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**THE ROLE OF RENEWABLE ENERGY TARGET
IN ACHIEVING LOW CARBON ECONOMY IN AUSTRALIA**

In the light of the dramatic events of the 21st century, the main theme of management has become a wide spread of radical changes and their impact on people's lives. Today, we can see these changes: globalization, rapid change in information technology, management during the economic crisis, outsourcing, e-business, knowledge management, global virtual teams and others. Though these changes people begin more frequently think about what will come in future. The great part of all using technologies has a negative impact on the environment but the economy around the world depends on them. People around the world become more serious about sustainability and, also, they concerned about future of humanity though many generations, respectively. Widely respected ecological economist Herman Daly (1996) claims that sustainability relates to sustainable development and identified it as development without growth beyond environmental limits. In fact, sustainability bases on three dimensions: social, environmental, and economic

(Beckerman & Wilfred 2001). All of three dimensions has a very strong connections and the most prioritize one is environmental. Obviously, environment gives a base for economy by means of natural resources, and creates a home for creatures and humans. Here appears a very sharp question why people use natural resources, while new technologies allow using alternative ones like renewable energy? Why people continue to use technologies that have a negative impact on environment and do not try to reduce emissions?

The essay is focused on analyzing the role of renewable energy target in achieving a low carbon economy in Australia. Firstly, the essay identifies the types of renewable energy sources in Australia and demonstrates them on the maps. Besides, this part discusses benefits of renewable energy and what profit it can bring Australian economy. The second point of the essay describes why it is difficult to switch to renewable sources completely. The next part of the essay analyses positives and needs in renewables and explains actions of Australian government to achieve low carbon economy. Additionally, the essay summarizes key points and makes some predictions for future.

Types of renewable energy in Australia and what profit it can bring to the economy.

There are number of technologies of clean energy that can be used in Australia. The first one is a wind turbine. It is the most cost-effective technology apart from hydro-electric generation [Adadevoh, 2012]. The power outputs scales approximately as the cube of wind speed, Australian wind farms are located along the windy southern littoral districts. Australian wind turbine market expected to provide the largest share of targeted 20 % renewable energy by 2020. Moreover, wind turbines are cheaper than any other renewable source and it can be recouped from 3 to 6 month (2012). The second one is solar thermal energy. This type of energy based on sunlight processing to electricity, in Australia sunlight falling in one day is equal to half the total annual energy that is necessary by the whole world [Brethower & Rummmler, 2011]. So, to power all energy requires 0,3 % of the land to devote it in Australia (2011). The core difficulty of implementation of solar energy is that places where it can be done is pretty far from the major population centers. The third alternative source of energy is solar photovoltaic. This technology effective in the daytime and less effective in the evening time, while it produces 15 % to 20 % of energy [Crocker & Tschirhart, 2012]. The main disadvantage is a payback period of investments between 4 and 10 years and 2 to 3 years to recoup the energy used in manufacture. Solar photovoltaic is partially implemented in Australia and tariffs vary from \$0,60 per kWh in the ACT, in contrast to \$0,20 per kWh in Tasmania [Mullins, 2012]. Besides, Western Australia has a great potential for solar energy, for example, Perth has 3150 hours of sunshine per year unlike Melbourne over 2000 hours of sunshine per year (2012). The next source of alternative is biomass energy.

Biomass energy includes a number of its types like gasification, pyrolysis, biomechanical, direct combustion, fermentation, and BIGCC (biomass integrated gasification combined cycle) [Loane, 2011]. Generally, the payback period of the biomass energy is 2 years and it can be used by domestic applications. Australia, in case of liquid fuels, has a fairly low target at the moment of 350 mega liters by 2012 (2011). The fifth is fuel cells that produce both electricity and heat. The net efficiency is greater than 80 % in domestic environment [Dorden, 2012]. So, fuel cells have high efficiency of conversion to electrical power. Low CO₂ emissions and reduce noise are another benefits of it. Significant savings in greenhouse gas emissions more than 50 % (2012). The sixth alternative is geothermal. In fact, the potential of geothermal energy in Australia is enormous. The majority of geothermal resources are a long distance from major population centers. Also, there are 32 companies in Australia that produce this type of energy. Australian Government supports the development of geothermal energy and invests \$500 million in Renewable Energy Fond. The final ones are wave and tidal energy. Australia is well placed for utilization of wave energy. Usually, wave potential measured in kWh per meter of wave front, so in a good weather it reaches 20 to 40 kWh for every meter of wave front and over 1000 kWh per meter in major storms [Soldy& McDaniel, 2011]. In case of tidal energy, In Australia there are only few areas provide suitable conditions. Therefore, it can be useful in niche locations like supplying energy needs of some remote settlements.

Basing on Australian Bureau of Statistics there are currently 8 million householders in Australia and about 40 % of Australian homes have no ceiling insulation. So, average consumption of energy equivalent to 16 000 kWh per household per year. If Australian householders start to use alternative energy what benefits will they receive? Firstly, they will save \$89 to \$336 per year that is for the economy \$2,9 billion on household energy bills over the period 2012–2020. Secondly, decrease of 2,4 million tons of greenhouse gases per annum [Havtence, 2011]. Thirdly, Australian economy will save \$250 million on new energy infrastructure and reduction in electricity prices. Finally, GDP will increase in \$894 million over the period 2012–2030 (2011). That is why the profit by using alternatives is tangible.

Difficulties with implementation renewable energy sources

Usually, the development of renewable energy requires a great deal of new research and development effort. Besides, today people have a number of tried and tested technologies that can be deployed now, however, many of them appear to be uneconomic on the contrary to coal generated electricity, unless coal is fully contains CO₂ emissions, and, unfortunately, advantages of investments in coal-based infrastructure are obvious [Volonce et al., 2011]. Consequently, the first difficulty is a lack of investments. In Australia there are significant industry players like Origin Energy, Energy Australia and the Business Council of Australia, according to Australian government insistency

that 20 % of ‘electricity generation should come from renewable energy sources’ [Bartom& Graflied, 2012], resulting in higher industry costs than necessary. So, the second reason is high industry costs. Furthermore, there are a lot of changes and corrections in renewable energy target because it will have a negative impact on coal and gas generators and electricity network in whole. It is also should be price regulations, respectively [Tomson, 2012]. That is why the next one is uncertainty in regulations. Renewable energy target, as it was mentioned, requires very huge investments and the average payback period of renewables is 3 to 6 years, so in any case it would have a minimum effect on household prices over the long term (2012). The fourth difficulty is long payback period and not immediate interest for householders and investors. Australian Climate Change Authority claimed that the rooftop solar energy would be one of the main sources that will be developed and implemented [Macleod et al., 2011]. Besides, there will be a limited number of companies who will have certificates that allow installation and service of rooftop solar energy sources. The fifth problem is lobbying the main industry and the appearance of new monopoly; also, service costs of the rooftop solar batteries could be pretty high (2011). Another difficulty contains in a low replacement rates that are 1,9 % per year, so it will take nearly 50 years before renewables will completely implemented with high standards (2011). Finally, the installation of any type of renewable energy is very expensive for householders.

Bottom line: the current climate of investment in Australia is not favorable to renewables. Australian government should eliminate any uncertainties in regulations; otherwise, Australia will lose her competitive edge in developing renewable energy technologies and will become passive importer of technologies developed overseas, instead of an innovator and major exporter in her own right.

Making decision: renewables or no?

Though all listed difficulties and problems with implementation renewable energy sources positive sights of it are outweighed. Firstly, the utilization of renewables is the first step to sustainability because it will regulate emissions in the atmosphere and reduce negative impact on the environment (Volonce et al. 2012). Basing on Australian Bureau of Statistics average electricity consumption per household is about 15 kWh per day, so total emissions is over 45 million tones of CO₂ per annum. That is why Australian government implemented a number of programs that provide community access to renewable energy; support for renewables assists industry development, and reduces the barriers to the national electricity market. All strategies play a strong role in reducing greenhouse gas in Australia and to be the leader in environmental sustainability. Another important goal is the development that will appear after implementation renewables, in the other words, people have to learn how to use new technologies and how they can be developed to

be much more effective. Also, the demand for new jobs will increase and new workplaces will be created that will decrease unemployment, respectively. Furthermore, it is not a secret that carbon tax is a hard pill to swallow for Australian householders; however, companies are overly attached to this regulatory factor. While the opposition leader Tony Abbott is forcing against the carbon tax, the prices for emissions are rising and cost of life is rising as well [Grattan, 2012]. For the last few years price for carbon tax has extremely risen, so companies like Origin Energy were seriously affected by this government policy in terms of its customers, who count each cent paid for electricity and are not ready to pay extra cash for government will [West, 2012]. Finally, implementation renewable sources of energy will lead to impressive reduction of carbon tax for companies and householders that is another benefit for all sides' prosperity. Here is another yes in favor of renewable energy sources it is customers' loyalty. Today people not only Australians, but also all around the world start to value ecological system and try to contribute the protection of the environment [Norton et al., 2012]. According to this statement householders will support renewables and use only these sources of energy.

Among all difficulties and all positives the benefits from using renewable sources are obvious. Utilization and the development of renewable energy sources is a huge step in achieving low carbon economy in Australia. Australian government has developed plan to achieve a clean future. Core element of this plan is carbon price that will cut pollution in the cheapest and effective way, also, Australian government makes investments in clean energy sources like wind, gas, and solar. Besides, Australian Renewable Energy Agency (ARENA) coordinates investments of \$ 3,2 billion to research and development, commercialization and demonstration of renewable energy technologies. Then Clean Energy Financial Corporation (CEFC) coordinates \$10 billion investment in energy efficiency and low pollution energy technologies (2012). An additional \$200 million the government invested over five years to support grants for business and innovations in development of low emission technologies and improvement of existing low carbon technologies (2012). So, putting together all actions that have already been taken and will be take Australian government does a lot to achieve low carbon economy in long-term perspective.

Conclusion

Today's economics is based on utilizing natural, non-renewable resources and great part of them has a negative impact on the environment such black, brown coal or oil. The essay identified types of renewable energy sources in Australia. Australia is rich country on renewable energy sources due to its geographical position that means possible utilization of wind energy, solar thermal, solar photovoltaic, biomass energy, fuel cells, geothermal energy, wave and tidal energy. The usage of listed sources can be profitable

for Australian economy in savings on household energy bills and, also, the increase in GDP. Besides, the essay discussed a number of difficulties with implementation renewable energy sources. In general, those difficulties relate to obvious benefits of investments in traditional energy sources, government policies uncertainty, and high cost for householders in service renewables. All of difficulties were explained in details above. The final part of the essay described why it is important to utilize renewable energy sources in achieving low carbon economy in Australia. Moreover, the essay identifies all positive sights and highlighted the importance of renewable energy sources for Australian economy. Australian government takes a lot of actions to achieve low carbon economy by the way of making huge investments in the development of low emission technologies. The essay main assumption is that Australian government politics will lead to sustainable economy and sustainable environment, by the way, these two dimensions of sustainability will be reached, social sustainability will be as following. So, Australia is quite close to sustainability and it also has a great potential to become economically strong world leader.

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