

Environmental  
Sustainability,  
Strategy & Performance

# Emissions Reduction Plan 2023



# 1 Strategic Context

Fire and Emergency is Aotearoa New Zealand's trusted national fire authority and an emergency first responder. We maintain a continuous state of readiness, so we can be there when communities need us. Every day we work to:

- respond to fires and emergencies
- provide capability and collaborate with other agencies during other emergency responses
- work across Aotearoa New Zealand to promote fire safety and reduce unwanted fires.

Our purpose is why we exist – protecting and preserving lives, property and the environment. Our vision is what we aspire to – stronger communities protecting what matters, he taonga te ahi, he taonga tangata, he taonga te taiao.

*He taonga te ahi* – fire is an intrinsic part of the natural environment, a powerful element that has the power both to cause harm and sustain life, for example, by providing warmth and comfort.

*He taonga te tangata* – this refers to the taonga (treasure) of our people and the taonga of our communities.

*He taonga te taiao* – the taonga of the environment reminds us to take care of the environment and property as we carry out our work.

The nature of emergencies is changing. Climate change is driving more unpredictable and extreme weather events. Earlier in 2023, we saw huge amounts of rain causing flooding and landslips in the North Island, while at the same time the South was experiencing extreme risk of wildfire. Tragically, in serving our communities while responding to these unprecedented events, we lost two of our own firefighters. This year we have also deployed our people in response of emergencies in Australia, Vanuatu and Canada.

While the types of emergencies we respond to have changed over time, the challenges of our past year demonstrate how our work remains critically important to protecting and preserving lives, property and our environment.

Over the past 12 months, we have also welcomed new Board and Executive Leadership Team members, embedded our new leadership and organisational structure while managing challenges in our operating environment. As our unification journey nears completion, our focus returns to continuous improvement in how we perform our functions. We need to ensure the safety of our own people, while delivering our services to communities efficiently, with uncertain future funding. This and our challenging operating context, has set the stage for how we have addressed our emissions reduction approach in this plan.

In response to the Government's Carbon Neutral Government Programme (CNGP), we are working to reduce our gross climate emissions, acknowledging the challenge between responding to increasing and more complex fires and emergencies while reducing carbon emissions. For us, carbon-friendly alternatives for some of our specialised assets, such as our fleet of fire trucks, which is one of our biggest emitters of carbon, and our tools and equipment, do not exist yet or are cost prohibitive for New Zealand to invest in, in the short-medium term.

Our emissions response outlined below is based on our [Climate Response Strategy 2022–2030](#), which supports our focus on reducing our climate impact (through mitigations as practical) while responding to a wider range of emergencies as a result of climate change (adaptation).

## 1.1 Approach

Our strategic context has driven our approach to emissions reduction in this plan, focused on:

- assessing our level of emissions since our baseline year set in 2018/19
- demonstrating our progress against the 2025 and 2030 emission reduction targets
- setting new targets that consider our operating parameters
- discussing emissions reduction initiatives that are already being implemented or are underway
- identifying initiatives that are being considered for the future
- identifying data gaps and the emission sources that have been excluded from our analysis, confirming valid reasons for any data gaps.

We are balancing the above approach with the challenges that we are facing in our operating environment, and the need to respond in a safe manner, to protect and preserve lives, property and the environment in communities across Aotearoa.

## 1.2 Challenges

The very nature of our work, the equipment, technology, and chemicals we use mean currently, we cannot deliver our functions (such as firefighting) without creating emissions; meanwhile, our main functions of fire response and suppression play a role in reducing emissions from unwanted fires.

Fire and Emergency has achieved reductions in its own emissions in recent years, but greater reductions in future years could not be practically achieved without significant changes to our operations and/or reductions to our levels of service. Emissions from our red fleet (fire trucks) are our largest mandatory emission source, but we cannot acquire low emission alternatives – there are very few available worldwide and those that are available are prohibitively expensive. We therefore have focused on reduction initiatives that are practical and affordable and do not negatively impact our response capabilities.

We have adopted a “split targets” approach to setting our emission reduction targets, dividing our responses into “main sources”, which are those over which Fire and Emergency has greater control and can reduce in line with a 1.5-degree pathway<sup>1</sup>, and “response sources”, such as red fleet and aircraft, where only modest reductions are likely, as emissions increase with increased response and limited alternatives are available.

We are not yet at the stage where we can forecast the emissions reductions potential of different initiatives. As our maturity increases, we will be able to develop plans with a more complete understanding of reduction potential and costs.

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<sup>1</sup> CNGP organisations are required to set gross emissions reduction targets for 2025 and 2030 consistent with a 1.5-degree pathway, measured against a base year and based on the reduction potential within the organisation.

## 2 Where we are now: Emissions Inventory and Progress Against Targets

Fire and Emergency was an early adopter of the CNGP, and started retrospectively certifying our annual emissions inventory in 2021, in advance of our requirements under the CNGP. We chose 2018/19 as a base year as it wasn't impacted by COVID. We produced our Climate Response Strategy in 2022, and we have recently had our fifth annual emissions inventory audited. It shows that our emissions have increased since 2021/22 but are still significantly lower than our base year.

In 2021/22, our total reduction in emissions was 17%, fuel was down 15%, air travel 66% (i.e. to a third of the baseline amount) and accommodation was down by 58%. Based on these reductions, we were a Finalist in the Large Organisation category of the Toitū Brighter Future Awards in 2022.

Figure 1 shows our total mandatory emissions for each year from our baseline year of 2018/19 to 2022/23. Figure 2 shows how our mandatory emissions are tracking against the 1.5-degree pathway 2025 and 2030 targets. They show a steady decrease until 2021/22. 2022/23 was the first year since our baseline where mandatory emissions rose on the previous year. Increased travel following the pandemic contributed to this. Despite this, we are still on track for the 2025 target of a 21% gross reduction. The recent increase demonstrates that further work will be needed to keep emissions low to achieve that target, such as reviewing non-essential air travel and utilising alternative approaches to connecting with, and engaging with, our colleagues and business partners both domestically and internationally.

In August 2023, our Executive Leadership Team approved a set of emissions reduction targets that reflected our new strategic environment. These were based on seeking to align what seemed achievable for an emergency response organisation (from data up to 2021/22) with the Government's intent of consistency with the 1.5°-degree pathway: a 21% reduction by 2025 and a 42% reduction by 2030. They took a pragmatic, split target approach, noting the changing demands of our response role and our challenging operating environment.

The way we currently operate to deliver our core response function and respond to fires and emergencies for New Zealanders means there currently isn't a viable pathway for us to achieve an overall 42% reduction by 2030. At the moment, there are no low-emission alternative tools and equipment available globally for some of our needs, or where they do exist, they are currently cost prohibitive. As such, the focus for 2030 is on where we are able to align with the 1.5°-aligned target, with more modest reductions for where we face a challenge in meeting the targets – such as red fleet and helicopters. This reflects the “split targets” approach noted above.

A more detailed commentary on progress against targets is contained in the following table.

## 2.1 List of Targets with Commentary

### All Mandatory Sources

| Target name                                                                                                             | Baseline period | Baseline | 2024/25 Target | 2029/30 Target | 2022/23 Emissions | 2022/23 Progress | On Track | Comments                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------|-----------------|----------|----------------|----------------|-------------------|------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Absolute reduction in gross emissions (all mandatory reporting sources) by 21% by 30 June 2025 and 42% by 30 June 2030. | 2018/19         | 16,849   | 21%            | 32%            | 14,021            | 16.8%            | ✓        | While 2022/23 is higher than last year, it is still on track to meet the 2025 target. However, it demonstrates that we need to further decrease emissions, and return to lower levels of travel if we are to achieve it. Our 2030 total gross emissions from mandatory sources will almost certainly not meet the 42% target set by the CNGP, due to response activities (red fleet and aircraft) which we cannot readily reduce. |

### Mandatory Sources (Excluding Red Fleet & Aircraft)

| Target name                                            | Baseline period | Baseline | 2024/25 Target | 2029/30 Target | 2022/23 Emissions | 2022/23 Progress | On Track | Comments                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------------------------------|-----------------|----------|----------------|----------------|-------------------|------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All mandatory sources (excluding red fleet & aircraft) | 2018/19         | 11,260   | 27.8%          | 30%            | 8,953             | 20.5%            | ✓        | On track to meet or exceed 2025 CNGP target of 21%.                                                                                                                                                                                                                                                                                        |
| White fleet & petrol                                   | 2018/19         | 3,428    | 20%            | 30%            | 3,174             | 7.4%             | ✗        | Was on track in 2021/2022 but has seen a large increase again this year, though a slight reduction since the baseline. 2021/22 was affected by pandemic lockdowns so may not be a realistic reflection of normal activity.                                                                                                                 |
| Fuel gases (LPG, natural gas)                          | 2018/19         | 1,428    | 30%            | 50%            | 1,202             | 15.8%            | ✗        | Highlights the need to address the oxidiser at NTC, as NTC is the source of the increase in gas use this year.                                                                                                                                                                                                                             |
| Electricity                                            | 2018/19         | 1,576    | -20%           | 5%             | 917               | 41.8%            | ✓        | Actual emissions are far lower than expected. Electricity usage has stayed fairly flat compared with the baseline (13.9 to 13.4 GWh), but the grid has been much cleaner. The 2025 target expecting an increase in electricity emissions could be rewritten next year ("-20%" here meant an expected <i>increase</i> in emissions of 20%). |
| Air travel                                             | 2018/19         | 3,189    | 65%            | 75%            | 2,022             | 36.6%            | ✗        | Was exceeding the target in 2021/2022 but has seen a large increase again this year. Will need addressing.                                                                                                                                                                                                                                 |
| Taxis, Rental cars, Private cars                       | 2018/19         | 340      | 45%            | 70%            | 223               | 34.5%            | ✗        | Not far off track, despite the increase in travel this year.                                                                                                                                                                                                                                                                               |
| Accommodation                                          | 2018/19         | 292      | 45%            | 70%            | 195               | 33.2%            | ✗        | Not far off track, despite the increase in travel this year.                                                                                                                                                                                                                                                                               |
| Purchased energy: Steam (coal)                         | 2018/19         | 140      | 0%             | 100%           | 216               | -54.0%           | *        | Off track, however will be entirely transitioned to biofuels in Dec 23, so will count as carbon neutral, well ahead of schedule.                                                                                                                                                                                                           |

### Red Fleet & Aircraft

| Target name                             | Baseline period | Baseline | 2024/25 Target | 2029/30 Target | 2022/23 Emissions | 2022/23 Progress | On Track | Comments                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------|-----------------|----------|----------------|----------------|-------------------|------------------|----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Red fleet                               | 2018/19         | 4,110    | 5%             | 10%            | 4,125             | -0.4%            | ✗        | Slight increase but generally staying relatively flat across the years. As noted, there is little we can currently do to bring down red fleet emissions.                                                                                                                                                                                          |
| Helicopter/aircraft fuel use (jet fuel) | 2018/19         | 1,479    | 15%            | 15%            | 943               | 36.3%            | ✓        | Highly variable source. Very low this year, in part because of a wet summer (helicopters were used in response to Cyclone Gabrielle, but by NEMA not FENZ). However, with an incoming El Niño, hot and dry conditions are expected and is likely to mean an increase in helicopter use in response to wildfires, and so an increase in emissions. |

Note, we use the terms "red fleet" and "white fleet" to refer to our fleet of fire appliances (red fleet) and the marked and unmarked vehicles we use in support of our operational response (white fleet), such as operational command, risk reduction, specialist advice such as fire investigation and corporate functions that support our frontline responses.

## 3 Initiatives we are implementing or planning

In this section, we list the initiatives that we are now implementing or commencing planning with a view to implementing in the short-medium term.

As discussed above, our ability to make significant reductions in emissions from within our red fleet, in the short-medium term, is limited by the requirement to deliver our response services, without access to low emissions alternatives. Our current initiatives focus on our strategy for vehicles within our “white” fleet, i.e. vans, utes, cars and SUVs.

As we develop Asset Management Plans (AMPs), we will improve our strategic approach to sustainable asset management and renewals. This will help us continue to make prioritised investment decisions that meet the health and safety and regulatory compliance aspects of our response context and consider future sustainability.

### 3.1 Fleet and Equipment

#### 3.1.1 Optimise our White Fleet

We have over 700 vehicles in our “white” fleet. For some vehicle classes such as pool cars, we have fully electric options available and are moving towards this approach as vehicle renewals permit. For others, such as SUVs, there are hybrid models. However, about 70% of our light vehicle fleet are utes, many of which are used in response-oriented roles and need the ability to tow heavy trailers, operate in off-road or remote environments and run the engine and headlights for periods of time (away from charging apparatus) as part of response requirements. Currently in New Zealand there are no electric or plug-in hybrid alternatives available that meet the requirements of our operational response environment.

Our primary focus is optimisation (ensuring we have the right vehicles for the jobs) through a Fleet Asset Management Plan currently under preparation. This will include the costs of migrating the white fleet to low emission options and the likely state of the EV (Electric Vehicle) market, which will inform decisions on the rate of such a migration and the time horizon over which migration may be able to occur. As of 30 June 2023, we operated 4 battery electric vehicles, 27 plug-in hybrid electric vehicles and 9 hybrid vehicles.

#### 3.1.2 Install vehicle charging infrastructure

Our fleet and property teams are working to support electric vehicles with charging infrastructure, where this is currently relevant and practical. When a battery-electric vehicle (BEV) or plug-in hybrid electric vehicle (PHEV) is deployed, it is supplied with a dedicated charger and we ensure the electricity supply to the building is able to handle the increased loads, upgrading the supply where necessary. Future roll out of charging infrastructure will be considered for inclusion as asset management planning is matured.

#### 3.1.3 Replace small equipment with battery-electric options

Our fire trucks carry a lot of tools and equipment, including power tools such as chainsaws, and cutting and rescue equipment (e.g., the “Jaws of life”). Many of these use petrol engines. While only a small source of emissions, electrification has the added benefit of reducing our firefighters’ exposure to airborne pollution, as equipment such as chainsaws are often used in enclosed environments.

Many appliance hand tools and illumination are now battery powered. We are piloting battery powered roadside rescue equipment and looking at charging solutions for on-station charging of multiple Li ion batteries.

## 3.2 Property

### 3.2.1 Improve energy efficiency

We have an ongoing programme of improving the energy efficiency of existing buildings. In 2016, the New Zealand Fire Service (our predecessor) ran a review of energy use, which identified lighting to be the largest use of electricity in our sites. Consequently, our upgrades focus on retrofitting lighting systems with energy efficient LEDs and, where relevant, occupancy sensors to automatically switch off lights when not needed. For new buildings and upgrades of existing buildings, we use energy-efficient heat pumps and thermal insulation to reduce the need for active heating and cooling. These initiatives are incorporated within business-as-usual planning.

### 3.2.2 Generate our own energy

We have piloted solar hot water systems on selected buildings to assess the potential of on-site energy generation and plan to review the suitability of on-site solar generation more widely. A possible future option in this area may be to consider on-site electricity generation with storage (stationary batteries) to provide resilience to stations, allowing them to operate independent of the national grid. This could allow them to continue to operate even during power outages, which are common during major emergency events without relying on diesel generators. However, these fully self-sufficient options are not yet cost-effective.

### 3.2.3 Replace coal use for heating (imported steam)

We have one site, Dunedin City Station, that is heated by steam supplied from a coal boiler originally built as part of the hospital complex. The hospital has already transitioned to using renewable fuel (wood pellets) instead of coal. Our supplier has transitioned to entirely renewable fuels in October 2023, which has removed our reliance on coal as an energy source.

## 3.3 Internal Efficiencies

### 3.3.1 Travel Office

In September 2020, we established the Travel Office to better manage travel bookings by centralising all non-training-related travel, following the COVID-19 pandemic. This was made permanent in 2021, and both costs and greenhouse gas emissions from travel have remained lower than before the pandemic. In the 2021/2022 year, emissions from air travel were less than half the pre-pandemic baseline. While the 2022/23 year showed that emissions from air travel are increasing again, the Travel Office is tightening up on non-essential travel.

### 3.3.2 Air Desk

We use aircraft (rotary and fixed wing) predominantly for wildfire containment and suppression. An Air Desk was established in 2021 as a centralised process to manage and coordinate the use of aircraft, through a software system that collates real time tracking data and allows highly accurate reporting on costs, fuel usage and emissions data. This assists with early fire containment and suppression reducing the overall duration and intensity of the fire, emissions and costs. While set up

primarily to allow for the safe, effective, efficient and logistically-appropriate dispatch of aircraft, this approach has the potential to aid future decisions regarding aircraft in terms of emissions.

### 3.4 Unwanted Alarms Strategy

Almost a third of the incidents we respond to are for unwanted (“false”) alarms – i.e., where we are alerted and respond but there is no actual emergency. Many unwanted alarms are from connected alarms in buildings (“private fire alarms”) triggering when there is no fire. There are many causes for this, including faulty equipment, steam setting off a smoke detector, accidental damage to sensors, or technicians not isolating equipment when working on or near it.

We already work with building owners, occupants and alarm companies to reduce unwanted alarms and apply a range of tools to reduce them occurring and have now developed a strategy to address aspects of how these affect us as an organisation. This includes providing better information to inform a more proportionate response, such as building telematics/additional sensors into building panels that provide more than the standard panel notifications.

Reducing the number of vehicles we send to an alarm activation would mean lower emissions, both from the amount of driving and from idling once vehicles arrive. It would also result in less wear on our vehicles and personnel fatigue. We are looking into the best way to progress responses to unwanted alarm activations, while maintaining a safe response for communities.

### 3.5 Risk Reduction

Our people spend a lot of time and effort on fire safety and fire risk reduction initiatives, such as education campaigns, our schools programme, or installing and checking smoke alarms. While the focus of these is primarily on saving lives, a single average house that completely burns to the ground releases around 30 tonnes of CO<sub>2</sub> equivalent<sup>2</sup>. This means that each house prevented from burning, saves the equivalent of driving more than 175,000 kilometres<sup>3</sup>.

We also run risk reduction programmes for wildfires, including setting fire seasons to prevent outbreaks of fire at the most high-risk times of year.

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<sup>2</sup> <https://fireandemergency.nz/assets/Documents/Research-and-reports/Report-104-Assessing-the-Impact-of-Vegetation-and-House-Fires-on-Greenhouse-Gas-Emissions.pdf>

<sup>3</sup> <https://ourworldindata.org/travel-carbon-footprint>



## 4 Potential future initiatives being considered

This section looks at initiatives that are likely to be technically feasible for potential future consideration. We are investigating them with a view to including them in updates to our Asset Management Plans, as longer-term prospects for further reducing our emissions.

### 4.1 Fleet and Equipment

#### 4.1.1 Zero- or Low-emission Heavy Vehicles: Electric, Hydrogen and Hybrid

Our red fleet, consisting of 1300 heavy vehicles, is the largest of our mandatory greenhouse gas emissions sources.

We have sought a proposal from a vehicle manufacturer to trial an electric fire truck. Most of these vehicles are too heavy for there to be a viable electric alternative at present. Other firefighting organisations internationally are trialling electric, hydrogen or hybrid fire trucks, and we will continue to monitor their progress, and work with vehicle manufacturers, to consider trialling a zero-emission battery-electric truck prototype.

#### 4.1.2 Trial a non-operational electric truck

We operate a few Incident Support Vehicles, which transport additional equipment to large events, and Breathing Apparatus Tenders, which transport replacement air tanks for breathing apparatus equipment. These heavy vehicles typically do not need to respond as urgently to emergencies as our fire trucks. Our fleet team are looking for suitable opportunities to trial an electric option for such low-risk vehicle types.

#### 4.1.3 Reduce idling

To avoid diesel trucks being stranded from flat batteries, engines are typically left running (idling) when the truck is not moving or pumping water. Newer trucks have batteries that sound a warning when their levels get too low and eventually shut off vehicle functions such as lights, etc. It will thus be possible to reduce periods of idling without significant impact on our operations.

#### 4.1.4 Investigate use of drones in emergency services

While it is likely to be some years before zero-emission air vehicles are available that can perform tasks such as extinguishing wildfires, other tasks – such as reconnaissance – could be done by drones. We will continue to monitor the progress of drone technologies, including heavy-lift drones. Our Urban Search and Rescue teams already operate drones that have been used for surveillance at wildfires.

### 4.2 Training

Training our staff and our volunteers so they are able to respond safely, with the right equipment, when incidents happen around Aotearoa is a critical part of our readiness activities. As our operating context changes and the expectations on our organisation change, it is important our people are able to receive the right training for their roles, and that their training adapts as our environment changes, so our people can continue to respond safely in communities.

#### 4.2.1 Replace thermal oxidiser at National Training Centre

To properly train firefighters means exposing them to live fire training. At our National Training Centre (NTC) in Rotorua, this includes burning wood pallets and other combustible materials.

However, the fuel is not cleanly burned, producing soot and smoke (particles of unburned or partially-burned fuel). To comply with clean air regulations, we pass this dirty smoke through a burner (called a thermal oxidiser) that ensures only carbon dioxide is emitted, not more harmful particles. The thermal oxidiser uses liquid petroleum gas (LPG) to achieve this. Our smaller training centres in Auckland and Christchurch use water-based scrubbers instead, which only require electricity to run the pumps and management of the dirty water afterwards. We are in the process of identifying and costing scrubber options for NTC that are less carbon-intensive but still meet the Council clean air regulations.

#### **4.2.2 Use AR (Augmented Reality) and VR (Virtual Reality) for training**

A trial has been run in Christchurch using virtual reality (VR) for firefighter training instead of some live fire training. Presentations at the latest AFAC (Australian and New Zealand National Council for Fire and Emergency Services) conference covered VR and augmented reality (AR) for training. We will continue to explore these options to see where we can conduct effective training that does not need emissions-generating fires.

#### **4.2.3 Explore training efficiencies**

We will continue to explore the most efficient ways to deliver training to our people. We hope to review how we deliver training to try and identify the best ways to ensure the best training is delivered in the most efficient manner (e.g. whether we send participants to a trainer or a trainer to the participants, saving on travel).

## 5 Excluded Sources and Data Gaps

Targets and reduction initiatives have focused only on mandatory emissions sources, as these are more reliably measured. The emissions inventory this year for the first time has included non-mandatory, spend-based emissions, which means that, to the best of our knowledge, no material emissions are excluded. As far as we can measure, all emissions generated by or for Fire and Emergency are now included. There are large uncertainties associated with spend-based estimations, so these have not been included in Figure 1. No targets have been set for these supply chain emissions as we do not have data to measure reductions.

Not everything we spend money on was included as a potential emissions source, as some do not have a tangible product or service (and thus emissions) associated with that spend – for example, staff salaries or certain kinds of fees. A number of small spend-based sources were excluded as they are well below 1% of our total inventory (e.g. medical services, repair services, pest control).

Our largest mandatory sources have reasonable data for total emissions. Improvements will focus on better understanding our emissions, such as deeper analysis by region, district, or station, or measuring changes over time. We have a project underway to set up a data management and dashboarding system for our emissions data, which should enable better insights into the data and more timely reporting.

The following smaller mandatory sources rely on at least some degree of estimation (inventory percentages are for 2022/23 unless stated otherwise):

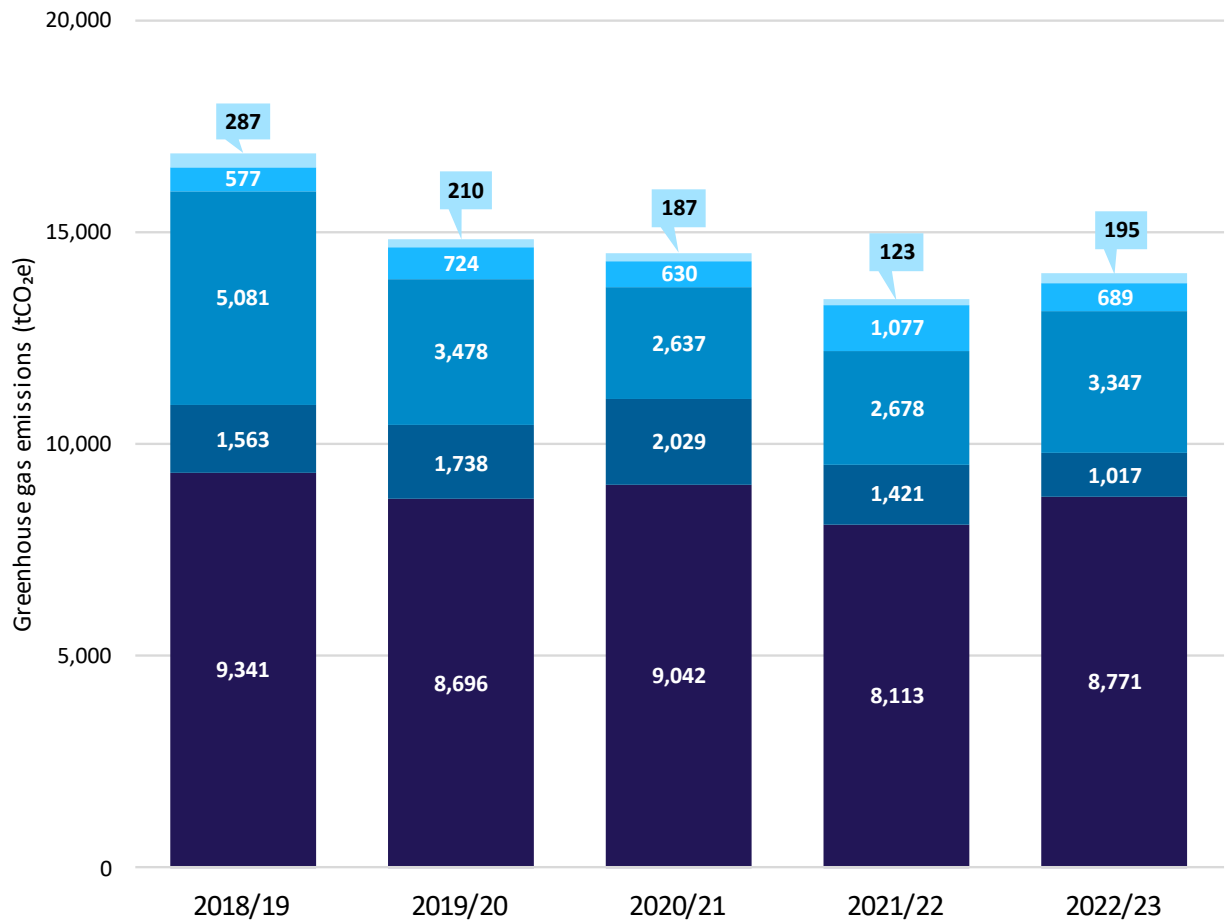
- Diesel from plant and equipment hire: this uses distance, hours, or similar measures where available, but use estimates based on the amount of fuel (and thus emissions) for each invoice. Some invoices do not provide details so are based on the amount spent. Between 0.12% and 2.2% of our inventory.
- Miscellaneous uses of diesel and fuel gases: we use diesel for generators or bottled gas for water heating, barbecues, fire demonstrations, etc. 0.4% of total inventory (de minimis).
- Taxis, private car and rental car use: we have distance driven for most of these (though not well recorded for private car use), however we do not necessarily have the vehicle type. A detailed analysis on the 2021/22 data found that the difference in rental car use between that and an average estimate did not result in a significant difference to our overall inventory. 1.6% of our inventory.
- Freight and staff relocations: mostly only a spend-based estimate and some entries do not provide detail. 0.9% of inventory (de minimis).
- Waste disposal and paper recycling: in 2022, we ran waste audits at several of our stations, a region office and our National Training Centre, however, the small sample size and issues with specific samples (i.e., that no rural stations had waste for us to collect) mean that the emissions are probably a significant over-estimate. We intend to run waste audits, or at least measurements of total waste mass, at a wider range of sites to better understand our waste profile. 2.5% of inventory.
- Water supply and wastewater treatment: these are based only on estimates, which make assumptions about variables such as the amount of time volunteers spend on stations. Many of our sites are not metered and water from fire hydrants is not metered, nor can we measure total wastewater. One approach may be to pick representative sites that are metered and extrapolate from there. 1.4% of inventory.
- Working from home: estimated not measured. We intend to further explore this area to improve our understanding. 0.3% of inventory (de minimis).

## Glossary of Terms

CNGP: [Carbon Neutral Government Programme](#).

NEMA: [National Emergency Management Agency](#).

tCO<sub>2</sub>e: tonnes of carbon dioxide equivalent, a standardised measure of greenhouse gas emissions that allows comparison of different types of gases (e.g. CO<sub>2</sub>, methane and fluorinated refrigerants).



- Category 6 emissions**  
From other indirect sources (accommodation)
- Category 5 emissions**  
Use of products from the organisation, which for us are currently zero
- Category 4 emissions**  
From products we use (like water, wastewater, materials, waste, gas)
- Category 3 emissions**  
From transportation (like business travel, helicopters and aircraft)
- Category 2 emissions**  
From imported energy (electricity and steam)
- Category 1 emissions**  
From sources we own or control (such as fuel, training burns, refrigerants)

Figure 1: Fire and Emergency's Annual Mandatory Emissions from 2018/29 Baseline

## Emissions Reduction Progress Against Targets (mandatory sources)

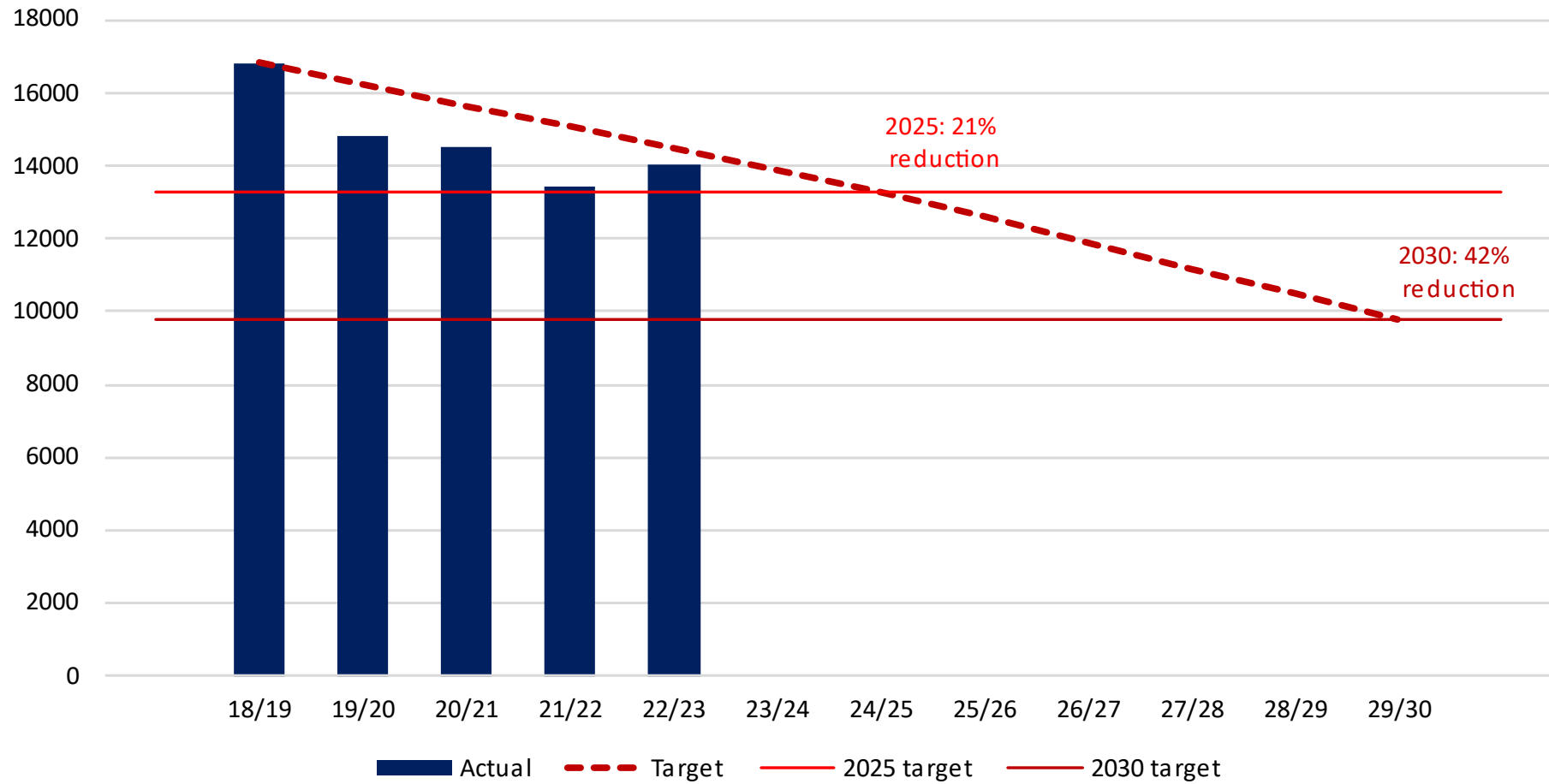


Figure 2: Progress against 1.5-degree pathway targets