

ENVIRONMENTAL RELATED ENERGY RISKS

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Environmental Related Energy Risks: the case of Indonesia¹

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Abstract

Indonesia highly depends on fossil fuel for its energy. This creates problems of climate change and air pollution. In order to mitigate the environmental problems, the government and international organizations planned to implement several policies. The paper aims to explore business risks related to: the impacts of climate change and air pollution, the policies and the opportunities created from the problems and the policies.

Keywords: energy, business risk, climate change, air pollution.

The energy sector in Indonesia is largely constrained by uncertainties in various forms. We can group these risks into two categories: one, the risks associated with energy price volatility (i.e. energy market fluctuations) and two, risks that are related to the impact of energy use. The first type or risk is mainly formed by the interaction of energy supply and demand in the market, in which not only the demand side plays a major role (i.e. increasing energy demand as the result of economic growth), but the supply side as well (i.e. energy production and geopolitics of energy). In the second category, we deal more with the impacts caused by energy usage, environmental impacts ("externalities") in particular. Without neglecting the importance of market (or price) risks, the focus of this paper is the environmental risks of energy utilization.

Climate change and air pollution are externalities resulted from energy utilization. These externalities will reduce the welfare of the society, including those who do not receive any benefits from the energy products. The paper explores not only the risks related to climate change and air pollution, but the risks related to the policies to mitigate and to adapt the environmental problems as well, both at national and international levels. As the problems not only cause risks but also opportunities, the last part of the paper identifies business opportunities related to air pollution and climate change.

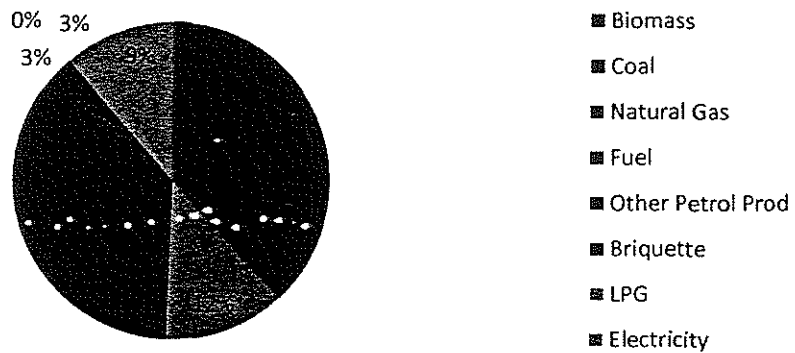
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Indonesia's energy consumption structure and business risks

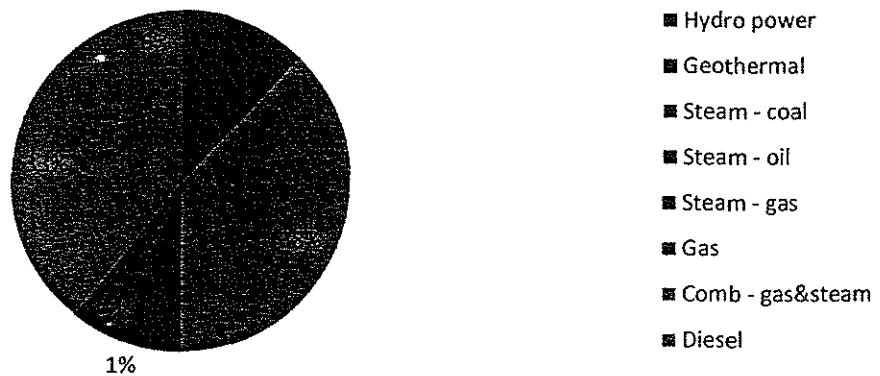
In 2009, Indonesia's energy consumptions are dominated by fossil fuel, in the forms of coal, natural gas, fuel and LPG (Figure 1) (Ministry of Energy and Mineral Resources, 2010). With about 81 percent of electricity generated from fossil fuel (see Figure 2), the contribution of this non-renewable energy resource is about 66 percent of total energy consumption in Indonesia.

Figure 1. Final Energy Consumption by Type (BoE)- year 2009



Source: Ministry of Energy and Mineral Resources (2010)

Figure 2. Power plant production (PLN) by energy type (GWh) - year 2009

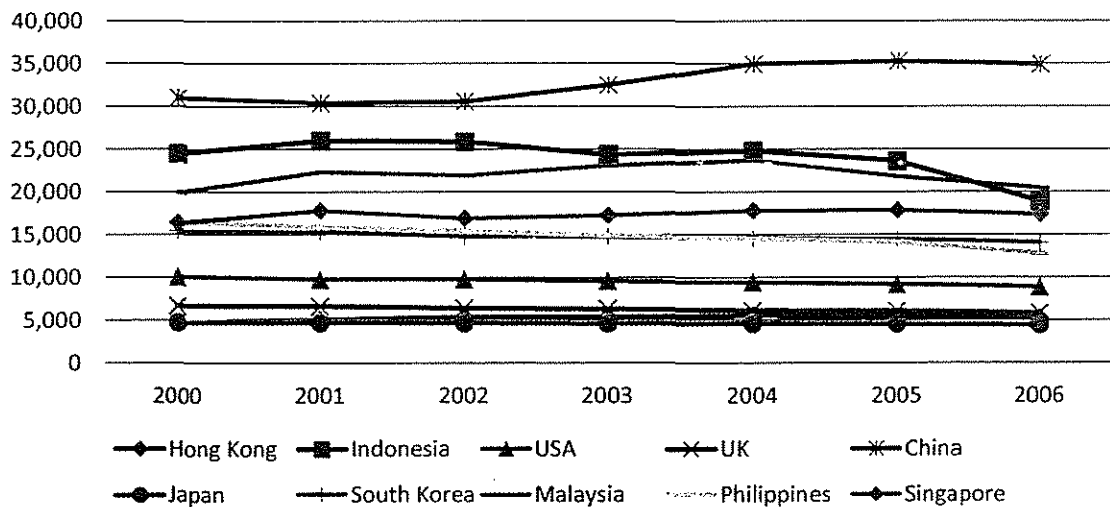


Source: Ministry of Energy and Mineral Resources (2010).

Indonesia's high dependency on fossil fuel, particularly oil, is due to the structure of the existing energy infrastructure and the lifestyle (Ministry of Energy and Mineral Resources, 2010). In transportation sector for example, most of the transportation modes are oil-based. Limited natural gas infrastructure to transport gas from production fields (mainly in Sumatra and Kalimantan), to the demand centers (mainly in Java) has also made the use of gas not yet to be optimum.

High dependency on fossil fuel for its energy is not the only characteristic of Indonesia's energy structure. Elasticity and intensity of energy³ in the country are among the highest, showing an in-efficiency in energy use. Data of the year 2006 from the Energy Information Administration (2008) shows that to produce 2,000 USD of GDP, Indonesia needs 18,915 British thermal unit (Btu) energy. Although the energy intensity in 2006 is better than that of 2000, Indonesia is less energy efficient than other countries such as: Japan, South Korea, the Philippines and Singapore (see Figure 3)

Figure 3. Energy Intensity for Selected Countries, 2000 - 2006
(Btu¹ per 2000 USD)



Source: Energy Information Administration (2008)

¹ Btu : British thermal unit

³ Energy elasticity measures the change in energy consumption due to economic growth; energy intensity measures the energy consumption per one dollar GDP. The higher the energy elasticity and the energy intensity show the less efficient in energy consumption.

The high domestic use of fossil fuel in Indonesia will have several impacts on business sector. The first business risks are associated with the environmental deterioration resulting from energy use. Fossil fuel burning generates not only energy products but also emissions. Among the emissions are green house gases (GHG) emissions⁴, the main source of climate change. Acid rain is another environmental problem from fossil fuel burning. Air pollutants such as sulfur dioxide and nitrogen oxide cause acid rain.

The second category of business risk is associated with policies regarding the environmental problems. Climate change and air pollution are externalities which will reduce the welfare of the society, including those who do not receive any benefits from the energy products; which will invite the government and global society responses through policies to mitigate and to adapt to the problems.

Business risks related to the impacts of climate change and air pollution

Climate change caused by Greenhouse Gases (GHGs) tends to increase the earth surface temperature. The impacts of this 'global warming' are: the melting of the ice-caps on the earth causing the rise of the sea level, and the increase of climate variability.

As an archipelago, Indonesia is vulnerable to the impacts of climate change. Rising of the sea level potentially make Indonesia's small islands to sink⁵. The economic sectors such as agriculture and fisheries are also very vulnerable to the extreme weather variability (Jones *et al.* 2007). Although, it does not mean that other sectors such as industry, trade, tourism and transportation are prevented from the impacts.

Extreme weather events result in uncertain water availability. There would be a time with plenty of water which not only provide sufficient irrigation for agriculture but also could destroy the crops. On the other hand, there would be a prolonged dry season resulting in water scarcity, which also potentially damage the plants.

Extreme weather variability instigates natural disasters such as flood and hurricane. Compared to developed countries, developing nations have limited infrastructures to adapt to the potential disasters (Stromberg 2007). As a consequence, the potential loss from the disasters (e.g. damaged buildings & other infrastructures, human casualties) will be more in developing countries than those in industrial nations. The lack of infrastructures would be a serious problem for business in almost all sectors.

⁴ GHG emissions are: water vapor, carbon dioxide, methane, ozone, nitrous oxide and chlorofluorocarbons.

⁵ In fact, there are several islands in Indonesia disappeared, whether it is due to climate change or not.

The second environmental problem regarding to the energy use is the acid rain. Living creatures needs water with certain acidity level. Higher acidity level in the water may damage crop and animal farming. Acid water is also corrosive and thus reduces the economic life of metal equipments. Installing additional instruments is needed to prevent loss caused by acid rain.

Table 1. Examples of Business Adaptation to Environmental Problems related to Energy Use

Environmental Problem	Problem, type of adaptation and related sector/s)
Climate Change: Prolonged dry season (water scarcity)	<ul style="list-style-type: none"> - No water for irrigation; adaptation: planting dry resistant paddy crop; sector: agriculture. - No water for power plant (reduce/uncertain electricity supply); adaptation: self-provided electricity power plant (employs <i>genset</i>); sectors: all economic sectors using electricity.
Climate Change: Heavy rainfall (flood)	<ul style="list-style-type: none"> - Flooding over the crops (harvest failed); type of adaptation: planting flood-resistant paddy crop; sector: agriculture - Flooding over the plants (building, machinery, etc.); adaptation: building wall to prevent water to come in or relocating the plants; sector: all sectors
Air pollution: Acid rain	<ul style="list-style-type: none"> - High acidity of rainfall (not suitable for some crops or animals) which increase the risk of harvest failure; adaptation: cover the fish pond with during rainy seasons; sector: fisheries.

Facing the environmental problems of climate change and acid rain, business sectors should implement adaptation actions in order to reduce the financial risks. Some of them have been implemented, ranging from putting ' a simple' plastic over the fish pond to planting water-resistant crops involving ' a high tech' research in agriculture (see Table 1). Adaptation to climate change and acid rain means higher production costs. Although, the costs must be relatively lower than the potential damage.

Business risks related to policies to mitigate climate change and air pollution

Environmental problems related to energy invite government intervention, both at the national and global levels. Kyoto Protocol is the international agreement representing the world's response toward climate change. Under the Protocol, developed countries including in the Annex 1 are legally binding to reduce their GHG emissions by 5% under their 1990 level by 2012.

Indonesia is not included in the Annex 1 of the Kyoto Protocol. However, the country is the third biggest GHG emitter (PEACE 2007) and, as mentioned above, is very susceptible to the impacts of climate change. For those reasons, Indonesia has committed to reduce its emissions by 26% by 2020 compared to the business as usual (Ministry of Finance 2009). Government policy is one of the external risks for business organizations (Chapman 2006).

The Indonesia's Ministry of Finance (MoF) plans to remove all subsidies for energy and furthermore to apply carbon tax. The MoF suggests to increase the tax by 10% per year by 2020 (MoF 2009). Indeed, these policies will increase the price of energy product generating from fossil fuel, and therefore put coal industry on a risky business.

The rise of the energy price will increase the efficiency of energy consumption. However, economic sectors such as transportation and energy-intensive industries, will suffer from the price change. On the other hand, the more expensive the energy product, the more viable the transformation of the production process and the economic activities, from high to low emission alternatives. Business sectors will choose emission abatement options available in the market when their costs are less than the additional price⁶ of the fossil-fuel-based energy products.

Regarding the problem of air pollution, the government implements the emission inspection for public and private vehicles. At present, the regulation does not seem to be a serious threat for business organizations. However, business risk could emerge from public pressure (Chapman 2006). Firms considered as the source of a serious environmental problems could be boycotted by consumers. Therefore, there is no other choice: a firm must be perceived as an environmentally friendly among the community, customers and other business stakeholders (Chapman 2006).

⁶ The after-tax price

Business opportunities related to environmental related risk of energy

Climate change does not only cause problems but also provide opportunities. Reducing GHG emissions from the energy-sector could be achieved by improving efficiency in energy consumption and moving from fossil fuel to renewable energy sources. Higher price of the coal-and-oil based energy product due to the implementation of carbon tax will raise the willingness to implement energy-efficient production machinery. This is an opportunity for business sector to create equipments which are less energy consumption.

Increase in fossil-fuel-based energy products will also raise the feasibility of renewable-clean energy source development. Several zero-emission renewable energy sources are available for Indonesia, among others are geothermal, micro-hydro and solar power.

Indonesia is host of 40% of the world's geothermal resources, but the utilization of the resource is only about 3% (MoF 2009). Therefore, Indonesian government seems to be enthusiastic in developing geothermal energy source (MoF 2009). However, the cost of producing energy from geothermal cannot compete to that of the current price of fossil-fuel generated energy (Partowidagdo 2009). The competitiveness of the energy product generated from geothermal and solar increases when the price distortion in fossil-fuel energy product is removed, as planned by the government (MoF 2009). The government invites private sectors to build geothermal power plants in several partnership schemes.

In contrast, the government does not seem to be keen in developing solar power. At present, there is no government incentive for developing solar energy (Kompas 14 November 2010). Indeed, the current price of energy generating from solar power has not been efficient yet. However, Singapore is in the race with Japan, Korea, China and India to develop solar technology to increase its efficiency, and consider "Asian-populous countries" as the future market (Jakarta Globe 31 May 2010).

Solar power should be a potential energy source in Indonesia. Geographically Indonesia has abundant sun (Kompas 14 November 2010). Indonesia's technology on solar cell has also not been left behind other countries. A technique improving solar panel efficiency that is used widely in Japanese solar companies is based on the invention of an Indonesian Physics engineer in 1991 (Kompas 20 December 2003). Later the engineer develops a new technology that is claimed as the cheapest solar panel in the world (Kompas 10 October 2008). In collaboration with two investors (from Indonesia and the US), he started to produce solar panel using the technology, and receives order from Spain to produce solar panels using the new technology (Kompas 10 October 2008).

As a non-Annex 1 country of the Kyoto Protocol, Indonesia has an opportunity to benefit from the Clean Development Mechanism (CDM) scheme⁷. Indonesia could seek funding assistance from the Annex-1 countries to finance projects of GHG emission reduction including development of zero-emission energy and increasing energy efficiency⁸. Indeed, this 'carbon trading' has not established yet, and thus there are uncertainties related to the global Certified Emission Reduction (CER) market.

Another potential business opportunity is insurance. Business sectors facing the impacts of climate change and air pollution problems and of the policies related to the problems, are the potential demand for insurance.

Conclusion

Climate change and air pollution are the environmental problems caused by energy consumption. The problems will affect business organizations in several ways, among others are: the physical impacts, the global and government policies related to the impacts, and the opportunities emerged from the problems; which have been elaborated in this paper. The negative impacts of climate change and air pollution are among others: increase in the cost of production due to adapt to the problem, and increase in the price of coal-and-oil based energy. The later effect will rise the risk of coal and energy-intensive industries. Climate change also provides business opportunities: the increase of demand for energy-efficient appliances, the viability of the zero-emission-renewable energy source and the financial assistance for transformation from high to low emission economy activities through CDM scheme.

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⁷ Under CDM, the Annex 1 countries could "buy" an emission reduction conducted in the non-Annex 1 countries.

⁸ There are examples of Indonesian organizations benefiting from CDM. Most of them are related to forestry sector. PT Semen Padang is an example of a non-forestry company using CDM to finance its effort to improve efficiency in energy consumption.

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