Statistical Perspectives

Energy and Development in the ASEAN Region

A statistical overview of energy sectors in Brunei Darussalam, Cambodia, Indonesia Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam

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Statistical Perspectives

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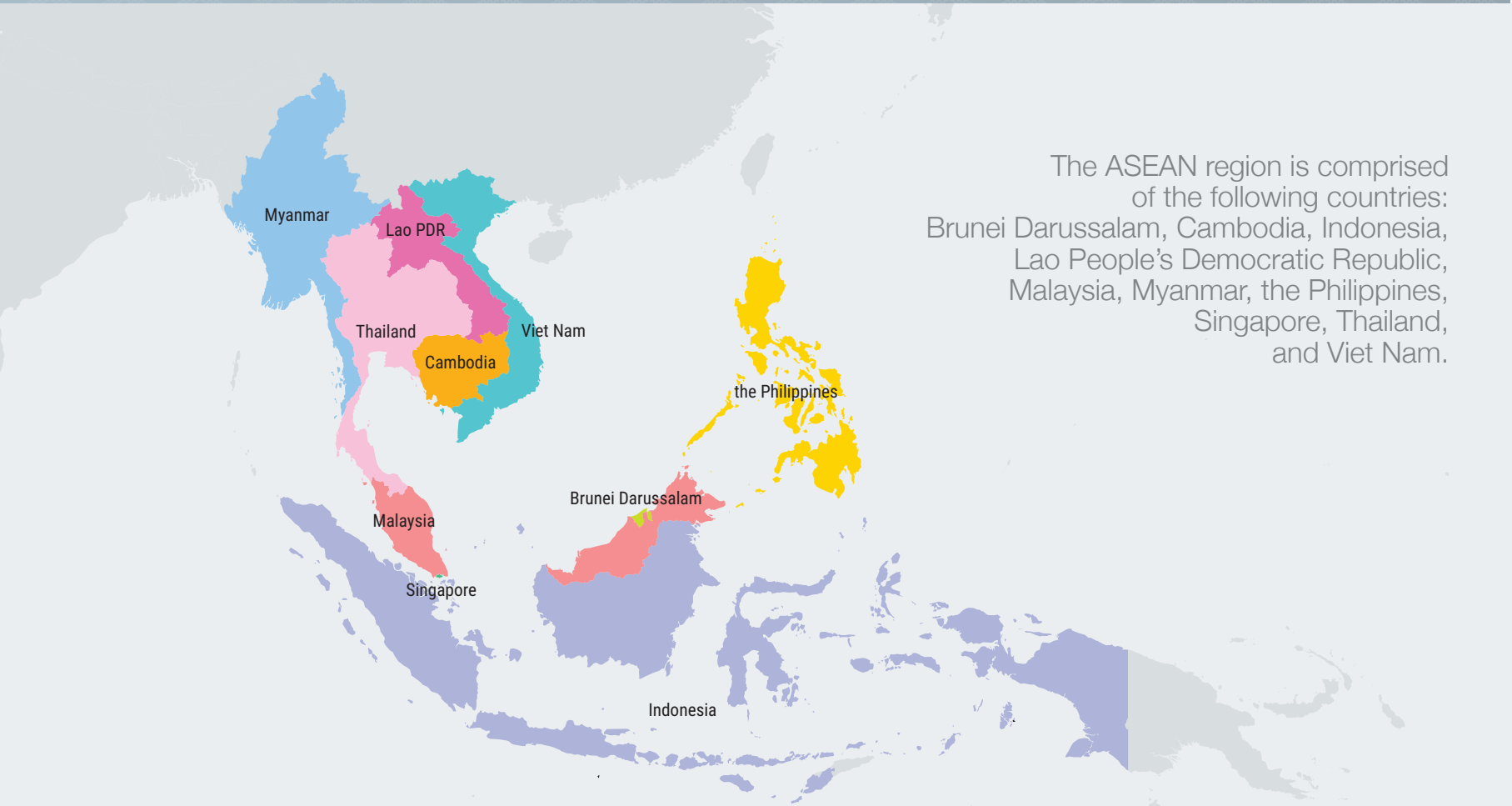
A statistical overview of the energy sectors of Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam

This publication is for reference only. Graphs and charts are based on data sources consulted for this publication. Additional data sources may exist that are not represented. In some cases, data sets may not be complete. ESCAP cannot confirm methodologies of third-party data sources. Data is not available for all countries for all indicators. Due to data limitations, only selected countries are used in several of the statistical representations. Due to the numerous sources used, the year of the latest data available varies.

Data presented in map formats are provided as illustrative charts. The designations employed and the presentation of the material in this publication do not imply the expression of any opinion on the part of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities, or concerning the delimitation of its frontier or boundaries.

Due to space limitations, data sources for all charts are presented at the end of the publication. Data sources include data and information available from the ESCAP Asia-Pacific Energy Portal which utilizes data from British Petroleum, Climatescope, ESCAP, International Energy Agency, International Renewable Energy Agency, Frankfurt School-UNEP Centre/BNEF, UN Comtrade, the World Bank, and the World Health Organization. There may be discrepancies between the data from the Asia-Pacific Energy Portal and ASEAN Energy Database System (AEDS).

This publication was prepared by Kim Roseberry in collaboration with Kira Lamont and and Gennady Fedorov. Review and inputs were provided by the members of the ESCAP Energy Division. Accuracy of content is the sole responsibility of the authors.

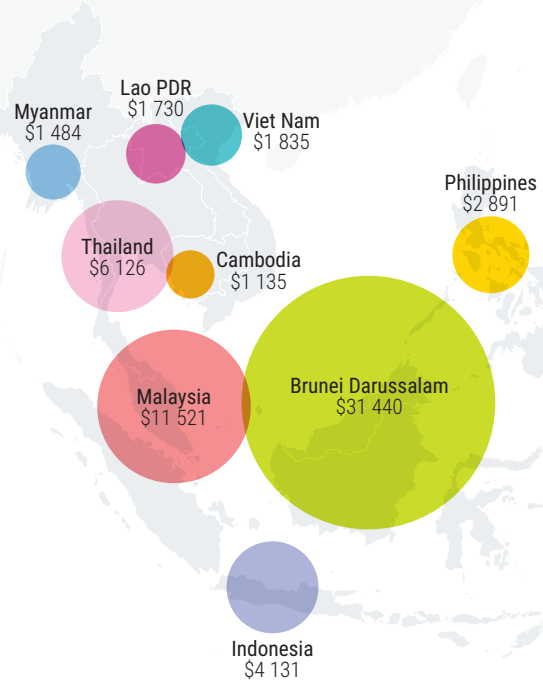


The ASEAN region is comprised of the following countries: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam.

Contents

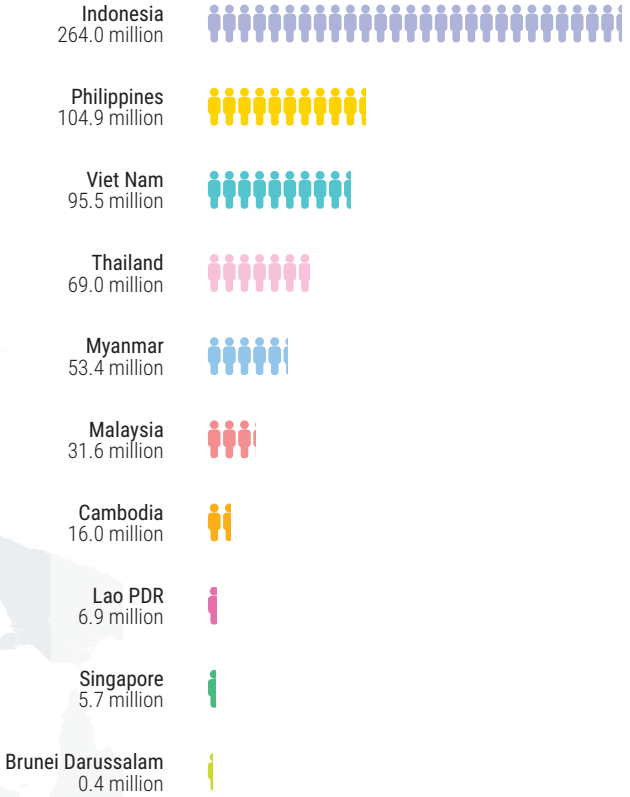
GDP per Capita, 2017

Constant 2010 US$

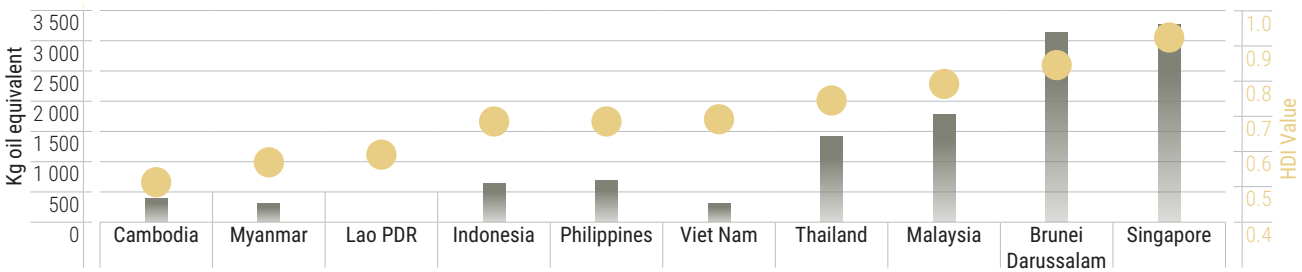


Population Size, 2017

Millions



Per Capita Energy Consumption, 2016 and Human Development Index, 2017



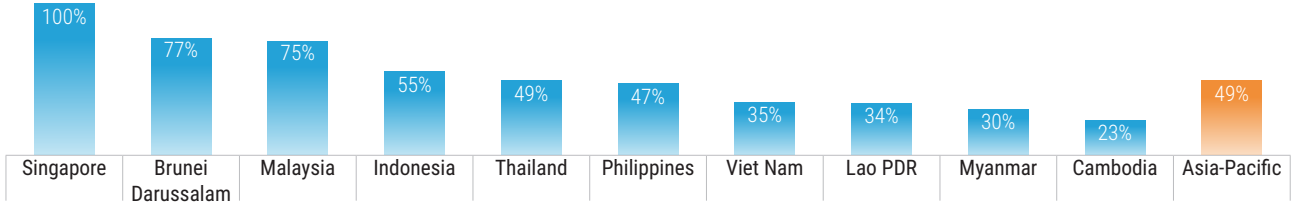
› Energy underpins development and outcomes. Human development – as measured by life expectancy, education levels, and income – remains highly varied across economies. Within countries, urban areas tend to have better access to energy services, as well as healthcare, education, and economic opportunities.

Note: Energy consumption data is unavailable for Lao PDR

Per Capita Energy Consumption

Human Development Index (HDI)

% of Population Living in Urban Areas, 2017



What is the Human Development Index?

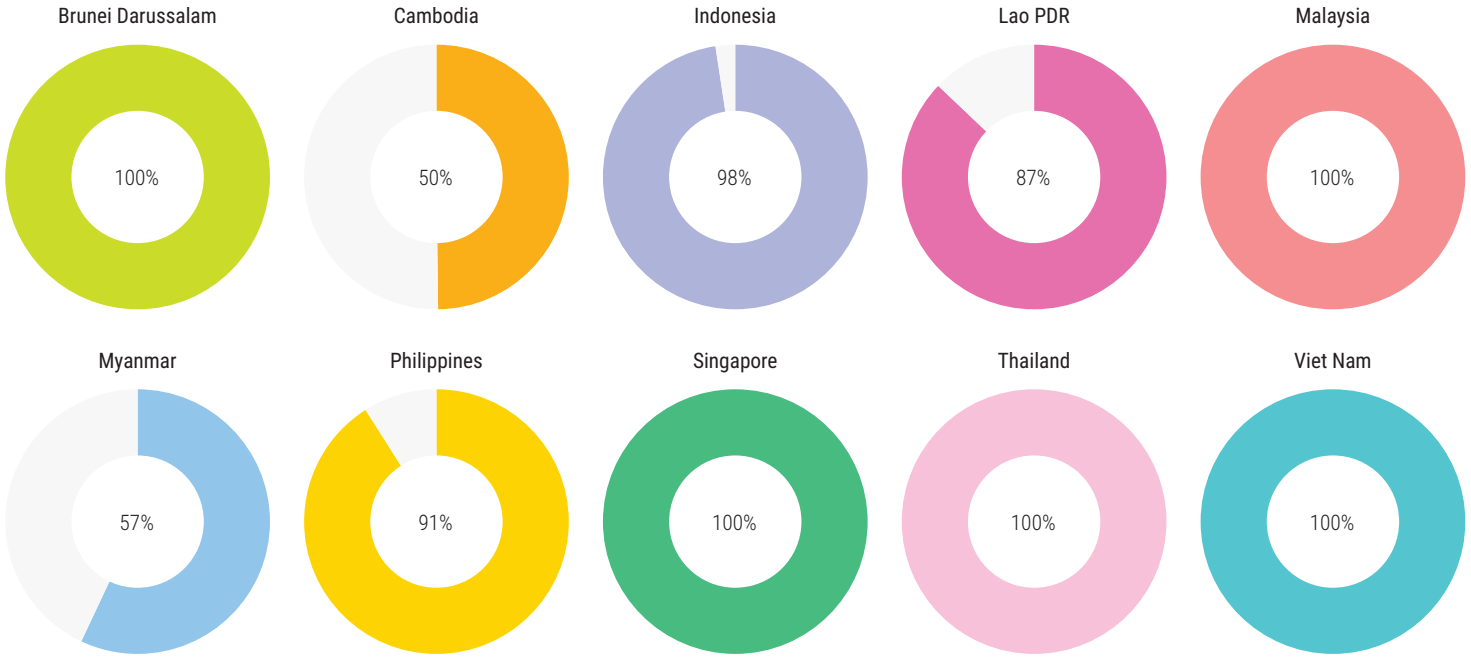
The Human Development Index, produced by the United Nations Development Programme, offers a broad measure of human development. The composite index "integrates three basic dimensions of human development. Life expectancy at birth reflects the ability to lead a long and healthy life. Mean years of schooling and expected years of schooling reflect the ability to acquire knowledge. And gross national income per capita reflects the ability to achieve a decent standard of living."

Source: Human Development Report Office.

For more information on the Human Development Index, please visit: http://hdr.undp.org/.

7 AFFORDABLE AND CLEAN ENERGY

% of Total Population with Access to Electricity, 2016

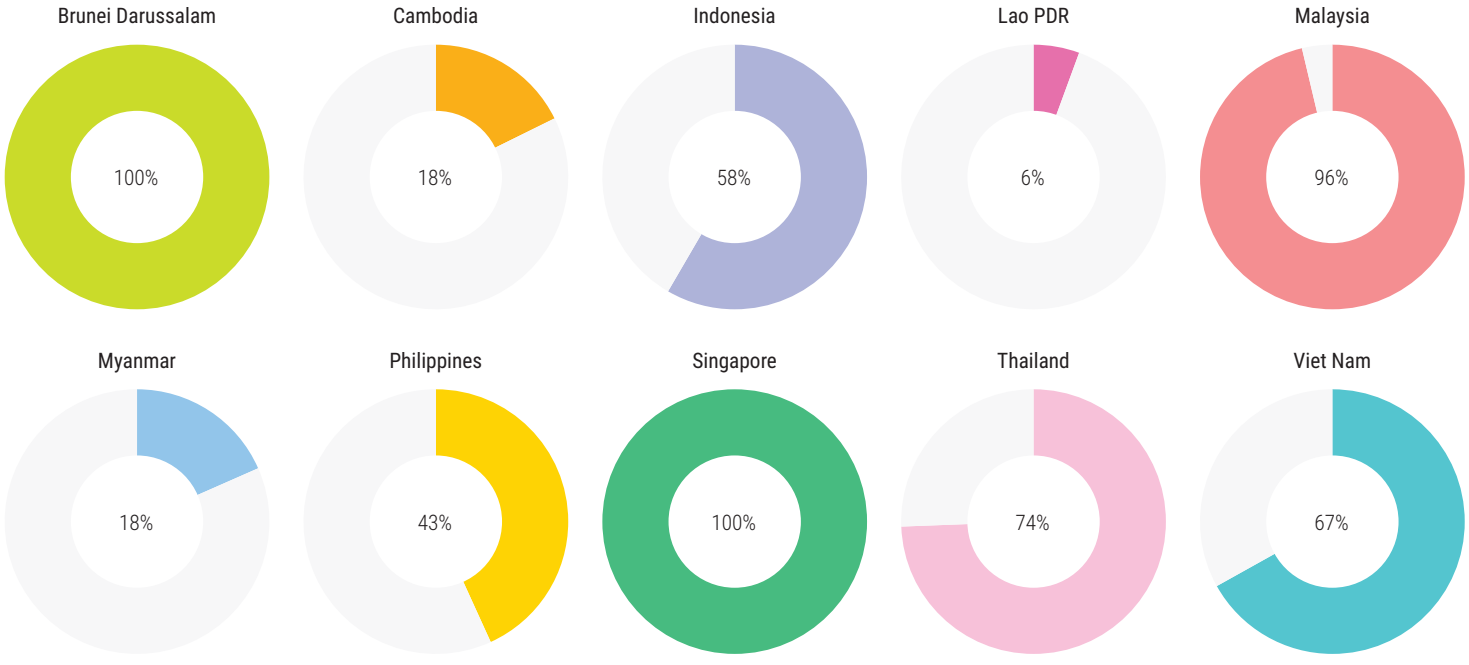


› Progress toward achieving universal access to electricity has been significant, and **92.7%** of the ASEAN region's population has access, though challenges remain for several countries.

Note: Access to electricity is the percentage of population with access to electricity. Electrification data are collected from industry, national surveys, and international sources.

2030 TARGET: Universal access to affordable, reliable and modern energy services

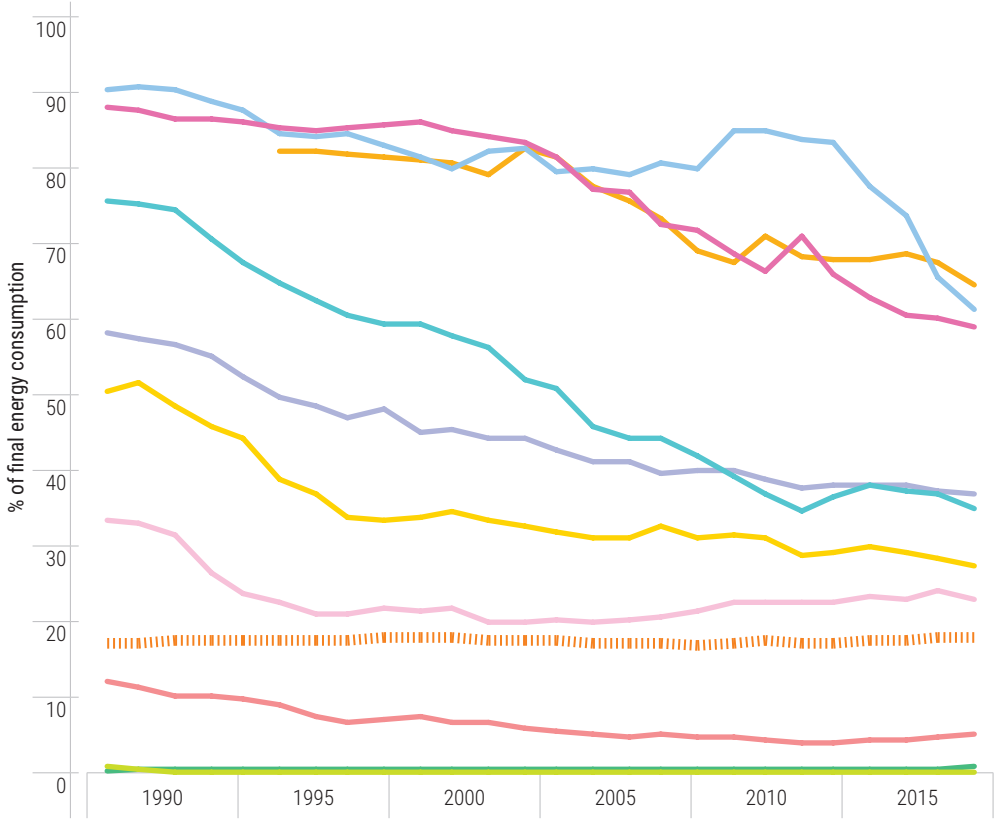
% of Total Population with Access to Clean Cooking, 2016



› Access to clean cooking fuels and technologies remains low for the majority of ASEAN countries, and at the regional level, only **56.3%** of the population has access.

See more data related to this topic in the "Energy Access" section.

Renewable Share of Total Final Energy Consumption, 1990-2015

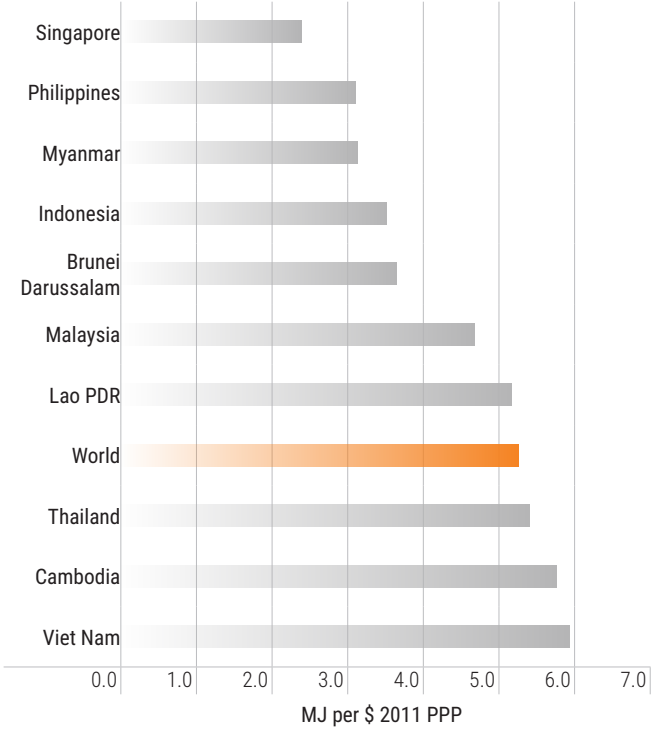


See more data related to this topic in the "Renewable Energy" section.

› As energy consumption has increased dramatically within the region, renewable energy's share of total final consumption is falling across most countries, moving in the opposite direction from achieving the SDG7 objective. However, positive shifting consumption patterns resulting from the introduction of electricity or clean cooking methods may be contributing factors, particularly for lower-income countries. High income countries in the region demonstrate the lowest shares of renewable energy.

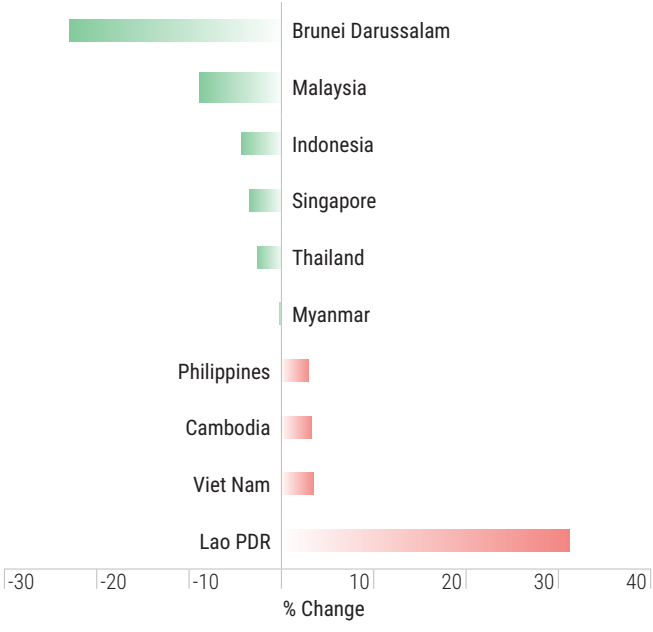
2030 TARGET: Increase substantially the share of renewable energy in the global energy mix.

Energy Intensity, 2015



› Energy intensity is a measure of energy efficiency based on energy consumption and GDP. By this measure, most ASEAN countries perform well against the global average, though some show recent increases in intensity.

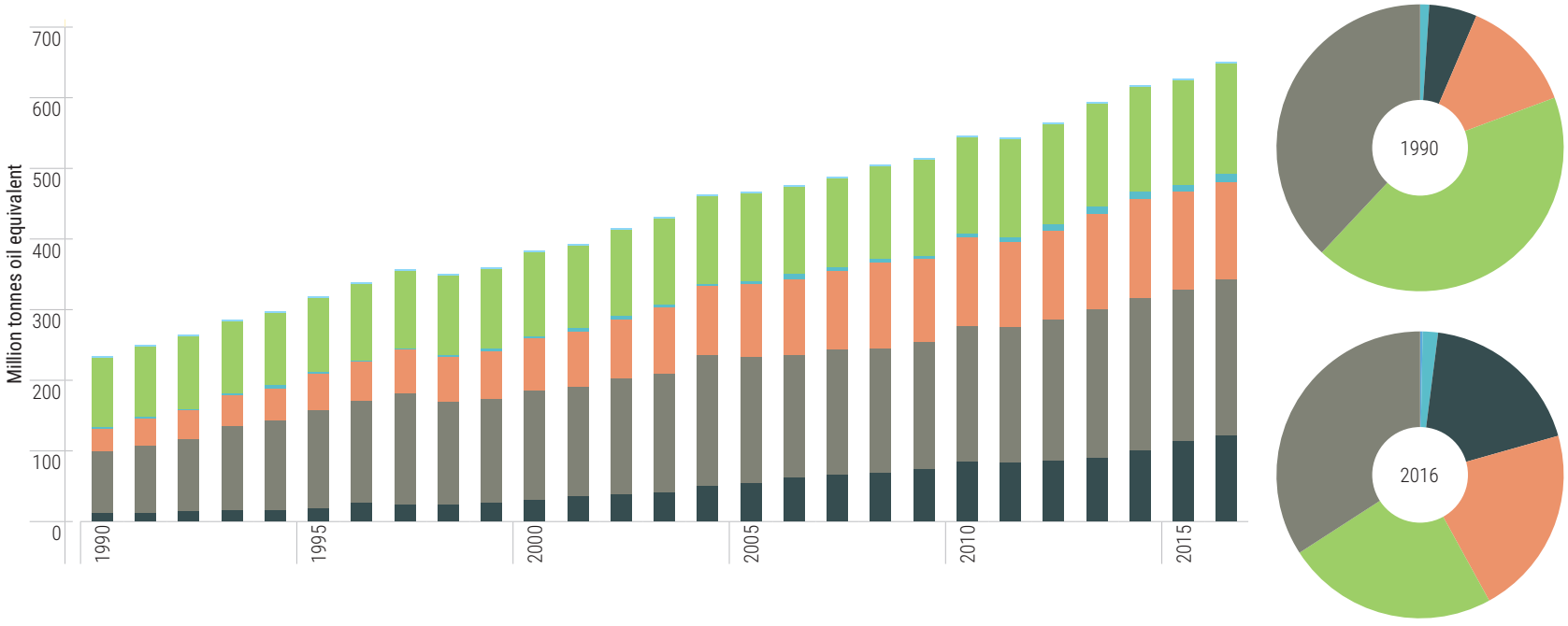
Energy Intensity Compound Annual Growth Rate, 2015



See more data related to this topic in the “Energy Efficiency” section.

2030 TARGET: Double the global rate of improvement in energy efficiency.

Primary Energy Supply in the ASEAN Region, 1990-2016

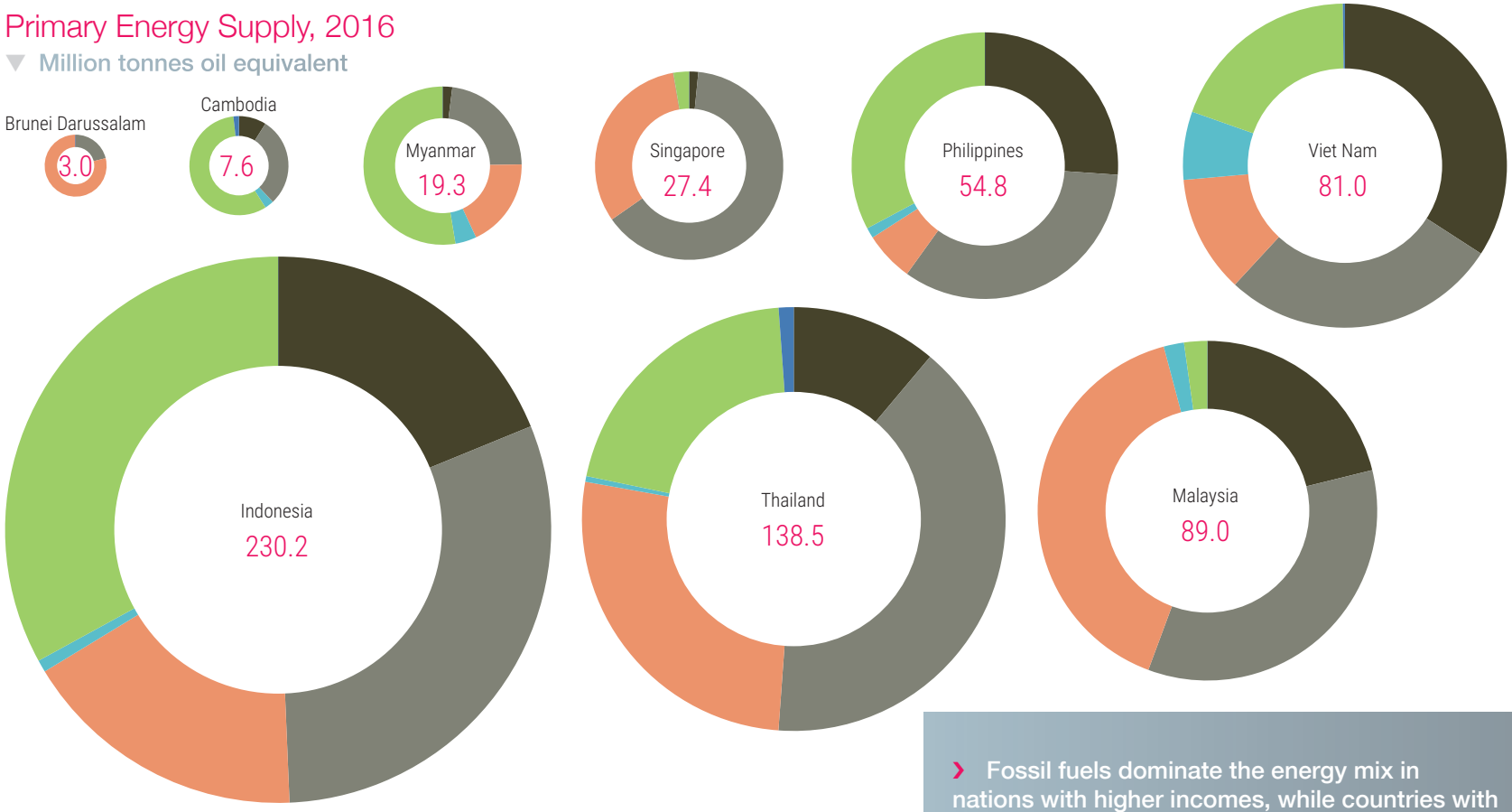


› At the regional level, ASEAN's primary energy supply has nearly tripled since 1990, with coal and natural gas gaining increasingly large shares within the energy mix.

*Renewables include solid biomass, which for some countries comprises a large share of their renewable energy use. Solid biomass is often used in traditional forms for cooking and heating, which have negative health impacts. In these uses, solid biomass is not considered "modern" renewable energy, but is still included in this data depiction.

Primary Energy Supply, 2016

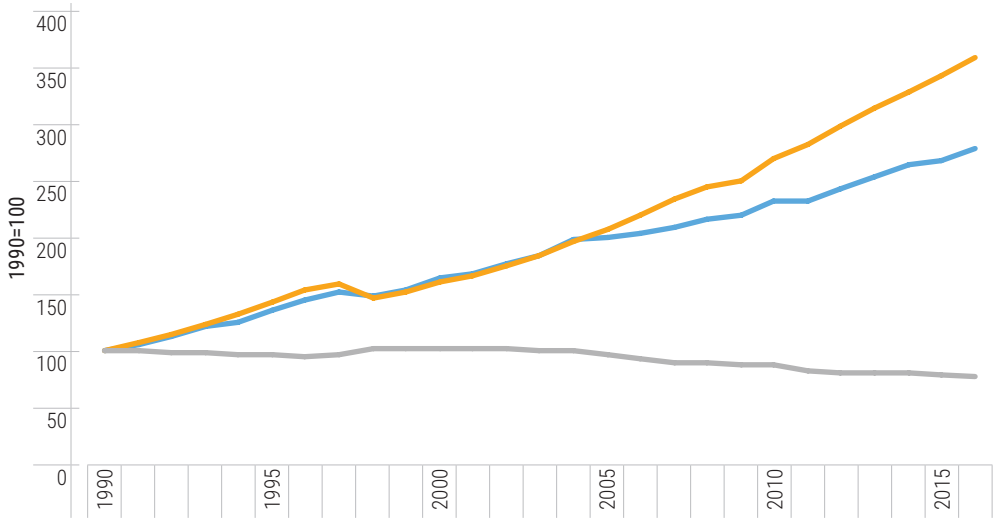
▼ Million tonnes oil equivalent



Note: Energy mix data is unavailable for Lao PDR

› Fossil fuels dominate the energy mix in nations with higher incomes, while countries with lower incomes have higher shares of renewables.

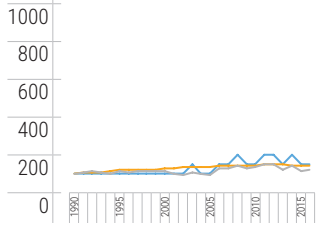
Relative Growth Trends for Total Primary Energy Supply, GDP and Energy Intensity in the ASEAN Region, 1990-2016



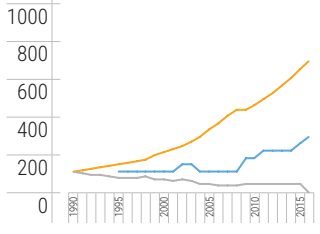
› Energy supply and GDP in the ASEAN region remained on track with each other until the mid-2000s when the start of a decoupling can be seen, as well as increasingly more economic value creation with less energy.

Total Primary Energy Supply
GDP
Energy Intensity

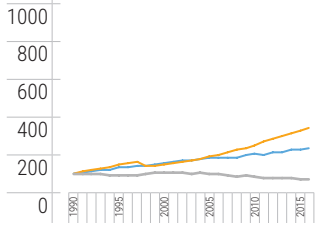
Brunei Darussalam



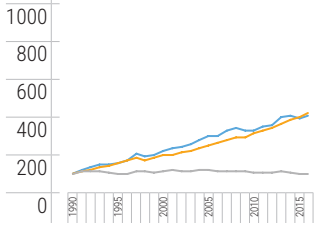
Cambodia



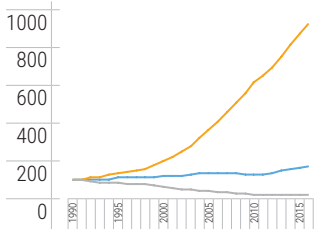
Indonesia



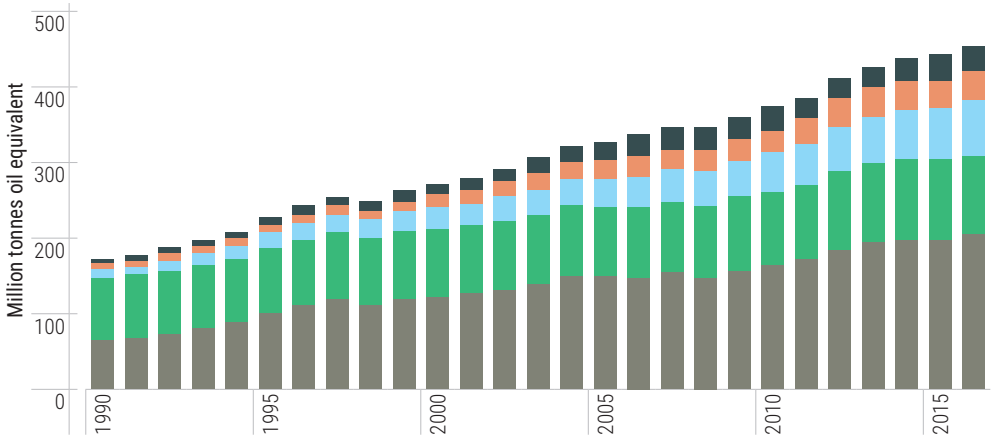
Malaysia

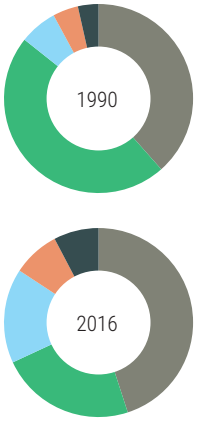


Myanmar



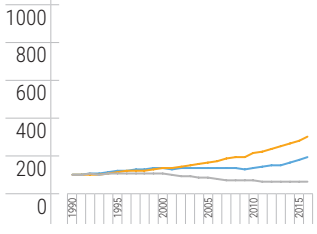
Final Consumption, by Product, in the ASEAN Region,1990-2016



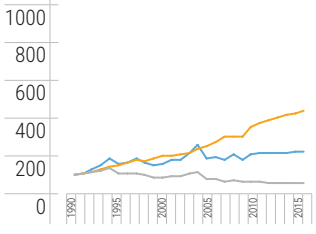


› Oil's share of the final energy consumption mix is approaching half, while coal and natural gas have doubled their shares since 1990. Electricity, produced from a number of resources, has demonstrated the largest share growth as access and the electrification of end uses continues to expand.

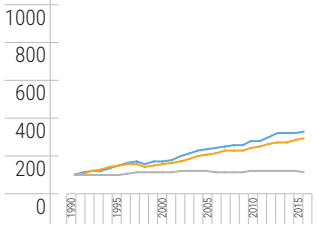
Philippines



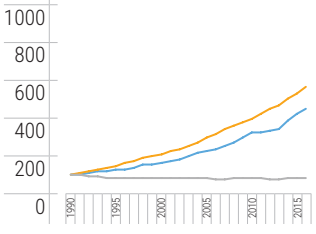
Singapore



Thailand

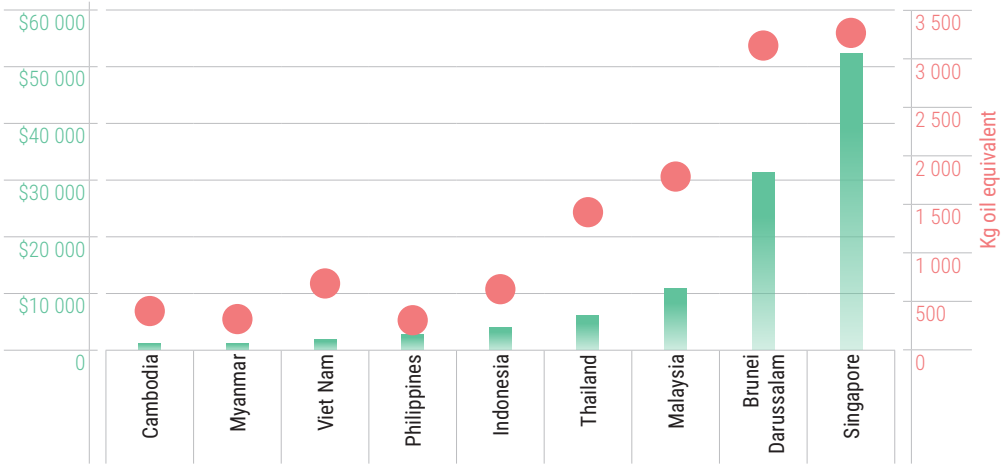


Viet Nam



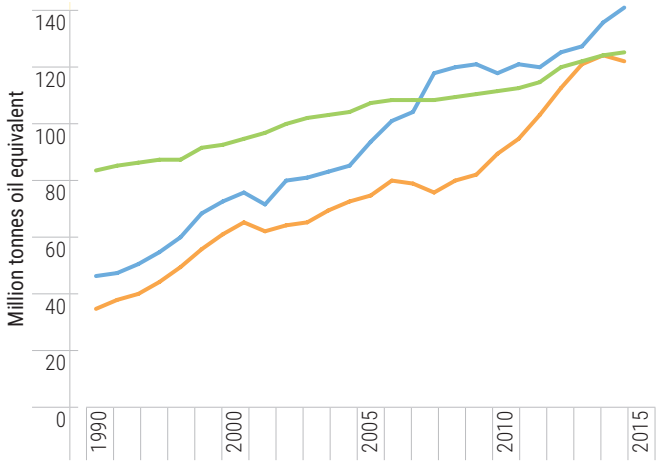
Note: Data is unavailable for Lao PDR

Per Capita GDP and Per Capita Final Consumption, 2016



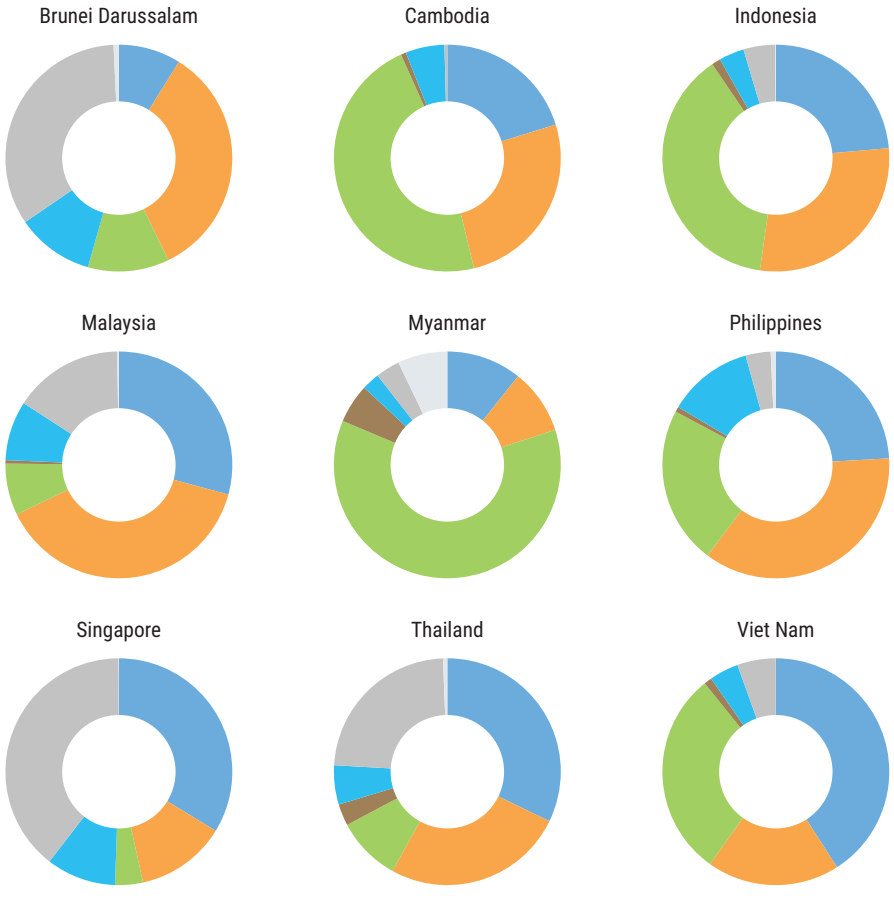
Note: Data is unavailable for Lao PDR

Final Consumption by Sector in the ASEAN Region, 1990-2016



› Across ASEAN countries, higher per capita energy consumption is associated with higher per capita GDP levels. Industry tops sectoral energy consumption, though the transportation sector is keeping pace. Residential energy consumption continues to grow, but at a slower rate.

Final Consumption, by Sector, 2016



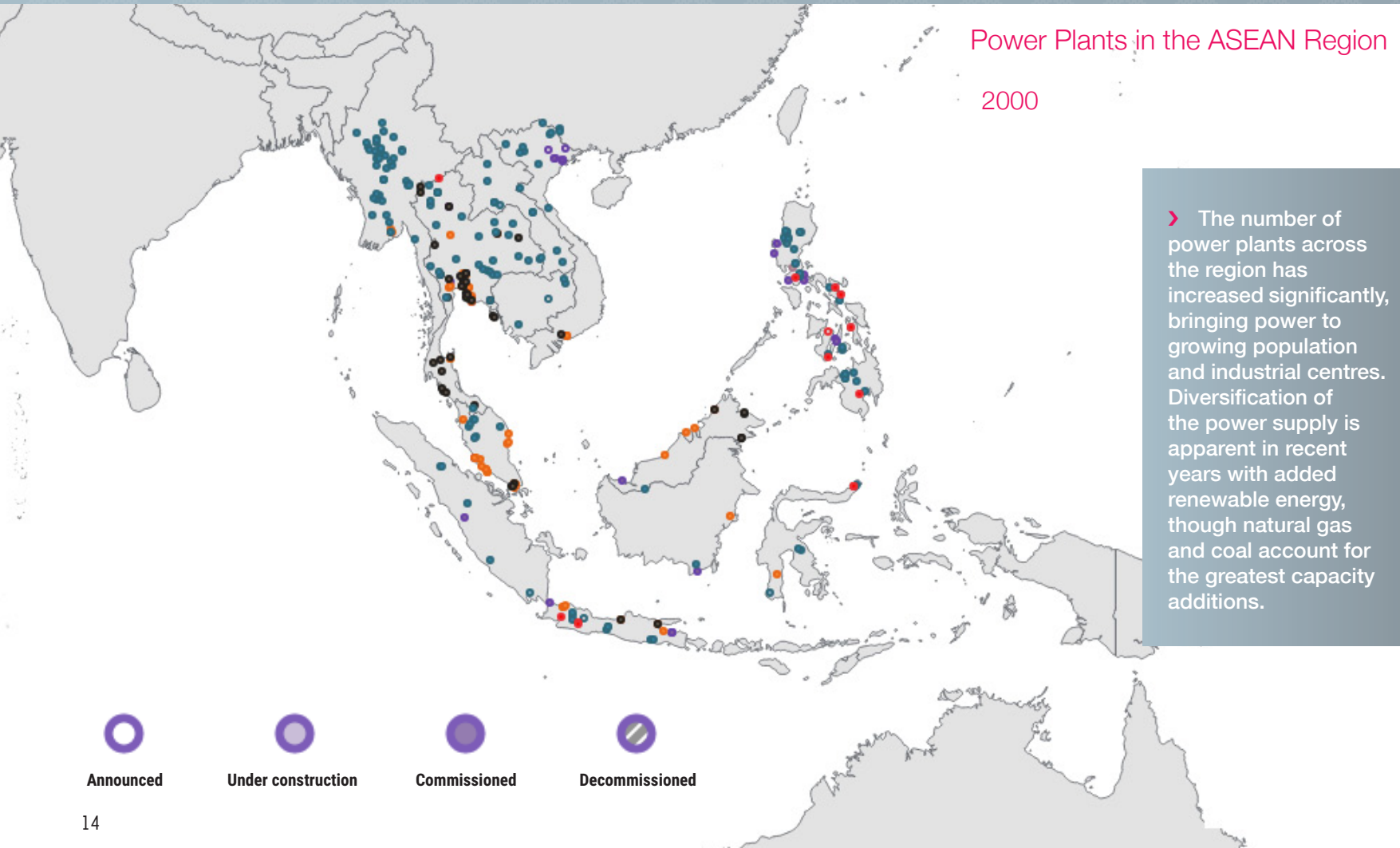
› At the national level, sectoral shares of energy consumption are highly varied. Industrial development levels play a large role in the overall composition of the final consumption mix.

Note: Data is unavailable for Lao PDR

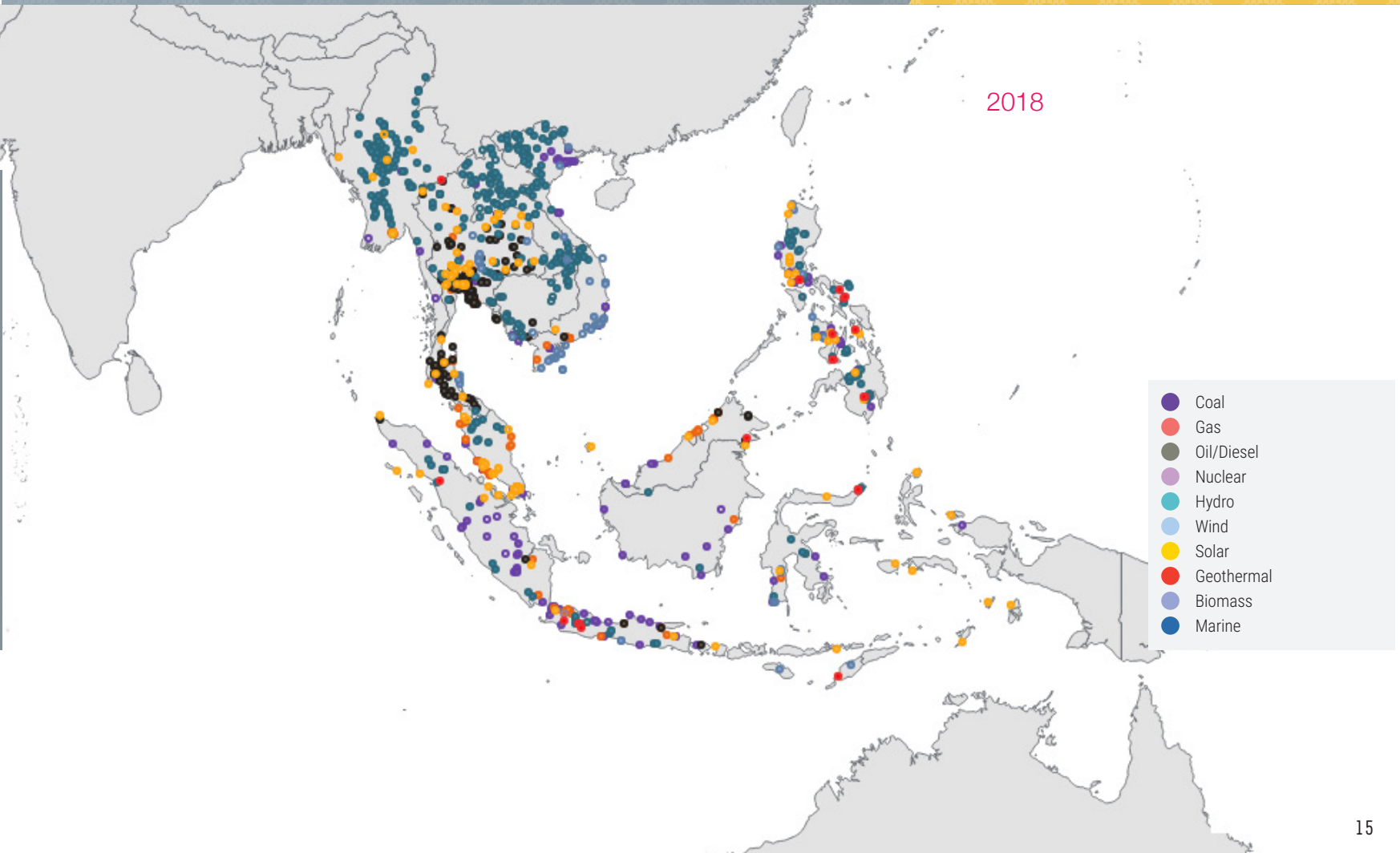
- Industry
- Transport
- Residential
- Agriculture/forestry
- Commerce and public services
- Non-Energy Use
- Other

Power Plants in the ASEAN Region

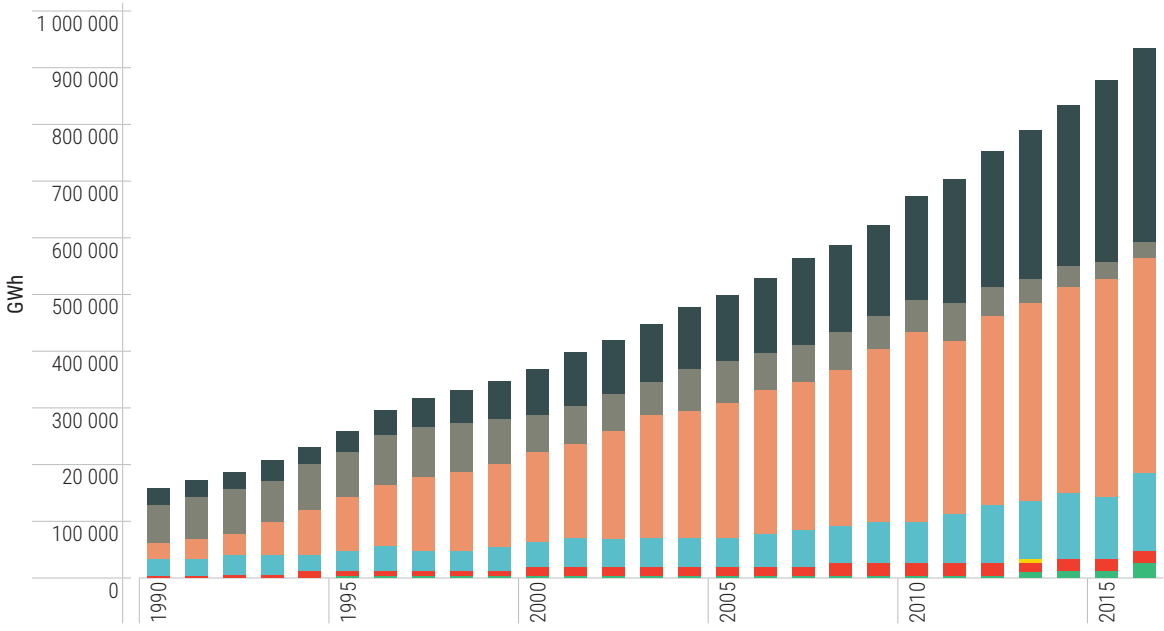
2000

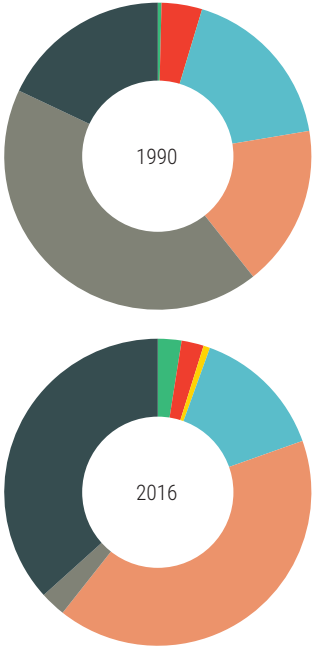


› The number of power plants across the region has increased significantly, bringing power to growing population and industrial centres. Diversification of the power supply is apparent in recent years with added renewable energy, though natural gas and coal account for the greatest capacity additions.


2018
Coal
Gas
Oil/Diesel
Nuclear
Hydro
Wind
Solar
Geothermal
Biomass
Marine

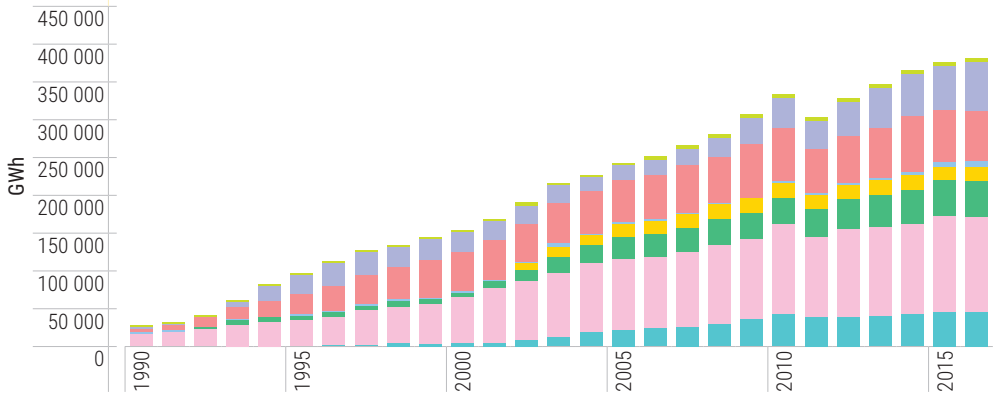
Electricity Production in the ASEAN Region, by Product, 2016





› Since the 1990s, natural gas has commanded the largest share of the power mix, though coal is quickly gaining share and is expected to overtake natural gas. Oil-based power is quickly fading from the mix, while biofuels, and, to a lesser extent, solar power are making gains.

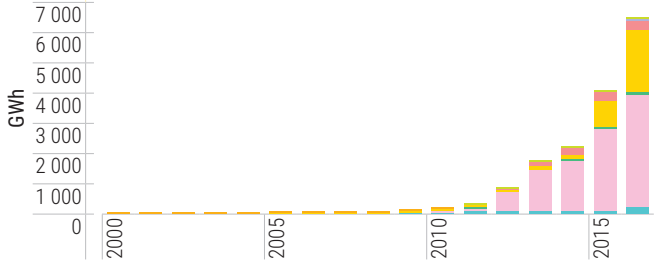
Electricity Production from Natural Gas in the ASEAN Region, 1990-2016



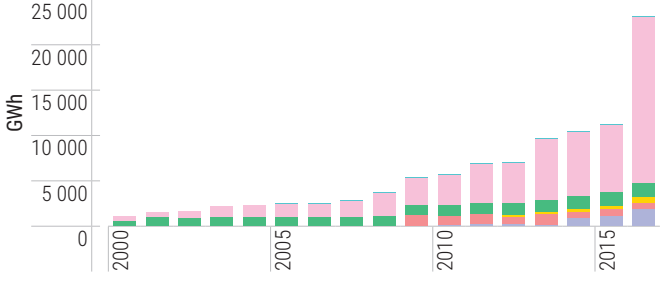
› On a regional basis, the largest long-term growth in electricity production is from natural gas. Thailand, the largest producer of natural gas power, has doubled production since 2000, while Viet Nam has made gas a significant source for electricity, and Singapore has come to nearly exclusively rely on it.

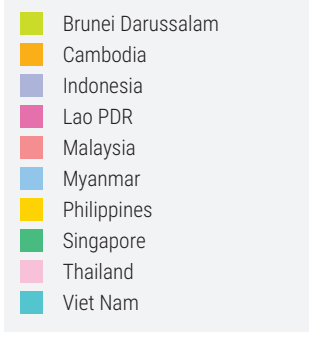
Biofuels occupy a small share of the power mix, but are making fast gains with Thailand leading new power production. Similarly, solar and wind demonstrate exponentially increasing production, driven by Thailand and the Philippines.

Electricity Production from Solar and Wind in the ASEAN Region, 2000-2016

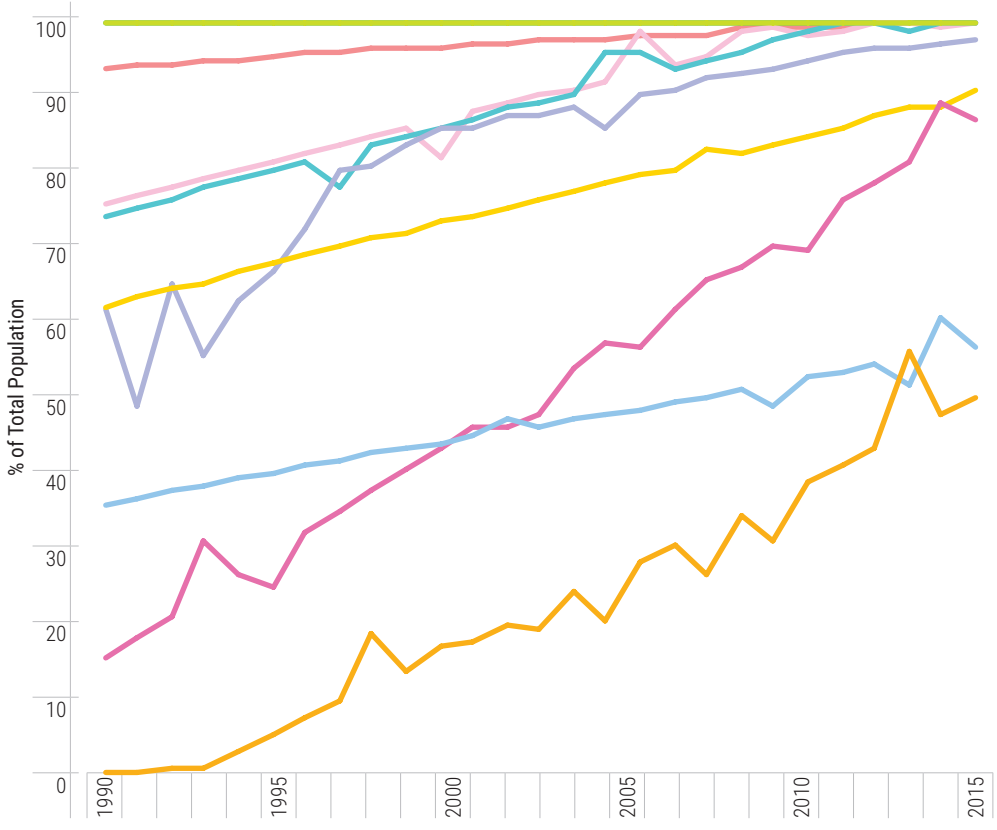


Electricity Production from Biofuels in the ASEAN Region, 2000-2016





% of Total Population with Access to Electricity, 1990-2016

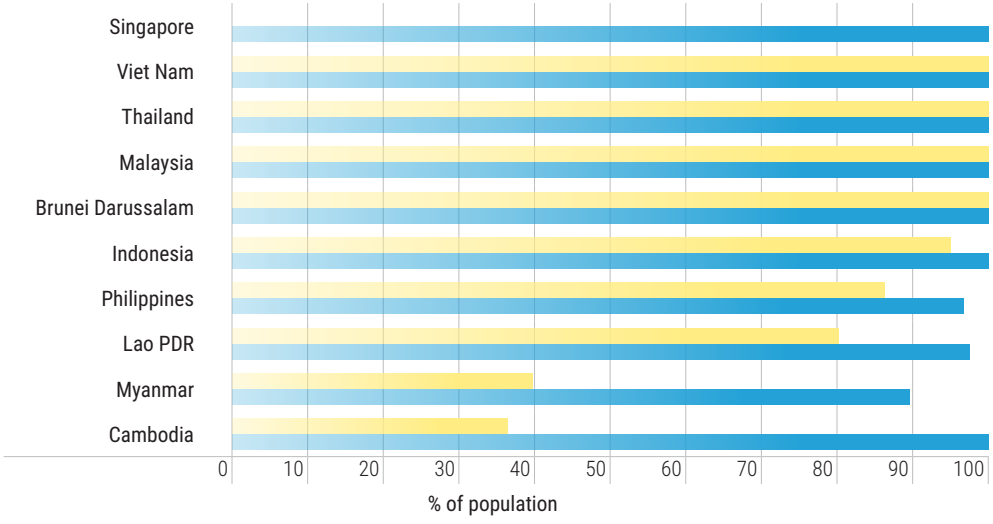


› The countries of ASEAN have demonstrated dramatic progress in their electrification efforts, with several achieving universal access. However, unserved populations still exist in more than half of the countries, and significant advancements are still required to achieve the objectives of Sustainable Development Goal 7.

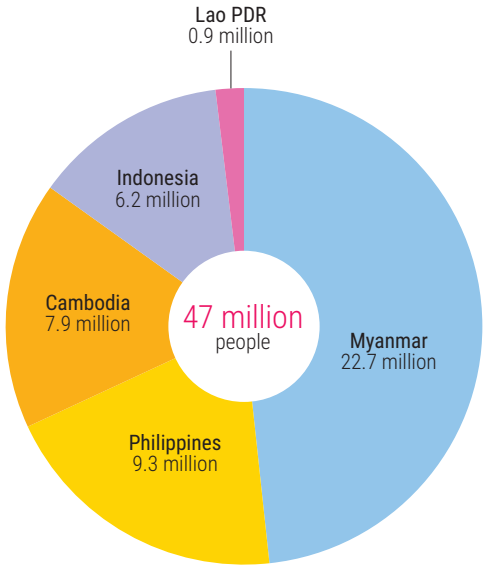
Note: Electrification data are collected from industry, national surveys and international sources.

Data sources include household surveys, government agencies, and utilities. The low frequency of data collection for some sources means that gaps exist in the data and estimations are generated by an estimation model. Observed data points are kept. Due to the various sources of information feeding into the models, data can appear inconsistent from one year to the next.

% of Urban and Rural Population with Access to Electricity, 2016



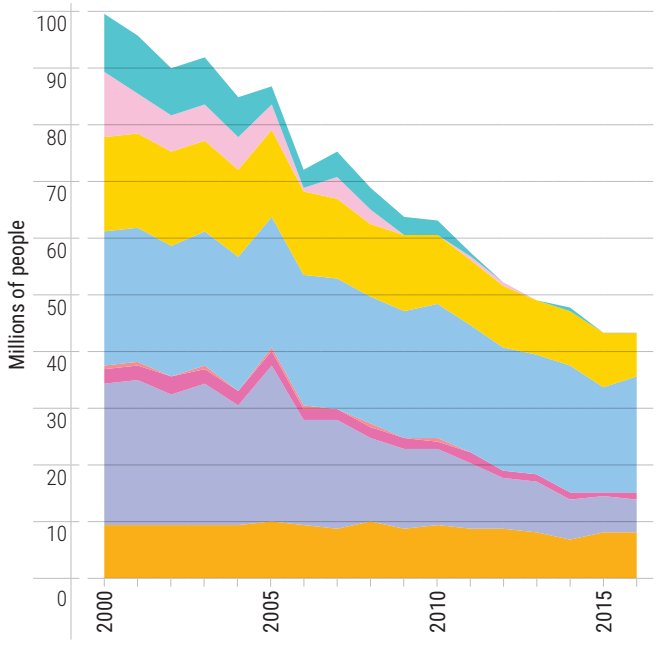
People without Access to Electricity in the ASEAN Region, 2016



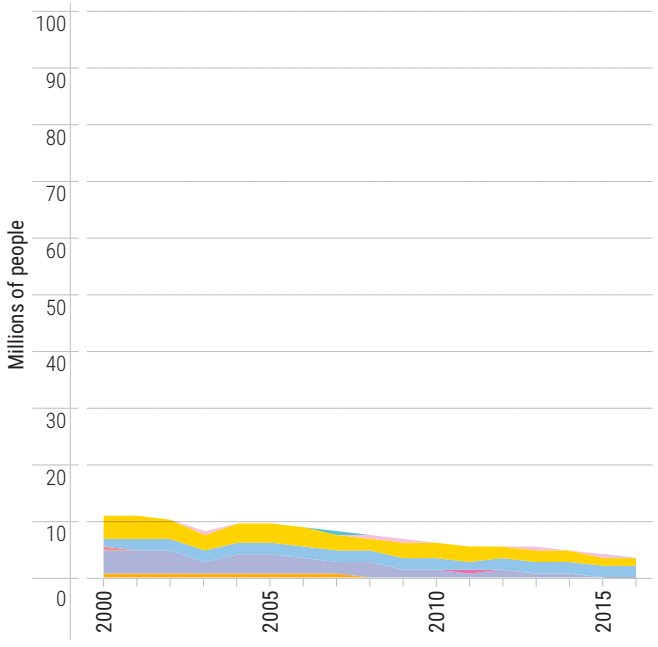
› Access rates in urban areas are generally high, though significant discrepancies exist for rural areas in a number of countries.

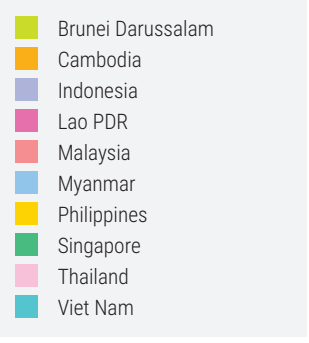
› The remaining populations without access to electricity tend to be located in remote areas and those with challenging geographies.

Rural Populations without Access to Electricity, 2000-2016



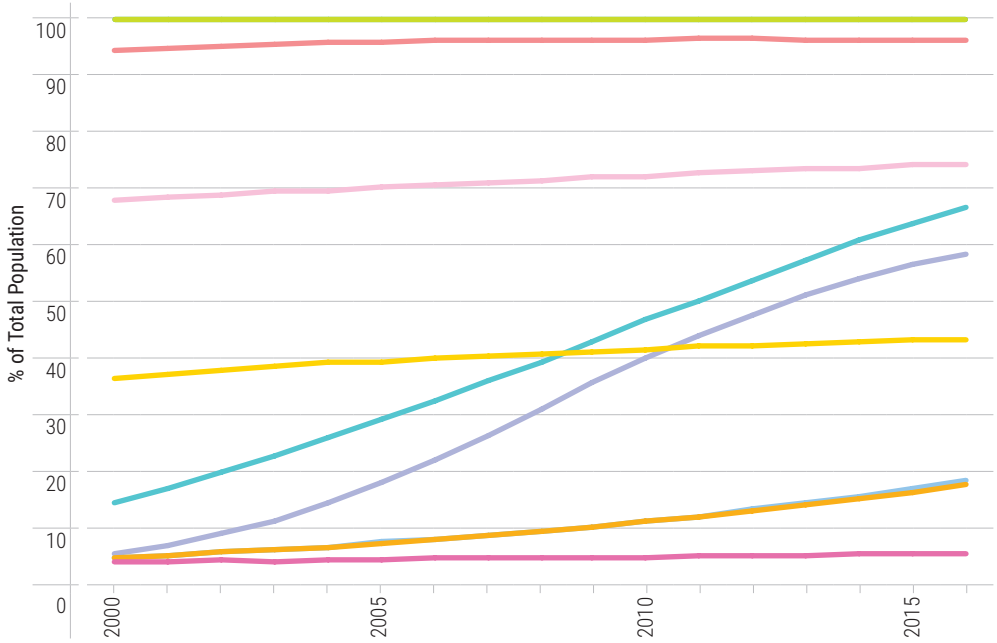
Urban Populations without Access to Electricity, 2000-2016



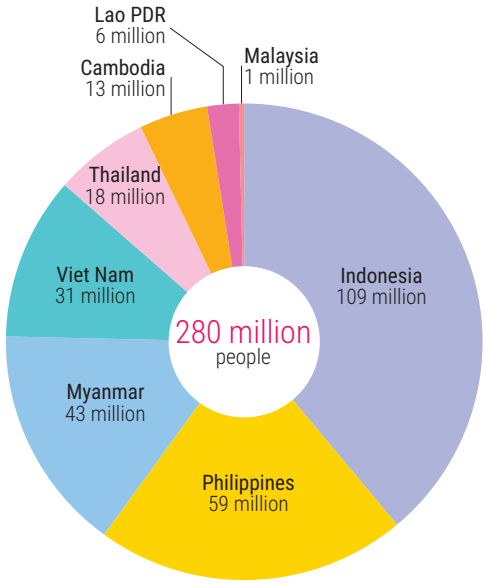


› Approximately **7.3%** of the ASEAN population lacks access to electricity. Most live in rural areas where the size of the access gap is many times the gap of the region's urban population.

% of Total Population with Access to Clean Cooking, 2000-2016



Population without Access to Clean Cooking, in the ASEAN Region, 2016



› The developing countries of ASEAN continue to struggle to bring clean cooking fuels and technologies to their populations. However, Indonesia and Viet Nam stand out with their rapid rates of progress, with annualized increases of 3.0 and 3.4 percentage points, respectively, over the 2010-2016 period.

› An estimated **280 million people** in ASEAN continue to rely on traditional cooking fuels and technology. Those in rural areas are far more likely to depend on fuels such as wood, dung, and charcoal.

Access to Electricity Targets

Country	Target	Document
Brunei Darussalam	Number of incidents of power outages of more than 1 hour duration in a year. Target 2017: 100 per year. Target 2035: less than 50 per year.	Energy White Paper (2014)
Cambodia	By 2020, all the villages will have electricity of some type; by 2030, at least 70% of households will have access to grid-quality electricity. By 2020, all villages will have access to electricity supplied by the national grid and other sources.	Program for the Development of Rural Electrification of Department of Rural Electrification Fund Electricité du Cambodge (REF) 2017-2018 National Strategic Development Plan 2014-2018
Indonesia	Achieve 96.6% electrification ratio by 2019. "Close on" 100% electrification in 2020.	The Medium Term National Development Plan 2015–2019 Government Regulation Number 79/2014 Concerning the National Energy Policy (2014)
Lao PDR	At least 90% of families have access to electricity by 2020.	The Eighth Five-Year National Socioeconomic Development Plan (2016–2020); Intended Nationally Determined Contribution (2015)
Malaysia	By 2020, 99.9% of households will have electricity supply in Peninsular Malaysia, Sabah, and Sarawak.	Eleventh Malaysia Plan 2016-2020
Myanmar	Achieve 75% electrification rate by the end of year 2021/2022. Achieve 100% electrification by 2030.	National Energy Policy (2014) The Myanmar National Electrification Plan (NEP) Roadmap (2016)
Philippines	Total household electrification by 2022.	Philippine Development Plan 2017-2022
Viet Nam	Most of rural households will have access to and utilize electricity by 2020.	Decision 428 / QD-TTg: Approval of the Revised National Power Development Master Plan for the 2011-2020 Period with the Vision to 2030; Decision No. 2081 QD-TTg on the Approval of Electricity Supply Programme for Rural, Mountains area and the Islands, Period 2013-2020

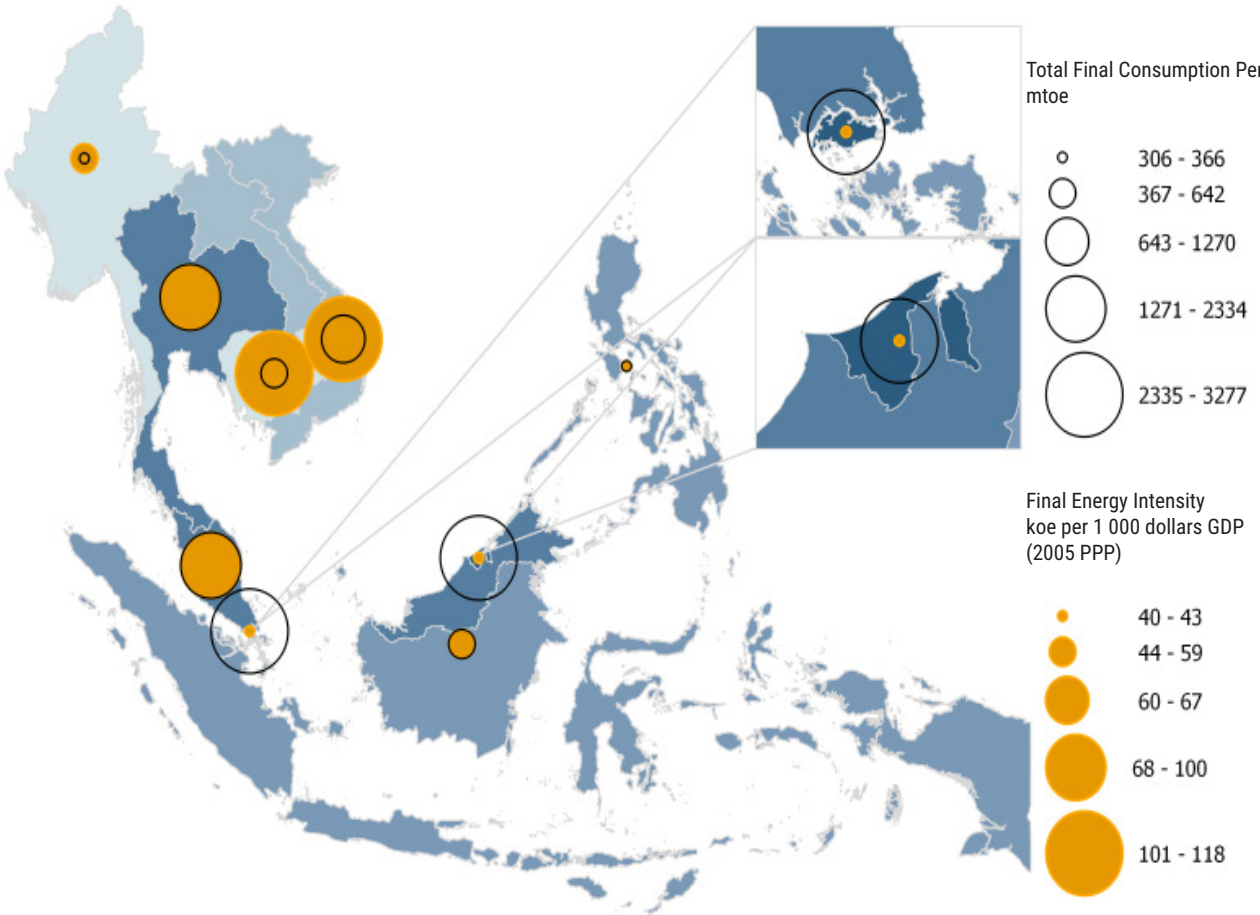
› ASEAN countries that have yet to achieve universal electrification all have established electrification targets.

Access to Clean Cooking Targets

Country	Target	Document
Brunei Darussalam	Not applicable - the country has achieved 100% access."	
Cambodia	None identified	
Indonesia	Achieved household gas utilization ratio of 85%, by 2015.	Government Regulation Number 79/2014 Concerning the National Energy Policy (2014)
Lao PDR	Increase the number of households using biogas by 50 000 in 2025.	Renewable Energy Development Strategy in Lao PDR (2011-2025).
Malaysia	None identified	
Myanmar	Distribute approximately 260 000 cookstoves between 2016 and 2031.	Myanmar's Intended Nationally Determined Contribution-INDC (2017)
Philippines	None identified	
Singapore	Not applicable - the country has achieved 100% access."	
Thailand	None identified	
Viet Nam	To increase the rate of rural households using commercial energy for cooking to 50% by 2010 and 80% by 2020.	Decision 1855/QD-TTg: Approving Viet Nam's National Energy Development Strategy up to 2020, with 2050 vision (2007)

› Clean cooking has not received the same policy attention in the ASEAN region as has electrification. While large access gaps remain in a number of countries, quantifiable targets are few. However, several have established programmes and have policy statements on general objectives.

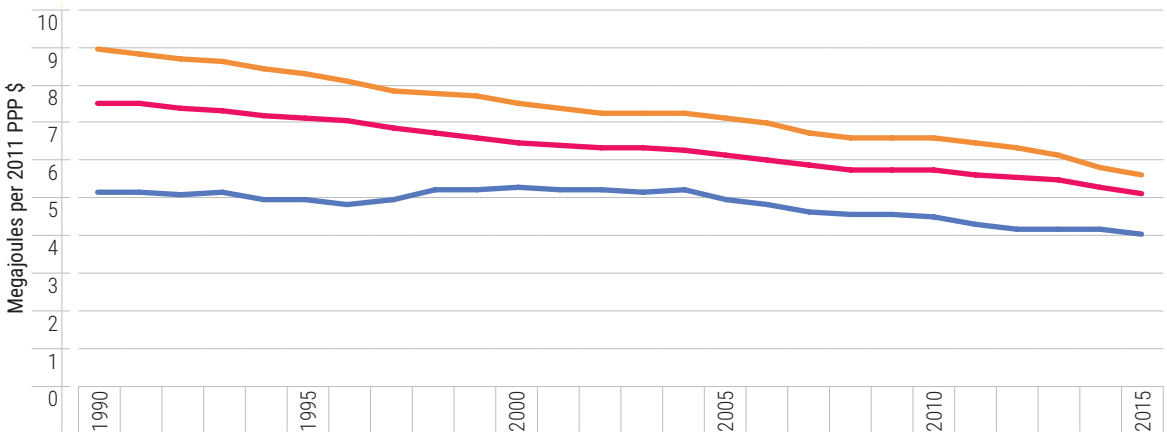
Per Capita Total Final Consumption and Energy Intensity, 2016



› High consumption rates and low energy intensity levels are found in high income economies, whereas industrialisation and economic structures create significant variance among the ASEAN region's lower to upper middle income countries

Note: Energy consumption and energy intensity data is unavailable for Lao PDR.

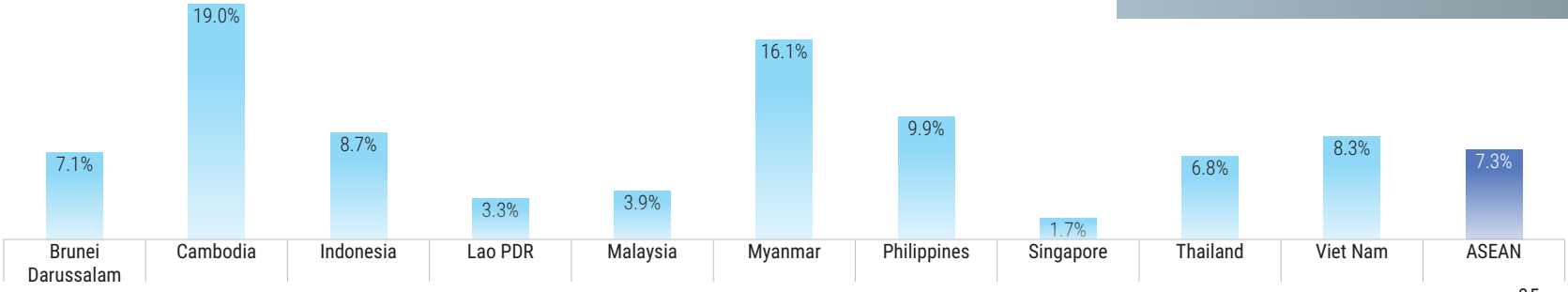
Energy Intensity, 1990-2015



› The energy intensity of ASEAN has remained lower than the Asia-Pacific and global levels, indicating the ability of the region to generate more economic value per unit of energy consumed than much of the world.

The long-term trend is falling regional intensity, which tracks global trends, though areas for improvement remain. For example, in the power sector, transmission and distribution losses remain high in some national contexts.

Transmission and Distribution Losses % of Net Electrical Power Production, 2015

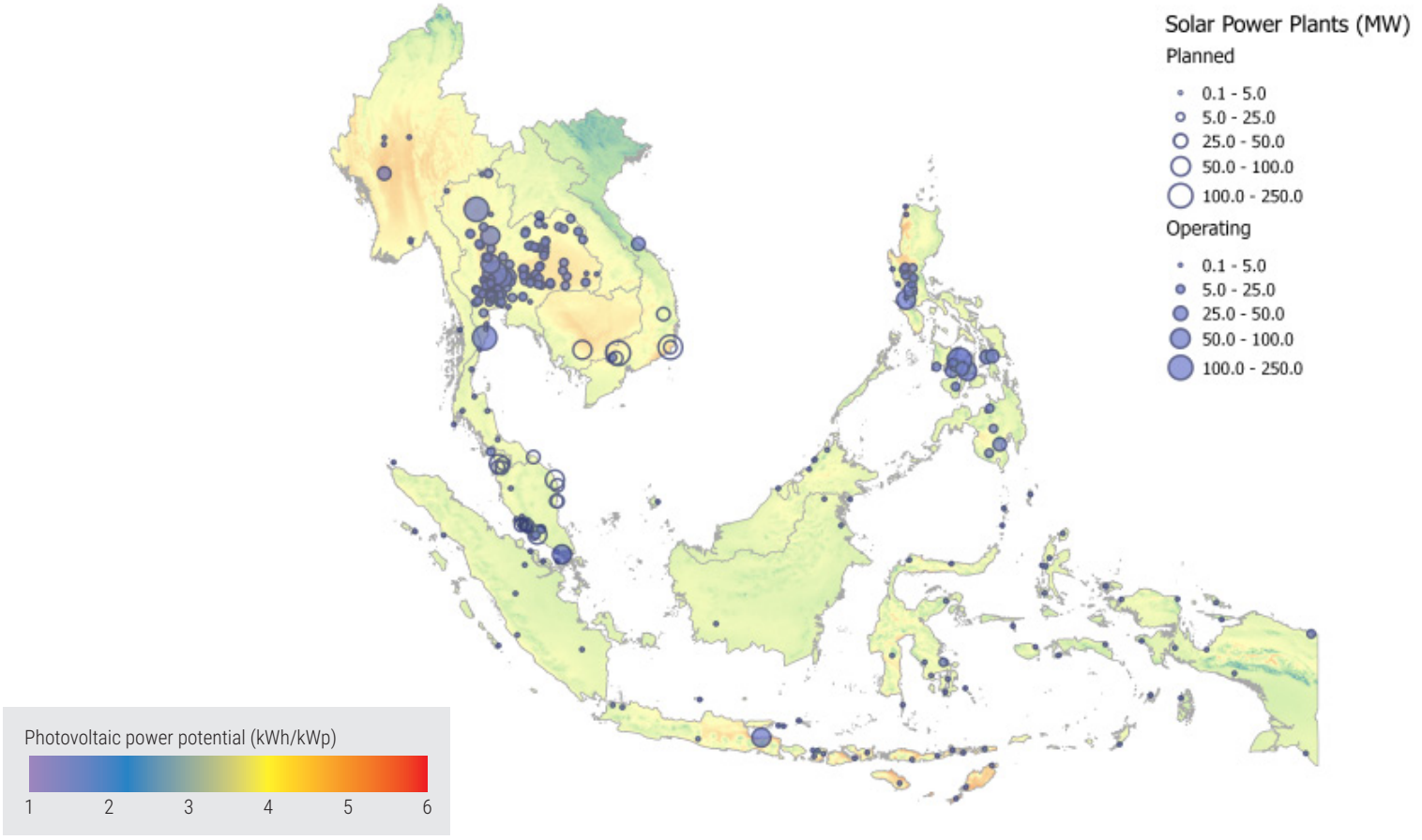


Energy Efficiency Targets

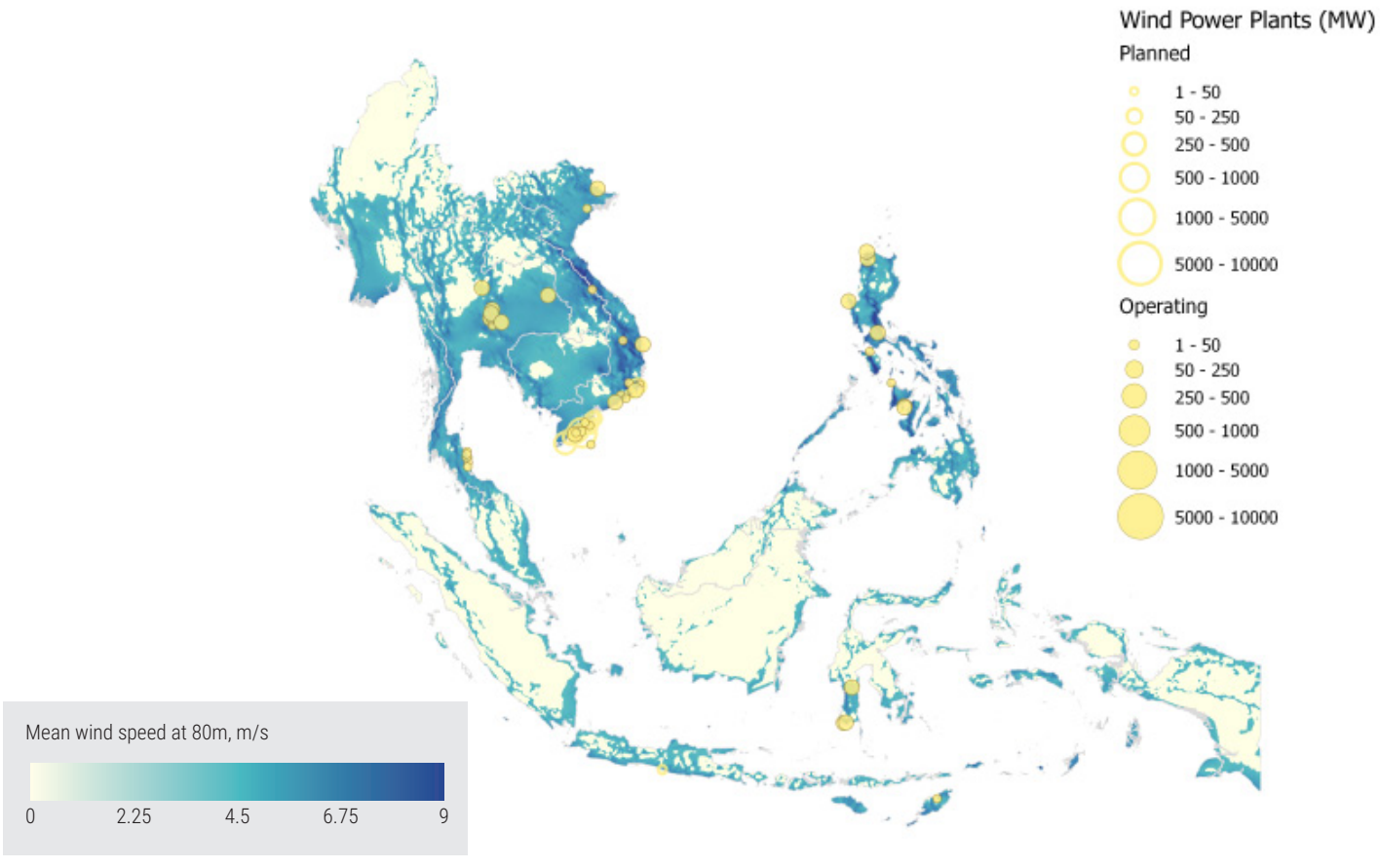
Country	Target	Document
ASEAN	Reduce energy intensity in ASEAN by 20% as a medium-term target in 2020 and 30% as a long- term target in 2025 (base year 2005).	ASEAN Economic Community 2025 Consolidated Strategic Action Plan (2016); ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025
Brunei Darussalam	Reduce total energy consumption by 63% by 2035 compared to business-as-usual (BAU). Reduce energy intensity by 45% by 2035.	Brunei Darussalam's Intended Nationally Determined Contribution (INDC) (2016) Energy White Paper (2014)
Cambodia	Reduce energy demand by 20% until 2035, compared to BAU.	National Policy, Strategy and Action Plan on Energy Efficiency in Cambodia (2013)
Indonesia	Reduce final energy intensity 1% percent per year up to 2025.	Government Regulation Number 79/2014 Concerning the National Energy Policy (2014)
Lao PDR	Reduce TFEC by 10% by 2030, and reduce energy consumption level by around 1% per year on average, compared to BAU.	The National EE&C Policy towards 2030 (2016)
Malaysia	Reduce Malaysia's energy consumption 10-15%, compared to BAU.	Economic Transformation Programme (ETP) - A Roadmap for Malaysia (2010)
Myanmar	Realise a 20% electricity savings by 2030, compared to forecast electricity consumption. Reduce energy consumption by 12% by 2020, 16% by 2025, and 20% by 2030 (base year 2012).	Myanmar' s Intended Nationally Determined Contribution-INDC (2017) National Energy Policy, Strategy and Road Map (2016)

Country	Target	Document
Philippines	♀ Reduce energy intensity by 40% by 2030, equating to a saving against the BAU baseline of 10 665 ktoe. ♀ Decrease energy consumption 1.6% per year, compared to baseline forecasts.	♀ Philippines Energy Efficiency and Conservation Action Plan (2016-2020) ♀ An Energy Efficiency Roadmap for the Philippines (2014-2030)
Singapore	♀ Realise a 35% energy intensity improvement by 2030 (base year 2005).	♀ Sustainable Singapore Blueprint (2015)
Thailand	♀ Reduce the power sector's energy intensity by 30% by 2036 (base year 2010). ♀ Reduce energy intensity by 25% by 2030 (base year 2005); Reduce final energy consumption by 20% by 2030. ♀ Reduce power usage in the production process by 25% within the next two decades.	♀ Thailand Power Development Plan 2015-2036 (PDP2015) ♀ Thailand 20-Year Energy Efficiency Development Plan (2011-2030) ♀ Policy Statement of the Council of Ministers Delivered by Prime Minister Yingluck Shinawatra to the National Assembly Tuesday 23 August B.E. 2554 (2011)
Viet Nam	♀ Realise commercial electricity savings of more than 10% of total power consumption for the 2016-2020 period. ♀ Decrease annual energy volume by 2.5% per year and achieve saving rations of about 2.5% by 2020 and of 4% by 2020 in the total annual output of commodity electricity; Realise savings of 8-10% of total power consumed during 2016-2020 period. ♀ The energy-GDP elasticity coefficient will reach 1.5 by 2015, 1.0 by 2020, and maintain at 0.6-0.8 by 2035. ♀ For the period 2011-2020, reduce energy consumption per unit of GDP by 1-1.5% per year; Reduce elasticity of electricity-GDP from 2.0 at present to 1.0 in the year 2020. ♀ Industrial production establishments shall save 5-8% of energies consumed per product.	♀ Decision 428 / QD-TTg: Approval of the Revised National Power Development Master Plan for the 2011-2020 Period with the Vision to 2030 (2016) ♀ Decision No. 14318/QD-BCT on the Approval of the Project for Restructuring Viet Nam Power Sector for the Cause of Industrialization, Modernization and Sustainable Development Towards 2020 and for Visions Extended to 2030 (2015) ♀ Industrial Development Strategy through 2025, vision toward 2035 (2014) ♀ Green Growth Strategy for the Period 2011-2020 with a Vision to 2050 (Decision No. 1393/QĐ-TTg) (2012) ♀ Strategy on Cleaner Industrial Production to 2020 (2009)

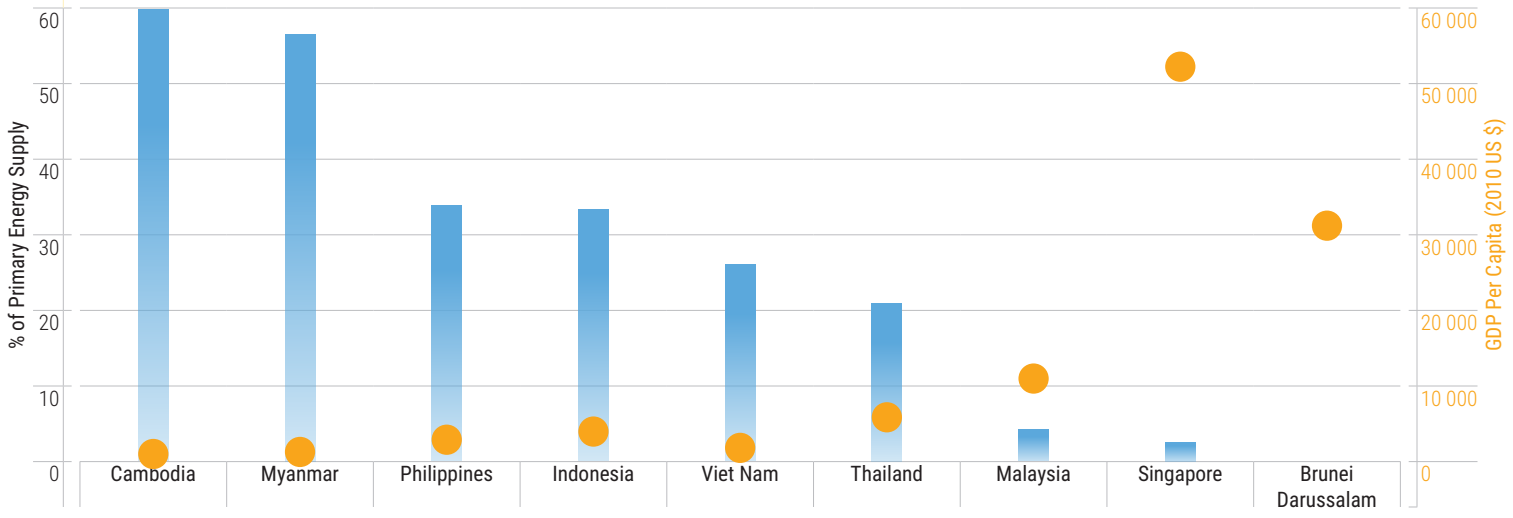
Solar Potential and Solar Power Plants, 2018



Wind Potential and Wind Power Plants, 2018



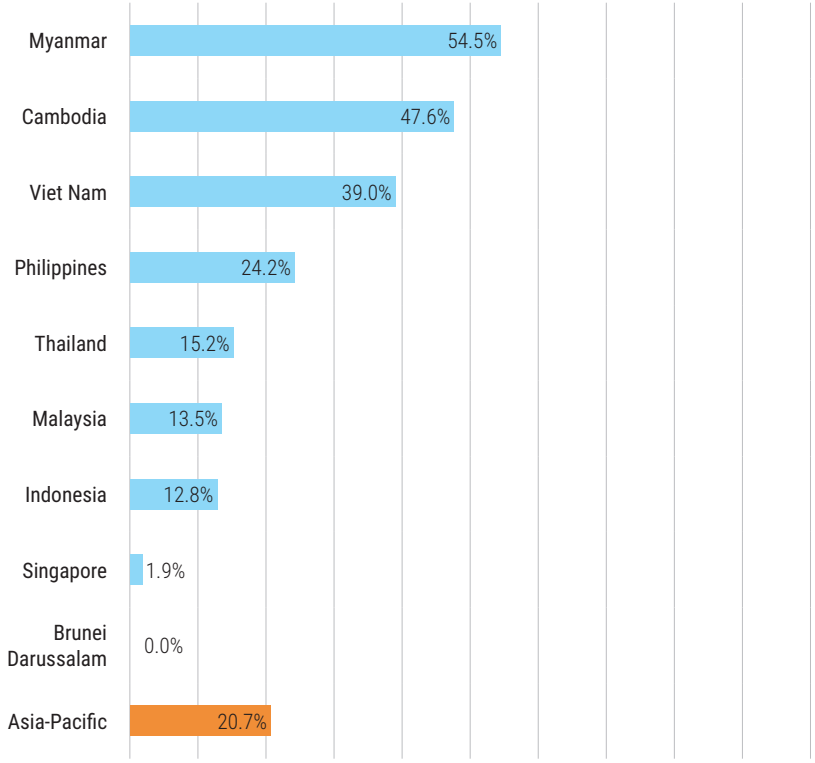
Renewable % of Primary Energy Supply and GDP Per Capita, 2016



› In ASEAN, higher GDP levels are associated with lower shares of renewable energy in the primary energy and power supplies.

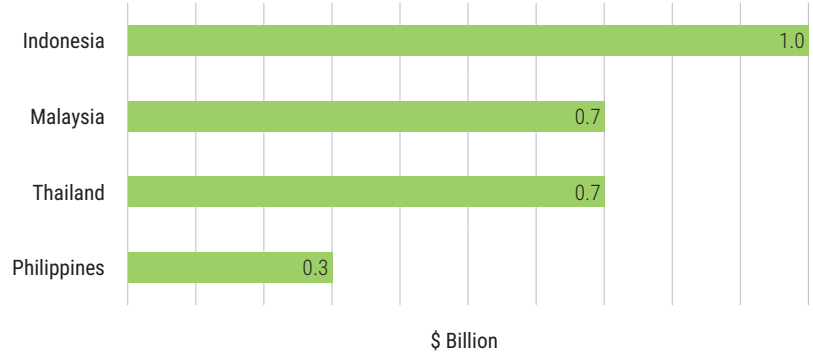
Note: Renewable energy data is unavailable for Lao PDR

Renewable % of Electricity Generation, 2016



Note: Data is unavailable for Lao PDR.

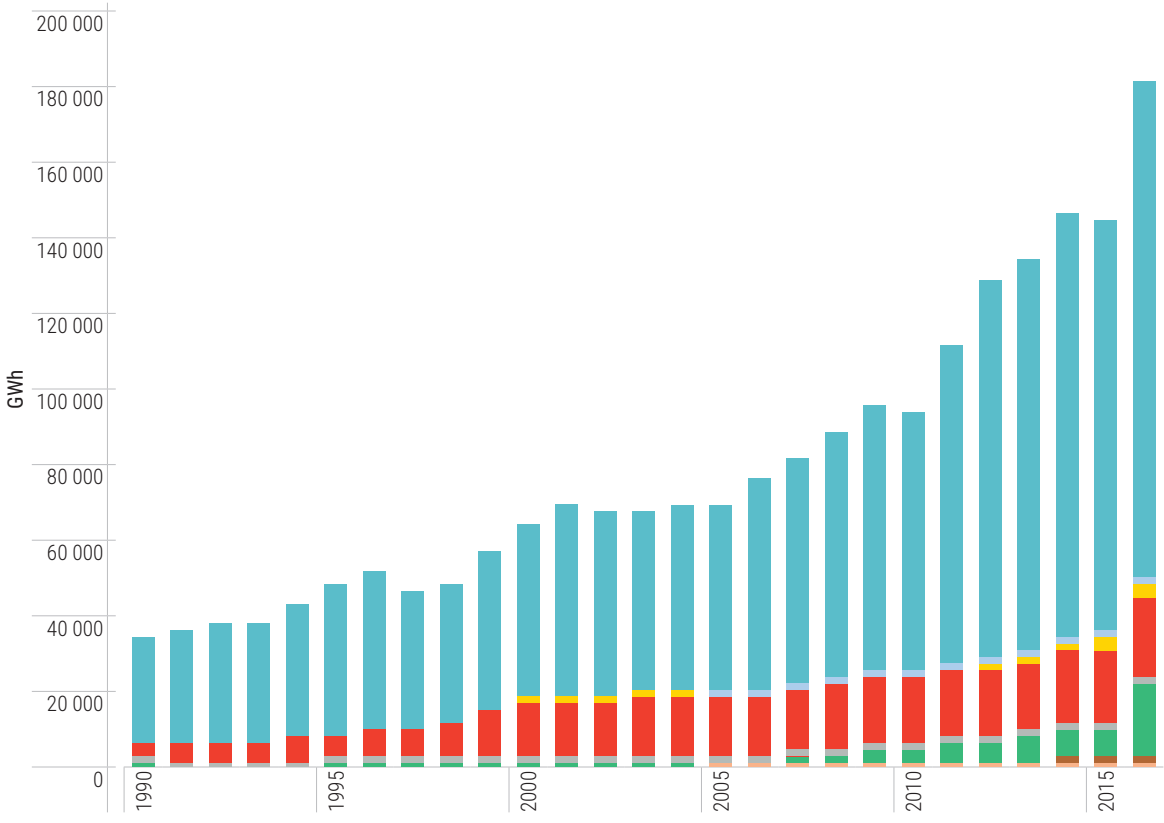
Renewable Energy Investment, 2017



Note: Data is drawn from the *Global Trends in Renewable Energy Investment* 2018 report, published by the Frankfurt School-UNEP Centre and Bloomberg New Energy Finance. Data coverage is only available for the above countries. Investment includes venture capital, corporate R&D, Government R&D, private equity, public markets new equity, asset finance, and small distributed capacity estimates for undisclosed deals. Asset finance figures adjust for re-invested equity.

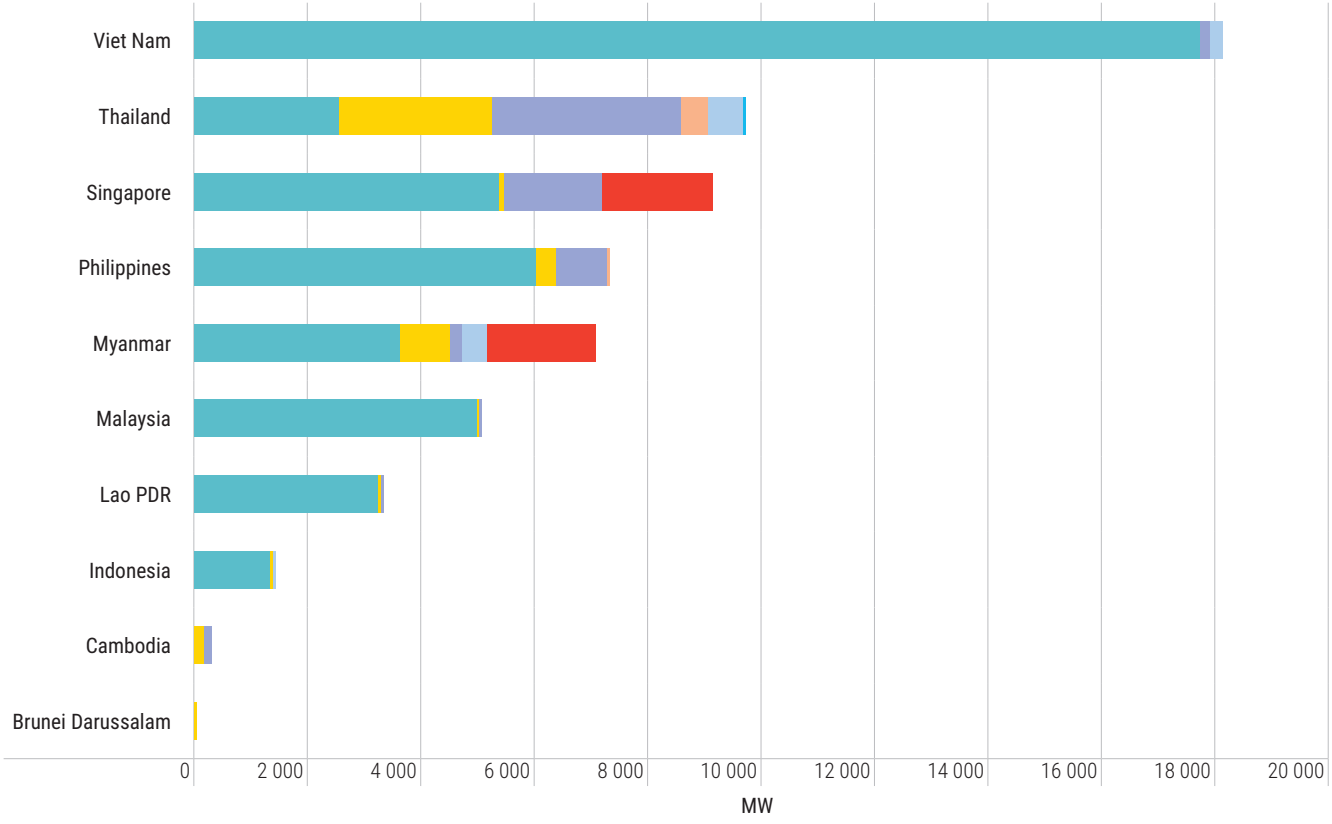
› Investment in renewables in 2017 saw a drop across most countries, though Indonesia bucked the trend with a 67% increase over 2016.

Renewable Electricity Output in the ASEAN Region, by Resource, 1990-2016



› Hydropower has long led renewable electricity output in ASEAN, though geothermal has also maintained a solid place in the mix. In recent years, other renewables – particularly solid biofuels, solar, and wind – are being used to generate power, and are shifting the composition of the region's electricity sector.

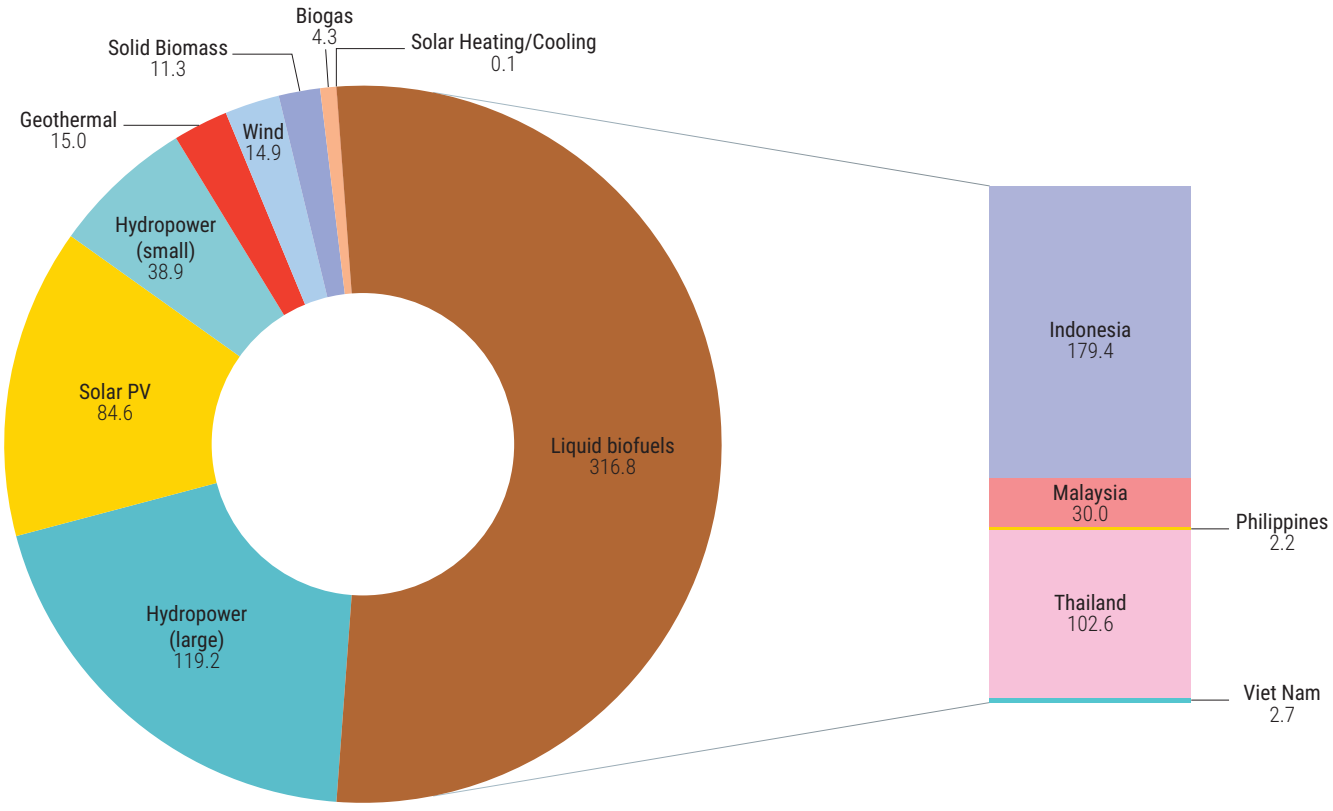
Renewable Installed Capacity, by Resource, 2017



› Installed renewable energy capacity is dominated by hydropower, though several countries have significant solar, biomass, and geothermal installations.

Renewable Energy Jobs in the ASEAN Region, by Sector, 2017

▼ Thousands



Note: Numbers include direct and indirect jobs, as well as the large hydropower sector.

Estimated Jobs in Renewable Energy, by Country, 2017

▼ Thousands

605 Thousand

Renewable Energy Jobs

› In ASEAN, liquid biofuel production in Indonesia and Thailand provides more than half of the region's renewable energy jobs. Other important energy sources in terms of employment include hydropower, which provides one-fifth of the region's renewable energy jobs and is particularly important in Indonesia and Viet Nam. Additionally, solar PV offers 14% of jobs, and plays a key role in the renewable energy industries of Malaysia, the Philippines, and, to a lesser degree, Thailand.

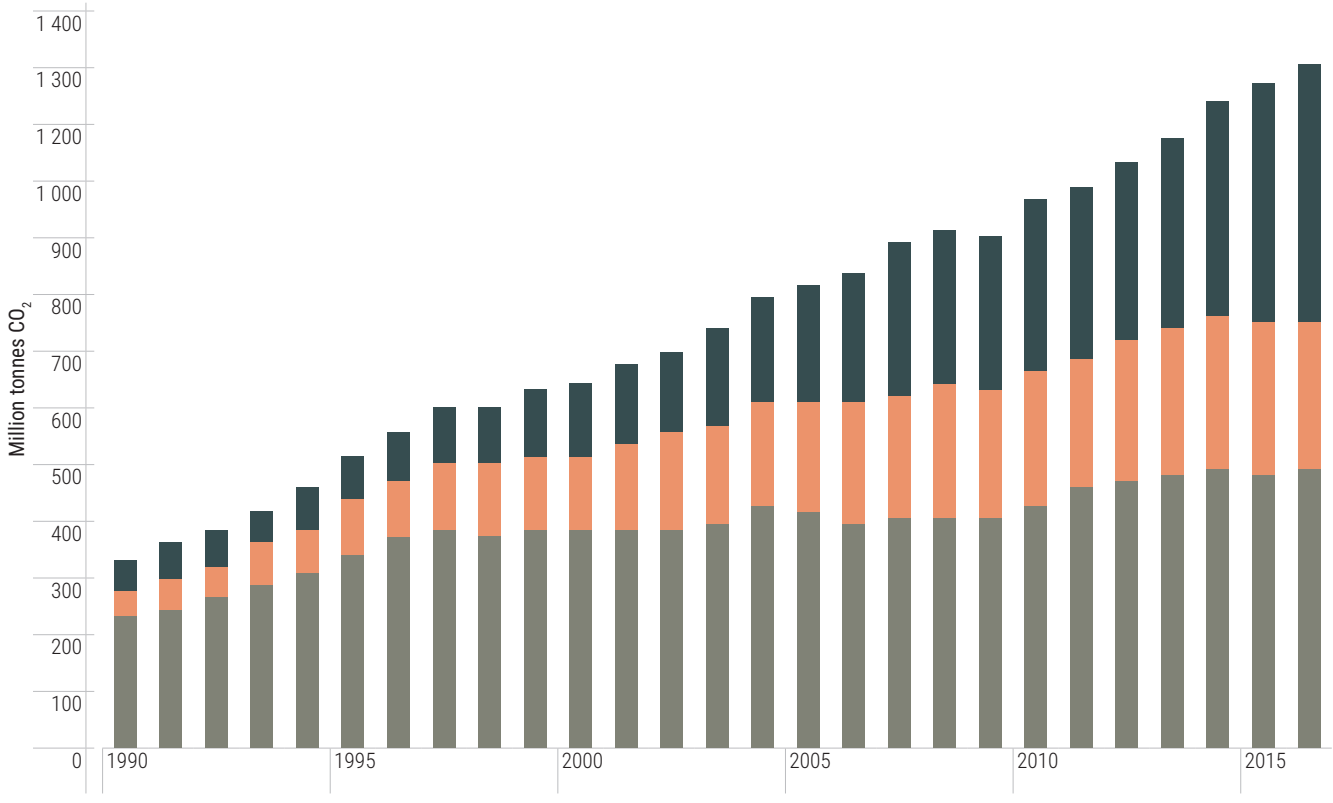
Renewable Energy Targets

Country	Target	Document
ASEAN	♀ Increase renewable energy to 23% of the ASEAN primary energy mix by 2025. (Aspirational target)	♀ ASEAN Economic Community 2025 Consolidated Strategic Action Plan (2016); ASEAN Plan of Action for Energy Cooperation (APAEC) 2016-2025 - Phase I: 2016-2020 (2016)
Brunei Darussalam	♀ Increase renewable energy to 10% of total power generation by 2035. ♀ Increase the share of renewable energy in the total power generation mix by 2.7% or 124 000 MWh by 2017 and by 10 % or 954 000 MWh by 2035.	♀ Brunei Darussalam's Intended Nationally Determined Contribution (INDC) (2016) ♀ Energy White Paper (2014)
Cambodia	None identified	
Indonesia	♀ Increase new and renewable energy to 23% by 2025. ♀ Increase new and renewable energy to at least 23% by 2025, to at least 31% by 2050.	♀ Intended Nationally Determined Contribution Republic of Indonesia (2016) ♀ Government Regulation Number 79/2014 Concerning the National Energy Policy (2014)
Lao PDR	♀ Increase the share of small scale renewable energy to 30% of total energy consumption by 2030 ♀ Increase the share of renewable energy to 30% of total energy consumption in 2025.	♀ Intended Nationally Determined Contributions (2016) ♀ INDC (2016); Renewable Energy Development Strategy in Lao PDR (2011)
Malaysia	♀ Increase the renewable share of electricity from 2% to 20% by 2030. ♀ Renewable sources including biomass, biogas, solar PV, and mini hydro are targeted to reach 7.8% of total installed capacity in Peninsular Malaysia and Sabah by 2020, or about 2 080 MW. (Excludes large hydro projects) ♀ Increase the cumulative total of renewable energy capacity to 2 065 MW, 3 484 MW, and 11 544 MW; the renewable energy share of installed capacity to 10%, 13%, and 34%; the renewable share of the energy mix to 9%, 10%, and 13% in 2020, 2030, and 2050, respectively.	♀ Ministry of Energy, Science, Technology, Environment & Climate Change official website (2019) ♀ Eleventh Malaysia Plan 2016-2020: Anchoring Growth on People (2016) ♀ National Renewable Energy Policy and Action Plan (2009)

Country	Target	Document
Myanmar	None identified	
Philippines	Increase renewable capacity to an estimated 15,304 MW by 2030, almost triple the 2010 level.	National Renewable Energy Programme (NREP) (2012)
Singapore	By 2030, it is estimated that renewable energy could potentially contribute up to 8% of Singapore's peak electricity demand.	Singapore's Intended Nationally Determined Contributions (INDC) and Accompanying Information (2016)
Thailand	Renewable energy to reach 20% of electricity, 30-35% of heat, 20-25% of fuels, 30% of final energy consumption by 2036.	Alternative Energy Development Plan: AEDP 2015 (2015); Thailand Power Development Plan 2015-2036 (PDP2015)
Viet Nam	Increase the share of electricity produced from renewables (excluding large- and medium-scale and pumped storage hydropower) to 7% in 2020 and over 10% in 2030. The electricity produced from hydropower sources shall account for approx. 29.5% of power generation in 2020, approx. 20.5% in 2025 and approx. 15.5% in 2030.	Decision 428 / QD-TTg: Approval of the Revised National Power Development Master Plan for the 2011-2020 Period with the Vision to 2030 (2016)

Note: A number of countries have additional renewable energy sub-targets related to specific energy resources, which are not included here due to space limitations.

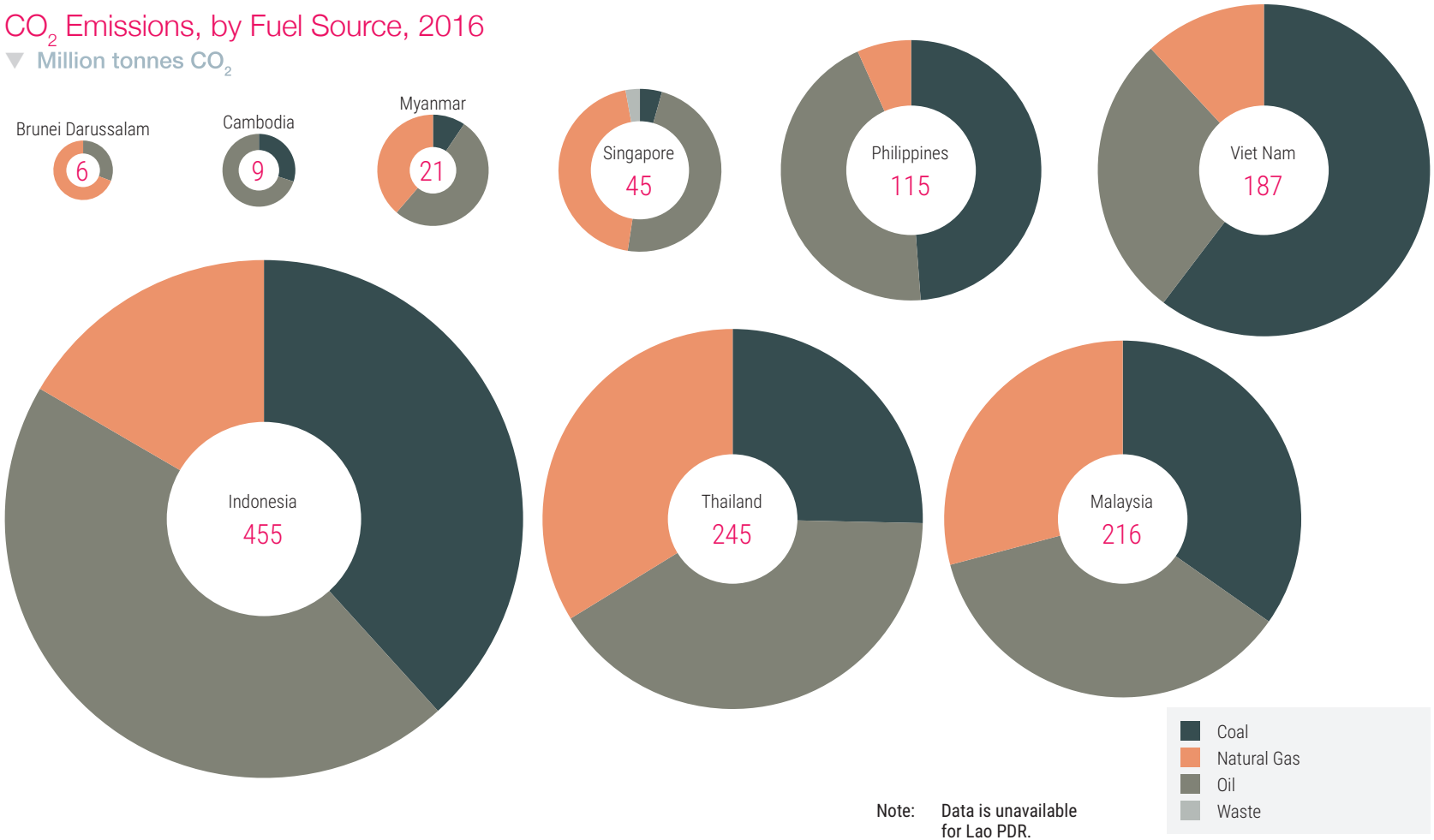
CO_2 Emissions from Fuel Combustion in the ASEAN Region, by Fuel Source, 1990-2016



› Oil accounts for the largest share of CO2 emissions in South-East Asia, though increasing coal use in recent years means coal is responsible for more than one-third of all emissions from fuel combustion.

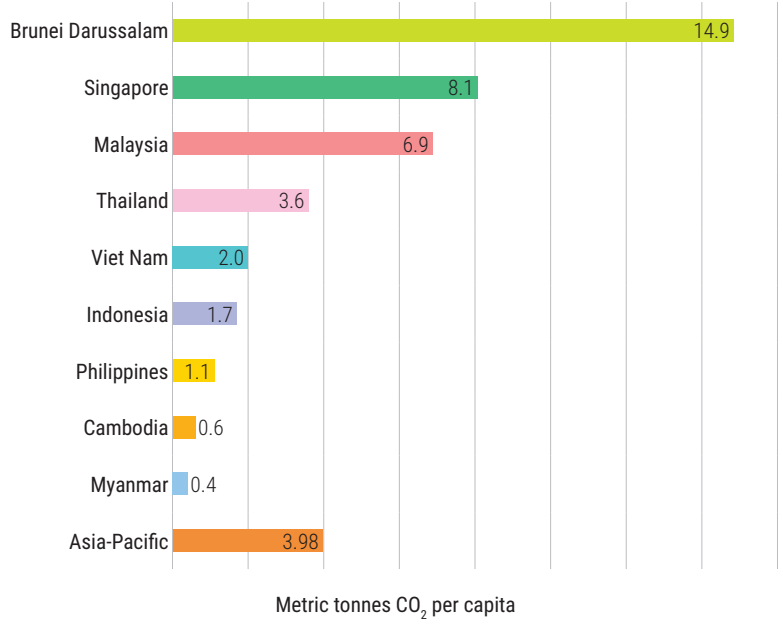
CO_2 Emissions, by Fuel Source, 2016

Million tonnes CO_2

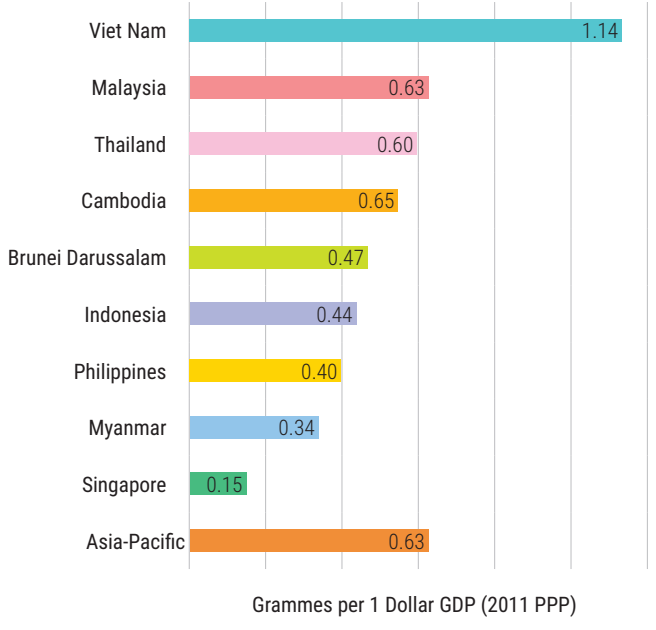


Note: Data is unavailable for Lao PDR.

Per Capita CO_2 Emissions from Fuel Combustion, 2016



Carbon Intensity of the Economy, 2016



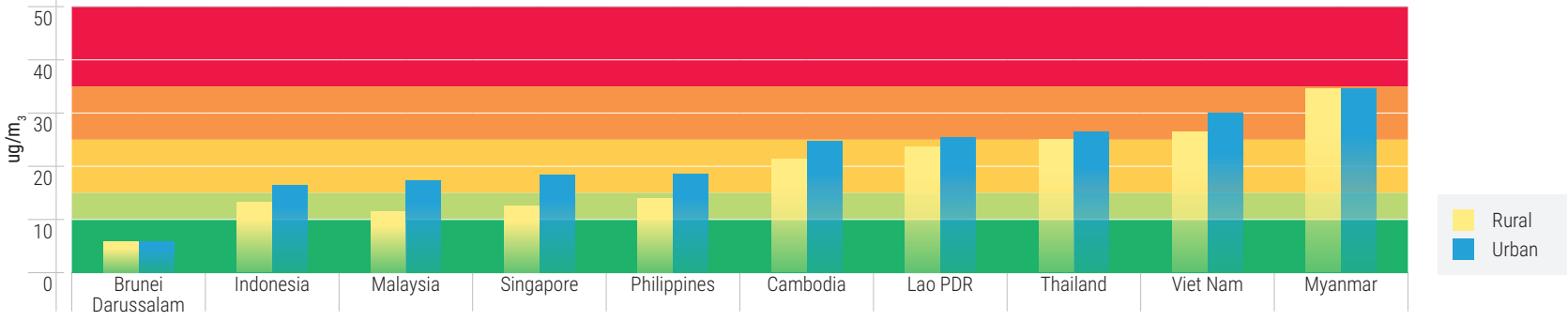
› Measuring carbon in terms of per capita emissions versus economic output provides very different pictures of the environmental impacts of energy consumption.

Note: Data is unavailable for Lao PDR.

AIR QUALITY TARGETS	PM2.5 ($\mu g/m_3$)	HEALTH IMPLICATIONS
WHO Guideline	10	These are the lowest levels at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to PM2.5
WHO Interim Target 3	15	In addition to other health benefits, these levels reduce the mortality risk by approximately 6% [2-11%] relative to the -IT-2 level.
WHO Interim Target 2	25	In addition to other health benefits, these levels lower the risk of premature mortality by approximately 6% [2–11%] relative to the IT-1 level.
WHO Interim Target 1	35	These levels are associated with about a 15% higher long-term mortality risk relative to the AQG level.
Exceeds all targets	>35	

› Poor air quality is a significant factor experienced within the region, where the vast majority of the population is exposed to pollutant levels well above World Health Organization (WHO) guidelines.

Annual Mean Concentration of Particulate Matter of Less than 2.5 Microns of Diameter (PM2.5), 2016



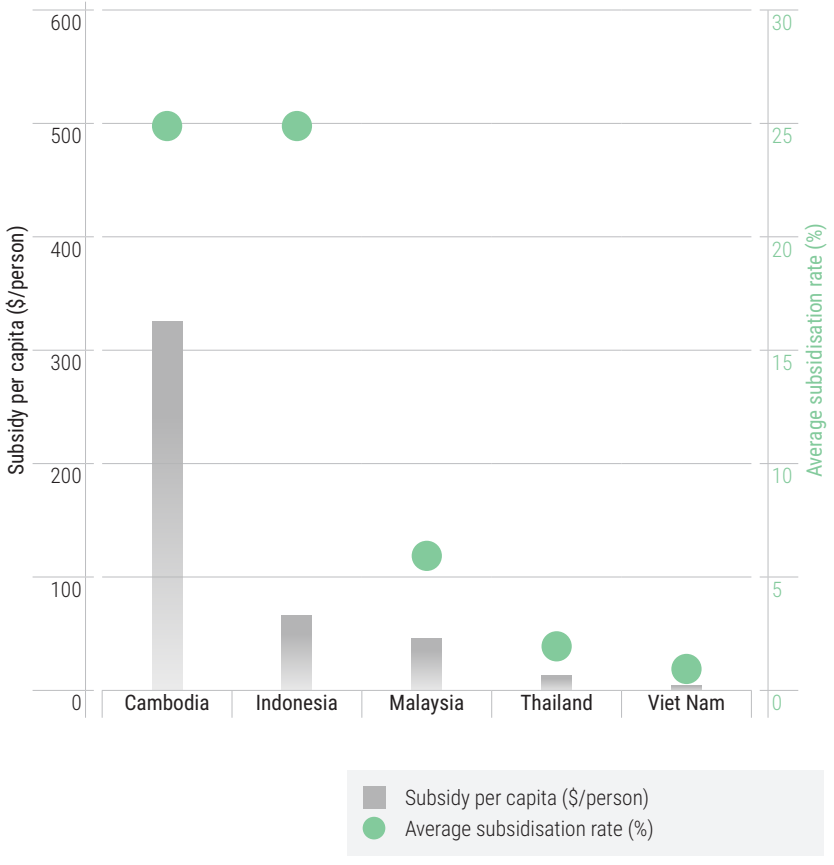
Fossil Fuel Subsidies, Select ASEAN Countries, 2017

	$ Million, 2017		% of 2017 GDP
	2015	2017	
Indonesia	$ 17 859	$ 17 602	1.7%
Malaysia	$ 314	$ 1 419	0.5%
Thailand	$ 920	$ 799	0.2%
Viet Nam	$ 233	$ 261	0.1%
Brunei Darussalam	$ 174	$ 140	1.1%

Note: "The IEA measures fossil fuel consumption subsidies using a price-gap approach. This compares final end-user prices with reference prices, which correspond to the full cost of supply, or, where appropriate, the international market price, adjusted for the costs of transportation and distribution. The estimates cover subsidies to fossil fuels consumed by end users."

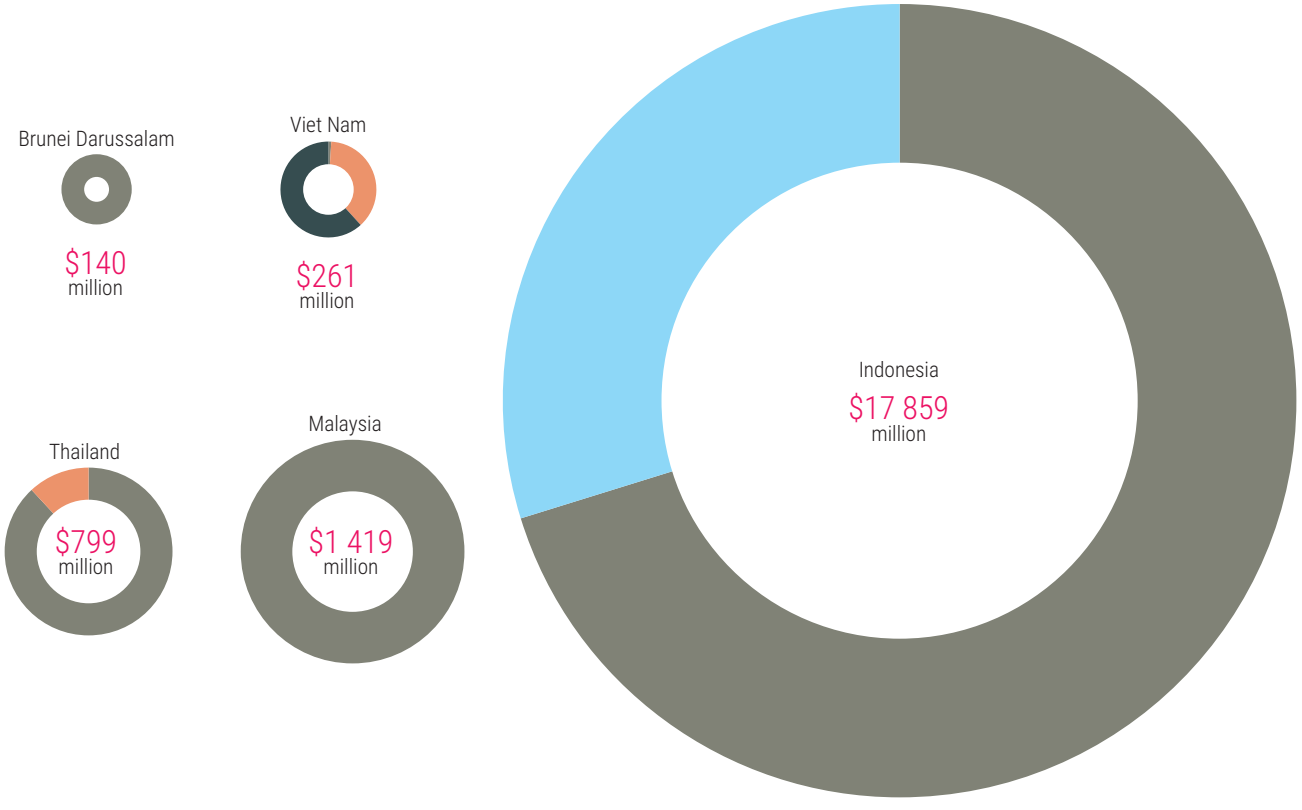
For more detail on fossil fuel consumption subsidies see the 'documentation' section on the World Energy Outlook website: http://www.iea.org/weo/.

Fossil Fuel Subsidisation Rates, 2017



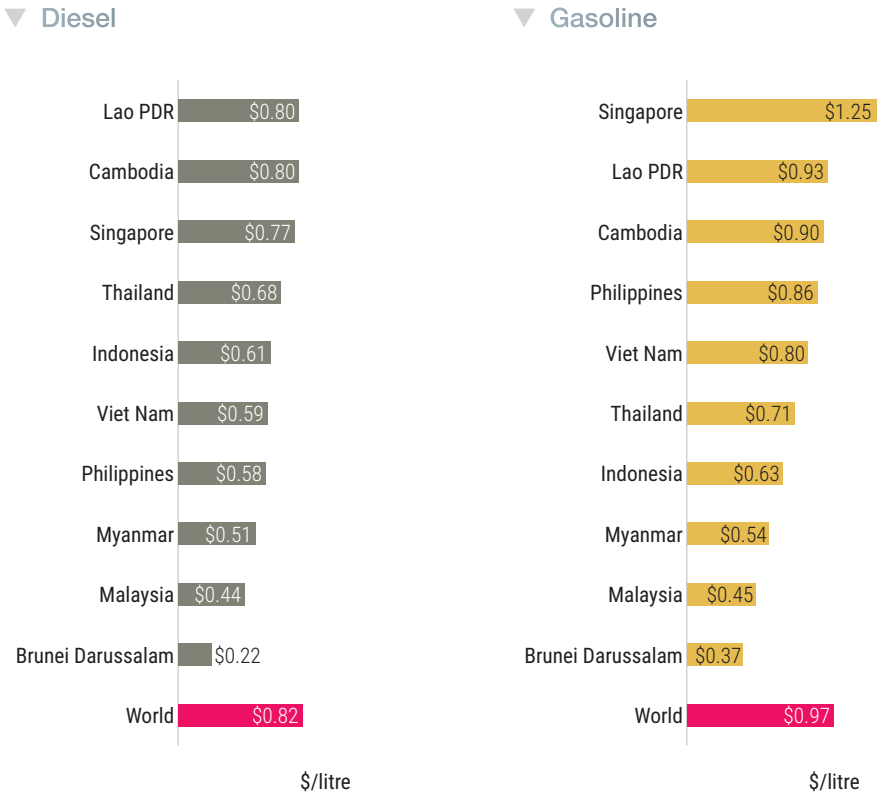
Fossil Fuel Subsidies, by Resource, 2017

▼ $ Million, 2017



› Fossil fuel subsidies hinder clean energy development and climate action. Subsidy reform in a number of countries has helped reduce government spending on energy and shifted consumer prices toward the true costs of energy. However, for some countries, subsidies are on the rise.

Average Pump Prices, 2016

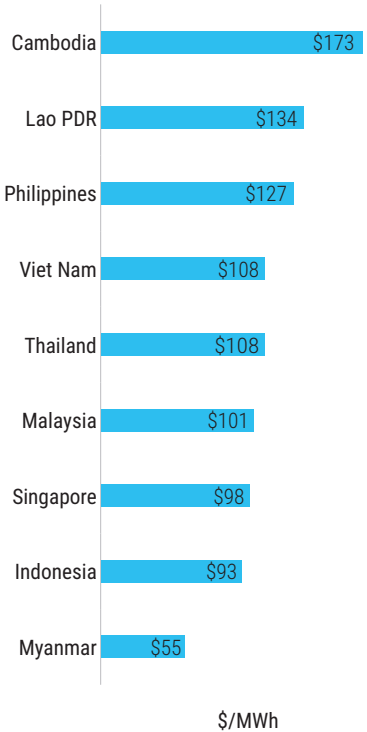


› In the ASEAN region, fuel prices in the transport sector remain low compared to global averages.

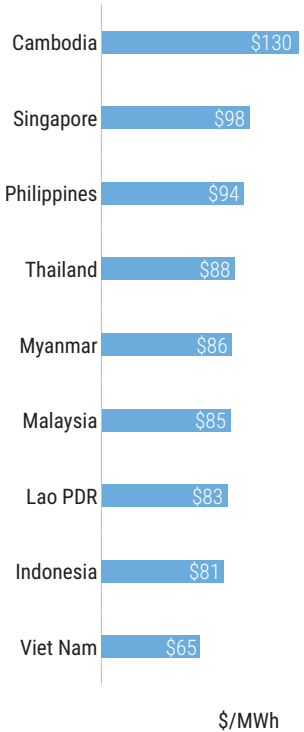
At the same time, energy affordability is a pressing issue faced by policymakers and consumers in several countries. High prices for fuel and electricity can encumber socio-economic development, while low prices may encourage wasteful consumption.

Average Electricity Prices, 2017

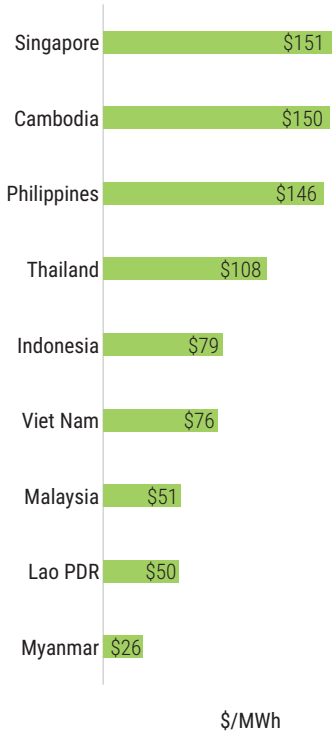
Commercial



Industrial

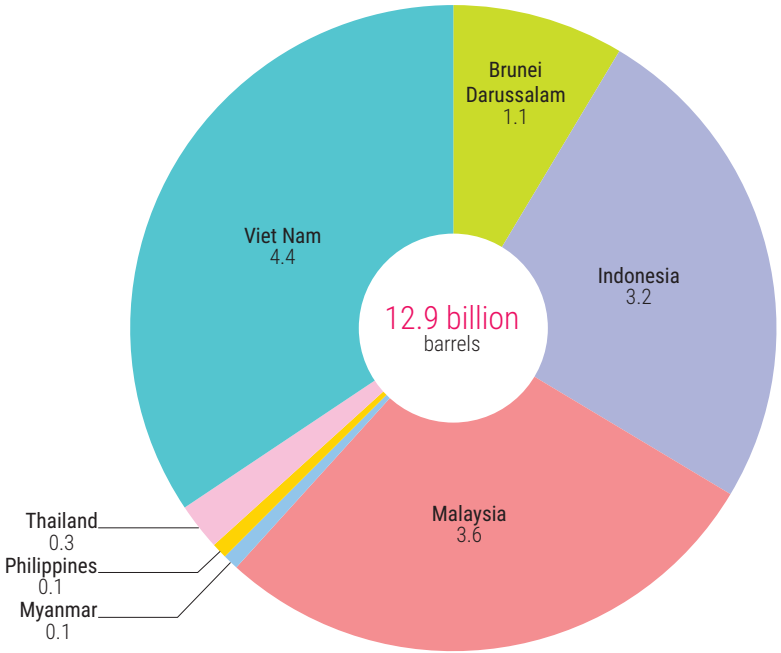


Residential

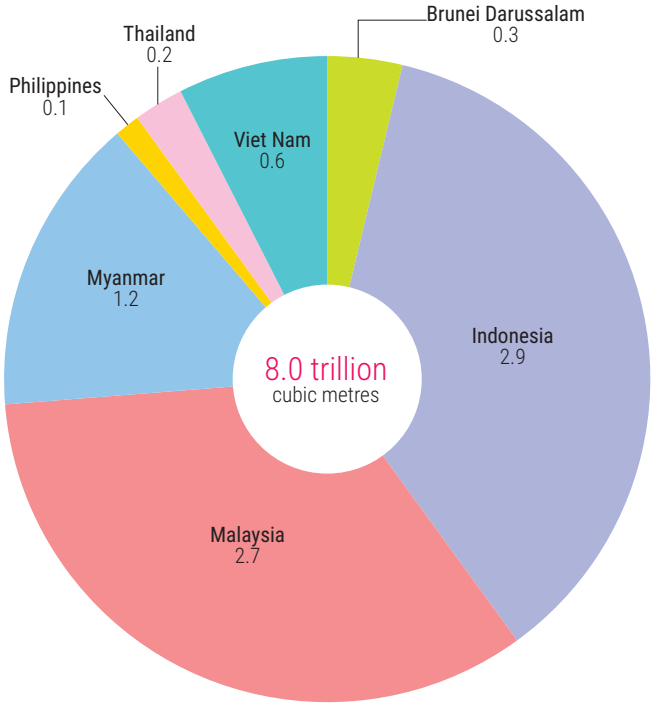


Proved Fossil Fuel Reserves in the ASEAN Region, 2017

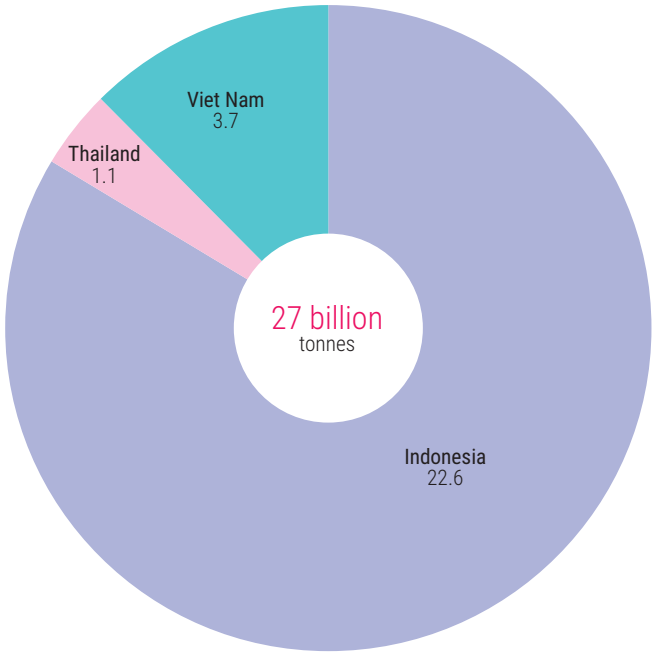
Oil



Natural Gas



▼ Coal

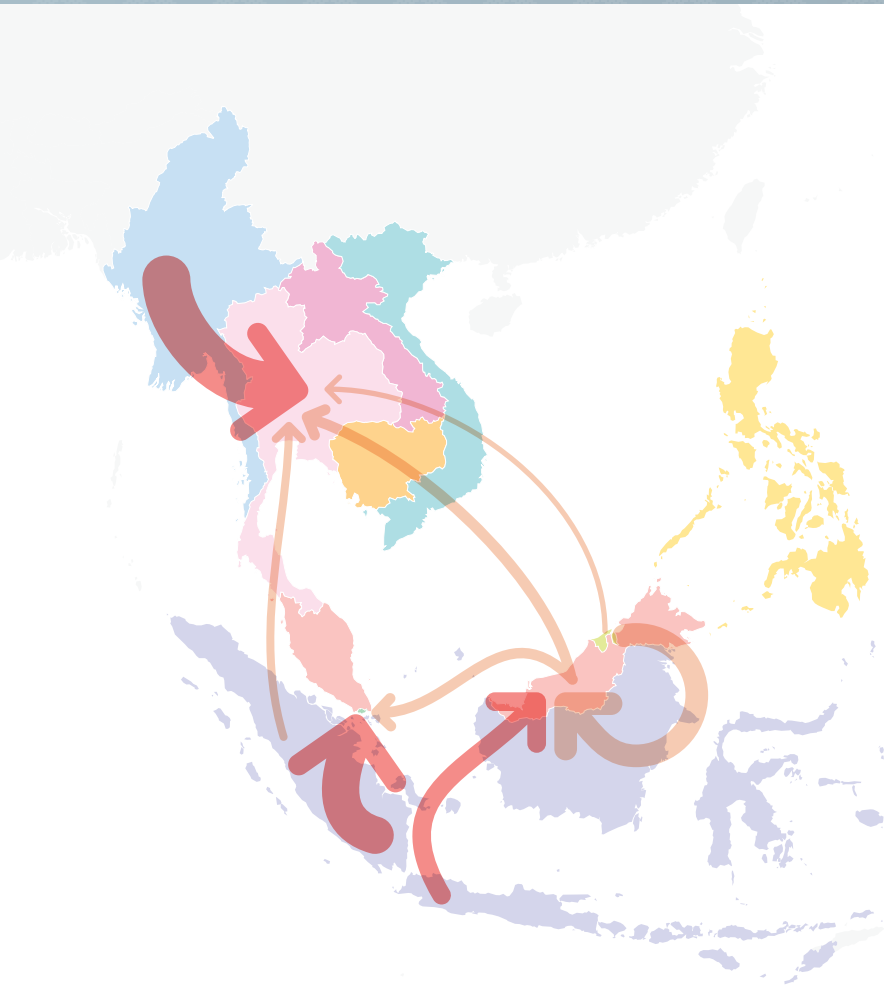


Reserves-to-Production Ratios, 2017

	Oil R/P ratio	Natural Gas R/P ratio	Coal R/P ratio
Brunei Darussalam	26.6	22.4	
Indonesia	9.2	42.9	49
Malaysia	14.1	34.9	
Myanmar	n/a	65.0	
Philippines	n/a	n/a	
Thailand	2.1	5.2	65
Viet Nam	36.0	68.3	88

› Reserves-to-production ratios indicate the remaining number of years a resource will last at current production rates. While oil reserves could be expected to last 36 years in Viet Nam, the second and third largest reserve countries, Malaysia and Indonesia, have significantly shorter remaining time periods. The largest gas reserve countries of Indonesia, Malaysia, and Myanmar, appear to have relatively long production life spans, while coal appears plentiful at 2017 production rates.

Major Intra-Regional Gas Trade Movements, 2017

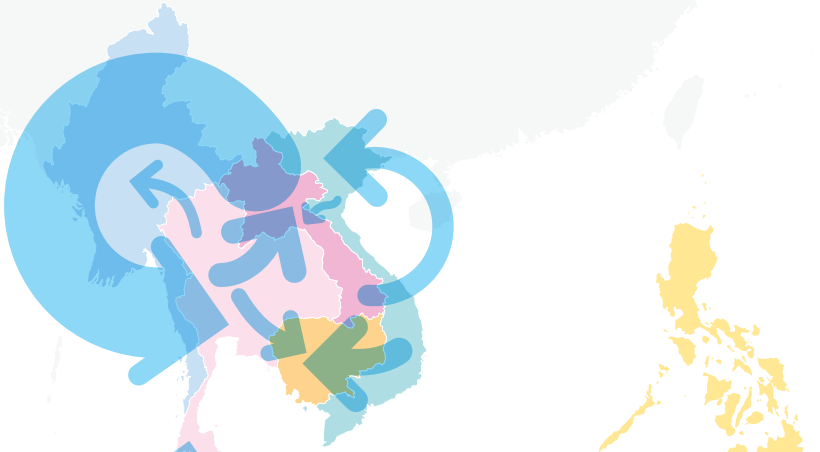


By Pipeline

From	To	Billion cubic metres
Indonesia	Malaysia	0.7
Indonesia	Singapore	7.3
Mynamar	Thailand	8.2

As LNG

From	To	Billion cubic metres
Brunei Darussalam	Malaysia	1.1
Brunei Darussalam	Thailand	0.1
Indonesia	Thailand	0.3
Malaysia	Singapore	0.3
Malaysia	Thailand	0.4

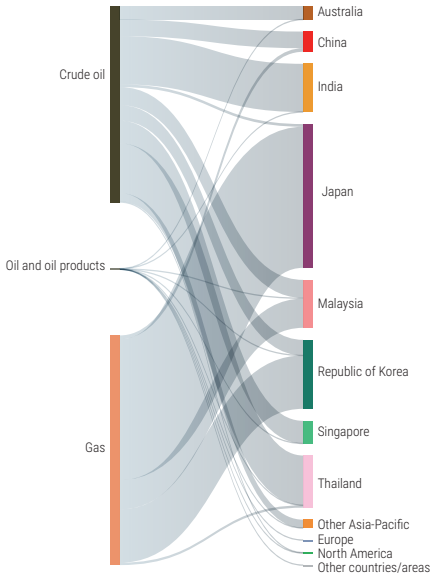


Intra-Regional Electricity Trade, 2016

From	To	GWh
Lao PDR	Thailand	20 134
Lao PDR	Viet Nam	1 213
Malaysia	Indonesia	24
Malaysia	Thailand	25
Thailand	Cambodia	401
Thailand	Lao PDR	832
Thailand	Malaysia	132
Thailand	Myanmar	109
Viet Nam	Cambodia	2 129
Viet Nam	Lao PDR	81

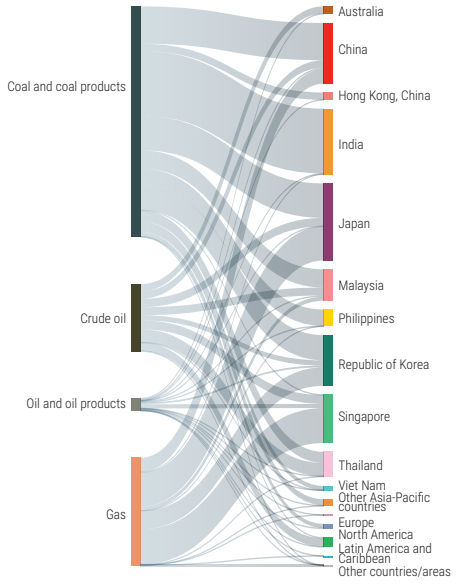
Energy Export Flows for ASEAN Net Exporters

Brunei Darussalam, 2017



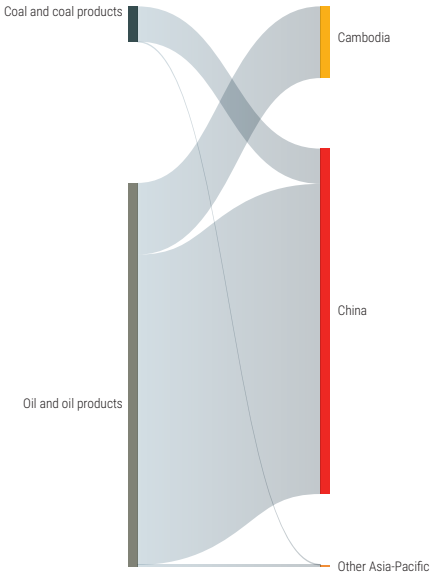
$4.8 Billion Trade value

Indonesia, 2017



$30.48 Billion Trade value

Lao PDR, 2016

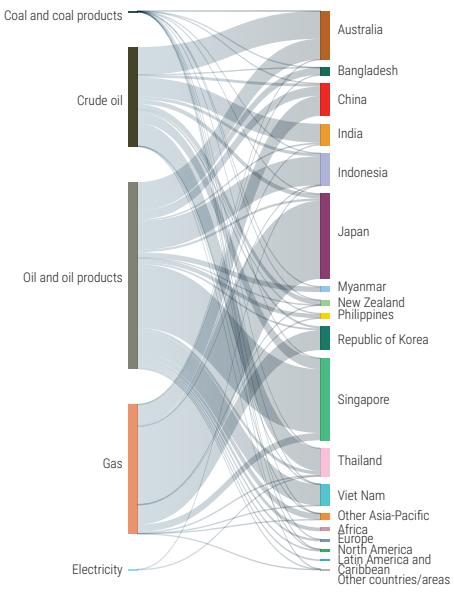


$7.5 Million* Trade value

Note: Data presented in these trade flow charts are data as reported by the subject country. Data may not be complete, or may not align with figures reported by partner countries.

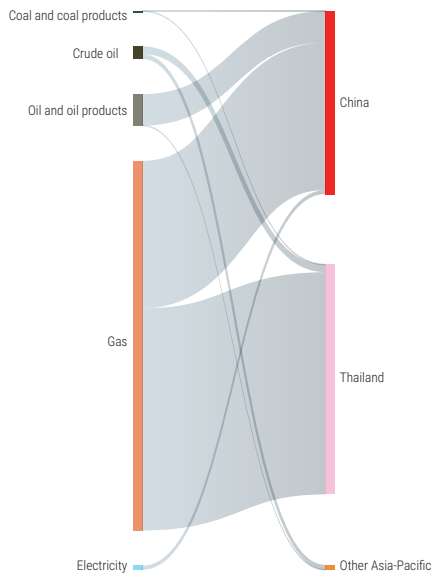
*Lao PDR's reported electricity export data is unavailable, and therefore this chart is incomplete. Electricity imports by Thailand and Viet Nam from Lao PDR are reported to total over $1 billion.

Malaysia, 2017



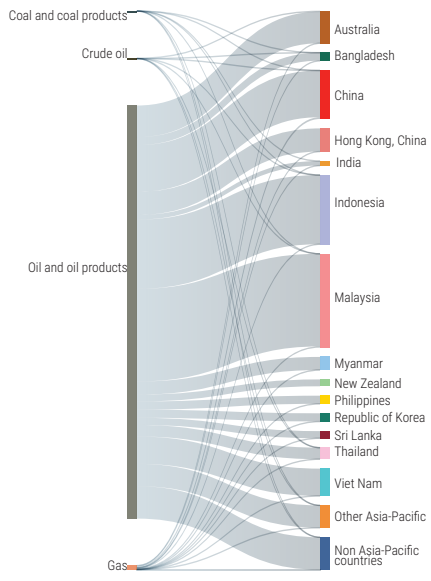
$28.9 Billion Trade value

Myanmar, 2017



$3.7 Billion Trade value

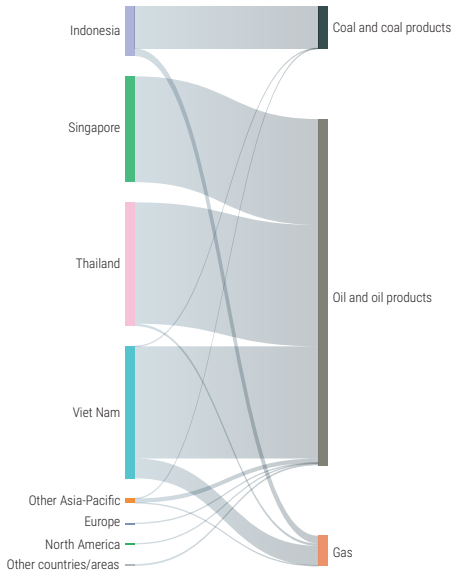
Singapore, 2017



$45.5 Billion Trade value

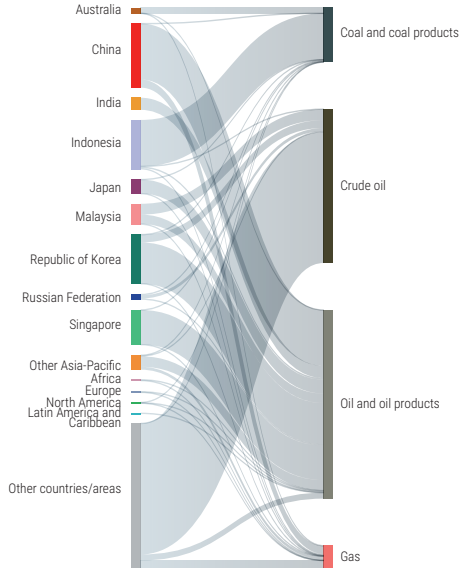
Energy Import Flows for ASEAN Net Importers

Cambodia, 2016



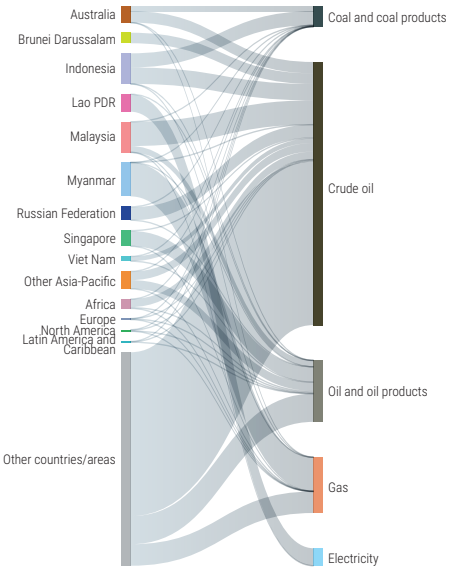
$1.1 Billion Trade value

Philippines, 2017



$11.1 Billion Trade value

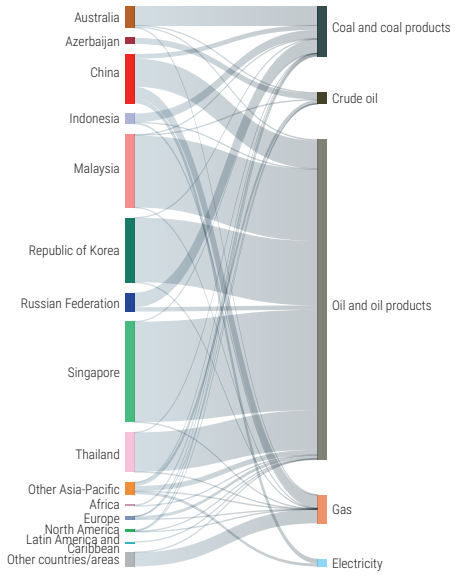
Thailand, 2017



$24.2 Billion Trade value

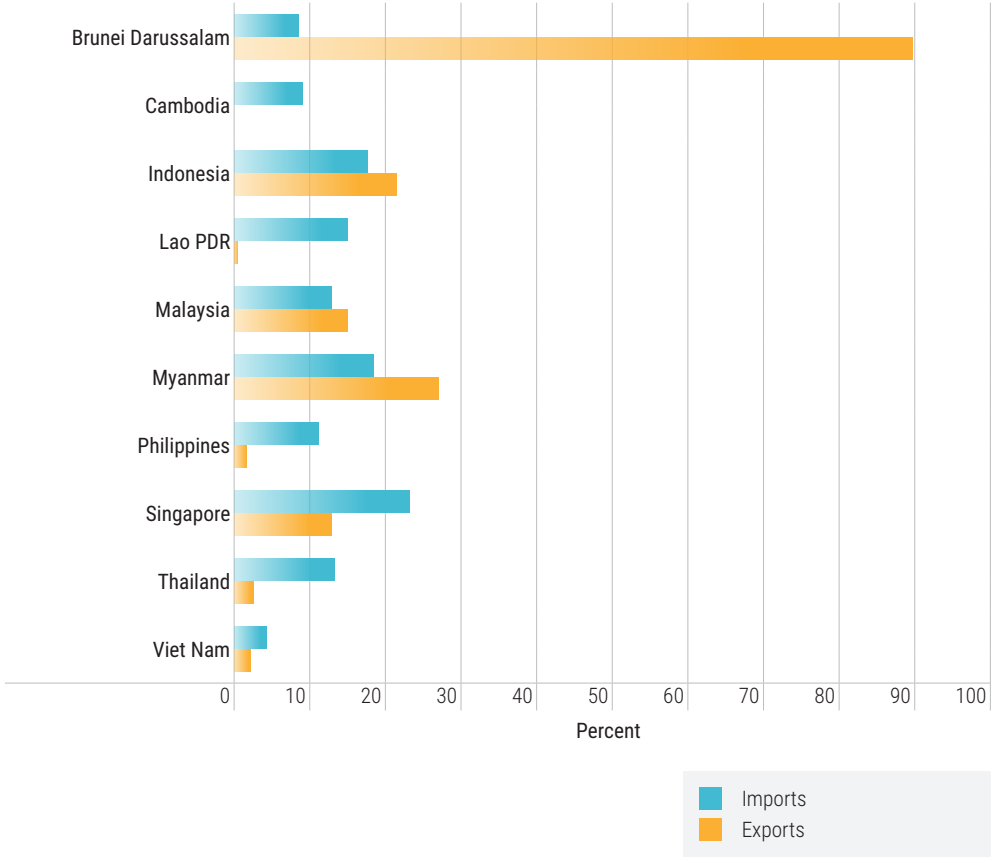
Note: Import and export flow diagrams are shown in terms of trade value. Imports are not necessarily consumed domestically, but may be re-exported. More interactive trade flow charts are available at www.asiapacificenergy.org

Viet Nam, 2016

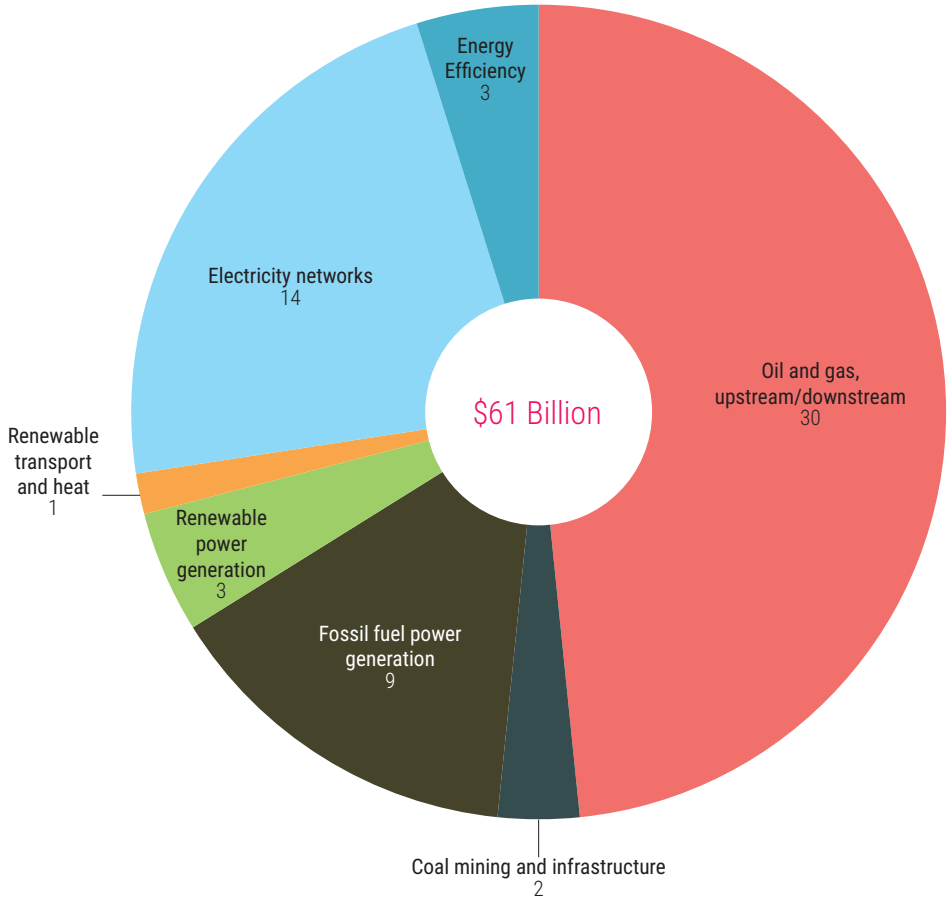


$7.2 Billion Trade value

Fuel Imports/Exports % of Merchandise Imports/Exports, 2017

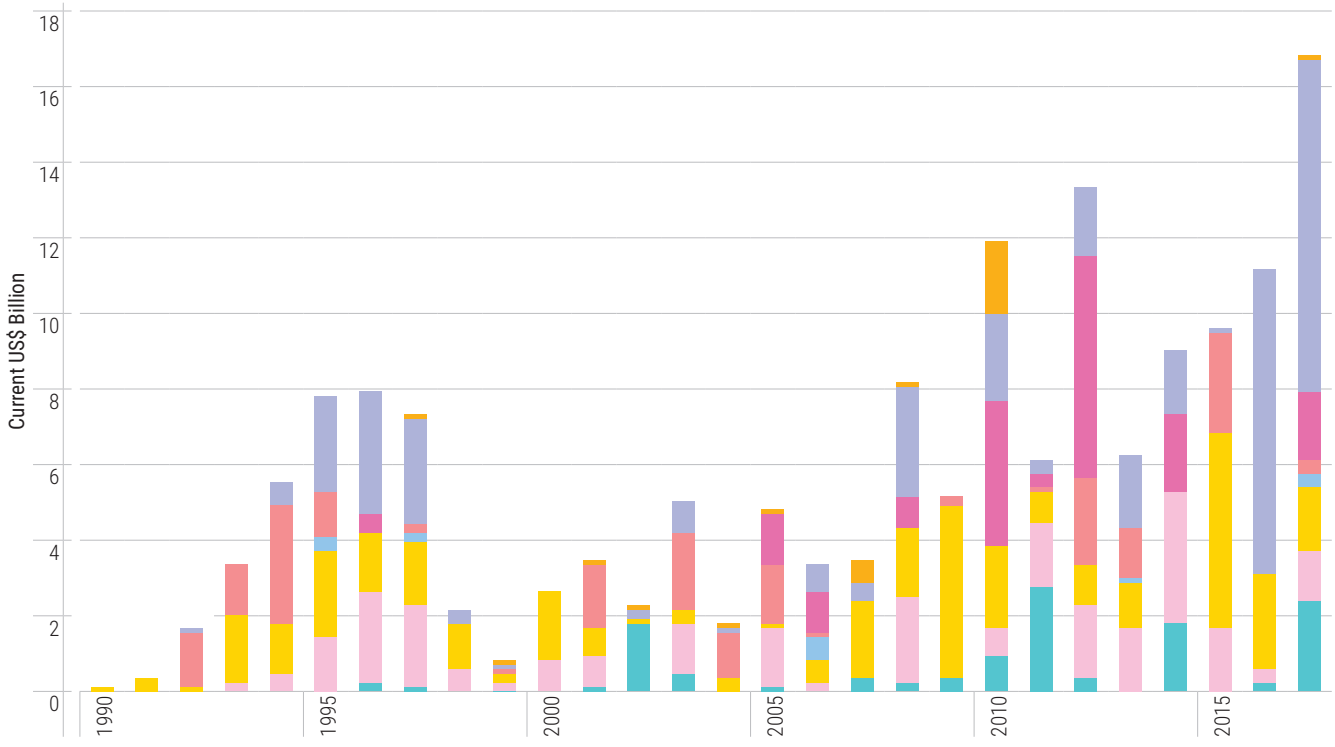


Investment in Energy in the ASEAN Region, 2017



› In 2017, overall energy investments fell, and funds directed toward the fossil fuel supply far outpaced renewables. In 2016, renewables accounted for approximately 44% of total power generation investments, while, in 2017, investments only held approximately 25% of the total share.

Investment in Energy Projects with Private Participation in the ASEAN Region, 1990-2017



Note: Investment in energy projects with private participation refers to commitments to infrastructure projects in energy (electricity and natural gas: generation, transmission and distribution) that have reached financial closure and directly or indirectly serve the public.

› Private participation in energy investments is on the rise in the region, particularly with large investments in Indonesia in 2016 and 2017.

Note: Investment in energy projects with private participation refers to commitments to infrastructure projects in energy (electricity and natural gas: generation, transmission and distribution) that have reached financial closure and directly or indirectly serve the public

Regulatory Indicators for Sustainable Energy (RISE) scores

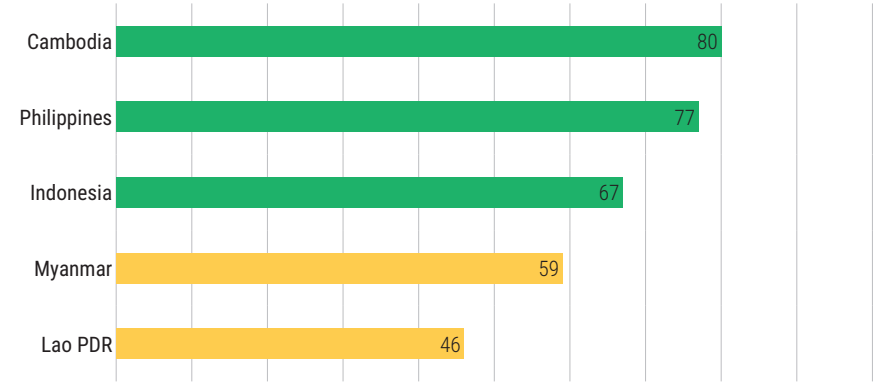
RISE, produced by the World Bank, is a set of indicators that supports the comparison of national policy and regulatory frameworks to advance SDG7. RISE indicators are scored between 0 and 100 across universal access, renewable energy, and energy efficiency categories.

Source: World Bank, Regulatory Indicators for Sustainable Energy 2018

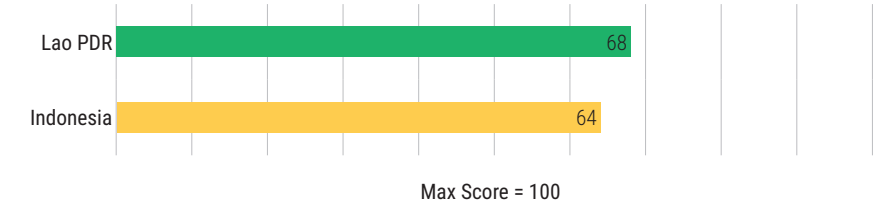
More information is available at: rise.worldbank.org

Policy Framework Scores, 2017

Electricity Access



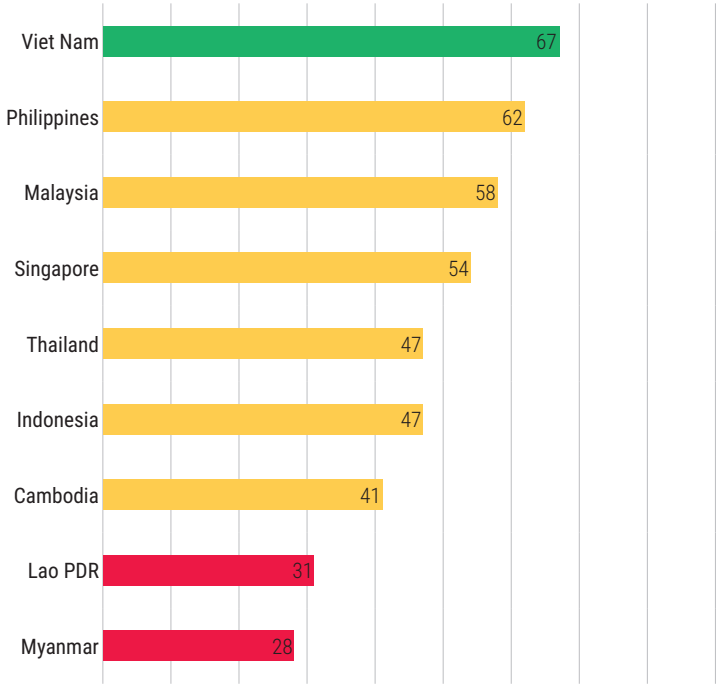
Clean Cooking



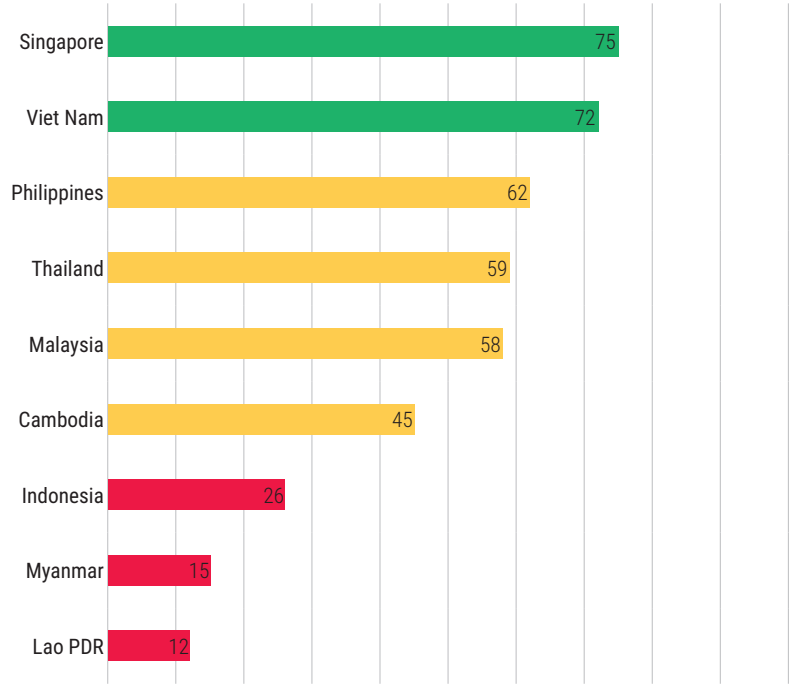
- Green (67-100) indicates a relatively mature policy and regulatory environment
- Yellow (34-66) suggests a country has made significant progress in developing its frameworks
- Red (0-33) indicates that the policy and regulatory environment is at an early stage of development

Note: Not all countries are covered under each RISE theme. Electricity access is not analysed in countries that have achieved universal access, while the analysis of clean cooking regulatory frameworks is in a pilot stage.

Renewable Energy



Energy Efficiency



Sources

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2	GDP per Capita, 2017	ESCAP based on the data from United Nations Statistics Division, UNSD National Accounts Main Aggregates database (NAMAD) and population figures from World Population Prospects
	Population Size, 2017	United Nations, World Population Prospects - 2017 revision
3	Per Capita Energy Consumption, 2016 and Human Development Index, 2017	ESCAP based on the International Energy Agency, and United Nations Development Programme (UNDP)
	% of Population Living in Urban Areas, 2017	United Nations, World Population Prospects
4	% of Total Population with Access to Electricity, 2016	World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program
5	% of Total Population with Access to Clean Cooking, 2016	World Bank, Sustainable Energy for All (SE4ALL) database from WHO Global Household Energy database
6	Renewable Share of Total Final Energy Consumption, 1990-2015	World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program
7	Energy Intensity, 2015	World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program
	Energy Intensity Compound Annual Growth Rate, 2015	Ibid.
8	Primary Energy Supply in the ASEAN Region, 1990-2016	ESCAP based on the International Energy Agency
9	Primary Energy Supply, 2016	International Energy Agency
10	Relative Growth Trends for Total Primary Energy Supply, GDP and Energy Intensity in the ASEAN Region, 1990-2016	ESCAP based on the International Energy Agency
11	Final Consumption, by Product, in the ASEAN Region,1990-2016	Ibid.
12	Per Capita GDP and Per Capita Final Consumption, 2016	ESCAP based on UNSD NAMAD and WPP, and ESCAP based on the International Energy Agency
	Final Consumption by Sector in the ASEAN Region, 1990-2016	International Energy Agency
13	Final Consumption, by Sector, 2016	Ibid.
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	Electricity Production from Solar and Wind in the ASEAN Region, 2000-2016	Ibid.
	Electricity Production from Biofuels in the ASEAN Region, 2000-2016	Ibid.
18	% of Total Population with Access to Electricity, 1990-2016	World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program
19	% of Urban and Rural Populations with Access to Electricity, 2016	Ibid.
	People without Access to Electricity in the ASEAN Region, 2016	Ibid.
20	Rural Populations without Access to Electricity, 2000-2016	Ibid.
	Urban Populations without Access to Electricity, 2000-2016	Ibid.

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23	Access to Clean Cooking Targets	Ibid.
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25	Energy Intensity, 1990-2015	World Bank, Sustainable Energy for All (SE4ALL) database from the SE4ALL Global Tracking Framework led jointly by the World Bank, International Energy Agency, and the Energy Sector Management Assistance Program
	Transmission and Distribution Losses % of Net Electrical Power Production, 2015	Author based on United Nations Statistics Division
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28	Solar Potential and Solar Power Plants, 2018	ESCAP, Global Solar Atlas, owned by the World Bank Group and provided by Solargis
29	Wind Potential and Wind Power Plants, 2018	ESCAP, IRENA: Global Atlas, Map data: '[Vaisala, 2016]'

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	Renewable Energy Investment, 2017	Frankfurt School-UNEP Centre/BNEF
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33	Renewable Installed Capacity, by Resource, 2017	International Renewable Energy Agency
34	Renewable Energy Jobs in the ASEAN Region, by Sector, 2017	Ibid.
35	Estimated Jobs in Renewable Energy, by Country, 2017	Ibid.
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	Carbon Intensity of the Economy, 2016	ESCAP based on the International Energy Agency and United Nations Statistics Division, UNSD National Accounts Main Aggregates database (NAMAD)

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56	Policy Framework Scores, 2017	World Bank

Abbreviations used in this publication

ASEAN	Association of Southeast Asian Nations. ASEAN is comprised of the following economies: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam.
Asia-Pacific	The Asia-Pacific region is comprised of the following economies: Afghanistan, American Samoa, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Fiji, French Polynesia, Georgia, Guam, Hong Kong (China), India, Indonesia, Islamic Republic of Iran, Japan, Kazakhstan, Kiribati, Kyrgyzstan, Lao People's Democratic Republic, Macao (China), Malaysia, Maldives, Marshall Islands, Federated States of Micronesia, Mongolia, Myanmar, Nauru, Nepal, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Pakistan, Palau, Papua New Guinea, the Philippines, the Republic of Korea, the Russian Federation, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tonga, Turkey, Turkmenistan, Tuvalu, Uzbekistan, Vanuatu, and Viet Nam.
BAU	Business-as-usual
CO_2	Carbon dioxide
GDP	Gross domestic product
GW	Gigawatt
GWh	Gigawatt hour
HDI	Human Development Index
kg	Kilogram
kgoe	Kilogrammes oil equivalent
ktoe	Thousand tonnes oil equivalent
kW	Kilowatt
MJ	Megajoules
mtoe	Million tonnes oil equivalent
MW	Megawatt
MWh	Megawatt hour
PM2.5	Atmospheric particulate matter of less than 2.5 micrometres in diameter
PPP	Purchasing power parity
SDG7	Sustainable Development Goal 7
TFEC	Total final energy consumption
toe	Tonnes oil equivalent
$	US Dollar
$\mu g/m_3$	Microgrammes per cubic metre

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