

**Submission**

**No 23**

## **INQUIRY INTO THE ECONOMICS OF ENERGY GENERATION**

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**Position:** Senior Development and Government Affairs Manager  
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16 February 2012

The Committee Manager  
Public Accounts Committee (PAC)  
Parliament House  
Macquarie St  
Sydney NSW 2000

**Re: Submission in response to Inquiry into the Economics of Energy Generation in New South Wales**

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Infigen Energy welcomes the opportunity to make a submission to the State Government's Inquiry into the Economics of Energy Generation.

Infigen Energy is Australia's leading specialist renewable energy business. Infigen Energy is also the largest non-Government owned renewable energy generator in New South Wales as well as the largest wind farm owner in Australia. Infigen Energy operates six wind farms in Australia totalling over 550 MW in generating capacity, including:

- 279 MW, Lake Bonney Stage 1, 2 & 3 Wind Farms near Millicent, SA;
- 89MW, Alinta Wind Farm near Geraldton, WA; and
- 190MW, Capital and Woodlawn Wind Farms east of Canberra near Bungendore, NSW.

Infigen Energy also owns and operates wind energy facilities in the United States, taking its aggregate wind energy business interests to over 1600 MW. Infigen Energy is listed on the ASX exchange and is headquartered in Sydney.

It is also worth noting that Infigen Energy is actively working to develop four large scale solar energy plants in NSW. More information about the company is available on our website [www.infigenenergy.com](http://www.infigenenergy.com).

As an electricity generation plant developer, owner and operator, Infigen Energy will confine its submission to the electricity market as opposed to other energy markets.

Our response to the Terms of Reference of the Inquiry appear on the following pages.



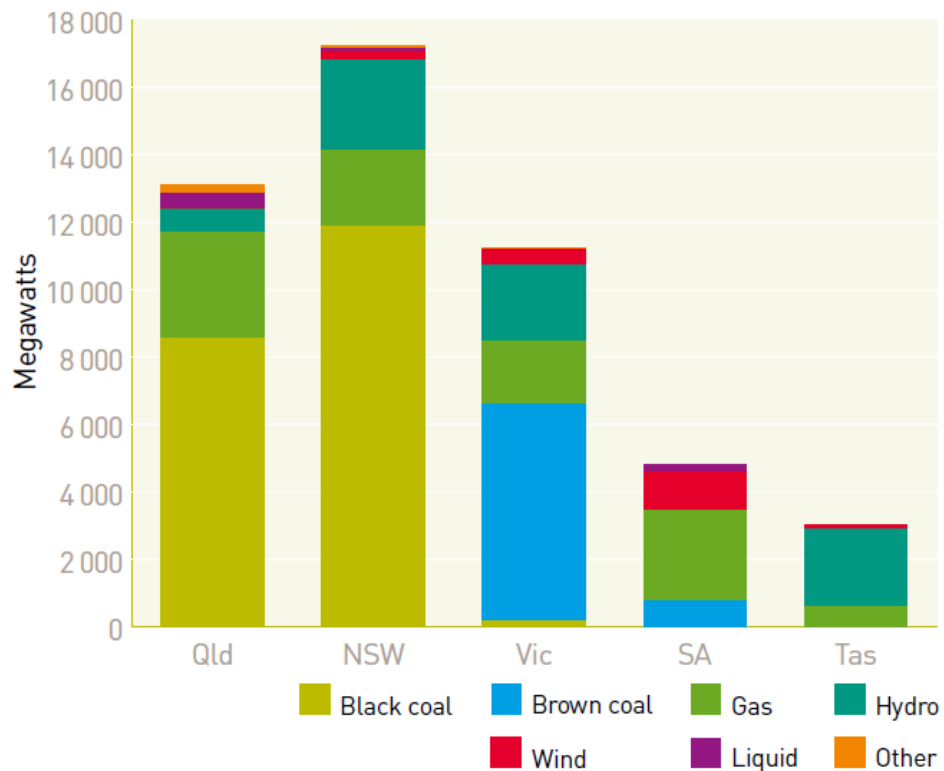
## THE MIX OF ENERGY SOURCES USED IN NSW

New South Wales generates the great majority of its electricity by burning black coal. Secondary sources of electricity generation are hydro electricity, primarily the Snowy Hydro scheme, and burning natural gas. A graph showing the installed electricity generation plant technologies for NSW, and the other States, is shown in the graph below<sup>1</sup>.

Renewable energy generation of electricity, by wind power or solar energy, makes up a relatively small percentage of total electricity generation today in NSW. The installed wind capacity is the red line in the graph below. Rooftop solar PV installations are not included in the graph below as the graph only covers utility scale generation plants. According to the Clean Energy Council, over 1000 Megawatts (MW) of rooftop solar PV has been installed in Australia, of which about 32% is located in NSW.

It is worth noting that South Australia had negligible amounts of installed wind energy facilities 8 years ago, but this situation has changed significantly as the graph below shows.

Registered capacity in regions, by fuel source, 2011



<sup>1</sup> State of the Energy Market 2011, AER



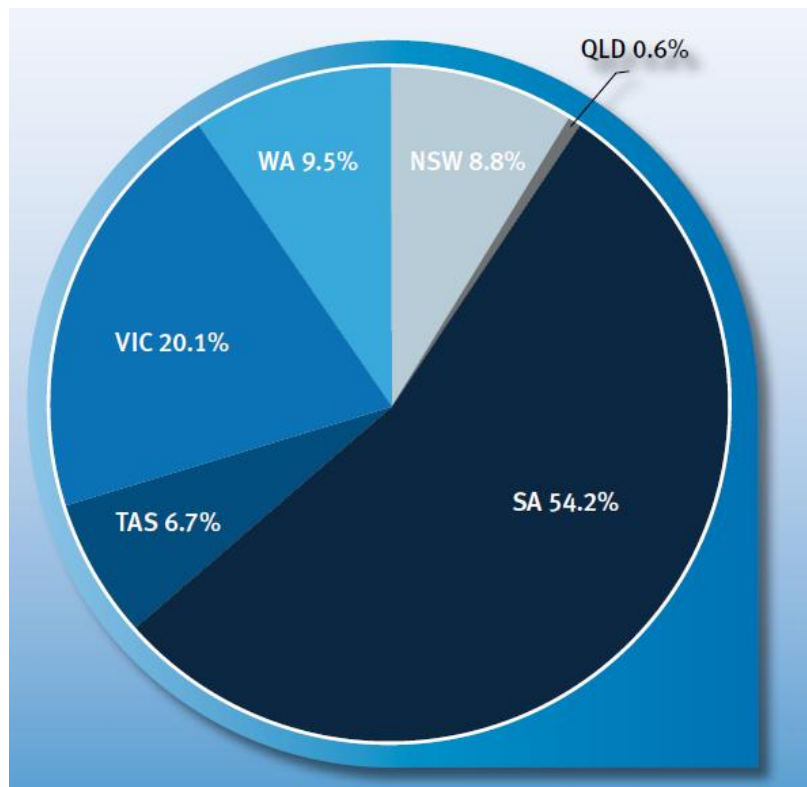
## COMPARISON OF NSW'S ENERGY MIX WITH OTHER JURISDICTIONS BOTH IN AUSTRALIA AND OVERSEAS

### Comparisons within Australia

As shown in the Figure on the previous page, NSW has a similar electricity generation mix to Victoria and Queensland---burning coal generates the great majority of electricity in these States with some contributions from gas and/or hydroelectric plants.

However, in the past 8 years or so, South Australia has significantly changed its electricity generation mix by installing over 1200 MW of wind generation capacity that currently generates over 20% of South Australia's electricity needs. Therefore, over one fifth of South Australia's electricity is generated without any pollution and is produced on a completely sustainable basis. On a routine basis every month, over 50% of SA's electricity is supplied by wind energy for various periods of time.

The pie graph below<sup>2</sup> shows that despite being the most populous State, NSW is fourth in regards to installed wind energy capacity. Therefore, NSW is lagging several other States with regards to realising the regional investment and clean electricity generation provided by wind energy facilities.



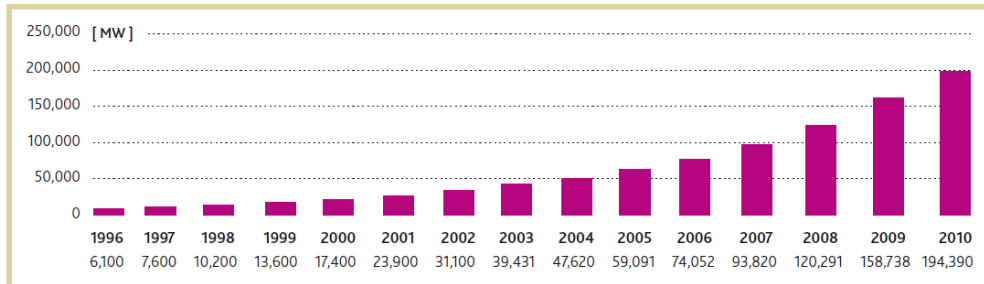
<sup>2</sup> Review of Australian Wind Industry 2011, Clean Energy Council



### Comparisons with Other Countries

Wind energy installations worldwide have been rising very consistently and rapidly worldwide. The chart below shows that wind energy worldwide has grown by over 25%, year-on-year, every year, for the past 15 years.<sup>3</sup>

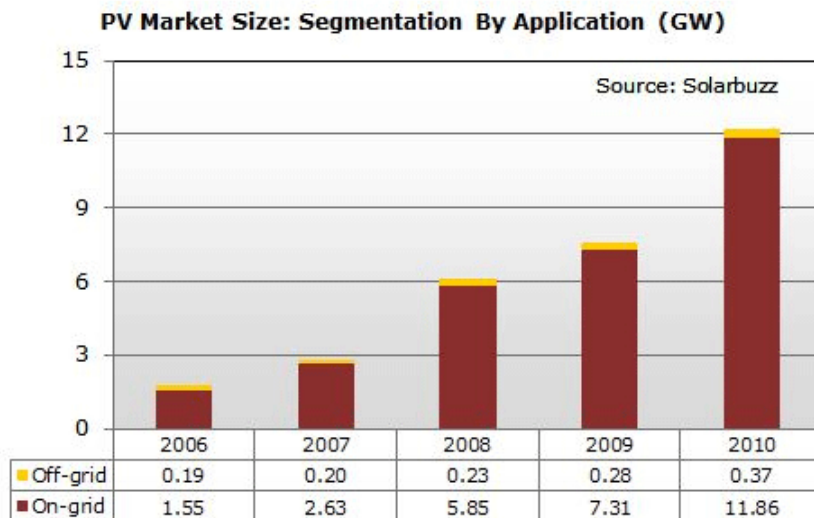
GLOBAL CUMULATIVE INSTALLED WIND CAPACITY 1996-2010



It is hard to think of another industry, in any market, that has grown so rapidly and consistently. To put it another way, wind energy capacity worldwide has doubled every 3 years for the past 15 years.

It is worth noting that some of the leading countries for wind installations, such as Germany, have generally lower wind speeds than NSW. While wind farms are relatively new to many regions in New South Wales, they have proven themselves to be a safe, effective, and clean source of electricity for many years overseas.

Likewise, solar PV installations have also been rising rapidly worldwide in the past few years as shown in the graph below. The installation of solar PV, both large and small scale installations, has quadrupled in the past three years, admittedly from a relatively small base.



<sup>3</sup> Global Wind 2010 Report, Global Wind Energy Council



At this point, it would be useful to discuss the LRET Scheme and the economic impact of wind energy generation in the National Electricity Market.

### The Large-scale Renewable Energy Target (LRET) Scheme

The Commonwealth LRET legislation enjoys tri-partisan support as it is strongly supported by the Government, Opposition and Greens Party. This legislation places an obligation on electricity retailers to source a certain percentage of their electricity each year from new renewable sources such as solar and wind energy---or pay a substantial penalty. The percentage of electricity sourced from renewable sources will rise from about 9% today to 20% in 2020 nationwide. Retailers recoup the incremental costs of the LRET scheme by passing these costs through to their customers. While opponents of renewable energy complain about the “outrageous costs” of the LRET scheme, **IPART assessed the annual cost increase attributable to the LRET scheme as just \$19/household, or 37 cents/week.**<sup>4</sup>

As a national scheme, the costs paid by NSW customers for the LRET, while quite modest, do not depend at all on whether renewable energy facilities are built in NSW or other States. The front page story in the Daily Telegraph last year (excerpt below) stating “Electricity prices could surge again as power companies sting customers to help bankroll wind farm projects being built across the state.” is 100% in error. The impost of the LRET scheme to NSW consumers is identical whether 1 or 1000 wind turbines are built in NSW.

# Wind sending price of power sky high

exclusive

Geoff Chambers

ELECTRICITY prices could surge again as power companies sting customers to help bankroll wind farm projects being built across the state.

GoSwitch.com.au founder Ben Freund, whose site offers energy deal comparisons, said customers were being sluggish to cover renewable projects.

Companies behind major projects include Origin Energy, AGL, Transfield Services and Epron.

The renewable energy grid

comparing the current long-run marginal costs for power generators revealed the difference between coal and wind energy. The 2008 report showed that by this year, wind energy projects would cost the equivalent of \$97.62 per megawatt hour (MWh) compared with \$45.99 for black coal.

ment of Resources, Energy and Tourism released estimates of the levelised costs of existing and new electricity generation technologies.

\*\*These estimates ... indicate that without a carbon price the estimated levelised cost per unit of electricity for a new coal-fired power station

It has been said that NSW electricity customers helped fund wind farms built primarily in South Australia over the past ten years. While the impost of the LRET scheme is modest, it is true that NSW electricity customers helped fund wind farms built in other States over the past decade. The blue pie chart above shows NSW did not receive their fair share of renewable energy investment during the last decade.

<sup>4</sup>[http://www.ipart.nsw.gov.au/Home/Industries/Electricity/Reviews\\_All/Retail\\_Pricing/Changes\\_in\\_regulated\\_electricity\\_retail\\_prices\\_from\\_1\\_July\\_2011/02\\_May\\_2011\\_-\\_Public\\_Hearing\\_Presentation\\_on\\_Draft\\_Report/Presentation\\_-\\_Electricity\\_Public\\_Hearing\\_Draft\\_Report\\_-\\_2\\_May\\_2011](http://www.ipart.nsw.gov.au/Home/Industries/Electricity/Reviews_All/Retail_Pricing/Changes_in_regulated_electricity_retail_prices_from_1_July_2011/02_May_2011_-_Public_Hearing_Presentation_on_Draft_Report/Presentation_-_Electricity_Public_Hearing_Draft_Report_-_2_May_2011) page 10



## The Economic Impact of Wind Energy Generation

While wind turbines are relatively expensive to build, they are amongst the cheapest electricity generating technologies to operate as their fuel, the wind, is free and does not incur any resource extraction or transportation expense. This is important as electricity generators tend to bid into the wholesale market at prices near their marginal, or incremental, costs of generation. Therefore, wind farms almost always underbid coal and gas fired generators. This increase in low cost generation entering the National Electricity Market results in downward pressure on wholesale electricity prices. This “merit order effect” is seen today in SA where the average wholesale price of electricity (including wind farms) is at least \$5.00/MW-hr less than the wholesale price of electricity received by coal and gas fired generators (i.e. not including wind farms)<sup>5</sup>.

A recent report by the Australian Energy Market Commission (AEMC)<sup>6</sup> has forecast that the **reduction** in wholesale electricity prices caused by the LRET scheme will be \$10-\$15/MW-hr across the National Electricity Market in 2020. Therefore, the market benefit of wind energy reducing wholesale electricity prices in SA today is forecast to continue, and expand, to 2020.

Therefore, arguments that wind energy is “too expensive” are simplistic and misleading. First, the current cost to electricity customers, via the LRET scheme, is quite minimal at only 37 cents/week. Second, wind energy is applying downward pressure to wholesale electricity prices in SA today, and is forecast to do so in NSW and the rest of the NEM later in this decade, which will at least partially offset the cost of the LRET scheme to consumers.

## ISSUES RELATING TO LONG TERM ENERGY SECURITY IN NEW SOUTH WALES

The electricity needs of NSW customers are primarily met by electricity generating plants in NSW. However, as part of the National Electricity Market, NSW can also import (or export) electricity from Queensland and/or Victoria using existing transmission interconnectors. However, these interconnectors do not have unlimited capacity, so it is important for NSW to be close to self sufficient with regards to electricity generation.

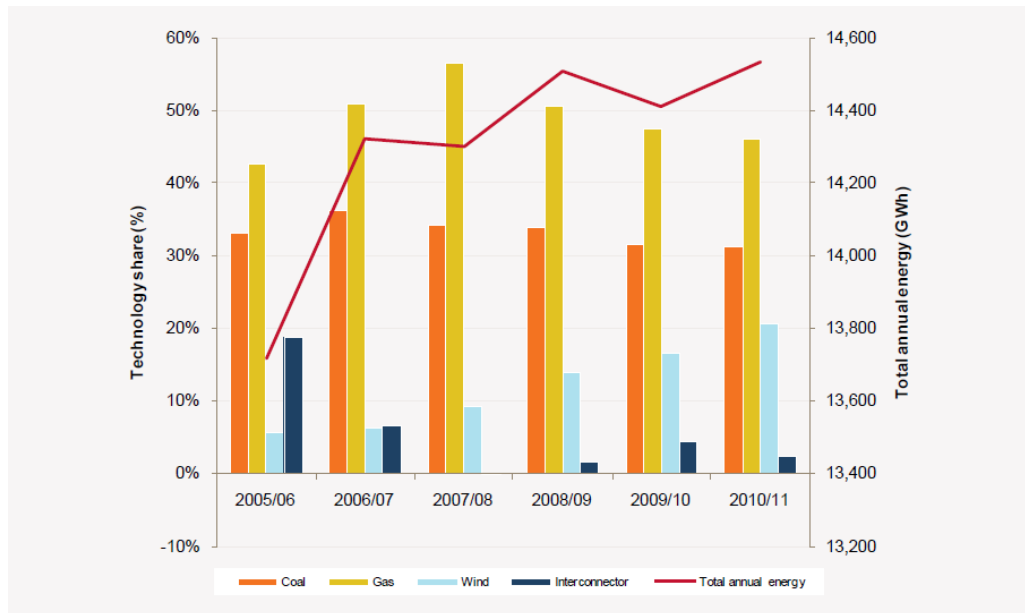
Construction of new renewable energy plants in NSW will significantly assist in meeting increases in electricity demand. This has been seen in South Australia where the increase in wind generation has reduced the need for coal and gas fired generation---as well as the importing of electricity from Victoria. The graph below, from the Australian Energy Market Operator (AEMO), demonstrates this clearly<sup>7</sup>.

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<sup>5</sup> See Table 2 in the *South Australian Demand and Supply Outlook 2011*, AEMO

<sup>6</sup> *Impact of the enhanced Renewable Energy Target on energy markets, Interim Report* (p. 27), AEMC November, 2011

<sup>7</sup> *South Australian Demand and Supply Outlook 2011*, AEMO



The graph shows that as wind energy’s market penetration (light blue bar) rose from about 5% in FY06 to over 20% in FY11, the generation by coal (orange bar) and particularly gas (yellow bar) declined significantly. The import of electricity from Victoria (dark blue bar) also declined to much lower levels. Besides significantly reducing the pollution from electricity generation, the increase in renewable energy generation in SA has led to a reduction in the need for coal and gas fired generation of electricity.

It is also worth noting that renewable electricity generation plants, such as those powered by solar and wind, do not have any fuel price risk. The same cannot be said for gas and coal fired generators. Gas prices, in particular, are widely forecast to double later this decade once LNG export facilities cause the gas market to be exposed to export parity pricing. Likewise, as current low cost coal contracts expire, coal prices for coal fired generators are also likely to rise towards export price levels. Therefore, renewable electricity plants provide security against potentially volatile fuel prices and corresponding increases in future electricity prices.

**THE POTENTIAL FOR NSW SOURCING ENERGY INTERSTATE**

As discussed previously, the existing electricity interconnectors do enable electricity to be imported into NSW. However, if NSW follows through with its Renewable Energy Action plan of having 20% of its electricity generated by renewable sources, including Snowy Hydro, then there should be little need to import additional electricity from interstate in the short to medium term.





## **THE POTENTIAL FOR, AND BARRIERS TO, DEVELOPMENT OF ALTERNATIVE FORMS OF ENERGY GENERATION (E.G. TIDAL, GEOTHERMAL) IN NEW SOUTH WALES**

Emerging renewable or “alternative” forms of energy have many of the same barriers as other new technologies in other market segments. These include proving the technology works---both as a prototype and in the longer term. Once the technology is proven, the capital and ongoing costs need to be established with a high degree of confidence. Last, the technology needs to be cost competitive or be successful in obtaining government grants to bridge the cost gap.

The Commonwealth’s new Australian Renewable Energy Agency (ARENA) has been set up to provide Research and Development support for these emerging renewable energy technologies. The New South Wales Government could also provide further R&D funding, or other programs, to advance some of these emerging technologies in NSW if they were so inclined. While such an investment could be worthwhile in the longer term, it should be recognised that these emerging technologies are unlikely to be deployed at scale in the next 3-5 years.

## **BEST PRACTICE TO ALTERNATIVE ENERGY GENERATION IN OTHER JURISDICTIONS**

### Solar PV

Infigen Energy considers that the NSW Government has an appropriate planning process with regards to larger scale solar generation facilities.

However, solar PV is currently not cost competitive with wind energy, and therefore it is not economically viable to build and operate a solar PV plant relying on the LRET scheme (and a carbon price of \$23/tonne). Therefore, specific grants are required in order to build larger scale Solar PV plants such as the Commonwealth’s Solar Flagships program. Additional funding from State Governments can improve the economic viability of solar PV projects even further. As has been reported in the media, both the Victorian and NSW Governments provided additional financial support for Solar Flagships PV project proposals in their States during the original Solar Flagships tendering process last year. Infigen Energy considers that the NSW State Government should continue this support to enable NSW to obtain its fair share of regional investment in solar PV facilities.

### Wind Energy

Infigen Energy notes that the NSW Government has recently released its draft wind farm guidelines for public comment. Therefore, we consider that the current consultation process for the wind farm guidelines is the most appropriate forum for specific comments in this regard.



That being said, Infigen would like to make the general observation that wind energy facilities should be treated the same as other large infrastructure or energy projects. Every form of electricity generation has some amenity impact on the surrounding community---wind energy is no exception. Therefore, the planning process and guidelines for wind farms should be very similar to other electricity generation facilities. The additional planning requirements should be limited to unique amenity impacts of the particular technology. For example, shadow flicker is a unique amenity impact of wind turbines, and guidelines in this regard are reasonable (and have been incorporated into the Draft NSW Wind Farm Guidelines).

However, if the acoustic and visual amenity impact of a wind farm is seen to require a special “gateway process” if wind turbines are proposed within two kilometres of neighbouring residences, then one is inclined to ask what is the equivalent gateway process and buffer distance for a coal fired generator? The air pollution from coal burning plants disperses over a wide area and should require a gateway process for all neighbours within 10 or 20 kilometres if a similar framework were utilised as proposed in the draft wind farm guidelines. Coal Seam Gas (CSG) projects have the potential to pollute underground water supplies. As underground aquifers can extend for hundreds of kilometres, the radius for a CSG gateway should be quite extensive.

The NSW Department of Health has recently made it clear<sup>8</sup> that they find “studies” claiming to show wind turbines make people sick to be “not scientifically valid”, “the lowest category of scientific evidence, and “not of sufficient scientific rigour”. In contrast, there is no doubt that coal fired generators generate air pollution that has serious negative health impacts. As just one example, the Australian Academy of Technological Sciences and Engineering (ATSE) estimated “the total health damage cost...of coal fired power station emissions is about \$13/MW-hr, equivalent to an aggregated national health burden of around **\$A2.6 Billion per annum.**”<sup>9</sup>

Infigen considers that proposing an onerous gateway process for a clean energy source with no potential for air or water pollution, while ignoring any sort of buffer zone or “gateways” for electricity plants with health costs running into the billions of dollars is not best practice. Electricity generation plants should not have extraordinary planning rules and requirements applied to them just because they are powered by the wind---unless the same requirements are applied to competing electricity generation technologies.

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<sup>8</sup> As reported in the Sydney Morning Herald January 24, 2012

<sup>9</sup> *The Hidden Costs of Electricity: Externalities of Power Generation in Australia*, ATSE March 2009



Wind and Large scale solar generated electricity are proven technologies experiencing tremendous growth worldwide. Infigen Energy looks forward to New South Wales increasing its utilisation of wind and solar power and achieving its target having 20% of its electricity generated by renewable sources by 2020.

If you have any questions with regards to this submission, please feel free to contact myself using the details below.

Yours sincerely,



Jonathan Upton  
Senior Development & Government Affairs Manager

