

Energy for sustainable development in Malaysia: Energy policy and alternative energy

Abdul Rahman Mohamed, Keat Teong Lee*

*School of Chemical Engineering, Engineering Campus, Universiti Sains Malaysia, Seri Ampangan,
14300 Nibong Tebal, Seberang Perai Selatan, Pulau Pinang, Malaysia*

Available online 31 May 2005

Abstract

Energy is often known as the catalyst for development. Globally, the per capita consumption of energy is often used as a barometer to measure the level of economic development in a particular country. Realizing the importance of energy as a vital component in economic and social development, the government of Malaysia has been continuously reviewing its energy policy to ensure long-term reliability and security of energy supply. Concentrated efforts are being undertaken to ensure the sustainability of energy resources, both depletable and renewable. The aim of this paper is to describe the various energy policies adopted in Malaysia to ensure long-term reliability and security of energy supply. The role of both, non-renewable and renewable sources of energy in the current Five-Fuel Diversification Strategy energy mix will also be discussed. Apart from that, this paper will also describe the various alternative energy and the implementation of energy efficiency program in Malaysia.

© 2005 Elsevier Ltd. All rights reserved.

Keywords: Alternative energy; Energy policy; Sustainable development

1. Introduction

Life is a continuous process of energy conversion and transformation. The accomplishment of civilization has largely been accomplished due to the increasing efficient and extensive harnessing of various forms of energy to extend human capabilities and ingenuity. Energy is thus one of the indispensable factors for continuous development and economic growth (Rogner and Popescu, 2001). However, at the same time, energy production can contribute to local environment degradation, such as air pollution and global environmental problems, principally climate change. Lately, the demand for energy is expected to increase worldwide over the next 24 years (International Energy Outlook, 2004), both in the industrial countries and particularly in the developing countries like Malaysia where rapid economic growth is expected. Fig. 1 shows the energy demand

for Malaysia in the year 1999, 2002 and estimated values for 2005, 2010 (Thaddeus, 2002; UK Trade & Investment, 2003). It can be seen that the energy demand in Malaysia increases rapidly as the energy demand increase almost 20% within the last 3 years (from 1999 to 2002). The energy demand is further expected to increase to 18,000 MW by the year 2010. In order to meet the increasing demand of energy in Malaysia, a major challenge facing the power industry will be having an effective and sustainable energy policy. An effective and sustainable energy policy has two main considerations. The first consideration is to increase access to affordable, modern energy services in countries that is lacking and secondly, to find the mix of energy resources and technologies (efficiencies) that will reduce the adverse environmental impacts of providing necessary energy services (Spalding-Fecher et al., 2005). Since all the urban areas and 93% of the rural areas in Malaysia have access to electricity (World Employment Report, 2001), the crucial challenge facing the power sector in Malaysia currently is the issue of sustainability that is to

*Corresponding author. Tel.: +60 4 594 1012; fax: +60 4 594 1013.
E-mail address: chktlee@eng.usm.my (K.T. Lee).

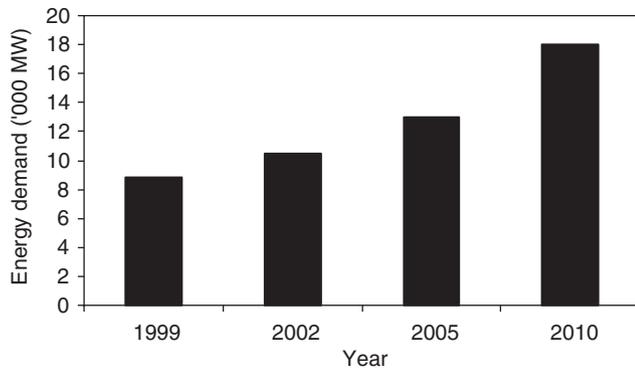


Fig. 1. Energy demand in Malaysia. Sources: Thaddeus (2002) and UK Trade & Investment (2003).

ensure the security and reliability of energy supply and the diversification of the various energy resources. The question of security and reliability of supply is critical, to ensure smooth implementation of development projects to spur economic growth in Malaysia while diversification of energy resources is critical to ensure that the country is not dependent only on a single source of energy (Leo-Moggie, 1996). At the same time, these challenges must be met without having adverse effect on the environment to ensure sustainability. Therefore, the aim of this paper is to describe the various energy policies adopted in Malaysia to ensure long-term reliability, sustainability and security of energy supply. The role of both, non-renewable and renewable sources of energy in the current Five-Fuel Diversification Strategy energy mix will also be discussed. Apart from that, this paper will also describe the various alternative energy and the implementation of energy efficiency program in Malaysia.

2. Energy policies in Malaysia

Throughout the years, the government of Malaysia has formulated numerous energy-related policies in order to ensure the long-term reliability and security of energy supply for sustainable social-economic development in the country. The various energy policies included the National Energy Policy (1979), National Depletion Policy (1980) and Fuel Diversification Policy (1981, 1999). The National Energy Policy has three primary objectives; supply, utilization and environmental. The first primary objective is to ensure the provision of adequate, secure and cost-effective energy supply by developing indigenous energy resources (both non-renewable and renewable) using least cost options and to diversify supply sources (both from within and outside the country). The second objective is to promote the efficient utilization of energy and discourage wasteful and non-productive patterns of energy

consumption within the socio-cultural and economic parameters. The final objective is to ensure that factors pertaining to environmental protection are not neglected in the pursuit of the supply and utilization objectives. Environmental challenges facing the energy sector cover climatic change, air and water pollution as well as solid waste, which are mainly caused by the increasing use of fossil fuels (Hitam, 1999). On the other hand, the National Depletion Policy is aimed to conserve the country's energy resources, particularly oil and gas, as these resources are finite and non-renewable. In this respect, the production of crude oil was limited to an average of 630,000 barrels per day (bpd) while the consumption of gas in Peninsular Malaysia is limited to about 32,000 million standard cubic feet per day (Mariyappan, 2000).

The Fuel Diversification Policy in Malaysia was continuously reviewed to ensure that the country is not too dependent on a single source of energy. Table 1 shows the energy mix in Malaysia for the year 1980, 1990, 2000 and 2003 (Abdul-Rahman, 2003; BioGen, 2003). Since 1980, the Malaysian government has implemented the four-fuel diversification strategy in the energy mix. This strategy was implemented after the occurrence of two international oil crisis and quantum leaps in prices in the year 1973 and 1979, in which during that time, the Malaysian energy sector had been highly dependent on a single source of energy, oil. Faced with the possibility of prolonged energy crisis, the government called for the diversification of energy resources away from oil. Other options of energy resources available at that time were hydropower, natural gas and coal as there were large untapped indigenous hydropower and natural gas reserves, while coal was considered an abundant worldwide resource with a very low and stable price (Thaddeus, 2002). As a direct consequence of this strategy, the contribution of oil to the energy mix has dropped drastically from a high 90% dependence in 1980 to less than 10% in 2003 as shown in Table 1. On the other hand, natural gas, coal, hydro and biomass contributed 71.0%, 11.9%, 10.0% and 1.1%, respectively to the energy mix. However, using conventional non-renewable energy such as fossil fuels (oil and coal) and natural gas in the energy mix has

Table 1
Energy mix in Malaysia

| Source | 1980 (%) | 1990 (%) | 2000 (%) | 2003 (%) |
|-------------|----------|----------|----------|----------|
| Oil | 87.9 | 71.4 | 53.1 | 6.0 |
| Natural gas | 7.5 | 15.7 | 37.1 | 71.0 |
| Hydro | 4.1 | 5.3 | 4.4 | 10 |
| Coal | 0.5 | 7.6 | 5.4 | 11.9 |
| Biomass | — | — | — | 1.1 |

Sources: Abdul-Rahman (2003); BioGen (2003).

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات