



**NATIONAL
ENERGY
EMISSIONS
AUDIT**

National Energy Emissions Audit
September 2017

*Providing a comprehensive, up-to-date
indication of key greenhouse gas and
energy trends in Australia*

Hugh Saddler | Author

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Level 1, Endeavour House, 1 Franklin St
Canberra, ACT 2601
Tel: (02) 61300530
Email: mail@tai.org.au
Website: www.tai.org.au

Key points

+ *Australia's energy emissions keep going up*

Australia's annual energy combustion emissions increased between March and June 2017, to the highest level seen for the past six years. Australia's total energy combustion emissions have now reached a record level, higher than the previous peak seen in 2009.

+ *Australia stands almost alone among developed countries in failing to reduce its energy combustion emissions*

Australia is the only member of the UNFCCC Annex 1 group of developed countries, apart from Turkey, in which energy combustion emissions in 2017 are the highest since 1990, the first year of the UNFCCC.

+ *Petroleum consumption is the main driver of emission increases*

A large increase in consumption of petroleum fuels, particularly diesel, was the main cause of the increase. Electricity generation emissions went down between March and June, while natural gas emissions showed only a slight increase.

+ *Diesel is the largest source of emissions from use of petroleum fuels*

Diesel consumption accounts for 55% of all emissions from consumption of petroleum fuels within Australia, and just under 20% of all energy combustion emissions. Use of diesel has consistently been growing much faster than consumption of all other petroleum fuels. Just over half of national diesel consumption is used for road transport. The remainder for a variety of economic activities including mining, agriculture, rail transport and construction. Both road transport and other uses of diesel contributed to the increase in consumption.

+ *Emissions from consumption of petrol also increased*

Consumption of petrol, used overwhelmingly for road transport, also increased between March and June 2017. This was the first sustained increase in consumption of, and emissions from, petrol for over six years.

+ *No indication of when or if growth in petroleum emissions will stop*

Australia has no policies likely to slow the growth in emissions from petroleum fuels in the immediate, or indeed medium, let alone long term future. That means that decisive reduction in emissions from electricity generation, much larger than the "proportionate" 25 to 30 per cent figure, will be needed if Australia is to comply with its Paris Agreement obligation.

+ *Urgent action is needed to introduce strong motor vehicle fuel efficiency standards*

Australia is also a stand-out in its failure to introduce strong motor vehicle fuel efficiency standards. Rectifying this deficiency should be a top priority, because it takes some years for new standards to work their way through the whole motor vehicle fleet.

+ *Road transport policy failure as dire as energy policy failure*

The data on transport energy consumption in this September 2017 *Emissions Audit* lead to an inescapable conclusion: the absence of any serious policy measures to curb the growth in energy consumed by road transport is a failure almost as great as the failure in electricity industry policy.

Introduction

Welcome to the September 2017 issue of The Australia Institute's *National Energy Emissions Audit* (the *Emissions Audit*). The *Emissions Audit* tracks Australia's emissions of greenhouse gases from the combustion of fossil fuels – this issue contains data up to the end of June 2017. The *Emissions Audit* will therefore give readers the most up to date possible advice on how Australia is tracking towards meeting its emissions reduction commitment under the Paris Agreement.

Fossil fuel combustion accounts for the majority of Australia's emissions – 71% in Australia's most recent *National Greenhouse Gas Inventory*, which was for the year 2014-15. Fossil fuel combustion emissions also account for most of the year on year change in Australia's emissions. Over the last few years the change is an increase.

The *National Energy Emissions Audit* is published on a quarterly basis, in September, December, March and June each year, with data to the end of the preceding quarter. Each month the *Electricity Update* of the *Emissions Audit* is produced, reporting on changes to emissions from electricity generation in the National Electricity Market (NEM), and including commentary on other issues relating to the extraordinarily dramatic changes happening in Australia's electricity supply system.

All emissions data are reported as annual moving averages. This approach removes the impact on the reported data of seasonal changes, which particularly influence electricity and gas consumption. Annualised data will show a month on month increase if the most recent monthly quantity is greater than the quantity in the corresponding month one year previously.

Most data are presented in the form of time series graphs, starting in June 2011, i.e. with the year ending June 2011.

Total energy combustion emissions to June 2017

Until recently, total emissions as recorded in the *Emissions Audit* have been roughly constant since about March 2016. However, in the two months to June 2017, the trend in emissions has taken a sharp upward tick. At the end of June, emissions were higher than at any time since June 2011 (Figure 1). Emissions from electricity generation are continuing their decreasing trend, though with small ups and downs. However, emissions from petroleum product combustion increased very markedly in May and June, with sales of both petrol and diesel increasing. By contrast, consumption of natural gas in eastern Australia for purposes other than electricity generation appears to be no longer increasing. As foreshadowed in the June 2017 Emissions Audit, all three LNG plants at Gladstone have reached full production capacity (two liquefaction trains each) and, given high wholesale gas prices, growth in gas consumption in Australia over the next year or so seems unlikely.

Figure 2 shows the absolute magnitude of emissions from the three sources shown in Figure 1, and also separates out the three main fossil fuels used for electricity generation. Electricity generation is the largest of the three sources, but is generally trending down, as emissions from brown coal, in particular, decrease. Emissions from gas used to generate electricity make a relatively small contribution to total energy combustion emissions. Emissions from petroleum fuels are steadily increasing and have currently reached 83% of electricity generation emissions.

Figure 1

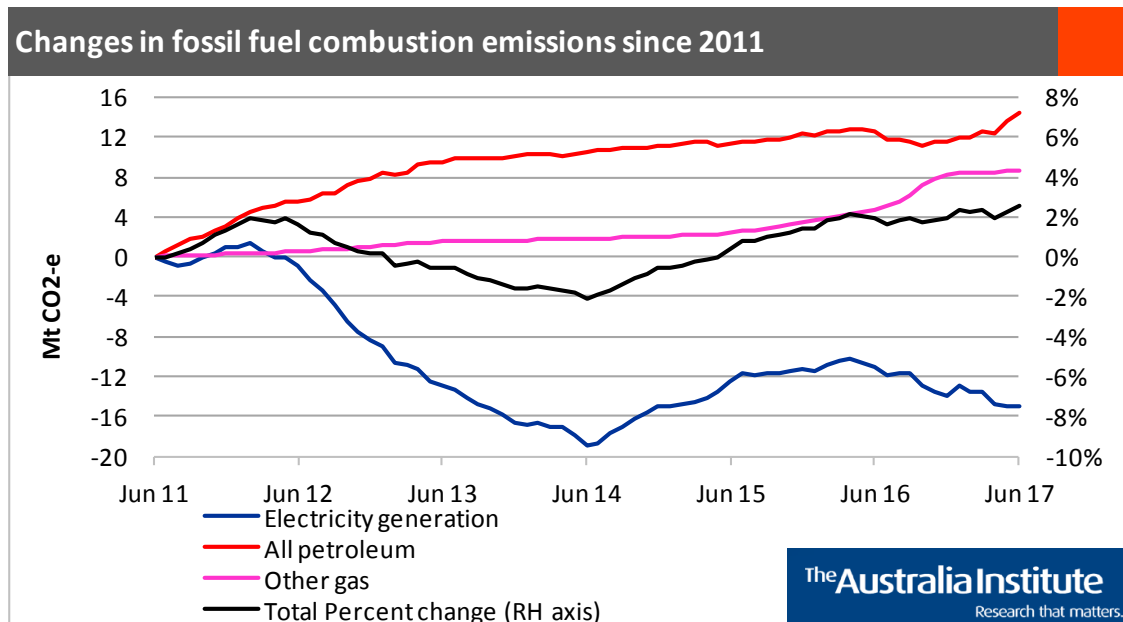
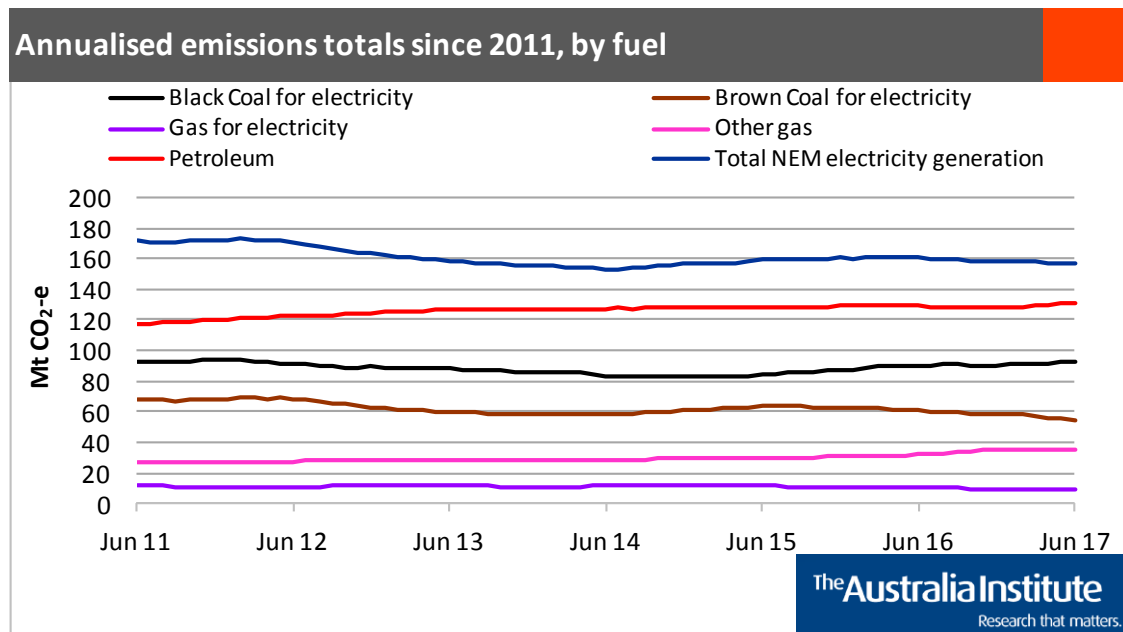


Figure 2



Petroleum emissions

Figures 3 and 4 show, respectively, changes in emissions, and changes in total emissions since 2011 from the four main groups of petroleum products: road transport fuel, bulk diesel, aviation fuels, fuel oil and non-auto LPG.

Road transport fuels

The *Emissions Audit* defines road transport fuels as being the sum of petrol, automotive LPG and retail sales of diesel. The data show that the rate of growth in consumption of road transport fuels is accelerating. Prior to this year total consumption of petrol had been falling until 2014 (the decline started in 2008 according to *Australian Energy Statistics*), followed by several years of static consumption, as Figure 5 shows. The *Emissions Audit* has consistently interpreted this growth as reflecting the widespread uptake in Australia of diesel engine cars, following behind the strong trend in Europe. Now, it appears, not only is road transport diesel consumption continuing to grow strongly, but growth in consumption of petrol has resumed.

What's more, these data understate the volume of road transport fuel consumption. About 28% of bulk sales of diesel are also used for road transport, based on a comparison of these data for the year ending June 2016 with the most recent official national energy consumption data in *Australian Energy Statistics*, published in early September 2017. This is in no way surprising; all bus fleet operators and many road freight transport operators refuel their vehicles from bulk supplies delivered to their fleet depots.

Figure 3

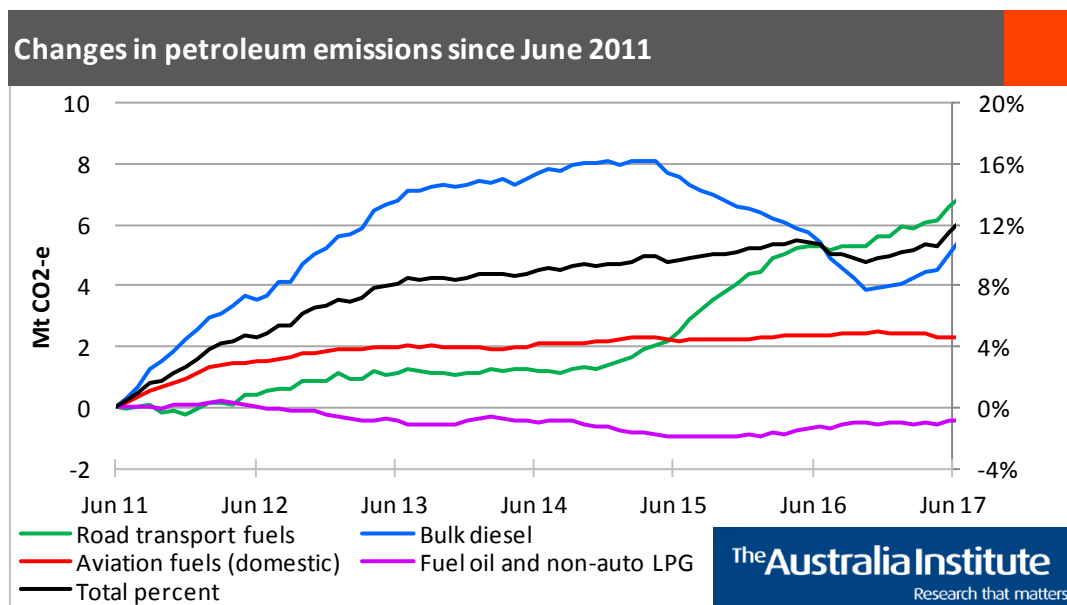
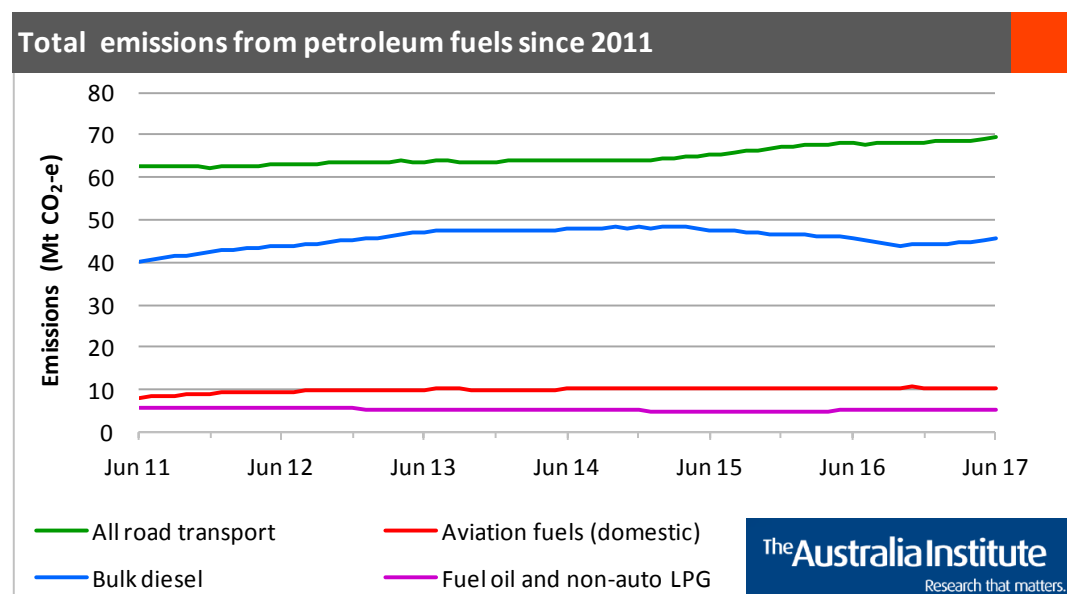


Figure 4



Fuel oil and non-automotive LPG

These two products are effectively alternatives to pipeline gas in a variety of stationary energy applications, and are mainly used where pipeline gas is not available. Consumption is small and gradually declining.

Domestic aviation fuels

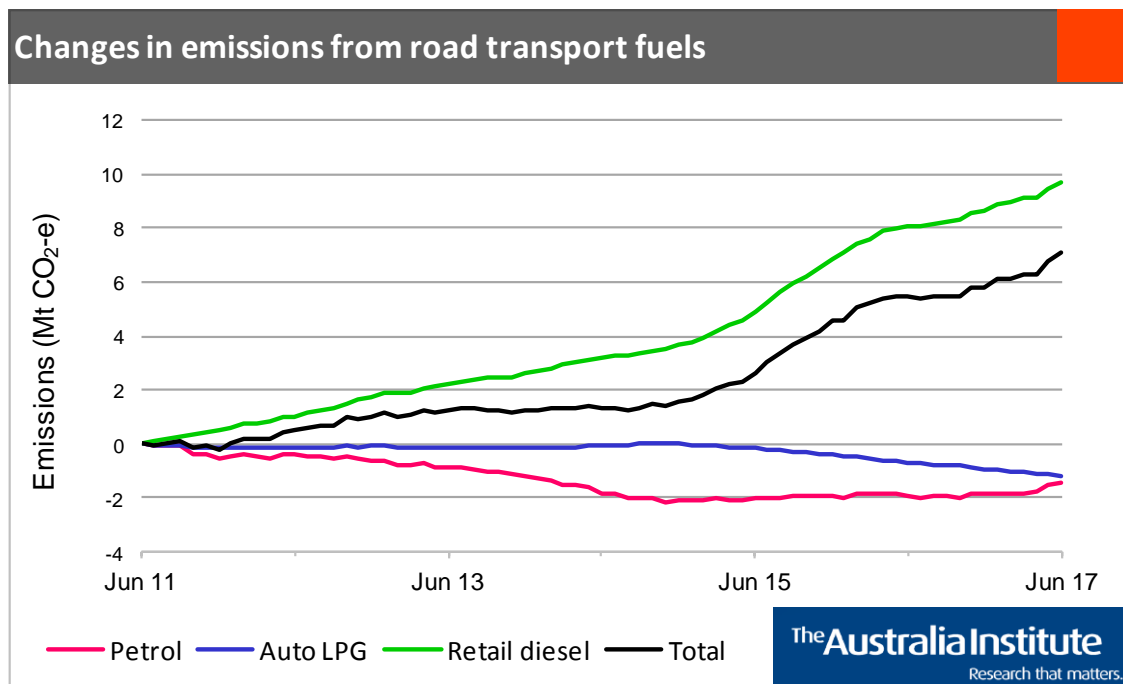
As discussed in the June 2017 *Emissions Audit*, emissions from domestic aviation have hardly increased since 2013. Domestic aviation activity statistics published by the Bureau of Infrastructure, Transport and Regional Economics show that there has been little or no growth

in passenger kilometres since 2014, meaning that fuel consumption, emissions and passenger kilometres have maintained a fairly constant relationship.

Diesel fuel bulk sales

Diesel accounts for the largest share of petroleum product consumption and emissions, and effectively all of the growth in consumption of petroleum products and emissions arising from that consumption since 2011. The June *Audit* explained that diesel is used in a more diverse range of activities and economic sectors than any other petroleum product. As calculated above, about 72% of bulk diesel fuel sales is used for purposes other than road transport in 2015-16¹. Until 2015, bulk sales of diesel grew faster than any other category of petroleum product consumption and, by that date, accounted for more emissions than total consumption of petrol. The data also show very sharp increases in bulk sales of diesel in May and June 2017 (Figure 6), as well as an accelerating but less sharp increase in retail sales (Figure 6)².

Figure 5



¹ Australian Energy Statistics

² Department of Energy and Environment’s monthly publication, *Australian Petroleum Statistics*

Figure 6

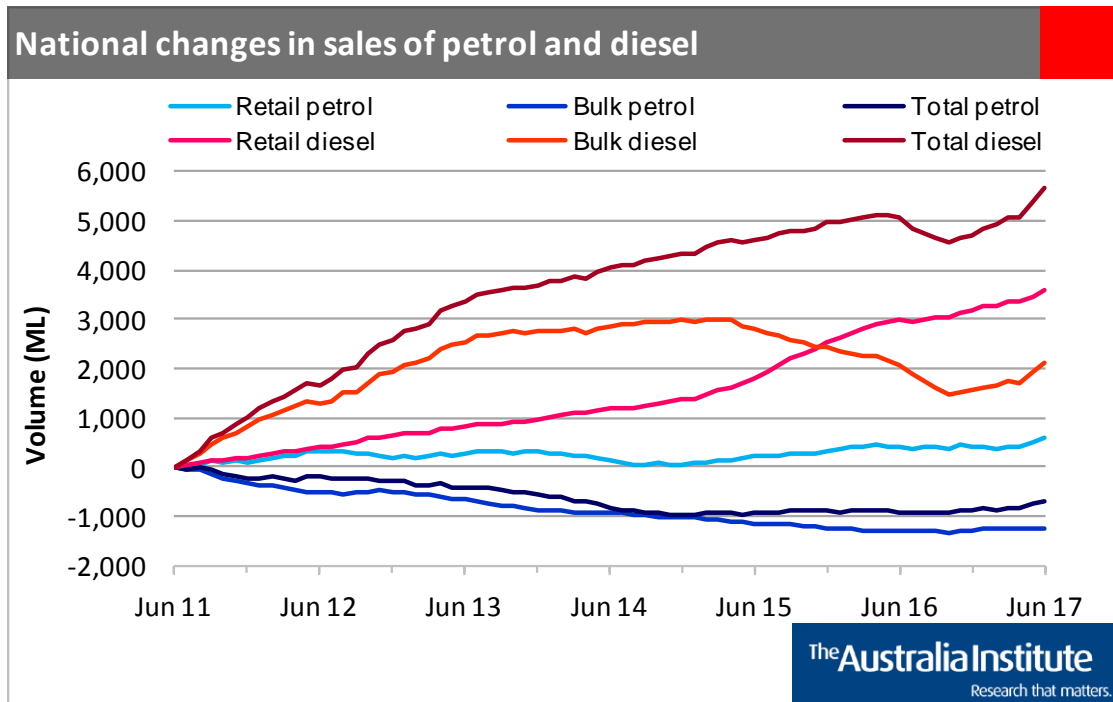


Figure 7 shows trends in bulk diesel sales by state. As has been the case for some years, diesel consumption in Queensland and Western Australia dominates both total national bulk sales of diesel and the changes in those sales. Of the total, Western Australia used 32% in the year to June 2017 and Queensland used 28%; New South Wales was next with 15% and Victoria used 14%. Given these shares, it is fairly obvious that the main drivers of changes in consumption are the mining industries in the two states, meaning mainly iron ore in Western Australia and coal in Queensland. *Australian Energy Statistics* shows that in 2015-16 mining accounted for a third of total diesel consumption in Western Australia, and rail transport, much of which transports iron ore, a further 7%. These quantities equate to about 50% of bulk diesel sales in that year. The data in Figure 7 suggest that there was a brief drop in mining activity in Western Australia during the second half of 2016, which may now have reversed, while there was a more prolonged, and earlier, fall in production of coal.

Figure 7

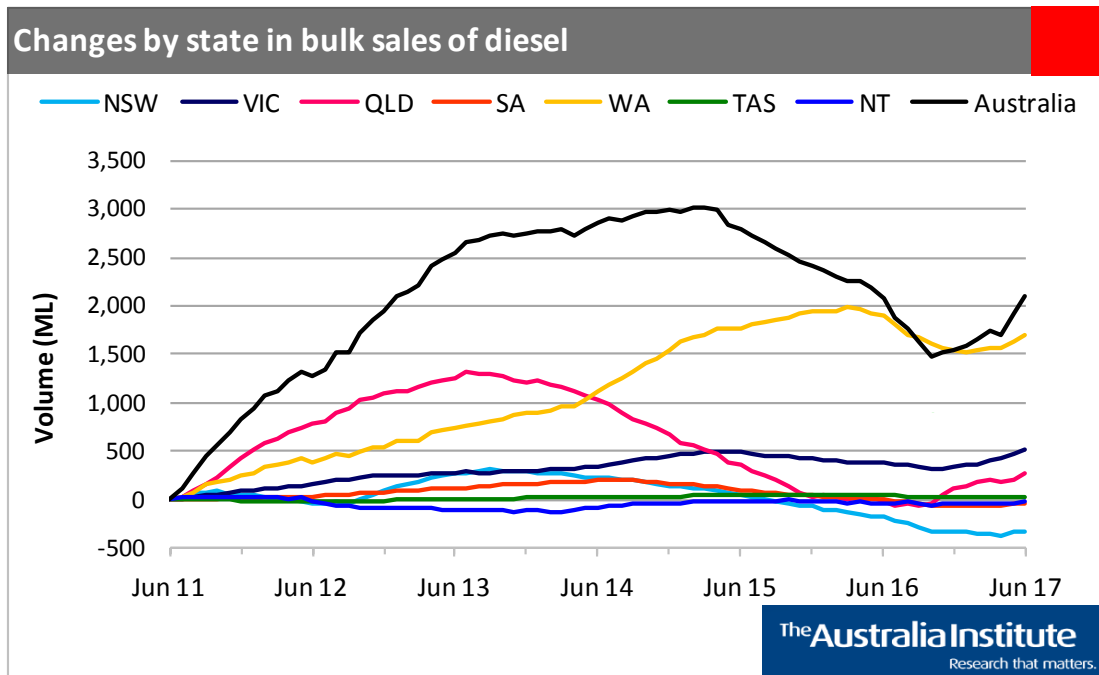
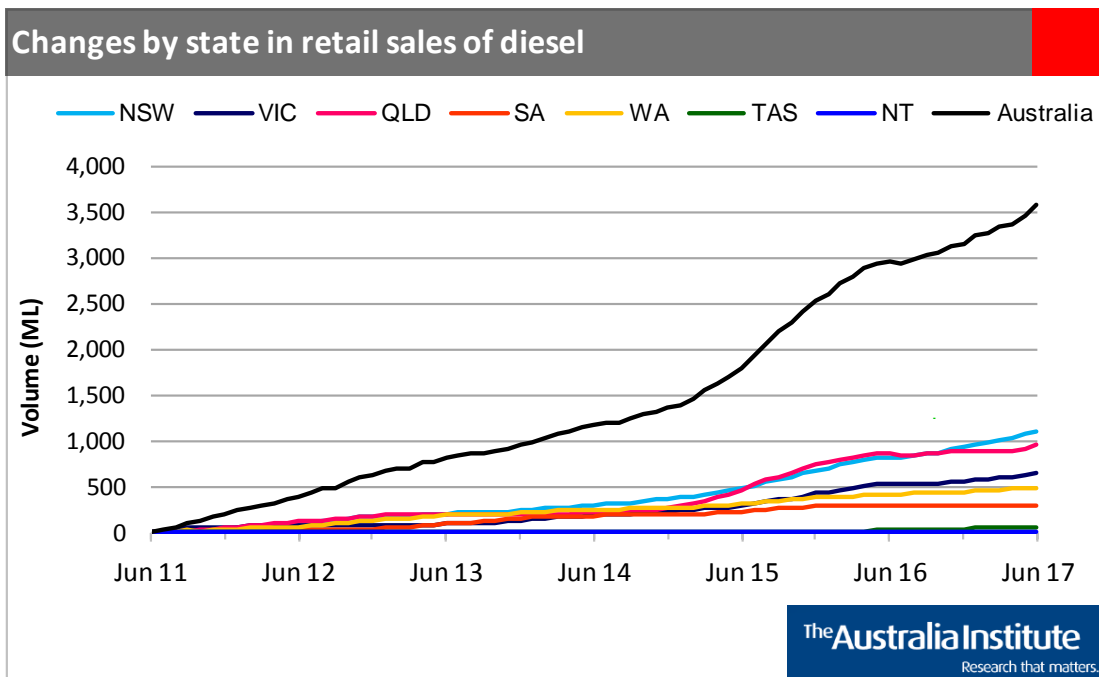


Figure 8



These trends are broadly consistent with the quarterly output statistics published by the Office of the Chief Economist in the Industry Department. It is also possible that closure of some of the higher cost, less efficient coal mines in Queensland may have contributed to reducing diesel fuel consumption.

Finally, the increase in retail sales of diesel is spread across all states. The inexorable increase in road transport activity and associated emissions is almost entirely unaffected, unlike electricity consumption, by any increase in fuel use efficiency.

The big picture: what is happening to Australia’s energy combustion emissions?

Figure 1 shows that, beginning early in 2016, energy combustion emissions reported by the *Emissions Audit* have been the higher than at any time over the past six years. How do current energy combustion emissions compare with emissions prior to 2011? Figure 9 shows energy combustion emissions since 1990, the base year for emissions reporting under the UN Framework Convention on Climate Change. The graph shows that emissions increased every year until 2009. Since then they have been down and up twice, but until now have remained lower than the peak level reached in the 2009 National Greenhouse Gas Inventory (NGGI).

For this report total, energy combustion emissions have been extrapolated to June 2017. This extrapolation used the *Quarterly Update of Australia’s National Greenhouse Gas Inventory*, published by the Department of Environment and Energy, to support the *Emissions Audit* data, using the relationships discussed in the June 2017 *Emissions Audit*.

Figure 9

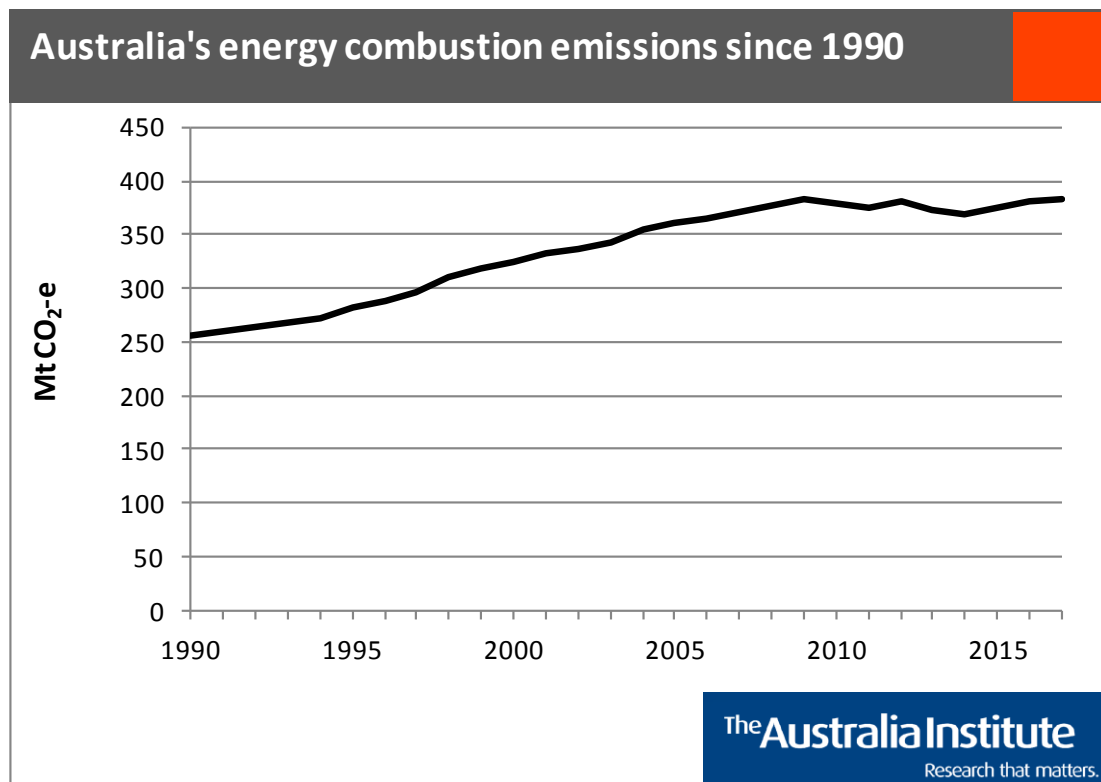
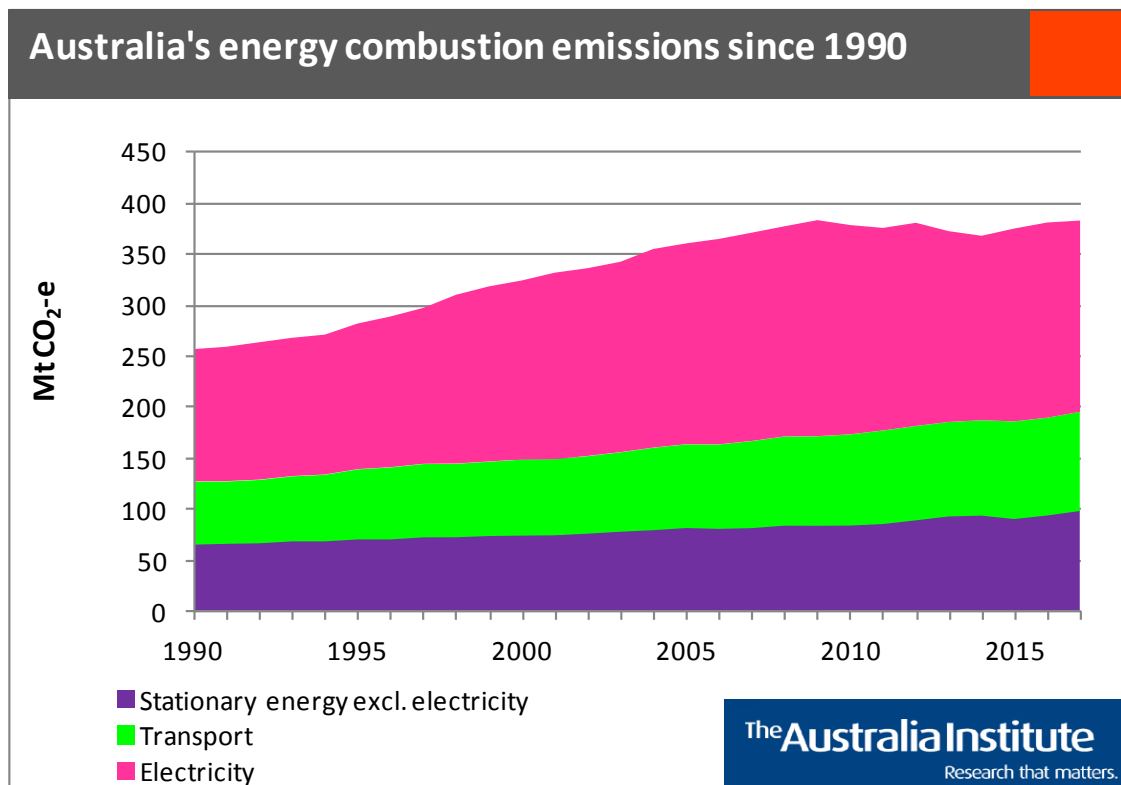


Figure 10



Data sources: Australian Greenhouse Emissions Information System (AGEIS), Quarterly Update of Australia's National Greenhouse Gas Inventory

Australia's total energy combustion emissions for the year 2016-17 are likely to be slightly higher than in the previous highest year, 2008-09 (Figures 9, 10 and 11). If this trend continues, Australia will stand in a most unusual position amongst all other economically developed (Annex 1) countries party to the United National Framework Convention on Climate Change (UNFCCC). In the great majority of Annex 1 countries, energy combustion emissions have been falling steadily since the peak of the Global Financial Crisis, i.e. about eight years. In many Annex 1 countries the decline in energy combustion emissions has lasted much longer than that. In a handful of other Annex 1 countries, including Canada, Japan and New Zealand, energy combustion emissions increased briefly for a year or two around 2012, but in all these three countries these emissions are again falling and show absolutely no indication of going above their previous highest level³.

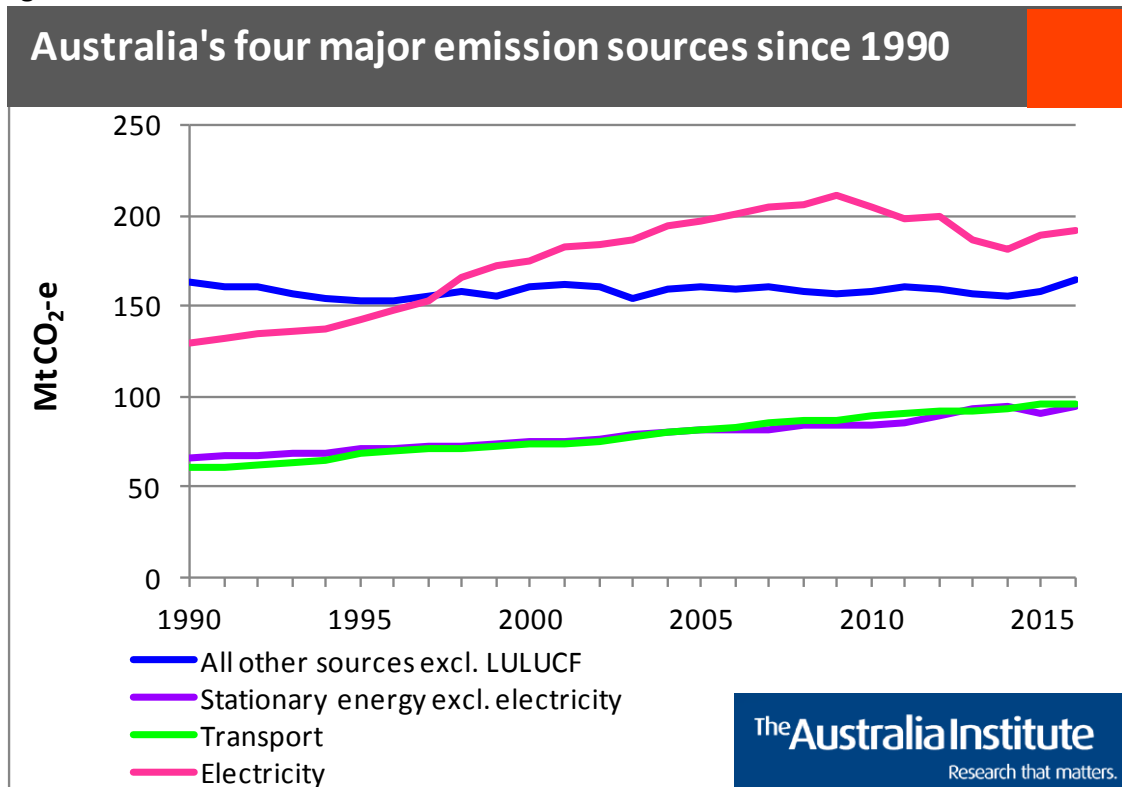
Apart from Australia, there is only one other Annex 1 country where energy combustion emissions will be higher in the most recent inventory year than in any previous year since 1990. That country is Turkey. Turkey has a population of over 80 million, its emissions per capita are less than a quarter of Australia's and its GDP per capita is between one quarter and one half of Australia (depending on the exchange rate basis used to compare GDP).

³ United Nations Framework Convention on Climate Change (n.d.) GHG data from UNFCCC, http://unfccc.int/ghg_data/new_reporting_requirements/items/9560.php

What is more, so far as Australia is concerned, as recently as June 2017 it seemed as if Australia’s consumption of petroleum products, and associated emissions, may have been starting to level out. Even so, it was concluded that Australia is absolutely not on track to achieve its Paris Agreement emissions reduction target. Now that appears that petroleum emissions may have resumed their steady increase, and could well keep increasing until the end of 2017 or into 2018, the prospects are even worse.

Electricity generation is the only one of Australia’s top four sources of greenhouse gas emissions which has ever recorded falling emissions for more than two successive years (Figures 10 and 11). By contrast, both transport and other stationary combustion demonstrate an almost inexorable upward trend. Emissions from all other sources have been remarkably constant ever since 1990.

Figure 11



The June 2017 *Emissions Audit* reached the “inescapable conclusion...that much, if not most, of the required emissions reduction must come from electricity generation”, which remains true. The data on transport energy consumption in this *September 2017 Emissions Audit* lead to a second inescapable conclusion: that the absence of any serious policy measures to curb the growth in energy consumed by road transport is a failure almost as great as the failure in electricity industry policy.

Nearly forty years ago, the then Fraser government tried to reduce growth in road transport fuel consumption, in response to the sudden oil price increases and supply disruptions associated with so-called oil shocks of the 1970s. The voluntary programs introduced achieved

nothing. Ever since then, the perceived need to protect the domestic motor vehicle manufacturing industry, reliant on large, fuel hungry cars acted as a political block to energy policies to mandate increases in motor vehicle fuel efficiency. That obstacle is now gone. Action to decisively increase the efficiency of Australia's motor vehicle fleet is now urgent.

Appendix: Notes on methodology

The quarterly NEEA Report (“the Audit”) reports greenhouse gas emissions arising from the use of fossil fuels to provide useful energy. The format in which data are presented in the Audit is determined by the data sources available. This means that the Audit has three major components: electricity generation, consumption of petroleum products and consumption of gas for purposes other than electricity generation.

For electricity generation, the data are those presented monthly in the NEEA Electricity Update. This means that they include all emissions from electricity generators supplying electricity within the National Electricity Market (NEM). The Audit does not include emissions arising from off-grid generation located in the five eastern states. It also excludes all emissions from electricity generation, both grid and off-grid, in Western Australia and the Northern Territory.

For emissions from consumption of petroleum products, the key data source is the monthly government publication, Australian Petroleum Statistics. The specific figures used are monthly sales of petroleum products, published in Tables 3A and 3B. This means that the emissions cover the whole of Australia, not just the eastern states. The emissions calculated are adjusted to net out emissions arising from the small quantities of diesel used at power stations supplying the NEM. It is important to note that earlier this year the Department of Environment and Energy applied a rigorous quality audit and upgrade process to Australian Petroleum Statistics. The outcome was changes to some previously published, i.e. “historic”, data and a new starting date of July 2010 for the improved data series. This new starting date is one reason that many graphs start with annual emissions for the year to June 2011.

The estimates of emissions from natural gas are, like electricity emissions, confined to the eastern states. Two separate sources are used. For the period to June 2016, annual gas consumption data by industry and state (Table f) of Australian Energy Statistics is used to provide total gas consumption, net of gas used to generate electricity, in the five eastern states. Linear interpolation is used to estimate moving annual gas consumption for each intermediate month. From July 2016 onward the source data are constructed from the pipeline gas flow data published in the weekly Gas Market Report of the Australian Energy Regulator (AER). The NEEA estimates of emissions from gas used for electricity generation in the NEM are subtracted from these totals. The Gas Market Report explains that some gas consumption may not show up in its reported pipeline flow data, i.e. that these data may somewhat underestimate total gas consumption. Comparison with the Australian Energy Statistics data confirms that to be the case, which is why the latter data have been used for all periods up to June 2016.

All data are reported as annual moving averages. This approach removes the impact of seasonal changes on the reported data. Annualised data reported in the quarterly NEEA Report (“the Audit”) will show a month on month increase if the most recent monthly quantity is greater than the quantity in the corresponding month one year previously. Most data are presented in the form of time series graphs, starting in June 2011, i.e. with the year ending

June 2011. Some graphs start in June 2008. These starting dates have been chosen to highlight important trends, while enhancing presentational clarity.