

Malaysia's Power and Electricity Sector: Current Landscape and Future Directions



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Malaysia's power and electricity sector is a dynamic and evolving landscape, crucial for supporting the nation's economic growth and sustainability goals. This article provides an overview of Tenaga Nasional Berhad (TNB), electricity distribution, tariff structure, government subsidies, the energy mix, and the way forward for Malaysia's energy needs. Additionally, we explore TNB's investment experiences in Pakistan and potential learnings for Pakistan's energy policy and implementation framework.

Tenaga Nasional Berhad (TNB)

TNB is the largest electricity utility in Malaysia, responsible for generating, transmitting, and distributing electricity across the country. It plays a crucial role in ensuring a stable and reliable power supply to support Malaysia's economic growth.

Electricity Distribution

Electricity distribution in Malaysia is primarily managed by TNB in Peninsular Malaysia and Sabah Electricity Sdn. Bhd (SESB) in Sabah. TNB operates an extensive network of transmission and distribution lines to deliver electricity to residential, commercial, and industrial consumers.

Tariff Structure and Government Subsidies

The electricity tariff structure in Malaysia is categorized based on consumer types and voltage levels. TNB's tariff rates vary for domestic, commercial, and industrial users. The government provides subsidies to ensure affordable electricity, especially for low-income households and small businesses. For instance, domestic consumers using up to 1,500 kWh per month are not subject to tariff increases. Additionally, the government allocated an electricity subsidy of RM5.2 billion (approximately USD 1.2 billion) for the second half of 2023 to maintain affordable rates for the majority of consumers.

Energy Mix

Malaysia's energy mix includes a combination of fuel-based sources (natural gas, coal, and oil) and renewable energy (hydropower, solar, and biomass). As of recent data, renewables contribute approximately 18% to Malaysia's energy mix, with hydropower accounting for 86% of this renewable capacity. The government aims to increase the share of renewable energy to 31% by 2025.

Comparison of TNB with Other Utilities

TNB is recognized as one of the leading utilities globally. According to Brand Finance, TNB ranks as the third strongest utility brand worldwide and the second in Asia, following South Korea's KEPCO, with a brand value of USD 2.74 billion. TNB's main competitors include Indonesia Power, Malakoff Berhad, and MMC Corporation. In comparison, TNB distinguishes itself through its extensive infrastructure, large employee base, and robust financial performance. Additionally, TNB's emphasis on digital transformation and sustainable energy initiatives further strengthens its competitive position in the utilities sector.

Data Centres and Sustainable Energy

Investments in data centres are significantly driving the growing energy demand in Malaysia. The country has become ASEAN's fastest-growing data centre hub, with substantial investments approved between 2021 and 2023. Data centres are energy-intensive, requiring a continuous and reliable power supply and play a key role in promoting sustainable energy development. This rising demand is prompting Malaysia to optimize its electricity generation capacity and shift towards renewable energy sources.

The Malaysian government is leveraging the expansion of data centres to advance its renewable energy goals. For example, the National Energy Transition Roadmap includes initiatives to increase renewable energy capacity and develop large-scale Battery Energy Storage Systems (BESS) to ensure a stable energy supply for data centres. Furthermore, the Malaysian government is actively expanding sustainable energy capacity through various initiatives:

- **Solar Energy:** Malaysia is increasing solar energy production with the development of solar parks and rooftop installations. Solar photovoltaic (PV) technology is a key focus, with a goal of reaching 150 gigawatts of installed capacity by 2050.

- **Hydropower:** Both small and large hydropower projects are being implemented to harness the country's abundant water resources, making hydropower a key component of the renewable energy mix.
- **Bioenergy:** Malaysia is utilizing its diverse bioenergy potential, including biomass and biogas, for sustainable energy generation. The bioenergy plan includes the use of palm oil biomass, such as mill residues, for power generation, biogas production, and other biofuels, playing a crucial role in diversifying renewable energy sources.
- **Wind Energy:** Malaysia is exploring the potential of onshore and offshore wind energy projects, though these are still in the early stages.

Current Power Generation and Consumption

As of 2024, Malaysia's total electricity generation stands at approximately 166.82 billion kilowatt-hours (kWh) annually. The country's installed generation capacity is around 45.5 gigawatts (GW), supported by a diverse mix of power plants and infrastructure. Malaysia's power infrastructure includes 169 power plants with a total capacity of 37,153 MW, and 11,747 km of power lines. This extensive network ensures efficient electricity distribution across both urban and rural areas.

Tenaga Nasional Berhad (TNB) employs over 35,000 people, with approximately 1,500 in finance and IT roles. The finance team, led by the Chief Financial Officer, manages financial operations, budgeting, and strategic planning, while the IT team, led by the Chief Information Officer, focuses on digital transformation, cybersecurity, and IT infrastructure. TNB leverages advanced digital solutions, such as Enterprise Resource Planning (ERP) systems, advanced analytics, and cloud computing, to streamline financial processes and ensure efficient and secure operations.

TNB's Investment Experiences in Pakistan

Tenaga Nasional Berhad (TNB) has international investments, including in Pakistan, where it owned and operated a 235MW combined-cycle gas turbine power plant in Sindh. This was one of TNB's first international ventures, and the plant was recently sold to AsiaPak Investments Limited as part of TNB's strategy to streamline its international portfolio and focus on renewable energy growth.

Key Insights for Pakistan's Energy Policy and Implementation Framework

Malaysia's energy sector offers valuable lessons for Pakistan:

- **Diversification of Energy Mix:** Malaysia's balanced integration of renewable and traditional fuel sources can guide Pakistan in diversifying its energy mix and reducing reliance on coal.
- **Government Support and Subsidies:** Targeted subsidies and tariff structures in Malaysia promote affordability and sustainable energy consumption. Pakistan can adopt similar measures to support low-income households and encourage renewable energy adoption.
- **Grid Modernization:** TNB's investments in grid modernization to accommodate renewable energy sources highlight the importance of infrastructure upgrades to ensure a stable and resilient power supply in Pakistan.
- **Strategic Roadmaps:** Malaysia's National Energy Transition Roadmap (NETR) and Malaysia Renewable Energy Roadmap (MyRER) provide clear strategies for achieving sustainability goals. Pakistan can benefit from similar comprehensive energy transition roadmaps.

Top Three Drivers for Future Energy Needs

- **Industrialization:** The ongoing expansion of Malaysia's industrial sector leads to increased energy consumption. As industries grow and modernize, the demand for electricity is projected to rise.
- **Urbanization:** Rapid urban growth creates higher energy demands for residential, commercial, and infrastructure needs. Urban areas require significant energy for lighting, heating, cooling, and transportation.
- **Population Growth:** Malaysia's expanding population results in greater energy consumption. With an estimated population of around 34.1 million in 2024, more people lead to increased electricity demand for homes, schools, hospitals, and other public services.

Initiatives by Malaysian Government in Energy Sector

To facilitate Malaysia's growth, the government has outlined several key initiatives:

- **National Energy Transition Roadmap (NETR):** Focused on transitioning to a low-carbon energy system, improving energy efficiency, and increasing the adoption of renewable energy.
- **Grid Modernization:** TNB is investing in modernizing the national grid to integrate more renewable energy sources and ensure a stable, resilient power supply.
- **Sustainable Energy Development:** The government is promoting large-scale solar farms and small hydropower plants to diversify the energy mix and reduce dependence on fossil fuels.

These initiatives aim to ensure a reliable, affordable, and sustainable energy supply to support Malaysia's economic growth and development.

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