENT

- Continued to work with our 400 framework suppliers to understand their emissions and to develop emissions reduction plans.
- Added low carbon materials to our frameworks.

GOVERNANCE

- Our carbon footprint is audited to ISO14064-1.
- We have worked with the external team revising PAS2080, the standard for managing carbon in buildings and infrastructure to understand how we can improve our processes for carbon management.
- Added a new section to our Annual Report and Accounts to comply with the recommendations of the Task Force on Climate Related Financial Disclosures.

POLICY AND REGULATION

- Continued to work with the Sustainable Scotland Network and the Scottish Government on emissions reduction within the public sector, engaging with the government on the development of Scotland's biodiversity and climate change adaptation strategies.
- During 2022/23 we delivered a series of well-attended learning events with the Sustainable Scotland Network and with Royal Scottish Geographical Society to share our learning and approaches to carbon counting, capital carbon management and land carbon inventory management. We are developing our Climate Change Adaptation Plan to be published later this year.

INNOVATION

- Deployed our first process emissions monitors.
- Collaborated with water companies in Singapore and New Zealand on process emission monitoring and reduction technologies.
- Progressed development of ammonia recovery technology.
- Trialled innovative low carbon materials.
- Progressed research though our Hydro Nation Chair and research fellows.

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STRATEGIC INNOVATION FOCUS AREAS

We have progressed a number of activities across these areas.

LOW ENERGY WATER AND WASTE WATER TREATMENT, AMMONIA AND METHANE RECOVERY

DIGITAL AND ANALYTIC TOOLS

MATERIALS RESEARCH

WATER FOR HYDROGEN PRODUCTION

CASE STUDY: EXEMPLAR WASTE WATER TREATMENT WORKS

Our Exemplar Waste Water Treatment Works transformation project has installed real time control improvements and final effluent monitoring at 16 of our largest sites to reduce energy use and manage compliance risk along with condition monitoring of key equipment to give advance warning of mechanical problems that could impact service.

So far over 1GW of energy has been saved and this will increase as the control systems are optimised.

CASE STUDY: AQUADVANCE

This transformation project is optimising the operations of our largest water distribution network in central Scotland, controlling service reservoir levels and saving 2GW of energy use through the use of advanced analytic software.

CASE STUDY: CARBON CURE

We have piloted the use of a novel low carbon concrete that reduces the amount of cement needed in concrete production by injecting CO_2 into the concrete mixture to reduce emissions.

CASE STUDY: SUPPLYING WATER FOR HYDROGEN

Scottish Water Horizons are developing 25 projects across Scotland to design and deliver water supplies that will enable 6.8GW of hydrogen production. The first of these at Whitelees for Scottish Power will start construction in later this year.

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