

# Electricity Prices in Australia: An International Comparison

A report to the Energy Users Association of Australia



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CME is an energy economics consultancy focused on Australia's electricity, gas and renewables markets.

Level 43, 80 Collins Street  
Melbourne  
3000  
[www.carbonmarkets.com.au](http://www.carbonmarkets.com.au)

This report was prepared by Bruce Mountain, Director, CME  
[bruce.mountain@carbonmarkets.com.au](mailto:bruce.mountain@carbonmarkets.com.au)  
61 +(3) 9664 0680  
0405 505 060

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## EXECUTIVE SUMMARY

It is commonly considered that Australia's electricity prices are low in comparison to those in other developed countries. However, household electricity prices in Australia have risen by more than 40% since 2007, and are projected to rise by another 30% by 2013/14. This report was commissioned to assess how contemporary Australian electricity prices compare internationally.

Electricity prices in other developed economies have been stable or have risen (and in some cases declined) very gradually over the last decade. The sharp increase in Australian electricity prices combined with changes in exchange rates has meant that average electricity prices to households in Australia are now higher than those in Japan, the EU, U.S. and Canada. The gap may widen after taking account of further expected price rises in Australia.

The analysis shows that change in exchange rates between 2007 and 2011 have increased the difference between household electricity prices in Australia and those in the U.S., the EU and Canada. However exchange rate changes have been less significant than rising prices: even if 2007 rates of exchange are used, household electricity prices in Australia in 2011/12 are still higher than those in the EU, U.S., Japan and Canada.

As shown in Figure 3, out of 91 comparator countries, states or provinces, household electricity prices in four Australian jurisdictions in 2011 were in the top six. They are South Australia (third highest), New South Wales (fourth highest), Victoria (fifth highest), and Western Australia (sixth highest). Tasmania is the eleventh highest and only Queensland (sixteenth), the Northern Territory (twenty-first) and the Australian Capital Territory (twenty-ninth) and lie outside of the top eleven.

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## Glossary

<b>ABS</b>	<b>Australian Bureau of Statistics</b>
<b>AEMC</b>	<b>Australian Energy Markets Commission</b>
<b>BREE</b>	<b>Bureau of Resource and Energy Economics</b>
<b>CPI</b>	<b>Consumer Price Index</b>
<b>EIA</b>	<b>Energy Information Administration</b>
<b>IEA</b>	<b>International Energy Agency</b>
<b>OECD</b>	<b>Organisation for Economic Co-operation and Development</b>
<b>PPP</b>	<b>Purchasing Power Parity</b>

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# 1 Introduction

Electricity prices in Australia have risen significantly since 2007. It is commonly considered that Australia's electricity prices are low in comparison to those in other countries. Recently the Bureau of Resource and Energy Economics said that despite price increases, electricity prices in Australia remain below the average of member countries of the Organisation for Economic Cooperation and Development (OECD).

In this context, the Energy Users Association of Australia (EUAA) asked CME to compare the price of electricity to end users in Australia and other countries. This report sets out our methodology, results and observations.

## 2 Methodology

### Comparisons

Three comparative analyses are presented:

1. **Common monetary areas and other major economies:** This compares the aggregate average price paid by households. It is expressed in cents per kilowatt-hour in Australia and is compared to average prices in the United States (U.S.), the European Union (27 countries) and two other major developed economies (Canada & Japan).
2. **Household electricity price index:** this is an index of the change in household electricity prices in Australia, the U.S., EU, Canada and Japan. The index is calculated in constant currencies of each country/monetary area and hence is not affected by the translation of currencies of other countries into Australian dollars.
3. **Country comparisons:** This compares the average price of electricity exclusive of sales taxes or excise taxes paid by households in Australian jurisdictions, with the prices paid in 92 other countries or jurisdictions (provinces, states) within countries. The comparison is in Australian cents per kilowatt-hour.

All price comparisons are exclusive of sales taxes, value-added taxes and excise taxes. The first and third comparison will be affected by changes in the Australian dollar relative to comparator country currencies. To assess the impact of this, the first comparison is repeated but using average exchange rates in 2007, rather than 2011, so that the effect of changes in exchange rates can be seen. Comparisons of prices, adjusted for Purchasing Power Parity (PPP)<sup>i</sup>, are also developed.

### Data

We sought to compare prices for residential, commercial and industrial end users. We found that this was not possible for commercial and industrial end-users because price data for these end users is not available in Australia, although it was available in most other countries.

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The Australian Bureau of Statistics publishes a “business” electricity price index in the calculation of the Producer Price Index. However this is not comparable to the typical “industrial” and “commercial” categories published internationally which typically use Standard Industrial Classifications. Furthermore the ABS data is only an index, not a price and so can not be compared to actual prices in other countries.

For residential electricity prices, for the last two years the Australian Energy Markets Commission (AEMC) has published an annual report “Possible future retail electricity price movements”. The most recent report is the AEMC’s estimate of residential electricity prices in all Australian jurisdictions in 2010/11, and annual projections to 2013/14. For Australian household electricity price projections from 2012 to 2014 we have used these data.

The AEMC said that it based its analysis on standard offers to household electricity users, but that in Victoria prices may be 10% to 20% below the standard offer. However we presume that the AEMC was not confident of the extent of these discounts or else it would have reduced its projections of prices in Victoria accordingly.

The AEMC also noted that the “consumer” prices for electricity in Western Australia and the Northern Territory are below the “actual” prices because the government subsidises the difference. We have used the AEMC’s estimate of the consumer prices for the Northern Territory. For Western Australia we have used “actual” prices (which were just over 4 c/kWh above consumer prices in 2011) because the AEMC data does not provide projections of consumer prices after 2012.

For household electricity price data up to January 2012, we used the electricity index data provided by the Australian Bureau of Statistics (ABS) in its calculation of the Consumer Price Index (CPI).

For other countries, data on household electricity prices was obtained from the following sources:

- Eurostat: for prices in European Union member countries, and also for some other non-EU member countries including Turkey and Norway;
- The Energy Information Administration (EIA) of the United States of America for prices in the contiguous states of the United States of America (i.e. excluding Alaska and Hawaii);
- The International Energy Agency (IEA) for prices in Switzerland, Canada, New Zealand and Japan. The IEA report we have used is “Energy Prices and Taxes, Quarterly Statistics, Fourth Quarter 2011” and we understand is the latest publicly available electricity price data from the IEA. Ideally we would have used IEA data for Australian prices. However, the IEA only reported Australia’s household electricity price data for the period from 2001 to 2004.

Some of the comparisons require the conversion of prices in other currencies into Australian dollars. We used the mid point of the bid and ask prices using average interbank rates for 2011 provided by [www.oanda.com](http://www.oanda.com).

Finally, we examined a recent report by the Bureau of Resource and Energy Economics (BREE, 2012) that concluded that Australian household electricity prices are below the

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OECD average. That report used average Australian household prices for the year ending June 2010 of 19.38c/kWh as calculated by the Australian Energy Markets Commission in November 2010 (see AEMC (2010)). A more recent AEMC report published in November 2011 (see AEMC (2011)) shows average household electricity prices for the year ending June 2012 of 24.8 c/kWh, an increase of around 28%. We have used the most recent data.



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### 3 Results

#### 3.1 Comparison with common monetary areas and other major economies

Figure 1 shows the average household electricity prices in Australia in 2011/12 compared to the average household prices in the EU (27 countries), Japan, U.S. and Canada. The results are stated in Australian cents / kWh based on the average 2011 exchange rates.

**Figure 1. Household electricity prices in Australia compared to common monetary areas and other major economies<sup>ii</sup> at average 2011 exchange rates**

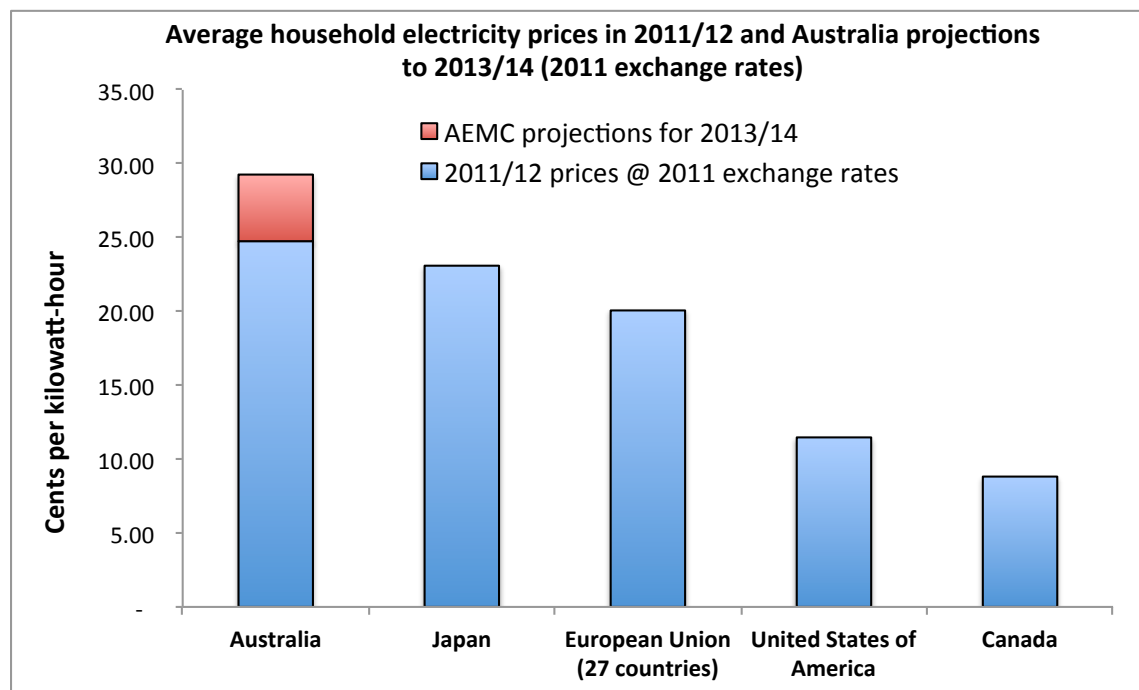


Figure 1 shows that at average 2011 exchange rates, Australia had higher average household electricity prices than the average prices in the other countries/blocs examined. In 2011/12 average household electricity prices in Australia (just under 25 cents/kWh) were 12% higher than average prices in Japan, 33% higher than the EU, 122% higher than the U.S. and 194% higher than Canada.

Figure 1 also shows the AEMC's projections of household electricity prices in 2013/14. Price projections for the other countries in the comparison are not known. As shown in Figure 2 below, prices in these other countries have been stable over the last decade.

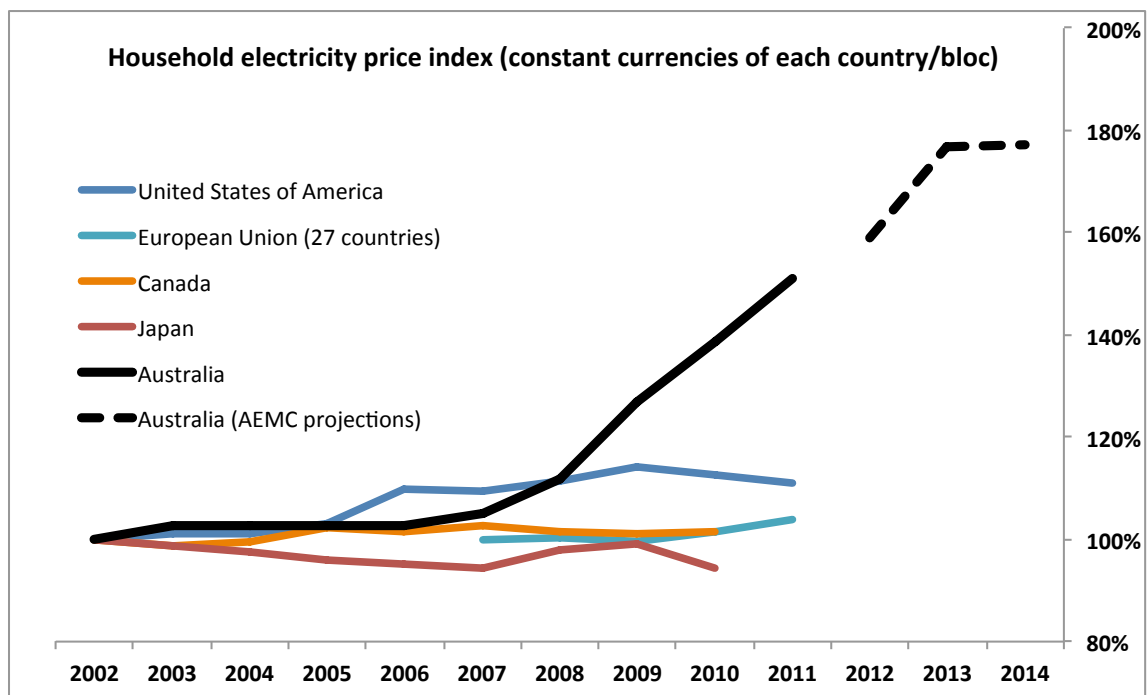
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### 3.2 Household electricity price index

Figure 2 is an index of household electricity prices in constant currency starting from 2002. The index shows how electricity prices have changed since 2002. The index value for each country has been calculated in real terms (constant currency) of that country. It therefore excludes the impact of inflation on prices and also is not affected by currency conversions.

Figure 2 shows that household electricity prices in the U.S., EU, Canada and Japan have been stable in the period from 2002 to 2010/11. By contrast Australian electricity prices were stable from 2002 to 2007 but since then have risen around 40% in real terms and are projected to rise a further 30% over the next two years.

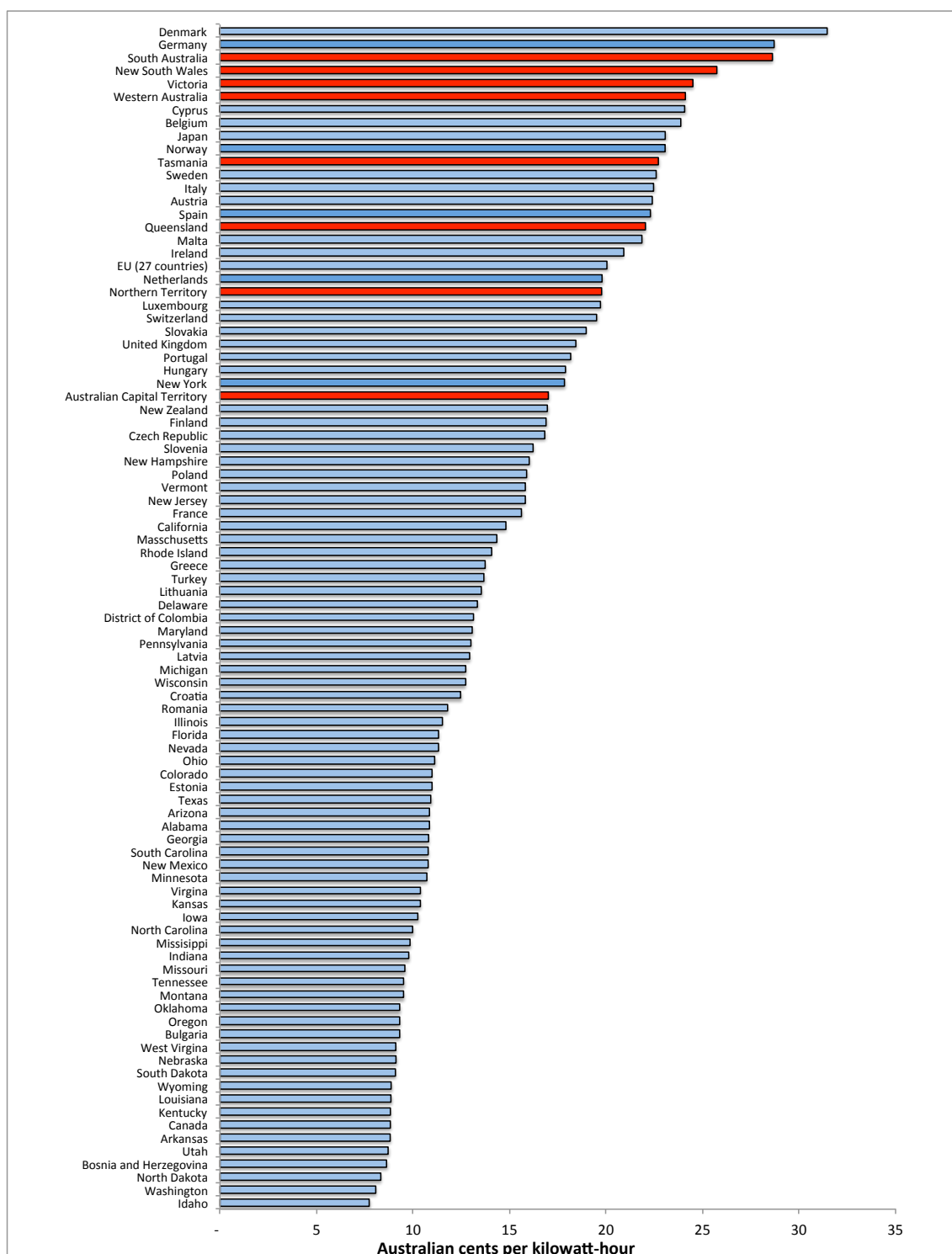
Figure 2. Household electricity price index<sup>iii</sup>



### 3.3 Country comparisons

Figure 3 is a comparison of 2011 household electricity prices for the 91 countries, states and provinces in the comparison. It shows the ranking of each jurisdiction (province, state or territory) from highest to lowest prices. Australian states and territories are marked in red.

Figure 3. 2011 household electricity prices by country, state and province<sup>iv</sup>



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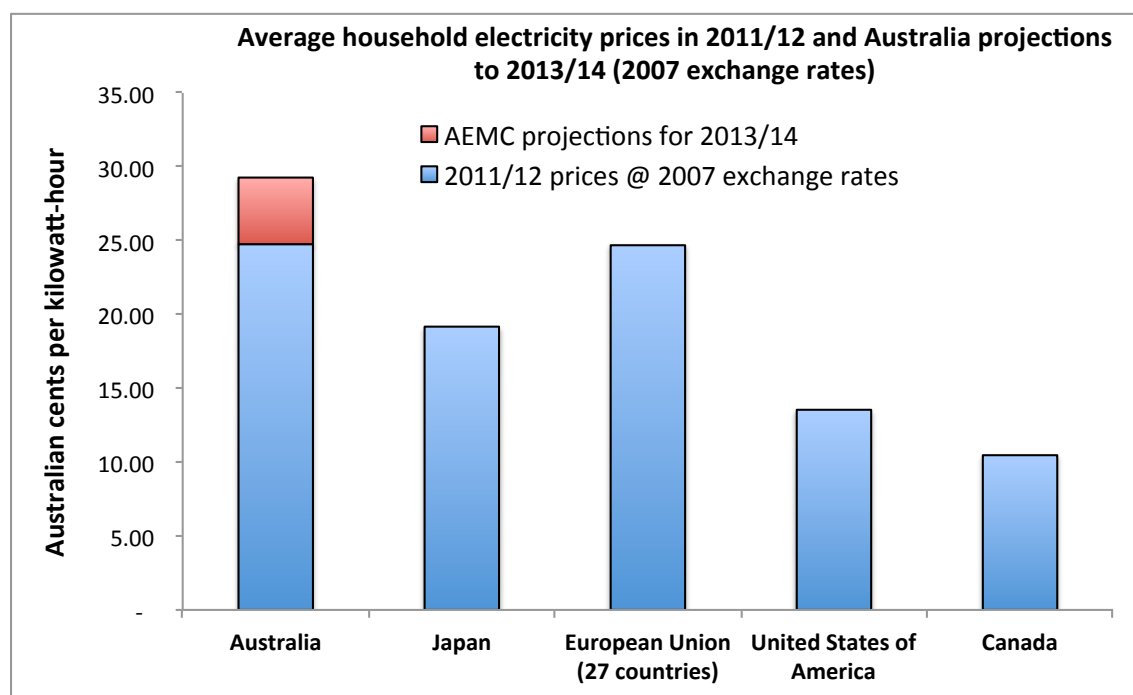
### 3.4 Impact of changes in exchange rates

Figures 1 and 3 showed household electricity prices in Australia compared to other countries, in Australian cents per kilowatt-hour converted at average 2011 exchange rates.

A question arises on the extent to which the comparison is affected by changes in the Australian dollar exchange rates, since the Australian dollar has risen significantly against the Euro, U.S. Dollar and Canadian Dollar over a similar period to which prices have risen significantly in Australia. Figure 4 uses the same price data used in Figure 1 but foreign currencies are converted into Australia dollars using average exchange rates in 2007 (this year was chosen because this is the year after which prices in Australia began to rise significantly and also because exchange rates were lower in 2007 before the effect of the mining boom).

Figure 4 shows that even using 2007 exchange rates, average household prices in Australia in 2011 are still higher than in Japan, the EU, U.S. and Canada. Comparing Figure 4 and Figure 1, it is clear that the rise of the Australian dollar (relative to the Euro, U.S. Dollar and Canadian Dollar although not the Japanese Yen) partly explains changes in relative prices since 2007. However the bigger effect is that prices in Australia have risen significantly since 2007.

**Figure 4. Household electricity prices in Australia in 2011 compared to common monetary areas and other major economies at average 2007 exchange rates<sup>v</sup>**

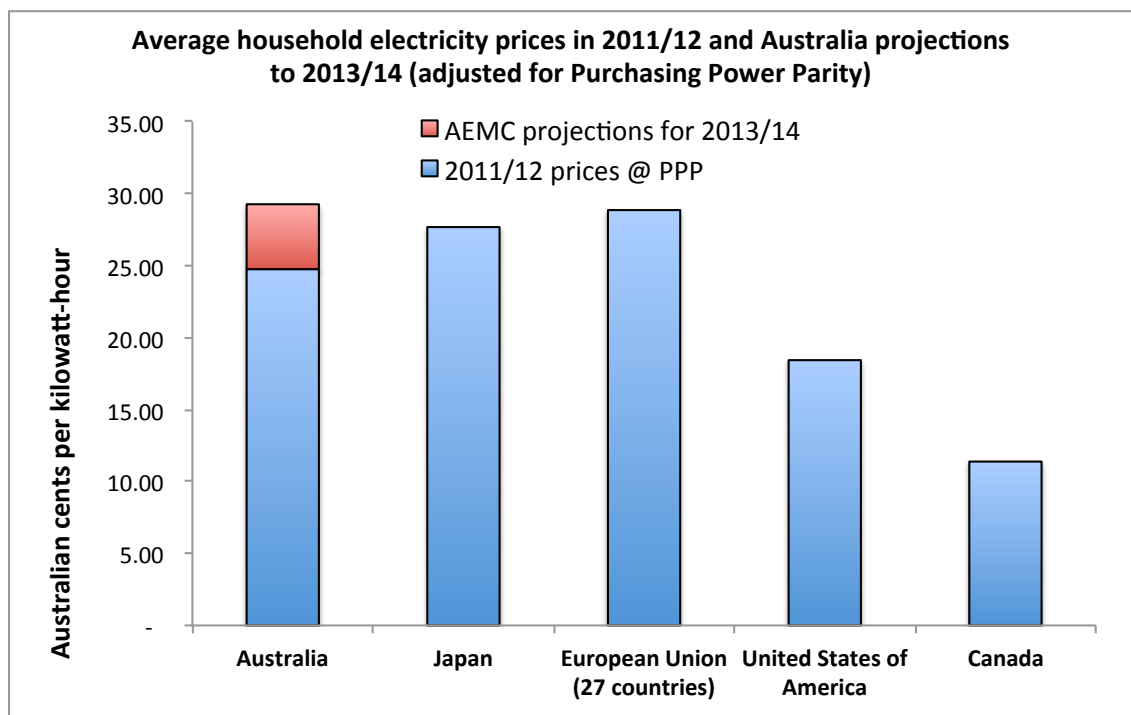


Other approaches might be used to take account of differences in purchasing power that are not reflected in exchange rates comparisons. We used the 2011 Comparative Price Level indicator (the ratio of Purchasing Power Parity to exchange rates) published

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in OECD (2012) to adjust the prices calculated using market exchange rates and shown in Figure 1. The resulting comparison is shown in Figure 5.

**Figure 5. Average household electricity prices in Australia in 2011 compared to common monetary areas and other major economies at Purchasing Power Parity<sup>vi</sup>**



Finally, we suggest caution in drawing conclusions on the impact of changes in exchange rates on international price comparisons. Around three-quarters of all expenditure incurred by Australia's electricity network service providers is capitalised. The bulk of this capitalised expenditure is for equipment imported from other countries, particularly the U.S., countries in the EU and Japan. The appreciation of the Australian dollar relative to the Euro and US Dollar, and the depreciation relative to the Japanese Yen will affect the Australian Dollar cost of imports. In view of the general appreciation of the Australian Dollar, and the significance of imported components, the expectation should be that this would be reflected in generally lower electricity prices in Australia. While price changes may lag cost changes to some extent, it is reasonable to expect that household electricity price increases in Australia between 2007 and 2011 would be even higher than they have been, had the Australian dollar not appreciated relative to the U.S. Dollar and Euro.

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## 4 Observations

1. As shown in Figure 1, the average price of electricity for households in Australia was approximately constant in real terms for the five years between 2002 and 2007. Since then and until the end of 2011 prices have risen by about 40% in real terms (constant currency). The AEMC expects household electricity prices to rise another 30% in real terms by 2013/14.
2. As shown in Figure 2 the price of electricity in Japan and Canada, has been approximately constant in real terms since 2002, while the price in the U.S. has risen by about 10%. By comparison, Australian electricity prices have risen significantly since 2007. As a result of these increases, average prices in Australia are now about 10% higher than average prices in Japan, 20% higher than the EU, 70% higher than the U.S. and 130% than Canada. If prices in Australia had not increased since 2007 they would now be about 20% lower than in Japan, 5% lower than in the EU, 55% higher than in the U.S. and 105% higher than in Canada.
3. As shown in Figure 3, out of 91 comparator countries, states or provinces, household electricity prices in four Australian jurisdictions in 2011 were in the top six. They are South Australia (third highest), New South Wales (fourth highest), Victoria (fifth highest), and Western Australia (sixth highest). Tasmania was the (eleventh highest) and only Queensland (sixteenth), the Northern Territory (twenty-first) and the ACT (twenty-ninth) and lie outside of the top eleven.
4. As shown in Figure 4, the appreciation of the Australian dollar relative to the Euro, U.S. dollar and the Canadian dollar, explains part of the relative increase in the price of electricity in Australia compared to the EU, U.S. and Canada between 2007 and 2011. However exchange rate changes are less significant than underlying price increases in Australia. Furthermore, the Australian Dollar has depreciated relative to the Japanese Yen.
5. If electricity prices in Japan, the EU, the United States and Canada continue their trend from 2002, and prices in Australia increase as the AEMC has projected, at current exchange rates household electricity prices in Australia will be about 30% higher than in Japan, 60% higher than in the EU, 160% than in the U.S. and 250% higher than in Canada by 2013/14.
6. As shown in Figure 5, adjusting for Purchasing Power Parity (PPP) based on the OECD's measures, electricity prices in Australia are currently around 11% lower than in Japan, 14% below EU prices, but 34% higher than U.S. and 117% higher than Canadian prices. Assuming no changes in PPP and that prices in Japan, the EU, the U.S. and Canada continue their trend from 2002, prices in Australia (at PPP) will be higher than these comparators by 2013/14.

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## Endnotes

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<sup>i</sup> The OECD publishes statistics on the purchasing power of different currencies. This is then used to develop adjustments to the traded exchange rates to take account of the differences in the purchasing power of different currencies.

<sup>ii</sup> **Sources:** Australian data from AEMC (2011) for year beginning 1 July 2011; EU data is from Eurostat (2012) for semester ending 30 June 2011 (the latest data available). Data for Canada and Japan from OECD (2012) is for 2010 (the latest available). Since Japanese and Canadian prices have been gradually declining/approximately constant in constant currency respectively, the use of 2010 data may be a slight over-estimate (for Japan) or slight under-estimate (for Canada) of the prices in this comparison of 2011 data in the EU, U.S. and Australia. However the differences are likely to be immaterial. It might be argued that we should have used Australian data for the year beginning 1 July 2010 and ending 30 June 2011. We decided against this because the Australian prices are increasing rapidly while the prices in the comparator countries/regions have been declining or approximately constant and hence a more accurate comparison for 2011 is obtained using the approach we have used. Data for the U.S. is 2011 prices from EIA (2012) (Table 5.3) for the rolling 12 months to November 2011 but includes state-specific taxes that range between 2% and 4% but have not been excluded in the prices in the EIA's calculation because the EIA said it was unable to calculate an accurate average. This means that the U.S. data should be considered to be a slight over-estimate of tax-exclusive prices in the U.S. Prices for all other countries exclude sales/value added taxes and excise taxes. All prices are in 2011 Australian cents based on average exchange rates for 2011 as provided by [www.oando.com](http://www.oando.com) using the mid-points of the bid and ask prices and interbank exchange rates. The AEMC price projections from 2012/13 are stated in constant December 2011 Australian cents by deflating the AEMC's projections assuming CPI of 2.5% per year.

<sup>iii</sup> Sources: Index values for Australia from 2002 to 2011 are based on Index Numbers (A2328141J) deflated into 2002 dollars by the All Groups CPI (A2325806K), both published by ABS (2012). Index values for the other countries are based on the same data sources in Footnote 1, deflated into 2002 currency based on CPI data published in IEA (2012). It should be noted that the data on European prices is taken from Eurostat, which changed the basis of its comparative calculation in 2007. For consistency therefore the time series for Europe only begins in 2007 and so data is re-based to that year, not 2002. We cross-checked for changes in European prices published by the International Energy Agency and found that their measure of OECD (Europe) showed electricity prices increasing by 8.9% in real terms between 2002 and 2007. We did consider using the OECD (Europe) household electricity price index measure but decided not to do this since it showed a 6% jump in electricity prices between 2007 and 2008. This appears to be attributable, not to underlying price changes but to a change in calculation methodology by Eurostat who present their data separately before and after 2007 for this reason.

<sup>iv</sup> Sources: As identified in endnote (i).

<sup>v</sup> Sources: as identified in endnote (i) but using average exchange rates in 2007

<sup>vi</sup> Based on comparative price levels for 2011 published by the OECD and available from <http://stats.oecd.org/Index.aspx?DataSetCode=PPPGDP>