

Alternative Electricity Supply Options for Malaysia

A Scenario Analysis for Meeting Economic and Environmental Challenges

Jaya Singam A. Rajoo

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Malaysia has established an ambitious development goal of becoming a fully developed country by 2020. It has also experienced an impressive economic growth with an annual average rate of six per cent for the period 1990 to 2007. This growth had been contributed by the industrial sector which is also the major electricity consumer. The Industrial Master Plan 3 outlines the country's goal in attaining Vision 2020 by developing the industrial sector, particularly manufacturing. Indigenous energy resources, particularly, gas had spurred the industrial sector's growth. With existing gas fields in Peninsular Malaysia becoming depleted, domestic demand had to be met with imports¹. Cheaper electricity from subsidised gas may no longer be available for the industrial sector's growth.

This study aims to explore the country's electricity supply options against these challenges as well as meeting its economic and environmental goals. Five electricity supply scenarios were developed, the business-as-usual (BAU) scenario based on existing energy policies and four alternative scenarios that incorporate environmental, energy security and fossil fuel reduction goals. The RE scenario is based on promotion of renewable energy to reduce fossil fuel consumption; the Nuclear and Gas scenario promotes natural gas and nuclear energy to reduce coal import; the DSM scenario is based on reduction of total electricity demand by the industrial, residential and commercial sector through energy efficiency and demand side management measures; the Mitigation scenario incorporates all three approaches in the alternative scenarios to reduce electricity demand, fossil fuel consumption and environmental emission. Based on the results of the scenario analysis, there is potential to reduce electricity demand by 86.5 TWh in 2030. The CO₂ emission reduction potential ranges from 265 million tonnes to 1.3 billion tonnes while the SO₂ reduction potential ranges from 4.5 to 17.9 million tonnes in 2030. The total fossil fuel reduction potential ranges from 37.7 to 270 Mtoe.

Cumulative costs and benefits analysis based on a 5 per cent discount rate against the BAU scenario shows that only the DSM scenario offer a net benefit in electricity generation. However, all alternative scenarios show a net benefit with a 10 per cent discount rate. The cost of saving carbon in all the alternative scenarios in US\$ Million/tonne also shows a net benefit for both discount rates. The costs of electricity generation including environmental externality costs shows that the Mitigation scenario has the lowest cost compared to all other scenarios at US\$4.5 billion in 2030 compared to the BAU's US\$8.7 billion for the same year.

¹ Natural gas reserve in 2007 was 88.9 Tscf and estimated to last for 34 years at present production rate. Most of this gas is located in Sarawak and Sabah (Source: Ministry of Finance, Malaysia's Economic Report 2007/2008)