Chapter 1

Introduction: The Growing Importance of Biofuels in Asia

November 2014

This chapter should be cited as
ERIA (2014), 'Introduction: The Growing Importance of Biofuels in Asia', in Yamaguchi, K. (ed.), *Study on Asian Potential of Biofuel Market*. ERIA Research Project Report 2013-20, pp.1-5. Available at: http:/www.eria.org/RPR_FY2013_No.20_Chapter_1.pdf

CHAPTER 1
Introduction: The Growing Importance of Biofuels in Asia

Introduction

With a growing population, rising income levels, and expanding urbanisation, Asia's demand for oil is expected to increase rapidly. However, due to limited resource reserves, most of the countries in the region are heavily dependent on import for their oil supply, which is a major, if not the most critical, concern in their energy policies. Biofuels are perceived as one of the possible options to address the oil security issue since expanding the use of biofuels will not only result in oil demand reduction but also contribute to the diversification of liquid fuels' import sources. Moreover, biofuel production also provides an additional means to increase farmers' income.

The use of biofuels started in the late 19th century. Such utilisation continued until the 1940s, but the falling fossil fuel prices stopped their further development.[1] Interest in commercial production of biofuels for transport rose again in the mid-1970s, when ethanol began to be produced from sugarcane in Brazil and later from corn in the United States.

The world consumption of biofuels has increased from 8,082 thousand tonnes of oil equivalent (ktoe) in 2001 to 52,219 ktoe in 2011. Biofuels provided 2.1 percent of the world's total transport fuel demand. Today's leading market, the United States and Brazil, together accounted for 81 percent of global bio-gasoline consumption in 2011. Europe leads in the use of biodiesel, with 58.9 percent of the world's biodiesel consumed by the Organisation for Economic Co-operation and Development (OECD) member countries in 2011. The Asia

[1] IEA (2011).

and Pacific region accounted for only 5.6 percent of the world's total biofuel production in 2011 and 5.1 percent of biofuel use.[2]

But the growth is expected in Asia. With this growing interest in biofuels in Asia, the focus of this study was on the Asian potential of the biofuels market. The objectives are to find the potential of biofuels—bioethanol and biodiesel—in Asia and to find policy options to promote the sustainable use of biofuels. The features of this study are the (1) quantitative results in both supply and demand outlooks; (2) use of energy–agriculture integrated models with surveys of the latest biofuel policies; and (3) analyses of regional prospects including those of supply–demand gaps within the region, which consists of 16 Asian countries that include ASEAN 10 countries, Australia, China, India, Japan, New Zealand, and South Korea.

This study was conducted with the support and endorsement of the Economic Research Institute for ASEAN and East Asia (ERIA). A working group (WG) was established in 2011, comprising biofuel policy makers from Indonesia, Malaysia, the Philippines, and Thailand, and with the Institute of Energy Economics, Japan (IEEJ) working as the coordinator.

Growing Importance of Biofuels in Asia

1.2 Growing importance of biofuels in Asia

One of the critical findings of the Internal Energy Agency (IEA) is that the demand growth centre of oil demand is moving toward developing Asia, which accounts for almost two-thirds of the gross increase in demand over the projection period.[3] According to IEA, the share of biofuels will increase from 1.5 percent in 2012 to 2.9 percent by 2035 in its current policy scenario, whereas it has to reach 8.9 percent by 2035 in its CO_2 emission stabilisation scenario.[4] The prospect of biofuel use in Asia will become critical to reduce the fossil oil consumption in the region.

[2] IEA (2013a).

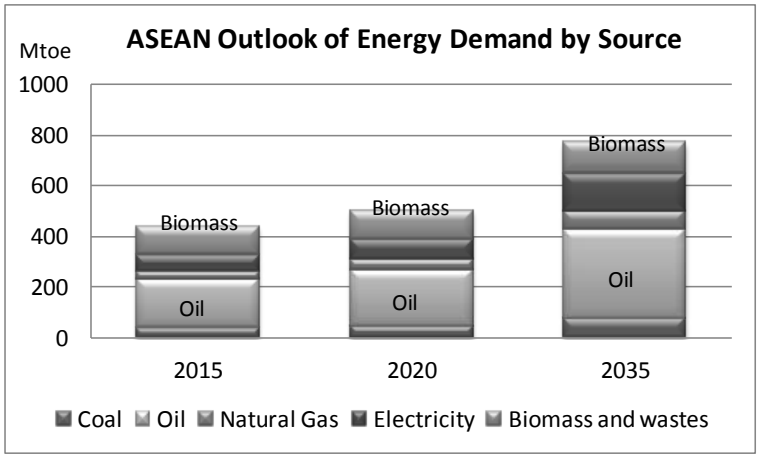
[3] IEA (2013c).

[4] So-called 450 scenario by IEA sets the energy system on track to have a 50% chance of keeping to 2°C the long-term increase in average global temperature (Table A.15.1).

The importance of biofuels as alternatives to oil products can be highlighted further if the prospect of the growing share of oil consumption in Asia is to be considered. According to the Asian Development Bank (ADB),[5] the share of oil consumption will continue to grow (Figure 1.1). Another important fact is the dependence on traditional use of biomass, such as firewood and charcoal, in the residential sector. This share is expected to decrease in the future with the progress of electrification. The most cost-effective way is to replace oil consumption with cost-competitive biofuels as their competitiveness would improve further with the prospects of rising oil prices in the long run.

This outlook implies that the growth of biofuels as an alternative to oil could greatly contribute to the prospects of CO_2 reduction in the future.

Figure 1.1 Growing Oil Demand in Final Energy Consumption of the ASEAN Region



Source: ADB (2013).

The concern for fossil fuel consumption has become an important driver in the introduction of renewables. Biofuel is renewable. Thus, the production and consumption of biofuels have become very important in considering energy security and agricultural benefits in many Asian countries, especially in the ASEAN. As will be explained in more detail in Chapter 2, such trends can be found in the countries' policies for the promotion of renewable energy (Table 1.1).

[5] ADB (2013).

Table 1.1 Renewable Energy Targets and Plans of Selected ASEAN Countries

Country	RE Targets in Primary Energy	RE Electricity Targets	Biofuels Targets and Plan
Indonesia	23% of primary energy supply, 2025	17.5%, 2021; 11% Geothermal; 6.5% Hydropower	5% of primary energy supply by 2025
Lao PDR	Increase by 30%, (new renewables) 2025	Keep the share of renewable as near as 100%, 2025 Biofuels, 450 million L/day	10% (662 ktoe), 2025
Malaysia	n/a	17% by 2030 including Biomass 1,750 MW Mini-hydro 490 MW Solar PV 854 MW Municipal waste 390 MW	B5 implementation program (no target)
Philippines	n/a	15,319 MW by 2030 (5,439 MW, 2010)	B20, E20 mandates by 2025
Thailand	25%, 2021	Solar + wind, 3,200 MW; Hydro, 1,608 MW; Ocean and geothermal, 3 MW; Biomass, 4,390 MW by 2021	40 million L/day by 2021
Viet Nam	5%, 2030; 11%, 2050	6%, 2030	5% mandate plan (from 2015)[(a)]

Note: (a) Based on Decision 177/2007/QD-TTg.
ktoe = thousand tonnes of oil equivalent, Lao PDR = Lao People's Democratic Republic, L = litres, n/a = not available, MW = megawatts.
Source: Compiled by the authors from various sources.

Asian countries, however, vary greatly in biofuel feedstock resources and biofuel market size. For example, Indonesia and Malaysia, as the world's largest palm oil producers (from which biodiesel can be produced), have huge potential for biodiesel production. However, bioethanol production in these two countries is relatively small. On the other hand, Thailand has abundant bioethanol production potential and a relatively large domestic market, but the country's potential for biodiesel production is limited (only a limited area in south Thailand has palm plantation). Therefore, a regional integrated market for biofuel trade across countries is expected to optimise the biofuel supply and demand in the region.

Scope and the Structure

The study was conducted through three phases. The first phase focused on the biofuel development status and future biofuel demand and supply potentials in four working group (WG) member countries, namely, Indonesia, Malaysia, the Philippines, and Thailand. The second phase expanded the scope of the study to 16 countries—to include all of the ASEAN countries, and other countries in the region such as Australia, China, India, Japan, New Zealand, and South Korea. Although the scope of the study in the first and second phases was limited to the energy sector, the third phase expanded the analysis of the supply side to include the constraint of food and agriculture, as well as the potential of biofuel trade. In all phases, the study focused on conventional (or first generation) biofuels.

This paper is structured as follows: Chapter 1 reviewed the increasing importance of biofuels in Asia and the significance of this study. In Chapter 2, policies of biofuels and current development status were reviewed. Chapter 3 focused on the estimates of future of demand and supply to analyse the Asian potential of biofuels. The potential of the region's biofuel trade and the prospects are discussed in Chapter 4. The issue of competitiveness and the issue of food vs. fuel were summarised under the findings of this study in Chapter 5, followed by policy implications in Chapter 6.