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THE LEGISLATIVE ASSEMBLY FOR THE

AUSTRALIAN CAPITAL TERRITORY

ELEVENTH ASSEMBLY

ACT Greenhouse Gas Inventory Report for 2024-25

Presented by
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Strategy.
Policy.
Research.

ACT Greenhouse Gas Inventory: 2024-25

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Acknowledgement of Country

The ACT Government acknowledges the Ngunnawal people as traditional custodians of the ACT and recognise any other people or families with connection to the lands of the ACT and region. We acknowledge and respect their continuing culture and the contribution they make to the life of this city and this region.

Accessibility Statement

This document has been designed to meet the ACT Government's Web Accessibility Policy and the Web Content Accessibility Guidelines (WCAG) 2.1 Level AA. It uses tagged headings, alternative text for figures and English (Australia) language settings.

If you require this report in an alternative format, please contact the City and Environment Directorate at environment@act.gov.au.

This ACT Greenhouse Gas Inventory was compiled and produced for the ACT Government, City and Environment Directorate, by Lachlan Rule, Graham Anderson and Philip Harrington.

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Executive Summary

The ACT's greenhouse gas (GHG) emissions for 2024–25 totalled 1,658 kilotonnes of carbon dioxide equivalent (kt CO_2-e). This represents a 46.9% reduction from the 1989–90 baseline and a 1.5% decrease compared with 2023–24. Net removals from the land use, land-use change and forestry (LULUCF) sector offset 90 kt CO_2-e (5.4% of total emissions). On a per-capita basis, emissions declined to 3.4 t CO_2-e per person, down 69% since the baseline year.

Emissions were dominated by ground transport (61.1%), stationary energy (18.5%), and industrial processes and product use (IPPU) (10.9%), with smaller contributions from waste (6.0%), agriculture (1.9%), and aviation (1.7%). Notable emissions results in this inventory year include:

- **Electricity emissions remain at zero**, as the ACT continues to maintain a 100% renewable electricity supply through a combination of local generation, renewable power purchases, and the surrender of Large-scale Generation Certificates (LGCs).
- **Fossil fuel gas emissions** continued to decline, falling 10% year-on-year to 291 kt CO_2-e, though, LPG use increased slightly.
- **Ground transport** emissions fell 1.1%, supported by improved fuel efficiency and electric vehicle uptake.
- **Aviation** emissions declined nearly 10%, due largely to newer, more efficient aircraft entering service.
- **IPPU emissions** rose significantly compared to what was reported in previous reports following a methodological update that better captures refrigerant leakage across commercial and residential sources.
- **Waste** emissions decreased slightly.
- **LULUCF** continued to act as a net sink, though removals were 44% lower than what was reported in 2023–24.

The ACT has maintained its 40% reduction milestone but has not met the 2025 interim target of a 50–60% reduction from 1989–90 levels. This shortfall primarily reflects higher reported refrigerant emissions under the revised IPPU method and restated LULUCF data. Nevertheless, continued declines across the inventory demonstrate ongoing structural decarbonisation of the ACT economy. Further emission reductions will depend on continued electrification of fossil fuel gas appliances and deeper transport decarbonisation supported by consistent monitoring through future inventories.

1. Introduction

The *Climate Change and Greenhouse Gas Reduction Act 2010* (the Act) sets a Territory wide greenhouse gas (GHG) emissions reduction target of zero net emissions by 30 June 2045, along with a target for per capita emissions to peak by 30 June 2013. The *Climate Change and Greenhouse Gas Reduction (Interim Targets) Determination 2018* sets interim emissions reduction targets of 50-60% by 30 June 2025, 65-75% by 30 June 2030, and 90-95% by 30 June 2040.

Estimating emissions annually is essential for the ACT to measure and report on its progress towards meeting these targets.

The Act also requires that an independent entity prepare an annual report on GHG emissions in the ACT. The annual Greenhouse Gas Inventory (GGI) report is produced specifically to satisfy this requirement. The 2024-25 report contains the following:

- the amount of GHG emissions in the ACT for 2024-25;
- an analysis of the ACT's progress in meeting GHG emissions targets, including a comparison of the annual emissions with emissions reduction targets, identification of the main sources of emissions, and identification of possible reasons for changes in amounts of emissions from previous years; and
- an analysis of the ACT's progress in meeting the renewable energy target, including compliance with the target, and identification of the main sources of renewable energy generated for the ACT.

Overview of Inventory Methodology

This inventory is based on the method established under the Act, the *Climate Change and Greenhouse Gas Reduction (Greenhouse Gas Emissions Measurement Method) Determination 2024* (the Determination).

Specifically, emissions in the ACT for the inventory year include the following sectors:

- **Energy**: GHG emissions from 'fuel combustion' for 'stationary energy', 'ground transport', and 'domestic aviation' and 'fugitive gas emissions' from the distribution of fossil fuel gas.

- **Industrial processes and product use (IPPU)**: emissions of synthetic greenhouse gases from refrigeration and air conditioning systems in the industrial, residential and mobile sectors.
- **Agricultural**: GHG emissions from livestock and the non-CO_2 emissions from agricultural soils.
- **Land use, land use change and forestry (LULUCF)**: GHG emissions from 'Forest land', 'Cropland', 'Grassland', 'Wetland', 'Settlements', and 'Harvested Wood products'.
- **Waste**: GHG emissions from 'Solid waste disposal' and 'Wastewater handling'.

Calculating Emissions

Emissions for a given sector are generally calculated as a function of quantifiable activity data, such as fossil fuel gas consumption, multiplied by an emission factor.

$$Emissions = Activty\ data \times Emission\ factor$$

Quantifying Activity Data

Quantifying an activity metric can be more or less complicated depending on the sector. For example, quantifying total gas consumption in the ACT is relatively simple, with a single network provider able to provide metered data for use in calculations. In other cases, such as agricultural soil emissions, quantifying an activity metric can rely on extensive modelling based on evolving science. The ACT GGI directly applies prorated national figures for a number of these more complex activity data sources.

Defining Emission Factors

An emission factor is the quantity of GHG emissions generated per unit of activity. To account for the fact different greenhouse gasses have different Global Warming Potentials (GWP), as shown in Table 1, emissions factors are generally represented as kilograms of carbon dioxide equivalent (kg CO2-e). To align with other jurisdictions, the emission factors used in the ACT GGI methodology are drawn from the Australian Government's National Greenhouse Accounts (NGA) Factors workbook, which in turn reflect the National Greenhouse and Energy Reporting (Measurement) Determination (NGER Determination).

TABLE 1: EXAMPLES OF COMMON GREENHOUSE GASSES AND ASSOCIATED GWP (NGA FACTORS)

Greenhouse Gas	Chemical Formula	GWP (100-year)
Carbon dioxide	CO_2	1
Methane	CH_4	28
Nitrous oxide	N_2O	265

The emission factors, activity data and associated data sources, are summarised in Appendix Two. Detail on methodologies are included in the relevant sectors in Section 3.

Divergence from National Greenhouse Accounts

As part of the annual NGA update, the Australian Government prepares State and Territory Greenhouse Gas Inventories (STGGI). Like the NGA, the STGGI is released with a two year delay, meaning the May 2025 release reports on emissions to July 2023. As shown in Figure 1, the ACT GGI has consistently reported higher emissions than the STGGI, particularly prior to the realisation of the ACT's 100% renewable energy target in 2019-20.

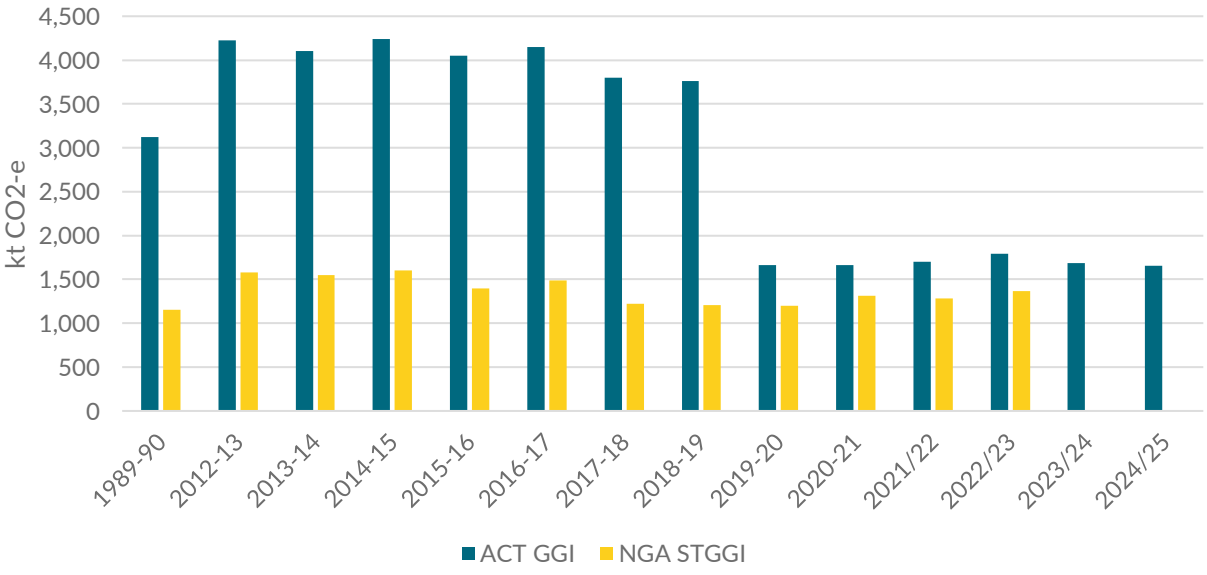

FIGURE 1: COMPARISON OF ACT GGI AND NGA STGGI

The differences between NGA STGGI and the ACT GGI stem from variations in methodology and data sources. Section 11(3)(b) of the Act requires that the ACT GGI must, *"as far as practicable, ensure consistency with the best national and international*

practices in relation to measuring greenhouse gas emissions." To this end, the ACT GGI aligns with the NGA STGGI where possible but diverges from it when required to more accurately reflect the emissions generated within the ACT. This approach allows the ACT Government to monitor the impact of emission reduction policies. Key differences between the two inventories are summarised below.

Energy

The NGA STGGI reports only Scope 1 emissions, in line with Intergovernmental Panel on Climate Change (IPCC) Guidelines. As the ACT has no fossil fuel electricity generators within its borders, this leads to no electricity emissions being recorded from 1989-90 onwards. The ACT GGI includes Scope 2 emissions, which accounted for a significant share of total emissions until the ACT's 100% renewable energy target was met in 2020. This diversion from the STGGI methodology has been maintained because the inclusion of Scope 2 emissions more accurately reflects the true emissions impact of activities occurring within the ACT.

The allocation of national stationary energy emissions (excluding electricity) in the STGGI does not use actual metered data, while the ACT GGI does. This divergence means the ACT GGI will capture local emissions in this sub-sector more accurately than the STGGI. This divergence is particularly relevant in relation to fossil fuel gas combustion, with the STGGI allocating the ACT's residential and commercial fossil fuel gas use to NSW. Similarly, while transport emissions in the STGGI are developed using data reported by fuel companies, jurisdictional allocation is partially modelled using Australian Energy Statistics, a dataset with known limitations. In contrast, the direct collection of local fuel sales data for use in the ACT GGI ensures a more accurate estimate of local emissions.

Finally, the ACT GGI includes aviation emissions, calculated using the GHG Protocol guidance for cities, while the STGGI allocates the ACT's aviation emissions to NSW.

Industrial Processes and Product Use

Though the revised commercial and residential refrigerant gas emissions methodology adopted in this year's GGI ensures significantly greater alignment with the NGA, the approach to allocating national data differs from that used in the STGGI. While the STGGI largely uses population to allocate refrigerant emissions (excluding large-scale facilities required to report under the National Greenhouse and Energy Reporting scheme), the ACT GGI methodology uses local activity drivers, such as space conditioning electricity use, to allocate national totals. This divergence ensures the ACT GGI more accurately

captures IPPU emissions based on the structure of the local economy and prevailing policy settings (i.e. the gas connection ban).

Waste

The NGA STGGI estimates waste-sector emissions using a combination of national waste-generation data, population shares, and standard IPCC first-order decay (FOD) model parameters, such as default waste composition, decay constants, and methane-capture efficiencies. This approach does not incorporate site-specific landfill data or reflect local variations in waste management performance.

The ACT GGI, by contrast, estimates emissions directly from the Territory's two landfill sites, Mugga Lane (active) and West Belconnen (closed), using the Australian Government Clean Energy Regulator's (CER) Solid Waste Calculator. This tool applies the same underlying equations as the STGGI but allows for the use of locally measured inputs, including waste volumes, composition, and methane capture data supplied by the ACT Government and landfill operators. As a result, the ACT GGI approach provides a truer representation of local landfill emissions based on measured data and contemporary operating conditions.

2. Emissions Summary

The ACT's net GHG emissions in 2024-25 were 1,658 kilotonnes of carbon dioxide equivalent (kt CO_2-e), with 1,747 kt CO_2-e of emissions and a net removal of 90 kt CO_2-e (5.4% of total emissions) by the land use, land use change and forestry (LULUCF) sector.

The major sources of emissions were ground transport (61.1% excluding LULUCF) stationary energy (18.5% excluding LULUCF), and IPPU emissions (10.9% excluding LULUCF). Stationary energy emissions consisted of fossil fuel gas combustion (16.7%), fugitive gas emissions (1.1%), and other stationary fuels (0.6%). Further emissions were generated from agriculture (1.9% excluding LULUCF), aviation (1.7% excluding LULUCF), and waste processing and decomposition including wastewater (6% excluding LULUCF). Table 2 shows total emissions for 2024-25.

TABLE 2: ACT 2024-25 GREENHOUSE GAS EMISSIONS BY SOURCE

Emission Source	Emissions (kt CO_2-e)	Share of total (inc. LULUCF)	Share of total (exc. LULUCF)
Ground transport	1,067.4	64.4%	61.1%
Fossil fuel gas combustion (a)	291.9	17.6%	16.7%
Industrial processes/product use (IPPU)	189.6	11.4%	10.9%
Waste including wastewater	105.5	6.4%	6.0%
Agriculture	32.6	2.0%	1.9%
Aviation	29.7	1.8%	1.7%
Fugitive emissions	20.1	1.2%	1.1%
Other stationary energy (b)	11.3	0.7%	0.6%
Subtotal (excl. LULUCF)	1,747.5	105.4%	100.0%
LULUCF	-89.8	-5.4%	N/A
Total (inc. LULUCF)	1,657.7	100.0%	N/A

Notes:
(a) Emissions from electricity remain 0 kt CO_2-e, as the ACT maintains 100% renewable electricity supply.
(b) Other stationary energy includes combustion of LPG, heating oil, and wood fuel.

Changes in emissions

The ACT's total net GHG emissions in 2024-25 were 1,658 kt CO_2-e. This figure represents a reduction of 1,466 kt CO_2-e (-46.9%) since the 1989-90 baseline, and a decline of 26 kt CO_2-e (-1.5%) since the 2023-34 inventory year.

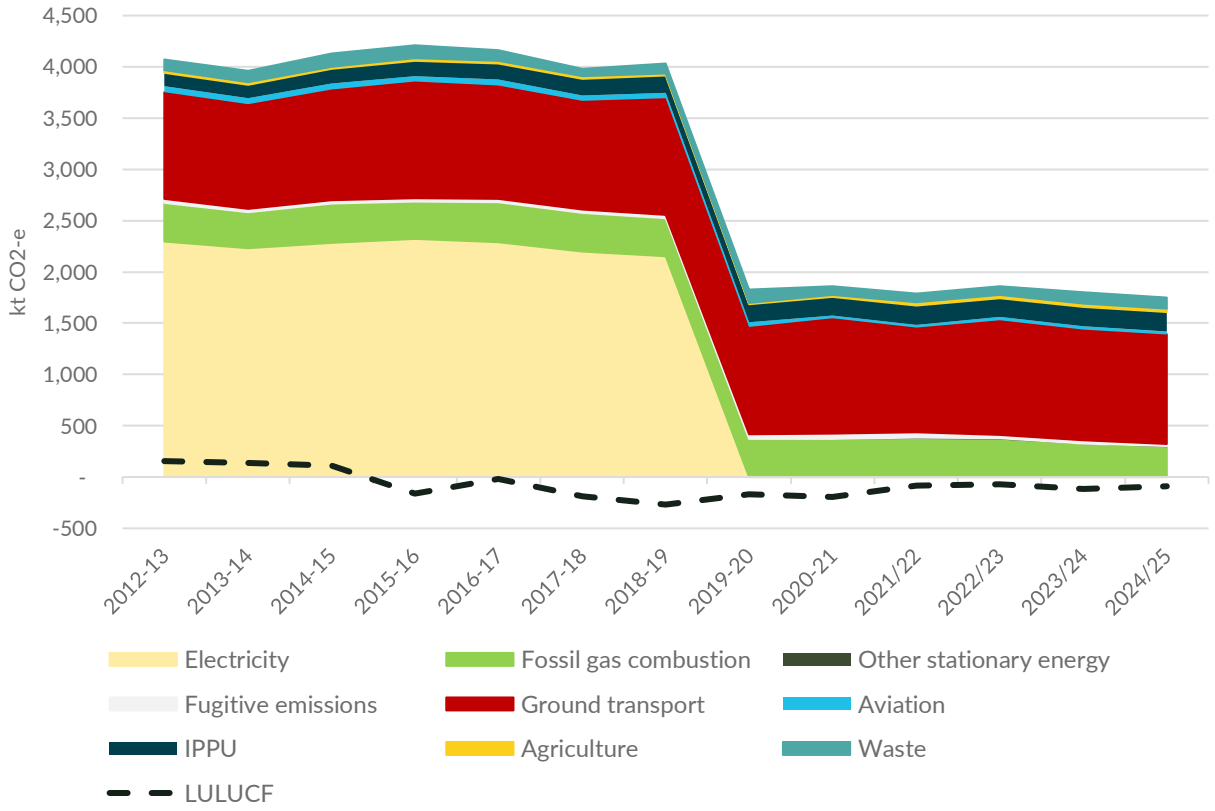

FIGURE 2: ACT EMISSIONS, 2012-13 TO 2024-25

Per capita emissions

Since the ACT's baseline year (1989-90), the Territory's population has grown 73% (from 279,000 to 481,344 in June 2025). Over the same period per capita emissions have decreased from 11.2 t CO_2-e to 3.4 t CO_2-e in 2024-25, a 69.2% reduction. The majority of this decline took place from 2018-19 to 2019-20 as the ACT delivered on its renewable energy targets and per capita emissions fell from 8.3 to 3.8 t CO_2-e (a 59% decrease). Per capita emissions fell 2.9% to 3.4 t CO_2-e from 2023-24 to 2024-25.

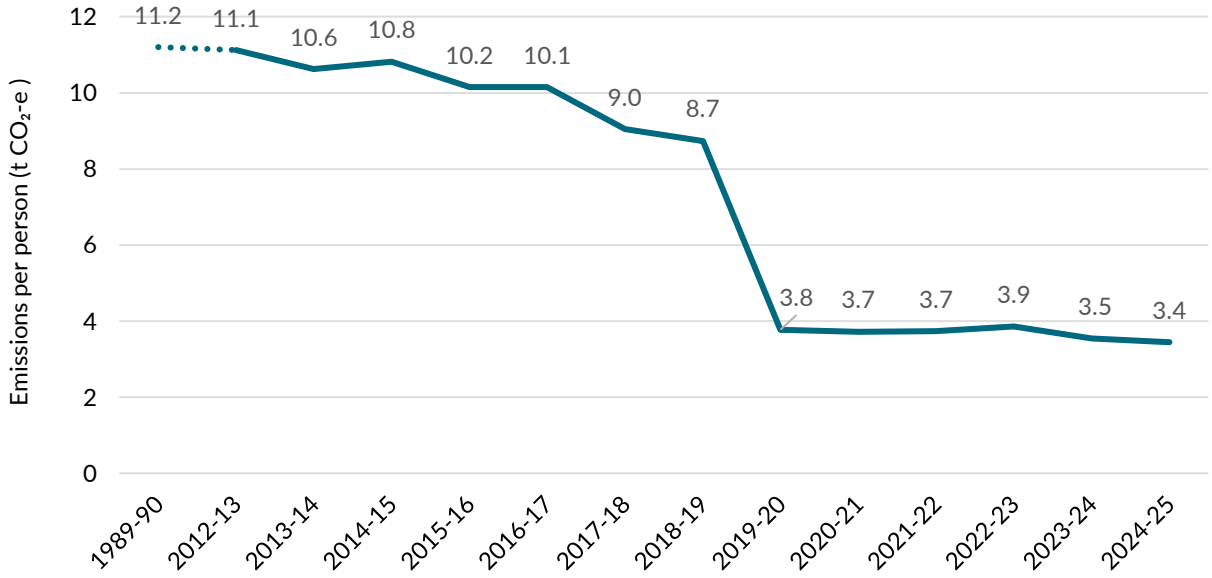

FIGURE 3: ACT PER CAPITA EMISSIONS, 1989-90 TO 2024-25

3. Emissions by Sector

This section outlines the ACT's GHG emissions by sector, along with key sub-sectors within each. It summarises the activities contributing to these emissions and discusses factors that may explain observed changes over recent years. A summary of data restatements for previous years is provided in Appendix One.

Sector classifications are based on the five Intergovernmental Panel on Climate Change (IPCC) source categories:

- Energy
- Industrial processes and product use
- Agriculture
- Land use, land-use change and forestry
- Waste

Energy

The energy sector is the largest source of emissions in the ACT, at 1,420 kt CO_2-e, or 81.2% of total emissions (excluding LULUCF) in 2024-25.

Electricity

The ACT differs from other Australian jurisdictions in that it has historically had no sizeable electricity generators located within its borders. As a result, the majority of the Territory's electricity supply has traditionally been imported from the National Electricity Market (NEM). Because most of the emissions associated with electricity consumption occur outside the ACT, a GGI prepared strictly in line with IPCC Guidelines, reporting only emissions from sources within the boundary, would substantially understate the Territory's electricity-related emissions. Accordingly, the ACT GGI has always included Scope 2 emissions associated with electricity consumption.

In recent years, the growth of rooftop solar and the commissioning of several large-scale solar farms within the ACT have reduced the Territory's reliance on imported electricity. The share of imports to the ACT grid has fallen from 93.3% in 2018–19 to 84.3% in 2024–25.

Alongside this increasing share of local renewable generation, the ACT has maintained a 100% renewable electricity target since 1 January 2020. Under this target, all residual emissions from non-renewable electricity consumption are offset through the surrender of additional Large-scale Generation Certificates (LGCs).

To determine the number of LGCs required for surrender each year, the Territory takes its total electricity consumption, 3,160 GWh in 2024–25, compared with 3,070 GWh in 2023–24, and subtracts:

- the quantity of renewable electricity generated from rooftop solar PV within the ACT (374 GWh in 2024–25);
- the portion of imported electricity deemed renewable under the federal Large-scale Renewable Energy Target Renewable Power Percentage (RPP), which was 18.2% in 2024–25 (575 GWh); and
- the ACT's share of "below-baseline" renewable hydroelectric generation in New South Wales (92 GWh in 2024–25).

The remaining electricity consumption, 2,115 GWh, is offset through the surrender of LGCs to maintain the ACT's 100% renewable electricity status. As a result, electricity-related emissions in the ACT have remained at net zero since the 2019–20 reporting year.

TABLE 3: 2024-25 100% RENEWABLE ENERGY TARGET CALCULATIONS

	2024-25 contribution to target (GWh)	YoY change (%)
Total electricity supplied to customers	3,161	+2.9%
LRET generation	575	-1.6%
Small-scale solar PV	374	+11.2%
ACT share of below baseline generation	96	+1%
Required surrender of LGCs	2,115	-1.3%
Residual electricity	0	0

Stationary energy

Stationary energy emissions are calculated by multiplying the quantity of a given fuel source, determined by data collected by the ACT Government, by emissions factors drawn from the NGA Factors workbook.

Fossil fuel gas combustion, associated with the reticulated gas network, is the second largest emission source in the ACT, with combustion and fugitive emissions contributing 17.8% to total emissions in 2024-25. LPG (0.6%) and firewood (<0.1%) combustion make up the remainder of stationary energy emissions. Fossil fuel gas emissions (combustion and fugitive) decreased 10.1% from 2023-24 to 2024-25 to 311 kt CO_2-e, or 17.8% of total emissions (excluding LULUCF).

TABLE 4: STATIONARY ENERGY EMISSIONS BY SOURCE (KT CO_2-E)

Emissions	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Fossil fuel gas combustion (a)	127.7	367.8	365.6	368.1	369.9	366.6	316.6	291.2
LPG	No data	No data	6.3	6.3	14.8	11.8	10.8	11.1
Heating oil	No data	No data	0.1	0.1	0.1	0.1	-	-
Wood fuel (b)	16.8	0.3	0.3	0.3	0.4	0.3	0.2	0.2
Fossil fuel gas fugitive emissions	3.5	33.2	46.5	51.0	53.6	33.9	29.6	20.1
Total	148.0	401.2	418.8	425.8	438.8	412.8	357.3	322.6

Notes:
(a) 1989-90 fossil fuel gas consumption emissions include CNG used by TCCS bus fleet.
(b) A minor (-77 t/CO2-e) adjustment has been made to wood fuel emissions for 2021-22 due to an error in the historical data.

Per capita fossil fuel gas consumption continued to decline, falling from 13 GJ in 2023-24 to 11.7 GJ in 2024-25, a 9.7% reduction. This fall is a continuation of a long-term decline in per capita fossil fuel gas consumption associated with increased electrification across the economy, and particularly in the residential sector, driven by market dynamics, improved technology, and the ACT Government's gas phase-down policies.

TABLE 5: TOTAL AND PER CAPITA FOSSIL FUEL GAS CONSUMPTION IN THE ACT (EXCLUDING TRANSPORT)

	Units	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Fossil fuel gas combustion (TJ)	TJ	7,137	7,096	7,144	7,179	7,115	6,145	5,651
Per capita fossil fuel gas combustion	GJ per capita	16.3	15.9	15.8	15.8	15.3	13.0	11.7

Ground transport

Like stationary energy, ground transport emissions are calculated by multiplying the quantity of a given fuel, determined by data collected by the ACT Government, by emissions factors drawn from the NGA Factors workbook.

Ground transport is the largest emission source in the ACT, contributing 61.1% (excluding LULUCF) to total emissions in 2024-25. Ground transport emissions fell 1.1% from 2023-24 to 2024-25.

TABLE 6: GROUND TRANSPORT EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Emissions	790.0	1,140.1	1,046.8	1,123.8	1,015.9	1,116.2	1,079.7	1,067.4

Notes:
(a) Ground transport emissions include all emissions from transport fuel use such as off-road vehicles and other machinery and domestic marine.
(b) 1989-90 emissions exclude CNG used by TCCS bus fleet (which is included in stationary fossil fuel gas combustion).

Sales of all transport fuels decreased in 2024-25, with petrol sales (including E10 and E85) declining 0.9%, diesel sales declining 1.3%, LPG sales decreasing 20.9% and CNG sales (for the Transport Canberra bus fleet) declining 11.4%. Per capita transport energy use decreased 2.5% to 32.5 GJ. No long-term decline in per capita use is obvious in the data, though recent falls are likely a combined result of increased EV uptake, more efficient fossil fuel vehicles entering the fleet, and ongoing increases in daily public transport usage (albeit from a low base).

TABLE 7: GROUND TRANSPORT FUEL CONSUMPTION

Fuel type	Units	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Petrol (incl E10 & E85)	kL	312,014	282,816	295,277	263,304	293,443	282,655	280,033
Diesel	kL	151,247	144,012	161,827	149,885	161,833	157,504	155,505
LPG	kL	No data	4,508	3,647	2,913	2,503	2,363	1,870
CNG from Canberra bus fleet use	GJ	80,585	74,480	90,583	82,058	67,480	63,712	56,417
Per capita	GJ	38.4	34.9	36.8	32.7	35.1	33.3	32.5

Aviation

Aviation emissions are estimated in accordance with the GHG Protocol guidance for cities and reflect only those emissions that occur within the ACT boundary. Emissions from the landing and take-off (LTO) cycle, including taxi-out, take-off, climb, descent, landing, and taxi-in, are used as a proxy for aviation emissions occurring within the Territory. Emissions generated during the remainder of the flight are assumed to occur outside the ACT.

Data on aircraft movements is provided by Canberra Airport and includes the departures and arrivals by aircraft type. Aggregated data is provided in Table 9. Emissions are then calculated using the Airport Carbon and Emissions Reporting Tool (ACERT), developed by Airports Council International for the purpose of calculating airport carbon emission inventories.

Public (commercial) air service emissions are calculated based on number of LTO cycles per aircraft type, while light aircraft emissions are based on local AVGAS sales. Commercial aviation emissions decreased 9.9% to 29.2 kt CO_2-e in 2024-25. This fall is greater than the fall in recorded aircraft movements (7.5%) and is likely associated with more efficient aircraft entering regular service. This shift is most notable in Qantas' replacement of older Boeing 717 aircraft with new, and more efficient Airbus A220s, with 717 movements falling almost 90% from 2023-24 to 2024-25, while A220 movements more than tripled over the same period. Commercial aviation emissions remain lower than pre-covid levels, though this is in part a result of improved data accuracy, with previous emission estimates relying on representative fleet numbers, rather than actual aircraft movements.

TABLE 8: REGULAR PUBLIC TRANSPORT AIR SERVICE MOVEMENTS (DEPARTURES AND ARRIVALS)

	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Total public air service movements (arrivals and departures)	38,588	28,700	16,486	22,237	39,088	39,402	36,461

TABLE 9: AVIATION EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Public air service emissions	-	54.5	40.6	23.3	31.4	31.4	32.5	29.2
Light aircraft emissions	-	0.4	0.3	0.4	0.3	0.4	0.4	0.4
Total emissions	21.4	54.9	40.9	23.7	31.7	31.7	32.9	29.7

Industrial Processes and Product Use

No major industrial sites with significant process emissions are present in the ACT, so the IPPU category includes only refrigerant gas emissions from refrigeration and air-conditioning (RAC) systems in the residential and commercial/industrial sectors and mobile air-conditioning (MAC). Estimation of emissions from medical gases has been discontinued since 2022-23 as these emissions are negligible.

The methodology for estimating emissions in the IPPU sector has been revised in this inventory cycle to improve coverage, consistency and alignment with national and international best practice. The revisions address known limitations in the previous approach for both the Commercial and Industrial (C&I) and Residential (Res) refrigerant subsectors, ensuring a more complete representation of IPPU emissions across the ACT economy.

The previous approach to estimating C&I emissions relied on data reported through the National Greenhouse and Energy Reporting (NGER) scheme and captured only those facilities above mandatory reporting thresholds and therefore excluded a large share of emissions from small to medium businesses. The revised method allocates the ACT's share of national C&I refrigerant emissions using two key activity drivers: commercial building electricity consumption (for air-conditioning emissions) and gross floor area of relevant building types (for refrigeration emissions). This approach better reflects the Territory's higher-than-average commercial building electricity intensity and lower than average share of buildings and firms using significant refrigeration.

For the residential subsector, the methodology has been updated to align with the revised C&I methodology, by applying the national inventory framework while maintaining ACT-specific activity drivers. The previous methodology calculated refrigerant leakage based on estimates of the number of air-conditioners and refrigerators in the Territory, with the data used in this calculation not having been updated since 2019. The revised method instead apportions national residential refrigerant emissions using the ACT's share of space-conditioning and refrigeration energy use from the *Residential Baseline Study*. This change improves consistency across sectors, reduces reliance on outdated assumptions, and more accurately represents the transition to electric space-conditioning systems in the ACT.

To maintain temporal consistency, the revised methodologies have been applied across the full historical time series (i.e. 2012-13–2024-25). The 1989-90 baseline has also been recalculated to include emissions from chlorofluorocarbon (CFC) use, providing continuity

between pre-and post-HFC periods and ensuring the ACT's inventory reflects the complete refrigerant transition from ozone-depleting to synthetic greenhouse gases.

Both methodological updates result in higher estimated refrigerant emissions compared with the previous approach, reflecting improved data coverage rather than an underlying increase in activity. IPPU emissions now account for 189.7 kt CO_2-e, or 10.9% of total emissions (excluding LULUCF), compared with 41.3 kt CO_2-e, or 2.5% (excluding LULUCF), under the previous methodology. IPPU emissions have also risen steadily in recent years, reflecting the increased adoption of air conditioning in commercial and residential settings.

TABLE 10: IPPU EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Commercial & industrial emissions	86.1	70.1	72.1	76.8	74.6	77.3	77.3	77.4
Residential emissions	51.5	84.1	88.3	91.7	94.0	94.1	97.7	98.2
Mobile emissions	0.8	13.4	13.4	14.0	13.9	14.3	14.2	14.1
Medical gases (discontinued)	No data	1.5	1.9	1.8	1.5	-	-	-
Total emissions	138.4	169.1	175.7	184.3	184.0	185.6	189.3	189.7

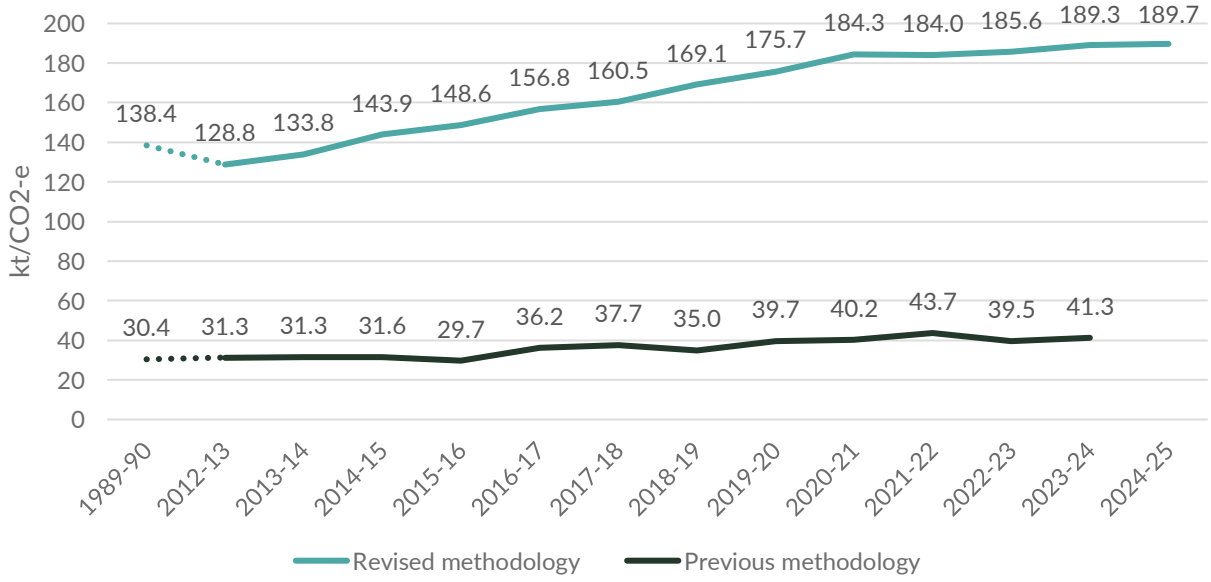

FIGURE 4: COMPARISON OF IPPU EMISSIONS UNDER REVSIED AND PREVIOUS METHODOLOGIES

Agriculture

Agricultural emissions totalled 32.6 kt CO_2-e in 2024-25. This total is made up of emissions driving from enteric fermentation (27.5 kt CO_2-e, or 84.3%), manure management (1.8 kt CO_2-e, or 5.5%) and agricultural soils (3.3 kt CO_2-e, or 10.2%).

The number of sheep and cattle is the primary driver of the ACT's agricultural emissions. The Australian National Greenhouse Accounts (ANGA) show a significant increase in sheep numbers in recent years, rising from 43,323 in 2018-19 to 94,786 in 2024-25. Cattle numbers increased over the same period from 4,002 to 6,876. The 2023 ANGA also included an increase in the total number of cattle over the entire inventory period (1989-90 to 2024-25), and a revision of agricultural soil emissions, which led to slightly higher emissions over the historical period, as shown in Table 11.

Emissions for this sector are calculated using the most recent ANGA data and are subject to a two year lag.

TABLE 11: AGRICULTURE EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Enteric fermentation	No data	13.9	12.1	15.2	26.4	27.5	27.5	27.5
Manure management	No data	0.9	0.8	1.1	1.7	1.8	1.8	1.8
Agricultural soils	No data	1.8	1.6	1.9	3.2	3.3	3.3	3.3
Total emissions	53.0	16.6	14.4	18.1	31.3	32.6	32.6	32.6
Previously stated	42.0	15.8	13.8	17.2	30.1	30.1	30.1	-

Land Use, Land Use Change and Forestry (LULUCF)

The ACT Government's reporting on LULUCF emissions is based on figures in the ANGA State and Territory Greenhouse Gas Inventories (STGGI) report. STGGI reports are published 18-24 months after the end of each reporting year. The latest STGGI report, used to estimate the LULUCF emissions this year, was released in May 2025 and presents data for the year ending 30 June 2023.

As noted in previous inventories, the LULUCF emissions source category has been subject to regular method changes at the national level, resulting in significant fluctuations in the

LULUCF emissions data year-to-year for each state and territory. Furthermore, these method changes have resulted in retrospective changes that extend back to the ACT's baseline year of 1989-90, which has had implications for the entire time series of emissions data. The 2023 STGGI report included additional changes to current and historical data, resulting in significant restatements back to the baseline year, as shown in Table 12.

To reduce these year-to-year fluctuations that have impacted the ACT emissions inventory reporting, the ACT Government has adopted a rolling average based on the previous three years of national inventory data for the current year's inventory. This approach smooths the interannual variations to some extent and reduces the extent to which the following year may see a significant increase or decrease and unsettle current considerations about legislated commitments and targets. It also enables the Territory to report on its updated inventory without needing to wait the full 18-24 months for previous financial year reporting.

The LULUCF sector continues to act as a net carbon sink for the ACT although removals were 22% lower in 2024-25 compared to 2023-24.

TABLE 12: LULUCF EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Forest land	-144.7	-252.6	-157.4	-172.6	-94.1	-84.7	-117.2	-98.7
Cropland	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0
Grassland	1.3	-8.0	-3.0	-8.7	8.3	13.0	4.2	8.5
Wetland	2.7	2.2	1.9	2.6	2.9	2.9	2.8	2.9
Settlements	52.4	-0.1	2.9	-9.7	1.8	1.8	-2.1	0.5
Harvested Wood Products	-82.7	-9.7	-9.4	-5.4	-2.2	-3.0	-3.6	-2.9
Total LULUCF	-171.1	-268.3	-165.1	-193.8	-83.4	-70.1	-115.8	-89.7
Previously stated in 2023-24 GGI	-173.8	-286.6	-178.4	-207.1	-109.3	-165.0	-160.5	-

Waste

Waste-related emissions fall into two separate sub-categories, methane emissions from the breakdown of organic materials in solid waste sent to landfill, and emissions of methane and/or nitrous oxide from the treatment of wastewater.

Solid waste

In the ACT, solid waste emissions arise from the active Mugga Lane landfill and the closed West Belconnen site. To estimate emissions, the ACT uses the CER's Solid Waste Calculator, which in turn reflects the First Order Decay (FOD) model of estimating methane generation based on waste composition, methane capture, and oxidation.

While the ACT's methane capture and combustion volumes have increased, rising from 9.5 million m^3 in 2018-19 to 17.5 million m^3 in 2024–25, total emissions from landfill also increased, from 84.8 kt CO_2-e in 2018–19 to 99.7 kt CO_2-e in 2024–25. Over this same period total waste entering landfill fell 32%, from 262.3 kt to 178.3 kt. This apparent inconsistency, shown in Figure 5 is a function of both data issues, with the accuracy of waste stream composition data key to the corresponding accuracy of emission estimates, as well as the internal design of the CER calculator. Though up-to-date waste stream composition data was provided in 2024-25, these inputs had not been updated in several years, meaning significant changes in the carbon input to the landfill may have been missed.

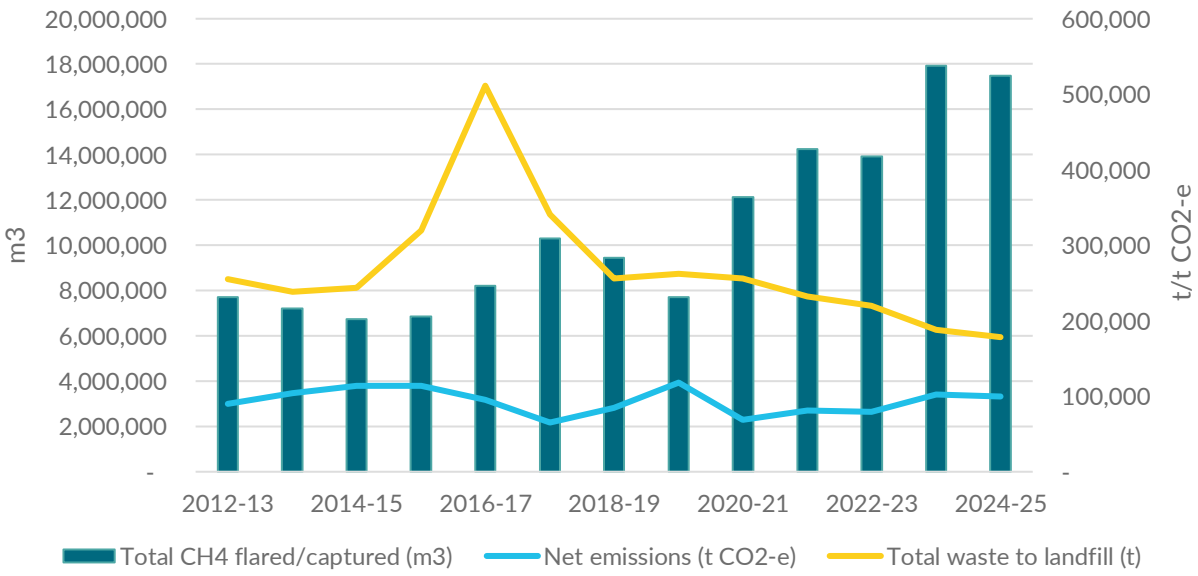

FIGURE 5: METHANE CAPTURE, WASTE TO LANDFILL AND WASTE EMISSIONS, 2012-13 TO 2024-25

The default Collection Efficiency Limit (CEL) of 75% in the CER Calculator effectively caps the proportion of total methane generation that can be counted as captured. In cases such as the ACT, where measured capture efficiency may exceed this value, the calculator will overstate residual emissions, leading to under-reporting of actual abatement. Consistent with national practice and to maintain methodological alignment with the NGER Determination, the ACT has retained the default 75% CEL setting. Internal analysis indicates this assumption likely understates the Territory's methane capture performance.

TABLE 13: SOLID WASTE EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Emissions	101.0	84.8	118.1	69.0	81.1	79.4	102.1	99.7

Wastewater

Wastewater emissions were 5.8 kt CO_2-e, or 0.3%, of total emissions (excluding LULUCF) in 2024-2025. Wastewater emissions consist of methane and nitrous oxide released during the digestion treatment process used at Lower Molonglo Wastewater Quality Control Centre. A small revision (-159 tCO2-e) has been made to the 2023-24 emissions figure due to a data transcription error in the previous Inventory.

TABLE 14: WASTEWATER EMISSIONS (KT CO_2-E)

	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Emissions	27.0	12.1	12.0	13.1	6.0	5.5	5.6	5.8

4. Emission Reduction & Renewable Energy Targets

Net Zero by 2045 and Interim Targets

The ACT's emission reduction targets are legislated under the *Climate Change and Greenhouse Gas Reduction Act 2010* (the Act). Its principal target is to reduce GHG emissions to achieve zero net emissions in the ACT by 30 June 2045. Alongside the Net Zero Target, the ACT also has a series of interim targets at five-yearly intervals. The ACT's interim targets are to reduce emissions from 1989-90 levels by:

- 40% by 2020
- 50 to 60% by 2025
- 65 to 75% by 2030
- 90 to 95% by 2040

As shown in Table 15, net emissions decreased by 46.9% from 1989-90 to 2024-25. This reduction has been largely due to the 100% renewable energy target, with a smaller contribution made by falling fossil fuel gas use.

TABLE 15: CHANGE IN ACT EMISSIONS FROM 1989-90 BASE YEAR

	Units	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Net emissions	ktCO2-e	3,124	3,762	1,662	1,664	1,704	1,794	1,684	1,658
Change from 1989-90	%	-	20.4%	-46.8%	-46.7%	-45.4%	-42.6%	-46.1%	-46.9%

This result means the ACT has maintained the 2020 target (40% emissions reduction), but has not met the 2025 interim emissions reduction target of 50 to 60%. Changes to the IPPU methodology to more accurately reflect the scale of refrigerant gas emissions and a

historic restatement of LULUCF emissions have contributed to higher emissions in this inventory year than in previous years.

Per Capita Emission Target

The Act also sets a per-capita emissions target, with peak emissions to be reached by 30 June 2013. Figure 6 shows that per capita emissions peaked at 11.1 tCO2-e in the 2012-13 inventory year and have declined consistently since then. Table 16 shows the percentage change in per capita emissions from a 1989-90 baseline.

TABLE 16: EMISSION REDUCTIONS FROM 1989-90 BASELINE

	Units	1989-90	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25
Per capita emissions	tCO2-e	11.2	8.7	3.8	3.7	3.7	3.9	3.5	3.4
Change from 1989-90	%	-	-22.0%	-66.3%	-66.8%	-66.6%	-65.6%	-68.3%	-69.3%

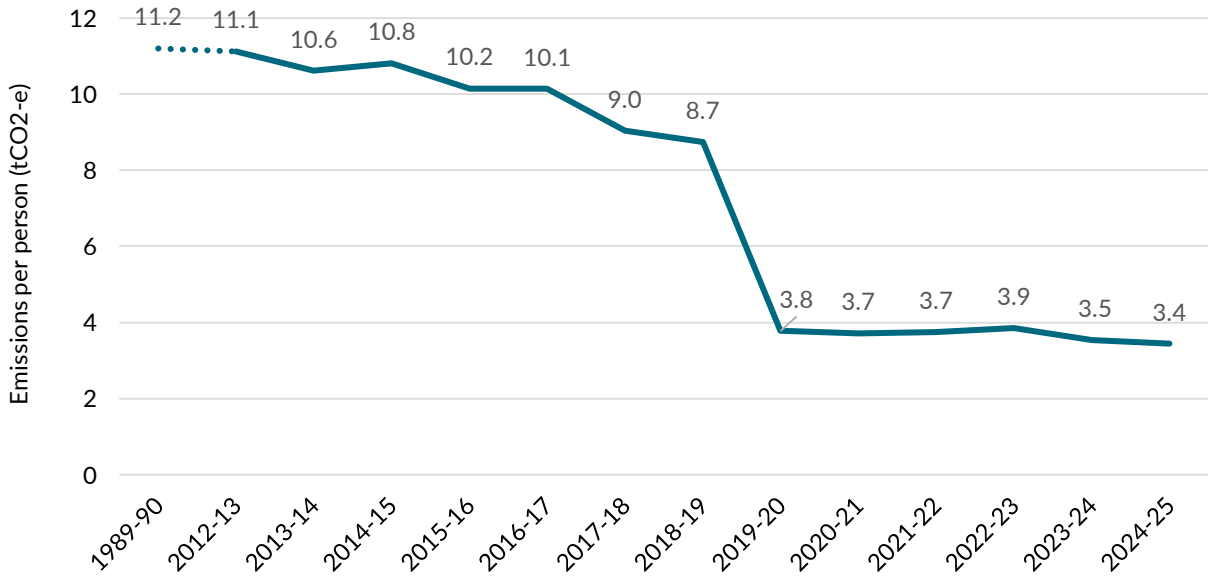

FIGURE 6: TREND IN PER CAPITA EMISSIONS (TCO2-E) – ACT, 1989-90 TO 2024-25

Renewable Energy Target

The ACT has a 100% renewable energy target legislated under the Act. This target was achieved by the legislated deadline of 1 January 2020 and has been maintained since. See section 3 for more detail.

Appendix One: Summary of Emission Restatements

Historical emissions data occasionally needs to be restated to account for changes to methodologies and data inputs, as well as errors made in previous Inventories. This section summarises the restatements made in the 2024-25 GGI.

Stationary energy

A very minor (-77t CO_2-e) restatement of wood fuel emissions has been made in the 2021-22 inventory year due to a data entry error.

Industrial Processes and Product Use

A major restatement of IPPU emissions has been made to the entire inventory period, totalling 1,523 kt CO_2-e since 2012-13, with a corresponding upward revision of the 1989-90 baseline year by 108 kt CO_2-e. This restatement is a result of two factors:

- Changes to the Commercial and Industrial and Residential refrigerant methodologies have corrected known shortcomings with the former methodology, which significantly underreported IPPU emissions. These changes account for almost the entirety of the restatement as associated baseline year changes.
- Very minor changes between the 2022 and 2023 National Inventory Reports to estimated national vehicle fleet numbers over the recent historical period led to a 7 t/CO2-e restatement in total emissions over period from 2019-20 to 2024-25

Agriculture

Agriculture emissions have been revised by 8.6 kt CO_2-e since 2019-20. This restatement is a result of two changes made in the 2025 ANGA release:

- Changes to historic cattle numbers (and to a very minor extent, goats) has led to a 7 kt CO_2-e restatement of historical emissions.
- Changes to historical agricultural soil emissions has led to a 1.6 kt CO_2-e restatement of historical emissions.

Land Use, Land Use Change and Forestry

LULUCF emissions have been revised by 321.7 kt CO_2-e since 2012-13 as a result of methodological changes to the ANGA. 280.3 kt CO_2-e, or 87.2%, of this total is a result of changes to estimated abatement from forests, with changes to grassland abatement estimates making up a further 37.6 kt CO_2-e, or 11.7%. The remainder is a combination of minor adjustments to estimates of emissions from wetlands, the construction of settlements, and abatement in harvested wood products. A small, 2.7 kt CO_2-e adjustment was also made to the 1989-90 baseline.

TABLE 17: SUMMARY OF DATA RESTATEMENTS IN 2024-25 INVENTORY

Sector	1989-90	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
5.1 Electricity	0	0	0	0	0	0	0	0	0	0	0	0	0
5.2 Fossil fuel gas	0	0	0	0	0	0	0	0	0	0	0	0	0
5.3 LPG	0	0	0	0	0	0	0	0	0	0	0	0	0
5.4 Fuel oil	0	0	0	0	0	0	0	0	0	0	0	0	0
5.5 Wood fuel	0	0	0	0	0	0	0	0	0	0	-0.1	0	0
5.6 Fugitive emissions	0	0	0	0	0	0	0	0	0	0	0	0	0
6. Ground transport	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2 Aviation	0	0	0	0	0	0	0	0	0	0	0	0	0
7. IPPU	108.0	97.5	102.5	112.3	118.9	120.6	122.8	134.1	136.0	144.0	140.4	146.1	148.0
8. Agriculture	11.0	0	0	0	0	0	0	-1.0	0.9	0.6	-0.1	2.4	2.5
9. LULUCF	2.7	16.5	17.3	18.1	18.7	19.6	21.1	18.3	13.3	13.3	25.9	94.9	44.7
10.1 Waste	0	0	0	0	0	0	0	0	0	0	0	0	0
10.2 Wastewater	0	0	0	0	0	0	0	0	0	0	0	0	-0.2
Total (inc. LULUCF)	121.8	113.9	119.7	130.4	137.6	140.2	143.9	151.4	150.3	158.0	166.0	243.4	195.0
Total (exc. LULUCF)	119.0	97.5	102.5	112.3	118.9	120.6	122.8	133.1	137.0	144.7	140.2	148.5	150.3

Appendix Two: Summary of Activity Data and Emission Factors

TABLE 18: ACTIVITY DATA AND EMISSION FACTORS, VALUES AND SOURCES

Inventory sector	Activity data	Activity data source	Emission factor	Emission factor source
Stationary Energy – Electricity	Electricity consumption, (kWh), solar generation, RPP, large scale renewable generation	Evoenergy, CER	0.81 kg CO2-e/kWh	2024 NGA Factors workbook
Stationary Energy – Fossil fuel gas	Consumption (GJ)	Evoenergy	51.5 kg CO2-e/GJ	2024 NGA Factors workbook
Stationary Energy - LPG	Consumption (kL)	ACT Government	1,557 kg CO2-e/kL	2024 NGA Factors workbook
Stationary Energy – Heating Oil	Consumption (kL)	ACT Government	2,601 kg CO2-e/kL	2024 NGA Factors workbook
Stationary Energy – Wood Fuel	Consumption (t)	ACT Government	1.2 kg CO2-e/GJ	2024 NGA Factors workbook
Stationary Energy – Fugitive Emissions	Consumption (GJ), Unaccounted for Gas %	Evoenergy, NGER Determination	437 t CO_2-e/TJ for methane and 0.8 t CO_2-e/TJ for carbon dioxide.	NGER Determination
Transport - Petrol/gasoline	Fuel consumption (kL)	Private fuel suppliers	2312.6 kg CO2-e/kL	2024 NGA Factors workbook
Transport – Diesel	Fuel consumption (kL)	Private fuel suppliers	2717.8 kg CO2-e/kL	2024 NGA Factors workbook
Transport – LGP (transport applications only)	Fuel consumption (kL)	Private fuel suppliers	1598.2 kg CO2-e/kL	2024 NGA Factors workbook
Transport – Ethanol (as part of E10 and E85 fuels)	Fuel consumption (kL)	Private fuel suppliers	9.4 kg CO2-e/kL	2024 NGA Factors workbook

Inventory sector	Activity data	Activity data source	Emission factor	Emission factor source
Transport – Compressed Natural Gas (CNG)	Fuel consumption (GJ)	Private fuel suppliers	54.5 kg CO2-e/GJ	2024 NGA Factors workbook
Transport - Aviation	Aircraft movements by type, landing and take-off (LTO), duration, direct AvGas sales	Canberra Airport	2,240. kg CO2-e/kL (AvGas)	2024 NGA Factors workbook
IPPU – Commercial/Industrial	Emissions, electricity use, floor area	National Inventory data, Commercial Building Baseline Study	N/A – direct data used	N/A
IPPU - Residential	Emissions, electricity use	National Inventory data, Residential Baseline Study	N/A – direct data used	N/A
IPPU – Mobile	Emissions, vehicle numbers	National Inventory data, ACT vehicle registration data	N/A – direct data used	N/A
Agriculture – Enteric Fermentation	Herd numbers	National Inventory data,	Cows/cattle: 1398.04 kg CO2-e /head/year Sheep: 187 kg CO2-e /head/year Goats: 140 kg CO2-e /head/year Horses: 504 kg CO2-e /head/year	National Inventory Report 2023
Agriculture – Manure Management	Herd numbers	National Inventory data,	Cows/cattle: 128 kg CO2-e /head/year Sheep: 9.5 kg CO2-e /head/year Poultry: 0.84 kg CO2-e /head/year	National Inventory Report 2023
Agriculture – Agricultural soils	N/A – direct data used	National Inventory data,	N/A – direct data used	N/A
LULUCF	N/A – direct data used	National Inventory data,	N/A – direct data used	N/A
Waste	N/A – direct data used	National Inventory data,	N/A – direct data used	N/A