



Malaysia



The electricity supply industry in Malaysia was corporatised and later privatised in 1992 complementing the Government's aim to increase private sector's participation in infrastructure development, promote competition and improve efficiency in the power sector. There are three major utilities in the country – Tenaga Nasional Berhad (TNB), Sabah Electricity Sdn Bhd (SESB) and Syarikat SESCO Berhad (SESCO).

In 1992, The Government opened up the generation sector by licensing IPPs to supply electricity to the utilities through negotiated PPA. The Government incentivises IPPs through bankable PPAs under a single buyer model within each utility domain.

For the distribution sector in Peninsular Malaysia, the Government has issued licenses to companies to operate as local distributors or suppliers of electricity in designated franchise areas, such as hill resorts, islands, shopping complexes and industrial parks. Some of these companies also operate their own co-generation plants to supply part of their supply demand with the rest purchased from the utilities grid supply. TNB, SESCO and SESB remain the main distributors of electricity throughout the Peninsular, Sarawak and Sabah respectively.

The current structure adopted by the electricity industry gives priority to meeting demand and ensuring security of supply.

The key features of the industry are:

- Industry regulation under the Energy Commission (EC)



Photo: Bloomberg

A new housing project in Kota Kemuning, Selangor

- Potentially new generation capacity to become contestable through competitive bidding process
- Single buyer in TNB. Tariffs will continue to be regulated.

In line with the Nation's Progress and the national economic growth of 5.7% in 2006, the electricity industry in Malaysia will continue to grow at a projected rate of 5 - 5.5 per cent up to

PROFILE

Capital Area	Kuala Lumpur	Installed Capacity	18,623MW
Population	329,750 km ²	Population Electrified	95%
GDP	24,821,286	Main Voltages (kV)	500, 275, 132, 66
Currency	US\$313.8 billion	Natural Resources	petroleum, natural gas, bauxite
	Ringgit		



An Alstom hydropower equipment plant in Malaysia steps up the pace

year 2010 despite the current regional economic slowdown.

Demand - Past, Present, Future

Malaysia's electricity demand is expected to grow at 6.3% per year through to 2010. The government is planning to use hydropower to produce 30% of its electricity over the next decade to reduce dependence on fossil fuels.

Together with the government's rural electrification programme, investment in the country's power generation and transmission & distribution sectors is estimated to reach US\$11

Projected figures for electricity consumption in 2007

Region	Projected Energy Sales 2007 (GWH)
Peninsular Malaysia	79,376
Sarawak	4,407
Sabah	3,201

Projected figures for electricity consumption in 2008

Region	Projected Energy Sales 2008 (GWH)
Peninsular Malaysia	83,344
Sarawak	4,627
Sabah	3,361

Peak Demand

Region	Peak Demand 2006 (MW)
Peninsular Malaysia	12,990
Sarawak	773
Sabah	583

Source: TNB, SESB, SESCo

Supply

At present, Malaysia enjoys ample electricity supply. The national utility company, Tenaga Nasional Berhad (TNB), supplies power to Peninsular Malaysia, while in East Malaysia, the Sabah Electricity Sdn Bhd (SESB) and the Sarawak Electricity Supply Corporation (SESCO) provide power to the States of Sabah and Sarawak respectively.

Transmission voltages are at 500 kV, 275 kV and 132 kV while distribution voltages are 33 kV, 22 kV, 11 kV and 415 V three-phase or 240 V single phase. System frequency is 50 Hz+/- 1%.

TNB also offers electricity packaged with steam and chilled water under its Total Energy Solution for the benefit of certain industries that require multiple forms of energy for their processes.

At Kulim High Technology Park (KHTP), a ring formation electrical system, the most advanced

of its kind in the region, ensures continuous uninterrupted power supply. This guaranteed, stable power supply meets the strict tolerances required by high technology operations, reflecting the government's thrust to promote such industries.

Percentage of population having access to electricity

Source: 9th Malaysian Plan Chapter 19

Region	Electrification Percentage
Peninsular Malaysia	99%
Sarawak	80%
Sabah	73%
Malaysia Overall	93%

Power Generation

Installed generating capacity for 2006

Source: Source: TNB, SESB, & SESCo

Types of Fuel	Peninsular Malaysia (MW)	Sabah (MW)	Sarawak (MW)
Coal	3,670 (IPP)*	-	213
Gas	4,370 (TNB), 7,607 (IPP)*	194	483
Oil	64 (TNB)	361	174
Hydro	1,911 (TNB)	90	97

* Jana Manjung & KEV is considered as IPP Plant.

Region	Generation Capacity 2006 (MW)	Generation Capacity 2007 (MW)
Peninsular Malaysia	17,622	19,022
Sarawak	967	1,102
Sabah	645	780

Left-side: Power generating capacity and variation with respect to 2007

Source: TNB, SESB, & SESCo

Fuel types are used to generate electricity

Source: Source: TNB, SESB, & SESCo

Region	Capacity Mix 2006 (MW)	Capacity Mix 2007 (MW)
Peninsular Malaysia	Coal (21%), Gas (68%), Oil (0.00%), Hydro (11%)	Coal (0%), Gas (30%), Oil (56%), Hydro (14%)
Sarawak	Coal (22%), Gas (50%), Oil (18%), Hydro (10%)	Gas (55%), Coal (22%), Diesel (12%), Hydro (10%)
Sabah	Coal (0%), Gas (30%), Oil (56%), Hydro (14%)	Gas (48%), Oil (46%), Hydro (5%), RE (1%)

Region	Generation Mix 2006 (MW)
Peninsular Malaysia	Coal (23%), Gas (70%), Oil (1%), Hydro (6%)
Sarawak	Coal (26%), Gas (61%), Oil (6%), Hydro (7%)
Sabah	Coal (0%), Gas (42%), Oil (42%), Hydro (15%), Biomass (1%)

only increased with the simultaneous increase in the demand for electricity.

Renewables

Malaysia also boasts a handful of renewable options for energy generation. Like:

Bio-mass:

- Palm Oil Waste
- Rice Husk
- Wood waste

Hydro power

Bio-gas:

- Landfill Gas
- Palm oil mill effluent (POME)
- Municipal Solid Waste (MSW)

Among the country's natural reserves, Malaysia had 4.2 million barrels of oil reserves as of 2005 year-end, against which it produced 827 thousand barrels per day. It had 87.5 trillion standard cubic feet of natural gas reserves as at the end of 2005 and a production of 59.9 billion cubic meters of natural gas during the same period was witnessed (as per BP Report 2006).

Environment

In 2006, TNB, with the cooperation of the Ministry of Energy, Water and Communications, embarked on an energy efficiency advertising campaign aimed at encouraging and educating the public on how to use electricity wisely and efficiently.

Export and Import

- The National Grid in Peninsular Malaysia is interconnected to Thailand's transmission system operated by electricity Generating Authority of Thailand (EGAT) in the North via a High Voltage Direct Current (HVDC) interconnection with a transmission capacity of 300 MW and a 132 kV High Voltage Alternating Current (HVAC) overhead line with maximum transmission capacity of 90 MW.
- In the South, the National Grid is interconnected to Singapore Power's transmission system at Senoko via two 230 kV cables with a firm transmission capacity of 200 MW.

Malaysia engages in power export, which has

EXPORT 2003	EXPORT 2004	EXPORT 2005	EXPORT 2006
193 GWh	605 GWh	1855 GWh	2,325 GWh

Source: TNB, Annual Report 2006

In 4 September 2002, Malaysia ratified the Kyoto Protocol. With this, among others, Malaysia has to meet the responsibilities towards limiting the emissions on carbon dioxide and other green house gases. The energy sector is one of the sources of carbon dioxide emissions in the country.

TNB Environmental Policy

As the leading player in the power sector, TNB's operations have a sizeable environmental impact. Therefore, TNB is committed to achieving excellence in environmental management in order to preserve and upgrade the environment for the benefit of future generations.

Stesen Janakuasa Sultan Azlan Shah (SJAS), owned by TNB, is the first Malaysian power plant to run on clean coal technology. The power plant is linked directly to the Department of Environment, enabling its emission levels to be monitored in real time.

The engineering systems employed by SJSAS have been designed to meet World Bank emission standards and the detailed Environmental Impact Assessment. All these, among other efforts have led to SJSAS being certified as MS ISO 9001:2000 and MS ISO 14000 compliant on 26 May 2006.

TNB is committed to:

- Protect, conserve and improve the environment in all of its operations and decision making.
- Comply with all applicable laws and regulations, and establish standards that will lead to continuous improvement of its environment performance.
- Implement an Environmental Management System that will ensure that all impacts to the environment from our operations are eliminated or minimised.
- Carry out environmental audits at required

intervals to ensure compliance with Corporate Environmental commitments, and implement environmental training programmes for our employees to develop a high level of competency.

- Promote environmental awareness amongst contractors, the public and other stakeholders and to make available our environmental policy to them

TNB initiatives:

- Waste management & recycling - TNB formulated a company-wide programme on waste management to educate staff on how to reduce and recycle waste.
- Scheduled Waste Disposal - All scheduled wastes were identified, stored and disposed as per requirements under the Environment Quality Acts 1974 (Scheduled Waste Regulations 1989).
- Emissions - Continuous Emission Monitoring System for its fuel-fired boilers as required by the Department of Environment.
- Halon Replacement - Halon is replaced with environmentally-friendly alternatives.
- Environmental Audits & ISO Certification
- Crisis Management - An environmental disaster team has been set up in all power stations to overcome any pollution incidents within the compound as well as the surrounding environment.

Transmission and Distribution

Utility companies' transmission and distribution system development follows closely the development of generation sites. Expansion is based on fulfilling transmission and distribution adequacy and security aspects. The government has further plans of installing more lines for enhancing transmission.

The length of the installed backbone network (in km):

Description	Peninsular Malaysia	Sabah	Sarawak
HV+EHV Transmission Lines Length (kmc)	18,200	1,600	900
HV+EHV Substation Capacity (MVA)	74,600	2,200	4,100
Primary Distribution Length (kmc)	265,200	400	9,800
Secondary Distribution Length (kmc)	220,400	5,100	11,900
Distribution SS Capacity (MVA)	48,000	3,800	6,400

Source: TNB/Peninsula r Malaysia

TRANSMISSION LINE / CABLE LENGTH & TRANSFORMER CAPACITY	CURRENT	2007
500kV		
Lines (cct-km)	890 (334)*	-
Transformer Capacity (MVA)	6,750	-
275kV		
Lines (cct-km)	6,730	127
Cable (cct-km)	55	14
Transformer (MVA)	27,273	2,880
132kV		
Lines (cct-km)	10,436	770
Cable (cct-km)	680	74
Transformer (MVA)	40,208	6,255

*334km is 500kV insulated line energised at 275kV

SESCo/Sarawak

Year	Line/Cable
2008	50KM : 132KV Mukah PS to Selangau
2009	150KM : 275KV Bakun to Kemena

SESB/Sabah

Voltage Level (kV)	2007
275 (cct-km)	640
132 (cct-km)	927
66 (cct-km)	123
Total (cct-km)	1,690
S/S Capacity (MVA)	2,290

Source: Source: TNB, SESB, & SESCO

Tariffs**How are electricity tariffs formulated?**

The Minister of Energy, Water and Communications regulates the electricity tariffs charged by utilities to final consumers in Peninsular Malaysia and Sabah in pursuance of the Electricity Supply Act 1990.

With regard to the revision of old/existing tariff, the Ministry of Energy, Water and Communication need to put up a tariff proposal to the cabinet for approval.

In Sarawak, electricity tariffs charged by Syarikat SESCO Berhad (SESCo) are subjected to the Sarawak Electricity Supply Ordinance 1992. The tariff structures in Peninsular Malaysia, Sabah and Sarawak differ due to the differences in the cost of supply of electricity in those regions.

Among the principles applied in determining tariff rate is that tariff should reflect the cost of supply, provide adequate revenue for the development of the power sector, competitiveness among the industries and services, affordability of the consumers and social economic objectives of the Government.

TNB's revised tariff rates were effective from 1 June 2006. TNB continued to offer 10% discounts

on electricity bills to houses of worship, welfare homes/organisations, government-aided schools and institutions of higher learning, the mining industry and a Special Industrial Tariff to qualified industrial customers.

- The reasons for the tariff review were as follows:-
- Most of the cost to supply electricity has increased since the last tariff review.
- Most of the cost has increased beyond the utility company's control.
- To ensure sustainable electricity supply reliability.
- Large capital expenditure is required to maintain and enhance electricity supply infrastructure
- Benefit from operational efficiency alone is insufficient to support the demand growth for electricity.
- A reliable electricity supply system is a prerequisite for the nation's economic growth.
- Low tariff may lead to inefficient use of electricity and national resources.

(Report reproduced from goldbook 2008)