

Yes, Australia is Highly Motivated to Focus on Domestic Renewable Micro Electricity Generation for Domestic Buildings – Economy Wise

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ABSTRACT: In this study, an overview of energy, how Australia is producing electricity, highlighting currently used fossil fuel generation technique's major share compared with starting renewable energy technique's minor share of total electricity generated. How electricity transmission is done, wholesale and retail electricity pricing method and such prices movement history are presented. A focus on economic aspects presenting residential electricity sector prices and Australian households' income and how it is affected by electricity consumption bill supplied by the traditional technique of electricity generation via coal burning widely utilized in Australia. Statistical economic indices data are presented such as consumer price index and wage price index are shown, graphed, discussed and analysed. This study concluded, it is a strong yes that Australia is highly motivated to focus on domestic renewable micro electricity generation for domestic buildings considering the historical and current ongoing economic aspects relevant to Australian households. Today it is a highly motivated and stimulated option; however, tomorrow it is an obligation.

Keywords: Australian households' income; domestic electricity consumption; electricity generation and transmission; grid connection; feed-in tariffs; renewable energy; micro electricity generation.

JEL Classifications: B3; D1; D8

1. Introduction

The aim of this study is to answer a question whether Australia has a strong motivation to focus on the utilisation and application of domestic renewable energy micro generation technologies for electricity generation to energise domestic buildings or not.

Apparently energy is directly related to natural resources. Energy is the keystone of nature and society. All life on earth is made possible by incident solar energy captured and stored by plants and passed through ecosystems. Human civilization was spawned by innovation in acquiring and using diverse sources of energy, first by cultivating plants and domesticating animals and eventually by building machines that could use energy stored in fossil fuels. In fact, each phase of development of civilization was triggered by changes in energy use that provided opportunities for growth of human populations and economic systems (Randolph and Masters, 2008). Today society is in unprecedented growth period. Since 1850 and the dawn of Industrial Revolution, the population, the economy, and energy use have surged, fuelled by oil, natural gas, and coal. This growth will be limited by diminishing availability of oil and gas and environmental constraints of fossil fuel use, probably sooner than most realize.

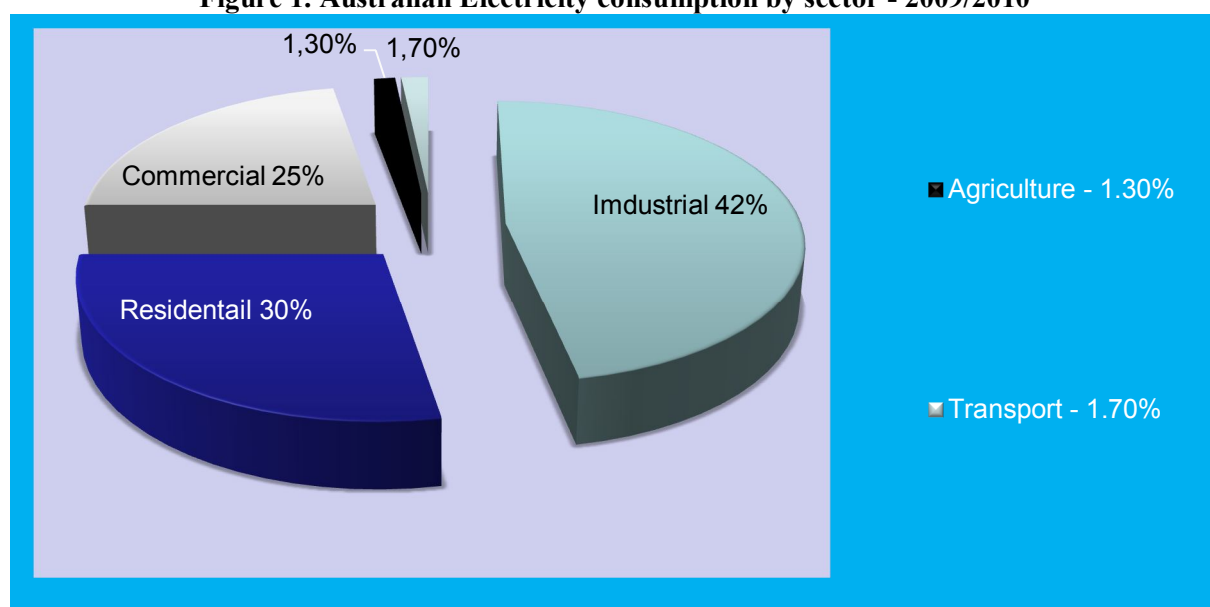
No doubt that energy is the major factor influencing almost every industry on earth. The building (construction) industry is one of the most vital, huge and active industries in the world. Such an industry has many interconnecting aspects that affect the environment in general and the availability of natural resources associated with the sustainability.

Needless to mention that energy sources and energy efficiency are vital elements, which represent the factor that is most governing the building industry in general and specially in the sustainable (green) buildings. Basically, energy is the electricity, gas, oil or other fuels used in buildings for heating, cooling or ventilation, for lighting or hot water supply or to operate other engineering services. It refers to operational energy and does not consider the energy embodied in

building materials or invested in the construction and recycling of buildings (Building Code Australia Board – BCA 2009).

Electricity consumption of the produced overall electricity varies in Australia by sector. As Australia is one of the developed countries, it can be easily derived that the industrial sector has the largest share of consumption followed by the commercial sector. Figure (1) shows that industrial sector the largest share, followed by residential sector and commercial sector, ending with a minor shares for transport and agriculture (Australian Energy News, 2010). The real important observation that the residential sector has such a large share of electricity consumption.

Figure 1. Australian Electricity consumption by sector - 2009/2010

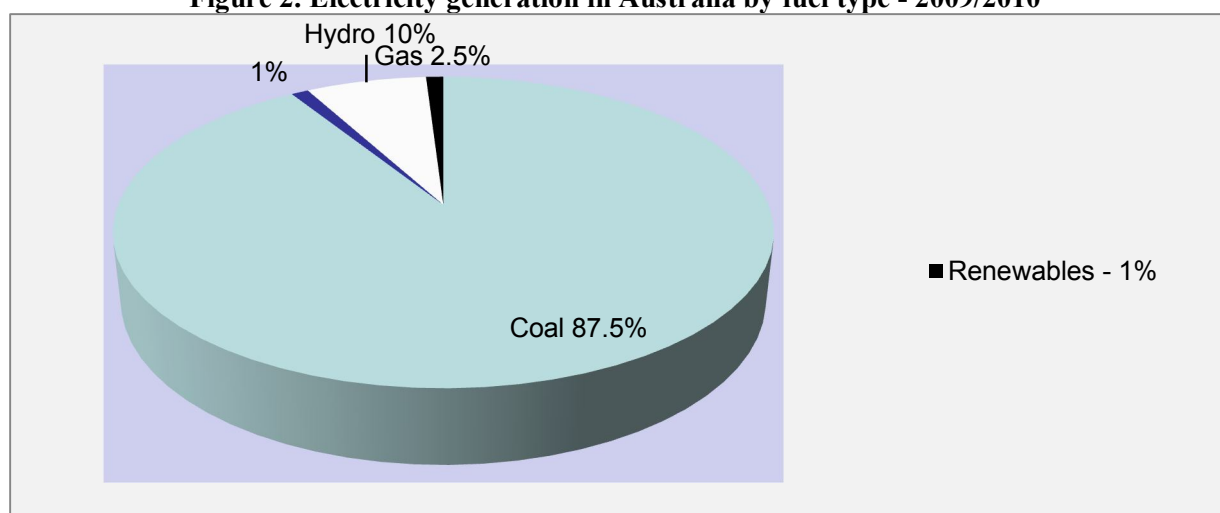


Source: (Australian Energy News, 2011)

Electricity is generated in Australia mostly based on burning fossil fuel. Figure (2) clearly shows that more than almost 85% of the electricity is generated by burning coal either black or brown followed by very minor share of gas and hydro (Australian Energy News, 2010).

This implies that the utilisation of renewable energy sources to generate electricity is almost null Australia wide.

Figure 2. Electricity generation in Australia by fuel type - 2009/2010



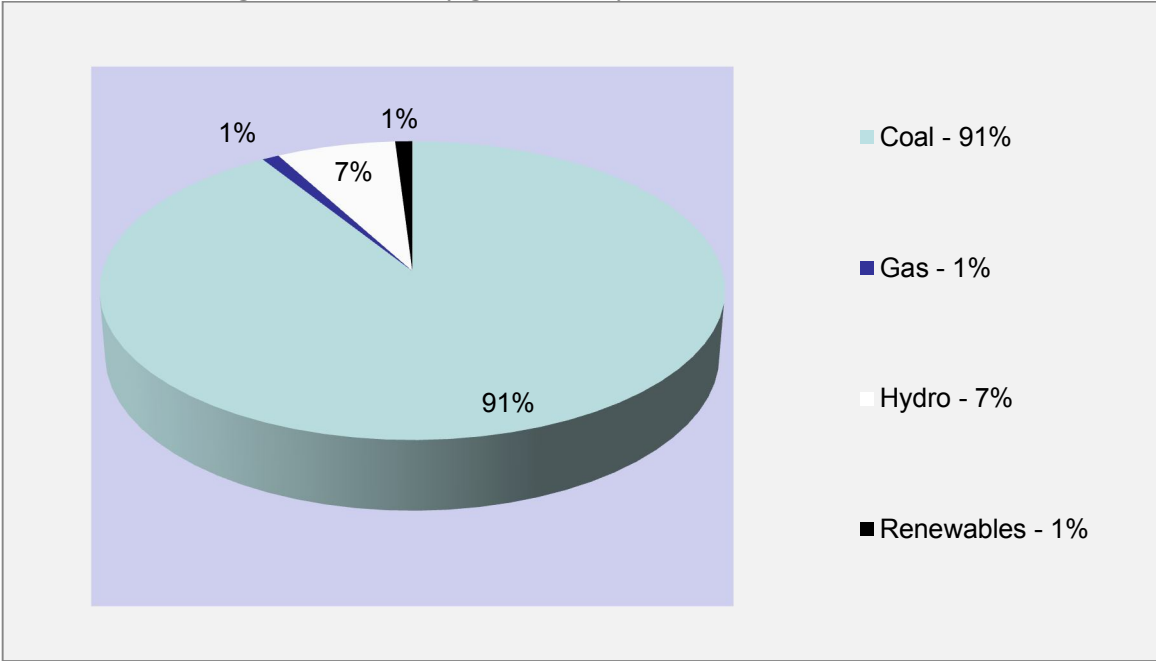
Source: (Environment and Energy NSW, 2011)

While considering New South Wales (NSW) which is the oldest Australian state and the

Yes, Australia is Highly Motivated to Focus on Domestic Renewable Micro Electricity Generation for Domestic Buildings – Economy Wise

largest population and cities, as shown in Figure (3) again coal burning has the largest share of electricity generation, followed by a minor share of Hydro. Other renewable energy sources such as wind, photovoltaic, biomass and geothermal, are almost negligible in NSW.

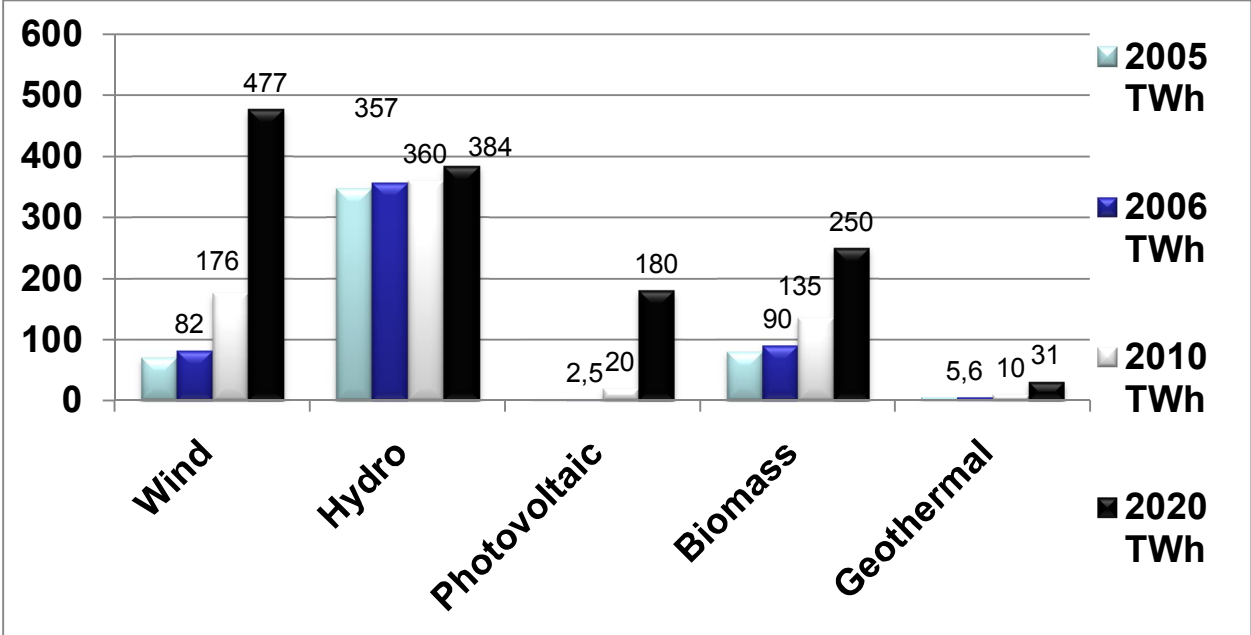
Figure 3. Electricity generated by fuel source in NSW, 2011



Source: (Environment and Energy NSW, 2011)

Comparing the share of renewable energy sources between Europe, the oldest consentient, with Australia the newest one and the sixth largest country area wise worldwide, Figure (4) shows that Europe started electricity generation and has ambitious future plans to produce hundreds terawatts.

Figure 4. The contribution of renewable energies to electricity consumption in Europe



Source: (Randolph & Masters 2008)

2. Electricity Prices in Australia

Historically, Australia has had stable and competitive electricity prices by developed world standards (Bureau of Resources and Energy Economics, 2013b). Average wholesale electricity prices increased in 2007, largely as a result of record average demand over the year combined with a tight supply situation caused by drought conditions. However, wholesale electricity prices have generally moderated since then. In 2011–12, wholesale electricity prices averaged around 8% lower than in 2010–11 (Bureau of Resources and Energy Economics, 2013a). In contrast to wholesale prices, retail electricity prices have been steadily increasing in recent years. Since about 2007 until to date, both household and business prices have risen sharply, especially for households (Bureau of Resources and Energy Economics, 2013a). More specifically, over the past four years the cost of electricity for households has risen on average by around 70 per cent nationally according to the consumer price index (Australian Bureau of Statistics (ABS), 2013a), (cited in (Bureau of Resources and Energy Economics, 2013a)). Some states have experienced major price rises during this period. For Example, residential electricity prices have risen 84 per cent in Melbourne and 79 per cent in Sydney over the last four years, while, Darwin and Canberra had the smallest increases in retail electricity prices, with 42 per cent and 45 per cent respectively (Clean Energy Council, 2012).

In Australia, the price of electricity is determined by a number of factors such as transmission and distribution network costs, the wholesale electricity price faced by retailers, and government policies. Recently, a major driver of rising retail electricity prices has been the significant investment in new, and upgrade of existing, transmission and distribution infrastructure required to support increasing (peak rather than overall) demand for electricity (Bureau of Resources and Energy Economics, 2013a). Rising network charges associated with transmission and distribution continue to be the largest contributor to price rises (Bureau of Resources and Energy Economics, 2013a). The major reason for the recent increases in power prices is the rising cost of replacing the ageing poles and wires of Australia's electricity network which were built 40-50 years ago ((Clean Energy Council, 2012) & (Bureau of Resources and Energy Economics, 2013a)).

Moreover, the wage price index in Australia for private and public sectors is consistently decreasing starting from June 2013 till date and the more drastic that it is tending down (Australian Bureau of Statistics (ABS), 2013b).

Although, the Australian electricity transmission and distribution providers endeavour to apply the state of art technologies to minimize the transmission and distribution, the value for Electric power transmission and distribution losses was 14.628 tWh in 2010. Over the past period (1960-2010), such losses reached a maximum value of (18.151 tWh) in 2001 compared with a minimum value of 2.646 tWh in 1961 (International Energy Agency, 2013). In Australia, during 2006, 2007, 2008, 2009 and 2010, the total electricity generation for public consumption was 227, 228, 230, 229 and 228 tWh respectively, while, the distribution losses were 6%, 5%, 6%, 5% and 5% respectively of the total generated electricity (Bureau of Resources and Energy Economics, 2013a).

3. Australian Households' Awareness of Green Power

Australian households have an initial awareness of green power options. In 1999 only 19% of households were aware of green power option. By 2008, the ratio had risen to 52%, including 5% who reported that they were already paying for green power (ABS, 2009). Not all households who were aware of green power were willing to pay extra for electricity generated from renewable energy in 2008 (ABS, 2009). Only around one-third (32%) of households were prepared to pay more for electricity generated from renewable sources (ABS, 2009). However, the willingness to pay extra did not necessarily translate into action.

Furthermore, a number of significant barriers still face the utilisation of Australia's renewable energy resources. For example, frequent changes in regulation and approval processes are affecting well-established technologies like wind farms in some locations, lack of regulations are affecting proved technologies overseas such as micro-scale wind turbines for domestic application of electricity generation, in addition to the relatively high upfront capital costs and lack of familiarity with renewable energy technologies (Bureau of Resources and Energy Economics, 2013a). For instance in a study conducted in Western Australia, the capital cost, at the study time 1991, of renewable energy equipment (wind or solar) was the dominant reason for not using it in electricity generation besides other important reasons such as a lack of confidence in the performance of renewable energy

components, a perception that there would be inadequate maintenance and service facilities and a lack of familiarity with the equipment (Harman, 1991).

4. Australia's Policy of Domestic Renewable Energy.

Currently the Australian government has an announced Renewable Energy Target (RET) which splits into two parts: The Large-scale Renewable Energy Target (LRET) and the Small-scale Renewable Energy Scheme (SRES) (Clean Energy Regulator, 2014).

The LRET creates a financial incentive for the establishment and growth of renewable energy power stations, such as wind and solar farms, or hydro-electric power stations. It does this by legislating demand for Large-scale Generation Certificates (LGCs). These LGCs are created based on the amount of eligible renewable electricity produced by the power stations. LGCs can be sold or traded to liable entities, in addition to the power station's sale of electricity to the grid. RET Liable entities have a legal obligation to buy LGCs and surrender them to the Clean Energy Regulator on an annual basis (Clean Energy Regulator, 2014).

The Small-scale Renewable Energy Scheme creates a financial incentive for owners to install eligible small-scale installations such as solar water heaters, heat pumps, solar panel systems, small-scale wind systems, or small-scale hydro systems. It does this by legislating demand for Small-scale Technology Certificates (STCs). STCs are created for these installations according to the amount of electricity they produce or displace. RET liable entities have a legal requirement to buy STCs and surrender them on a quarterly basis. (Clean Energy Regulator, 2014).

Having stated that for STCs, it is vastly important to emphasize strongly that for solar panels, all installations from 1 July 2013 are not eligible for solar credits. For hot water system and/or heat pump, installer will not qualify for any Government-based financial recompense at the completion of any process relating to STCs. Additionally, originally there were no credits and/or rebates for any STCs small-scale wind system or small-scale hydro systems and definitely none for biomass small systems as they are not considered in the STCs at all.

Considering, the feed-in tariffs into grid into Australia for residential applications. Australia currently has no nationalised program, only state run schemes. Here's an at-a-glance look at state arrangements. The most recent feed-in tariffs in Victoria is 8c/kWh, South Australia 16c/kWh, ACT 7.5c/kWh, Tasmania 8.228c/kWh, Northern Territory 19.23c/kWh, Western Australia 8c/kWh, New South Wales 5.3c/kWh. On the other hand, the municipality electricity supply price is around 35c/kWh (Energy Matters, 2014).

5. Discussion

Considering, the soaring prices of supplying domestic municipality electricity prices. Apparently, households are facing substantial known increases in electricity prices over the next few years as the size of electricity bills is increasing much faster than average wages and paying these bills is taking up an increasing proportion of average household income. By all means, the impact on low income households, pensioners and beneficiaries of welfare payments will be much greater; it is worth stating that according to the financial stress indicators there are currently approximately 25% of Australian people who receive social security pensions and allowances could not pay electricity, gas or telephone bills on time (Australian Bureau of Statistics (ABS), 2011), knowing that there approximately five million direct beneficiaries of income support payments in 2010 (Australian Bureau of Statistics (ABS), 2012), not including low income households, this is only showing one affected Segment of the Australian population of the continual increase of electricity bill rates.

The electric power transmission and distribution losses include losses in transmission between sources of supply and points of distribution. As most electricity consumers, in Australia, are located a long distance from electricity generators and since the electricity supply chain requires networks to transport power from generators to customers, thus, those networks extends from hundred to thousand kilometres. Consequently, the longer distribution distances, the higher electricity losses in the way from generators to consumers, the huge money losses which are to be sustained by the consumer and added to his electricity consumption bill. Therefore, electric power transmission and distribution losses are considerable; unavoidable and substantial economic burden nationally and individually.

Due to the relatively sophisticated nature of renewable energy technologies, the lack of familiarity of such technologies and the lack of the government and media support to explain the pros and cons of several renewable options in the Australian market are the main drivers/reasons behind the refraining of households from considering renewable energy as probable feasible alternative source of energy.

Considering the Australian government policy for STCs, it is apparent that such policy is neither supporting nor encouraging the promotion of any STCs as there are almost no rebates and/or incentives for households to invest in domestic renewable electricity generation system. The more crucial that there is a big gap between the feed-in tariffs into grid and the traditional electricity price rate per kWh which strongly alienate the households to consider the domestic renewable electricity generation as an option to invest in once they realise the economic information involved which is totally against the renewable option.

6. Conclusion

This paper provided information about electricity generation in Australia, considered residential sector electricity, Australian Households income and their electricity consumption expenses, Australian government policy towards STCs, feed-in tariffs into grid. Since Australia has a massive storage of coal which is currently the major source of electricity generation, there is a valid question which is “*Does Australia needs to swap or partially shift to renewable energy? Knowing that it has enough coal storage for coming generation*”. This paper considered the economic aspects of households and answered a strong “Yes” from this point of view.

There are two economic motivating reasons for this research, (i) The continual increase of the households’ electricity bill, (ii) The massive electric power losses in transmission and distribution in the current Australian national electricity network associated with massive money losses.

There are great obstacles of promoting domestic renewable energy production technologies is the households’ lack of knowledge related to the renewable energy field, the economics of this option is mysterious and once households realise that there are no STCs rebates or incentives and the dramatically cheap feed-in tariffs into grid compared with what they are charged for traditional electricity generated from of fossil fuel, automatically they would alienate from the domestic renewable energy production at all.

It is really encouraged that the Australian current government needs to have thorough revision technical wise, away from politics, of policies related to renewable energy in general and to small/micro scale energy generation systems for residential buildings As the time runs without taking serious actions towards supporting micro electricity generation via available renewable energy sources, the worse impact on low income households, pensioners and beneficiaries of welfare payments. It is a role has to be played by Australian political governments to support and promote micro electricity generation at the very near future.

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Yes, Australia is Highly Motivated to Focus on Domestic Renewable Micro Electricity Generation for Domestic Buildings – Economy Wise

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