The Strategy for Energy Crisis in United Kingdom and Indonesian: Case Study

TRI WISMIARSI
Director, Centre for Research and Business Studies,
Bakrie School of Management, Jakarta

Abstrak

Artikel ini menelisik strategi untuk menghadapi tantangan krisis energi. Strategi ini dikembangkan dengan cara menganalisis penyebab krisi energi, yang didukung oleh analisis situasi dengan menggunakan SWOT *(strength, weaknesses, opportunities,* dan *threats)* yang dihadapi oleh negara. Dengan mengunakan studi kasus dari Britania dan Indonesia, hasil-hasilnya menyodorkan strategi-strategi alternatif guna menangani krisis yang mencakup penghematan energi yang berasal dari fosil dan mengembangkan energi alternatif.

Kata kunci: pemanasan global, perubahan iklim, energi fosil, penghematan energi , biofuels

Introduction

People dependency on fossil fuel creates energy crisis and bigger problems, the global warming and climate change. The government leaders around the globe met and discussed the effect of global warming and climate change in the United Nations Framework Convention on Climate Change in December 2007 in Bali. Therefore, the issue of strategy to face energy crisis has to be in line with what have been agreed on the convention.

The issues of global warming and climate change as the results of our economic activities based on fossil fuels have invited experts to understand their impacts on the economy. The risks associated with the greenhouse gases resulted from business activities were predicted to cause large and irreversible changes in the climate and affect the global economy in the long term (Hamid, Stern and Taylor, 2007). The stock of greenhouse gases (GHGs) in the atmosphere influences the temperat-

ure changes (Hamid, Stern, and Taylor, 2007). GHGs stock has the same effect, regardless its geographic origin. This climate change affects the basic element of life for people around the world, i.e. water, food, health, and the environment. According to research, most of the impact are chanelled via water, for example through floods, droughts, storm surges and sea level rises (Hamid, Stern and Taylor, 2007, p. 6). Furthermore, the impact of climate change is predicted to be more severe and takes place in the poorer countries where people are more vulnerable and less able to respond to the impacts. On the contrary, these poorer countries are the least responsible for the GHGs stocks in the atmosphere as their economic activities are fewer than those, the richer ones.

This paper looks at the causes of energy crisis and the strategy to tackle the energy crisis in Europe, especially in United Kingdom. Furthermore, the analysis of what causes energy crisis in Indonesia, strengths, weaknesses, opportunities, threats as well as alternative strategy to solve or minimise the effect of energy crisis are discussed. Finally, the implementation of renewable energy in Germany provides valuable insights for both countries when developing the renewable energy.

Energy Consumption in Europe: the United Kingdom

Before the late 1980, the UK consumption of coal for producing electricity was around 65% out of the total demand of energy supply. However, during lated 1980 to early 2000, this country moved to gas as the supply for electricity generation. This led the country to the stage where it diversed its energy supply, introduced retail competition and reduced emissions of about 15% in 1990 (Energy Brief, 2005).

The largest consumers of energy are industry and commerce which account for about one-quarter of the final consumption of primary energy (Energy Brief, 2005). The third largest consumer is transportation which mainly needs petroleum products. There are five sectors, which include chemicals, manufacturing and food and are accountable for more than 50% of industrial energy use. Furthermore, industry and commerce demand for 13% of the total consumption of natural gas. In terms of cost of production, industry spent significant amount of money to buy energy. Steel, cement, glass, chemicals, aluminium and paper are the energy intensive users. For example, industry pays around 24% of production cost to buy energy to produce steel and paper, and 40% of production cost to procure

energy to perform their fabrication in aluminium industry. People as the final consumers expend 75 billion pound for their energy use. The peak period of using energy is during the winter.

Energy Consumption in Indonesia

Contradictory to its famous of huge potential natural resources, especially in petroleum, Indonesia as one of significant oil producers is now facing energy crisis. In the phase of the country development which is industrialising its economy, Indonesia consumes a lot of fossil based fuels to provide the energy. The growth of its energy consumption is around 15% per year, which is equal to the growth of total energy in the country. During 1965–1980, the growth of its total energy was only 8% per year. This development was extremely higher compared to the growth of the total energy in industrialised economies which only amounted to 3% per year (Artikel Iptek, 2004). To solve the energy crisis in Indonesia, the government issued Instruksi Presiden No. 10/2005, which concerns with energy saving in electricity and fossil fuels. This policy is certainly relevant to the problem faced by the country, yet it cannot help the country's problem of energy crisis. As the country is developing in many sectors of industries, undoubtedly it needs a massive supply of energy, which cannot be solved solely by energy saving in the long term. To find the best solutions for energy crisis, many parties involved in developing the country need to sit together to work out a strategy to help the country in facing the energy crisis.

Energy demand in Indonesia is divided into several categories – industry, household, transportation, government and commercial. The total demand of energy, especially petroleum, in 2003 was 489.01 million barrel (Sugiyono, 2005) which was increasing from 221.33 million barrel in 1990. The industrial sector was the largest consumer of energy, followed by transportation and household sector. Petroleum is still the biggest contributor of energy source. In the same year, it contributed to 67.7%. This was followed by energy from geothermal (13%), electricity (11.3%) and LPG (1.6%). It was estimated that the energy consumption is increasing by 5.7% per annum for 30 years (from year 2000 to 2030) (Santosa and Yudiartono, undated). This figure gives indication of a very intensive increment to more than 250% from 2003. Furthermore, the government official from the Department of Mining and Energy said that our energy consumption will be five times higher

than that of today in 2025 (Republika, 30 October 2007). With a very limited supply of and high dependency on petroleum, Indonesia seems to have problem of energy supply if it does not prepare alternative energy to support the economic development.

Research Methodology

This study is based on secondary data. To analyse the situation faced by the countries, the UK and Indonesia, it employs SWOT analysis. This analysis aims for discovering the base for developing strategy to face the energy crisis. SWOT analysis is a tool frequently used in the business competition. This analysis is inteded for analysing the situation before developing a strategy made by a company to win the business competition (Wilson et al, 1996 and Wheelen and Hunger, 2002). With a constantly changing environment, each effort or strategy needs an information system to tracks trends and developments. Each trend and development can then be categorised as an opportunity or a threat. If an organisation would like to capitalise the opportunity or minimise the impact of the threat, this institution needs to assess the trends and developments related to the opportunites and threats, before it takes an action. Identification of opportunities is often relatively simple, few organisations have the ability in terms of competences to capitalise them (Wilson et al, 1996). These few organisations are likely to evaluate their strengths and weak-nesses on a regular basis (Wilson et al, 1996). "SWOT analysis is not a panacea", as this approach has weaknesses, i.e., it considers only opportunities and strengths when considering alternative strategies, uses no weights to reflect priorities, uses ambiguous words and phrases, same factors can be placed in two categories (e.g., a strength may also be a weak-ness), no obligation to verify opinions with data or analysis, requires a single level of analysis, no ligical link to strategy implementation (Wheelen and Hunger, 2002, p. 109). To minimise the risk when developing a strategy, it is suggested that weaknesses should be counted in, as it can prevent a strategy from being useful. Although it has weaknesses, SWOT analysis is powerful enough and largely used as a tool for an analysis prior to developing a strategy.

As explained above that SWOT analysis is utilised in organisations before they formulate their strategies. This study uses SWOT analysis to analyse the situation of a country. Therefore, the country is treated as a corporation. This method of analysis

is quite often found in several industries such as wood products, rattan, etc., which considers the country, i.e., Indonesia as a firm (Nurrochmat, 2005).

The SWOT Analysis: The United Kingdom and Indonesia

This section provides analysis of SWOT. Each element of SWOT – strength, weakness, opportunity and threat– is explained step by step in separate subsections.

The SWOT Analysis - The United Kingdom

Strengths

The UK as other EU member states is more advanced in their awareness of the impact of the fossil fuel based economic activity to the global warming. This country has done many research on the impact of climate change, e.g., study of climate change economy by Stern Review. Its people have higher awareness on the importance of energy saving. In fact they demand for clean energy.

The country has developed lower carbon technologies to support efforts to develop renewable energy to reduce the consumption of fossil based fuels and reduce its dependencies on fossil based fuels. These technologies include nuclear, carbon capture and storage combine heat and power, microgeneration, hydrogen and renewable energy (including wind, geothermal wave and tidal).

Weaknesses

The UK imports gas from Norway and Russia. This shows UK's dependency on those 2 countries is high (Energy Bries, 2005). The government spending on energy research fell by 80% between 1990 - 2001. This shows that R & D on public energy spent is only 0.02%, or less than a tenth of the proportion spent in the US. From fifteen EU memberstates, only Portugal spend lower fund to public energy R&D (Energy Brief, 2005).

UK current policy is heavily dependent upon wind energy which causes over emphasis on one technology and neglect of other tchnology such as tidal and biomass systems (REF Stern Review Evidence, 2005).

Opportunities

The issue of EU energy market liberalisation has been targeted to be implemented by 2007. This forced some member states which were reluctant to open up their energy markets. Some countries in the Continent are less liberalised. This causes energy prices in the UK, which is now increasingly rely on gas import

and more liberalised, and is more expensive (Energy Brief 2005). However, full liberalisation of energy market in 2007 provides opportunity to the UK such as a wider range of suppliers and service offerings to choose from, and greater liquidity in gas and electricity wholesale markets, leading to more efficient price settings.

Threats

The trend of energy prices are increasing, not only in UK but also accross Europe (Energy Brief, 2005). However, the prices are lower than those in Germany and France for industrial electricity and gas. It was predicted that energy prices will continue to rise as the total demand of energy is increasing. According to experts, the UK is now facing the situation – the four challenges – which needs attention from the policy-makers, i.e., the raising of the energy total demand, managing the move from being an exporter to a major importer of gas, ageing UK power plants and climate change. These challenges are worsen by another key issues threaten to question the ability of policymakers and energy companies to act in response to the four challenges (Energy Brief, 2005), specifically, (1) the scale and timing of replacement capacity for ageing the UK power station were tight and expensive (needed to be replaced by 2010 for 2.1 – 8.8 billion pound), (2) system which can back up emergency planning failures or technical failures which may cause interruption of electricity supply or gas supply, 3) implication of moving to a low-carbon emission by 2050, this needs right approach to obtain greater energy efficiency and build low-carbon power generation which embrace a wide range of technologies (including nuclear, renewables, combined heat and power, clean coal and carbon capture and storage) and the final energy should be commercially viable without significant subsidy.

The global threat, i.e. the global warming is predicted to give positive impacts in the short term, such as warmer climate during the winter and larger crops production. However, in the long term it will give negative impacts, such as better condition for microorganisms to grow which may affect the human health and biodiversity.

The UK's Strategy to Face the Energy Crisis

With its advance and larger technology development and research, EU nations believe that renewable energy has a significant role in challenging the energy crisis

and climate change (REF Stern Review Evidence, 2005). The UK strategy to catch up the efforts to lower the GHGs focuses on the development of renewable energy. Furthermore, the energy must demonstrates favourable records such as securing the country from energy demand. Besides, this renewable energy must be a reliable source of energy to be relied on. These two factors then can support the economic activity which is cleaner and sustainable in the long term.

The development of wind energy in the UK obtains full support from the government. However, evidence shows that this clean energy promotion activity has not included policy to encourage producers to become responsible for marketing their products by themselves (REF Stern Review Evidence, 2005). Therefore, renewable energy plants create employment in industries producing these investment goods. On the contrary, its extra cost related to market risk and price risk are reduced to zero for suppliers of renewable energy (REF Stern Review Evidence, 2005). This condition may give negative effects to the country as it might not viable economically. Therefore, "economic viability and attractiveness is the first and fundamental test of any energy crisis and climate change policy for the UK" (REF Stern Review Evidence, 2005, p. 5).

The SWOT Analysis: Indonesia

Strengths

Indonesia is located in the tropical region in which many natural resources are available in large amount or can be relatively easy to be promoted or developed as along as appropriate techniques of methods which are used to exploit or explore them. Many varieties of fossil based fuels are found in Indonesia such as oil, coal, and gas. The country also has several resources of renewable energy such as solar, water, geothermal and wind. Up to now, only oil has been fully exploited. However, its supply is decreasing and many experts believe that it will be in scarcity in one or two decades from now in Indonesia.

Apart from that, Indonesia with its rich and famous biodiversity, has very high potential plants to be developed as biofuel, i.e., biodiesel and bioethanol. These two categories of energy are considered as clean energy as they do not contain polluted emission.

Research which focuses on biofuel as alternative energy has been done by many countries in the world. Some countries concentrate on developing biodiesel, while others deliberate on elaborating bioethanol. Biodiesel is

developed from crude palm oil, castor oil and soybean. Based on the availability and its potential to be developed, palm oil is very prospective (Wirawan and Salikhah, 2005). Bogor Agricultural Institute and Bandung Institute of Technology have developed a method for cultivating and producing the oil from the plants. This type of biofuel can be used to substitute fossil based fuel or as an additive agent of diesel oil. Bioethanol or ethanol can be made from plants which contain starch such as cassava, sweet potato, corn and sago palm. These are very familiar crops cultivated in many places around Indonesia. Therefore, they are very potential to be developed as biofuels, since people know how to grow them.

Recent research found that some certain types of seaweed which grow in many places around Indonesia can also be cultivated to produce bioethanol. Since Indonesia is surrounded by the sea, hence, this another potential crop which is now also being cultivated by people living in the coastal area, is another strength which can be exploited by the country.

Weaknesses

Although Indonesia has many natural resources which can be produced as fuels or sources of energy, it has lower level of technology to produce the energy needed. The country exports crude oil to many overseas markets and depends on the revenue from it to develop the country for decades. However, it still imports the refined oil and not many oil refinery available in the country. Pertamina is a state owned and the only firm which has the authority to exploit and distribute the oil produced from the crude oil. However, its performance is frequently doubted by many Indonesian people.

Many parties including higher education institutions, government, private sectors are aware of the potential of energy from renewable resources as well as energy which is made from plants or bioenergy. However, the development of those alternative energies have not been fully supported by the government through the introduction of two regulations, Peraturan Pemerintah No. 5 Tahun 2006 and Instruksi Presiden No. 1 Tahun 2006. These two regulations discuss optimum energy supplies, making use of efficient energy, pricing policy and efforts to save the environment. Furthermore, those regulations also concern with infrastructures, cooperation between government and private sectors, community development and research

needed to support and stimulate the promotion of alternative energy. Yet, there is no significant investment provided by the government to develop the alternative energy since the regulation had been introduced. Some private parties have tried to advance their knowledge and experience in developing alternative energy from crude palm oil and castor oil for their own supply, both for their energy supplies and raw materials (Wismiarsi, 2006). However, they are also concerned with the government support, policies and incentives as developing them need large investment and strong commitment.

Opportunities

Fossil based fuel is the most economical fuel. It was calculated that with the price of oil of USD 40.00 per barrel, the transportation technology based on fossil based fuels is more economical compared to the transportation technology using gas or biofuels. Biofuel application on transportation is considered challenging as transportation is the second largest consumer of energy. However, the cost of producing biodiesel or bioethanol is more expensive compared to the production cost of conventional fuel when the oil price is around USD 40.00 per barrel (Sugiyono, 2005).

Nowadays, the oil price seems to contiouosly increase from USD 70.00 per barrel to more than this level. According to experts, with the very expensive crude oil price and its continuity to increase, biofuels is very promising to be developed (Sugiyono, 2005). When the crude oil price is USD 50.00 per barrel, the patern of transportation will be the same as usual. This is because the cost of production of biofuels is more expensive compared to production cost of conventional fuels. However, if the crude oil price rise to USD 60.00 per barrel, biofuels is more economical to be utilised as fuels for transportation (Sugiyono, 2005). Therefore, biofuels is a promising alternative of fuels which need more attention from both the government and private sectors.

Threats

It was found that the GHGs available in the atmosphere nowadays is around 430 ppm (parts per million) CO_2, compared to only 280 ppm CO_2 before the industry revolution.This concentration increases the global temperature to more than half degree Celcius (Stern Review, 2007). It was predicted that in 2035 the emission will be 550 ppm CO_2 in the atmosphere, if the pace of the development level, i.e., the economic

activities, is still the same like nowadays or more (Stern Review, 2007). This will raise the global temperature to two degrees Celcius or more. The consenquences of this condition include the increase of water sea level, as the ice in the two polars has melt and this will decrease the fresh water supply in India, some parts of China and Andes in South America. Furthermore, it will also reduce the crops production, especially in Africa. The warmer climate will become a good condition for many micro-organisms to grow. Hence, malaria, dengie fever and other diseases influenced by vectors will be spread around the globe. Other concequences such as species extinction will also threaten us. Our condition at the moment is five degrees Celcius warmer compared to the condition in the ice age. This gives illustration of how global warming can change lives around the world and affect the economy. To some extent, the change cannot be repaired (Stern Review, 2007).

Indonesia which consists of thousands of islands will be the first to receive the impact of climate change and the effect of the climate change. Some parts of Indonesia now experience a very long drought, however other parts are severe from the flood. This bad affects the country's economy as it is based on agriculture.

Indonesia's Strategy to Deal with the Energy Crisis

Based on the explanations in the previous sections, the energy consumption to support our economic development —industry, transportation, our way of lives - gives impact on limited supply of conventional fuels which causes dramatically increase of their prices. Furthermore, this eonomic impact is accompanied by bigger problem, that is the destruction of our environment which affects the global economy in the long term. At the end, people have to account for all which have been done by both the rich and poor economies. Therefore, to face the global energy crisis needs strategies which have to be implemented globally or at least at the country level.

The strategy can be divided into two categories, i.e., 1) to save the conventional energy and at the same time increase the mitigation, and 2) to develop alternative energies.

To Save the Fossil Based Energy

Energy saving policy has been introduced by Instruksi Presiden No. 10/2005. Due to this policy, action taken to save the energy can be done through several activities. Firstly, by educating and promoting the consumers about the importance of

energy saving by explaining the benefit of energy saving action can be a good way. Energy saving will certainly save money as people reduce what they consume. Secondly, energy saving will also lengthen the life cycle of the products which use fossil based fuels as the stock of this kind of fuels is also lengthened. Thirdly, energy saving behaviour will reduce the emission. Hence, this will contribute to the lower pace of global warming and keep the climate condusive for economic development and human lives for generations. Fourthly, energy saving behaviour has to be supported by investment in sectors which largely consume the fossil based fuels, such as transportation. Up to now, our means of transportation, e.g., cars, buses and trains, depend on a massive supply of petroleum. Although there are a number of taxis and buses using gas as their fuels, the facilities to support them, e.g., gas stations, are still limited. They are only available in main cities such as Jakarta and Surabaya. In addition to this, most of the cars offered by the car producers use petroleum as their fuels. Therefore, this situation creates discomfort situation for people who are ready to change their behaviour from using the conventional energy to using gas as alternative fuel as the source of energy of their transportation.

The energy saving behaviour itself can be expanded to behaviour which is not only related to the consumption of energy for transportation but also energy for heat and demand of products and services which contain or involve high emission. Then, this will slowly change the life style of global consumers.

The media used for educating and promoting the energy saving behaviour incorporate printed media both in hard copy and electronic format (e.g., newspaper, magazine, websites, television, etc.). These communication programs aiming for behaviour changing should be implemented periodically involving people such as community leaders, public figures, celebrities, experts, political leaders, teachers as model for the agents of change. Students from the earlier stage of education need also to be taught and learn how to save the energy.

Alternative Energy Development

The development of alternative energy can be done by involving many parties which include government, the higher education institutions, private sectors and non government organisations. As explained in the analysis sections, our country has many alternative energy to be developed. Energy, which can be developed from solar, wind, water

and geothermal, has not been implemented yet in Indonesia, although many developed countries in European Union have applied the technologies needed to exploit and consume those alternative energies. Moreover, bioenergy which can be produced from familiar crops and plants has not been supported well by the Indonesian government through investment.

In the era of colonialism, our predecessors have experienced very hard situation to get the energy for themselves as the colonial domination provides energy for the sake of their business only. Although kerosene at that time had been used for lighting and cooking, it was only affordable for the rich. For people who could not afford kerosene, coconut oil and castor oil were largely used for many domestic applications including lighting. In our era now, where the technology has been developed further from the past, it has to be implemented to support the improvement of those oils produced from various species which largely grow in Indonesia. Additionally, another type of biofuels which are called as bioethanol (produced from familiar crops such as cassava, sweet potato and corn) can also be advanced to generate alternative energy.

To support the production of bioenergy, it needs involvement from the community and many organisations in the community as government cannot support this activity alone. We need programs to empower the community to develop alternative energy for themselves. People in the community are taught to produce bioenergy as well as other renewable energy for their consumption. It is known that some places in Indonesia are still far from getting electricity from the state owned company, PLN. People who live in this part of the country have to provide their electricity by themselves. For example, in certain places people produce their electricity from water power. Therefore, any effort to supply and meet the energy demand have to be maintained by the government. The community who can fulfill their needs by themselves can be promoted as models for further development and implementation in other places around the country.

Any cooperation to develop the cultivation of technology which supports the development of alternative energy has to be spread over the country. The higher education institutions which have done many research on renewable energy have to hold up the implementation and adoption of those energy in the community. Many countries in European Union which tend to be more concerned with the

energy saving and more sophisticated in the related technology can work together with people in Indonesia. It is very reasonable to work out together the strategy for facing the energy crisis since the impact of the global warming is experienced by the whole world. Hence, there is a high dependency among nations to develop the utilisation of alternative energy. Indonesia is a big market for products yielded by many EU nations. To maintain this market, the EU nations have to advance the knowledge and technology of their market in using alternative energy. As a place which has many sources of alternative energy, Indonesia can share its experience as well as promoting and selling its renewable energy derived from its biodiversity to many nations in EU.

Lessons Learned from Germany

Germany is one of the advanced nations in providing its needs of clean energy. Its energy demand is supported by nuclear, fossil fuels and renewable energy. The wind energy is still the largest contributor and it contributes to more than 5% of the country energy supply (Yahoo News, 2007). Another renewable energy is the solar energy which is now increasingly demanded by the population. However, its contribution is relatively low, only around 1%. Most of renewable energy is 10% more expensive compared to the conventional energy. Although many people are willingly to pay more, recent research found that this gives negative impact on the purchasing power. Many experts argue that the promotion of renewable energy require the renewable energy producers become responsible for marketing their products by balancing the services necessary for a marketable product and combine the services with renewable product (REF Stern Review Evidence, 2005).

Conclusion

The limited supply of fossil based fuels gives impacts on the development of many nations including EU member states and Indonesia. This condition results in negative effects on the economic activities, human lives and the environment. Fossil based fuels consumption for centuries affects the global warming which then influence the climate of the whole regions around the world. We are now in the stage of undergoing the climate change which results in the destruction of economic development of many nations and quality reduction of our lives. Consequently, a strategy to face the crisis need to be developed and implemented very soon. The strategy includes changing the behaviour of people to be more en-

ergy saving and to develop renewable energy. The promotion of renewable energy to reduce the emission should consider the marketing factors, as this effort needs high investment. The implementation of the strategy should involve the whole nations in the world in which every nation can learn from what have been done and implemented in one country and help and facilitate others to improve, develop and implement the country strategies which may be different from one country to another.

REFERENCES

Artikel Iptek (2004) www.beritaiptek.com.

Energy Brief (2005), *Powering the Future: Enabling the UK Energy Market to Deliver*, The Voice of Business, Nov.

Hamid, L., Stern, N., and Taylor, C. (2007), "Reflections on the Stern Review: A Growing International Opportunity to Move Strongly on Climate Chang", *World Economics*, 8 (1): January - March.

Nurrochmat, D. R. (2005), *Strategi Pengelolaan Hutan: Upaya Menyelamatkan Rimba yang Tersisa, Pustaka Pelajar*, Yogyakarta.

REF Stern Review Evidence (2005), "Submission to the Stern Review on the Economics of Climate Change", 08.12.05.

Republika (30 October 2007), *Energi Berlebih Picu Gas Rumah Kaca*, www.republika.co.id

Santosa, Y. and Yudiartono (undated), *Analisis Prakiraan Kebutuhan Energi Nasional Jangka Panjang di Indonesia, Strategi Penyediaan Listrik Nasional dalam Rangka Mengantisipasi Pemanfaatan PLTU Batubara Skala Kecil, PLTN dan Energi Terbarukan.*

Stern Review (2007), *On the Economics of Climate Change*, www.sternreview.org.uk

Sugiyono, A. (2005), *Pemanfaatan Biofuel dalam Penyediaan Energi Nasional Jangka Panjang, Seminar Teknologi Untuk Negeri*, Badan Pengkajian dan Pengembangan Teknologi (BPPT).

Wheelen, T. L. and Hunger, J. D. (2002), *Strategic Management and Business Policy*, Eighth Edition, Prentice Hall, Upper Saddle River, New Jersey.

Wilson, R. M. S., Gilligan, C., and Pearson D. J. (1996), *Strategic Marketing Management*, Butterworth Heinemann, London.

Wirawan, S. S. and Salikhah, M. D. (2005), *Kajian Hasil Riset Biodiesel di Indonesia*, BRDST - BPPT.

Wismiarsi, T. (2006), *CSR: Motivation and Implementation, Case Study of Indonesia*, presented at the 1st International Conference on Business and Management Research, Facing 21st Century Challenges, 23rd -24th August 2006, Bali.

Yahoo News, (2007), "Freiburg, Jerman – Rolf Disch Memanen Energi Surya di Kotanya, Freiburg, dimulai dari Rumahnya Sendiri", 19 Juli 2007.