Seizing the Potential of Renewable Energy In Indonesia

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ABSTRACT

The high dependency on fossil fuels, such as oil and coal, in fulfilling Indonesia's energy consumption, has made Indonesia become a net oil importer country. Moreover, the recent global trend intends to lower the environmental impact due to carbon energy. In order to meet energy sustainability, these concerns have to be reduced through developing alternative sources of energy. Having renewable energy is currently considered as one strategy for Indonesia to meet its rapid economic growth. This paper endeavours to seek the possibility of the implementation of renewable energy in Indonesia. This article is going to argue that renewable energy could substitute the use of fossil fuels in two main ways, namely the economic factor and environmental issue. This essay will examine the reasonable concerns, which might encourage the utilization of renewable energy as well as its barriers. Eventually, the paper will propose policy recommendation regarding the establishment of green energy in Indonesia.

Key word : *renewable energy*

1. INTRODUCTION

The important role of energy has been realized extensively for a long time in achieving social, economic and environmental objectives to establish a sustainable development and to support national economic growth in Indonesia. Since the last two decades, Indonesia's economy has altered from a typically agricultural dominated economy to a more industrially led one (Resosudarmo & Kuncoro, 2006).

This rapid burgeoning industrial transformation requires abundant energy consumption, which is mainly from the combustion of fossil fuels. This increase is in line with the country's economic and population growth. Currently, Indonesia pretty much depends on fossil fuels for its energy sources and the non-fossil alternative renewable energy has not been utilized optimally. Data of fossil energy reserves from The Ministry of Energy and Mineral Resources (2005) as cited from Wirawan & Tambunan (2006) shows that the proven reserves of oil are about 9 billion barrels and with an average production rate of 500 million barrels per year, then the reserve will be exhausted in 18 years.

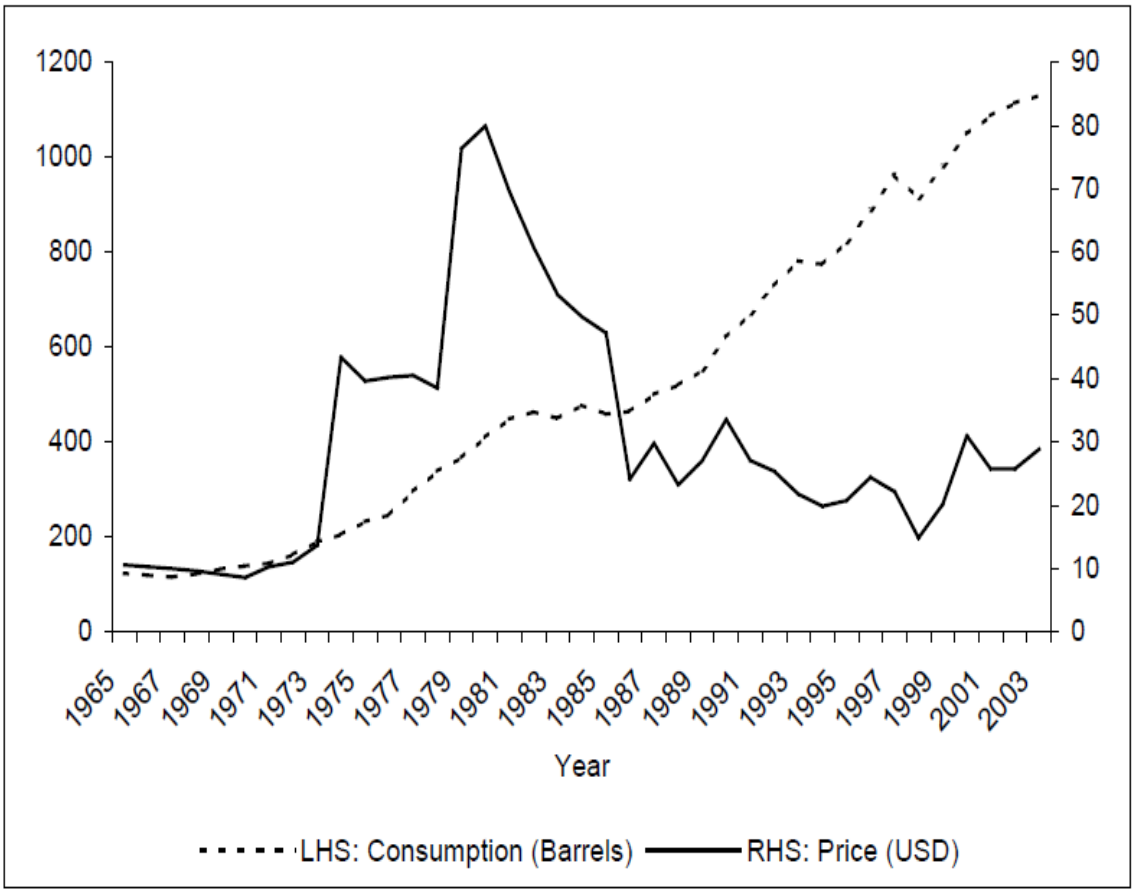
This paper is going to argue that developing a range of renewable energy sources is the correct choice for Indonesia to meet the energy consumption. In order to ensure energy security through reducing Indonesia's position as a net oil importer, the development of renewable energy is on demand, which will cut the dependency on fossil fuels. This study focuses on the prospect of enhancing renewable energy in Indonesia as well as the limitations of it.

2. THE RATIONALE FOR RENEWABLE ENERGY IN INDONESIA

To date, oil has played a vital role as the core energy source in Indonesia. For the last decade, as much as 65.5 percent of Indonesia's total energy consumption has been sourced from crude oil (Ministry of Energy and Mineral Resources, 2006 cited from Hartono & Resosudarmo, 2007). This is mainly due to the significant contribution of crude oil to government revenue. However, since 2000, Indonesia has shifted from a strong energy exporter to an importing nation that, for the first time, is concerned with rising production costs, energy subsidies, and climate change. This circumstance forced Indonesia to eventually remove itself from the Organization of the Petroleum Exporting Countries (OPEC) in 2009 (International Trade Administration, 2010).

On the one hand, domestic oil demand has risen dramatically for more than the last 10 years, on the other hand Indonesian oil production has not increased and no new significant oil reserve has been discovered as well as the national oil production facilities are limited and the capacity decreasing gradually (Wirawan & Tambunan, 2006). Figure 1 exhibits the growing trend of domestic demand for oil in spite of the increase in price over the last decade. That Indonesia depends too much on oil is one of the energy related concerns. Therefore, to satisfy domestic energy consumption, Indonesia has to import more crude oil and finished petroleum products, such as gasoline and diesel fuel. Indonesia becomes very dependent on overseas oil supply to fulfill the increasing demand. This situation may worsen the security of fuel supply.

Figure 1. Indonesian Crude Oil Consumption and International Crude Oil Price



Source: Center of Data and Information, Ministry of Energy and Mineral Resources (2005), cited from Hartono & Resosudarmo (2007)

Another concern is the negative impact on the environment. Indonesia's energy use from vehicles and industrial activities produces emissions, which cause generally human health problems. At the international level, the main concerns are global climate change and global warming due to human augmentation of the greenhouse gases (Lidula et al, 2007).

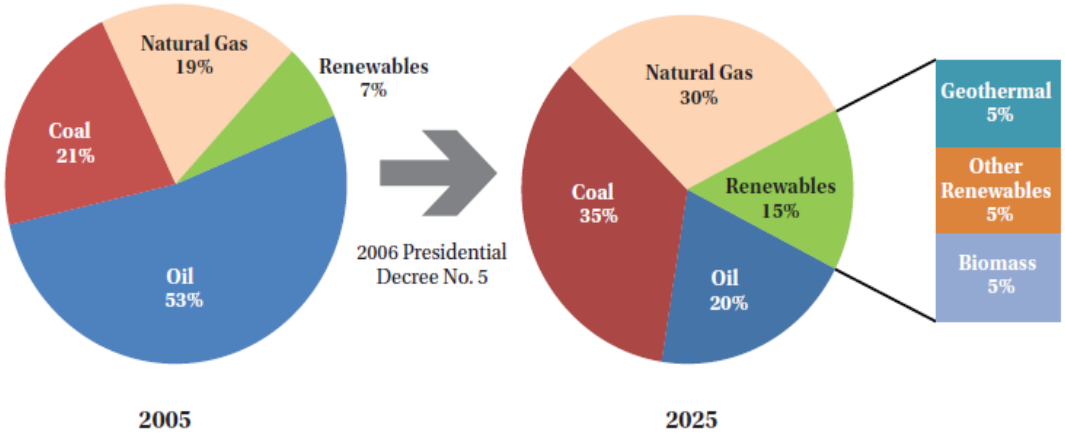
Having the above issues, there is a clearly growing concern about how energy needs are addressed on a sustainable basis. To reduce the high dependency on oil and to meet the global environment requirement, there is no choice that the maximum utilization of environmental friendly alternative fuels should be developed. The transition has driven a new commitment to renewable energy, domestic production, and environmental sustainability.

Considering also the ever increasing fossil fuel prices and the fact that Indonesia is richly endowed with renewable energy sources, renewable energy sources have become a more attractive option for sustaining national demand in Indonesia's energy sector. Despite a long-term effort in Indonesia, renewable energy sources and energy efficiency are not yet utilized to anywhere near their potential. With the Kyoto Protocol entering into force on 16 February 2005, Indonesia has advantages in terms of renewable energy and energy efficiency. However, as Lidula et al (2007) emphasize that building capacity is needed to adapt policies and regulations, synchronize policy instruments and attain local approaches to endorse these concepts. Developing renewable energy sources can improve energy security for the reason that renewable energy can partly or fully substitute fossil fuels. According to Sambodo (2008), a renewable energy source stands for an organic non-fossil fuel of biological origin, which involves biomass, biofuels, hydro, geothermal, solar, wind, ocean thermal, waves, and tidal. Observing the continuously soaring fuel price and increasingly diminishing Indonesia's oil reserves, the Indonesian government shows its seriousness in developing alternative renewable energy.

Various policies, which are supporting the development of this energy, have been made. Among them is Presidential Regulation No. 5/2006 regarding the National Energy Policy. Generally, the National Energy Policy is intended to secure national energy supply and to support the sustainable national development, and becomes the guidance of the national energy management in efforts for the fulfillment of national energy security (Wirawan & Tambunan, 2006). Additionally, Hermawan & Hadi (2006) point out that the central aspect of the national energy policy is about energy intensification and energy diversification as well as energy conservation.

Since the oil reserves are decreasing, Indonesia needs to diverse and balance the energy mix benefits with the clean energy. The use of renewable energy would eliminate the dependency on a single source of fossil fuels for the generation of electricity and meet Indonesia's growing energy demand. Therefore, the investment opportunity is present and stands to benefit from developing its abundant and indigenous renewable resources in order to provide for the country's domestic needs. Suryantoro et al (2005) argues that this clean energy of choice will obviously enable Indonesia to export its more alternative fuels for much-needed foreign currency.

Figure 2. Current and Future National Primary Energy Mix



Source: PLN Presentation to US Energy Association, cited from International Trade Association (2010)

Figure 2 demonstrates the targeted contribution of each energy type on 2025 (for comparison with the 2005 energy mix data) to secure the energy supply for domestic use. The current situation of energy supply in Indonesia still uses a small amount of renewable energy, which accounts for only 7% of total energy supply in 2005. Nevertheless the government, through the Presidential Decree No. 5 of 2006, has directed to boost the production of renewable energy in generating capacity to 15% in 2025. The future renewable energy comprises at least 5% of geothermal; biomass, and other new renewable energy (biofuels, hydro power, solar, and wind) with at least 5% respectively. New renewable energy power plant producing approximately 6.7 GW will be constructed for the upcoming 15 years to facilitate that target (International Trade Administration, 2010).

Moreover, Table 1 indicates the potential of renewable energy in Indonesia. Hermawan & Hadi (2006) identify that from as much as 217 geothermal prospects have been surveyed, 70 of them may provide energy of about 27 GW. So far, the installed geothermal plant merely generates just above 1 GW. Furthermore, the potential of hydropower is theoretically approximately 75 GW, however, the utilization of large-scale hydropower is 4.3 GW (just about 6% of the country's potential), while utilization of mini hydropower is roughly at 86 MW (out of 500 MW potentials).

Table 1. Renewable Energy Potential in Indonesia

Energy source	*Installed capacity*	*Resource potential*	*Undeveloped potential (%)*
Hydropower	4,264.0 MW	75,670 MW	94
Geothermal	1,052.0 MW	27,510 MW	96
Mini-hydropower	86.1 MW	500 MW	83
Biomass	445.0 MW	49,810 MW	99
Solar	12.1 MW	4.8 kWh/m²/day	—
Wind	1.1 MW	9,190 MW	99
Ocean	0.0 MW	35 MW	100

Source : PLN Presentation to US Energy Association, cited from International Trade Association (2010)

To encourage the development of renewable energy, the Government of Indonesia has set several programs. According to the Ministry of Energy and Mineral Resources (2009) report, the programs mostly include rural electrification and interconnected renewable power plants along with self-sufficient energy villages as well. Biofuels development can be a good example in the linking together of these programs. The local people are expected to plant palm oil, which then can be used to produce biofuels. It simultaneously improves the quality of life of the villagers and provides energy for electricity. In addition, developing biofuels cuts the greenhouse gas emissions, which support Indonesia's commitment to environmental sustainability.

3. THE CHALLENGES AHEAD

The advancement of renewable energy may face some obstacles. Painuly (2001) recognizes factors which should be taken into account, namely cost-effectiveness, technical barriers, and market barriers such as inconsistent pricing structures, institutional, political and regulatory barriers, and social and environmental barriers.

Even though Indonesia confronted the shortage of fossil fuels supplies, the government does not critically support renewable energy development which promotes energy security and reduces energy shock. According to Sambodo's (2008) research that the proportion of biomass to total energy consumption has a tendency to drop although the amount of biomass has tended to rise. It means that the government has set an ambiguous goal in the primary energy supply and has lacked strong policy incentives for enhancing the renewable energy

Furthermore, in spite of the substantial amount of Indonesia's renewable energy resources, the lack of financial incentives still has detained the commitment to improve renewable energy deployment. In fact, without financial back up and worsened by the heavy subsidies in fossil fuel consumption, it will hinder the expansion of clean energy infrastructure (International Trade Administration, 2010 ; Lidula et al, 2007). This will eventually deter the investment to different markets with more promising policy environment.

Last, the issue of the development of renewable energy, in particular biofuels, is that it brings about the conflicting aims between energy security and food security. Sambodo (2008) argues that biofuels increase the competitive use of palm oil, whether it is exploited for cooking oil or biofuels.

4. CONCLUSION

The renewable energy resource is expected to become a significant contributor to the country's energy and livelihood sector. Considering that the bulk of utilization of this particular energy source has been used adequately, much remains for development. In this respect, this article proposes the government to invite the private sector to actively participate in any renewable energy development activities in Indonesia.

The new Indonesia Energy Policy and other subsidiary regulations will give momentum to the opening of renewable energy projects that contribute to regional development, such as rural electrification and other direct encouragement of living in rural areas. This paper suggests a fruitful cooperation on technology transfer and information exchange on exploration, production and development of renewable energy

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