

# Energy demand, economic growth, and energy efficiency—the Bakun dam-induced sustainable energy policy revisited

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## Abstract

In embarking on a dynamic course of economic development and industrial modernism, Malaysia sees the need to increase its electricity generation capacity through the development of a mega-dam project—the Bakun dam. Although hydroelectricity generation offers one of the benign options in accommodating the increasing energy consumption per capita in Malaysia, it is argued that the construction of Bakun's dam which involves a complete and irreversible destruction of 69,640 ha of old forest ecosystem remains a difficult and uncertain endeavour. It is further argued that apart from mega-dam technology, there are also other means to orchestrate a sustainable energy system in Malaysia. These include the implementation of demand and supply initiatives, such as the deployment of energy saving technology or influencing behavioral change towards a sustainable energy consumption pattern.

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## 1. Introduction

Malaysia's profound transformation from an agriculturally based economy in the 1960s into an industrially oriented nation in the 1990s indicates that adequate supply of energy, especially the supply of electricity is critical to sustaining its industrial development momentum. It also reflects that energy consumption per capita will have to grow in the future amidst the chorus of acclaim of its industrial dynamism. This growth of per capita energy consumption has come to be associated with the triumph of mega-dam technology, which is embraced by Malaysia as one of the catalysts for industrial modernization. It is also increasingly recognized that mega-dam technology also serves as one of the strategic means to promote the objectives as contained under the Malaysian National Energy Policy (MNEP). These objectives include: (i) supply objective, which aims to ensure the provision of an adequate, secure, and cost-effective energy supply, (ii) utilization objective, which aims at promoting an efficient and clean utilization of energy consumption patterns and,

(iii) environmental objective, which aims to minimize the negative impacts of energy production on the environment. Furthermore the deployment of dam technology is also recognized by Malaysia as one of the crucial means to mitigate its imminent oil and gas depletion problems.

It is under this setting that Malaysia undertakes to construct one of the largest dams in the world—the Bakun dam (see Fig. 1 for the geographical location). The dam, which is the largest in Southeast Asia, is 205 m high with an installed capacity of 2400 mega watt (MW), and a lifespan of 50 years. The impoundment of the dam will inundate 69,640 ha of forest ecosystem—an area larger than the size of Singapore. The project is estimated to cost RM9 billion (\$1US = RM3.8, RM = Ringgit Malaysia). Mega or large dam may be defined as dam more than 15 m high or dam with a reservoir volume of at least 3 million m<sup>3</sup> (see for example, WCD, 2000).

However, accepting the premise that the Bakun project is critically important to achieve long-term growth and energy security in Malaysia, there is still a need to explore if it indeed represents a truly sustainable energy policy. Sustainable energy policy is only “truly” sustainable if it is not only consistent with the attainment of the objectives as stated in MNEP, but

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Fig. 1. Map of Malaysia and the geographical location of Bakun's Dam. *Notes:* Malaysia consists of West Malaysia (Peninsular Malaysia) which has 11 states with Kuala Lumpur as its capital, and East Malaysia which contains 2 states, namely, Sabah and Sarawak. This two parts of Malaysia is separated by South China Sea.

also compatible with the development of a cohesive and sustainable society.<sup>1</sup> This necessarily calls for the need to critically assess the nature and impacts of the Bakun dam-induced energy policy in order to determine if it fulfills its intended objectives as noted above. It also seeks to examine if the Bakun source of energy unfolds itself as a form of renewable and “green energy for the future” as claimed by the Malaysian authority (see EPU, undated). Renewable energy (RE) refers to any source of energy that can be used without depleting its reserves. Moreover, the nature of the analysis also inspires in-depth discussion on the potential of energy demand and supply measures as a means to promote a truly sustainable energy policy in Malaysia, and the establishment of an institution that is necessary to achieve this.

## 2. Bakun's energy policy—the *raison d'être*

### 2.1. Economic rationale

One of the main trusts underlying the implementation of the Bakun dam-induced energy policy and development strategy is the wide belief that energy consumption per capita is directly related to GDP/capita, i.e. high energy consumption = high production = high GDP growth.<sup>2</sup> This may be reflected in Figs. 2 and 3, where

<sup>1</sup> This is in accord with UNDP, UNDESA, and WCE's definition of sustainable energy, which states that sustainable energy “does not simply refer to a continuing supply of energy, but to the production and use of energy resources in ways that promote—or at least are compatible with—long-term human well-being and ecological balance” (UNDP, UNDESA, WCE, 2000, p. 3).

<sup>2</sup> Energy intensity is the ratio of total primary energy supply to gross domestic product. It may be converted in terms of purchasing power parity (PPP) to show the amount of energy use in the economic activity

from 1980 to 2001, energy and electricity consumption patterns in Malaysia moved more or less concurrently with GDP growth.

The GDP–energy interrelationship serves as a basic foundation under which the projection of energy demand in Malaysia is made. Accordingly, it is projected that by 2020, the final energy demand in Malaysia will reach 116 mega ton of oil equivalent (Mtoe) based on an annual growth rate of 8.1%. It is further estimated that about 58.2 Mtoe (50%) of the total projected energy requirement will be absorbed by the industrial sector (PTM, 2001). As far as the demand for electricity is concerned, it is forecasted to reach 21,668 MW by 2010 at an annual growth rate of 8.87% based on the assumption that GDP increases at an average rate of 7.3% from 2003 onwards (see ACE, 2002). This increasing future energy demand scenario appears to have made the Bakun project ever more critical to sustain long-term economic growth and industrial dynamism in Malaysia.

### 2.2. Resource depletion mitigating measure

Traditionally, the energy sector in Malaysia is based on a “four-fuel mix” strategy, i.e. gas, oil, hydro and coal. Historically, the generation mix placed heavy reliance on oil for electricity generation. This results in rapid depletion of its oil deposit. In fact, it has been projected that Malaysia's crude oil reserve will be depleted by 2008. As at December 2001, crude oil reserve in Malaysia was estimated at about 3.39 billion

(footnote continued)

in a country (Mielnik and Goldemberg, 2000, p. 504). PPPs are the rates of currency conversion which eliminate the differences in price levels between different countries arising from exchange rate fluctuation (see Ferguson et al., 2000, pp. 923, 924).

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