CHAPTER 3

Brunei Darussalam Country Report

Ministry of Energy, Brunei Darussalam

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1. Background

Brunei Darussalam is in northwest Borneo, with a coastline of 161 kilometres. It has a land area of 5,765 square kilometres and four districts: Brunei–Muara, Tutong, Belait, and Temburong. The capital city, Bandar Seri Begawan, is in Brunei–Muara. Brunei Darussalam has an equatorial climate, high rainfall, and high humidity.

Gross domestic product (GDP) in 2017 was US$13.5 billion[1] (World Bank, 2019). The population is 429,500 and GDP per capita US$31,400. About 55% of GDP is generated by the oil and gas sector. It dominates export value; crude oil, liquefied natural gas, and methanol account for more than 90% of total exports, primarily to Asia and the Pacific.

2. Energy Supply and Consumption in 2017

Oil and natural gas are the main sources of energy. In 2017, total primary energy supply (TPES) for both sources was 3.58 million tons of oil equivalent (Mtoe), with 2.86 Mtoe or about 80% from natural gas.

Brunei Darussalam has 890 megawatts (MW) of installed capacity in power generation of public utilities, including 1.2 MW of solar photovoltaic (PV). Electricity production from public utilities in 2017 was 3.72 terawatt-hours (TWh). Energy supply and consumption in 2017 are shown in Table 3.1

[1]All US dollars in this report are in constant 2010 values unless specified

Table 3.1. Energy Supply and Consumption, 2017
(million tons of oil equivalent)

Supply and Consumption	Oil	Natural Gas	Electricity	Total
Primary energy supplies				
Indigenous production	5.96	10.32	-	16.28
Net imports and others	–5.25	–7.45	-	–12.70
Total primary energy supply	**0.71**	**2.87**	**-**	**3.58**
Final energy consumption				
Industry	0.13	-	0.01	0.14
Transport	0.52	-	-	0.52
Others	0.05	0.02	0.26	0.33
Non-energy	0.01	0.45	-	0.46
Total final energy consumption	**0.71**	**0.47**	**0.27**	**1.45**

Note: 'Others' include the residential and commercial sectors.

Source: Authors.

Total final energy consumption (TFEC) in 2017 was 1.45 Mtoe; transport had the highest energy demand, at 0.52 Mtoe or 36.3% of TFEC, followed by the non-energy sector (31.6%), 'others' (22.1%), and industry (10.0%). Oil accounted for 49.0% of final energy consumption, followed by natural gas at 32.3% and electricity 18.7%.

3. Energy Policies

3.1. Supply

Brunei Darussalam continues to strengthen upstream oil and gas activities to ensure long-term energy security and sustainability of oil and gas reserves. The country is considering the development of unexplored areas such as deepwater fields. Rejuvenation of current upstream producing assets is a priority to enhance recovery from existing fields and maximise production. Brunei Darussalam is focusing on developing downstream energy industries by maximising economic spin-off potential from upstream production and assets.

Brunei Darussalam aims to reduce energy intensity by 45% by 2035 from the baseline year of 2005, in line with its regional commitment to the Asia-Pacific Economic Cooperation. The country targets increasing the share of renewable energy, particularly solar PV, in the power

generation mix to 100 MW by 2025. The government plans to introduce renewable energy policy and regulatory frameworks that will stimulate public and private sector investment in developing and deploying renewable energy.

3.2 Consumption

Brunei Darussalam has implemented several initiatives and activities to reduce energy intensity to 45% by 2035. Government agencies and industry collaborate on initiatives that promote energy efficiency and low-energy-intensive industry. Industry will identify and implement the latest technology to reduce energy usage, and adopt consumption behaviour, including by encouraging the embrace of energy-efficient appliances.

Efforts to achieve Energy Efficiency and Conservation (EEC) targets include power efficiency improvement, implementation of standards and labelling for electrical appliances, deployment of electric vehicles, expansion of EEC building guidelines, and use of LED lighting systems for streetlights, amongst others. The Department of Electrical Services and Berakas Power Company play major roles in improving power stations' efficiency, including by using combined-cycle turbines and co-generation power plants, whilst phasing out single-cycle power stations and carbon-intensive diesel-powered plants.

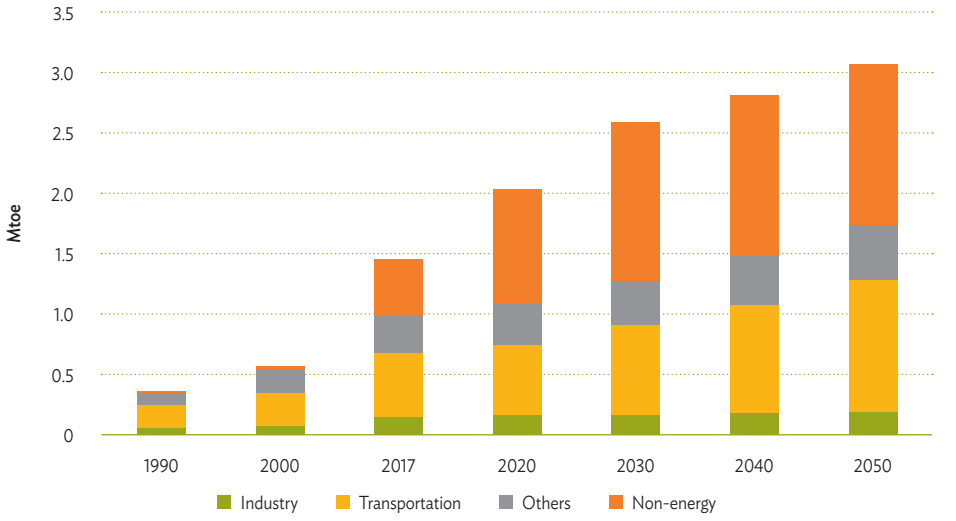
4. Outlook Result

4.1. Final Energy Consumption

4.1.1. Business as Usual

Under the business as usual (BAU) scenario, the projected TFEC in 2050 is 3.05 Mtoe (Figure 3.1). The increase in projected TFEC is linked to GDP growth rate, where the model is set at a constant rate of 2.4% per year over the projection period. In 2050, the share of oil in total demand will be 43.4%, mainly as transport fuel, whilst the share of natural gas will be 42.7%. In 2017, TFEC of oil was 0.71 Mtoe and is projected to increase to 1.32 Mtoe in 2050, whilst the TFEC of natural gas will increase from 0.47 Mtoe in 2017 to 1.30 Mtoe in 2050. The model predicts that public utilities' demand for electricity will increase at an average rate of 1.4% per year, from 0.27 Mtoe in 2017 to 0.42 Mtoe in 2050.

Figure 3.1. Final Energy Consumption by Sector, Business as Usual



Mtoe = million tons of oil equivalent.

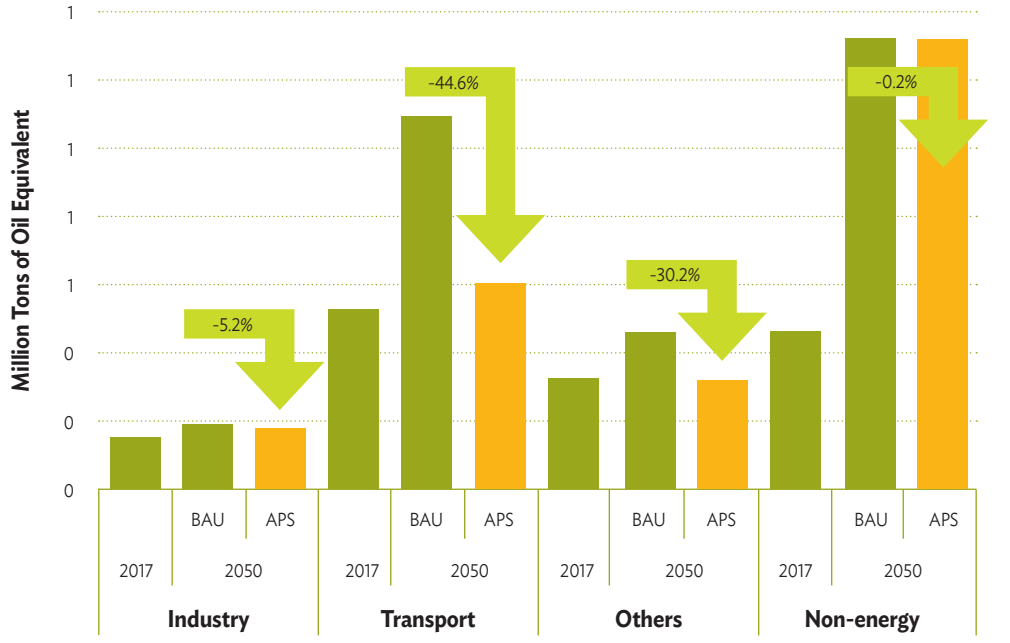
Source: Authors.

4.1.2. Alternative Policy Scenario

An alternative policy scenario (APS) was developed to estimate energy-saving potential to achieve energy intensity reduction targets by deploying advanced technologies and enforcing initiatives. Under APS, the overall TFEC in 2050 will be 2.41 Mtoe. In 2050, about 7.3% of energy demand will be from industry, 13.2% from 'others', and 24.9% from transport. Non-energy sector demand will account for 54.6%.

The introduction of electric vehicles will be a leading factor in the lower growth rate of transport fuel demand. In 2017–2050, TFEC will grow by an average of 1.6% per year. Referring to the result of Low Emission Analysis Platform (LEAP) model for energy outlook, the TFEC in 2050 under APS will be 20.8% lower than under BAU. The highest savings will be in transport at 44.6%, followed by 'others' (residential and commercial sectors) at 30.2%. Energy saving in industry will be the lowest, at 5.2%. No energy saving is assumed in the non-energy model (Figure 3.2).

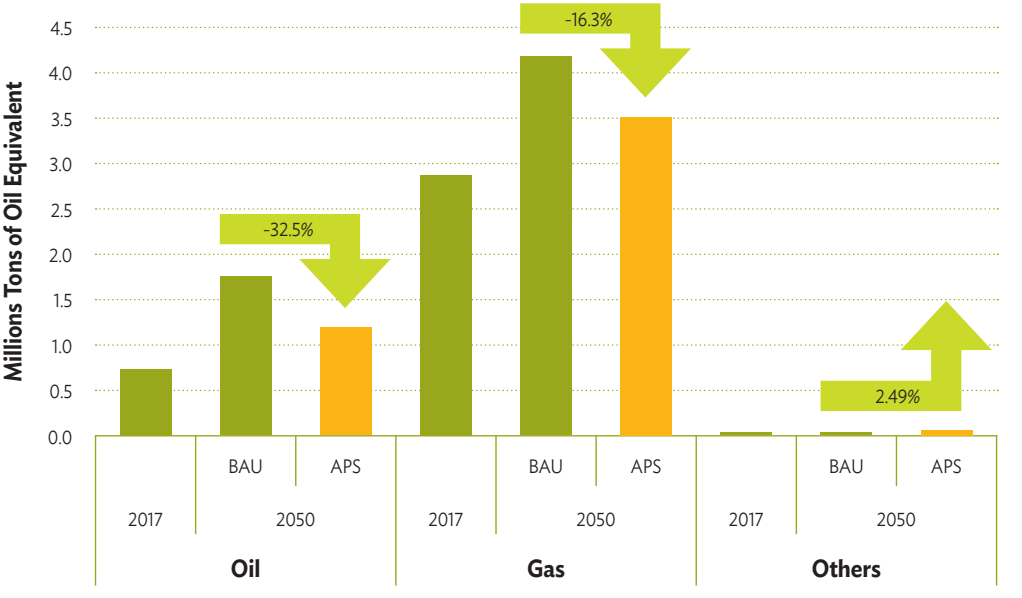
Figure 3.2. Final Energy Consumption by Sector, Business as Usual and Alternative Policy Scenario



APS = alternative policy scenario, BAU = business as usual.

Source: Authors.

Figure 3.3. Primary Energy Supply by Source, Business as Usual and Alternative Policy Scenario



APS = alternative policy scenario, BAU = business as usual

Source: Authors.

4.2.2. Alternative Policy Scenario

A decrease in TPES for oil and natural gas is projected between BAU and APS in 2050. In 2050, oil supply under APS will be at 1.18 Mtoe against BAU at 1.74 Mtoe, or 32.5% lower. Natural gas supply under APS is predicted to be lower than under BAU by 16.3%. However, renewable energy supply, particularly from solar PV sources, will increase significantly (figure 3.3).

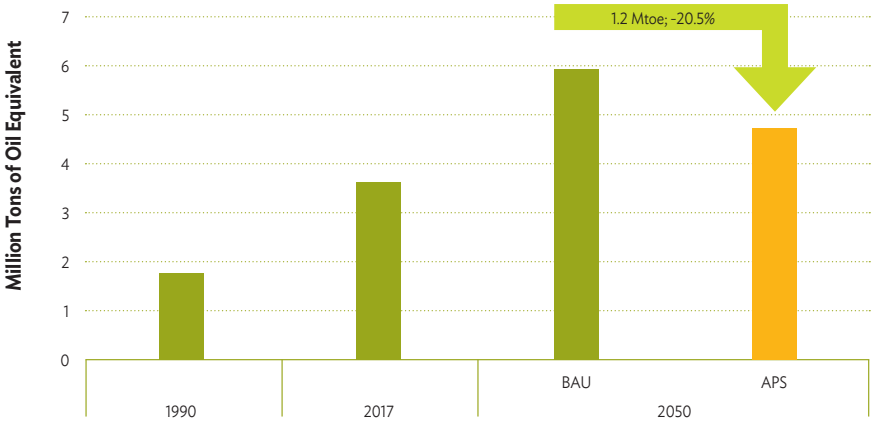
4.3. Power Generation

Power generation capacity from public utilities is dominated by natural gas. Of 890 MW of installed capacity (including 1.2 MW solar PV), diesel accounts for only 12 MW. Under BAU, about 4.9 TWh of electricity will be generated by 2050 from public utility thermal power plants, whilst only 0.002 TWh of power will be generated from renewable energy. Under APS, electricity generation from public utility thermal power plants in 2050 is projected at 4.3 TWh, a decrease of 13% from electricity generation under BAU. Solar PV is projected to produce 0.39 TWh in 2050.

4.4. Projected Energy Saving[2]

The energy-saving potential from implementing EEC measures and developing renewable energy is about 1.2 Mtoe of TPES or a reduction of 20.5% from BAU in 2050 (Figure 3.4).

Figure 3.4. Reduction of Primary Energy Supply, Business as Usual and Alternative Policy Scenario



APS = alternative policy scenario, BAU = business as usual.

Source: Authors.

[2] The difference between primary energy supply under BAU and APS.

4.5. Carbon Dioxide Emissions

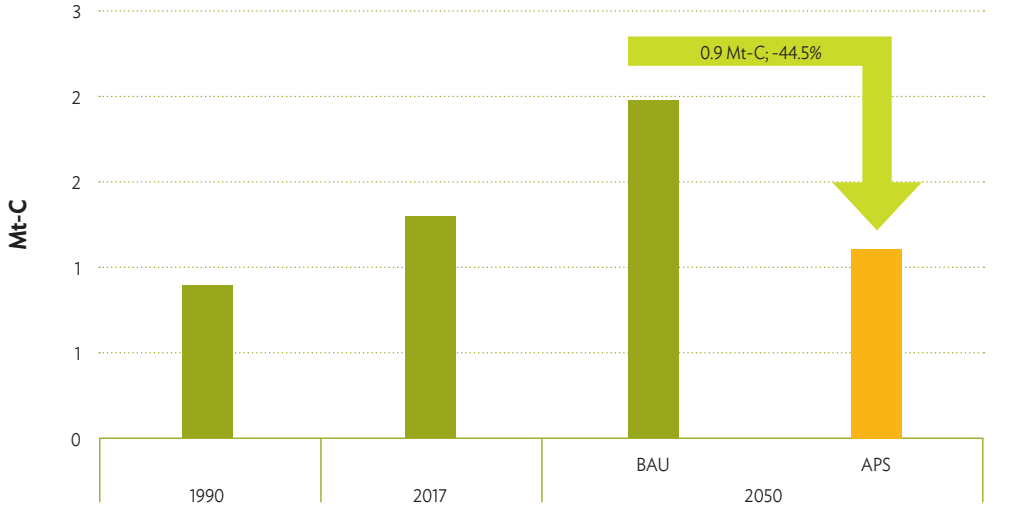
4.5.1. Business as Usual

The percentage increase in carbon dioxide (CO2) emissions correlates to the increase in TPES, which is expected because the energy mix is 99% fossil fuel. In 2017, the LEAP model shows 1.3 million tons of carbon (Mt-C). An increase of 1.3% per year is expected under BAU, with an eventual value of 2.0 Mt-C in 2050 (Figure 3.5).

4.5.2. Alternative Policy Scenario

Under APS, CO2 emissions could decrease by 44.5% in 2050 compared with BAU (Figure 3.5). The model shows that a total of 1.1 Mt-C will be emitted by 2050. The decrease in CO2 is significantly attributed to the improvement in the efficiencies of power generation plants.

Figure 3.5. Carbon Dioxide Emissions from Energy Consumption, Business as Usual and Alternative Policy Scenario



APS = alternative policy scenario, BAU = business as usual, Mt-C = million tons of carbon.

Source: Authors.

5. Policy Implications

To increase renewable energy sources and energy efficiency and conservation, Brunei Darussalam continues exploring and promoting low-carbon measures through several initiatives:

(i) Setting sustainable energy development targets

(a) The energy sector aims to reduce energy intensity by 45% in 2035 from the baseline year of 2005. Energy intensity can be reduced by improving energy efficiency and conservation and by diversifying the economy to include high value-added but less energy-intensive industries.

(b) Public and private investment in renewable energy technologies can increase the share of renewables to at least 30% of the total power generation mix by 2035.

(ii) Promoting energy efficiency and conservation

(a) Improving supply-side efficiency. Brunei Darussalam is pursuing a strategy to improve the efficiency of existing open-cycle gas turbines whilst using more-efficient combined-cycle gas turbines to expand capacity.

(b) Managing electricity and fuel demand. The use of fossil fuel to generate electricity and to power transport can be reduced by making energy technologies more energy-efficient and by using existing and future technologies more efficiently. The following are measures for doing so:

(i) Standards and labelling order. The soon-to-be implemented standards and labelling order for electrical appliances are a regulatory framework that allows only efficient technologies to be used in the residential sector and only efficient electrical appliances to be sold. This regulation will commence with air-conditioning systems then expand to cover refrigerators, lighting systems, and water heaters.

(ii) EEC Building Guidelines for Non-Residential Sector. The guidelines are mandatory for all government buildings. The Ministry of Energy and the Ministry

of Development are planning to extend the guidelines to the commercial sector as early as the first quarter of 2021.

(iii) Energy management. Brunei Darussalam is considering adopting an energy management system that is compatible with ISO 50001. Building owners will be encouraged to introduce management systems that include equipment to monitor energy consumption, such as building automation system controllers (i.e. demand controllers) and building energy management systems. Buildings must have an energy manager to implement conservation measures, monitor energy consumption, assess business decisions for sustainability, and seek opportunities to increase energy efficiency. As of 2019, Brunei Darussalam had five energy managers and auditors, who had undergone the Association of Southeast Asian Nations (ASEAN) energy manager training and certification program under the ASEAN–Japan Energy Efficiency Partnership. In September 2019, 20 national energy managers 'graduated' from the first energy manager training workshop conducted by an ASEAN-certified energy manager and auditor. The workshop will cover commercial buildings by 2021.

(iv) Residential tariff reforms. The progressive electricity tariff structure, introduced in 2012, encourages energy efficiency by providing a financial disincentive for high energy consumption. The new electricity tariff reform will help low-income citizens by charging them a minimum of only US$0.01 per kilowatt-hour for basic electricity consumption, and will promote energy saving and discourage energy wastage.

(v) Deployment of electric vehicles. The country aims to increase the share of electric vehicles to 60% of total annual sales by 2035. Achieving the target depends on the development of electric vehicle technologies and infrastructure. Government agencies, industry, and the private sector must, therefore, collaborate on promoting the use of electric vehicles. The Electric Vehicle Joint Taskforce was established in February 2020 to expedite their deployment. It is co-chaired by senior officials from the Ministry of Transport and Infocommunications and the Ministry of Energy.

The government seeks to achieve the objectives of Wawasan Brunei 2035 (Brunei Vision 2035) by encouraging a significant increase in economic activity in all sectors, including energy. Despite the increased focus on EEC, growing domestic energy demand ensures that fossil fuel will remain the primary energy source.