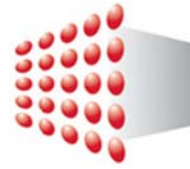


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## BULLETIN ARTICLE

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### **The Motivations for and Some Environmental Concerns Surrounding Biofuels Production in Asia**

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## **ABSTRACT**

*There are a number of motivations for Asian countries to develop biofuel industries. The primary one is energy security: they would like to reduce their very heavy reliance on imports of oil, particularly from the Middle East. A desire to mitigate climate change does not seem to be major motivation. The production of biofuels in Asia must be managed carefully lest it leads to serious environmental problems stemming from excessive deforestation and over use of fertilisers and water. The production of biofuels may cause hardship through increased prices for food.*

## **KEY WORDS**

*Biofuels, Transport Fuel, Energy Security, Environmental Impact*

\* Based on Adrian Zhou and Elspeth Thomson, “The Development of Biofuels in Asia”, *Applied Energy*, forthcoming.

## 1. **Introduction**

1.1 Biofuels have gained increased interest worldwide due to concerns about climate change and energy security. According to the International Energy Agency's reference scenario presented in the 2008 *World Energy Outlook* report, consumption of biofuels will grow at an annual growth rate of 6.8% from 2006 to 2030 and account for 1 to 4% of total transport fuel consumption. Currently, the biofuels market is considered well-established in Brazil, the United States and European Union (see Figure 1).

1.2 Most Asian countries are focusing their biofuel strategies on their main agricultural product such as palm oil or cassava. For example, Indonesia and Malaysia will continue to dominate Asia's biodiesel production, while Thailand, China and India will all focus largely on ethanol. The Philippines will continue to develop both. Asia could in fact potentially become a major exporter of biofuels.<sup>1</sup> As the demand for vehicles is expected to rise exponentially in the region over the next decades (see Figure 2), several Asian governments are developing policies to encourage the consumption of biofuels. For example, India mandated 5% blending of ethanol with gasoline in 2006, subject to commercial viability in 20 states and 8 union territories. In 2007, the Malaysian government passed a biofuels bill which mandates the use of the B5 blend (5% biodiesel, 95% diesel).

## 2. **Motivations for Development of Biofuel Industries in Asia**

2.1 A careful examination of relevant government reports indicates that the key reason why several Asian countries have been developing biofuel industries in recent

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<sup>1</sup> The term "Asia" is used here to connote Asia's currently largest biofuel producing countries, namely Indonesia, Malaysia, Thailand, the Philippines, China and India.

years is energy security. Their increasing dependence on imported oil is worrying, especially when most of the crude oil is expected to come from unstable regions in the Middle East and Africa, as well as Latin America. For example, China's dependence on oil could increase from 50% in 2007 to 80% in 2030, while India's could increase from 70% to 92% over the same time period. Biofuels are seen as a credible option because they can be blended easily with fossil fuels and have an immediate impact by reducing the quantity of fossil fuel imports. Other alternatives, such as electric cars or hydrogen cars, have far longer lead times due to the need to build new charging infrastructure, fuel refueling stations and fuel delivery systems.

- 2.2 Perhaps the next most important reason for Asian countries' development of biofuels is the need to protect trade balances and foreign exchange. The increasing dependence on foreign petroleum imports results in negative trade balances and an outflow of foreign exchange. Malaysia's *National Biofuel Policy* specifically states that saving foreign exchange is one of the primary aims.
- 2.3 Biofuels also provide local farmers and producers with an additional market to sell their produce. This diversifies risk for the farmers and possibly increases the prices that they can obtain for their crops due to increased demand. In addition, biofuels can increase employment in the agricultural sector.
- 2.4 Climate change is often believed to be one of the key drivers behind biofuel policies as countries strive to meet the requirements set forth in the Kyoto Protocol. However, for Asia, this is not the case. None of the main Asian biofuel producers is listed in the Kyoto Protocol as an Annex 1 country.<sup>2</sup> This means they

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<sup>2</sup> There are 36 industrialised countries and economies in transition listed in Annex 1 of the United Nations Framework Convention on Climate Change. Their responsibilities under the Convention are various and include a non-binding commitment to reduce their greenhouse gas emissions below 1990 levels.

are not required to reduce their greenhouse gas emissions as they are still developing countries. Climate change is mentioned by only one country, Malaysia. The main environmental consideration by most Asian governments is local air quality, not global climate change. The need to improve air quality is mentioned in the relevant Chinese, Indian and Philippines Government pronouncements.

### 3. **Environmental Concerns Surrounding Biofuel Production in Asia**

3.1 In order to grow the crops necessary to produce biofuels, additional land must be brought into production, resulting in deforestation. About 18 million hectares of rainforests have been cleared for the purpose of palm oil plantations in Indonesia and 10.6 million hectares of peatland have been cleared in Southeast Asia.<sup>3</sup> Such activity has had various repercussions such as serious erosion, loss of biodiversity and loss of wildlife habitat for endangered species such as the orangutans and Sumatran tigers. The infrastructure associated with the development of oil palm plantations, such as roads, also claims large tracts of forest. This leads to forest fragmentation which impedes animals' migration between different habitats, reducing their home ranges and population viability.<sup>4</sup> The clearance of rainforest and peatlands in Southeast Asia is believed to account for 8% of global annual carbon dioxide emissions from fossil fuel burning.<sup>5</sup>

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<sup>3</sup> M. Colchester, N. Jiwan, M. Sirait, Andiko, A.Y. Firdaus, A. Surambo, H. Pane, "Promised Land: Palm Oil and Land Acquisition in Indonesia – Implications for Local Communities and Indigenous People", 11, Forest People Programme, Perkumpulan Sawit Watch, HuMA and the World Agroforestry Centre, 2006, p. 11, at <[http://www.forestpeoples.org/documents/prv\\_sector/oil\\_palm/promised\\_land\\_eng.pdf](http://www.forestpeoples.org/documents/prv_sector/oil_palm/promised_land_eng.pdf)> [30 July 2008].

<sup>4</sup> Friends of the Earth Europe, "The Oil for Ape Scandal", 2005, p. 15.

<sup>5</sup> A. Hooijer, M. Silviu, H. Wosten and S. Page, "Assessment of CO2 Emissions from Drained Peatlands in SE Asia", *Delft Hydraulics Report*, 2006, p. 3535, at <<http://www.wldelft.nl/cons/area/rbm/PEAT-CO2.pdf>> [30 July 2008].

- 3.2 Over use of water resources is another concern. Some 400 Chinese cities are currently facing water shortages and India's ground water is depleting rapidly. The situation would be made even worse if these countries turn to biofuels in a big way because biofuel crops are often water intensive. For example, the production of ethanol is very water intensive, even more so if the feedstock is a crop that requires a lot of water for irrigation such as corn. It is believed that about 785 litres of water are required for every liter of ethanol, just for the irrigation of corn alone.<sup>6</sup>
- 3.3 Monoculture of biofuels crops requires the extensive use of chemical-based fertilisers, resulting in the release of nitrous oxide which is a greenhouse gas that is about 300 times stronger than carbon dioxide in terms of greenhouse gas potential. It is also known that nitrogen-based chemical fertilisers have a greenhouse gas potential of 10-100 times more in tropical climates than temperate climates.<sup>7</sup>
- 3.4 Haze has been a serious problem in the past for various ASEAN nations such as Singapore and Malaysia, though the situation has recently improved somewhat. The health problems that accompany haze include asthma, upper respiratory infections, decreased lung function as well as eye and skin irritations. The main cause of haze is forest fires in Indonesia. According to a Greenpeace study that used NASA satellite images, there were some 2,437 forest fire hotspots in 2006 and 440 in 2007 on the major oil palm concessions given to major plantations which supply companies such as Unilever.<sup>8</sup>

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<sup>6</sup> A. Aden, "Water Usage for Current and Future Ethanol Production", *Southwest Hydrology*, 2007, p. 23; and A. Mukherjee, "Biofuels Will Make China and India Thirsty", Association of the Electricity Supply Industry of East Asia and Western Pacific, Goldbook 2008, pp. 62-63.

<sup>7</sup> Intergovernmental Panel on Climate Change, *Climate Change 2001*, Chapter 4, Section 4.2.1.2 at <<http://www.grida.no/climate/ipcc%5Ftar/wg1/136.htm>> [30 July 2008].

<sup>8</sup> Calculated from Greenpeace, "How Unilever Palm Oil Suppliers are Burning Up Borneo", Greenpeace International, Amsterdam at <<http://www.greenpeace.org/raw/content/international/press/reports/how-unilever-palm-oil-supplier.bin>> [17 Nov 2008].

3.5 The expansion of biofuels industries could have long-term implications for food supplies and prices. According to a study done by the International Food Policy Research Institute carried out from 2000 and 2007, the demand for biofuels resulted in a 30% increase in the weighted average price for grain.<sup>9</sup>

#### 4. **Conclusion**

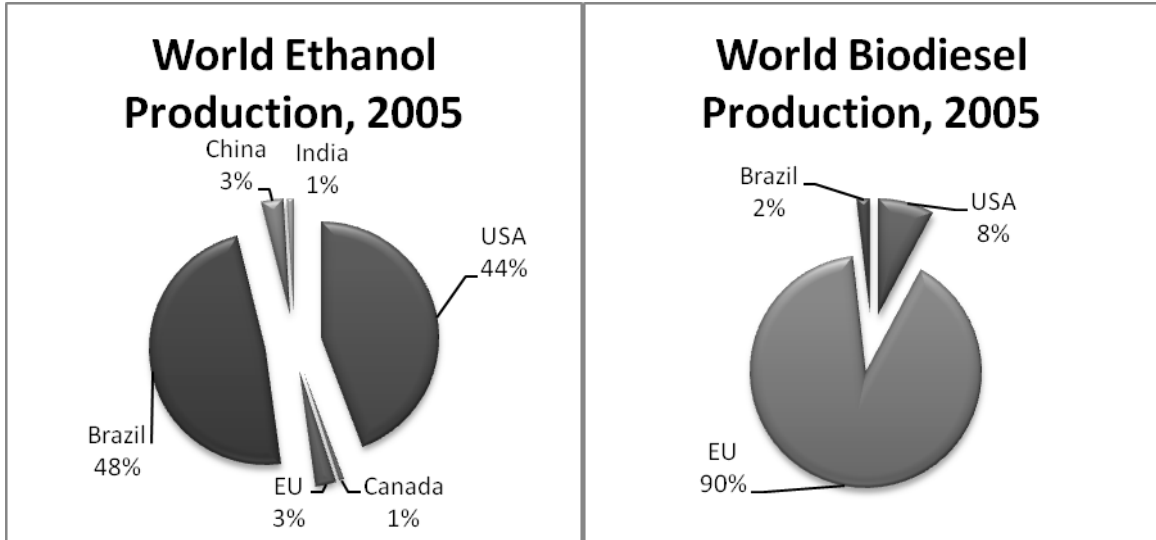
4.1 The main reason why Asian governments are developing biofuel industries is the desire to reduce dependence on oil imports. With biofuel production set to rise drastically in the coming years, Asian governments must ensure there is a system in place ensuring that the biofuel crops are grown only in approved places and conditions. A system of continuous monitoring of production sites is imperative to prevent serious damage to the environment.

\* Based on Adrian Zhou and Elspeth Thomson, “The Development of Biofuels in Asia”, *Applied Energy*, forthcoming.

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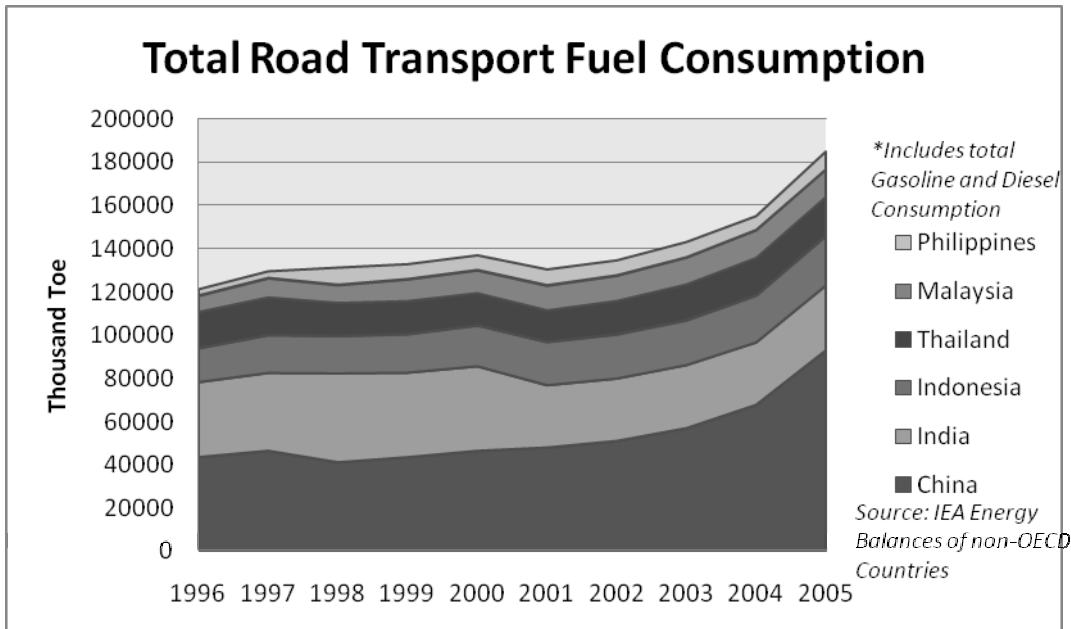
<sup>9</sup> M.W. Rosegrant, “Biofuels and Grain Prices: Impacts and Policy Responses”, Testimony for the US Senate Committee on Homeland Security and Governmental Affairs, 2008, Washington, DC.

Figure 1: World Biofuel Production by Source



Source: International Energy Agency Analysis based on F.O. Licht, *World Ethanol Markets: The Outlook to 2015*, Special Report No. 138, 2006, published in IEA, *World Energy Outlook 2006 Report*, Paris, © OECD/IEA, 2006, p.387.

Figure 2: Total Road Transport Fuel Consumption in Asian Countries



Source: IEA, *Energy Balances of non-OECD Countries 1996 to 2005*, Paris, © OECD/IEA.

## About the Authors

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