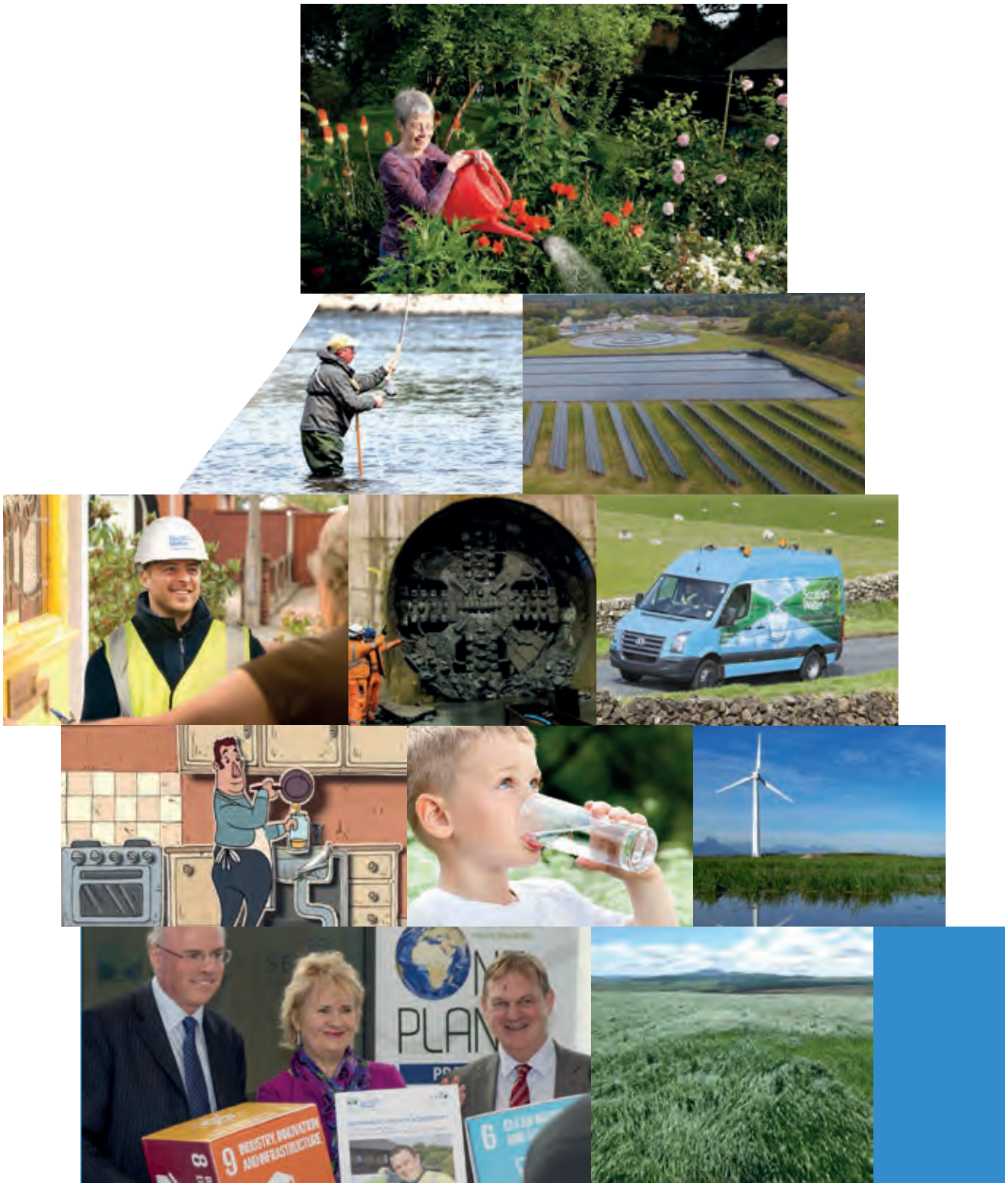
Scottish Water

Trusted to serve Scotland

Sustainability report 2018



Doing the right thing for Scotland

Our vital role

Every day, we deliver 1.38 billion litres of clear, fresh drinking water and take away 929 million litres of waste water which we treat and return safely to the environment.

The service we provide to 2.52 million households and 153,000 business premises is essential to daily life in Scotland.

The quality of drinking water we provide to customers has been sustained at a high level and our investment helps to support jobs and economic growth while protecting and enhancing the environment.

We do all of this at a cost which is among the lowest in Great Britain. Our average household charge is £42 lower per year than the average household charge in England and Wales.

During the six years of our investment period 2015-21, we plan to invest around £3.9 billion in maintaining and replacing our infrastructure and in delivering further improvements to drinking water quality, protecting the environment and supporting the Scottish economy. In 2017/18, the third year of that programme, we invested a total of £647 million.

Customer charges go towards maintaining and improving:

30,246
miles of water pipes

32,940
miles of sewer pipes

242
water treatment works

1,826
waste water treatment works

Contents

Icon key

We have developed the 3 icons shown below to represent the **Environment**, **Society** and the **Economy**. We have used the dark blue icons throughout this report to help you quickly identify the areas where our activities are having a positive impact.

Foreword

"In supporting Scotland's circular economy strategy, we have an opportunity to be a leader in delivering sustainable services; becoming more resource efficient, low carbon, and socially sustainable in everything we do."

Douglas Millican, Chief Executive

Welcome to our seventh annual sustainability report. In striving to fulfil our vision of being trusted to care for the water on which Scotland depends, we are increasingly focused on our interaction with the natural environment and with society. This year we expand upon the natural and social capital themes that we introduced last year.

We provide vital water and waste water services to nearly every household and business in Scotland. Through our work, we make a vital contribution to Scotland's health, prosperity and the sustainability of our society and the natural environment.

We will continue to work with our customers, regulators and the Scottish Government to shape a robust and appropriate regulatory framework that supports the Scottish Government's objectives for growth and the circular economy, fostering a sustainable water industry.

We have taken significant steps to reduce our carbon footprint (by one third over the past eleven years) and increase the amount of renewable electricity that we generate. Today we generate and host renewable electricity equivalent to more than double the grid electricity that we consume.

We see even more opportunities to make us a truly sustainable service, including maximising the value we can recover from waste water and developing partnerships with communities.

Natural and social capital

Natural Capital describes the stock from which we draw the environmental services that support society – the water we drink, the air we breathe, the food we eat and the land on which we live, work and play.

Social capital represents our impact on, and the engagement and trust we have with, customers, individuals, communities and stakeholders.

Highlights of the year

- Our carbon footprint continues to reduce, supported by further decarbonisation of grid electricity.
- 2017/18 saw us pass the renewable electricity milestone of hosting the generation of more than double the electricity we consume.
- We launched our Capital Carbon Accounting Tool as part of a new approach to managing carbon in our capital programme.

Supporting a sustainable society

In 2015, Scotland was one of the first countries in the world to sign up to the United Nations Sustainable Development Goals (UN SDGs) and vision of a world free of poverty, with universal respect for human rights, and sustainable economic growth. Scottish Water has a part to play, and we already support the UN SDGs in our core service and in a lot of our day-to-day work.

Most recently, we have started to incorporate these into our long-term planning process. In our 'Shaping the Future' document, published in January 2018, we highlighted how we can support Scotland's contribution as a Hydro Nation across 10 of the UN SDGs, shown below.

The Scottish Government regards Scotland's environment as a key asset in future social and economic success. Its ambitions were presented in its draft environment strategy for national success and prosperity within the Earth's sustainable limits, with a vision of 'One Planet Prosperity'.

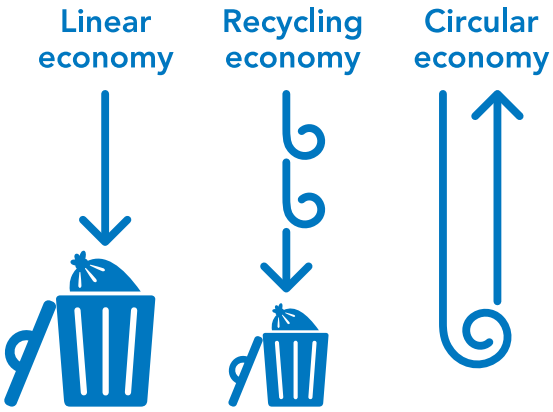
According to the ecological footprint measure, if everyone in the world were to consume natural resources and generate carbon dioxide at the same rate as Scotland, we would need three planets to support us. In responding to the Scottish Government's strategy, our focus is on how we can operate in a way that supports one planet prosperity.

An ambition to tackle climate change is at the heart of the Scottish Government's aim to create a growing, sustainable and inclusive economy. Taking a circular economy approach is fundamental to meeting this ambition, and Scottish Water has a role to play in developing the circular economy in the water sector as we seek to become more resource efficient.

UN Sustainable Development Goals supported by Scottish Water

A circular economy will benefit:

- the environment – cutting waste and carbon emissions and reducing reliance on resources
- society – more, lower cost options to access the goods we need with opportunities for social enterprise
- the economy – improving productivity, opening up new markets, improving resilience and adding value through realigning materials



The Scottish Government's circular economy strategy, 'Making Things Last', sets out priorities for moving towards a more circular economy. One of the priority areas is construction and the built environment. According to the strategy, "construction accounts for about 50% of all waste in Scotland and is a major influence on efficient use of resources".

As one of the biggest investors in Scotland's infrastructure, the choices Scottish Water makes in developing our Strategic Plan for our next investment period (2021-27) have the potential to make a notable positive contribution to the future of Scotland. We are therefore working to ensure sustainability is an integral part of everything we do.

To achieve a more sustainable future, we will need to work together with stakeholders. One example of how we are already doing this in practice is the Sustainable Growth Agreement[1] with SEPA, which we entered into in June 2018. It focuses on exploring three areas:

1. Managing rainwater and waste water drainage more sustainably
2. Maximising the recovery of resources from Scotland's waste water and recycling them back into a circular economy
3. Making choices about how to invest in protecting the water environment to minimise energy and resource use and maximise social and economic benefits

Douglas Millican, Environment Secretary Roseanna Cunningham and Terry A'Hearn Chief Executive of SEPA, at the announcement of the signing of the Sustainable Growth Agreement

[1] https://www.sepa.org.uk/media/360985/scottish-water-sga.pdf

Natural capital metrics

Trends are based on three years' data (from the start of our current regulatory period, 2015/16). We will develop our metrics in future years.

Operational carbon footprint

Our operational carbon footprint is a measure of the greenhouse gases we emit in the day-to-day running of our business to provide water and waste water services. We have been reporting this for 12 years. Our 2017/18 operational carbon footprint is examined in detail on pages 14-17. We work to reduce the greenhouse gases we emit, both in our operations and in our capital programme; therefore a downward trend is positive. The carbon associated with our capital programme does not form part of our operational carbon footprint and is not currently available as a separate metric, although we hope to be able to report on this in the future. You can read more about our capital carbon work on page 7.

Operational carbon footprint (tCO_2e/yr)

Carbon intensity ratio

Carbon intensity ratios show our greenhouse gas emissions per megalitre of water or waste water treated. They are useful metrics because, for example, if Scotland experiences a very wet year and we therefore have to treat a larger volume of waste water, the overall carbon footprint may increase; the waste water metric 'normalises' this to make it easier to see the underlying trend of emissions. We work to reduce the greenhouse gases we emit; therefore downward trends are positive.

Carbon intensity ratio drinking water (tCO_2e/ML)

Carbon intensity ratio waste water (tCO_2e/ML)

Sludge disposed/recycled

We produce waste water sludge as a natural by-product of the biological waste water treatment process. We treat it to specified standards and then recycle it, either as fertiliser to land or as fuel pellets for energy recovery. Sludge that doesn't meet the required standards is used for land restoration. On page 8 you can read about why sludge is recycled to land. We strive to reduce the amount of sludge we produce overall therefore a downward trend is positive.

Recycled

Disposed

Pollution incidents

An Environmental Pollution Incident (EPI) can occur as a result of something going wrong at one of our assets. Most often, these occur as a result of the waste water network spilling waste water to the environment. We have been working hard to reduce the overall number of EPIs we cause, and to reduce the severity of those we are responsible for; therefore downward trends are positive. You can read more about how we have been doing this on page 9.

Category 1

Category 3

Category 2

Category 4

Biodiversity

Due to the large number of assets we operate, we interact with many different environments. Some are specifically designated for features that give them natural heritage value, such as Sites of Special Scientific Interest (SSSIs). This metric illustrates the condition of features at sites where Scottish Water has an influence on that condition. We aim to help achieve favourable conditions; therefore an upward trend is positive. For more information on actions Scottish Water is taking on biodiversity, please see our 2017 Biodiversity Report, published every three years as part of our Sustainability Report.

Percentage of SSSI features assessed as favourable

Scottish Water and renewable power

Scottish Water has been installing renewable energy generation at a number of our operational sites in order to reduce the amount of grid electricity we use. We have also entered into a number of contracts with energy generators to lease some of our land to host wind turbines, helping the Scottish Government to meet its renewables targets.

Through a combination of Scottish Water's own investment in renewable energy installations and hosting private investment on our estate, we now generate and host around 923 Gigawatt hour (GWh) per annum of renewable energy. This saw a major energy milestone achieved in May 2018, after it was confirmed that the amount of renewable energy we generate and host is now more than double our own electricity consumption.

More than 70 of Scottish Water's water and waste water treatment works are now either fully or partly self-sufficient in their power requirements, leading to lower operating costs, smaller carbon footprint, and a more sustainable business.

Our solar energy (photovoltaic – PV) programme is focused on offsetting grid consumption at assets. Each site is different, but in all cases the vast majority of the power produced is used on site, with very little export to the electricity grid.

A new installation by Scottish Water Horizons at Invercannie Water Treatment Works, Aberdeenshire (shown in the photo below) is an excellent example of how we are making the most of our assets to help tackle climate change, as well as contribute to the Scottish Government's renewables targets. In 2017 we installed 710kW capacity of PV panels at Invercannie. 90% of the electricity they generate is used on site, providing over 15% of the site's electricity consumption.

Photovoltaic solar panels at Invercannie Water Treatment Works

Managing carbon in our projects

Everything we do as part of our capital programme – building a new treatment works, laying a pipeline, or replacing worn out equipment – has carbon emissions associated with it – when we spend money, we emit carbon.

We aim to reduce the carbon in our new investment during the course of our current capital programme (2015 to 2021). Improving our understanding of the sources of carbon emissions in our capital projects should lead to lower-carbon, lower-cost solutions.

In December 2017, Scottish Water launched our Capital Carbon Accounting Tool (CCAT) for use on our large capital projects. It enables project teams to make more informed choices about the options available to them, and we are now starting to see projects being promoted that include carbon appraisal.

On a waste water network rehabilitation project in Glenrothes, use of the CCAT highlighted a 13% carbon saving to be made from reducing the extent of excavation. This information supported the project team's decision to specify, where possible, trenchless techniques to reduce both carbon and cost.

Even before we began actively managing carbon in capital projects, we saw several instances of innovative design helping to deliver lower-carbon projects. A great example of this is the Elmvale Row flooding project in Glasgow. Our alliance partner aBV redesigned the underground stormwater storage tanks, reducing both the depth of excavation and the amount of concrete required, resulting in carbon emissions savings of over 1,750 tonnes – 35% lower than the standard approach.

As we build up reliable data on the carbon likely to be associated with different types of interventions this will help us to spot low-carbon opportunities much earlier in project development. Managing carbon not only reduces our carbon emissions but also reduces costs, may stimulate innovation, improves resource efficiency, and drives better solutions.

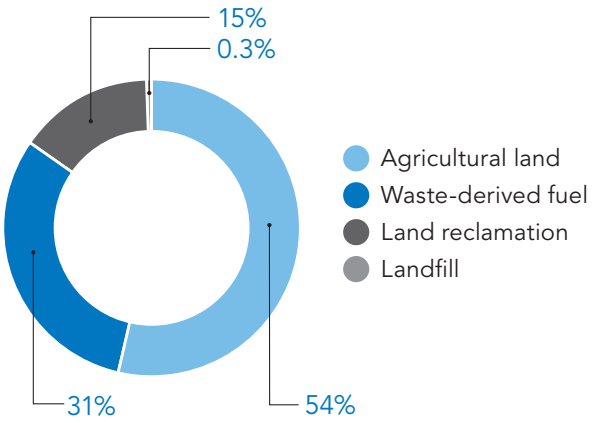
Elmvale Row stormwater tank

Value from waste water

Waste water sludge describes the residual organic matter that is a natural by-product of the biological waste water treatment process. This sludge is further treated to produce what we term 'bioresource'.

The vast majority of sludge is used beneficially. Most is treated to make bioresource that is either applied to agricultural land or used in pellet form as a fuel in the cement industry. Some sludge is used for land restoration projects. We send around 0.3% of sludge to landfill. The breakdown of this is illustrated in the chart below.

Sludge by end use

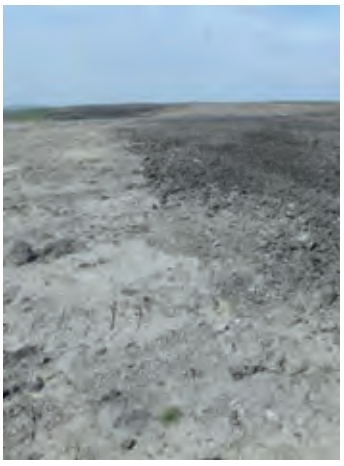


Bioresource has been recycled to agricultural land for many decades in the UK, Europe and the US, and such recycling is regarded as a safe and sustainable practice. This process is recognised as the Best Practicable Environmental Option in most circumstances.

Extensive research shows bioresource to be a very valuable source of organic nutrient fertilisers as well as soil conditioning. Bioresource provides farmers with essential nitrogen, phosphorus and potassium, together with other important nutrients useful in supporting crop growth and livestock nutrition. Rich in organic matter, this sustainable resource is an ideal soil conditioner owing to its humus-forming and fertilising properties. Research[1] has shown that regular applications of bioresource improve water-holding capacity, drought resistance and structural stability, as well as the biological activity of soils.

Scottish Water continues to support the restoration of derelict land for use as public amenity areas, forestry and agriculture.

One example is Broken Cross, a former opencast coal site near Douglas, South Lanarkshire. Various organic materials, including water and waste water sludge provided by Scottish Water, were blended to produce a soil-like material. This was mixed into the ground to work as a soil conditioner and nutrient booster, to rejuvenate land areas that were otherwise degraded, impoverished and nutrient deficient as a consequence of open cast mining operations for several years. In future, parts of the site will be made accessible to members of the public.



Broken Cross before restoration

Broken Cross after restoration

[1] Biosolids: soil quality and fertility benefits, UK Water Industry Research 2015.

Environmental pollution incidents

Scottish Water manages our assets with a focus on preventing environmental impacts. We operate thousands of waste water treatment works and pumping stations and more than 62,000 miles of water and sewer pipes. With such a vast asset base, Environmental Pollution Incidents (EPIs) sometimes occur.

EPIs may result in pollution of a watercourse as a result of an issue at a Scottish Water asset. Half of all EPIs are due to blockages in the waste water network, but they can originate from any waste water or drinking water asset.

There are four categories for the reporting of EPIs:

- Category 1 – Major Pollution Event – These events have an extensive visible impact on the environment of over 1km or the loss of amenity such as Bathing Water beach closure.
- Category 2 – Significant Pollution Event – These events are events which have a significant impact on the environment of less than 1km and cause a significant reduction in amenity.
- Category 3 – Minor Pollution Event – These are events which have a localised visible impact on the environment.
- Category 4 – Other Environmental Event – These are operational incidents that do not impact the environment but are notified to SEPA as part of risk management.

We have developed a programme of measures, including: data improvement; monitoring; targeting repeat issues; planned waste water network cleaning; and a public 'Keep the water cycle running' campaign on the proper disposal of items that cause blockages in the waste water network, such as wipes, sanitary products and 'fats, oils and grease' (FOG). Through this programme we've improved our performance from having 824 Category 1-3 events in 2010/11, to 168 in 2018/19.

While we have seen the number of Category 1-3 events decreasing, we have seen an increase in the reporting of Category 4 events. At this stage, we consider the increase to be a positive reflection of increased awareness and reporting within the business; although we would not wish to see this upward trend continuing in the long-term.

The improvements that have been put in place which have seen our Category 1-3 events decrease over the years have included:

- Focused teams to look at trends and identify and resolve poor asset performance.
- Significant investment on pump replacements, telemetry improvements and a wet well cleaning programme at our waste water pumping stations.
- EPI response time reporting and performance improvements, EPI hotspot spatial analysis, and commencement of a waste water network monitoring pilot.

Still from Keep the water cycle running campaign

Measures deployed at a surface water outfall to mitigate the impact of a hydrocarbon pollution incident at an industrial estate

Social capital metrics

Trends are based on three years' data (from the start of our current regulatory period, 2015/16). We will develop our metrics in future years.

Unplanned interruptions to supply

Interruptions to the supply of drinking water happen rarely, but can happen for many reasons. For example, if a pipe bursts, some customers may experience an interruption to their water supply; in extremely cold weather, pipes serving customers' properties may freeze; conversely, in very hot dry weather, soils dry out leading to pipes breaking. We experienced both these weather extremes during 2018 and worked incredibly hard behind the scenes to keep customers in constant supply. You can read more about how we do this on page 11. Interruptions to supply are measured in two categories: greater than 12 hours and greater than 6 hours. We aim to provide a constant supply of high quality drinking water to all our customers; therefore downward trends are positive.

>12 hours

>6 hours

Restrictions on water use/water consumption

If water sources are particularly low due to prolonged dry weather, we may need to restrict how customers use water in order to ensure there are enough supplies to go around. The more water customers demand, the more we must abstract from the environment, and the less there is for other uses such as agriculture and wildlife. We work to reduce our waste of water by, for example, finding and fixing leaks from our water network. We also work with customers to reduce their wastage of water, for example through our water efficiency campaign. We work to provide a constant supply of high quality drinking water to all our customers; and we aim to reduce the demand for water; therefore downward trends are positive. On page 12 you can read about how we dealt with the long hot summer of 2018.

Restrictions on water use

Water consumption (litres per household per day)

Number of properties at risk of internal flooding

The last thing we want to do is flood a customer's property with waste water. Due to more hard surfaces such as property extensions, paving over of gardens, and increasingly extreme weather events, sometimes our waste water network cannot cope with the increased volumes of surface water entering the system, and they can become overloaded at times of heavy rainfall and flood waste water into streets and properties. In April 2015 there were 302 properties identified as at highest risk from flooding from the waste water network. We expect to resolve 95% of these by March 2021, and have already resolved 128. However, more properties can be identified as at risk as we investigate new flooding issues, and in 2017/18 the total number of properties at highest risk has increased. You can read about one of our flooding projects in Glasgow on page 13. Obviously we want to minimise the number of properties at risk; so a downward trend is positive.

Number of properties at risk of internal flooding

Avoiding interruptions to supply

We work hard every day to reduce the number of interruptions that our customers experience to their water supply. To do this we are constantly improving our data and information to allow us to respond more quickly and effectively. We are also proactively working behind the scenes to prevent interruption to supply events from happening in the first place.

A great example of this is our work to create 'calm' networks. Through innovative thinking and challenging conventional working practices around network operation, we are leading our industry in understanding the link between pressure transients and burst pipes. Pressure transients are sudden changes in water pressure and have been suspected of leading to bursts, interruptions to supply, customer complaints and considerable costs to Scottish Water.

By developing our understanding of pressure transients and high speed logging, this gives us a significantly better understanding of how our networks operate and how we can reduce the risk of burst pipes.

To date we have identified and delivered a solution at 105 water pumping stations and the associated water network, resulting in an average burst reduction of 81%. The number of bursts prevented to date is 1,820. With an average burst cost of £1,000, this is a saving of almost £2 million.

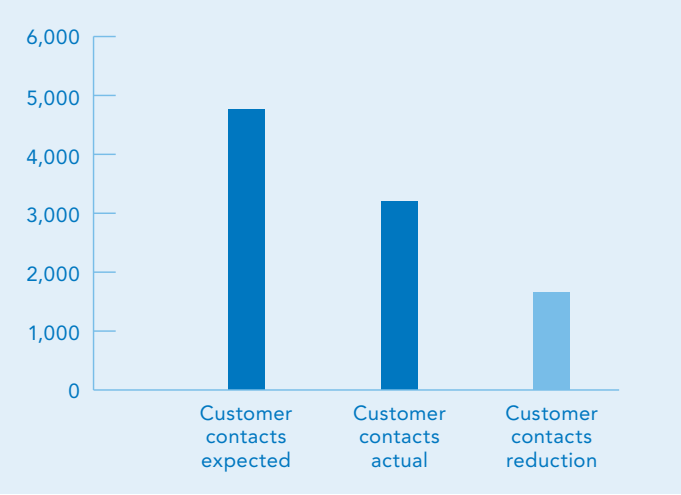
The graph to the right shows the reduction in the number of customers contacting us about low pressure or no water since the beginning of the pressure transient programme, showing that the outcome for customers from this work is a more calm, trouble-free service.

Sometimes, however, we have the additional challenge of keeping our services running in exceptional circumstances, such as the cold weather snap referred to as 'the Beast from the East'. Planning, co-ordination and dedication from our people were key to ensuring customers were kept in supply during the bad weather.

Pre-planning ensured that we had the right resources in the right areas, with the right equipment, allowing us to quickly respond to any eventuality and restore normal service as soon as possible. Moving around the country and accessing our assets was a huge challenge. Most of our treatment works are at the top of hills, so having the appropriate vehicles is also very important.

Scottish Water regularly encounters issues with severe weather, be it snow, frost, wind, rain, or lack of rain. But with the right preparation and committed people, we do our best to ensure our customers can rely on our services whatever the weather.

Customer contacts for no water/pressure



Securing service during dry periods

Scottish Water manages the long-term resilience of water supplies through our 25 year Water Resource Plan and by investing in the resilience of our asset base. Climate change projections are taken into account within these. Weather, however, is much shorter-term and can present us with more immediate challenges.

This summer, Scotland faced its driest six month period since 1984, during which time some areas of Scotland saw a 30% increase in water use. As a result, an additional 140 million litres of drinking water was produced per day to meet customer usage. Maintaining supplies under exceptional demand, while experiencing extremely dry conditions, posed a significant challenge.

Scottish Water worked hard to avoid water supply interruptions or restrictions for customers. This was achieved largely through extensive rezoning of supplies, supply augmentation and leakage reduction activity. We also worked with the Scottish Environment Protection Agency (SEPA) to increase abstraction from, and reduce compensation flows to, the environment where appropriate. To help balance the need between the environment and customers, and to manage our water resources sustainably, Scottish Water issued guidance nationwide to help customers use water wisely, with more targeted communications in more severely affected areas.

Our year-round water efficiency campaign supported the effort to reduce demand by giving customers the tools to use water wisely through the Water Saving Pack project. Since the beginning of June 2018, over 5,250 households have received various water saving devices through this project. Scottish Water employees and our partners at Home Energy Scotland attended over 150 events over the summer, engaging with customers on water efficiency and providing bespoke advice and devices to help customers avoid wasting water.

In line with our Water Resource Plan, it is important that we act responsibly in controlling the amount of water we abstract from the environment, as well as enabling our customers to play their part – together protecting the future sustainability of water resources and the freshwater environment, while minimising the impact of dry weather on customers.

Meeting customers with Home Energy Scotland

Shieldhall Tunnel

As the Greater Glasgow area continues to develop, we are modernising our waste water infrastructure to support the needs of both existing and future customers.

Scotland's biggest waste water superstructure, the Shieldhall Tunnel, became operational in late July 2018 in a feat of engineering hailed as "extraordinary" by Environment Secretary Roseanna Cunningham. Flows are running through the tunnel from across the south-side of Glasgow, with communities expected to benefit from fewer flooding incidents and improved environmental conditions.

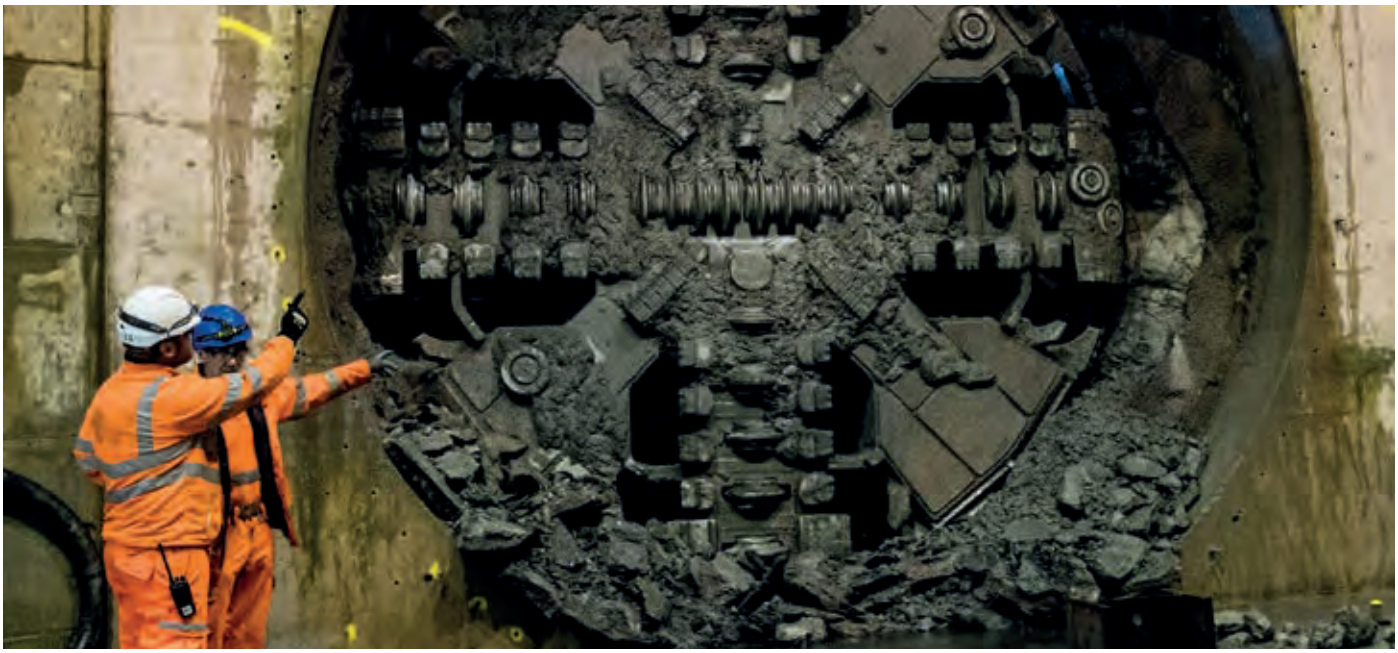
The tunnel was the flagship project in Scottish Water's investment in the Glasgow area's waste water infrastructure, the biggest since Victorian times. Ms Cunningham said of the tunnel:

"It's a fantastic example of the capital investment programme delivering real long-term benefits for communities to reduce flooding, help deal with the impact of climate change and improve the environment."

This major construction stretches for 3.1 miles from Craigton to Queen's Park via Bellahouston and Pollok parks and is alleviating pressure on the existing waste water network with 90,000 cubic metres of extra storm water storage – that's the equivalent of 36 Olympic-sized swimming pools.

Whilst the main outcome of the project is a reduced flood risk, the tunnel will substantially reduce the volume, and frequency, of waste water discharged to the environment from a number of Combined Sewer Overflows (CSOs). It enables more than 90% of what was discharged at these CSOs to be treated at Shieldhall Waste Water Treatment Works before being discharged from there, helping improve the environmental quality.

The Shieldhall Tunnel will have a huge positive impact, supporting a sustainable Scotland by reducing the flooding risk and improving the environment for the people of Glasgow and the River Clyde, now and in the future.



Daisy the Driller is pictured after its cutting head 'broke through' at the end of the tunnel in Queen's Park, Glasgow

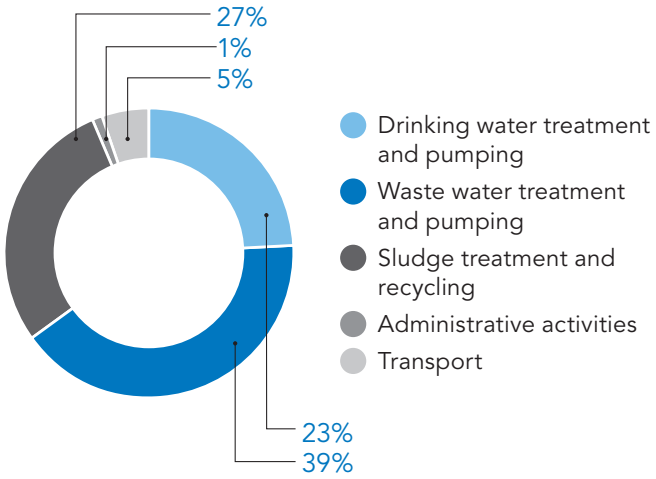
Operational carbon footprint 2017/18

We are pleased to report that our operational carbon footprint (CFP) for 2017/18 was 315,000[1,2], tonnes of carbon dioxide equivalent (tCO_2e); a decrease of 34,000 tCO_2e or 10% compared with 2016/17. We have seen our CFP fall by 32% since we started reporting in 2006/07.

This, our 12th annual operational carbon footprint report, covers the greenhouse gas (GHG) emissions associated with the delivery of water and waste water services to customers across Scotland. It is externally verified in accordance with ISO 14064-3, a process that provides assurance that our reporting is relevant, complete, consistent, accurate and transparent.[3]

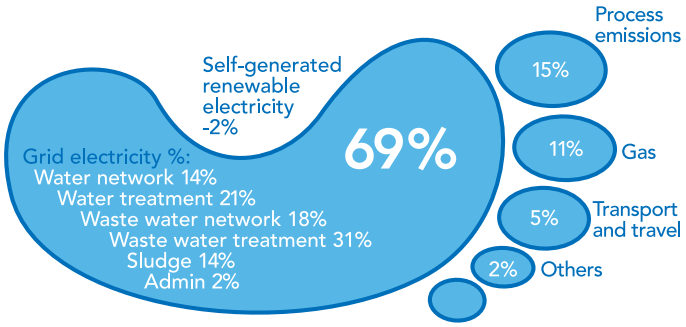
The chart below shows our CFP broken down by the types of activities that deliver our services. It shows that the majority of our emissions, 66% of the total, are produced through the pumping, treatment and recycling of waste water and sludge. Our emissions relating to transport make up only 5% of our CFP, despite operating a large fleet across a wide geographical area.

GHG emissions by activity 2017/18



Another way to look at the CFP is to examine the **sources** of emissions, as shown in the foot diagram below. We can see that grid electricity is by far the largest contributor at 69%. However this percentage will decrease over time as the proportion of grid electricity from renewable sources increases. Process emissions (GHGs such as methane and nitrous oxide formed from organic matter breakdown), and natural gas use also make significant contributions at 15% and 11% respectively.

GHG emissions by source 2017/18



The Department for Environment, Food & Rural Affairs (Defra) advises reporting GHG emissions in terms of **'Scope'**:

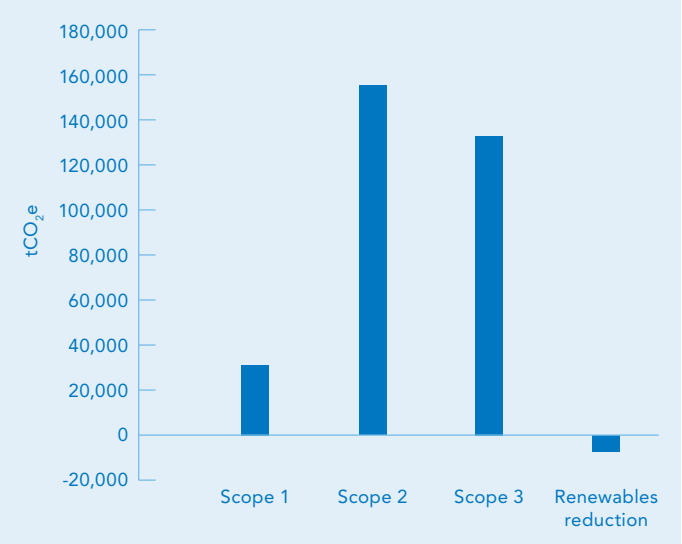
- Scope 1 – Direct emissions: on-site combustion of fossil fuels; process emissions; and emissions from vehicles owned or leased by Scottish Water.
- Scope 2 – Indirect emissions: use of grid electricity.
- Scope 3 – Indirect emissions: business travel by public transport and private vehicles; outsourced activities including sites run by PFI companies[4].

We show our emissions by scope in the chart on the next page. This confirms that the vast majority of emissions are scopes 2 and 3. The majority of scope 3 emissions are due to electricity use at many of the largest waste water treatment works, which are PFI operated.

Third party renewable generation that we host on our land, as discussed in the story on page 6, is not part of our operations and therefore is not accounted for in the 'renewables reduction' of our CFP – it is a benefit to Scotland's CFP, not Scottish Water's. For an explanation of how renewables are accounted for in our own CFP, see the 'Renewable electricity' section on page 17.

[1] This value is rounded to the nearest thousand tonnes.
[2] Our CFP includes waste sent to landfill, which is excluded by water companies in England and Wales. Therefore for comparison purposes our 'water industry comparable' CFP is 314,000 tCO_2e.
[3] In keeping with all UK water companies, we use the Carbon Accounting Workbook developed by UK Water Industry Research. This was originally developed in partnership with the Carbon Trust and is updated annually to reflect the latest emission factors, accounting rules and guidance from Defra and BEIS.
[4] Some of our waste water treatment works are run on our behalf by Private Finance Initiative (PFI) companies. The emissions from these sites are included in our CFP as Scope 3.

GHG emissions by scope 2017/18



Carbon Intensity of Water and Waste water

It is useful to understand the carbon intensity of our service – the amount of carbon emitted to treat and supply a litre of water, or collect and treat a litre of waste water.

Our water service is among the lowest carbon intensity in the UK. This is mainly due to more opportunity to use gravity to supply our customers (rather than pumping).

The carbon intensity of our waste water service is around the UK average. The metric takes account of the 'flow to full treatment' (i.e. it includes much of the rain water that enters our waste water network) and is a more accurate reflection of the carbon intensity of pumping and treatment than calculations using only foul discharges to the network.

Customers who know how much water they use, and waste water they produce (in litres or megalitres) can use the carbon intensity figures in the table below to calculate the CFP associated with their water and waste water use (CO_2e in grams per litre (g/l) or tonnes per megalitre (t/Ml)).[5,6]

Customer footprinting

Emissions Sources	CO_2e emissions (g/l or t/Ml)
Drinking water services – includes abstraction, pumping and treatment of drinking water supply	0.13
Waste water services – includes pumping and treatment of waste water and transport and treatment of sludges	0.27

Changes to the Carbon Accounting Workbook v12

The Carbon Accounting Workbook (CAW) is updated annually to take into account changes to emissions factors (EFs) or to reflect changes to reporting guidelines. For version 12 of the CAW, the change in the grid electricity EF (grid EF) had the most significant impact. The grid EF represents average annual EFs (in $KgCO_2e$ per kWh) for electricity in the UK national grid. It changes year to year as the fuel mix (coal, gas, nuclear, renewable etc.) used in power stations changes. The grid EF decreased by over 14% between 2016/17 and 2017/18, directly contributing to our fall in carbon emissions.

[5] Figures include emissions associated with administration, transport and waste to landfill; i.e. our whole operational footprint shared between water and waste water. They are indicative and based on the best available information. They will change over time and customers should ensure they use the latest figures if calculating emissions associated with their water and waste water services.

[6] Water industry comparison. As with the overall CFP, the UK water industry carbon intensity ratios exclude waste to landfill. Our 'water industry comparable' carbon intensity figures are: Water = 0.11, Waste water = 0.24.

Changes to our carbon footprint

Across the first eight years we reported our CFP (2006/07 to 2013/14) we saw a consistent downward trend in our emissions. The majority of this reduction was attributable to Scottish Water activities such as leakage reduction, investment in energy efficiency and renewable generation. The remainder was due to changes in the grid EF.

Due to a 13% increase in the grid EF in 2014/15 there was a partial reversal of this downward trend. From 2015/16 onwards we have seen electricity emissions factors decrease significantly, with the most recent fall in grid EF between 2016/17 and 2017/18 being over 14%. Overall since 2006/07 our carbon footprint has fallen by 32%.

Differences in carbon footprint compared to 2016/17 CFP

Our carbon footprint fell by nearly 10% compared with 2016/17. It is important to understand changes between years, and whether they are genuine or caused by a change in the accounting methodology. When we analyse changes between years, we split them into three categories. Often more than one category can have an impact on emissions from the same area of the CFP. The three categories we use are:

- **'Genuine'** – real changes in CO_2e emissions (i.e. from operational changes).
- **'Baseline'** – the inclusion of previously unavailable data or the exclusion of previously available data sources or changes in emissions factors. These changes may mask genuine increases and decreases.
- **'Reallocation'** – moving emissions from one part of the CFP to another (affecting the relative size of the divisions in the GHG emissions by activity diagram on page 14, but not the total CFP).

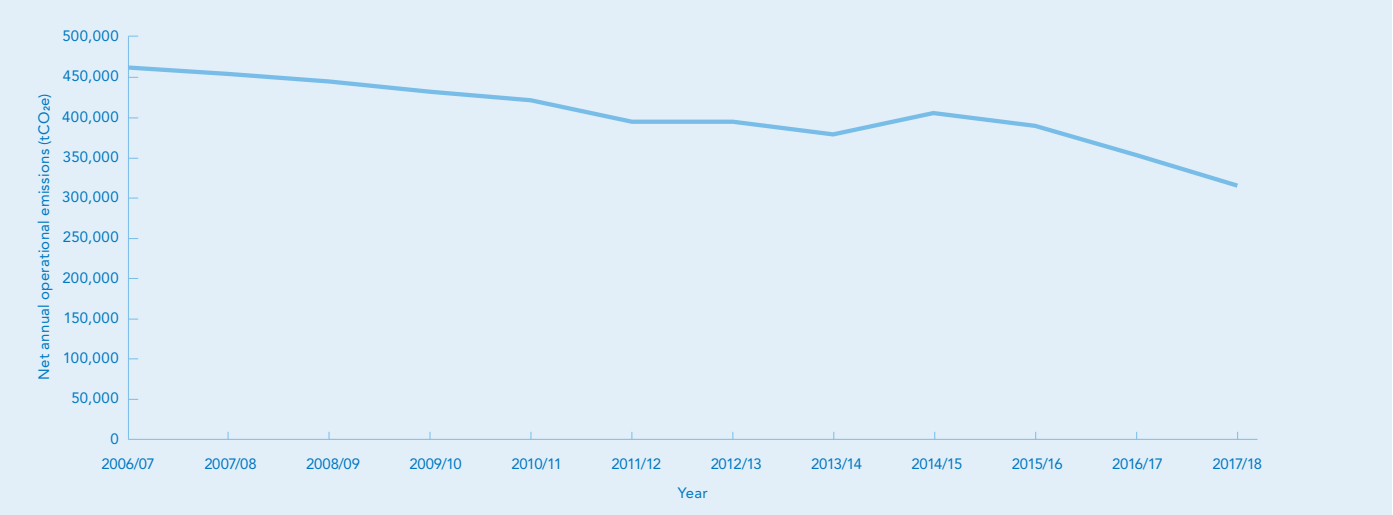
Although we saw an overall decrease of around 34,000 tCO_2e in 2017/18, this was the net effect of increases and decreases in different sections of our footprint; the main ones being:

- Grid electricity (decrease)
- Renewable electricity (increase)
- Natural gas (decrease)

Grid electricity

We saw a 14% decrease in the emissions relating to the use of grid electricity. Grid electricity emissions now make up 69% of the total carbon footprint, down from 71%. This reduction is due to the decrease in the grid EF discussed in the 'Changes to the Carbon Accounting Workbook v12' section on the previous page, so would be classed as a baseline change. We actually saw a small increase in the amount of grid electricity used (around 1%).

Carbon footprint trend



Renewable electricity

Scottish Water generates renewable electricity at a number of our sites. The electricity produced is either used on site or exported to the grid. When we generate and use on site 'REGO[7] accredited' renewable electricity, there are no associated emissions to add to our CFP. If the REGO accredited electricity is exported, we have a carbon saving (equivalent to the grid EF). Where the renewable electricity generated and used on site is not REGO accredited, emissions are added to our CFP as if we were using grid electricity.

In 2017/18 the carbon saving (subtracted from our carbon footprint) due to the export of REGO accredited renewable electricity was over 7,000 tCO_2e. This is down around 500 tCO_2e, 6.5%, from the previous year. Despite seeing an increase of over 9% in the amount of renewable electricity exported, the decrease in the grid EF has resulted in us seeing a reduction in our emissions saving. This would also be classed as a baseline change as it is due to the change in EF.

Natural Gas

Emissions relating to the use of natural gas decreased nearly 1,700 tCO_2e (5%). This is due to a genuine decrease in the amount of natural gas used. This decrease occurred at sites operated on a PFI basis and was due to decreased use of thermal driers for drying sludge and an increase in the use of heat from their combined heat and power plants.

Verification

Once completed, our CFP was externally verified by a consultancy experienced in GHG inventories, who stated: "Scottish Water's 2017/18 Carbon Footprint is materially correct and a fair representation of the organisation's footprint, based upon the data available, and has been calculated in accordance with the relevant UKWIR [UK Water Industry Research] methodology. As such, it can be published with a reasonable degree of confidence."

Conclusion

2017/18 saw our lowest ever carbon footprint and the largest percentage drop in emissions since we started reporting our carbon footprint over a decade ago.

Our carbon footprint is now 32% lower than it was in 2006/07. Over that time we have seen genuine reductions due to operational efficiency, leakage reduction and renewable power generation. The main contributor to the reduction since 2015/16 is a reduction in the carbon intensity of grid electricity.

The grid EF is forecast to continue to decrease year on year. In 2018/19 the EF will further decrease by around 14% again, which will have a significant impact on our reported footprint.

[7] Renewable Energy Guarantees of Origin.

Carbon footprint report glossary

CAW – Carbon Accounting Workbook
This is the tool that all UK water companies use to calculate their operational carbon footprint. Using the same accounting tool ensures consistency of approach for Regulators.

CFP – Carbon Footprint
This is the reportable amount of carbon that we have emitted as a result of our operations. It is expressed as tonnes of carbon dioxide equivalent.

Defra – Department for Environment, Food and Rural Affairs

BEIS – Department for Business, Energy and Industrial Strategy

EF – Emissions Factor
A figure used to calculate GHG emissions resulting from a unit of material or fuel, such as kilowatt hour of grid electricity of litre of diesel.

PFI – Private Finance Initiative
A number of large waste water treatment works are operated on Scottish Water's behalf by private companies. The emissions associated with these works are reported as part of our operational carbon footprint.

GHG – Greenhouse Gas
Greenhouse gases, including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) as well as some refrigerant gases.

ISO 14064
The international standard that specifies how organisations should quantify and report their greenhouse gas emissions. ISO 14064-3 specifies the verification process for emissions reports.

MWh – Megawatt Hour
One hundred kilowatt hours.

kWh – Kilowatt Hour
A standard measure of energy, used to report consumption of electricity or natural gas.

REGO – Renewable Energy Guarantees of Origin
The Office of Gas and Electricity Markets (Ofgem) issues to generators of renewable electricity, one REGO certificate per megawatt hour (MWh) of eligible renewable output.

tCO_2e/$kgCO_2e$ – Tonnes/ Kilograms of Carbon Dioxide Equivalent
This measure allows us to express the impact of different greenhouse gases in terms of the amount of carbon dioxide that would create the same amount of warming.

UKWIR – UK Water Industry Research Ltd
A not-for-profit company that conducts research on behalf of the UK water industry. UKWIR develops the Carbon Accounting Workbook used to calculate carbon footprints.

The water industry in Scotland

The water industry in Scotland is regulated. This model provides assurance that Scottish Water meets the interests of our customers, protects the quality of drinking water and the environment, and is accountable for our performance.

The water industry in Scotland is regulated as shown in the diagram below.

The Scottish Parliament
Holds Scottish Water and Scottish Ministers to account and regularly calls executives to its committees to give progress updates.

The Scottish Government
Scottish Ministers set the objectives for Scottish Water and appoint the Chair and Non-executive Members.

Scottish Water
Responsible for providing water and waste water services to household customers and wholesale Licensed Providers. Delivers the investment priorities of Scottish Ministers within the funding allowed by the Water Industry Commission for Scotland.

Water Industry Commission for Scotland (WICS)
Economic regulator. Sets charges and reports on costs and performance.

Drinking Water Quality Regulator (DWQR)
Responsible for protecting public health by ensuring compliance with drinking water quality regulations.

Scottish Environment Protection Agency (SEPA)
Responsible for environmental protection and improvement.

Scottish Public Services Ombudsman (SPSO)
Responsible for investigating complaints about public services in Scotland, including Scottish Water, once the services' complaints procedure has been completed and sharing lessons from complaints to improve the delivery of public services.

Citizens Advice Scotland (CAS)
Represents the interests of consumers within Scotland's water industry.

Customer Forum
Responsible for ensuring that customers have a clear voice in the business planning and price setting processes and at the heart of key decisions that affect the services Scottish Water customers pay for.

Other regulators
Like other companies and utilities, Scottish Water is also regulated by a variety of other bodies such as the Health and Safety Executive (HSE), Environmental Health Officers and the Scottish Road Works Commissioner.

For more information on Scottish Water and our services visit **www.scottishwater.co.uk** or contact our Customer Helpline on **0800 0778778***.

* We record all calls for quality and training purposes.