The Australia Institute
Research that matters.
> Climate & Energy.

National Energy Emissions Audit
Electricity Update

April 2019

Providing a comprehensive, up-to-date indication of key electricity trends in Australia

Author: **Hugh Saddler**

ABOUT THE AUSTRALIA INSTITUTE

The Australia Institute is an independent public policy think tank based in Canberra. It is funded by donations from philanthropic trusts and individuals and commissioned research. We barrack for ideas, not political parties or candidates. Since its launch in 1994, the Institute has carried out highly influential research on a broad range of economic, social and environmental issues.

OUR PHILOSOPHY

As we begin the 21st century, new dilemmas confront our society and our planet. Unprecedented levels of consumption co-exist with extreme poverty. Through new technology we are more connected than we have ever been, yet civic engagement is declining. Environmental neglect continues despite heightened ecological awareness. A better balance is urgently needed.

The Australia Institute's directors, staff and supporters represent a broad range of views and priorities. What unites us is a belief that through a combination of research and creativity we can promote new solutions and ways of thinking.

OUR PURPOSE – 'RESEARCH THAT MATTERS'

The Institute publishes research that contributes to a more just, sustainable and peaceful society. Our goal is to gather, interpret and communicate evidence in order to both diagnose the problems we face and propose new solutions to tackle them.

The Institute is wholly independent and not affiliated with any other organisation. Donations to its Research Fund are tax deductible. Anyone wishing to donate can do so via the website at https://www.tai.org.au or by calling the Institute on 02 6130 0530. Our secure and user-friendly website allows donors to make either one-off or regular monthly donations.

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

Table of Contents

Key points

+ **Continued fall in annual emissions over the past few months has been mainly driven by a large absolute increase in large scale solar generation.** Rapidly falling gas generation, which was previously a major driver of falling emissions, appears for now to have ended, with annual gas generation almost constant since December last.

+ **The dramatic increase in grid scale solar generation has contributed to renewables supplying monthly 14-15% of total generation (including rooftop solar) since last November.** This is a dramatic increase in the average 10% to 11% share this time last year.

+ **There has been a jump in medium (+15kW) to large (+100kW) rooftop solar installations.** The rate of increase of rooftop solar capacity continues to accelerate and, while residential scale installations continue to dominate, commercial scale installations, both smaller (between 15 and 100 kW capacity) and larger (more than 100 kW) have been making strong contributions, for the first time ever, over the past nine months.

+ **Our annual review of seasonal peak demand in each state shows that peak 30 minute (trading interval) demand reached record levels in both Queensland and South Australia, during summer 2018-19.** The records occurred even with significant contributions of rooftop solar (in both states, though more in South Australia because of the summer time effect) that reduced daily peaks below the levels which would otherwise have been reached.

+ **'Baseload' energy demand at a 15 year low in South Australia.** Total grid supplied electrical energy consumed in South Australia over the four summer months (December to March) was amongst the lowest experienced over the past fifteen years. The average utilisation of grid supply assets in the state is continuing to decrease, or to put it another way, so-called "base load" consumption, already small, is shrinking further. Nothing could more clearly demonstrate how out of touch with reality are calls for new "base load" generation, while also showing, by contrast, the increasing potential value of energy storage, whether supplied by batteries or pumped hydro.

Introduction

Welcome to the April 2019 issue of the *NEEA Electricity Update*, with data updated to the end of March 2019. The *Electricity Update* presents data on electricity demand, electricity supply, and electricity generation emissions in the National Electricity Market (NEM), plus electricity demand in the South West Interconnected System (SWIS). In this issue we provide a slimmed down version of just the key points and visual representations as we look to trial different variations of the *Electricity Update*.

ELECTRICITY UPDATE

Demand for electricity

Figure 1

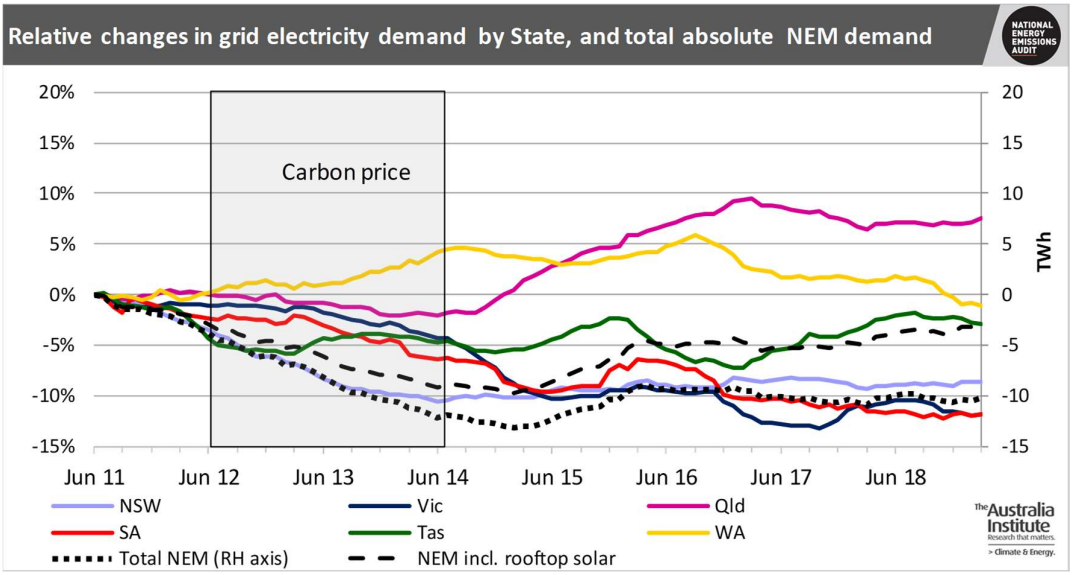


Figure 2

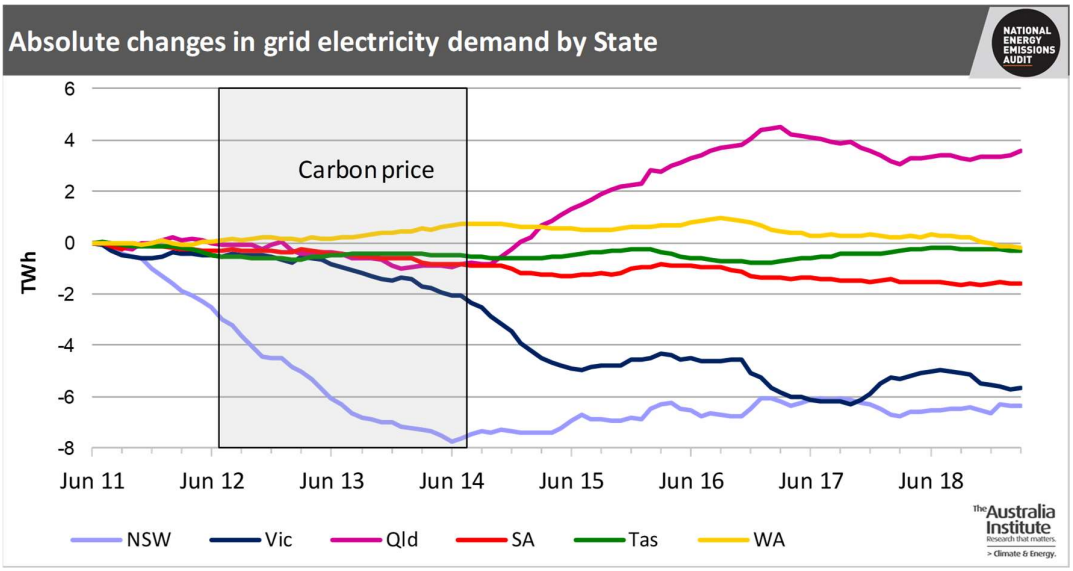
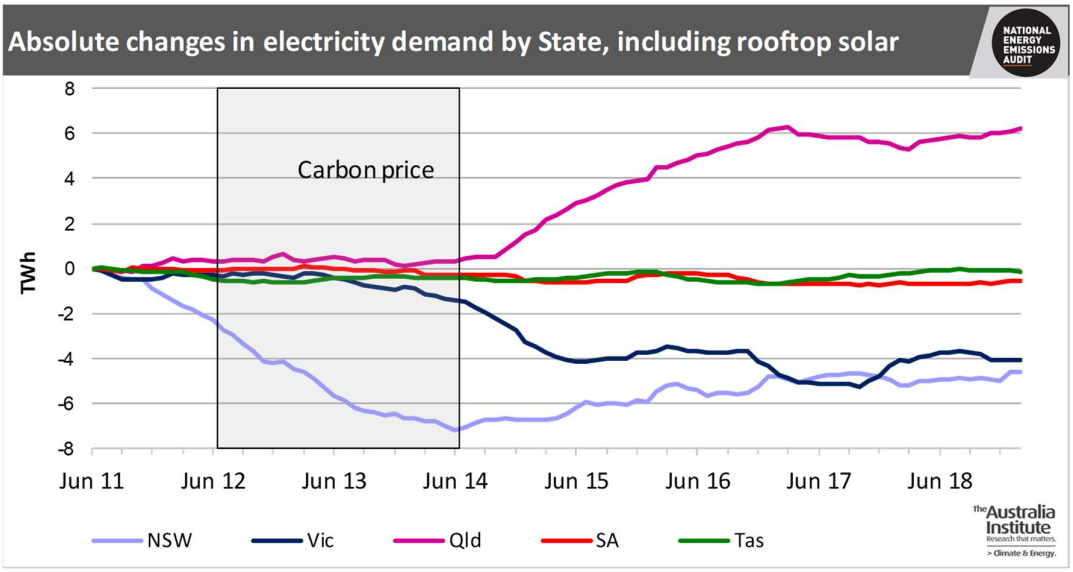


Figure 3



Generation and emissions

Figure 4

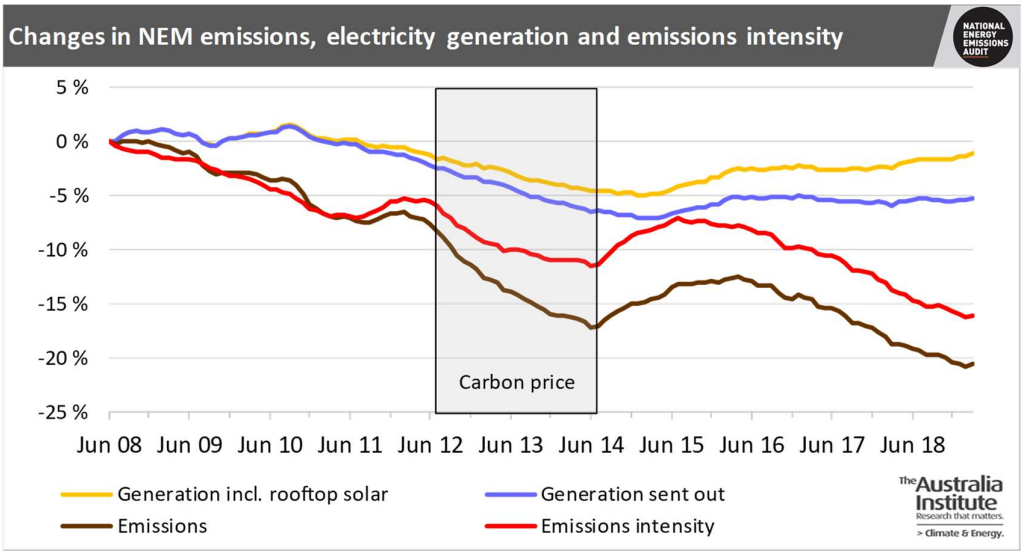
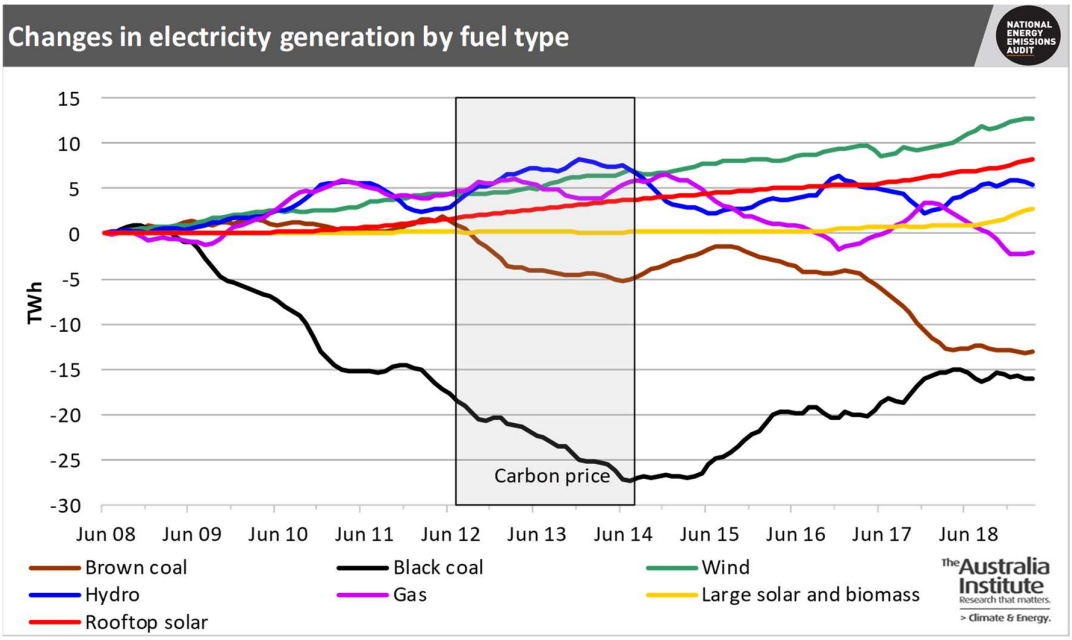


Figure 5



Growth in renewable generation in the NEM

Figure 6

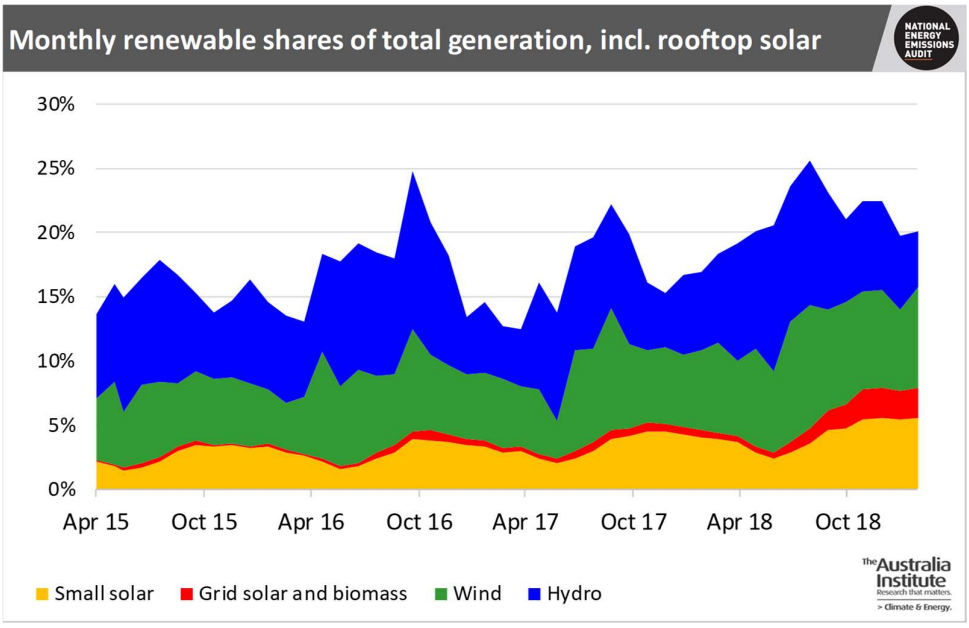


Figure 7

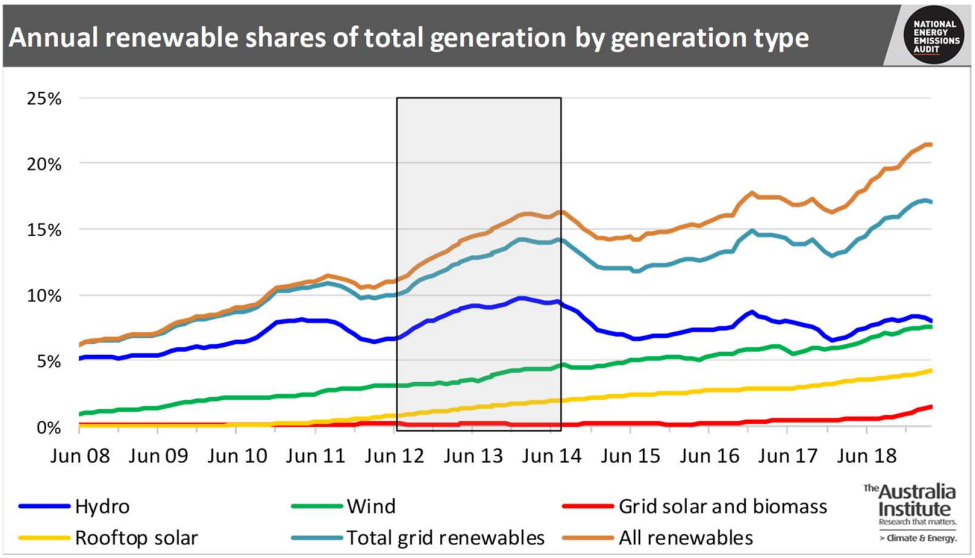


Figure 8

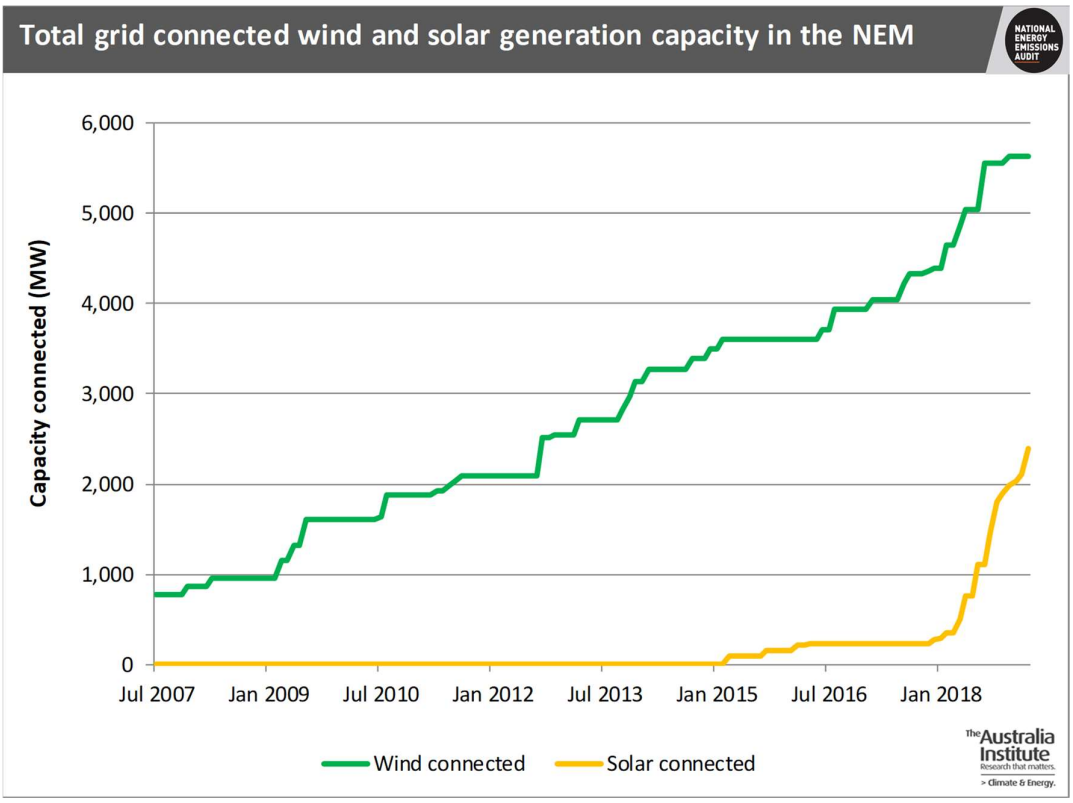


Figure 9

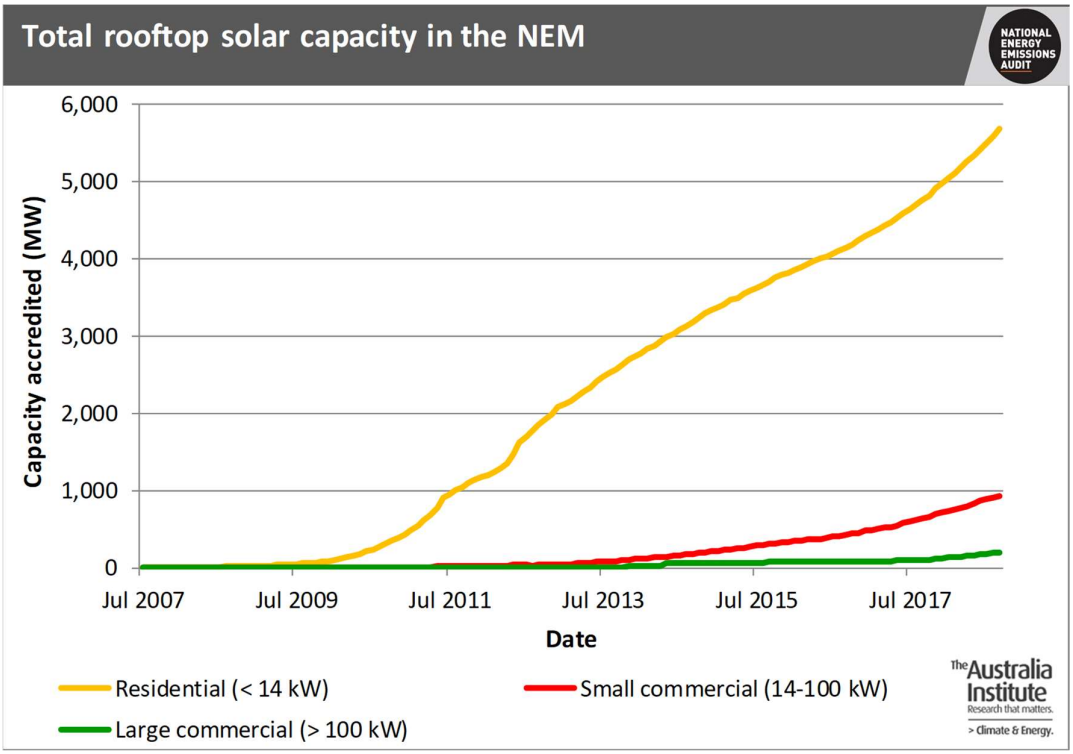


Figure 10

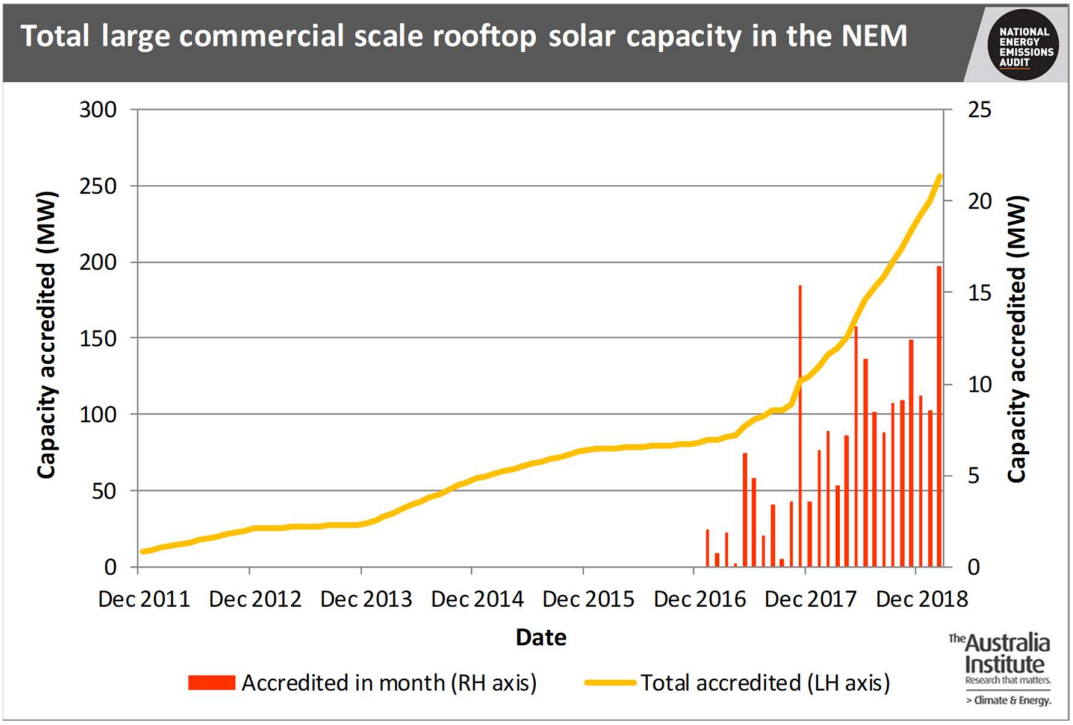


Figure 11

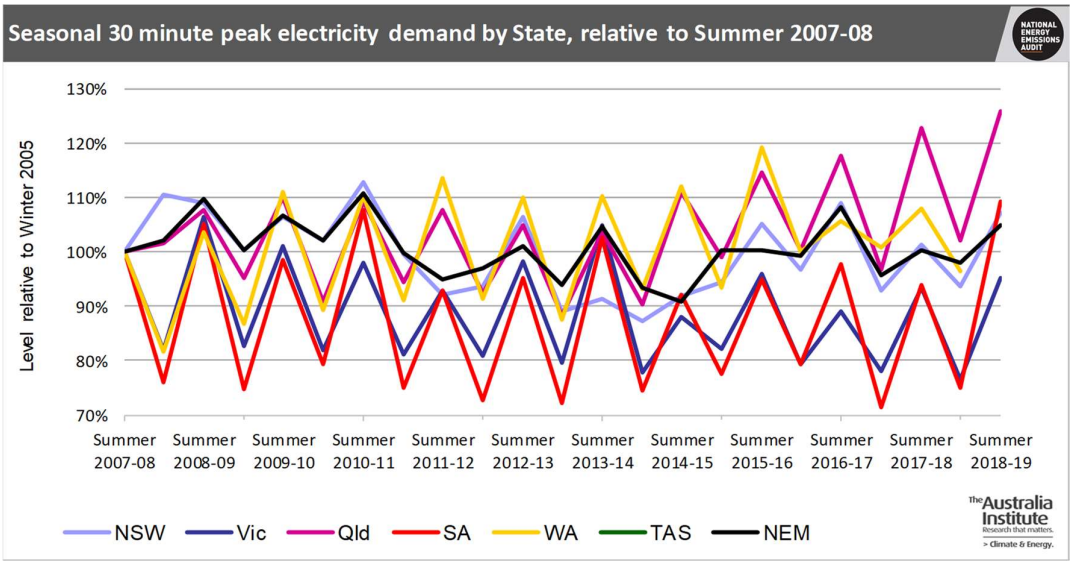


Figure 12

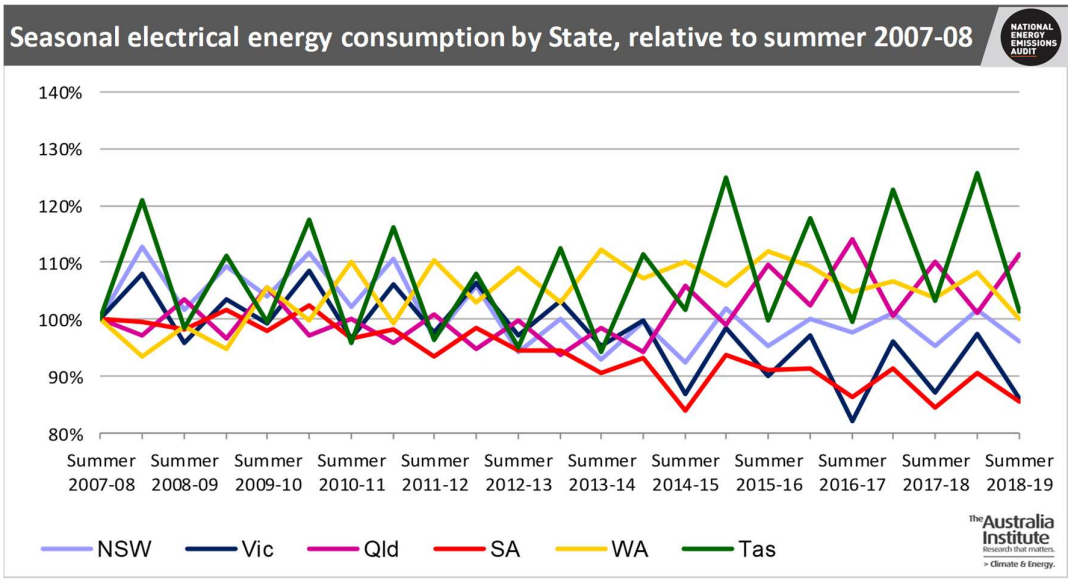


Figure 13

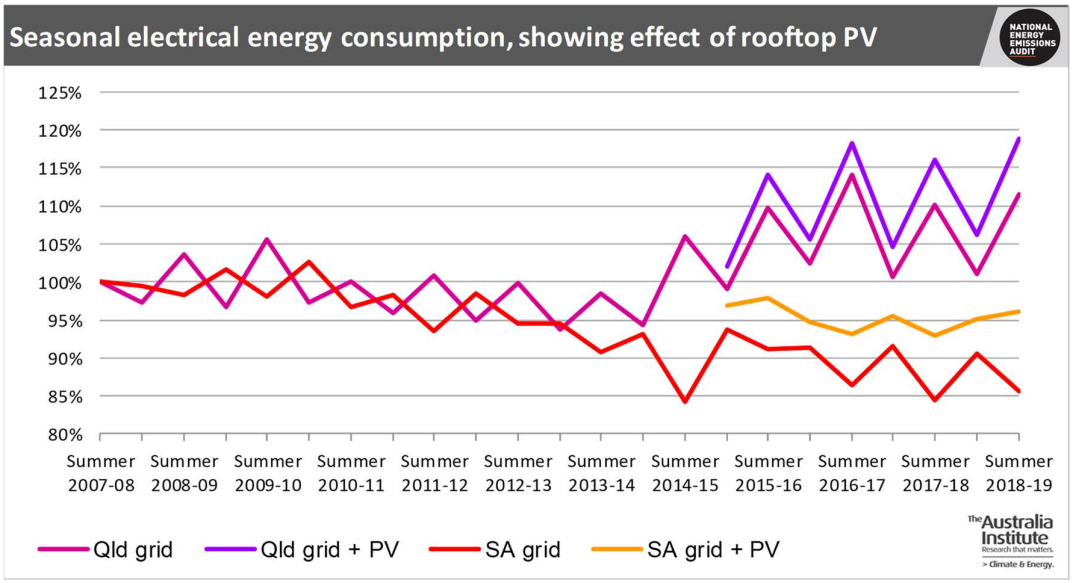


Figure 14

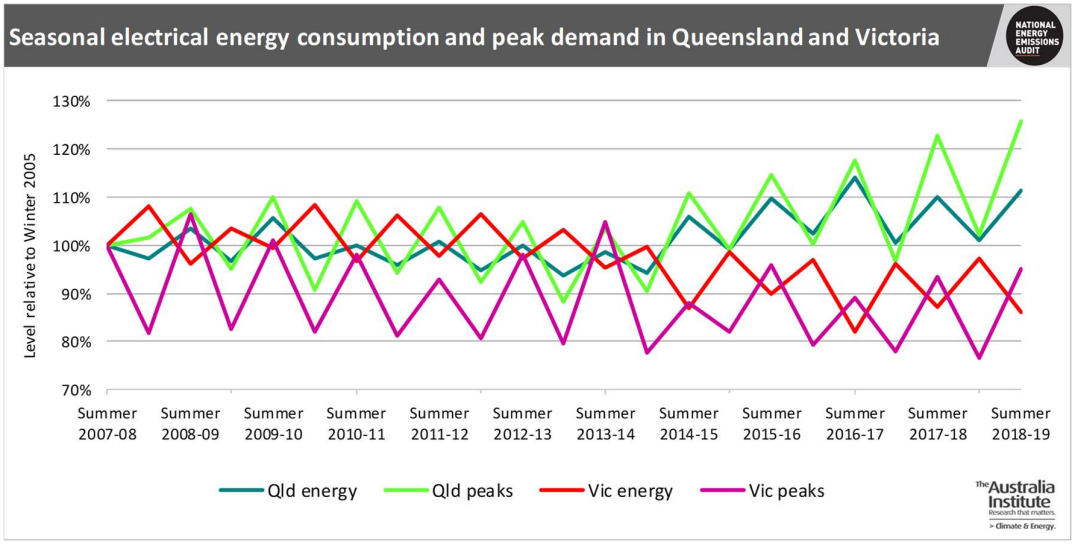
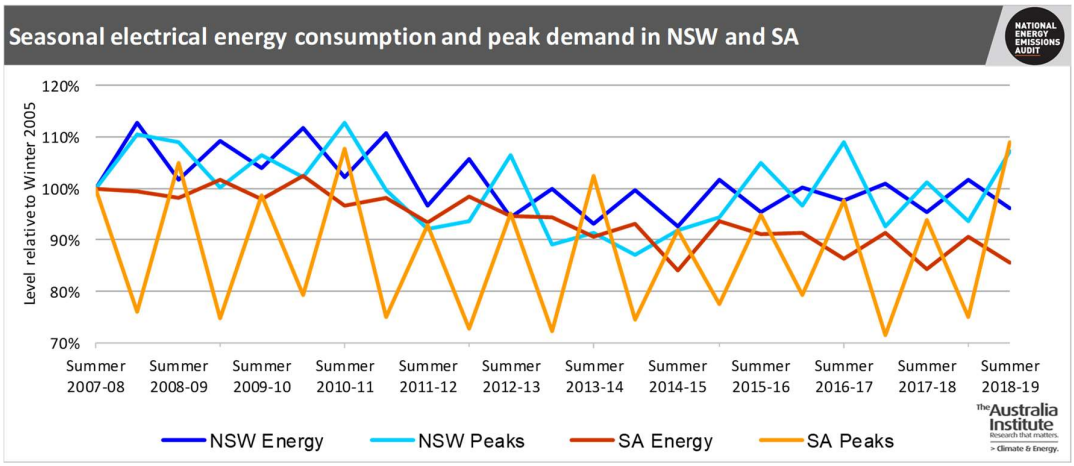


Figure 15


Seasonal electrical energy consumption and peak demand in NSW and SA
NATIONAL ENERGY EMISSIONS AUDIT
Level relative to Winter 2005
120%
110%
100%
90%
80%
70%
Summer 2007-08
Summer 2008-09
Summer 2009-10
Summer 2010-11
Summer 2011-12
Summer 2012-13
Summer 2013-14
Summer 2014-15
Summer 2015-16
Summer 2016-17
Summer 2017-18
Summer 2018-19
NSW Energy
NSW Peaks
SA Energy
SA Peaks
The Australia Institute
Research that matters.
Climate & Energy

APPENDIX: NOTES ON METHODOLOGY

Data on annual consumption of electricity, and seasonal peak demand, are for each of the six states. All other data are for the states constituting the National Electricity Market (NEM) only, i.e. they exclude Western Australia. All data are reported as annual moving averages. This approach removes the impact of seasonal changes on the reported data. Annualised data reported in *NEEA Electricity Update* 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.

Defining the particular meaning of the various terms used to describe the operation of the electricity supply system will help in understanding the data discussed.

Demand, as defined for the purpose of system operation, includes all the electricity required to be supplied through the grid level dispatch process, operated by AEMO. This includes all the electricity delivered through the transmission grid to distribution network businesses, for subsequent delivery to consumers. It also includes energy losses in the transmission system and auxiliary loads, which are the quantities of electricity consumed by the power stations themselves, mostly in electric motors which power such equipment as pumps, fans, compressors and fuel conveyors. Auxiliary loads are very large: in 2011 they amounted to 6.3% of total electricity generated and currently about 5.6%. Most of this load is at coal fired power stations, where it can be as high as 10% of electricity generated at an old brown coal power station and 7% at a black coal fired power station. Auxiliary loads are much lower at gas fired power stations, and close to zero at hydro, wind and solar power stations. Both demand and generation, as shown in the *Electricity Update* graphs, are adjusted by subtracting estimates of auxiliary loads. Thus demand, as shown, is equal to electricity supplied to distribution networks (and a handful of very large users that are connected directly to the transmission grid) plus transmission losses.

Generation is similarly defined to include only electricity supplied by large generators connected to the transmission grid. It does not include electricity generated by rooftop PV installed by electricity consumers, irrespective of whether that electricity is used on-site ("behind the meter") by the consumer or exported into the local distribution network. From the perspective of the supply system as a whole, the effect of this generation, usually termed either "embedded" or "distributed" generation, is to reduce the demand for grid supplied electricity below the level it would reach without such distributed generation. That effect can be clearly seen in the regular total generation graph; the gap between the red line – electricity sent out to the grid from large grid connected power stations – and the yellow line – that electricity plus estimated electricity generated by distributed solar systems – is the electricity supplied by those systems.