MALAYSIAN ELECTRICITY MARKET
INSTALLED CAPACITY IN ASEAN

Population (million) | Installed Cap. (kw/person)
--- | ---
FR | 67 | 2.0
SG | 5 | 2.8
MY | 30 | 1.2
TH | 67 | 0.7
VN | 90 | 0.4
ID | 250 | 0.3
PH | 100 | 0.2
MM | 54 | 0.1

Global average ~0.8kW/person

Installed Capacity (GW)
- Coal: 65
- Gas: 97
- Hydro: 45
- Renewables: 12
- Oil: 20
- Nuclear: 0

TOTAL ~239

Low per capita installed base ... Significant future addition requirements

Source: GE Power Marketing – MACA 2017
Key Figures

<table>
<thead>
<tr>
<th>Pop. (Millions)</th>
<th>GDP per Capita (USD)</th>
<th>GDP 2016</th>
<th>GDP 2017</th>
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</thead>
<tbody>
<tr>
<td>32.3</td>
<td>9 982</td>
<td>+ 4.2 %</td>
<td>+ 5.9 %</td>
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Market Characteristics

- 3rd User Market in ASEAN
- World Bank has globally ranked Malaysia at 8th place (right after Switzerland) in term of Getting Electricity rank within the Doing Business report.
- Electricity demand is expected to grow by 3.5% per year over the next 10 years, and 2.7% within 20 years. The average annual electric consumption within the period of 2015-2020 is at 3.1%. In the medium-term, its energy autonomy will not be sufficient.

ELECTRICITY MARKET

Tenaga Nasional Berhad (TNB)
(National electricity operator)

2017 : 47.4 b MYR (9.5 b EUR)
2016 : 44.5 b MYR (8.9 b EUR)

Electricity access:
- Peninsula : 99.8 %
- Sarawak : 91 %
- Sabah : 94.1 %

Electricity network:
- Peninsula : 21 469 km
- Sabah: 2 441 km

Number of Smart Meters:
8.5 M in 2021

Sources : TNB – Business France – Energy commission
MALAYSIA POWER GENERATION

Peninsular Malaysia 28.9 GW
- TNB 53%
- MMC 21%
- NUC 13%
- YTL 4%
- Tek Tenaga Perlis 3%
- Petronas 1%
- NUR 2%
- Sabah electricity
- Lotte
- Others

Source: Operational Installed capacity data - Platt's UDI World Electric Power Plant Database June 2017
International and Local Key Players

- USA: General Electric, GE Power - Siemens
- Japan: Mitsubishi
- South Korea: Jin Technology, Solarpeace Corp.
- Malaysia:
  - Public: TNB, Sarawak Energy Berhad (SEB), Sabah Electricity Sdn Bhd (TNB 80% and Sabah State Government 20%).
  - Private: 18 Independent Power Producer (IPP) in Malaysia: Malakoff, YTL, Ranhill etc.

Smart Grids

- Siemens, Solarpeace corp, IBM, Accenture etc.
- TNB’s Smartmeters partners:
  - Impianas Sdn Bhd
  - Shenzen Kaifa Co. Ltd (China)
  - Malaysian Intelligence Meters (JV with Shenzen Kaifa Co. Ltd)
  - Trilliant Smart Grid Communication Platform Asia Pacific

GOUVERMENTAL INSTITUTIONS

- Energy Commission
  National regulator
- KeTTHA
  Minister of Energy, Technology, Science, Climate Change and Environment
- SEDA
  “Feed In Tariffs” regulator
- PEMANDU
  In charge of Malaysia’s Economic Transformation Plan

Also known as Suruhanjaya Tenaga (ST) in Malaysia.

Statutory body under the Ministry Of Energy, Green Technology and Water Malaysia.


Regulate the electricity supply industry and piped gas supply industry in the peninsula and Sabah.

Custodian and focal point for Malaysia’s energy data.
**Tariff Flow**

1. **Base Tariff**
   - Imbalance Cost Pass-Through (ICPT)

2. **Tariff adjustment to reflect uncontrollable fuel costs & other generation costs**

- CAPEX & OPEX
- Power purchase cost charged by generators
- Return on regulated asset

**Average Base Tariff by Sector**

- **Commercial**
  - Average Tariff: 47.9 sen/kWh
  - US$ 11 cents/kWh

- **Industrial**
  - Average Tariff: 38.5 sen/kWh
  - US$ 9 cents/kWh

- **Domestic**
  - Average Tariff: 31.7 sen/kWh
  - US$ 8 cents/kWh

- **Fuel supply**
  - Costa are pass through for generators (both TNB & IPPs are managed by TNB Fuel division)

**Market regulation**
- By KeTTHA and Energy Commission

**TNB plays a central role:**
- Single Buyer, Generation, Transmission, System Operator and Customer Services

OPPORTUNITIES

- Installation of 8.5 millions of Smart Meters by 2021 by TNB (on going project).
- Public tendering: Large Solar Scale (on going project).
- Combined Cycle Gas Turbine (CCGT) power plant in Alor Gajah (on going project).

SUSTAINABLE CONSUMPTION
The average annual electric consumption within the period of 2015-2020 is at 3.1%.

REDUCING CARBON FOOTPRINT
Malaysia’s goal is to reduce its carbon footprint by 45% between the year 2005 to 2030 by integrating renewable energy into its energy mix.

“GRID TO THE FUTURE”
TNB plans to invest 540 Million EUR in this project to improve the efficiency and reliability of its network.

STRENGTH
- Globally ranked at 8th place (right after Switzerland) in term of Getting Electricity rank
- National electricity access penetration nearly 100%.
- National aim to integrate renewable energy into the energy mix (17% by 2030).

TOP 5 COUNTRIES
1. CHINA
2. SINGAPORE
3. USA
4. GERMANY
5. JAPAN

Malaysia experienced its highest peak in terms of electricity consumption in April 2016. In addition to this exceptional event, average electricity consumption will increase over the period 2015-2020 and energy autonomy could be insufficient in the medium term.

In order to best meet this demand, many investments are made by the national operator TNB to modernize its equipment and increase the efficiency and reliability of its electricity network.

This modernization programme requires the integration of smart grids. There are many opportunities from this initiative as the national operator is inclined to work with international actors. Although the market is still highly dependent on fossil fuels, Malaysia is increasingly interested in integrating renewable energy into its energy mix and in particular in solar energy.

SOURCES: TNB REPORTS 2017, ENERGY COMISSION
Malaysia has been actively pushing for a bigger position of renewable energy within its energy mix. The Malaysian Government and its national operator TNB are putting electricity production as a priority through three development axes:

- Improvement of energy efficiency
- Development of solar energy production capacity
- Strengthening the hydroelectric capacity

Below are some of the initiatives / policy making decision taken by the country:

- Hydroelectric
  - The 11th Malaysian Plan plans to increase hydropower capacity from 6% to 24% by 2020.
  - The goal is for these initiatives is to achieve 15% of the electricity mix by 2020.

- Biomass
  - The 11th Malaysian Plan plans to push biomass renewable energy mix from 23% to 38% by 2020.

- Solar
  - Access to finance is strengthened (state and private participation).
  - The price of electricity is adapted to ensure project’s viability the project viable.

**Renewable Energy Capacity Mix**

- **2016**
  - Solar PV: 4%
  - Hydro: 5%
  - Biomass: 91%
  - Total: 6.3 GW, ~18% of total IB

- **2026**
  - Solar PV: 4%
  - Hydro: 31%
  - Biomass: 62%
  - Total: 12.3 GW, ~23% of total IB

**Generation Mix**

- **2016**
  - Coal: 40%
  - Gas: 50%
  - Oil: 10%
  - HYD: 0%
  - Total: 154 TWh

- **2026**
  - Coal: 40%
  - Gas: 42%
  - Oil: 18%
  - HYD: 0%
  - Total: 222 TWh

**Renewable Energy Resources**

- Large hydro Potential: 20 GW
- Biomass and biogas from Palm Oil Waste: 1300 MW
- Small-scale hydro: 500 MW
- Solar Power: 6500 MW

**Source:** GE Power Forecast

- **Thermal generation remains the biggest** ... nearly 90% of generation is still from thermal by 2026
- **Increasing renewable generation** ... large GW addition & ~23% of IB in 2026. However, limited impact in overall generation (growth from 9% to 12% of total)
- **Small portion of power transfer in the future** ... planned from Laos via Thailand

**Source:** GE Power Marketing – MACA 2017
RENEWABLE ENERGY KEY PLAYERS

Key Players

▶ Solar

▶ Hydroelectric
• TNB, Sarawak Energy, Tokyo Electric Power Services Co (TEPSCO), Esajadi Sdn Bhd, Hokkaido Electric Power Co, etc.

▶ Wind Power
• TNB

▶ Biomass
• Sime Darby, FGV (Felda), Tradewinds, Wilmar, TH Plantations, Teck Guan, AIM, Global Green Synergy Sdn Bhd, MYBiomass Sdn Bhd, Palm Oil Industry Cluster (POIC), BiotechCorp, etc.
PROJECTS AND INITIATIVES

Identified Projects

- Bakun Hydroelectric Project (Hydroelectric)
- Upper Padas Hydroelectric Project (Hydroelectric)
- Liwagu Hydro Power Project (Hydroelectric)
- Berjaya Berhad Solar Plant (Solar)
- Large Solar Scale - LSS (Solar)
  - Package P1 (1MWac to 5.99MWac) in Peninsular Malaysia
  - Package P2 (6MWac to 9.99MWac) in Peninsular Malaysia
  - Package P3 (10MWac to 30MWac) in Peninsular Malaysia
  - Package S1 (1MWac to 5.99MWac) in Sabah and Labuan
  - Package S2 (6MWac to 10MWac) in Sabah and Labuan
