Water supply

	2018/19	2017/18	2016/17
Water supply dams (number of operational sources over the year)	12*	12	12
River sources (number of operational sources over the year)	3	3	3
Groundwater sources (number of operational sources over the year)	13	12	12
'A'-grade water treatment plants	15	15	15
Other water treatment plants	1**	Nil	Nil
Length of treated watermains (km)	9,349	9,187	9,096
Service reservoirs	85	85	89
Pump stations	94	93	93
Annual volume produced (ex plant m^3)	159,557,593	153,784,185	149,488,237
Annual volume sold (m^3)	128,610,171	127,548,898	123,291,865

* Though Watercare maintains Hays Creek, we do not draw any water from it and treat it as out-of-service.

** Warkworth Water Treatment Plant was commissioned in December 2018 and has not yet been submitted for grading. We expect the plant to achieve an 'A' grade when we do submit it for assessment.

Volume of water by source

	2018/19		2017/18		2016/17	
	Volume (m^3)	%	Volume (m^3)	%	Volume (m^3)	%
Waitākere Dam	3,517,824	2%	3,839,835	2%	3,481,154	2%
Upper Huia Dam	4,684,808	3%	8,102,899	5%	5,895,649	4%
Upper Nihotupu Dam	5,299,609	3%	8,272,721	5%	7,278,570	5%
Lower Huia Dam	10,182,607	6%	6,611,783	4%	8,617,074	6%
Lower Nihotupu Dam	6,035,042	4%	1,329,914	1%	3,333,443	2%
Cosseys Dam	16,665,256	10%	12,388,820	8%	12,397,456	8%
Upper Mangatawhiri Dam	24,687,408	16%	29,291,746	19%	22,832,396	15%
Wairoa Dam	12,722,452	8%	12,265,389	8%	12,774,149	8%
Mangatangi Dam	41,817,529	26%	45,572,241	29%	46,103,369	31%
Waikato River	26,460,059	17%	20,210,713	13%	20,973,406	14%
Onehunga Aquifer	5,147,992	3%	4,326,071	3%	4,511,210	3%
Rural North	1,727,329	1%	1,539,685	1%	1,774,126	1%
Rural South	928,023	1%	942,431	1%	896,396	1%
Total	159,875,938	100%	154,694,248	100%	150,868,397	100%

Conservation activities

Watercare's activities involve interaction with diverse flora and fauna. We work hard to minimise the impact of our activities and, where possible, to enhance the environment. We allocate significant resources to minimising the effects our dams have on the surrounding freshwater ecologies. This includes simulating flood flows downstream from the dams and implementing a native fisheries trap-and-haul programme, where migrating fish and eels are transferred around the dams.

Name of site	Ecological attribute	Conservation activities carried out in 2018/19
Southern regional wastewater plants	–	Continued pest control (rabbits, possums, rats) at all southern wastewater treatment plants.
Hūnua Ranges and Waitākere Ranges fish trap-and-haul programme	–	Trap-and-haul programme for the upstream migration of native juvenile eels and whitebait species and downstream migration of adult migrating eels. All trap and haul programmes are operated during the respective migrating season. Trap and haul at Mangatangi Weir operated for the transfer of native torrentfish. This is the first trap in New Zealand used for this purpose. This will continue in 2020.
Northern regional wastewater plants	Native bush and wildlife habitat	Continued vegetation and noxious/pest weed control on Watercare-owned land at Army Bay, Waimauku, Helensville, Omaha, Snells/Algies, Waiwera, Warkworth and Wellsford wastewater treatment plants.
Northern regional wastewater plants	Native vegetation	We continue to actively undertake pest control (vermin) at all the Northern regional wastewater treatment plants.
Omaha Wastewater Treatment Plant	–	Approximately 10 hectares of native planting is irrigated by treated wastewater at the Omaha Wastewater Treatment Plant grounds and is flourishing.
Omaha Wastewater Treatment Plant – Treated effluent storage pond	Native vegetation	Pāteke (Brown Teal) native to New Zealand continue to seasonally swim in the storage pond. These are the rarest waterfowl on the mainland and hence are an important ecological attribute to the area.
Māngere Wastewater Treatment Plant	Habitat for fauna	We have continued to undertake extensive vegetation management and noxious weed removal on Watercare land. Significant effort was put into removing moth plant from the foreshore areas this year.
Bird roosts	Foreshore of Manukau Harbour, internationally-renowned for migratory birds	The artificial bird roosts have remained stable with minimal erosion over the past year. The Manukau Harbour and the bird roosts have continued to support more than 20% of New Zealand's total wading bird population with many migratory species including Eastern Bar-tailed Godwits, Wrybills and Southern Pied Oyster-Catchers. The roosts have also seen increasing numbers of Royal Spoonbills over the cooler months. In addition, for the eight New Zealand Dotterel breeding pairs based at the artificial roosts, there were five fledged chicks, which is above the national average of 0.5 chicks per breeding pair.
Coastal Walkway	Habitat for fauna	In 2019, Watercare staff members successfully removed over 7,200 litres of rubbish from the Watercare Coastal Walkway foreshore.
Foreshore and Coastal Walkway	Foreshore of Manukau Harbour, internationally renowned for migratory birds	Continued coordinated pest control activities with Auckland Council's Ambury Regional Park as a defence against invasive pests. The efforts included bait lines and alternate bait pulses, DOC200 traps, live traps, Pindone drops and shooting to reduce the number of pests impacting the bird roost and the Watercare Coastal Walkway. The ongoing assistance from volunteers for the trap lines and the general public in reporting changes in the foreshore has helped make the foreshore a better place.
Hūnua Ranges plantation forestry right purchase	Native bush	Planting of 86,500 native trees and shrubs, replacing land used for pine forestry. Part of an ongoing restoration project, with more planting forecast for 2019/20.
Waikato RiverCare	Riparian restoration	Riparian planting along the lower Waikato River to enhance river water quality.
Central Interceptor Project	Riparian restoration	More than 900 native seedlings planted on the banks of a tributary of the Waititoki-Meola Creek on Mt Albert Grammar School land.
Bombay Water Treatment Plant	Riparian restoration	Initial riparian planting along 800 metres of stream bank. One hundred plants established, with approximately 5,000 more to be planted.

Dams and other operational areas within Waitākere Ranges are covered by the Waitākere Ranges Area Heritage Act. The Auckland Unitary Plan also designates parts of our land as Significant Ecological areas. Some of our sites also have 'heritage protection status' e.g. Nihotupu Filter Station.

Climate change

In early 2019, we launched our first Climate Change Strategy. This sets out our future direction as we embark on a journey to operate a low-carbon company that is resilient to climate change impacts. The strategy covers specific actions that we will take immediately and establishes a pathway of monitoring and understanding between now and 2025. This is so that we can adapt to the changing climate based on evolving data and projections. The strategy also enacts Watercare's Climate Change Policy which communicates to staff and suppliers what is expected of them to contribute to our climate objectives each year.

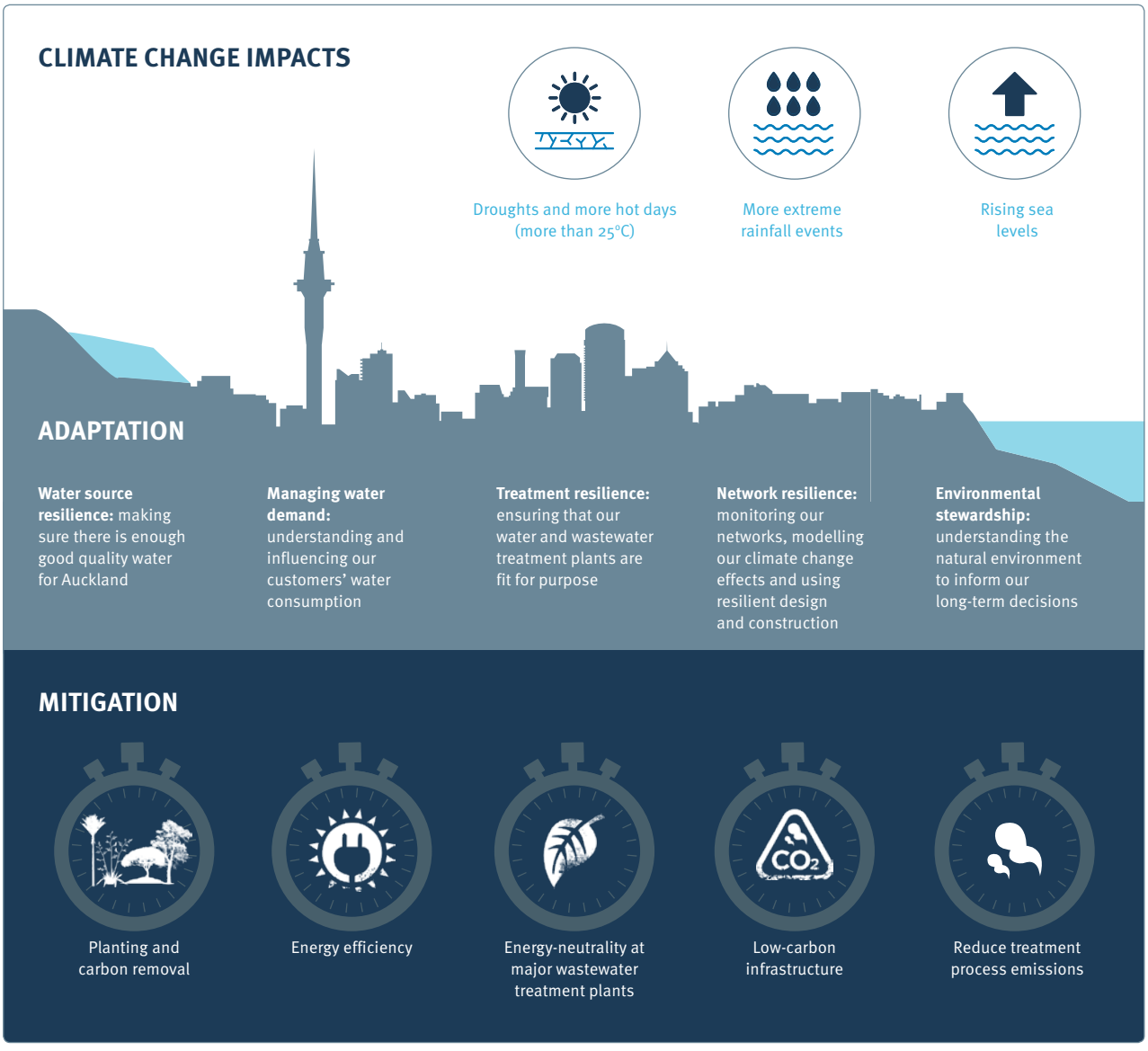
Climate change is one of the largest challenges that we face as an organisation. Its effects can include temperature increases, drought, increased frequency of severe storm events and rising sea levels. Every aspect of our operations is potentially impacted by these effects right from the planning and design of our infrastructure, to the way raw water is sourced and treated, or how wastewater is processed and discharged.

The strategy establishes two ambitious targets for emissions reductions from our operations which align with keeping the global temperature increase within 1.5 degrees Celsius.

- Net Zero emissions by 2050
- Reduce operational greenhouse gas emissions by 45% by the year 2030.

We realise that we cannot solve this challenge on our own and we will need to work with other organisations to achieve our goals and inform our thinking. To become future fit we will collaborate across the Auckland Council family, enable our employees to develop solutions and work together with suppliers and customers.

We have developed a work plan that consists of 14 portfolios across both adaptation and mitigation. Some of these and the direct impact of climate change on our operations are described below.



Greenhouse gas emissions

In the early 2000s, we significantly upgraded the Māngere Wastewater Treatment Plant. This enabled us to replace the open-air oxidation ponds and sludge lagoons with land-based treatment, enabling the capture of methane and nitrous oxide emissions and making biogas generation possible. This resulted in a long-term decrease in greenhouse gas emissions by approximately 80% compared to the 1990 baseline which is aligned with the Auckland Council Low Carbon Action Plan.

In 2013/14, we established an improved reporting framework which included a number of external emissions that should also be accounted for under our footprint (scope 3 emission sources). Since then we have decreased our emissions by 12%.

During the most recent reporting period a data issue was discovered in the reporting of biosolids in 2017 and 2018 as well as the volume of wastewater treated in 2018 when calculating our emissions. The biosolids had been recorded as wet tonnes instead of dry tonnes in 2017 and 2018. This has been resolved and as a result significantly reduced the emissions level from what was reported in those years.

Recalculated emission for 2016/17 – 36,711 tCO_2e (previously reported as 38,890 tCO_2e)

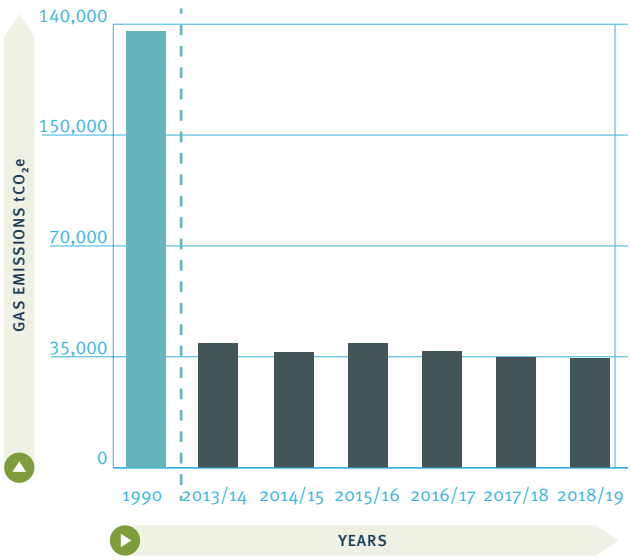
Recalculated emission for 2017/18 – 34,819 tCO_2e (previously reported as 36,404 tCO_2e)

Emissions for 2018/19 – 34,628 tCO_2e

There has been a slight reduction in emissions this year compared to last year. Our three major emission sources remain:

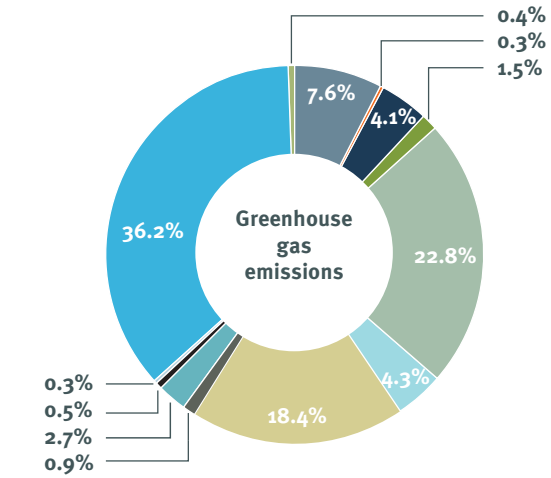
1) Electricity used in treatment plants and networks for both water and wastewater
2) Nitrous oxide and methane from wastewater
3) Consumption of lime used for water treatment and wastewater sludge treatment.

Greenhouse gas emissions since 1990 and over the last six years



We have a large energy improvement and energy neutrality programme underway that includes our foray into solar energy generation. We first introduced electric vehicles (EVs) in our fleet two years ago and have more EVs scheduled to arrive in late 2019.

As Auckland continues to grow and we supply to an increased population base, our emissions are projected to also grow in a linear fashion. Our challenge is to separate the two and reduce our emissions by 45% by 2030.



Natural gas use	7.6%	Transmission and distribution loss natural gas	0.9%
Biogas consumption	0.3%	Transmission and distribution loss electricity	2.7%
Fuel use in corporate vehicles	4.1%	Waste to landfill	0.5%
On-site fuel use	1.5%	Air travel	0.3%
Wastewater treatment	22.8%	Electricity use	36.2%
Fugitive emissions from network	4.3%	Other †	0.4%
Lime	18.4%		

† Refrigeration, private mileage and taxi use equal to 0.4%

Note 1 Watercare's carbon footprint has been calculated in accordance with the "Greenhouse Gas Protocol) (WRI, 2004), including all six Kyoto Greenhouse gases and the operational control method. Per protocol, it excludes biogenic CO_2 emissions from the burning of biogas which totalled 32,902.

Note 2 Emissions factors are sourced from Ministry for Environment 2015, 2019 and IPCC 2006. Wastewater emissions include additional industry calculations.

Reusing waste from treatment processes

We aim to reuse as much material as possible from our water and wastewater treatment plants. Watercare uses biosolids from the Māngere Wastewater Treatment Plant to rehabilitate Puketutu Island, which was formerly a quarry. We also maintain dedicated placement sites for solids removed during the water treatment process. In 2018/19, Watercare was able to reuse 76% of the solids from our water treatment process and 81% of the solids from our wastewater treatment process.

Operational waste from:	2018/19	2017/18	2016/17
Water treatment * (m^3)	12,472	12,494	13,277
Wastewater treatment ** (t)	137,976	138,885	142,195

* sludge
** biosolids, grits and screenings

Energy use and internal generation

Watercare co-generates electricity from biogas at both the Māngere and Rosedale wastewater treatment plants. As well as the financial and environmental benefits, co-generation also improves operational flexibility and resilience. Our water supply arm is an electricity supplier too, with turbines located in the four Hūnua dams generating hydroelectric power.

This year, we used 179,639MWh of electricity, an increase of 7.9% compared to 2017/18. We generated 26.7% of our total energy use internally, compared to 26.6% last year.

We have had significantly less rainfall this year, which has affected our total water storage. This means that we have pumped more water from the Waikato Treatment Plant which consumes more energy than gravity-fed supply from our lakes.

The energy improvement programme is well underway with a successful phase 1 where we achieved 8GWh of energy savings at the end of 2018. We have set a new 8GWh target for 2022. Feasibility work on energy neutrality projects is continuing and work is also underway to maximise Watercare's generation potential and reduce operational costs. These are likely to increase as a result of population growth, sustained use of the Waikato Water Treatment Plant and emerging demand pressures in the electricity supply market.

Work is also underway to deploy a 1MW solar array at Rosedale Wastewater Treatment Plant that will reduce grid consumption at the site by 900MWh per annum (23%).

Total energy consumption

	2018/19			
	Total	Unit	Total GJ	%
Grid electricity purchased	128,440.7	MWh	462,387	
Electricity – self generation renewable (solar, hydro, biogas)	46,364.2	MWh	166,911	
Electricity – self generation non-renewable (natural gas, diesel)	4,834.4	MWh	17,404	
Transport – petrol, premium, diesel	712,298.56	litres	27,001	
Transport – BOC Gas	864	kg	42	
Other – Natural gas	1618	GJ	1,618	
Total			675,363	
Renewable sources			566,413	84%
Non-renewable sources			108,950	16%

Internal generation

	2018/19	
	MWh	%
Electricity generated through water supply (hydro)	1,413	0.79%
Electricity generated through wastewater treatment (biogas) – Māngere	39,298	21.88%
Electricity generated through wastewater treatment (biogas) – Rosedale	7,196	4.01%
Electricity generated from solar	84	0.05%
Electricity generated from non-renewable sources	4,834.40	2.69%
Total internally sourced electricity	47,990	26.71%
Total purchased electricity	128,441	71.50%
Electricity exported to the grid (solar, hydro, biogas)	-1,625.90	- 0.91%
Total electricity consumed	179,639	

Liquid fuel use by corporate vehicles and standby generators at plants

	2018/19
	litres
Fuel card petrol (regular)	106,317.66
Fuel card petrol (premium)	5,832.50
Fuel card diesel	429,591.40
Mini-tankers diesel	170,557.00
Total liquid fuel consumption	712,298.56

The electricity and fuel use displayed here forms the total energy use by Watercare, excluding the energy involved in staff travel. Kilometres travelled by staff are reported in Watercare's greenhouse gas emissions table on page 17.

Metal content in biosolids at wastewater treatment plants

Biosolids from wastewater treatment plants can have a high metal content due to stormwater run-off from the streets and waste from industrial users. The table below displays the metal content of biosolids from the Māngere and Rosedale treatment plants, which produce most of Watercare's biosolids.

The metal content has continued to decrease this year to 2.36 tonnes from last year's 2.39 tonnes, as a result of effective controls and continued monitoring of industrial discharges by our trade waste team.

	2018/19		2017/18		2016/17	
Substance	Concentration (mg/kg)	Disposed weight (tonnes)	Concentration (mg/kg)	Disposed weight (tonnes)	Concentration (mg/kg)	Disposed weight (tonnes)
Arsenic	5.09	0.18	5.20	0.19	5.20	0.17
Cadmium	0.73	0.03	0.81	0.03	1.10	0.04
Chromium	43.35	1.55	41.19	1.49	52.76	1.70
Lead	16.24	0.58	18.52	0.67	19.81	0.64
Mercury	0.48	0.02	0.56	0.02	0.46	0.01
TOTAL	65.90	2.36	66.28	2.39	79.32	2.56

Resource consents

As at 30 June 2018, Watercare had 482 active consents across our network and treatment facilities, and averaged 484 active consents over the 2018/19 year. Our average rate of compliance with these consent conditions was 97.8%.

Our non-compliances are typically associated with treatment plants that are currently being upgraded or have upgrades planned. Where there have been repeat occurrences, we have plans in place for resolution – either through design, consenting, construction or commissioning.

Most of the non-compliances related to the smaller regional wastewater treatment plants. With the exception of the digester imbalance and subsequent odour issues around the Māngere Wastewater Treatment Plant, our major wastewater treatment plants (Rosedale and Māngere) were compliant for the year. The digester imbalance at Māngere resulted in more complaints than normal, but the frequency of complaints has reduced since the problem was resolved. We investigated all non-compliances, and are confident that we have not caused any long-term adverse effects on the environment.

We report all non-compliances to Auckland Council, and they took no formal enforcement actions during the year.

Resource consent conditions