INDONESIA BIOENERGY FUTURE PROSPECTIVE: STATUS, CHALLENGE AND OPPORTUNITY

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It was realised that the World energy consumptions tend to increase whilist it supplies continuously decreases. Fossil fuel as main fuel resources have trend declining. So an alternative energy resources is inevitably needed for substitution. Bioenergy is one of renewable energy resources have a potential prospect. In recent day fossil fuel resorces were still powerful but not for future. There is a huge number of renewable energy resources available around the world, as well as in Indonesia. Indonesia is having a potential abundance of renewable energy resources, such as, solar, wind, water, tide, wave, biomass etc., which is still underdevelopped. Indonesia bioenergy potential need to have a serious attention and exploitation to become a part of substitution of world energy demand. Facing this situation Indonesia should have a strong strategy and effort to coup-up-with this challenge. Indonesia roadmap for renewable energy research strategy should have established. There were a lots of things should be provided as a consequences such as research infrastructure, research team and budget, manufacture and businesses of bioenergy, business industry and marketing.To be part of world bioenergy community, Indonesia has an opportunity become a key nation to play role as a bioenergy potential for future due to its potential resources.

Key word; bioenergy, nation potential, renewable energy

Introduction. In recent years bioenergy has drawn attention as a sustainable energy source that may help cope with rising energy prices, address environmental concerns about greenhouse gas emissions, and offer new income and employment to farmers and rural communities around the world. For many the benefits to farmers are also perceived as a good way to reduce the costs and market distortions of their existing farm support policies. Moreover, whereas oil and coal are unevenly distributed among countries, all countries could generate some bioenergy from domestically grown biomass of one type or another, thereby helping to reduce their dependence on imported fossil fuels. (Hazel and Pachauri, 2006).

Total global energy consumption is huge—about 400 EJ (exajoules) per year—and is expected to grow 50 percent by 2025. Most of the increase will occur in developing countries, especially China and India. Most of this demand is currently met by fossil fuels, particularly oil. Rapid growth in oil demand, finite oil supplies, and political instability in many of the major oil-exporting countries are pushing up oil prices and making them more volatile. This trend seems destined to continue. As a result, many importing countries are looking to expand and diversify their energy sources and are looking at bioenergy as a potentially attractive prospect within their broader energy portfolios. Already, bioenergy

accounts for 10 percent of world energy supplies and the potential to better exploit many unused crop residues and to grow dedicated energy crops is enormous. Bioenergy's potential will also increase as second-generation technologies come on line, enabling more efficient conversion of cellulose-rich biomass to transport fuels and electricity. Technology advances will not only help make bioenergy more competitive with fossil fuels on price, but will also expand the range of feedstock that can be used, some of which (like fast-growing grasses and trees) can thrive in less fertile and more drought-prone regions that are less competitive with food and feed than current feedstock like sugarcane, maize, and rapeseed.
Adding to the interest in bioenergy is growing concern about global climate change and the need to reduce greenhouse gas emissions.
As the Kyoto Protocol has shown, many countries now seem willing to take steps to cut their emissions, even if this has associated economic costs. Bioenergy is attractive because it is a renewable energy source that has the potential to significantly reduce or at least slow growth in carbon emissions without involving much change in the way energy is used (for instance, it can be used in internal combustion engines and combustion-fueled electric power plants). This is because plant biomass captures carbon from the air, and its subsequent release when generating energy (when burnt in a car engine or power station, for example) simply returns the carbon back to the air to complete the cycle.(Hazell and Pachauri, 2006)

Bioenergy. Bioenergy is energy generated through biofuels. Biofuels are fuels of biological and renewable origin, such as fuelwood, charcoal, livestock manure, biogas, biohydrogen, bioalcohol, microbial biomass, agricultural waste and by-products, energy crops, and others. The main sources of bioenergy are (1) agricultural residues and wastes, (2) purpose-grown crops, and (3) wild vegetation. In their raw form, these sources are usually called biomass, though the term "energy feedstock" is also used, mostly for purpose-grown energy crops. Unlike oil, biomass can be produced in just about every country. Bioenergy already accounts for nearly 10 percent of total world energy supplies. It accounts for 33 percent of energy use in developing countries but only 3–4 percent in industrial countries. There are also large differences between developing regions: biomass accounts for more than 60 percent of final energy use in Africa, 34 percent in Asia, and 25 percent in Latin America. Most biomass in industrial countries is converted into electricity and heat in industrial-scale plants, whereas in developing countries it is mostly burnt by rural households as a source of energy for cooking and heating. Biomass is in fact the main source of household energy use for between 2 and 3 billion people in the developing world. Agriculture's own consumption of energy is relatively small—about 4–8 percent of total energy use in developing countries. This share has also declined over time as gains in efficiencies have reduced energy needs. Liquid biofuels for transport (mostly bioethanol—usually abbreviated to ethanol—and biodiesel) are still relatively minor sources of energy use and are produced in just a few countries. Brazil and the United States are the largest producers of ethanol for transport, accounting for about 90 percent of world production. Both countries currently produce about 16 billion liters per year, and ethanol has displaced 40 percent of gasoline use in Brazil but only 3 percent in the United States. The primary feedstock for ethanol is sugarcane in Brazil and maize in the United States. The European Union, especially France and Germany, is the largest producer of biodiesel, accounting for 88 percent of world production, followed by the United States, which produces 8 percent. Globally, biodiesel production is only about one-tenth of total ethanol production. Rapeseed is the primary feedstock for

biodiesel in the European Union. Other than Brazil, few developing countries have sizable biofuels programs at present. The main players are China, Colombia, India, and Thailand, but many others are interested in initiating (or have initiated) small pilot programs.(Hazell and Pachauri, 2006)

Status, challenge and opportunity

Status. There was not so many literatures available about research in bioenergy so far in Indonesia reflected the status of bioenergy development. It was noted that an event of seminar on bioenergy has been conducted at the end of June 2010 in Pekanbaru, Indonesia. One of recommendation of the seminar and conference was to create a mapping of bioenergy reseach as well as reaseachers in Indonesia under coordination of The National Contact Point (NCP) which based in Bogor Institute of Technology. This institution is hopped to play a key role for developping the future of bioenergy development in Indonesia.

Challenge. Indonesia is reported systematically destroyed peat forest for palm oil development such as reported by Levido and Paul (2008) as followed: Oil palm in Indonesia: more forest destruction? In Indonesia, for a long time oil palm has been produced for food and cosmetics, among other uses. Controversy has continued over whether such production should be certified as 'sustainable' under a scheme sponsored by Unilever. Now bioenergy provides an extra stimulus for exporting palm oil. Large areas of peat forest are being destroyed for this purpose, thus turning the country into a major CO2 emitter. Local people have little means to prevent this destruction, especially the external forces driving it (Colchester and Jiwan, 2006). The destruction could be stopped only through government control over land resources; strong enforceable titles to land could prevent its sale and land speculation. Genetically modified (GM techniques are being used to develop dwarf oil palm that matures earlier, to facilitate efforts at mechanising the harvest process. If such GM crops gain technical success, then their large-scale use would undermine smallholders as current producers of oil palm, while stimulating further environmental harm, more destruction of forests and more agrichemical usage for cultivation.
This report put Indonesia in such unconfort condition to develop palm industry. Green policy could be implemented to meet environmental concern.

Opportunity. Indonesia has an opportunity on bioenergy development (Soerawidjaja, 2010). Government policy and regulation have been established and implemented in supporting the development of bioenergy development such as *Peraturan Presiden Republik Indonesia No. 5/2006 and Instruksi Presiden Republik Indonesia No. 1/2006, Keputusan Presiden Republik Indonesia No. 10/2006* and many others. Some others regulation such as development of infrastructure support facility to develop of bioenergy industry, policy of added valued, ditribution and value chain and policy on domestic and export of bioenergy were needed to be established. (Hambali, 2010).

Development Strategy of Indonesia's Bioenergy. Several strategy should be provided, such as research and development, raw material development and market strategy and education strategy, (Hambali, 2010).
Research and Development Strategy. Research and development on bioenergy in Indonesia should continously develop. Existing Research and reseachers should be managed and compiled, and pushed to collaborate to avoid wasting of invaluable time and budged due to

repitition of the same research and directed focus of research. It could be initiated under coordination of The National Contact Point and on another hand the road map of bioenergy research should be established as well as providing budged support.

Raw material development strategy. Huge number of potential raw material for bioenergy available in Indonesia such as oil crops, starch and sugar plant, celluloce material and agricultural wastes. Potential material in recent day is palm tree e.g. in Riau Province huge area of Palm tree were available. (Bahri et al., 2010).

Market Strategy. Market Strategy is among of crucial point in bioenergy development, along with its production capacity, specification and standard quality, marketing and distribution.

Educational Strategy is needed to prepare human resorces potential as an expert in bioenergy (now and future). This could be provided through special postgraduate institution focuses on bioenergy. (Hambali, 2010).

Conclusion

It could be concluded that there is a big opportunity to Indonesia to develop bioenergy industry due to several reasons such as huge number of material resources, human resources and potensial market (future) availability. Research and development and its infrastructure on bioenergy research is inevitably to be provided. Domestic and export markets are widely available.

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