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National Energy Emissions Audit
June 2017

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

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Introduction

Welcome to the first issue of the Australia Institute's *National Energy Emissions Audit* (*NEEA*). This publication is the successor to the CEDEX® *Report*, which was a joint publication of the Australia Institute and pitt&sherry. The NEEA tracks Australia's emissions of greenhouse gases from the combustion of fossil fuels with a delay of less than three months after the emissions have actually occurred – this issue contains data up to the end of March 2017. Fossil fuel combustion accounts for the majority of Australia's emissions – 71% in the 2015 *National Greenhouse Gas Inventory*, which was released with zero publicity on 31 May last. They also account for most of the year on year change in Australia's emissions. Over the last few years, as this *NEEA Report* examines in some detail below, the change is an increase. The *NEEA Report* 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.

From now on, the *NEEA Report* will be published on a quarterly basis, in September, December, March and June each year, with data to the end of the preceding quarter. In each intermediate month and *NEEA Electricity Update Report* will be 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 reported in the *NEEA Report* 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 March 2017

Total emissions as recorded in the *NEEA Report* are increasing, albeit very slowly (Figure 1). Emissions from electricity generation are decreasing, though with small ups and downs, and emissions from petroleum product combustion appear to be roughly constant. The main source of increased emissions is consumption of natural gas (other than for electricity generation), which has been mainly driven by gas used to produce Liquefied Natural Gas (LNG) at the three export plants near Gladstone, in Queensland. Gas use by these three plants, which derive all the considerable energy they use, including for electricity generation, from the gas coming into the plants, is not publicly reported; estimates using secondary data have been made for the *NEEA Report*. Over recent months all three plants have reached steady production levels meaning that gas consumption is beginning to level off. 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.

Figure 1

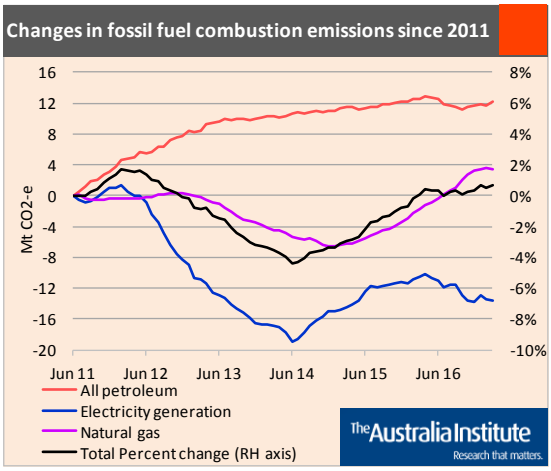


Figure 2

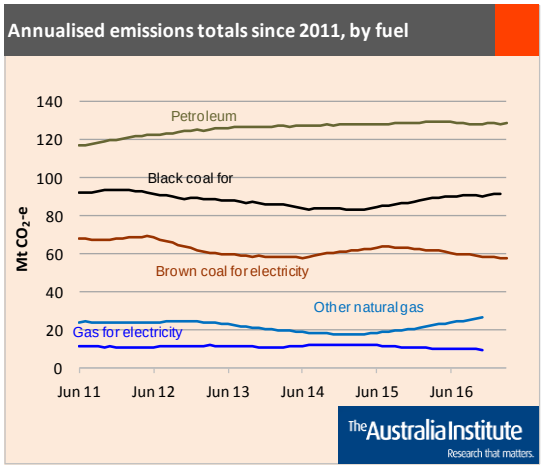


Figure 1 clearly shows an interesting change in the emissions trend over the past twelve months. In April 2016, growth in emissions from both electricity generation and petroleum product consumption ended and since then, in the case of electricity, has actually decreased. The main factors driving the reduction in electricity generation emissions have been the cessation of growth in demand for electricity, coupled with a growing share of new renewable generation from grid connected wind farms and now, also, solar PV farms. These factors will be examined in more detail in the next issue of the *NEEA Electricity Update*. Trends in petroleum emissions are discussed in the next section of this *Report*.

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.

- Petrol and automotive LPG have been combined, as they are close substitutes. Their consumption is almost entirely confined to road transport by cars and light commercial vehicles, with small quantities also used in various agricultural activities and in smaller boats. Consumption has been gradually falling since 2011, and before, as the number of cars with diesel engines has grown strongly.
- Fuel oil and non-automotive LPG 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.
- Emissions from domestic aviation show an interesting trend, as consumption grew strongly for several years up to 2012. During this period, the two major carriers competed on the basis of capacity, operating many flights with low passenger occupancy. Since then, official statistics from the Bureau of Infrastructure, Transport, and Regional Economics show that concentration on efficient fleet utilisation has seen load factors gradually

improve, while passenger numbers and revenue passenger km also grew. As a result, there has been virtually no growth in available seat km and no growth in fuel consumption.

Figure 3

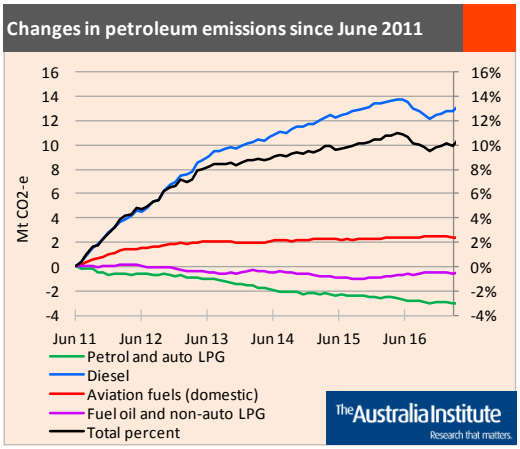
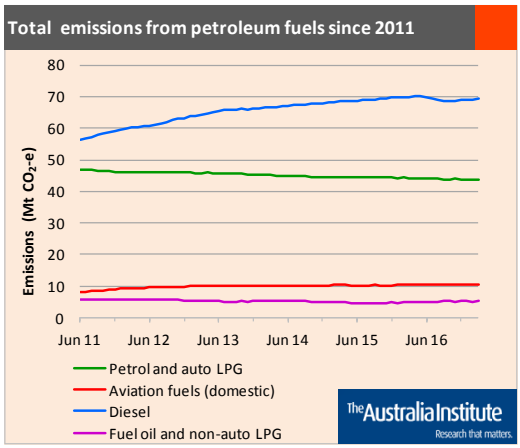


Figure 4



Diesel fuel 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. Diesel is used in a more diverse range of activities and economic sectors than any other petroleum product. The Department of Energy and Environment's monthly publication, *Australian Petroleum Statistics*, which is the primary source of input data for this part of the *NEEA*, separates diesel consumption into retail sales and other sales, most conveniently defined as bulk sales. It is safe to say that virtually all retail sales are for road transport, whereas bulk sales are used in a wide variety of applications, including agriculture, mining, rail transport, manufacturing, electricity generation (mainly at off-grid locations), and construction. Operators of road freight vehicle fleets formerly bought much of their diesel requirements in bulk, and fuelled their vehicle fleets at corporate depots. However, the data suggest that since about the beginning of 2015 there has been a strong shift towards retail sales (Figure 5), suggesting that road freight operators are increasingly buying fuel through retail outlets, so that most bulk sales are now for non-transport uses.

Figure 5

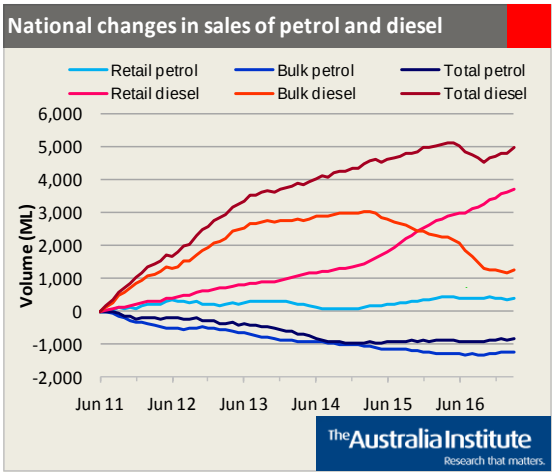
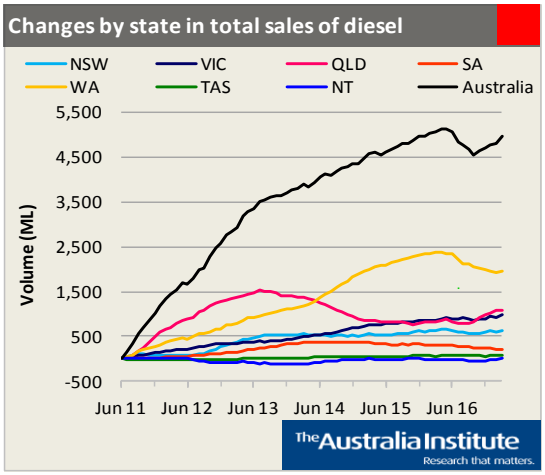


Figure 6



The other important trend change has been the slower rate of growth of total diesel fuel consumption from around mid-2013 (Figure 6). Comparison with *Australian Energy Statistics* data indicates that this was caused by a quite dramatic slow-down of consumption growth in the mining industry, especially in Queensland, where consumption actually fell, but also in WA and SA. The last twelve months have seen a further large drop in consumption in WA (Figure 6), probably mainly attributable to the mining industry. Total national diesel consumption actually fell as a result, and so too did total petroleum product consumption, and resultant emissions, as shown in Figure 1. This is the first reduction in total national petroleum product consumption, certainly since the first publication of *Australian Energy Statistics*, in 1974, and probably ever. The decrease in annualised total petroleum emissions between the peak in April 2016 and March 2017 is 0.5%, back to the same level as the year to November 2015. If sustained, this will change will represent a historic turning point in Australia's energy consumption patterns. However, far larger reductions will be need if Australia is to make a serious contribution to slowing the growth in atmospheric greenhouse gases.

Australia's progress towards its Paris Agreement target

On 31 May the Department of Energy and the Environment posted on the Departmental website Australia's *National Inventory Report* (*NIR*) for the 2015 reporting year. This three volume document, running to almost 900 pages, is the definitive annual statement of Australia's contribution to global greenhouse gas emissions and on its progress towards meetings its emission reduction commitments. It reports emissions to the atmosphere from the Australian landmass of greenhouse gases and removals of CO_2 through managed forest growth. It is not directly concerned with legalistic accounting of credits carried forward or of internationally traded emissions reduction credits, but simply with the physical emissions.

Are Australia's emissions heading in the right direction?

Compiling the *NIR* and submitting it each year to the UFCCC Secretariat, is a major obligation of all developed country parties to the UNFCCC. The publication of the 2015 *NIR* was

accompanied by no Departmental media notice (though on the same day the Department did put out an announcement entitled "Change in definition of a small business for the purpose of exemption from cost recovery fees for environmental assessments", and of course no Ministerial press release. Consequently, it has received no media coverage, despite the important message implicit in its numbers..

The *NIR* shows that, in the year 2014-15, Australia's total greenhouse gas emissions using UNFCCC accounting rules for Land Use, Land Use Change, and Forestry (LULUCF) decreased by a minuscule 1.2 Mt CO_2-e equivalent to 0.2%, compared with the year before. Accounting without LULUCF would have shown emissions increasing by a more substantial 1.4%.

Australia's commitment under the Paris Agreement is to reduce emissions, relative to their level in 2005, by between 26% and 28%. In 2005, emissions, as recorded, following some minor recalculations, in the 2015 *NIR*, totalled 597.4 Mt CO_2-e. Australia's Paris Agreement target would require emissions to be reduced to between 430 and 442 Mt CO_2-e. At 528.1 Mt CO_2-e in 2015, Australia would appear to be almost halfway to that target. Unfortunately, however, as Figure 7 shows, the large reduction since 2005 is entirely the result of a dramatic reduction in LULUCF emissions between 2007 and 2013.

Figure 7

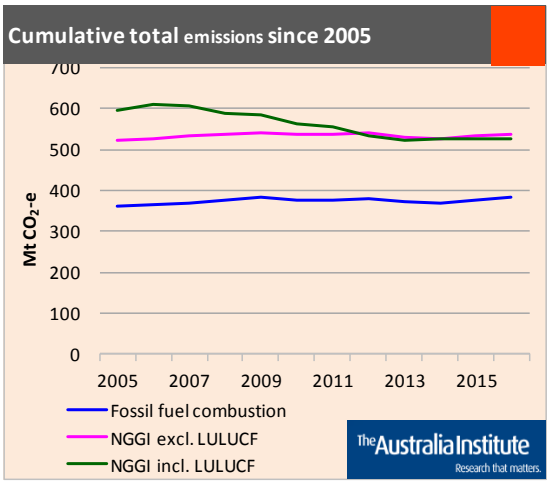
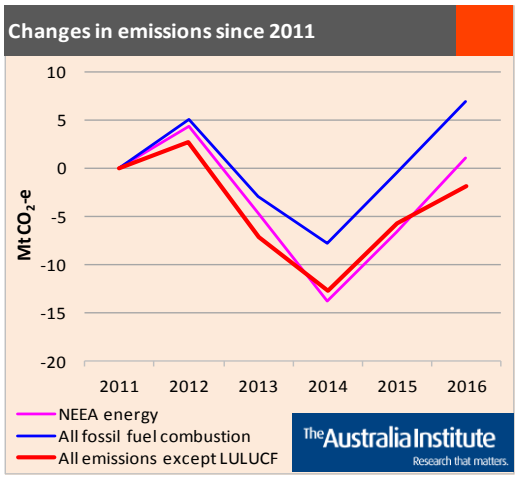


Figure 8



This has arisen, as Volume 2 of the *NIR* points out, from large reductions in what is classified, under the Inventory system, as Land converted to Grassland, more informally referred to as land clearing for pasture. Legislative changes in NSW and Queensland since 2005 were an important factor in reducing land clearing, to the extent that emissions from LULUCF are now approximately zero, and in some years slightly negative, i.e. a net sink, as a result of managed forest activities. Regrettably, some of these legislative restrictions on land clearing have since been repealed, notably in Queensland. Consequently, the Australian government's *Australia's emissions projections 2016*, published last December, expects an increase in LULUCF emissions over the next few years.

Overall, this publication projects that, in the absence of further policy action, Australia's total emissions will increase from the current (2015) level of 525.6 Mt CO_2-e to between 571 and

616 Mt CO_2-e by 2030, i.e. back to the 2005 level. This highlights just how far Australia currently is from being "on track" to achieve its 2030 emissions reduction target.

How can we get back on track? Much of the political debate and commentary seems to have assumed that this will be achieved by each source of emissions reducing its output by an amount proportional to the 28% Paris Agreement commitment. The absurdity of this notion by thinking about the four largest sources of emissions in 2005. These were electricity generation, transport, LULUCF, and livestock (mainly cattle). Emissions from these four sources in 2005 and 2015 are shown in the table below, in Mt CO_2-e.

Emission source	**2005 NGGI**	**2015 NGGI**
Electricity generation	197	189
Transport	82	95
LULUCF	76	-8
Livestock	61	54

The massive fall in LULUCF emissions is obvious, as is the modest fall in electricity generation emissions, almost entirely attributable to increased renewable generation. Transport emissions have grown strongly. Does anyone believe that in the next thirteen years they can be reduced to 59 Mt CO_2-e? And there is no known way to reduce livestock emissions to 44 Mt CO_2-e, except drastic reductions in the cattle herd. Is that what our political leaders want or expect? Of course not.

The inescapable conclusion is that much, if not most of the required emissions reduction must come from electricity generation. Fortunately, recent dramatic falls in the cost of renewable generation means that large increases in renewable generation, supported by additional energy storage and open cycle gas turbine generation, are entirely feasible, and be able to provide a reliable supply of electricity at prices no more, and probably less than the current wholesale price of electricity in the NEM.

Unfortunately, there is currently no national policy agreed, let alone in place to drive these changes. Two State governments, Victoria and Queensland do have such policies, which are well developed, though not yet legislated. If fully implemented, the policy targets of these two states would make a major contribution to achieving the needed reductions in national electricity emissions. Unless or until they are replaced by an equivalently strong national policy, these two state policies are probably Australia's best hope for approaching tis Paris Agreement commitment.

How well does the NEEA track Australia's emissions?

Finally, publication of the 2015 *NIR* provides a good opportunity to calibrate the NEEA calculations of emissions. The NEEA reports most, but not all national emissions from combustion of fossil fuels; over the years from 2011 to 2015 emissions reported here are between 81% and 83% of total national fossil fuel combustion emissions. The emissions

sources for which necessary data are not publicly available, and are therefore not covered by the NEEA include:

- consumption of coal and natural gas for electricity generation in WA and the NT,
- consumption of natural gas for all purposes, including production and processing of gas, in both WA and the NT,
- all consumption of coal in WA,
- all consumption of coal for purposes other than electricity generation in the five eastern states,
- petroleum consumed for energy at oil refineries, and
- gas used in the five eastern states for energy used in the production, processing and pipeline transport of gas, with the exception of estimated gas used for processing of gas to LNG at the three LNG plants in Queensland.

Figure 8 plots changes in emissions as reported by the NEEA alongside changes in total national energy combustion emissions, as reported in the 2015 *NIR*. The gap between the two lines shows that between 2012 and 2014, while emissions reported by the NEEA decreased, because of the effect of the carbon price on the NEM electricity generation mix, emissions from the sources not covered by NEEA increased. Most of the increase appears to have been caused by additional consumption of coal and gas in both WA and the NT, mainly for gas processing and also, in WA, for electricity generation and general industrial use. Since 2014 these energy combustion emissions not covered by the NEEA have been almost constant.

The NEEA does not, of course, claim to report all of Australia's greenhouse gas emissions from energy combustion, let alone its total emissions from all sources. What it does claim is to report *changes* in emissions from sources which currently account for about 60% of Australia's total emissions and have, historically, accounted for most of the year to year changes in total emissions, excluding LULUCF. The data plotted in Figure 8 show that since 2011 the NEEA has provided a very accurate, but slightly under-estimated, representation of changes in Australia's total emissions, excluding LULUCF. We are confident that it will continue to do so, and will also be watching for additional, reliable sources of data which could be used to expand its coverage of Australia's energy combustion emissions.