Scottish Water
Trusted to serve Scotland

NET ZERO EMISSIONS ROUTEMAP

ANNUAL UPDATE 2024 – YEAR FOUR

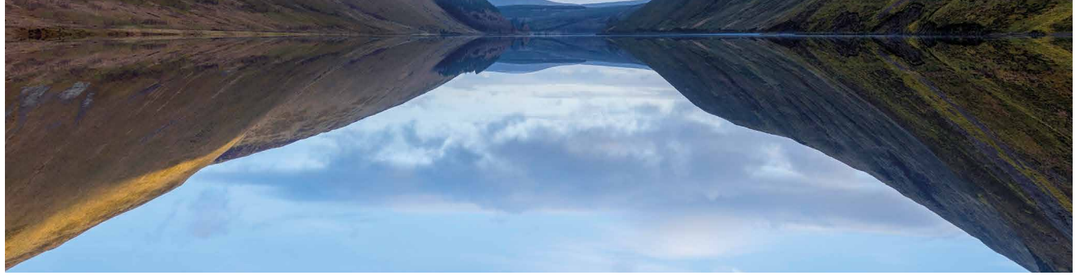
CONTENTS

YEAR FOUR OVERVIEW

We successfully delivered over 12,000 tCO_2e of carbon reductions in Year 4 of our Net Zero Routemap (2023/24).

Our annual operational greenhouse gas emissions – our carbon footprint – rose slightly to 225,000 tCO_2e during 2023/24 due to a rise in the carbon intensity factor of grid electricity used in the calculations.

Nevertheless, our actions are resulting in an overall downward trend for our operational emissions and we remain on track to deliver net zero before 2040.



DELIVERY

We continued to make progress across all areas of our routemap and delivered actions which eliminated, reduced or captured emissions.

Highlights include:

- Completed our largest number (48) of energy efficiency projects so far enabling an additional 5.68 GWh reduction in electricity use this year.
- Delivered 5.8 GWh renewable generation capacity including an innovative hydropower scheme at our Hamilton Waste Water Treatment Works.
- Delivered a record year for peatland restoration with 316 hectares (ha) restored supporting carbon capture alongside water quality, biodiversity and climate change resilience improvements.
- Planted 66 ha of native broadleaf woodland with oak, alder, hawthorn, rowan and birch trees and confirmed the establishment of 507 ha of natural woodland regeneration at Loch Katrine.
- Employed our first large electric panel van to help address our heavy transport emissions and increased our electric vehicles numbers to 473 overall with 291 charging points now installed from Dumfries to Shetland.
- With our Delivery Partners, reduced our construction sites carbon emissions by replacing diesel with hydro-treated vegetable oil (HVO), replacing traditional temporary access road construction with lower carbon aluminium trackway systems, using hydrogen-powered CCTV security units and lower carbon site welfare units.
- Developed and tested lower carbon site kiosks with our capital partners using recycled plastics, light gauged steel and timber.
- Undertook a low concrete pilot with Breedons and Caledonia Water Alliance using Carbon Cure technology, a first in the UK, capturing CO_2 in concrete. A roof slab for a large flowmeter chamber was produced with the potential of up to 10% CO_2 savings compared to a standard mix.
- Supported over 40 hydrogen projects with the potential to generate 3 GWh using a range of water resource types from potable water right through to waste water effluent.

YEAR FOUR OVERVIEW
PROGRESS IN YEAR
KEY OBJECTIVES FOR 2024/25
OPERATIONAL CARBON FOOTPRINT 2023/24
PROGRESS UPDATE
ENABLERS
STRATEGIC INNOVATION FOCUS AREAS

LEARNING

We continue to focus on developing our knowledge to identify and maximise future opportunities and we continue to review our progress and learn from our experiences.

We have improved our processes, skills and communication approaches around woodland planting and peatland restoration enabling larger areas to be restored and planted this year. We are looking to continue to mitigate against weather (notably winter storms) and commercial challenges by identifying and bringing forward larger numbers of candidate projects at the initial stages.

This year our renewables programme was impacted by the ability to retain people in a very active recruitment environment as the UK grew its renewable capacity. We are looking to address this through the implementation of a new reward framework.

In 2023/24 we paused the development of any new solar PhotoVoltaic (PV) schemes whilst we worked to establish an ethical supply chain. To continue to support our renewable energy generation targets we have examined alternative PV opportunities and wider renewable energy prospects such as wind and hydro power and continue to build our capabilities in these areas.

We have recognised that we need to expand our knowledge and capabilities around the installation of process emission monitors in our activated sludge waste water sites and their data connectivity with our existing digital systems. We are therefore increasing our resourcing in this area.

To reinforce the management, continuous improvement and learning required to embed net zero across all we do, we have commenced reviews and audits towards accreditation with the revised PAS2080 (Publicly Available Specification) for carbon management. We hope to achieve accreditation by next year.

PARTNERSHIP

We can only achieve our Beyond Net Zero ambition by working in partnership and we are continuing to strengthen and expand our activities in this area.

Our 10 year land management plan for Loch Katrine with Forestry and Land Scotland (FLS) has now been approved by Scottish Forestry (SF) which will support the capture up to 1 million tCO_2e over the next 60 years on 4,600 ha by planting and regenerating woodland and restoring peatland over the coming years.

We have partnered with the Royal Botanic Garden Edinburgh on their 'plants with purpose' programme to examine and optimise planting schemes to support carbon reduction in blue green infrastructure projects such as rain gardens and storm water planters.

We are expanding our woodland creation to support the Clyde Climate Forest with 60-70 ha at three woodland areas planned for this year with 19 ha woodland already created adjacent to the Clyde Climate Forest boundary.

To support the growing hydrogen economy, our business arm Scottish Water Horizons is partnering with stakeholders and production companies on over 40 projects across the country with a potential hydrogen capacity of over 3 GWh. Scottish Water Horizons provide hydrogen feasibility assessments, design, build and operation, and maintenance services on a range of water sources. This includes potable treated water, untreated raw water and final effluent from waste water.

Our commitment to partnership has led to Scottish Water to join the Edinburgh Climate Compact which will also support our existing membership of the Glasgow Climate Compact.

Finally, our Low Carbon Concrete Collective (LCC) with Network Rail, SSE, Scottish Power and Transport Scotland is continuing to make progress. The Collective was established in 2022 to accelerate the development, availability and adoption of the next-generation of low carbon concrete in Scotland and are progressing the design and pilot of:

- Pre-cast low carbon concrete manhole ring using a GGBS-blend with Recycl8's innovative bottom ash aggregate which uses landfill waste embracing the circular economy
- A structural foundation using the Recycl8 mix
- A pre-cast cable trough using the Recycl8 mix.

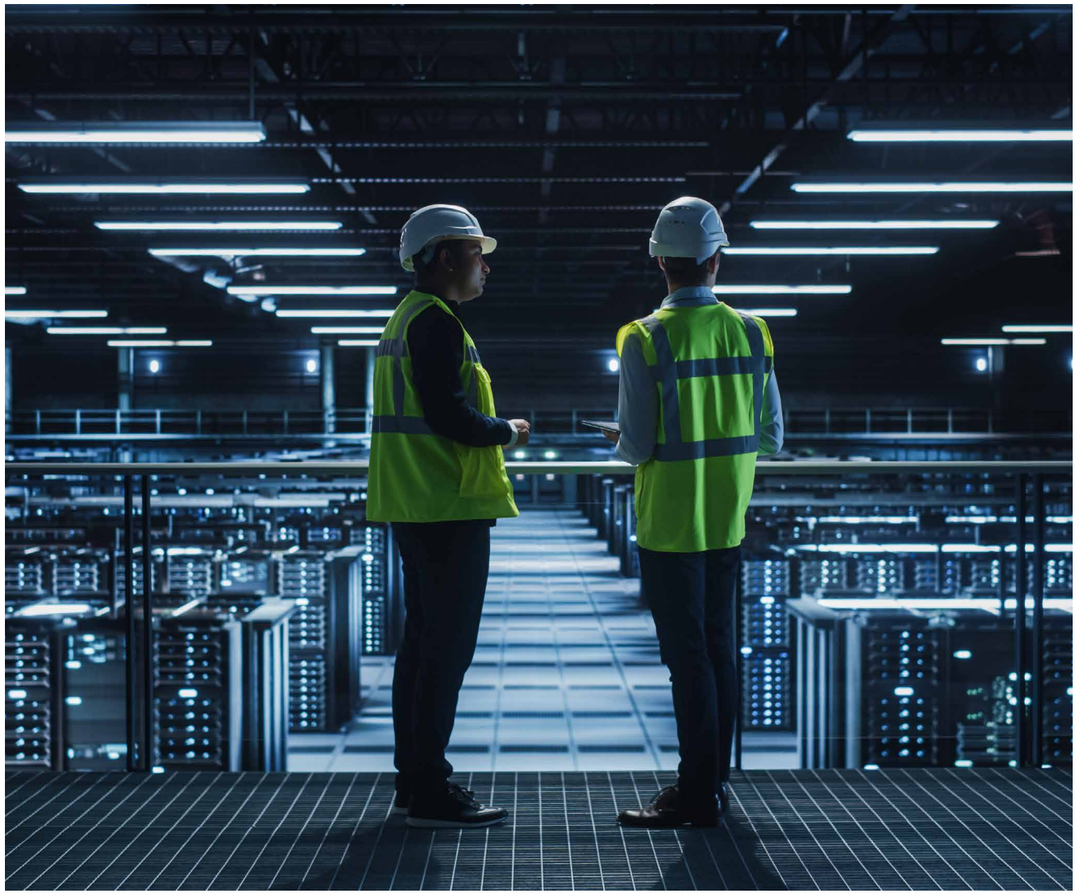
If you would be interested in partnering with us for example to:

- extend peatland regeneration, woodland planting and biodiversity schemes
- demonstrate renewable energy technologies and low carbon products
- establish blue-green and nature based rural and urban catchment solutions.

Please contact our Net Zero team at: **SWNetZero@scottishwater.co.uk**.

PARTNERS:

Transport Scotland – Còmhdhail Alba
STORY
SSE
ScottishPower
Scottish Water – Trusted to serve Scotland
RECYCL8
NetworkRail
Marshalls
RJ McLeod
Ibstock – At the heart of building
George Leslie
Breedon



COMMUNICATION AND ENGAGEMENT

To encourage knowledge sharing, our Net Zero Heroes network is going from strength to strength.

We now have over 60 people meeting together regularly from Scottish Water and our supply chain partners to share best practice. It includes people who have enabled and implemented carbon savings and carbon capture opportunities and others who have improved Net Zero reporting or delivered an exemplary project to help us with our sustainability ambitions. We have also initiated work with some of our key equipment suppliers to better understand how their products will decarbonise over time. This has allowed us to update our pathway to Net Zero investment emissions, which we forecast delivering for 2040.

We have been externally recognised for our work receiving a Distinction for the Net Zero Carbon Champion at the Global Water Awards, and we have also been recognised as one of the most inspiring utilities in the Achiever category of International Water Association's 2024 Climate Smart Utilities Recognition Programme.

YEAR FOUR OVERVIEW
PROGRESS IN YEAR
KEY OBJECTIVES FOR 2024/25
OPERATIONAL CARBON FOOTPRINT 2023/24
PROGRESS UPDATE
ENABLERS
STRATEGIC INNOVATION FOCUS AREAS

PROGRESS IN YEAR

During 2023/24 we made good progress across all 4 key strategic activity areas of our routemap:

EMBRACING LOW CARBON CONSTRUCTION

Adopted low carbon steel reinforcement (Rebar) products with c. 50% lower CO_2e content. Approximately 12% of our construction emissions are associated with Rebar products and therefore a reduction of 5-6% of our total construction emissions is now possible.

Started the development of low carbon concrete pilots – a pre-cast low carbon concrete manhole ring, a structural foundation and a pre-cast cable trough using a ground granulated blast-furnace slag (GGBS) blend with Recycl8's bottom ash aggregate using landfill waste embracing the circular economy.

BECOMING MORE ENERGY EFFICIENT

Saved 5.68 GWh of electricity in our water and waste water services through energy efficiency projects.

Saved over 0.46 GWh of energy so far through the installation of best efficiency point control at five of our largest pumping stations.

USING LOWER-CARBON ENERGY PRODUCTS

Completed 13 renewable energy projects with a generating capacity of 5.8 GWh.

Installed Scotland's first containerised hydropower scheme at Hamilton Waste Water Treatment Works generating c. 0.42 GWh of electricity.

Added a further 214 electric vehicles to our fleet giving us 473 in total and expanded our number of charging points to 291.

Deployed sustainable hydro-treated vegetable oil (HVO) reducing our diesel emissions by up to 90% with our investment programme partners.

STORING AWAY EMISSIONS THAT CANNOT BE AVOIDED

Restored a record 316 ha of peatland in our water catchments capturing over 6,000 tCO_2e alongside improving raw water quality.

Planted 66 ha of native broadleaf woodland with oak, alder, hawthorn, rowan and birch trees.

Confirmed the establishment of 507 ha of natural woodland regeneration at Loch Katrine.

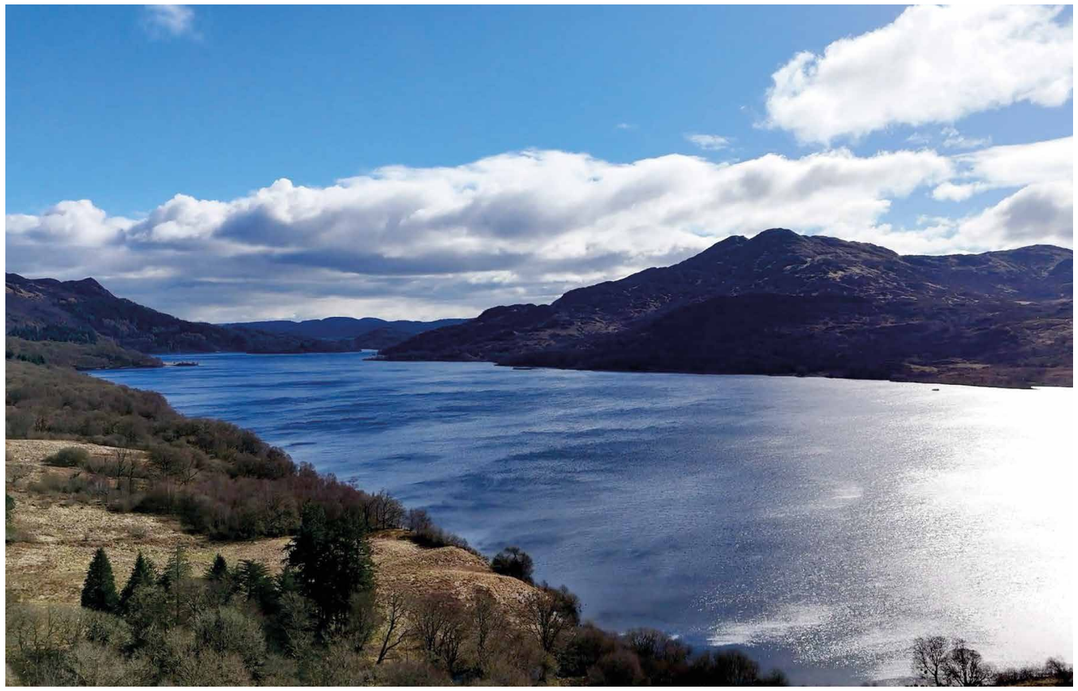
Published the contribution of our woodland creation and peatland restoration programmes to biodiversity in our triennial **Biodiversity Report** which set out our first natural capital accounts and presented our biodiversity baseline.

KEY OBJECTIVES FOR 2024/25

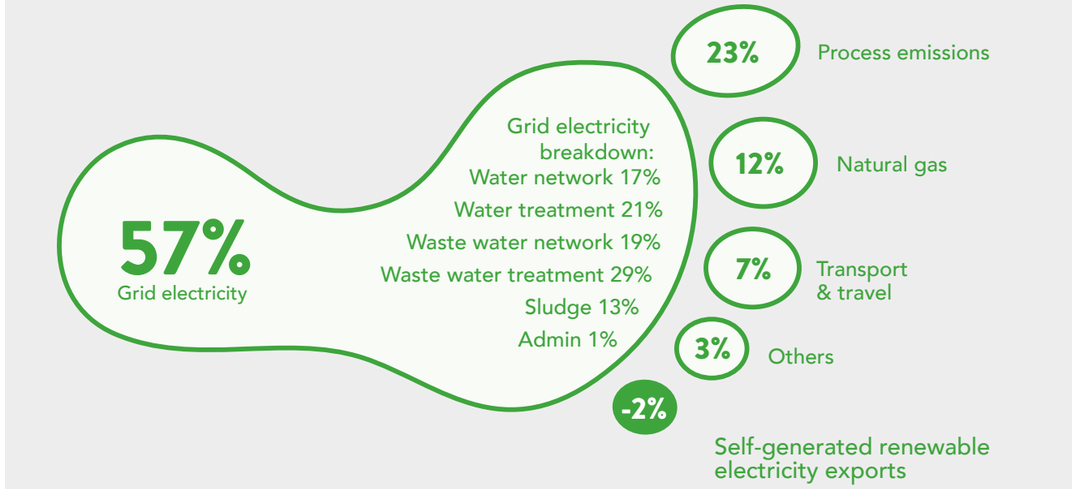
Our Year 5 plan is to further increase our rate of delivery and deliver more carbon reduction than was achieved in 2023/24.

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

- Develop and deliver opportunities to reduce emissions, particularly in energy efficiency, renewable energy and our vehicle fleet.
- Work with our partners on the development of hosted wind farms on our land.
- Progress work to improve measurement and control of nitrous oxide emissions at large waste water treatment works.
- Work with our supply chain partners to introduce low carbon designs and materials and to expand the "art of the possible" to reduce investment emissions.
- Progress changes to how we capture data to allow us to better measure carbon.
- Progress woodland creation and peatland restoration on our land holding to improve carbon capture.
- Start work on our Circular Economy Resource Recovery Factory at Alloa installing resource recovery treatment units for grit, cellulose and nutrients.
- Continue to develop blue green infrastructure to support climate change resilience and carbon reductions alongside biodiversity improvements.
- Engage with other UK and international water companies and other sectors to share and grow our knowledge on how to reduce emissions.



OPERATIONAL CARBON FOOTPRINT 2023/24



Our annual operational greenhouse gas emissions – our carbon footprint – rose slightly to 225,000 tCO_2e during 2023/24.

Whilst we continued to make good progress on energy efficiency and renewables, rises in the carbon intensity of grid electricity, contributed to a 2.3% (5,000 tCO_2e) increase compared with the previous year[3].

Nevertheless, our actions are resulting in a continued downward trend for our operational emissions and we remain on track to deliver net zero before 2040.

To do this we need to progress hosted wind farms on our land, invest in new technology to replace ageing sludge drying facilities and for the electricity grid to decarbonise. These, along with current intelligence on progress of process emissions reductions and forecast increase in carbon capture on our land show that we should achieve operational Net Zero in the mid-2030s.

As in previous years the footprint was verified externally to ISO 14064-1.

The continued greening of the grid coupled with increased energy efficiency and renewables delivery has made a significant contribution to our progress, but at 57% of emissions, electricity remains our biggest source.

At 23% 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.

[3] Our reported 2022/23 carbon footprint was found to contain an error that slightly under-reported the amount of electricity consumed by several PFI schemes. The revised 2022/23 footprint is 220,000 tCO_2e, a 1% increase on what we previously reported.

NET ZERO EMISSIONS ROUTEMAP | **ANNUAL UPDATE 2024 – YEAR FOUR**

PROGRESS UPDATE

We have highlighted key milestones on the way to net zero in our routemap which covers all aspects of our emissions. Our milestones are supported by a range of actions and activities to build capacity and capability which we undertake to deliver specific goals over defined timescales to reach net zero.

Progress across our goals can be viewed in the sections below.

ELECTRICITY

Electricity consumption is still our largest single source of emissions at 57%. We must reduce our consumption to reduce emissions and increase 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

- 5.68 GWh of energy efficiency projects were delivered against an in year target of 5.2 GWh for 2024/25.

2) Maximising the energy we recover from bioresources

- 48 GWh of energy was generated from bioresources in 2023/24.
- Co-digestion of whisky and brewery co-products at Nigg continued to generate more energy. Co-digestion at our Seafield site which is operated via a Private Finance Initiative (PFI) was delayed but we hope to start in 2025.

3) Generating or hosting all the energy we use

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

- Delivered 5.8 GWh of additional renewable capacity through solar and hydro generation. An additional 6.1 GWh of additional renewable capacity is planned for delivery in 2024/25.
- Overall 72 GWh of renewable electricity was generated in 2023/24.
- Continued to progress 311 GWh of new windfarms with RWE and Wind Estates which will be located on our land. Both projects are estimated to be commissioned in 2028.
- Continued to work with developers to identify additional windfarm opportunities.

CASE STUDY: INNOVATIVE HYDROPOWER SCHEME AT HAMILTON

Scottish Water Horizons has delivered an innovative hydropower scheme at Hamilton Waste Water Treatment Works. This project signifies a significant leap forward for the industry, achieving several notably milestones. Firstly, it marks the UK's first mid-process waste water installation which maximises energy potential. It is also Scotland's first containerised hydropower installation, delivering dual benefits of reducing construction emissions whilst saving time and costs. This project reduces our reliance on imported grid electricity and minimises on-site energy expenses. The scheme is estimated to produce 0.42 GWh of green electricity annually, offsetting approximately 14% of the site's yearly energy demand and mitigating around 64 tCO_2e annually.

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

- Started design work for our full-scale methane recovery unit at Nigg Waste Water Treatment Works.
- Expanded our nitrous oxide monitoring to a further site outside Glasgow and implemented innovative laser process emission detection at our Laighpark works.
- Further developed our innovative artificial intelligence software to reduce emissions.
- Assessed the emissions from some of our smaller treatment works notably our lagoon treatment site at Errol.

GAS AND FUEL OIL

Reducing our reliance on fossil fuels across all of 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:

- Implemented our sustainable hydro-treated vegetable oil (HVO) procurement framework with our delivery partners.
- Continue to expand HVO use to our standby generators and Scottish Water's heavy fleet vehicles.
- Installed 10 air source heat pumps to replace fossil fuel systems this year giving us a total of 48 so far.
- Delivered our largest single efficiency project this year which was a waste water pumping station upgrade saving 0.7 GWh.

TRANSPORT AND TRAVEL

Our fleet travelled around 18.4 million miles for business reasons. This was equivalent to the previous year. 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 a further 214 electric vehicles (EV) as part of our programme to replace diesel vehicles.
- Expanded our EV charging stations across our treatment sites and offices to 291.
- 153 employees have used the salary sacrifice scheme to support their EV purchase. This is an increase of 94 in year.
- Taken delivery of our first large electric panel van as a pilot to test their range and payload for our needs.

CASE STUDY: MOVE TO ALL EVS IN ORKNEY

10 new electric vans have been delivered to Customer Water Services (CWS) and Electrical and Mechanical (E&M) operational teams in Orkney, across Westray, Sanday, Eday, North Ronaldsay and the Orkney Mainland. To support the transition, electric vehicle (EV) charging points have also been fitted at operational sites including Boardhouse Water Treatment Works, Kirkwall Waste Water Treatment Works and Bu-Point Waste Water Treatment Works, with another 5 site installations in progress. All operatives are very pleased with the new EV driving experience and pioneering for the greener environment.

INVESTMENT

We were the first UK water company to include investment emissions as part of our net zero goal. Now that our operational emissions have reduced 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

- Continued to develop our Low Carbon Concrete Collective group with other infrastructure organisations across Scotland to accelerate the development, availability and implementation of the next-generation of low carbon concretes in Scotland.
- Continued to improve how we calculate carbon on projects so we can better assess the carbon intensity of our investment programme.
- Implemented a low carbon kiosk procurement framework making it easier to use these kiosks and avoid using glass reinforced plastic kiosks. The framework low carbon kiosks are 50-75% lower in carbon than our traditional designs.

2) Delivering zero emission investment with supply chain

GOAL: 75% reduction in carbon intensity

- Our Net Zero Heroes group has continued to share best practice from projects on reducing carbon, leading to wider adoption across our programme.
- Increased the use of low carbon concrete blended mixes across the country and updated our procurement framework to include these mixes. Projects like our Braidholm Flood Aleviation project used an Eco Pack Blended concrete mix that saved 15 tCO_2e in a single pour.
- Started to see more use of recycled aggregates on site.
- Reused water for pressure testing reducing tanker movements.
- Applied pneumatic compactors on site to reduce skip movements.
- Achieved our first low carbon site establishment through the use of our standardised 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.

CASE STUDY: TREATED WATER STORAGE BURGHMUIR

Repairing and maintaining treated Water Storage tanks in our networks across the whole of Scotland is responsible for c. 10% of the spend on our water treatment works and networks each year. Given the repeatability of site set up's for this work MacKenzie Construction Limited (MCL) investigated the lowest carbon site set up.

Burghmuir treated water storage tank repair in Perth, had a 42 week work programme, MCL adopted – aluminium track panels for the access road, eco welfare units, hybrid power generator, HVO to replace diesel and used a hydrogen powered site security system.

By comparing a traditional site set up with the set up at Burghmuir, MCL achieved a 97% reduction in CO_2e emissions saving 126 tCO_2e and a £43k reduction in costs. 70% of the site establishment used hybrid power.

This set up is now BAU across our sites.

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**

- Restored a record 316 ha of peatland improving carbon capture, water quality and biodiversity.
- Planted 66 ha of new native woodland.
- Achieved natural regeneration of 507 ha of land at Loch Katrine.
- Continued to screen our landholdings for further peatland restoration and tree planting potential, to deliver carbon capture and biodiversity benefits whilst not impacting our tenant farmer incomes.
- Scottish Forestry approved our 10-year land management plan with Forestry and Land Scotland 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.
- Completed interventions at several of our water and waste water treatment sites to improve local habitats through the installation of bird and bat boxes, hedgerow planting, tree planting, meadow creation and invasive species removal.

NET ZERO EMISSIONS ROUTEMAP | **ANNUAL UPDATE 2024 – YEAR FOUR**

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

- Grew our 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.
- Encouraged all our leaders to complete the Scottish Governments Climate Solutions course and developed with Zero Waste Scotland a Circular Economy course for all our people.
- Engaged our delivery partner leaders 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.
- Linked with the NHS Scotland on our Nature Calls campaign and developed a Nature Calls Checklist poster which included asking customers to "return unused medicines to the pharmacy for safe disposal".
- Increased the number of our Top Up Taps now at 133 across the country.

PROCUREMENT

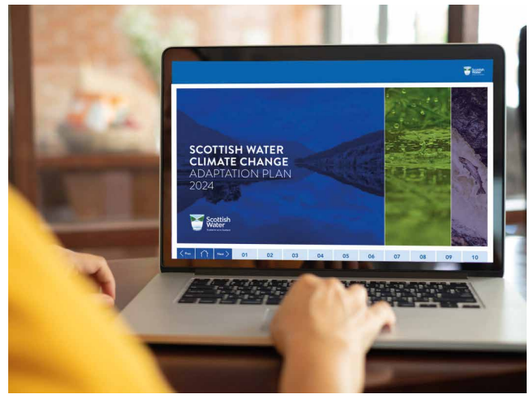
- Continued to work with our 400 framework suppliers to understand their emissions and to develop emissions reduction plans.
- Added further low carbon materials to our frameworks.

GOVERNANCE

- Our carbon footprint was audited to ISO14064-1.
- Started work to achieve PAS2080 certification, the standard for managing carbon to understand how we can improve our processes for carbon management.

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.
- Published our **Climate Change Adaptation Plan**.



INNOVATION

- Continued to deploy our process emissions monitors including innovative laser monitors (Granperspective).
- Collaborated with water companies in Singapore and New Zealand on process emission monitoring and reduction technologies.
- Progressed development of ammonia recovery technology.
- Trialed innovative low carbon materials.
- Progressed research though our Hydro Nation Chair and research fellows.

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 PUMPING STATIONS

Our Exemplar Waste Water Pumping Stations Transformation project has implemented best efficiency point control at five of our largest pumping stations. We have also connected the asset to the Xylem Avensor portal which allows for 24/7 remote monitoring of the station, allowing our operators to prioritise important operational issues. So far over 0.46 GWh of energy has been saved and this will increase as we optimise the further 30 stations in scope.

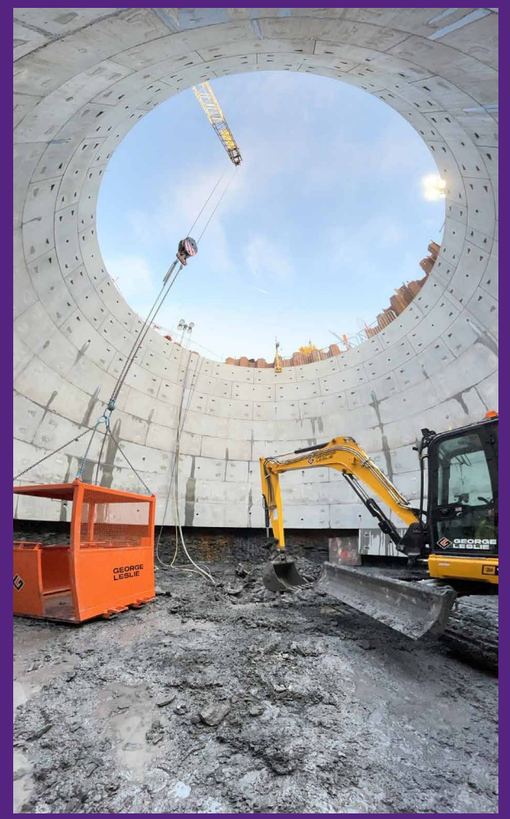
CASE STUDY: PROCESS EMISSION NITROUS OXIDE (N_2O) REDUCTION TRIALS

We have worked with Cobalt Water to grow our understanding of these technically challenging process emissions. From our results at sites in Glasgow it is becoming clear that nitrous oxide emissions which are currently calculated on a per capita basis are very site specific.

CASE STUDY: BRAIDHOLM

We have started to see the use of recycled aggregates on our sites. George Leslie at Braidholm worked with WH Malcolm to adopt recycled aggregate. 600 tonnes of secondary (recycled) aggregates as bedding material for pipes and hardstanding, and 225 backloaded tipper wagons removing 4,000 tonnes of excavated material for recycling was achieved. With concrete being one of the construction industry's biggest carbon emitters, the Braidholm Road team used 400m^3 low carbon concrete (40% less CO_2e). Other innovations employed included low energy welfare units, using temporary "fluming" of sewers saving 32 days over pumping, monitoring plant and vehicle idling times, monitoring vehicle driving styles, and trialling the using of small mobile battery power units for small plant. The total carbon saved was approximately 220 tCO_2e.

Recently we have also seen what Brewster Bros can deliver, including producing recycled sand for concrete and also providing Environmental Product Declarations (EPDs) for all their recycled aggregates.



CASE STUDY: SUPPLYING WATER FOR HYDROGEN

Hydrogen is a key fuel in the wider Net Zero transition, and water is a key component. To support the growing hydrogen economy, our business arm Scottish Water Horizons is working with stakeholders and production companies on over 40 projects across the country with a potential hydrogen capacity of over 3GW. We are working with them to provide feasibility assessments, design, build and operation, and maintenance services on a range of water sources. This includes potable treated water, untreated raw water and final effluent from waste water.

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PUBLISHED: OCTOBER 2024