

Interim ACT Greenhouse Gas Inventories for 2012-13 and 2013-14

transport | community | industrial & mining | carbon & energy



Prepared for:

Environment and Planning Directorate,
ACT Government

Client representatives:

Cameron Knight, Simon French

Date:

11 March 2015
Rev 05

Table of Contents

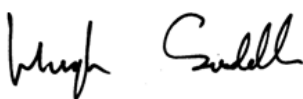
Executive Summary	1
1. Introduction	2
2. Total ACT Greenhouse Gas Emissions	3
3. Emissions by source	3
4. Trends in Greenhouse Gas Emissions	5

List of figures

Figure 1 - Energy related emissions in the ACT 2013-14	4
Figure 2 – Total ACT Greenhouse Gas Emissions since 1989-90 (ex LULUCF)	6
Figure 3 - ACT Greenhouse Gas Emissions per capita since 1989-90	6
Figure 4 – Annual ACT greenhouse emissions by source	7
Figure 5 - Annual ACT Greenhouse Gas Emissions from Electricity and Natural Gas	8

List of tables

Table 1 - Total ACT Greenhouse Gas Emissions Summary	3
Table 2 - Total ACT Greenhouse Emissions - excluding LULUCF	3
Table 3 - ACT Greenhouse emissions 2013-14 - by source	4
Table 4 - Detailed ACT Emissions Sources 2013-14	5

Prepared by: ...  Date: 5 March 2015
Hugh Saddler

Reviewed by:  Date: 5 March 2015
Mark Johnston

Authorised by:  Date: 5 March 2015
Phil Harrington

© 2015 pitt&sherry

This document is and shall remain the property of **pitt&sherry**. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form is prohibited.

Executive Summary

The interim ACT Greenhouse Gas Inventories for 2012-13 and 2013-14 show that total Territory emissions fell progressively from 4,352 kt CO₂-e in 2011-12 to 4,097 kt CO₂-e in 2012-13 and 3,995 kt CO₂-e in 2012-13. These changes equate to a reduction of 8 per cent over the two years. The Inventories excluding emissions arising from Land Use, Land Use Change and Forestry show the same reduction although not, of course, the same total emissions.

The largest source of emissions, as with all ACT Emissions Inventories for earlier years, is stationary energy, mainly resulting from consumption of electricity and natural gas. Emissions from this source were 2,734 kt CO₂-e in 2012-13, equivalent to 68 per cent of total emissions. The next largest source category, again as in all earlier years, is transport energy, which was responsible for 1,002 kt CO₂-e in 2012-13, equivalent to 25 per cent of the total. These two source categories also account for almost all the reduction in emissions from 2011-12 to 2013-14. These reductions are entirely caused by reduced demand for electricity, natural gas and transport fuels.

There has also been a small fall in fugitive emissions from natural gas leakage, in line with the small in total demand for natural gas. All other emission sources, totalling, in net terms, just over 6 per cent of the total 2013-14 emissions inventory, are unchanged from 2011-12.

These emissions are unchanged, by definition, because they are calculated on the basis of the currently prescribed methodology. This methodology specifies use of data for the ACT contained in the Commonwealth Department of the Environment's Australian Greenhouse Emissions Inventory System. The most recent data currently available in this System is for 2011-12, so these data have been used for both the 2012-13 and the 2013-14 ACT interim inventories. For the same reason the two inventories reported here use the 2011-12 emissions intensity value for calculating emissions attributable to electricity purchased from the National Electricity Market.

The prescribed methodology is scheduled to be reviewed later this year; following formal approval of any recommended changes to methodology, the inventories for 2012-13 and 2013-14 will be re-calculated, using the new methodology. It is likely that one feature of the review will be to recommend changes which avoid dependence on out of date national data. It is because of the forthcoming review, and subsequent recalculation, that the inventories described in this report are interim only.

1. Introduction

This report presents interim ACT Greenhouse Gas Inventories for the years 2012-13 and 2013-14. It is an interim Inventory for two main reasons. Firstly, for a number of key inputs, most notably the emissions intensity of electricity supplied through the National Electricity Market and actual emissions from all non-energy related sources, it uses data derived from the National Greenhouse Gas Inventory for 2011-12, not the actual year concerned. Secondly, the prescribed methodology is scheduled to be reviewed later this year; following formal approval of any recommended changes to methodology, the inventories for 2012-13 and 2013-14 will be re-calculated, using the new methodology. It is likely that one feature of the review will be to recommend changes which avoid dependence on out of date national data. Key features of the methodology used for these interim inventories, and in particular the two points summarised in this paragraph, are described in the following paragraphs.

The inventories have been prepared using the methodology prescribed in the *Climate Change and Greenhouse Gas Reduction (Greenhouse Gas Emissions Measurement Method) Determination 2013*. While most elements of this methodology are based on the IPCC *Guidelines for National Greenhouse Gas Inventories*, there is one very important departure relating to accounting for emissions associated with consumption of electricity in the ACT. Electricity related emissions are accounted on a basis similar to that specified as Scope 2 emissions under the *Greenhouse Gas Protocol*, with the ACT as a whole being defined as the consumer. In addition, emissions associated with losses in transmission, between the power stations and the ACT border, are also accounted. More details are provided below.

The other important feature of the prescribed methodology is that for emissions other than those related to energy (including both energy combustion and fugitive), the prescribed methodology uses data contained in the state and territory inventories, as compiled by the Australian Government (specifically, at the present time the Department of the Environment) and readily available through the Australian Greenhouse Emissions Information System (AGEIS). Unfortunately, from the ACT's perspective, these state and territory inventories for each year are compiled and published in conjunction with the national inventory for the corresponding year. This normally occurs no earlier than April two years after the end of the inventory year; for example, the most recent available national and state and territory inventories are for 2011-12, which were published in April 2014. It is expected that the inventories for 2012-13 will be published in April 2015.

The consequence of this timing is that ACT inventory data for 2012-13 will not be available through AGEIS until April 2015, at the earliest, and data for 2013-14 in April 2016. Consequently, the two inventories reported in this document use 2011-12 inventory data for all these sources. It is primarily for this reason that this document is an interim report on interim inventories. Fortunately, as has been shown in previous ACT inventory reports, and is explained below for the two most recent inventories, emissions from these sources account for only a small proportion of ACT total emissions (much smaller than for any of the other state and territories). This means that the use of interim emissions data for these sources, while not ideal, does not greatly affect the estimation of total emissions.

A further consequence of the timing of national inventory publications is that national greenhouse accounts factors, which, as their name suggests, are calculated for national emissions inventory data, are normally not published until July, i.e. more than two years after the end of the year to which they refer. The factor for the emissions intensity of electricity supplied in NSW is a key input to the prescribed methodology, being used to calculate the emissions attributable to consumption of electricity. Unavailability of up to date data means that, as with the minor emissions sources, the electricity emissions intensity factor from the 2011-12 national inventory has been used to calculate the inventories for both 2012-13 and 2013-14. Hence the emissions estimates for electricity in both years are also interim only.

2. Total ACT Greenhouse Gas Emissions

The interim estimates of total greenhouse gas emissions for the ACT are 4,096.5 kt CO₂-e for 2012-13 and 3,995.0 kt CO₂-e for 2013-14. These totals include the net impact on CO₂-e emissions from land use, land use changes and forestry (LULUCF).

Table 1 shows the interim results for 2012-13 and 2013-14, the results for the two preceding years and for the reference year of 1989-90. The targeted outcome for 2020 is also shown. This target is 40 per cent below the 1989-90 level of greenhouse gas emissions and is a legislated objective.

Table 1 - Total ACT Greenhouse Gas Emissions Summary

	1989–90	2010–11	2011–12	2012–13	2013–14	2020 Target
Total emissions including LULUCF kilotonnes CO₂-e	3185.5	4459.7	4352.1	4,096.5	3,995.0	1911

Table 2 shows total emissions when CO₂-e emissions from land use, land use changes and forestry (LULUCF) are excluded.

Table 2 - Total ACT Greenhouse Emissions - excluding LULUCF

	1989–90	2010–11	2011–12	2012–13	2013–14
Total emissions excluding LULUCF kilotonnes CO₂-e	3185.5	4471.6	4364.3	4,108.7	4007.2

3. Emissions by source

Stationary energy is the dominant source of emissions, and produced over two-thirds of the CO₂-e emissions that were attributable to the ACT in 2012-13 and 2013-14.

The transport sector is also very important, with one-quarter of emissions coming from petroleum based fuels used in transport vehicles. Industrial processes; waste; and fugitive emissions related to the energy sector account for the remainder of emissions. The net effect in 2013-14 of land use, land use changes and forestry (LULUCF) was a reduction in emissions of 12.2 kt CO₂-e.

Table 3 provides the broad breakdown of ACT emissions based on the interim results for the year 2013-14.

Table 3 - ACT Greenhouse emissions 2013-14 - by source

Emissions Source	Emissions in 2013-14, kilotonnes CO ₂ -e	% of total emissions ex LULUCF
Stationary energy	2,734.4	68.4%
Transport	1,001.0	25.0%
Fugitive emissions	17.2	0.4%
Industrial processes (synthetic gases)	139.1	3.5%
Agriculture	23.7	0.6%
Waste	91.9	2.3%
Sub Total (ex LULUCF)	4,007.2	100%
LULUCF	-12.2	-0.3%
TOTAL including LULUCF	3,995.2	

Emissions relating to some form of energy use accounted for around 94 per cent of total emissions (excl. LULUCF) in 2013-14. This is the combined emissions of stationary energy, energy for transport, and fugitive emissions (which in the case of the ACT is the leakage of natural gas). Emissions within stationary energy can be split into electricity, natural gas and fuel wood. The scale of emissions of these separate areas of energy use, as well as total energy related emissions, is illustrated below in Figure 1.

The figure clearly shows that the use of electricity from fossil fuelled power stations is by far the biggest single source of emissions in the ACT. The combustion of petroleum based fuels for transport purposes is the second largest source of emissions, significantly outweighing the third largest emissions source; the use of natural gas for stationary energy purposes (like home space and water heating). Natural gas leaks (where natural gas escapes before combustion) and the burning of wood for the space heating of ACT homes are relatively small emissions sources.

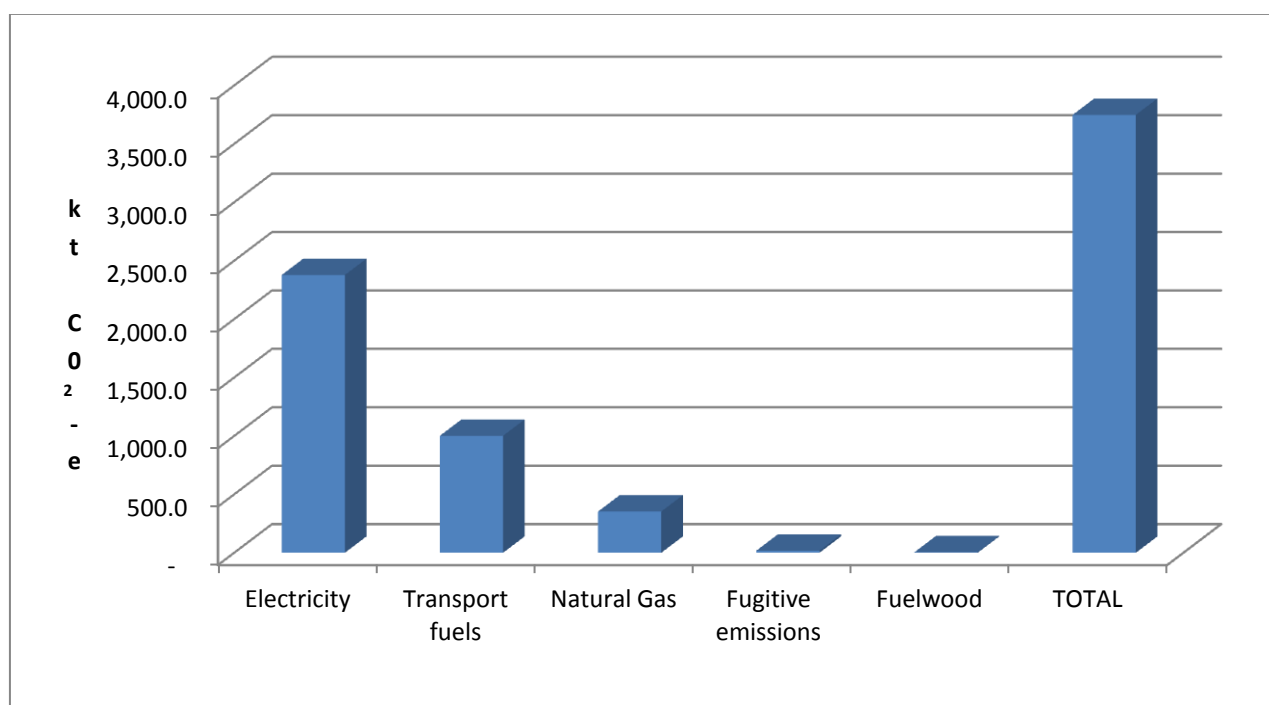


Figure 1 - Energy related emissions in the ACT 2013-14

The detail of all emissions sources for 2013-14, including changes in land use, land use changes and forestry, is shown in Table 4 below.

Table 4 - Detailed ACT Emissions Sources 2013-14

Emissions Source			kt CO ₂ -e
Energy			3,752.6
	A.	<i>Fuel combustion activities</i>	<i>3,735.4</i>
		Electricity	2,377.4
		Natural gas	352.8
		Transport fuels	1,001.0
		Fuel wood	4.3
	B.	<i>Fugitive emissions from fuels</i>	<i>17.2</i>
		Natural gas leakage	17.2
Industrial processes			139.1
		Production of halocarbons and SF6	-
		Consumption of halocarbons and SF6	133.4
		Other	5.7
Agriculture			23.7
		Enteric fermentation	20.0
		Manure management	0.1
		Agricultural soils	3.7
Land use, land-use change and forestry			- 12.2
		Afforestation and reforestation	- 12.2
		Deforestation	0.0
Waste			91.9
Total emissions including net CO ₂ -e from LULUCF			3,995.0
Total emissions excluding net CO ₂ -e from LULUCF			4,007.2

4. Trends in Greenhouse Gas Emissions

The total greenhouse gas emissions in 2013-14 were lower than the emissions for the previous year by 101.5 kt, a reduction of 2.5%. This reduction continues the downward trend in total emissions since 2010-11, when emissions peaked. Figure 2 shows the year by year trend of total emissions since 1990.

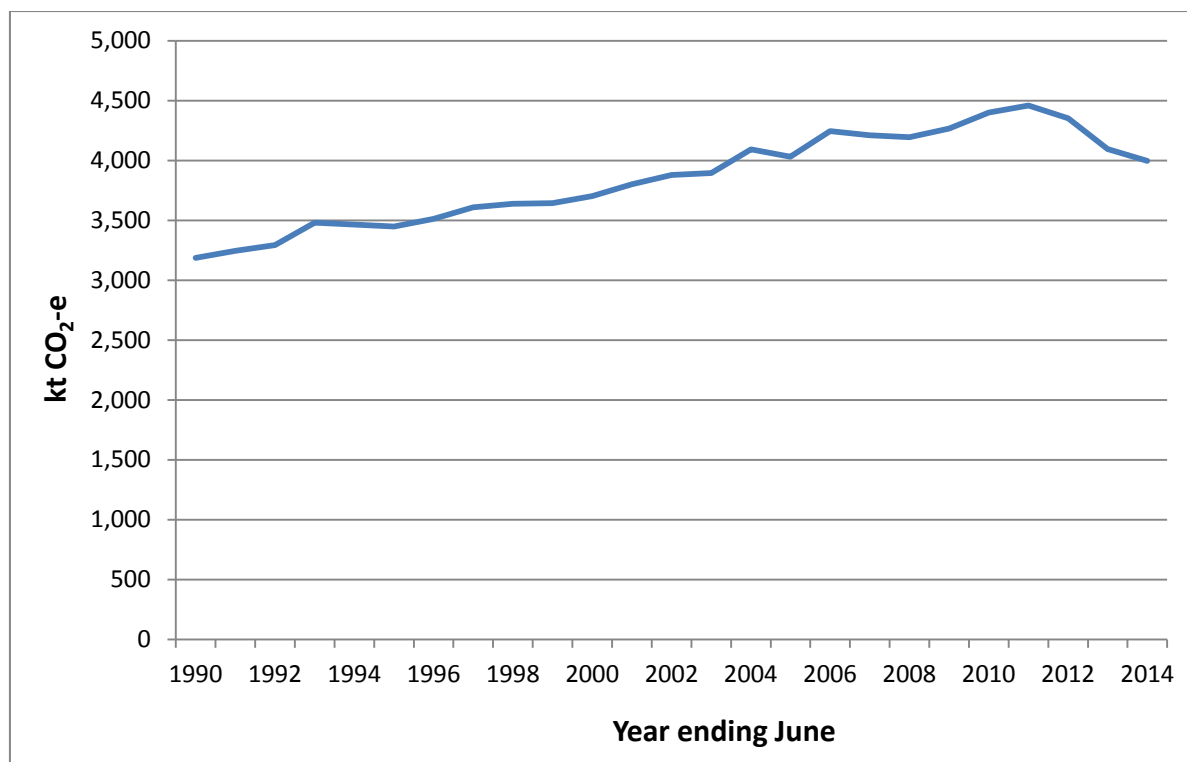


Figure 2 – Total ACT Greenhouse Gas Emissions since 1989-90 (ex LULUCF)

Per capita emissions for the ACT peaked earlier, in 2005-6 and dropped below the 1989-90 level in 2012-13. The per capita trend is shown in Figure 3.

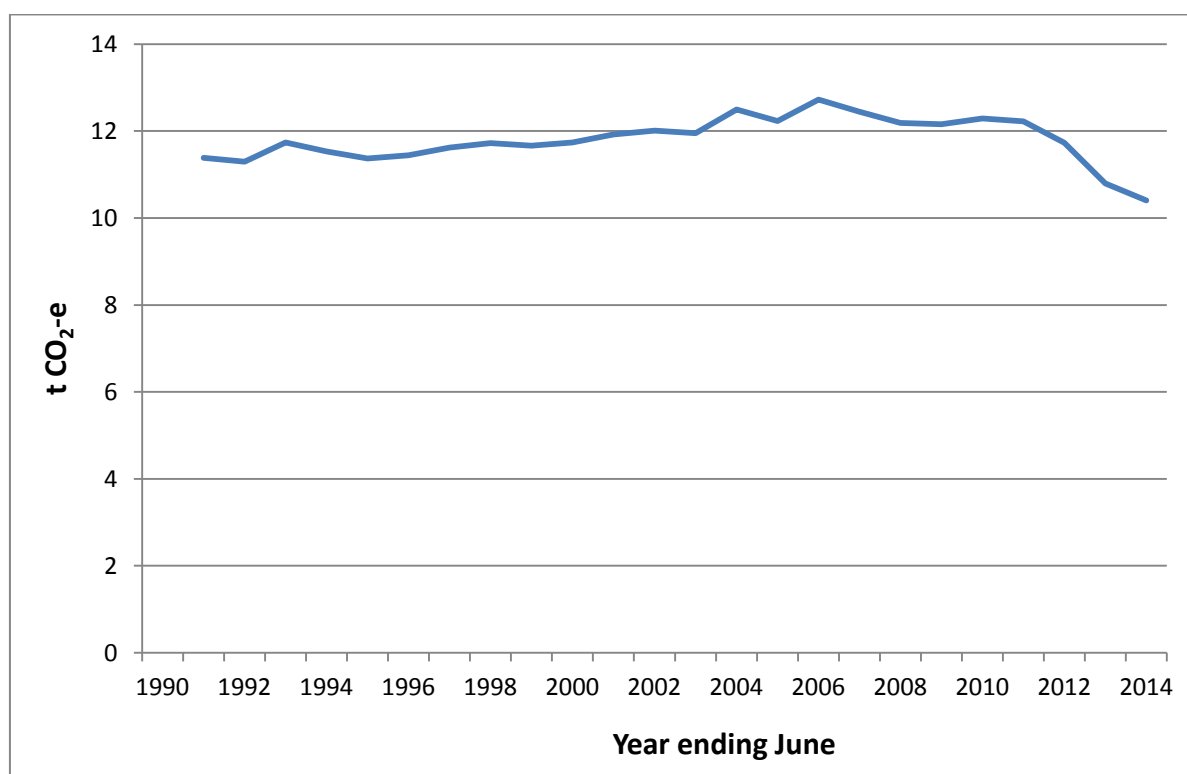


Figure 3 - ACT Greenhouse Gas Emissions per capita since 1989-90

Section 3 noted the domination of stationary energy (mainly electricity with some gas) and transport emissions in the total ACT emissions inventory. Transport emissions have remained fairly flat since 2010-11, with falls in stationary energy emissions accounting for the overall reduction in ACT emissions. This trend can be seen in Figure 4 which shows emissions by source for years 1989-90 and 2010-11 to 2013-14.

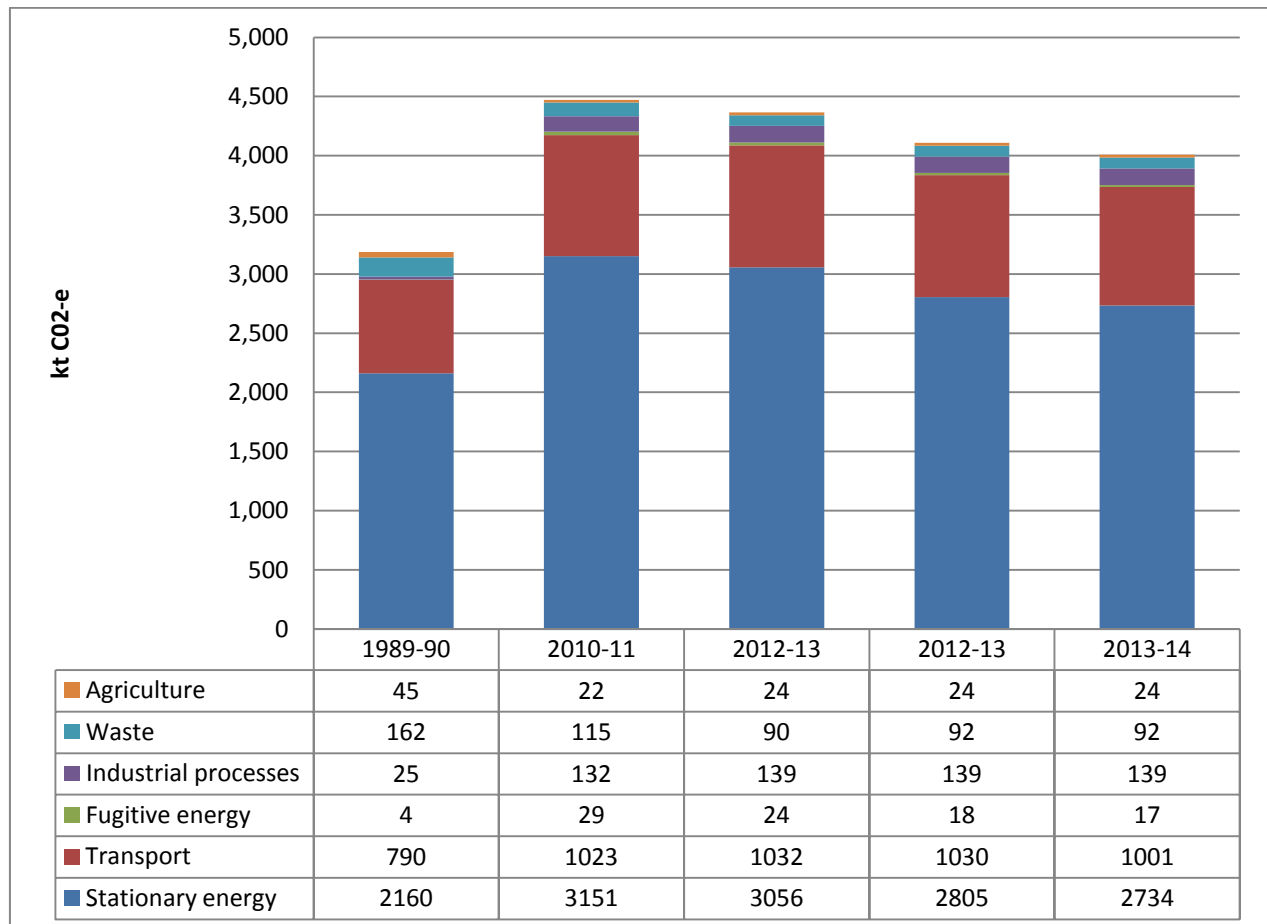


Figure 4 – Annual ACT greenhouse emissions by source

Natural gas and electricity emissions are combined into the stationary energy emissions shown above.

Emissions from natural gas rose considerably from the 1989-90 level, peaked in 2011-12 and have been declining gently since.

Falls in electricity emissions have contributed 81 per cent of the total reduction between 2010-11 and 2013-14. Electricity emissions peaked in 2010-11 and to 2013-14 have fallen by 14 per cent - still 18 per cent higher than the 1989-90 level. These changes are shown in Figure 5.

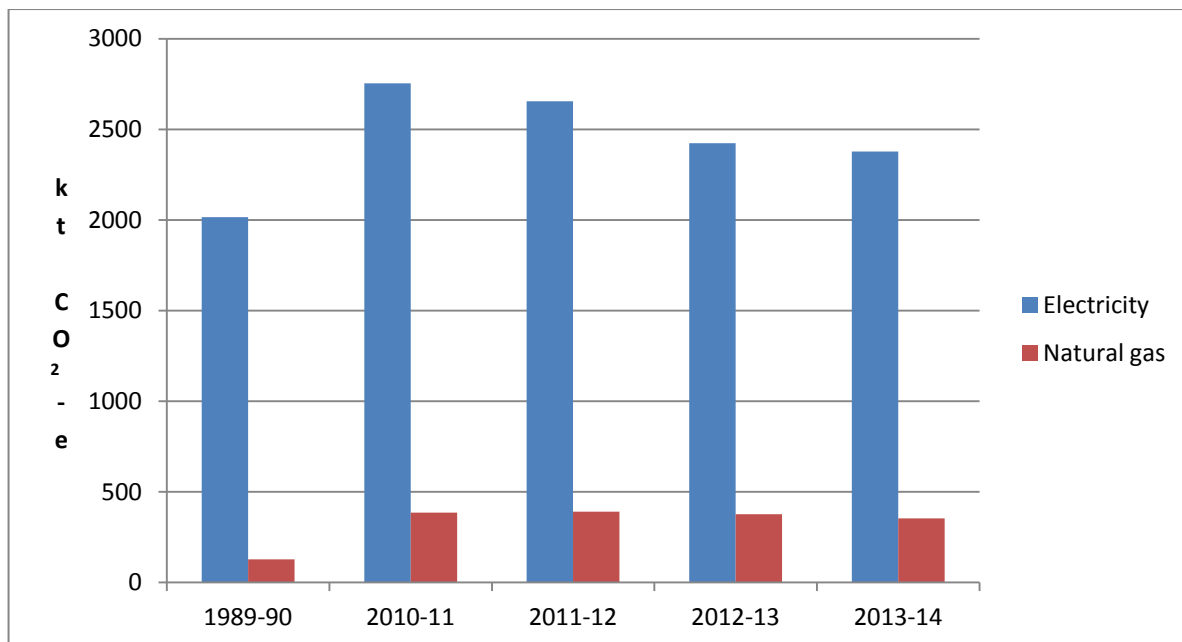


Figure 5 - Annual ACT Greenhouse Gas Emissions from Electricity and Natural Gas

The reduction in electricity emissions in the ACT is due to a steady fall in total demand for electricity since around 2010. If there is no change in the emissions intensity of electricity, such a decline will cause a fall in emissions. In fact, since 2010 the emissions intensity of electricity supplied through the NEM has decreased. Moreover, the growth in rooftop photovoltaic installations has emerged as a new, zero emission source of electricity supply, displacing some purchases of NEM electricity, and thereby further reducing the weighted average emissions intensity of electricity used by ACT consumers. The methodological need to use historic emissions intensity parameter values means that, because of these factors, the true fall in electricity emissions, and hence in total ACT emissions, was in fact larger than this interim inventory can estimate. In other words, the true emissions attributable to ACT electricity use in both 2012-13 and 2013-14 would be, in fact, lower than is shown here. It is assumed that addressing this weakness of the current methodology will be a top priority when the methodology is reviewed later this year.

Looking to the future, changing the methodology will be essential if the inventory is to fully capture the effect of the ACT's plan to steadily reduce the emissions intensity of electricity consumed in the ACT by contracting for new renewable electricity generation. Implementation of the plan is, of course, well underway, with completion of the Royalla solar farm and the announcement of contracts for two further solar farms and three new wind farms.

Appendix A

Data sources used

Electricity

Australian Energy Regulator, 2014. *Regulatory reporting statement, ActewAGL Distribution: Benchmarking RIN response, 2013-14*. Operational Data. <http://www.aer.gov.au/node/24311>

Australian Energy Market Operator, 2014. *National Electricity Forecasting Report 2014*. <http://www.aemo.com.au/Electricity/Planning/Forecasting/National-Electricity-Forecasting-Report>

GreenPower. *Quarterly Reports and Annual Audit Reports*. <http://www.greenpower.gov.au/About-Us/Audits-And-Reports/>

Department of the Environment, 2014. *National Greenhouse Accounts Factors*.

ACT Government Environment and Planning Directorate, Climate Change. Data provided by ActewAGL Distribution

Petroleum Fuels

ACT Government Environment and Planning Directorate, Climate Change. Fuel Survey data.

Department of the Environment, 2014. *National Greenhouse Accounts Factors*.

Natural gas

ACT Government Environment and Planning Directorate, Climate Change. Data on gas consumption provided by ActewAGL Distribution.

Department of the Environment, 2014. *National Greenhouse Accounts Factors*.

Fugitive energy: Natural gas distribution

Australian Energy Regulator, 2010. *ACT, Queanbeyan and Palerang gas distribution network Access arrangement proposal 2010-15: Final Decision – Public*. <http://www.aer.gov.au/sites/default/files/Final%20decision.pdf>

All other emissions

Department of the Environment, 2014. *Australian Greenhouse Emissions Information System*. Data for the ACT 2011-12. <http://ageis.climatechange.gov.au/>

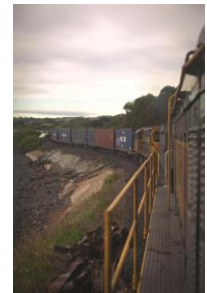
Contact

Hugh Saddler

02 6274 0101

hsaddler@pittsh.com.au

transport | community | industrial & mining | carbon & energy



Brisbane

Level 2
276 Edward Street
Brisbane QLD 4000
T: (07) 3221 0080
F: (07) 3221 0083

Devonport

Level 1
35 Oldaker Street
PO Box 836
Devonport TAS 7310
T: (03) 6424 1641
F: (03) 6424 9215

Launceston

Level 4
113 Cimitiere Street
PO Box 1409
Launceston TAS 7250
T: (03) 6323 1900
F: (03) 6334 4651

E: info@pittsh.com.au
W: www.pittsh.com.au

incorporated as
Pitt & Sherry (Operations) Pty Ltd
ABN 67 140 184 309

Canberra

LGF, Ethos House
28-36 Ainslie Place
Canberra City ACT 2601
PO Box 122
Civic Square ACT 2608
T: (02) 6274 0100

Hobart

199 Macquarie Street
GPO Box 94
Hobart TAS 7001
T: (03) 6210 1400
F: (03) 6223 1299

Melbourne

Level 1, HWT Tower
40 City Road
Southbank VIC 3006
PO Box 259
South Melbourne VIC 3205
T: (03) 9682 5290
F: (03) 9682 5292

