

# 9

## Energy Security in Indonesia

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### Introduction

Indonesia, which spreads over more than 17,000 islands and has a population of approximately 230 million, is the world's largest archipelago and the fourth most populous nation. It stretches along the equator for about 6000 kilometres – approximately the same distance as from San Francisco to New York. The territory extends roughly from 6° N to 10° S and from 95° E to 142° E, between the Indian and Pacific oceans and links the continents of Asia and Australia. While the country's territory covers an area of approximately 7.9 million km<sup>2</sup> (including the coastal Exclusive Economic Zone area), only approximately 1.9 million km<sup>2</sup> is land. Indonesia is the largest member state of the Association of Southeast Asian Nations (ASEAN) and accounts for nearly 40 per cent of its population and 36.5 per cent of its gross domestic product (GDP) (ASEAN, 2010).

Indonesia consumes the equivalent of 191 million tons of oil annually. This figure is projected to increase as a product of economic growth (World Bank, 2010). The Indonesian government has made energy security a policy priority. The Indonesian Ministry of Energy and Mineral Resources states that one of its missions is to provide energy security and ensure energy independence, as well as increase energy efficiency and take into account environmental issues in a way that maximises the welfare of the people (ESDM, 2010). Article 3 in the recently enacted law on energy (Law No. 30/2007) states that the ethos behind managing energy in Indonesia is to support the country's sustainable development and energy security. However, the law does not define energy security exactly. Nevertheless, the law does mention the goals of energy management energy, which are as follows:

- a) Achieving independent energy management;
- b) Guaranteeing the availability of energy in the country, both through domestic and foreign sources. Such availability is for:

- Supplying domestic energy demand;
  - Supplying intermediate inputs of domestic industries;
  - Increasing foreign reserves;
- c) Guaranteeing optimal, integrated and sustainable management of energy resources;
- d) Efficient use of energy in all sectors;
- e) Improving energy access for low-income people and those living in remote areas to improve their welfare in an equal and just way by:
- Providing support to make energy available to people on low incomes;
  - Building energy infrastructure in undeveloped regions and thus reducing regional disparity;
  - Developing autonomous energy industries and services and improving human professionalism;
  - Protecting the environment.

Based on the energy management goals stated in Law No. 30/2007, most Indonesian policy makers and energy analysts talk in terms of the '4 As' (availability, accessibility, affordability and acceptability), indicating the availability of energy at all times in various forms, in sufficient quantities, that can be accessible by most people at affordable prices, and obtained in a way that is not environmentally destructive (Indriyanto, 2010).

The issue of energy security has been the subject of discussion in Indonesia for a long time. However, until the end of the 1990s, it had never been central to the country's policy debates. The turning points were the depreciation of the rupiah, particularly in relation to the US dollar, during the 1997/98 Asian financial crisis and the increasing price of crude oil in the early 2000s, which made it very expensive to control the domestic price of fuel and electricity through energy subsidies. At that time, with approximately 43 per cent of its energy sources derived from crude oil,<sup>1</sup> the amount of government spending on energy subsidies increased from almost nothing in 1996 to approximately 21 per cent of total government expenditure in 2005 (ESDM, 2009). Whether the government could guarantee Indonesia's energy needs at an affordable price, and how to achieve it, became one of the hottest policy debates.

The issue of energy security became even more complex in 2005 when, for the first time in several decades, Indonesia became a net importer of oil. Since Indonesia is amongst the top 3–5 emitters of CO<sub>2</sub> globally, mostly as a result of deforestation and forest degradation, the increasing prominence of climate change concerns in the first decade of the twenty-first century also increased attention on energy concerns (Sari et al., 2007).

The Indonesian government reacted by developing policies and programmes to overcome the challenges associated with meeting energy security targets. This chapter will review some of the main challenges and

provide some understanding of the basis for Indonesia's current energy security policies. To achieve these goals, we first review Indonesian economic trends and development patterns since the 1970s, to provide background information on the main drivers of energy demand. Second, the chapter discusses energy supply and demand trends, which have been influenced by different issues, including declining oil and gas production and rapidly increasing domestic demand. Third, the Indonesian government's energy policies, including petroleum and electricity subsidies, are examined. Fourth, we discuss climate change issues and how concerns regarding the energy sector's greenhouse gas (GHG) emissions are influencing current energy security policies. We conclude with some final remarks related to energy security issues in Indonesia.

### **The Indonesian Economy**

For the sake of simplicity, Indonesia's 17,000 islands can be roughly divided into five major island-groups: Java-Bali, Sumatra, Kalimantan, Sulawesi and Eastern Indonesia. Indonesia shares the islands of Kalimantan with Malaysia, and Papua with Papua New Guinea (Resosudarmo et al., 2000). The Java-Bali island group dominates much of the Indonesian economy, accounting for 61 per cent of the total population and 61 per cent of GDP (Hill et al., 2008) while only occupying 7 per cent of the total land area.

Indonesia has 33 provinces, with the capital province Jakarta leading the regional income per capita. Inequality amongst provinces is widespread, with 50 per cent of the national GDP contributed by the three big provinces of Java: Jakarta, West Java and East Java. In 2004, the ratio of per capita gross regional domestic product (GRDP) of the richest to poorest province was 15.9 and 11.3 for household expenditure (Hill et al., 2008). Jakarta and the wider Java-Bali region is the centre for service-based, industrial economic activity, while the rest of the country relies heavily on mining and natural resource extraction.

In the 1970s, Indonesia grew at an average rate of above 7 per cent with earnings from oil exports as the main source of income. Indonesia was a net exporting country for oil until 2005 and the only Southeast Asian member of the Organization of the Petroleum Exporting Countries (OPEC) until 2008. Indonesia benefited from high oil prices in the 1970s but then suffered from the world oil price drop in the 1980s. Prices went from US\$37 per barrel in 1981 to US\$14 per barrel in 1986. To cope with the declining revenue and economic crisis at the time, the Indonesian government decided to diversify its economy by developing non-oil sectors. Relying too much on the oil and gas sector for economic revenue was considered not sustainable given the volatile nature of world markets. Indonesia adopted policies with the goal of liberalising trade, providing incentives for increasing exports, and conducting structural changes within the local economy. This reform was a

trendsetter that instigated Indonesia's current direction, that is, developing the industrial and services sector that are mainly concentrated in the Java-Bali island group (Resosudarmo and Kuncoro, 2006).

The 1997–1998 Asian financial crisis was a significant blow to the Indonesian economy. The Indonesian rupiah collapsed from 2300 to the dollar in June 1997 to more than 17,000 by January 1998. Inflation rose to 78 per cent and overall GDP growth was approximately minus 13 per cent. Since Indonesia controlled domestic fuel prices and wanted to maintain the pre-crisis price, the energy subsidy increased from almost nothing to approximately 17 per cent of total government expenditure, creating a significant fiscal burden on the government (Hartono & Resosudarmo, 2008).

The economic reforms following the Asian crisis focused mainly on strengthening the banking system, liberalising trade and foreign investment and promoting a better, more transparent government (Resosudarmo and Kuncoro, 2006). Reforms included an attempt to reduce the energy subsidy, which triggered huge riots, arson and mass looting in Jakarta. In May 1998, in the aftermath of the riots, under the threat of impeachment from no longer compliant leaders of parliament, Soeharto resigned from the presidency after 32 years in power. An important shift from Soeharto's authoritarian regime towards democracy took place. In 2001, the government enacted a new policy of political decentralisation, by vowing to increase the power of regional governments and change the centrist system of the Soeharto era. Before this decentralisation policy, the central government had the final say on nearly every issue, with regional powers exerting only limited authority in their own provinces. The system was also economically centrist, as most revenues from the mining and natural resource extraction went to Jakarta. Only non-resource revenue streams were distributed to regions. Under this model, high-earning regions saw only a fraction of their revenue contribution redistributed back to them. Decentralisation aimed to increase regional authority and the economic autonomy, so that high-earning regions could enjoy their revenue and manage their own budgets. These positive impacts, however, were not without their negative counterparts. The decentralisation policy caused increasing conflict between the central government and the regions; unprepared regional institutions caused more widespread corruption. These problems continue to affect Indonesia's investment sector (Resosudarmo and Kuncoro, 2006).

During the early 2000s, the increasing world price of crude oil increased the cost of the energy subsidy and placed the question of energy security on the political agenda. Various policy fora addressed the issue of whether Indonesia would be able to provide its people with the energy they need, and whether or not there would be enough energy to boost the country's industrial growth.

Despite these problems, including those regarding the energy sector, the Indonesian economy was able to recover. Since 2004, Indonesian per capita

Table 9.1 Indonesia: Main macroeconomic indicators

	Unit	2000	2002	2004	2006	2008
<b>GDP at 2000 prices</b>	<i>Trillion Rp</i>	1390	1506	1657	1846	2082
<i>Growth rate</i>	%	4.93	4.38	5.03	5.5	6.06
<b>Population</b>	<i>Million</i>	206	212	218	222	229
<i>Growth rate</i>	%	1.12	1.61	1.2	1.52	1.28
<b>GDP per capita</b>	<i>Thousand Rp</i>	6753	7104	7606	8308	9111
<i>Growth rate</i>	%	3.77	2.71	3.83	3.85	4.73

Source: ESDM (2009).

income has returned to pre-crisis levels, the rupiah has stabilised, inflation has been under two digits, foreign reserves have been relatively abundant and the economy has been able to grow by more than 5 per cent annually (Kuncoro and Resosudarmo, 2006). Table 9.1 shows that Indonesia's GDP has been growing at an average annual rate of approximately 5 per cent in the last ten years. Furthermore, it is projected that Indonesia will be growing at close to 6 per cent throughout the next decade.

Besides the economy, the population has also been growing at an average rate of approximately 1.3 per cent in the last decade, which is slightly higher than the world average, mainly due to the improvement in general health conditions. The infant mortality rate, as an important variable indicating general health conditions, dropped from 145 deaths per 1000 births in 1971 to 47 in 2000. In general, people's welfare has improved significantly since the 1970s. Average schooling years rose from only 1.9 in 1971 to 5.4 in 2000 (Hill et al., 2008). Poverty, measured by the percentage of people living below the official poverty line, dropped from approximately 30 per cent in 1984 to 17 per cent in 2004. Indonesia's Human Development Index (HDI) has been rising since the 1970s and continues to do so in the 2000s; HDI has risen by approximately 1.26 per cent annually, from 0.673 in 2000 to 0.734 in 2007 (UNDP, 2009).

The growing economy, increasing population and improvement of welfare are the main drivers of Indonesia's increasing consumption of energy. This is not surprising given that the United Nations Developments Programme (UNDP) (2004) has shown that there is a positive correlation between a country's HDI and its per capita energy consumption. In this sense, energy security has become central to Indonesia's policy debate.

### Energy Demand and Supply in Indonesia

Indonesia consumed the equivalent of approximately 191 million tons of oil in 2007, making it the 13th largest total energy consumer in the world and

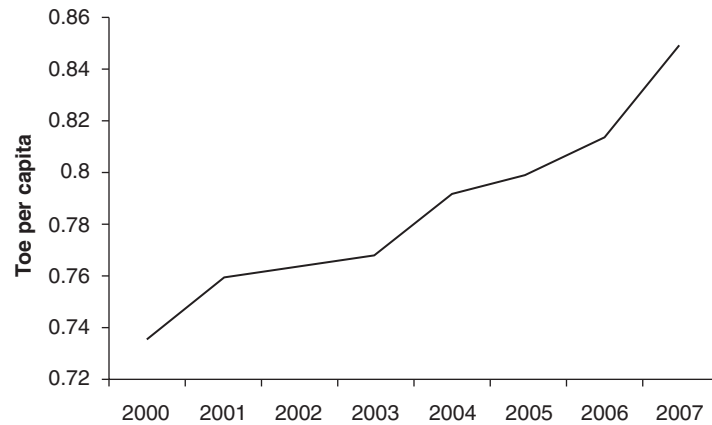


Figure 9.1 Indonesia: Final energy consumption per capita  
Source: NCCC and UNFCCC (2009).

the biggest in ASEAN. When calculated on a per capita basis, Indonesians consumed 0.85 toe per capita in 2007, far below the world average of 1.82 toe per capita and even below the ASEAN average of 2.22 toe per capita (World Bank, 2010). The energy consumption trend, however, has been increasing. From the year 2000 until 2008, the final energy consumption per capita has seen an increase of more than 15 per cent, or approximately 2.1 per cent annually, from the equivalent of 0.74 toe per capita in 2000 to 0.85 toe per capita in 2007 (Figure 9.1).

Analysed by sector, the end-users are categorised into industrial, household, commercial, transportation, and other sectors, with the industrial sector leading Indonesia's energy consumption with nearly half the total. Transportation is second, followed by the household sector (Figure 9.2). It can be inferred that the increase in energy consumption in the last two decades is mostly due to industrial sector growth.

Another characteristic of the high growth rate of Indonesia's energy consumption is that its consumption is not efficient, measured by the amount of energy used per GDP. Due to a technological gap, most developing countries have a higher energy intensity rate (i.e. less efficient use of energy) than developed countries. Industrialised countries tend to have access to better, more efficient technologies and cleaner fuel sources. However, Indonesia's energy intensity is also high when compared with several other developing countries, as shown in Figure 9.3. It must nevertheless, be noted that Indonesia's energy intensity started to decline from 2001 onwards, after increasing in the period 1996–1999.

While strong demand side growth reflects Indonesia's economic growth – mainly due to the growth of the industrial sector – the domestic supply side

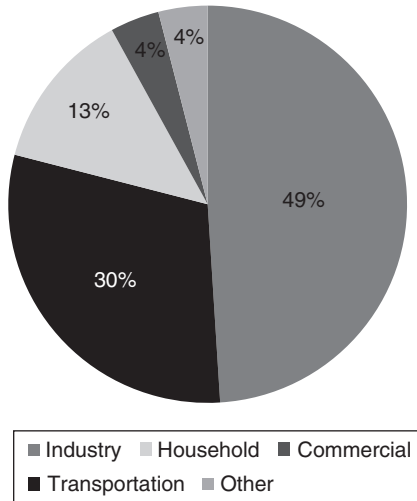


Figure 9.2 Indonesia: Share of total final energy consumption by sector (2008)  
Source: ESDM (2009).

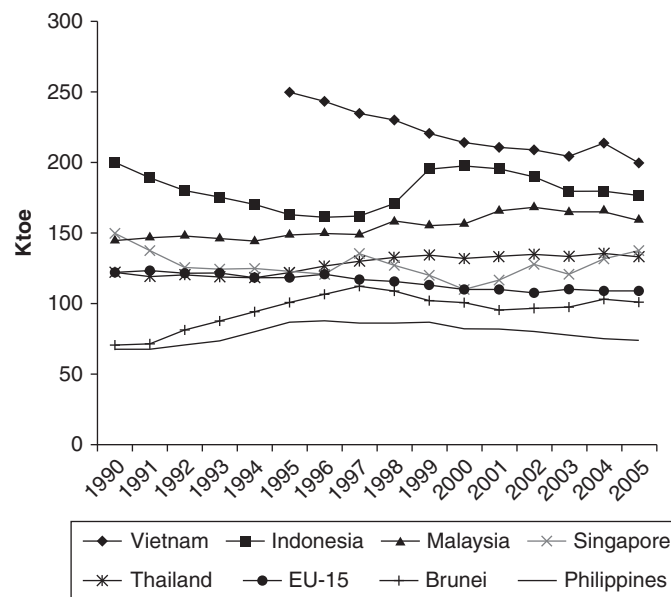


Figure 9.3 Energy intensity for selected Southeast Asian countries and EU-15  
Source: IEA (2007a, 2007b).

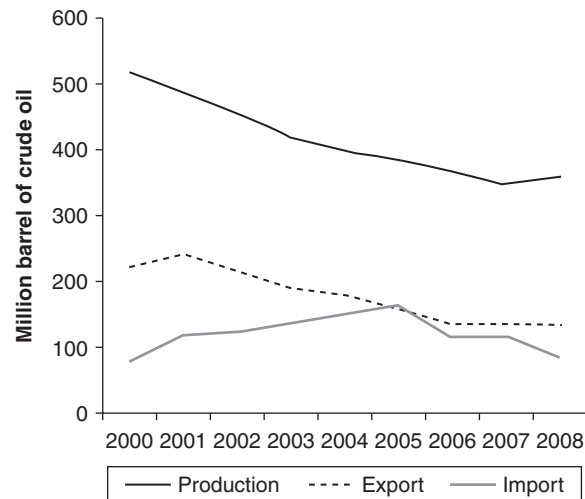


Figure 9.4 Indonesia: Crude oil production, export and import  
Source: ESDM (2009).

has not seen a similar trend. Crude oil production – on which Indonesia has traditionally relied for its energy needs and domestic oil reserves – has been consistently declining since 2000 (IIEE Research Team, 2006). In 2000, Indonesia’s crude oil production was 517 million barrels, whereas in 2008 it dropped to only 357 million barrels (Figure 9.4). One of the main factors contributing to this decline is the location of new reserves, mostly in far-flung areas where exploration is technically challenging. In addition, there is relatively flat exploration expenditure by oil companies, lack of investment in new technologies and no significant increase in refining capacity over the past decade (IIEE Research Team, 2006).

Flowing from production decline, Indonesian crude oil exports have also declined in the last decade. In 2005, Indonesia was a net-importer of crude oil as the government decided to prioritise domestic crude oil consumption over exports. As a result, the government enacted the Presidential Decree no 5/2006 on National Energy Policy in 2006 – a policy that explicitly pushes the country to reduce its reliance on crude oil and seek other energy sources – and decided to withdraw from OPEC in 2008.

Imports, on the other hand, increased along with increasing consumption and decreasing production in between 2000 and 2005. The Presidential Decree no 5/2006 prioritised a shift away from oil towards increased coal and natural gas consumption. This strategy might help to explain the more recent decline in crude oil imports. While the Indonesian government is trying to rely less on oil, it is still the main fossil fuel used throughout



the country and, as with energy consumption, there is increasing demand for refined petroleum products such as gasoline. Lack of investment in additional domestic refineries made way for increases in imported refined fuels, thus increasing Indonesia's vulnerability to international oil price fluctuations (IIEE Research Team, 2006).

While oil is Indonesia's main energy commodity, coal and natural gas have also played an important role, especially in the last decade. As of January 2007, Indonesia held the 10th largest proven natural gas reserves in the world and, in 2004, was the second largest net coal exporter in 2004 (EIA, 2007). Figure 9.5 illustrates Indonesia's various primary energy sources and their percentage share of the total energy supply. Petroleum products outstrip other sources, but its share is decreasing. Coal, on the other hand, has seen a sharp increase, as it is increasingly used in electricity generation. Coal soared from virtually zero in 1984 to 47 per cent of the state-owned power line networking's (PLN) fuel sources in 2008 (Resosudarmo et al., 2008; ESDM, 2009).

By 2007, coal had probably become the profitable mining sector. Coal-mining operations accounted for approximately 70 per cent of around US\$6 billion that mining contributed to government revenue in that year (US Commercial Service, 2007). Furthermore, since 2003, the export value of coal has been the highest amongst other mining commodities, reaching approximately US\$6 billion. As the government has set a target of increasing coal's share of primary energy supply to more than 33 per cent by 2025, up

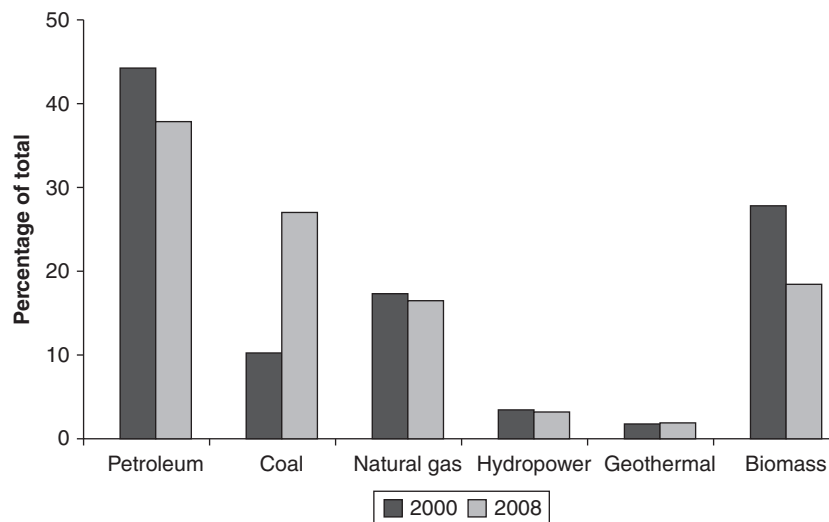


Figure 9.5 Indonesia: Primary energy supply

Source: ESDM (2009).

from 26 per cent in 2008, Indonesia's coal production is expected to increase. At the same time, revenues from exporting coal have become increasingly important for the Indonesian government.

### **Energy Security and Development Policies**

Since the mid 2000s, energy security has been a priority for the government of Indonesia. The strategies adopted by the government to manage its resources and the policies enacted to balance domestic use and supply have become critically important issues, given Indonesia's rapidly developing economy. The state plays a prominent role in regulating and managing the country's energy and natural resources, as stipulated by the 1945 Constitution. The Ministry for Energy and Mineral Resources defines its first priority as ensuring energy security and independence, with an emphasis on domestic supply of energy sources.

Recent key energy security policy legislation consists of: Presidential decree No. 5/2006 on National Energy Policy, Law No. 30/2007 on Energy, Law No. 17/2007 on the Long-term National Development Plan 2005–2025 Rencana Pembangunan Jangka Panjang Nasional (RPJPN) and Law No. 5/2010 on the Medium-term National Development Plan 2010–2014 Rencana Pembangunan Jangka Menengah Nasional (RPJMN). All four of them present programmes and policies connected to the availability of energy, development and people's welfare (Indriyanto et al., 2007). The main goal of these recently introduced policies is to diversify energy sources for Indonesia in order to reduce its dependence on oil. As previously mentioned, Indonesia is vulnerable to the dynamics of the international oil market, juggling declining domestic production with increasing consumption and refined imports. The main challenge, however, is Indonesia's controversial but popular energy price subsidies. Domestic energy prices are controlled by the government and they are below both supply cost and world prices, with the heaviest subsidies in place for kerosene, one of the nation's main cooking fuels and 'premium' gasoline (a non-subsidised version, 'pertamax', exists). According to the revised 2010 state budget, this fuel subsidy is projected to cost the government approximately US\$9.78 billion for 2010. In addition to petroleum products, the Indonesian government also controls the end-user price of electricity, which is currently lower than the production cost, and so subsidises electricity prices too. The state-owned National Electricity Company has a monopoly on electricity generation and distribution. The main energy source for power plants is oil. Hence, both fuel and electricity subsidies place a heavy burden on the government when crude oil prices are high (Indriyanto, 2008). For example, during the period of high world prices of crude oil (see Figure 9.6), the total government subsidy of fuel and electricity amounted to approximately 23 per cent of total government expenditure in 2008. In 2009, the world price of crude oil declined and so the total subsidy

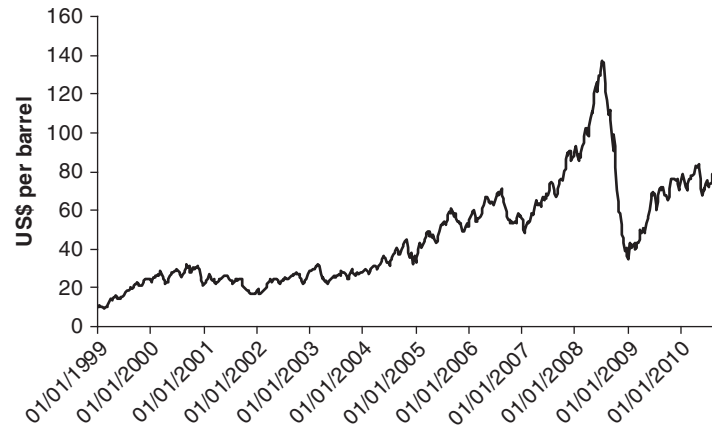


Figure 9.6 Crude oil: Average world price (1999–2010)

Source: US Energy Information Administration [[http://www.eia.doe.gov/dnav/pet/pet\\_pri\\_wco\\_k\\_w.htm](http://www.eia.doe.gov/dnav/pet/pet_pri_wco_k_w.htm); accessed: 28 September 2010].

on fuel and electricity went down to 10 per cent. Increasing the domestic price of fuel and electricity typically creates social and political unrest and so it can only be implemented progressively. Other options are to increase energy intensity and divert the source of energy from oil to other sources.

The Presidential Decree no 5/2006 explicitly lists two priorities for the national energy policy: reduce energy elasticity to lower than 1 by 2025, and supply the optimal primary energy mix by 2025. Energy elasticity refers to energy intensity per GDP, which is currently higher in Indonesia than in most other ASEAN countries. The optimal energy mix policy aims to diversify the country's energy sources, with less reliance on oil and more on natural gas, coal and renewable energy. As Table 9.2 clearly indicates, the decree lists the optimal primary energy portfolio that needs to be achieved by 2025. In comparison to the 2008 primary energy consumption, the

Table 9.2 Indonesia: Primary energy consumption

2008		2025 Target	
Petroleum	37%	Coal	33%
Coal	26%	Natural gas	30%
Biomass	18%	Petroleum	20%
Natural gas	16%	Biofuels	5%
Hydropower	2%	Geothermal	5%
Geothermal	1%	Other renewables	5%
		Other fossil fuels	2%

Source: Republic of Indonesia (2006), Presidential decree No. 5/2006.

Indonesian government will have to increase the share of natural gas and coal, and decrease the share of petroleum and biomass. Some experts have expressed concern that the targeted share of geothermal energy is too small, given the country's abundant potential in this area.

With this policy in place, it is clear that the government is trying to steer the nation away from oil dependence. Another regulation attempting to divert Indonesia energy sourcing is Law 5/2010 on the Medium-term National Development Plan 2010–2014 released by Indonesia's National Planning and Development Agency (*Badan Perencanaan dan Pembangunan Nasional* or Bappenas). This law – which identifies energy as the 8th National Development Priority – aims to attain national energy security and to ensure the continuity of national growth through institutional restructuring, while optimising the widest possible utilisation of alternative energy. Therefore, developing renewable energy is now a greater priority, assuming that the policy is fully implemented (Bappenas, 2010). Article 3 of the legislation targets an increase in electricity generation capacity by an average of 3000 MW per year starting in 2010. The ultimate target is to increase the spread of electricity, from an electrification ratio of 62 per cent at present to 80 per cent in 2014.

Despite the attempt to diversify energy sources, Indonesia still has to address the problem of how to eliminate its energy subsidies. It is true that the main goal of the subsidies is to enable low-purchasing power people to consume fuel, but the negative implications of this policy seem to be obvious. Indriyanto et al. (2007) argued that subsidies tend to cause overconsumption, since the market price does not reflect the actual cost of producing one unit of petroleum product. Subsidies also discourage energy efficiency measures and the development of alternative or renewable energy sources by way of low electricity tariffs. The state budget is heavily burdened by this policy and, in order to provide low-priced electricity, a little less than half the population are denied access to electricity. This policy mostly favours the urban population or those who are privileged enough to have access to electricity while forgoing the development of necessary new infrastructure needed to deliver electricity to those without it.

The issue of subsidies needs to be dealt with prudently. It has in fact become a highly political process as confirmed by past riots in response to price reforms. To this end, the Ministry of Energy and Mineral Resources has developed a strategy to reduce the petroleum subsidies gradually. The ultimate goal of this strategy is to eliminate petroleum subsidies entirely by 2025 (Sutijastoto, 2006). Whether or not the Indonesian government will succeed in implementing necessary reforms remains to be seen.

### **Climate Change Issues**

As an archipelagic developing country located on the equator, Indonesia is quite vulnerable to the effects of anthropogenic climate change. Sea-level

rise brought on by melted glaciers and expanding seawater will affect Indonesian coastal areas greatly, and precipitation and rainfall pattern changes will hinder agricultural productivity, amongst other problems (Bappenas, 2010). As the globe continues to warm, increasing volatility of seasonal patterns, and water shortage and flood problems are amongst the worst climate change effects on Indonesia.

Although it is a developing country, Indonesia's GHG emissions are significant. In the mid 2000s, although Indonesia ranked in the top five national emitters of GHGs, it would have ranked 16th or lower globally if emissions from deforestation and forest degradation were excluded (Sari et al., 2007). The forestry sector gained most government and international public attention, since it contributed more than 85 per cent of Indonesia's CO<sub>2</sub> emissions.

Emissions from the energy sector, however small, are rapidly growing. As mentioned, Indonesia is a fast emerging economy with an increasingly affluent population which aspires to better living conditions and, as a consequence, energy consumption per capita is increasing. As the population continues to grow and becomes richer, energy use will also grow. It is expected that, at the current rate of consumption and fossil fuel use, emissions from the energy sector will at least triple from 0.3 Gt CO<sub>2</sub>e in 2003 to more than 1 Gt CO<sub>2</sub>e in 2030 (Sari et al., 2007). CO<sub>2</sub> emissions from the energy sector must be managed, as this sector is crucial to the development of the Indonesian economy, both for earning export/foreign exchange revenue and for fulfilling the need for domestic energy (Bappenas, 2010).

In line with the above concerns and the national development planning priorities, the Indonesian government will focus on a set of priority sectors. These priority sectors are divided into mitigation and adaptation priorities, with the energy sector falling into the mitigation category. In order to reduce emissions from the energy sector Indonesia needs to properly address its heavy reliance on fossil-based fuels. More than 79 per cent of Indonesia's energy comes from fossil fuels, with 26 per cent of the total coming from coal. Heavy reliance on coal for power generation sector is the main contributor to Indonesia's high energy intensity rate (Resosudarmo et al., 2009). Coal is the dirtiest of the three main fossil fuels as it releases twice as much carbon dioxide per unit of energy as natural gas (EIA, 1993).

During the 2009 G-20 meeting in Pittsburgh, Indonesia announced its national target of reducing GHG emissions by 26 per cent below the Business As Usual (BAU) scenario by 2020 without the financial assistance of other countries, and by 41 per cent with international assistance. Figure 9.7 illustrates Indonesia's sectoral emissions in 2005. Quite obviously peatland, forestry and energy make up the largest sectoral emitters of CO<sub>2</sub> in Indonesia. Under the BAU scenario, this composition will not change much by 2020. With continuing deforestation, the forest area in Indonesia will naturally decline by 2020 with a corresponding declining growth rate of CO<sub>2</sub>

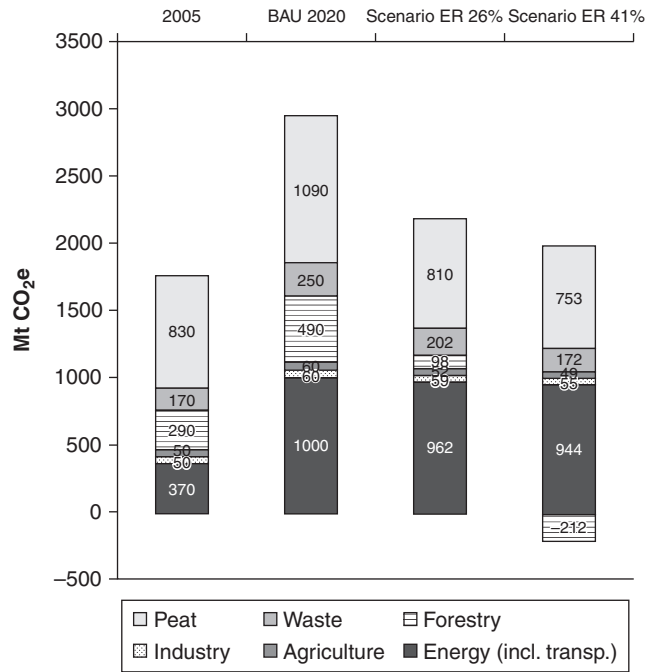


Figure 9.7 Indonesia: Projection of 2020 GHG emissions under BAU and emissions reduction scenarios  
 Source: NCCC (2009).

emissions from forest fires and less land clearing. The energy sector, on the other hand, is expected to grow continuously during this period, and thus its CO<sub>2</sub> emissions will rapidly grow from approximately 375 Mt CO<sub>2</sub>e in 2005 to approximately 1 Gt CO<sub>2</sub>e in 2020.

Looking at the 26 per cent reduction scenario, the forestry sector's emissions share declines significantly. But under this scenario, Indonesia is able to maintain the size of its forest cover, as the primary reduction of CO<sub>2</sub> emissions will come from the prevention of deforestation. This in turn will make the energy sector the largest sectoral emitter of CO<sub>2</sub> by 2020.

Table 9.3 lists Indonesia's overall plan of action to reduce CO<sub>2</sub> emissions by 2020. With regard to the energy sector, the Indonesian government opted to focus on three aspects, namely demand-side management, energy efficiency and developing renewable energy. Demand-side management primarily deals with end users and their energy consumption patterns. High fuel consumption coupled with low energy prices due to government subsidies are pressing concerns. On the supply side, the emissions intensity of electricity generation must also be improved. The possibility of using

Table 9.3 Indonesia: Emissions reduction plan

Sector	Action plan
Peatland	Improve peatland management, peatland mapping and law enforcement, generate alternative economic activities and strengthen peat fire management
Forestry	Improve programmes in forest fire management, combating illegal logging, preventing deforestation, local community involvement as well as land and forest rehabilitation
Agriculture	Improve water management programmes and plant rice varieties with less methane
Waste	Implement municipal solid waste law, enhance 3Rs (reuse, recycle, recovery), encourage private sector investment and develop landfill improvement programmes
Industry	Increase energy efficiency and access to better technologies
Transportation	Implement fuel efficiency standards, enhance public transportation infrastructure and implement traffic demand management
Energy	Improve programmes in energy conservation, demand-side management, geothermal energy and other renewable energy development

Source: NCCC and UNFCCC (2009).

cleaner and more efficient – though potentially more expensive – energy sources should be explored. Aside from gas, renewable energy sources such as micro-hydro and geothermal provide feasible alternatives to coal and oil. For Indonesia to be able to implement this, of course, requires reforms in the energy sector, though political willingness does not appear to be embedded in this policy.

Indonesia's ongoing energy security strategy seems to conflict with the goal of mitigating climate change. On the one hand, diversification policies aim to reduce oil reliance. Without taking into account environmental considerations, the logical alternative to oil is coal. By using coal, Indonesia achieves domestic energy security by utilising domestic reserves, so there is no, or limited, reliance on imports. Since coal is more of a local commodity than oil, it also enjoys fewer price fluctuations on the international market. Ready-to-use technologies and government incentives make coal mining an even more financially viable choice as Indonesia's main energy source.

When climate change is taken into consideration, the solution for diversification needs to be different. The coal-favouring situation conflicts with the solutions necessary to reduce energy sector emissions. The solutions currently considered by the government to resolve this conflict are as follows:

- Electricity reforms: To promote a significant shift away from coal and oil as primary fuel choices and utilise more natural gas, geothermal and other renewable energy sources such as hydropower;
- Carbon tax: A comprehensive tax that mainly targets the carbon-intensive coal industries. The carbon tax would be designed to have a larger impact on heavy industries and less on ordinary Indonesians, since most of the population still has low levels of energy consumption;
- Eliminating fuel subsidies: A far more serious attempt to eliminate or decrease subsidies on kerosene, gasoline and other refined fuel products remains a potential solution to drive down consumption and provide incentives to develop alternative energy sources. Decreasing subsidies for end user consumers, however, will affect ordinary Indonesians, who are still struggling with low purchasing power, the most.

Therefore, with climate change taken into consideration, the direction of the ongoing energy security strategy has to be re-orientated to take into account the energy reforms mentioned above.

Again, however, how far Indonesia will be diverted from its ongoing energy strategy remains to be seen. First, Indonesia is currently implementing its crash programme to build 10,000 MW of coal power plants within the next five years or so. One power plant has been finished and two more should be completed by the end of 2010. Implementation of this programme is certainly complicating Indonesia's attempt to redirect its energy security strategy towards one that takes the climate change issue into consideration. Second, in an attempt to gain popularity, President Susilo Bambang Yudhono decided to lower the domestic price of fuel. It is true that world crude oil prices, throughout 2010, have been low; however, the president's attitude really shows how reluctant the government is to adjust the domestic price of fuel in line with world prices.

### **Concluding Remarks**

This chapter sought to describe ongoing energy security policies in Indonesia and to explain the underlying reasons for these policies, while showing how climate change issues might affect the direction of these policies. From the discussion presented here, it can be concluded that the main drivers of increasing energy consumption in Indonesia are, as in many other countries, the steady growth of its economy and of the population's welfare. While there is generally nothing wrong with this trend, it must be remarked that energy intensity in Indonesia is relatively high – even when compared with other developing countries in the region – and that the main source of energy in Indonesia has to date been oil, with its wildly fluctuating prices. Indonesia currently sets its domestic price of fuel and electricity much lower than world prices in an attempt to support the purchasing power of its



people. Consequently, when the world price of oil increases, the subsidies inflate and become a great burden on the government. Such considerations notwithstanding, these subsidies remain popular. Whenever it tries to level domestic prices to the world price, the Indonesian government receives much criticism, in many cases followed by social unrest. On the other hand, it enjoys higher public support each time it reduces the price of domestic fuel. Hence, even if the government really wants to adjust the domestic price of fuel and electricity in line with the world price, it can only do so gradually. The other way to reduce the burden of this subsidy would be to diversify the country's energy source away from oil. Towards this end, the initial obvious option is coal. Indonesia's coal reserve is abundant and the technology needed to build coal power plants is relatively cheap.

Since the 1990s, climate change due to GHG – mostly CO<sub>2</sub> emissions – has rapidly emerged as the top environmental problem worldwide. Indonesia recognises that it has been amongst the top CO<sub>2</sub> polluters around the world, and has reacted by committing to reduce its level of CO<sub>2</sub> emissions. The current plan is to reduce total emissions by as much as 26 per cent compared to BAU by 2020 without the financial assistance of other countries, and by 41 per cent with international assistance. Though this commitment mostly affects the Indonesian forestry sector, it significantly forces the Indonesian government and economy at large to rethink their energy sector policy, and more precisely its energy security policy. First, Indonesia needs to actually implement its plan to reduce and eliminate its energy subsidies and, if possible, to reduce the time taken to eliminate these subsidies. Second, diverting its source of energy from oil to coal will increase Indonesia's CO<sub>2</sub> emission, since coal is a dirtier source of energy than oil. Indonesia needs to redirect this path away from oil, not to coal, but to much cleaner energy sources, such as geothermal, gas or other renewable energy sources. Indonesia has started developing plans to more seriously reduce and eliminate its energy subsidy as well as to create incentives for investments in utilising much cleaner energy sources. The devil will be in the details when it comes to implementation of this policy. It is clear, however, that a successful outcome will require a much stronger commitment to reform than the Indonesian government has shown to date.

## Notes

1. Indonesia's energy sources also include gas (16 per cent of the total), coal (10 per cent), and other sources, predominantly wood (31 per cent).

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