



TPSA | CANADA-INDONESIA TRADE AND  
PRIVATE SECTOR ASSISTANCE PROJECT

Report  
May 2017

# Investment Opportunities in Indonesia:

## Renewable Energy

Canada

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provided through Global Affairs Canada

WAVTEQ

 **BKPM**  
INDONESIA INVESTMENT COORDINATING BOARD

## **Investment Opportunities in Indonesia: Renewable Energy**

Prepared by WAVTEQ

WAVTEQ is a global consulting and technology company focused on helping governments worldwide attract foreign direct investment (FDI).

### **About the TPSA Project**

The Canada–Indonesia Trade and Private Sector Assistance (TPSA) Project is a five-year, C\$12-million project funded by the Government of Canada through Global Affairs Canada. The project is executed by The Conference Board of Canada, and the primary implementation partner is the Directorate General for National Export Development, Indonesian Ministry of Trade.

TPSA is designed to provide training, research, and technical assistance to Indonesian government agencies, the private sector (particularly small- and medium-sized enterprises, or SMEs), academics, and civil-society organizations on trade-related information, trade policy analysis, regulatory reforms, and trade and investment promotion by Canadian, Indonesian, and other experts from public and private organizations.

The overall objective of TPSA is to support greater sustainable economic growth and reduce poverty in Indonesia through increased trade and trade-enabling investment between Indonesia and Canada. TPSA is intended to increase sustainable and gender-responsive trade and investment opportunities, particularly for Indonesian SMEs, and to increase the use of trade and investment analysis by Indonesian stakeholders for expanded trade and investment partnerships between Indonesia and Canada.

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## EXECUTIVE SUMMARY

The Canada–Indonesia Trade and Private Sector Assistance (TPSA) project has as a key objective to increase investment by Canadian firms in Indonesia. The TPSA project is funded by the Government of Canada through Global Affairs Canada and managed by The Conference Board of Canada (CBoC). The ultimate goal of the TPSA project is to reduce poverty and increase sustainable economic growth in Indonesia through the expansion of Indonesian trade with Canada and the encouragement of Canadian investment in Indonesia.

This report provides a summary of investment opportunities for Canadian companies in Indonesia's energy sector, with the key focus on renewable energy.

Foreign investors across all industries are paying closer attention to the investment opportunities in Indonesia due to the size and growth of the economy, accessibility to the huge ASEAN market of 600 million people, and because Indonesia is becoming more pro-business and actively seeking foreign investment, including in sectors that were until very recently closed or partially closed to foreign investors.

Already the largest economy in ASEAN, Indonesia's GDP is forecast to increase from US\$862 billion in 2015 to US\$2.2 trillion in 2025. By 2025, Indonesia's economy will be nearly the same size as Canada's economy (forecast to be US\$2.6 trillion in 2025) and will be larger than India's economy was in 2015. Indonesia has a population of over 260 million, which is forecast to increase to 308 million by 2030. Just the increase in Indonesia's population is nearly the same size as Thailand's population.

These numbers in themselves demonstrate why foreign investors should be looking at Indonesia and, in fact, FDI into Indonesia is booming, increasing from US\$16.2 billion in 2010 to nearly US\$30 billion annually from 2013 to 2016.

Indonesia has huge need for FDI in the energy sector. Energy consumption increased by almost 50% from 2005 to 2014 and is forecast to increase by over 50% from 2015 to 2020. The government is targeting private investment of over US\$78 billion by 2025 with a major focus on renewable energy:

- **Solar:** installed solar capacity is low at 27 MW, and the government plans to increase this to 620 MW by 2020. The government aims to auction 90+ Solar PV / diesel hybrid projects in 2018 and has a national target of 1,400 MW installed solar photovoltaic capacity by 2025. To achieve this target, an estimated US\$3.8 billion of investment will be required from 2015 to 2025;
- **Hydroelectricity:** installed capacity is 5.9 GW while the potential capacity is 75.6 GW and the Indonesian government is targeting 26 new hydro power plants, of which 11 hydro projects are in various stages of appointment or construction. Feed-in tariffs have been introduced for Hydroelectricity and the government is targeting 8.3 GW of hydropower by 2024;
- **Geothermal:** Indonesia has exceptional volcanic activity and is believed to harbour around 40% of the planet's geothermal potential, with estimated resources and reserves totaling 28,000 megawatts (MW). The government is planning to boost installed capacity to 6500 MW by 2025, up from some 1340 MW that were on stream in early 2014 (with projects for another 1500 MW in development);
- **Biomass:** by 2025, the government is targeting that biomass will contribute more than 20% of electricity emanated from all new and renewable sources; and
- **Ocean wave energy:** has the theoretical potency of 510 GW, the technical potency 2 GW, and the practical potency 1.2 GW. The Energy and Mineral Resources Ministry of Indonesia has announced plans for the development of wave and current power plants in the country.



Foreign investors in Indonesia are very positive about the opportunities. In a 2016 survey of Canadian investors in Indonesia, renewable energy was ranked joint first in terms of FDI opportunities for Canadian investors and 90% of existing Canadian investors are planning to re-invest in Indonesia and 85% of Canadian investors would recommend other companies to invest. The time is right to scope out the investment opportunities in Indonesia.

## INDONESIA COUNTRY SNAPSHOT

### Indonesia by the Numbers

Indonesia is one of largest and fastest growing emerging markets in the world. Indonesia is the largest economy in ASEAN and Indonesia's GDP is forecast to increase from US\$862 billion in 2015 to US\$2.2 trillion in 2025. By 2025, Indonesia's economy will be nearly the same size as Canada's economy (forecast to be US\$2.6 trillion in 2025) and will be larger than India's economy was in 2015, which indicates the size of opportunity.

### Indonesia by the Numbers

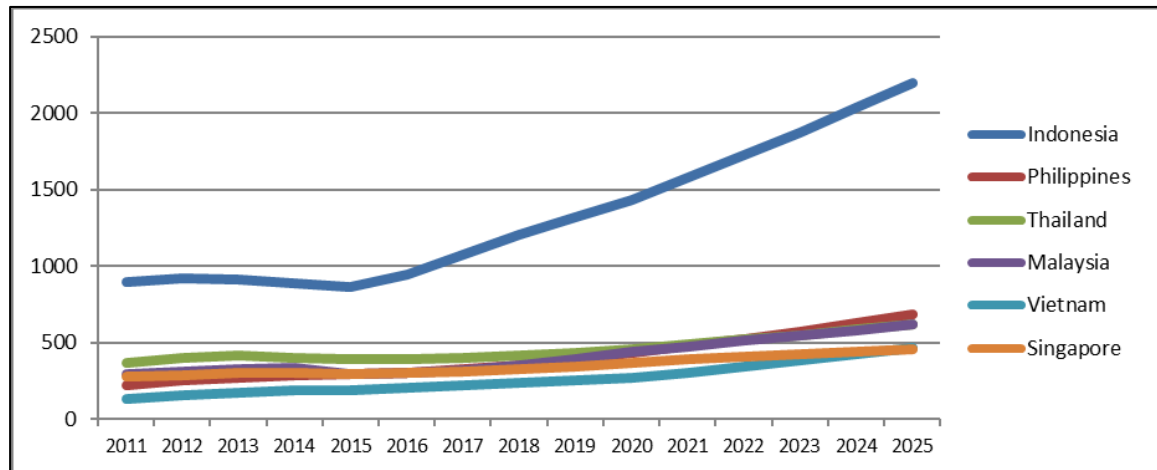


Source: WAVTEQ

### Economic Growth and Performance

As the chart below shows, Indonesia's economy started taking off in 2015. Now is the time companies should be considering investing in Indonesia to take advantage of the huge growth forecast in the economy, with almost US\$1 trillion expected to be added to the economy over the next 7 years (2017–2024)

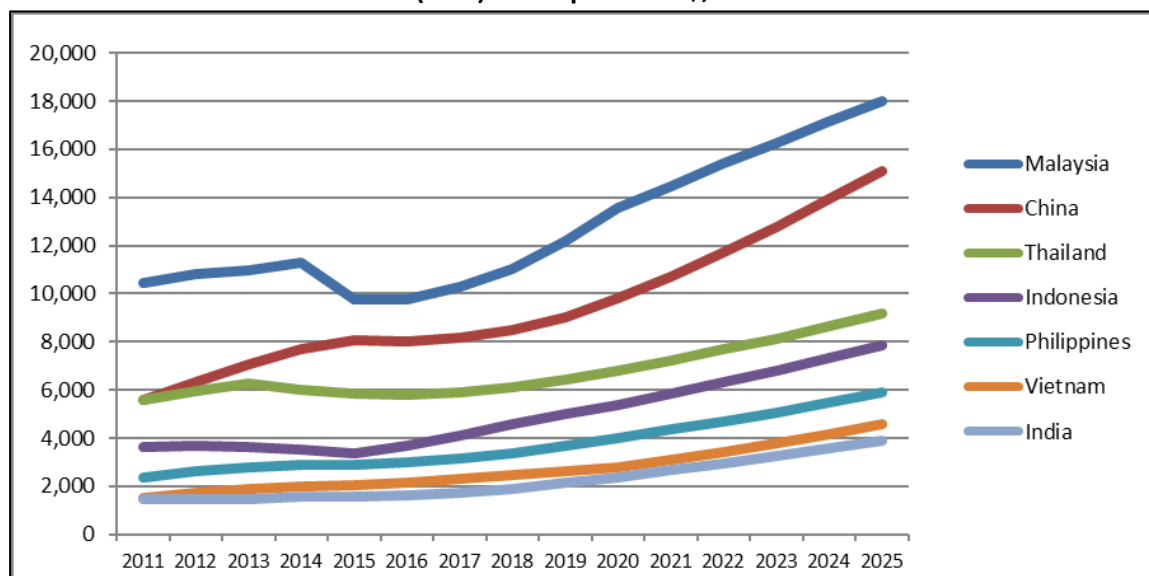
### Gross Domestic Product (GDP) at Current Market Prices in US\$ Million, 2011–2025



Source: EIU, June 2016.

Out of the major economies in ASEAN, Indonesia has the fourth highest GDP per capita, which is forecast to more than double from US\$3370 in 2015 to US\$7840 in 2025. Rising income levels and large and growing middle- and high-income families are driving growth in demand across all industries.

### Nominal Gross Domestic Product (GDP) Per Capita in US\$, 2011-2025

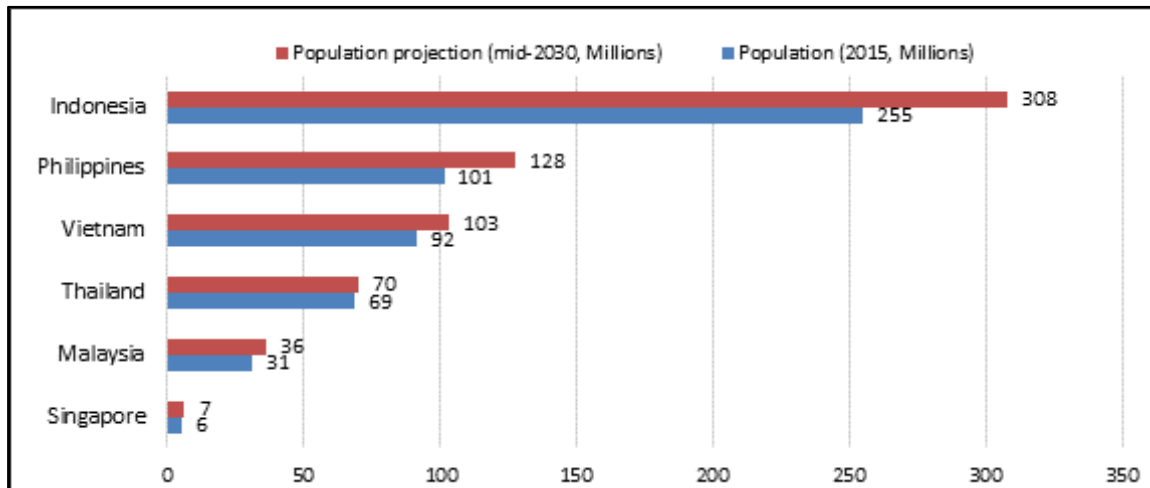


Source: EIU, June 2016.

### Population and Skills

Indonesia has a population of 255 million, which is forecast to increase to 308 million by 2030. Just the increase in Indonesia's population is nearly the same size as Thailand's population and far bigger than Malaysia's. Combined with rising disposable incomes, Indonesia's population size and growth makes Indonesia a highly attractive consumer market.

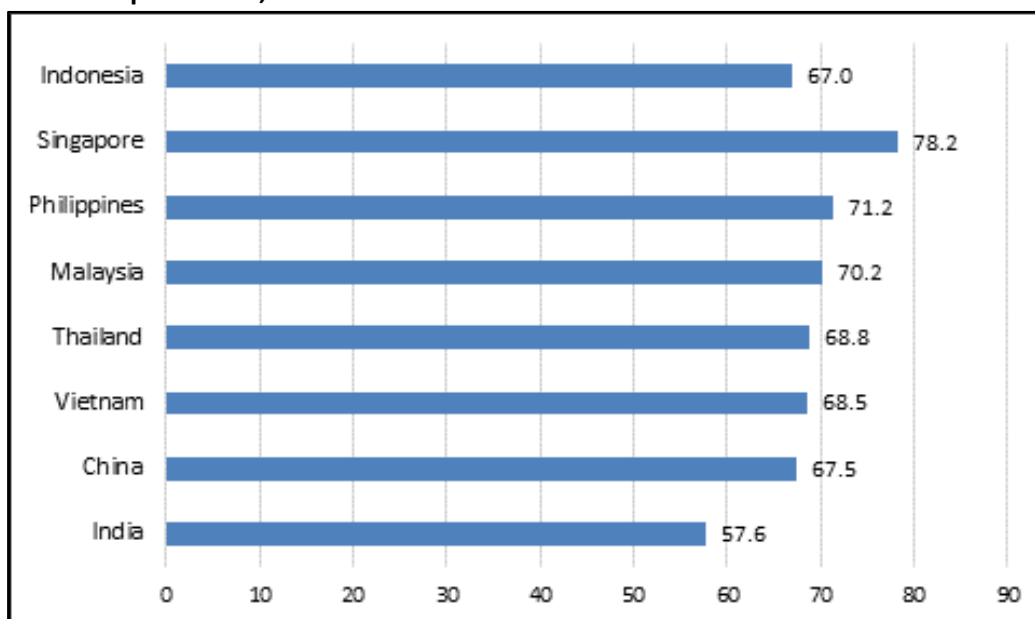
### Population by Country with Forecasts, 2015–2030



Source: International Monetary Fund (country); national statistics (sub-national) (fDi Benchmark 2016) & Population Reference Bureau World Population Data Sheet (fDi Benchmark 2016).

In terms of human capital, the following chart shows that Indonesia has a comparable human capital index to other ASEAN countries, China, and India. Indonesia's human capital index is almost the same as China's.

### Human Capital Index, 2015<sup>1</sup>

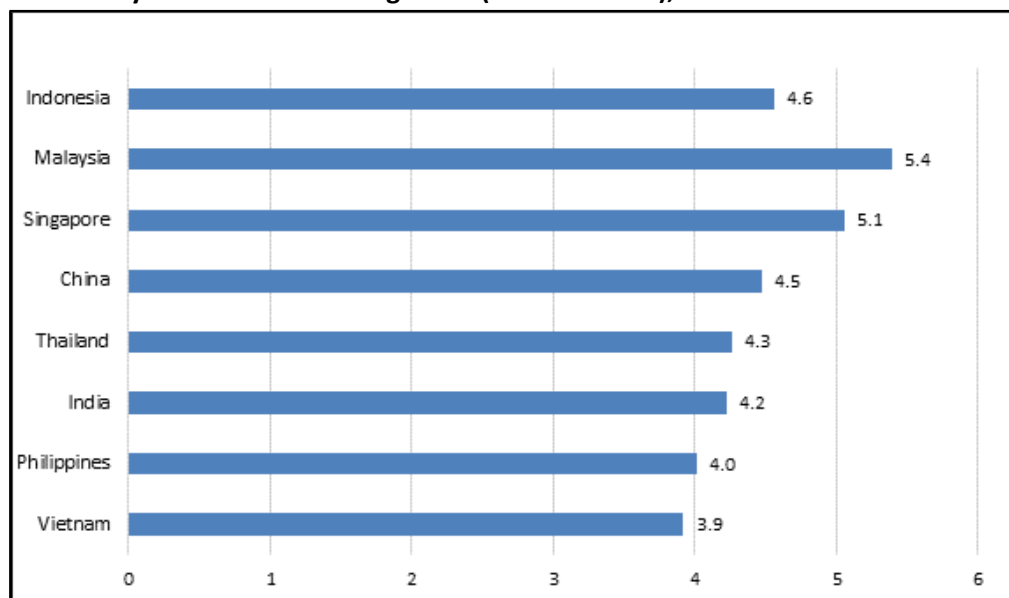


Source: The Human Capital Report, World Economic Forum, Switzerland, 2015.

Indonesia is rated as having a better availability of scientists and engineers than other countries in ASEAN except Malaysia and Singapore. Indonesia is also ranked higher than China and India.

<sup>1</sup> The Human Capital Index covers 46 indicators. Half of these are the result of disaggregating by education indicators and labour market indicators. For more information see: <http://reports.weforum.org/human-capital-report-2015/measuring-human-capital/>

## Availability of Scientists and Engineers (index out of 7), 2015<sup>2</sup>



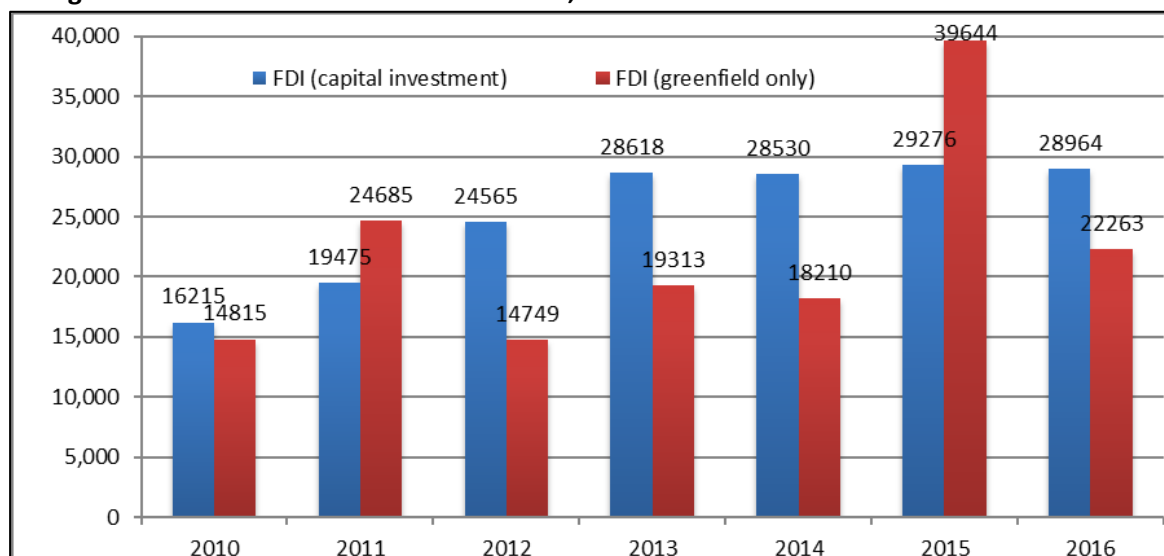
Source: Global Competitiveness Report, World Economic Forum, Switzerland, 2015-16.

## FOREIGN DIRECT INVESTMENT IN INDONESIA

### FDI Trends

FDI into Indonesia has increased significantly from US\$16.2 billion in 2010 to nearly US\$30 billion a year from 2013 to 2016, according to official FDI data from BKPM. Greenfield FDI has also increased rapidly from US\$14.8 billion of announced FDI projects to nearly US\$40 billion in 2015, based on data from the Financial Times.<sup>3</sup>

### Foreign Direct Investment Trends in Indonesia, 2010–2016



Source: FDI capital investment data from BKPM and FDI greenfield FDI data from fDi Markets from the Financial Times Limited.

<sup>2</sup> Based on an annual survey of over 14,000 executives.

<sup>3</sup> Note that greenfield FDI data is based on announcements of FDI projects, not the actual FDI capital being invested in the year of the announcement. For more information on the different methodologies of measuring FDI see: [www.fdiaccounting.com/methodology.cfm](http://www.fdiaccounting.com/methodology.cfm)



The table below shows FDI into Indonesia by major industry group. From 2011-2015, the industry group “Energy, Mining, Minerals & Utilities” attracted the biggest volume of FDI and second largest volume of greenfield investment.

**FDI by major industry group (inward FDI into Indonesia and outward FDI from Canada), 2011–2015**

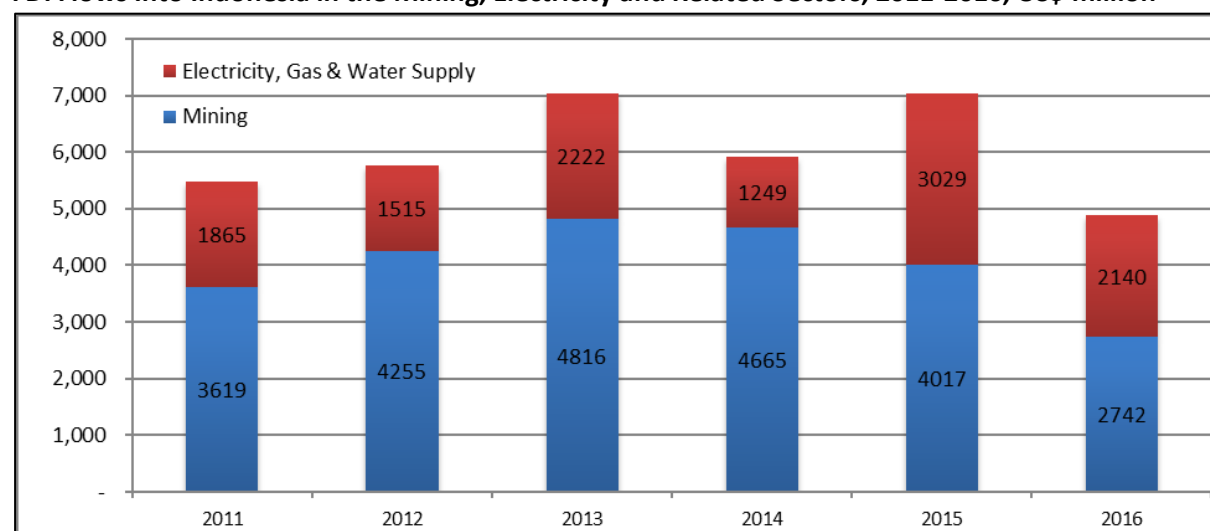
Industry sector grouping	FDI INTO INDONESIA			
	FDI (capital investment)		FDI (greenfield only)	
	# Projects	US\$ million	# Projects	US\$ millions
<b>Energy, Mining, Minerals &amp; Utilities</b>	<b>4607</b>	<b>34629</b>	<b>43</b>	<b>24169</b>
Agri-Business, Forestry & Wood Products	6287	19086	77	4623
Transportation & Warehousing	1098	14348	69	4855
Machinery, Metals, Electronics & Related	3942	13202	134	30563
Chemicals & Life Sciences	2116	11659	61	13283
Transport Equipment	1705	10161	89	8391
Construction & Real Estate	2429	8338	41	7840
Paper, Printing & Packaging	499	4146	6	262
Textiles	2079	3459	11	704
Retail & Wholesale	10159	3408	60	1673
Plastics & Rubber	1348	2741	31	3884
Tourism	2335	2636	22	1793
Other Services	5619	2137	221	5137
Other Industry	933	512	47	5246
<b>TOTAL</b>	<b>45156</b>	<b>130462</b>	<b>912</b>	<b>112424</b>

Source: WAVTEQ based on [www.fdimarkets.com](http://www.fdimarkets.com) and <http://www2.bkpm.go.id/en/investing-in-indonesia/statistic>.

## FDI in Energy

FDI in Indonesia in the energy-related sectors reached over US\$7 billion in 2013 and again in 2015 and nearly US\$5 billion in 2016.

**FDI Flows Into Indonesia in the Mining, Electricity and Related Sectors, 2011-2016, US\$ million**



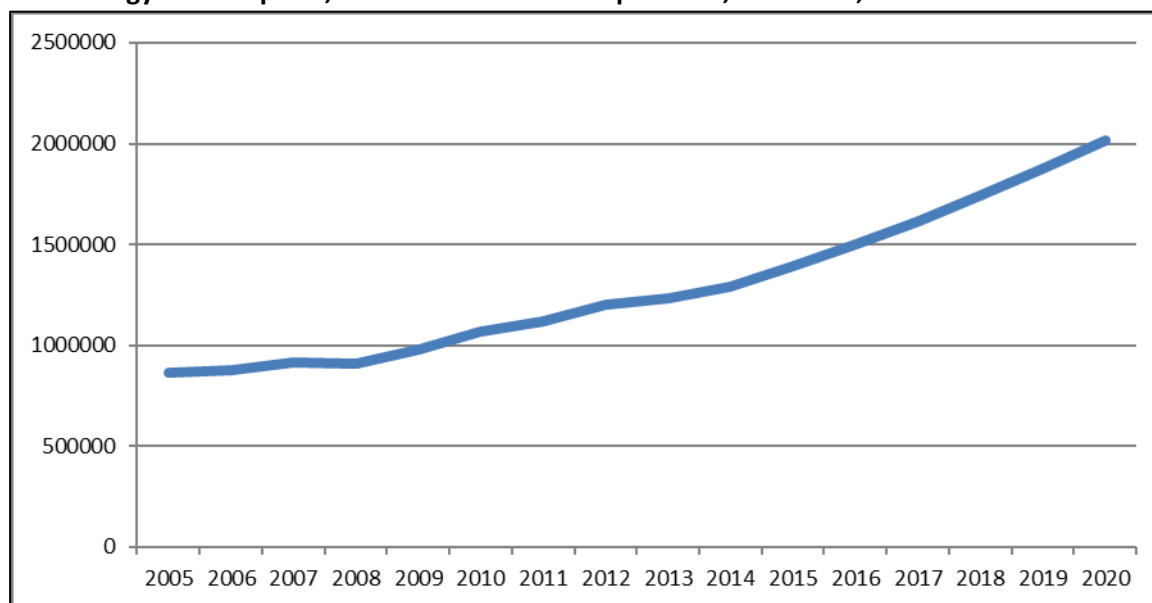
Source: WAVTEQ, based on BKPM data.

## ENERGY SECTOR IN INDONESIA

### Size of the Indonesian Energy Market

Indonesia's vast geographical area, a population of nearly 260 million people, and 5% annual GDP growth is creating significant opportunities for investment in the energy industry. Energy consumption increased by almost 50% from 2005 to 2014 and is forecast to increase by over 50% from 2015 to 2020

**Final Energy Consumption, Thousand-Barrel Oil Equivalent, Indonesia, 2005–2020**



Source: WAVTEQ, based on Ministry of Energy and Mineral Resources, Handbook of Energy and Economic Statistics 2015 and EIU.

The private sector will play a greater role than ever in development of the Indonesian power sector, with private investment of over US\$78 billion required to achieve a 99.7% electrification rate by 2025:

- The Electricity Supply Business Plan (RUPTL) aims to achieve an electrification ratio for Indonesia of 99.7% by 2025;
- To achieve this level of electrification, the RUPTL indicates at least 80.5 GW of power plants will need to be constructed by 2025;
- 18.2 GW of plants planned to be constructed by the state-owned electricity company (PLN);
- 45.7 GW by independent power producers (IPPs);
- The remaining 16.6 GW has not yet been allocated between PLN and IPPs;
- Construction of this level of power generation will require investment of at least US\$31.9 billion by PLN, and US\$78.2 billion from IPPs. As such, over the next 10 years, the private sector will play a greater role than ever in development of the Indonesian power sector. <sup>4</sup>

Electricity consumption and the number of customers in Indonesia are expected to grow rapidly over the next ten years, reaching 424.2 TWh and 78.4 million people respectively. Key growth areas within Indonesia are predicted to be Java-Bali, East Indonesia and Sumatera.

<sup>4</sup> Indonesia Energy, Utilities & Mining NewsFlash 2016, PricewaterhouseCoopers

- From 2015 to 2025, electricity consumption in Indonesia is expected to increase from 219.1 TWh to 464.2 TWh, growing on average by 8.7% per annum;
- The number of customers is projected to increase from 60.3 million in 2015 to 78.4 million by 2022, an additional 18.1 million customers;
- The electricity demand in Java-Bali is expected to increase from 165.4 TWh to 324.4 TWh, growing at a rate of 7.8% per annum;
- The demand in East Indonesia is expected to increase from 22.6 TWh to 57.1 TWh, an average growth rate of 11.1% per annum; and
- Demand in Sumatera is expected to grow from 31.2 TWh to 82.8 TWh, an average annual growth of 11.6%.<sup>5</sup>

## Growing Role of Renewable Energy

In terms of primary energy supply, the total supply of renewable energy (hydro power and biomass) has increased from 297,078 thousand barrel oil equivalent (BOE) in 2005 to 340,301 thousand BOE by 2014, demonstrating the continuing potential for investment.

The table below details the potential for each renewable energy source and the current installed capacity. We can see a high potential for future investment in all three renewable energy subsectors.

**Selected Renewable Energy Sources in Indonesia, 2013–2014**

Renewable energy source	Potential	Installed capacity
Hydro Power	75,600 MW	5,915 MW
Biomass	49,800 MW	700 MW
Solar Power	4.8 kWh/m <sup>2</sup> /day	42.78 MW

Source: Investment Opportunities, Renewable Energy – BKPM.

<http://www.all-energy.co.uk/novadocuments/81855?v=635646359979030000>

## Solar Sector

### Overview

Solar power is a renewable energy, obtained from electromagnetic radiation from direct sunlight. Sunlight can be converted into electricity either by directly using photovoltaics (PV), or indirectly using concentrated solar power (CSP), also known as concentrated solar thermal.

Indonesia is a tropical country, located on the equator line, and it has abundant potential for solar energy. Most of Indonesian receives high intensity of solar radiation, with the average daily radiation about around 4 kWh/m.

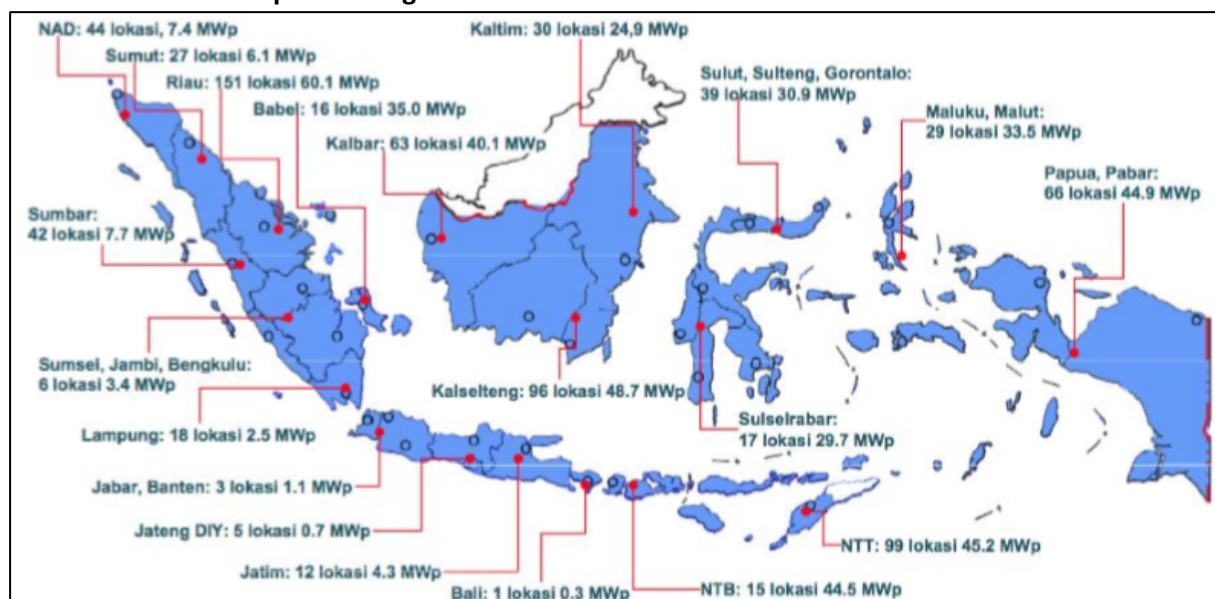
Solar energy in Indonesia has been introduced to meet the electricity demand in rural or remote areas which are not connected to national power grid by PLN. As an archipelagic country, thousands of islands do not have access to electricity (27% of the population is still off the grid), which makes Indonesia a country with plenty of opportunities for investment and development of this type of renewable energy.

Solar energy is well suited to both large and small-scale production, which is favored by the Indonesian government and PLN as it can easily be installed in remote villages. Due to high transportation costs, diesel-based electricity generation in regions like Maluku, Nusa Tenggara, and Papua is very expensive, increasing the competitiveness of electricity generated from solar power.

<sup>5</sup> Electricity Supply Business Plan, Perusahaan Listrik Negara (PLN) <http://www.pln.co.id/blog/ruptl/>

Installed solar capacity is low at 27 MW, and the plan to increase to 620 MW by 2020 will require foreign investment, which is strongly supported by the government of Indonesia.<sup>6</sup> The blended approach of targeting 620 MW capacity by 2020 through investment by both PLN (State Electricity Corporation) and private investment, opens opportunity for FDI beyond electricity generation projects, including the manufacture or supply of solar arrays, hybrid or combined power systems and automated control units. Identification of key sites that are investor ready or have the least obstacles (technical and legislative) and that have clarity on ownership requirements and tendering requirements (if any) will provide a stock of opportunities from which to attract investment in the short term.

### PLN's Solar PV Development Program



Source: PLN / Asian Development Bank 2015.

The establishment of the BKPM OSS (one stop shop) and the simplification (to a degree) of the number of procedures and time to implement will make investment more attractive. The ambition to auction 90+ Solar PV / diesel hybrid projects in 2018, provides the ideal opportunity (and time) to identify foreign bidders and allow them to prepare for the auction process.

### Solar photovoltaics capacity

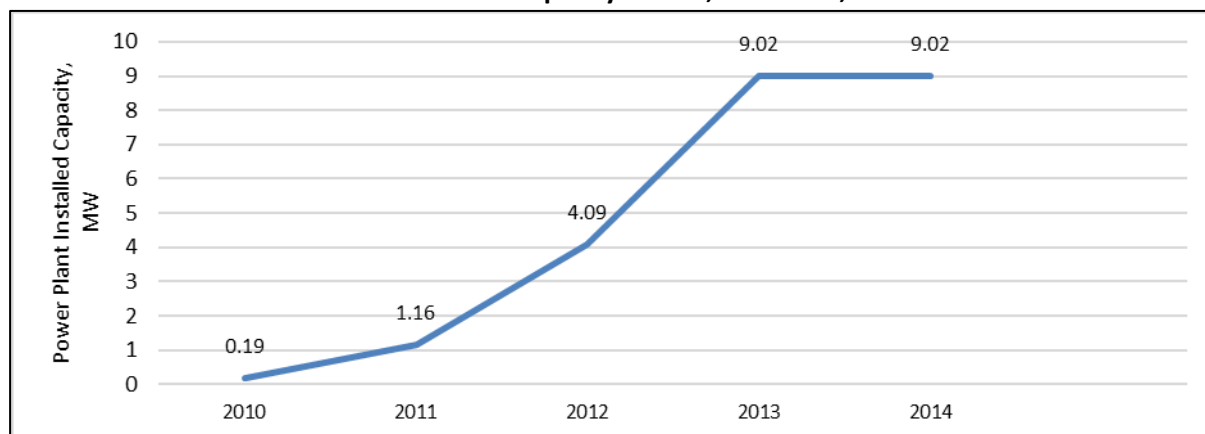
The Indonesian government is determined to promote solar photovoltaic energy to meet the energy demand for isolated areas. Solar energy in Indonesia is still in its initial phase. However, in recent years, its installed capacity has increased.

The chart below shows the five-year trend in installed capacity of solar photovoltaics in Indonesia. From 2010 to 2013, the capacity of solar PV grew dramatically from 0.19 MW to 9.02 MW. In 2014, installed capacity remained stable.

<sup>6</sup> <http://www.solarplaza.com/channels/markets/11591/new-government-decree-accelerate-indonesian-solar-market/>



### Power Plants Installed Solar Photovoltaic Capacity in MW, Indonesia, 2010–2014

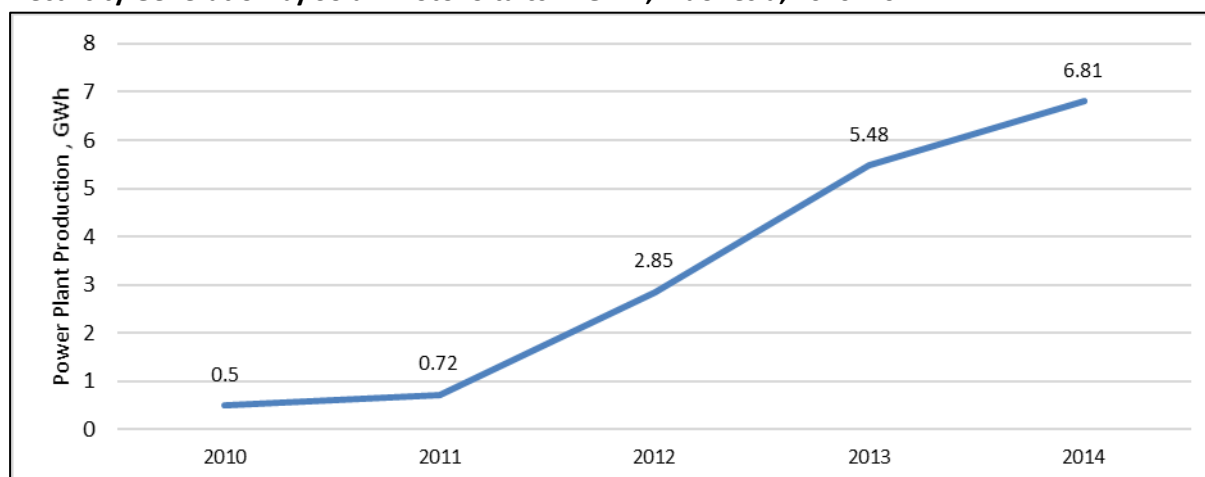


Source: Based on Handbook of Energy & Economic Statistics of Indonesia from the Ministry of Energy and Mineral Resources Republic of Indonesia <http://www.esdm.go.id/publikasi/statistik/handbook.html>.

### Solar photovoltaics generation

The amount of electricity generated by solar photovoltaic energy also increased significantly from 0.50 GWh in 2010 to 6.81 GWh in 2014.

### Electricity Generation by Solar Photovoltaics in GWh, Indonesia, 2010–2014



Source: Based on Handbook of Energy & Economic Statistics of Indonesia from the Ministry of Energy and Mineral Resources Republic of Indonesia <http://www.esdm.go.id/publikasi/statistik/handbook.html>.

As population and per capita electricity consumption are predicted to rise in the coming years, the government of Indonesia set a national target of approximately 1,400 MW installed solar photovoltaic capacity by 2025. In order to achieve this target, an estimated US\$3,755 million of investment will be required from 2015 to 2025. Electricity generation from solar photovoltaic is expected to reach 9,986 GWh, as shown in the following table.

### Solar Photovoltaic Capacity and Electricity Generation Target, Indonesia, 2015–2025

Year	Units	2015	2020	2025
Capacity	MW	417	760	1425
Production	GWh	2922	5326	9986
Investment	Million US\$	834	1140	1781

Source: BKPM, <http://www.all-energy.co.uk/novadocuments/81855?v=635646359979030000>.

## Solar thermal

Due to its geographical position, Indonesia has excellent resources and huge potential to develop solar thermal power. Solar thermal power is another source of renewable energy that may be of particular benefit to Indonesia. Indonesia has abundant potential of solar energy as a tropical country, located in the equator line. The table below highlights that, despite Indonesia's low development of solar thermal-electric, it has excellent resources and huge potential. Indonesia has an average solar radiation of 4.8 kWh per square meter per day, above the average of its neighbors.

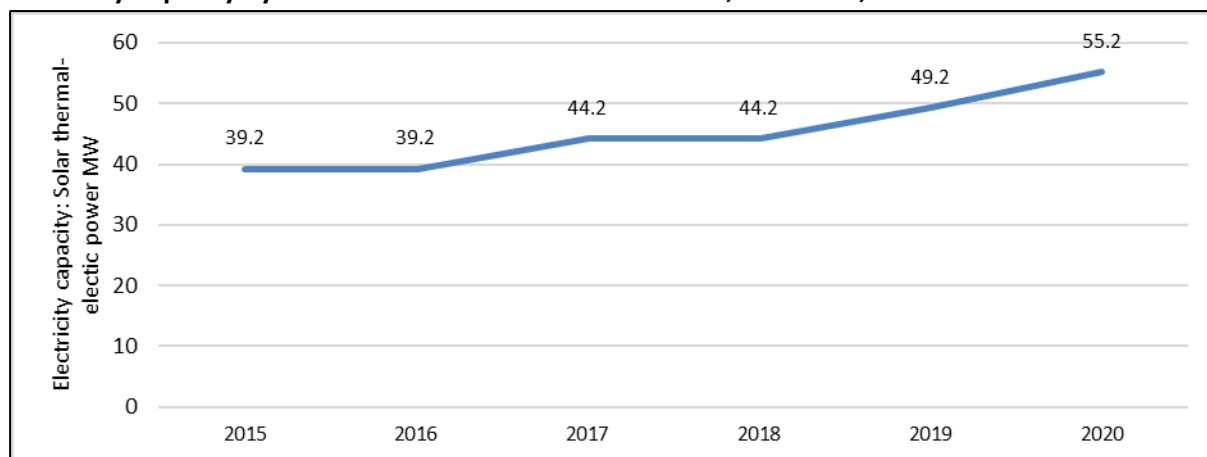
**Solar Thermal–Electric Capacity, Electricity Generation and Potential, Selected Countries, 2015**

Country	Solar Thermal Capacity (MW)	Solar Thermal Generation (GWh)	Potential (kWh per sq. m per day)
China	38338.0	40342.0	3.0
India	5576.0	9277.0	5.3
Thailand	2048.0	1275.0	4.8
Vietnam	100.0	150.0	4.6
Malaysia	80.0	189.6	4.9
Indonesia	39.2	11.5	4.8
Philippines	32.6	16.9	4.9
Singapore	15.2	21.7	4.4

Source: WAVTEQ, based on Energy Matters and Economist Intelligence Unit.

According to the EIU, in 2015 solar thermal capacity in Indonesia was 39.2 MW. From 2015 to 2020, solar thermal capacity is expected to growth on average by 7% per annum, reaching 55.2 MW in 2020. This is a larger capacity than the Philippines (53.8 MW) and Singapore (35.2 MW).

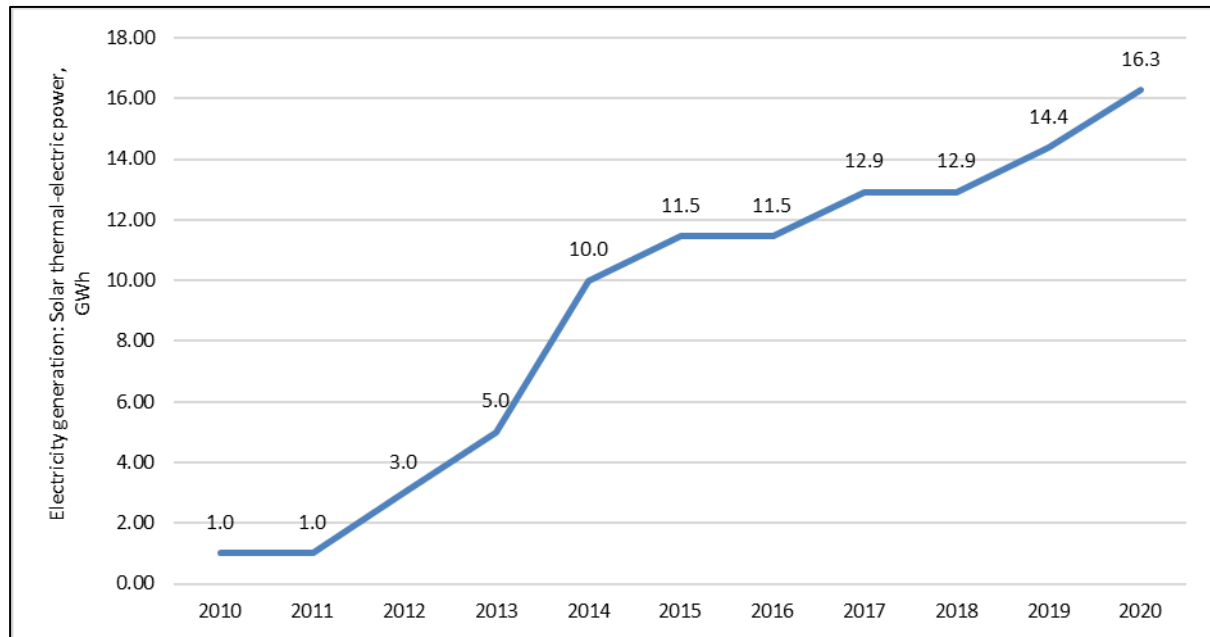
**Electricity Capacity by Solar Thermal–Electric Power in MW, Indonesia, 2015–2020**



Source: WAVTEQ, based on Economist Intelligence Unit.

In 2010, solar thermal power in Indonesia had a low gross electricity generation (1 GWh). However, electricity production from solar thermal power increased to 11.5 GWh in 2015. The next chart illustrates the trends and forecasting electricity generation from solar thermal from 2010 to 2020. Based on EIU, electricity generation from thermal-electric power is expected to grow from 11.5 GWh to 16.3 GW, at an average of 7% per annum.

## Electricity Generation by Solar Thermal–Electric Power in GWh, Indonesia, 2010–2020



Source: WAVTEQ, based on Economist Intelligence Unit.

## Investor case studies

### Canadian solar

- In January 2015, Canadian Solar Inc. (CSI) announced a 30MW solar manufacturing plant in Indonesia with US\$70 million funding secured from the IFC.

## Hydroelectricity

### Overview

Hydropower, or water power, is power derived from the energy of falling water or fast running water, which may be harnessed for many useful purposes. The installed capacity of hydroelectric is 4.8% of available capacity, indicating the huge potential for investment in the sector. The PWC guide *Power in Indonesia* (August 2015) cites 11 hydro projects in various stages of appointment or construction with a further nine down for direct appointment. The later have a total generation output of 413MW. In addition, there are numerous small hydro (<10MW) project opportunities, although clarification is needed on foreign investment restrictions for small hydro projects.

Installed capacity is 5.9 GW while the potential capacity is 75.6 GW and the Indonesian government is targeting 26 new hydro power plants, of which 11 hydro projects are in various stages of appointment or construction. Feed-in tariffs have been introduced for hydroelectricity and the government is targeting 8.3 GW of hydropower by 2024

### Capacity

Indonesia's hydroelectricity capacity, defined as the maximum active power that can be continuously supplied by hydroelectric power plants, is forecast to grow from 6,858 Mwe in 2015 to 8,159 Mwe in 2020 (+19%). This is a higher capacity than Malaysia, Philippines and Thailand.

Indonesia's hydroelectricity capacity accounts for an estimated 12% of its total electricity capacity in 2015; and is expected to increase to 13.4% by 2020. Only Indonesia and Malaysia are forecast to increase their hydroelectricity share of total electricity capacity.

### Hydroelectricity Capacity as a Proportion of Total Electricity Capacity

Country	2015	2020	Change*
Malaysia	17.9%	21.1%	+3.2%
Indonesia	12.0%	13.4%	+1.5%
Thailand	5.8%	4.9%	-0.9%
Philippines	18.9%	17.5%	-1.4%
China	22.0%	19.2%	-2.8%
India	15.0%	12.0%	-3.0%
Vietnam	50.9%	43.5%	-7.5%
Singapore	-	-	-

\* Percentage point change.

Source: WAVTEQ, based on Economist Intelligence Unit Energy Indicators and Forecasts.

According to the Economist Intelligence Unit (EIU), hydroelectricity capacity in Indonesia is set to reach 8,159 Mwe by 2020—a larger capacity than Malaysia, Philippines, Singapore, and Thailand. Indonesia will grow its capacity at a faster rate than India and Thailand.

### Forecast Hydroelectricity Capacity, Mwe, Indonesia, 2016–2020

Year	Capacity (Mwe)
2016	7358
2017	7558
2018	7758
2019	7958
2020	8159

Source: Economist Intelligence Unit: Energy Indicators and Forecasts.

## Generation

Hydropower energy in Indonesia will grow at an average annual rate of 2.6% between 2015 and 2020 and is set to reach 20,069 GWh by 2020. According to EIU, Indonesia's total electricity generated in 2015 was 229,709 GWh, of which 7.7% (or 17,693 GWh) was derived from hydropower.

In 2015, the total electricity generated by hydroelectric power plants in Indonesia (17,693 GWh) was higher than Malaysia (15,006 GWh), Philippines (9,562), and Thailand (6,632 GWh), and it is expected to grow at an average rate of 2.6% between 2015 and 2020. Electricity generated by hydropower is set to reach 20,069 GWh by 2020.

Hydropower will play a significant role in future government strategy in Indonesia, with the objective of reaching 8.3 GW of hydropower by 2024.<sup>7</sup> The government is targeting 26 new hydro power plants over this period.

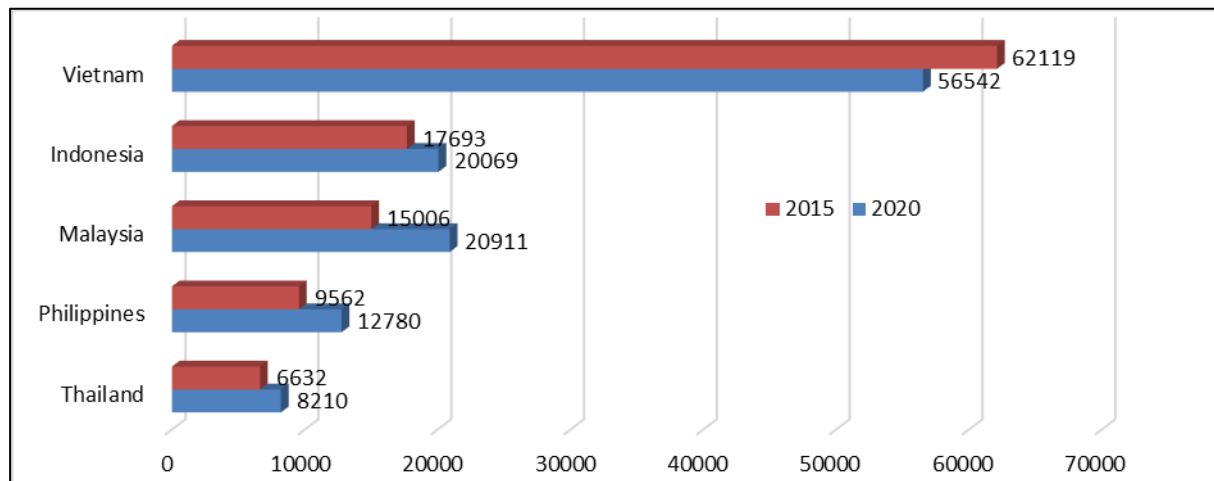
The following chart shows the levels of electricity generated by hydropower among selected ASEAN countries for 2015 and 2020. The level of electricity generated by hydropower in Indonesia is expected to grow by 13.6% between 2015 and 2020.

<sup>7</sup> Power in Indonesia, PricewaterhouseCoopers

<https://www.pwc.com/id/en/publications/assets/eumpublications/utilities/power-guide-2015.pdf>



## Gross Electricity Generation by Hydroelectric Power Plants in GWh, Selected ASEAN Countries, 2015–2020



Source: WAVTEQ, based on Economist Intelligence Unit Energy Indicators & Forecasts.

\* China = 1,041,235 GWh (2015) – 1,257,178 GWh (in 2020)

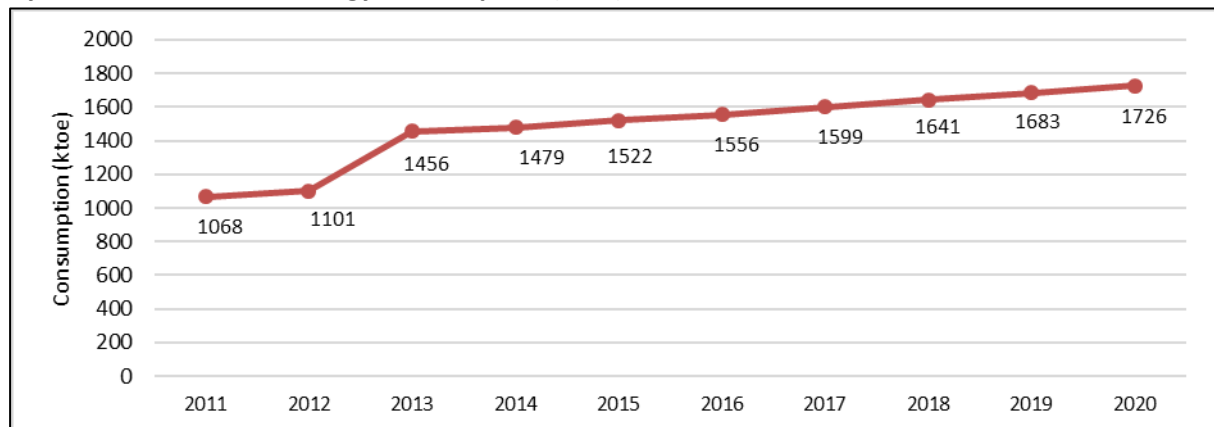
\*\* India = 155,315 GWh (2015) – 202,911 GWh (in 2020)

\*\*\* Singapore = 0 GWh

## Demand

Gross domestic hydro-energy consumption has increased year-on-year in Indonesia from 1068 ktoe in 2011 to 1522 ktoe in 2015. This trend is expected to continue with consumption reaching 1726 ktoe in 2020.

## Hydro: Gross Domestic Energy Consumption (ktoe), Indonesia, 2011–2020



Source: Economist Intelligence Unit Energy Indicators & Forecasts.

An overview of the capacity, gross domestic consumption (demand) and gross generation of hydroelectricity of selected ASEAN countries as well as China and India is provided in the following chart.

### Hydroelectricity Capacity, Demand and Generation, Selected Countries, 2016–2020

Country	Capacity (Mwe)		Domestic consumption (ktoe)		Generation (GWh)	
	2016	2020	2016	2020	2016	2020
China	333650	387150	93177	108117	1083450	1257178
India	45304	47304	14040	17450	163261	202911
Indonesia	7358	8159	1556	1726	18098	20069
Malaysia	5941	7586	1393	1798	16193	20911
Philippines	4043	5544	872	1099	10137	12780
Thailand	3541	3583	698	706	8114	8210
Vietnam	18300	21600	5117	4863	59498	56542
Singapore	-	-	-	-	-	-

Source: WAVTEQ based on Economist Intelligence Unit Energy Indicators and Forecasts.

### Investor case studies

#### PT Vale

- Subsidiary of Vale, a global mining company headquartered in Brazil
- Known for nickel production in Indonesia
- Responsible for the running of three hydroelectric power plants:
  - *Larona*: operations commenced in 1979, consists of three turbines with power capacity of 165 MW
  - *Balambano*: consists of two turbines with power capacity of 110 MW, operations began in 1999
  - *Kerebbe*: newest of the three plants, began operations in 2011, with two turbines and capacity of 90 MW
- Main use of this energy is to increase nickel production by prioritizing cost efficiency
- Contributes 34% (10.7 MW) of their energy to Perusahaan Listrik Negara (PLN), the state-owned electricity distributor

### Biomass

#### Overview

Biomass energy is produced using the biological material from living or recently living organisms—both from plant and animal. The material is burnt in such places as power plants to produce the electricity. Biomass consists of a variety of different components, including firewood, agriculture waste, urban solid waste, and industrial waste.

By 2025, the government is targeting that biomass will contribute more than 20% of electricity emanated from all new and renewable sources. Overall the category “New and renewable energy” refers to energy sources including solar energy, geothermal energy, wind power, biomass, hydropower and others. Biomass is forecast to equate to 5.1% of the total national energy mix in 2025, compared to its current contribution of 2%.

### Biomass Contribution Towards National Energy Mix, 2015–2025

Energy source	2015		2020		2025	
	MTOE*	National Energy Mix (%)	MTOE	National Energy Mix (%)	MTOE	National Energy Mix (%)
Biomass	4	2%	7	2.3%	19	5.1%
Overall new and renewable energy	22	10%	49	17.0%	87	23.0%
National energy mix	215	100%	290	100%	380	100%

Source: BKPM, <http://www.all-energy.co.uk/novadocuments/81855?v=635646359979030000>.

\*Million Tonnes of Oil Equivalent.

### Capacity

While the total potential for biomass power generation is very high at 50,000 MW, in reality the constraints on supply of feedstock will limit potential and the recent five-year moratorium on new Palm Oil plantations and the preference by existing plantations to export palm kernel may limit foreign investment in the field. It is understood that palm kernels are only one of many sources of biomass in Indonesia.

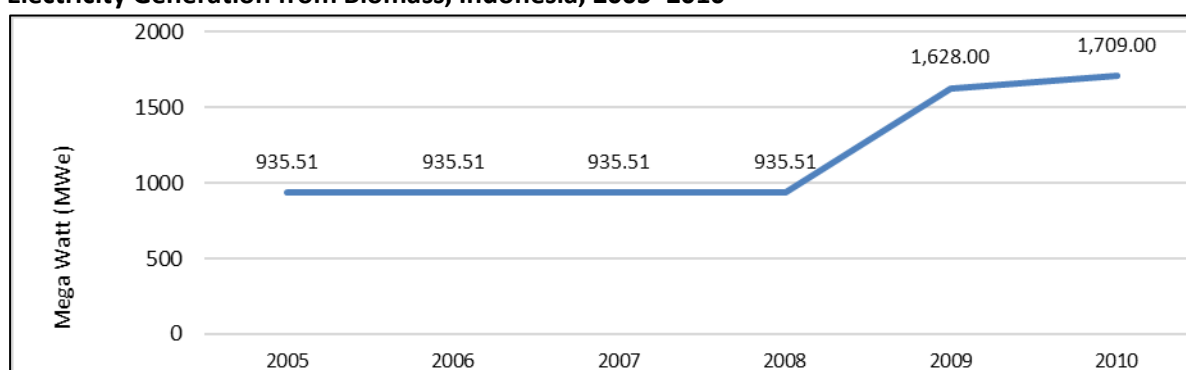
A new waste-to-energy scheme was introduced to take advantage of the huge potential of bioenergy from waste biomass, as only 3.25% (or 1.618 MW) of this potential was used in 2014:

- A new waste-to-energy scheme has been created in partnership with organizations including the European Union's Trade Cooperation Facility (TCF) programme and The Ministry of Energy and Mineral Resources (MEMR);
- Several strategic policies, incentives and regulations, were put in place to ease investment in the use of solid waste from municipalities;
- Indonesia generates over 150,000 tonnes of waste per day, which is disposed in over 430 government-run landfill sites, demonstrating the huge potential available to harness energy;
- Due to its tropical climate, Indonesia has a very strong agricultural industry. In 2010, agricultural production included 19.76 million tons of palm oil (the world's largest producer) and 2.59 million tons of natural rubber (ranking as the second-largest producer of rubber in the world). This results to a large volume of agricultural waste that can also be converted into biomass energy.

### Generation

The chart below illustrates that the installed capacity of electricity generation from biomass in Indonesia remained steady from 2005 to 2008, then began to rise substantially from 935.51 MWe in 2008 to 1,628 MW in 2009, and a continued, albeit smaller, increase from 2009 to 2010 (1,709 MW).

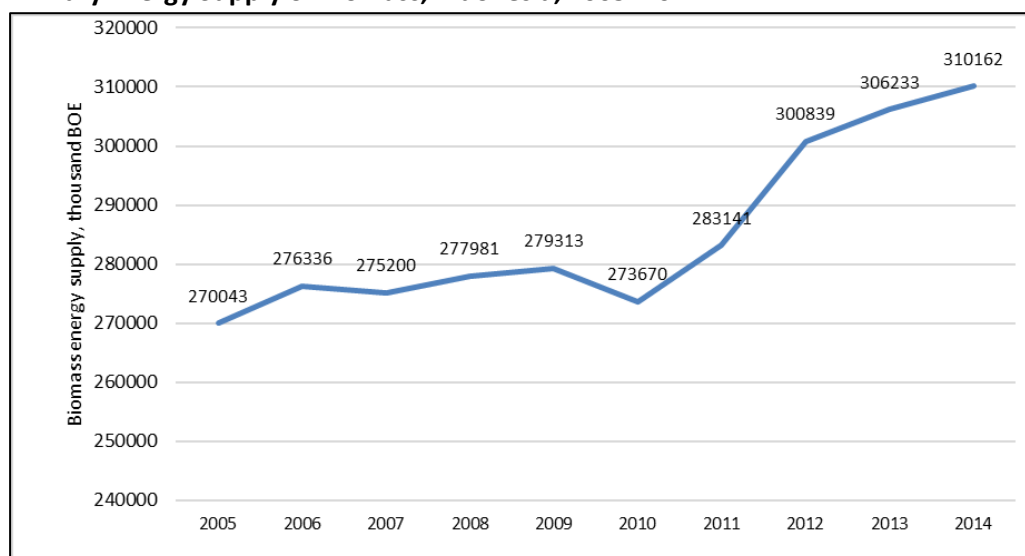
#### Electricity Generation from Biomass, Indonesia, 2005–2010



Source: BKPM, <http://www.all-energy.co.uk/novadocuments/81855?v=635646359979030000>.

According to data from the Ministry of Energy and Mineral Resources, biomass supply has risen significantly as shown in the chart below. The primary energy supply of biomass increased sharply from 2011 up to 2014, following a slight decline in 2010.

#### Primary Energy Supply of Biomass, Indonesia, 2005–2014



Source: Ministry of Energy and Mineral Resources, Handbook of Energy and Economic Statistics 2015.

### Consumption

Biomass energy consumption has increased year-on-year and reached 310,036 thousand BOE in 2014. According to the Ministry of Energy and Mineral Resources of Republic of Indonesia (ESDM), final consumption of biomass energy totaled 310,036 thousand BOE in 2014 and accounted for 24% of the total final energy consumption. Biomass energy consumption has increased year-on-year since 2010, and its consumption grew by 13.3% between 2010 and 2014. The table below shows the growing trend in the consumption of biomass energy between 2000 and 2014, and its proportion of the total energy consumed.

#### Biomass Energy Consumption in Thousand BOE, Indonesia, 2000–2014

Year	Biomass energy consumption	Total energy consumption	%
2014	310036	1292796	24.0%
2013	306087	1236725	24.7%
2012	300693	1204817	25.0%
2011	283027	1116599	25.3%
2010	273613	1067542	25.6%
2009	279169	978380	28.5%
2008	277874	906846	30.6%
2007	275126	916720	30.0%
2006	276271	880153	31.4%
2005	270043	864601	31.2%
2004	271765	875261	31.0%
2003	271974	839748	32.4%
2002	270207	799926	33.8%
2001	268953	802325	33.5%
2000	269042	777925	34.6%

Source: Based on Handbook of Energy & Economic Statistics of Indonesia from the Ministry of Energy and Mineral Resources Republic of Indonesia. <http://www.esdm.go.id/publikasi/statistik/handbook.html>.



In 2014, 71.2% (or 263495 thousand BOE) of total energy consumed by the household sector, was energy generated by biomass.

According to ESDM, the industrial and household sectors registered the highest consumption of biomass energy among all sectors in Indonesia. Within the total energy consumed in the industrial sector in 2014, 8.5% (or 45,188 thousand BOE) was energy obtained from biomass whereas in the household sector, 71.2% (or 263,495 thousand BOE) of total consumed energy was derived from biomass.

## Investor case studies

### Sinar Mas

Sinar Mas, through its subsidiary Asia Pulp & Paper (APP), is investing around US\$780 million to develop 10 biomass power plants over the next eight years with a total generating capacity of 1000 mw.

### Louis Dreyfus Company

Louis Dreyfus Company has established a bio-fuel plant in Lampung province in Sumatra, with the capacity to produce 470,000 million tons of bio-fuel annually.

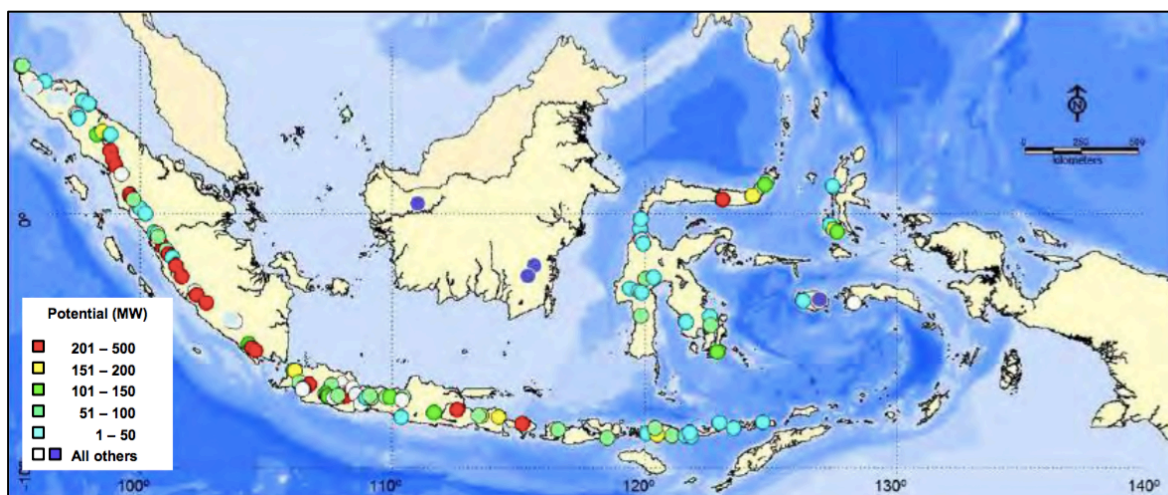
## Geothermal

### Overview

Indonesia has exceptional volcanic activity and is believed to harbour around 40% of the planet's geothermal potential, with estimated resources and reserves totaling 28,000 megawatts (MW). Sumatra holds most of these, followed by Java.

### Capacity

The government is planning to boost installed capacity to 6500 MW by 2025, up from some 1340 MW that were on stream in early 2014 (with projects for another 1500 MW in development). Unlike most other forms of electricity generation, geothermal is dominated by independent private companies. In total 299 geothermal potential sites have been identified.




The installed capacity of geothermal is 4.6% of available capacity demonstrating the huge potential for investment in the sector. Geothermal exploration and production licenses are offered via open auction, with a total of 16 sites being made available over the next two years to private companies, with a further five sites being provided for development by state owned enterprises.

## Investor case studies

"We built our first geothermal power plant in Indonesia back in 2000. It has been running extremely well since then in Lahendong, North Sulawesi.."

*Edward Thiessen  
President, Alstom Indonesia*

"The tenders are out there, they just need the investors to come in...there is still lots of room for new companies to come in and develop the resources."

*Paul Brophy  
President, EGS, Inc.*




"I see geothermal as the future energy and Indonesia inevitably has to develop its geothermal potential....Within the next few years, geothermal will be able to compete with coal on price in Indonesia."

*Sumpramu Santosa  
President Director, Supreme Energy*




### 21 Geothermal Power Projects to Be Tendered in 2016-2017:

Block	Capacity (MW)	Estimated Investment
Bonjol	60	USD 240 million
Gunung Talang Bukit Kili	20	USD 80 million
Gunung Endut	40	USD 160 million
Candi Umbul Telomoyo	55	USD 220 million
Gunung Willis	20	USD 80 million
Gunung Arjuno Welirang	110	USD 440 million
Gunung Pandan	10	USD 40 million
Gunung Dede Pangrango	55	USD 220 million
Songgonti	20	USD 80 million
Sipoholon Ria-Ria	20	USD 80 million
Simbolon Samosir	110	USD 440 million
Graho Nyabu	110	USD 440 million
Suwawa	20	USD 80 million
Sembalun	20	USD 80 million
Oka-Ile Ange	10	USD 40 million
Bora Pulu	40	USD 160 million
Gunung Hamiding	10	USD 40 million
Bonga Wayaua	5	USD 20 million
Gunung Geureudong	110	USD 440 million
Gunung Galunggung	110	USD 440 million
Gunung Ciremai	110	USD 440 million

Source: Ministry of Energy and Mineral Resources

## Wave and tidal

This is an embryonic sector in Indonesia with longer term potential. Indonesia has an ocean area reach out of 5,000,000 square kilometres. This is biggest archipelago country in the world and has great ocean energy potential.

Ocean wave energy has the theoretical potency 510 GW, the technical potency 2 GW, and the practical potency 1,2 GW (BPPT, 2014).

The Energy and Mineral Resources Ministry of Indonesia has announced plans for the development of wave and current power plants in the country. Pilot projects started in 2015.

**Sabella, French tidal energy developer, signed an MOU with PLP and MEINDO to supply tidal turbines from 100 kW to 2.500 kW in capacity that would power remote areas of Indonesia**



**Akuo Energy and Pertamina have also signed an MoU for developing renewable energy projects, including OTEC plant, at various sites in Indonesia**



## KEY STRENGTHS OF INDONESIA FOR FDI

A field trip to Indonesia was conducted in June 2016 to meet with Canadian and other investors and key stakeholders. Interviewees were asked to identify the three most important location determinants for FDI into Indonesia. The chart below shows that access to the Indonesian market and customers is considered the most important location determinant, with over 35% of respondents citing this factor as one of the top three location determinants. The next most important factors were access to the regional ASEAN market and access to natural resources.

### Key Location Determinants for FDI in Indonesia, % respondents citing factor

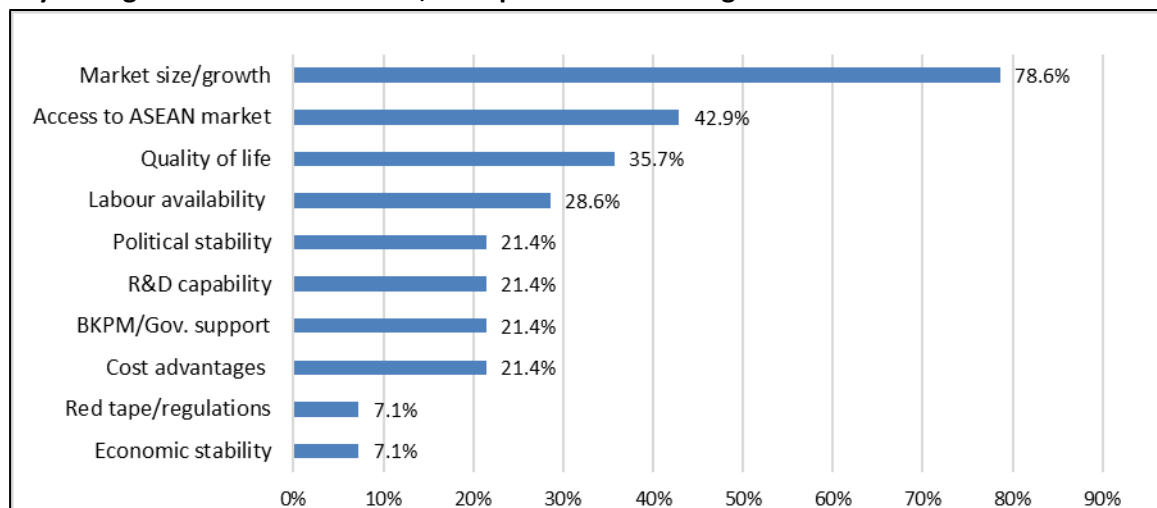


Source: WAVTEQ survey, June 2016.

Respondents emphasized the size and growth of the Indonesian and ASEAN market and that the high-growth economy offers a good return on investment and new sources of revenue independent of global markets, especially related to infrastructure and energy demand in Indonesia. Finding a good local partner is seen as key to navigating the regulatory climate and getting operations up and running. When forming a local partnership, investors recommend extensive due diligence and putting arbitration offshore.

Respondents were asked to rank location factors on a scale of 1 to 5 (1=Indonesia is very weak, 5=Indonesia is excellent). The chart below shows the key strengths of Indonesia for FDI. Over three-quarters of respondents saw market size and growth as a key strength and over 40% of respondents saw access to ASEAN as a key strength. The quality of life in Indonesia was cited as a key strength by over one-third of respondents and labour availability by over one-quarter of respondents.

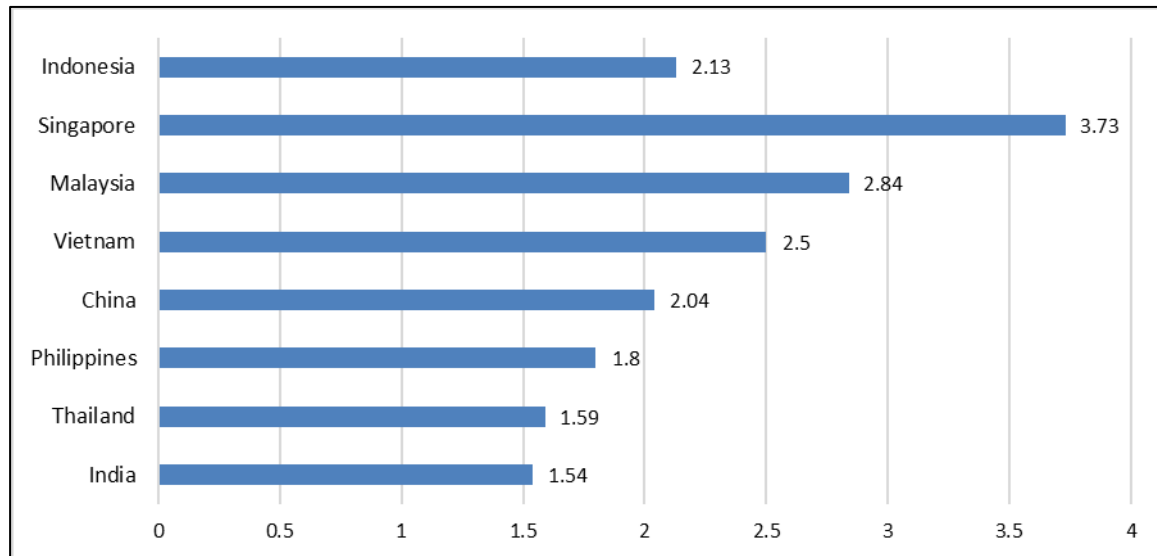
### Key Strengths of Indonesia for FDI, % respondents awarding the factor a score of 4 or 5



Source: WAVTEQ survey, June 2016.

Indonesia's overall political stability is evaluated as 2.13 out of a maximum of 4, which is below Singapore, Malaysia, and Vietnam but higher than China, Philippines, Thailand, and India.

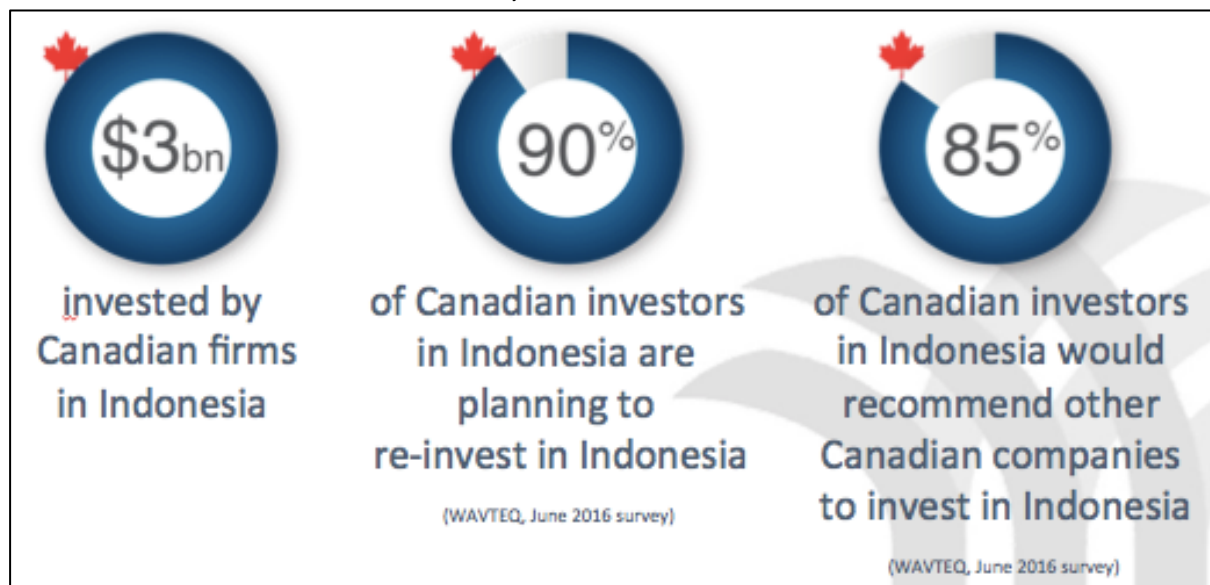
### Political Stability Index (out of 4), 2015



Source: fDi Benchmark (Based on Worldwide Governance Indicators 2016).

Canadian companies that have already invested in Indonesia are very positive about the investment opportunities, as shown in the following feedback. Investors highlighted the importance of understanding the local business culture and being in the market to succeed. They noted that the Indonesian culture is very welcoming and integrative and that there is easy access to government.

### Canadian investor Feedback on Indonesia, 2016

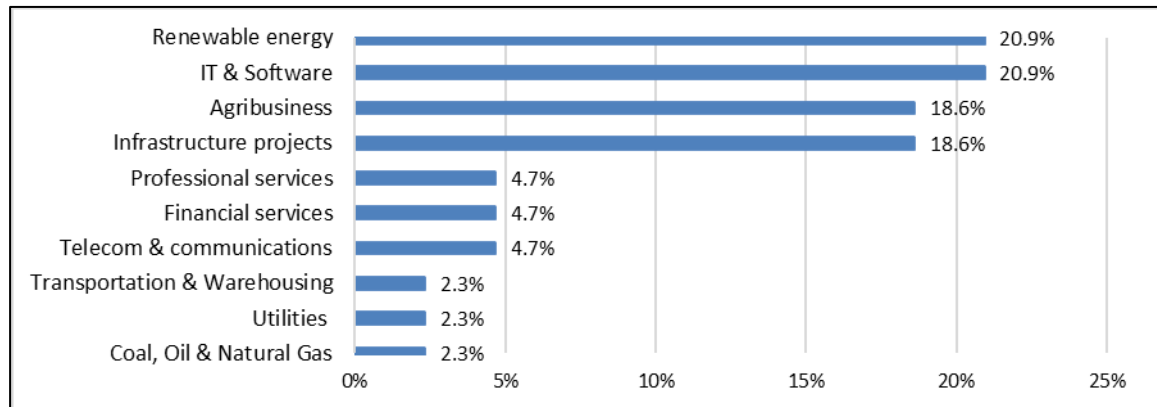


Source: WAVTEQ survey, June 2016.

## KEY INVESTMENT OPPORTUNITIES

Canadian and other investors and key stakeholders were asked to identify the top three sectors where they saw the best opportunities for FDI into Indonesia over the next five years. Renewable energy was ranked as having the joint best FDI opportunity for Canadian companies.

### Top 3 Sectors Having Best Opportunities for FDI in Indonesia in Next 5 years, % of respondents



Source: WAVTEQ survey, June 2016.

With Indonesia's economy forecast to more than double in size from US\$0.86 trillion in 2015 to US\$1.72 trillion in 2022, according to EIU data, demand for energy is growing rapidly. According to BKPM reports, electricity demand is forecast to increase eight times over the next decade and an additional 237 GW of capacity must be added to the current capacity. Electricity demand in Java and Bali is forecast to grow by 7.8% per annum while electricity demand in eastern & western parts of Indonesia is forecast to grow by 11.4% and 10.5% respectively. This is in line with EIU forecasts of energy demand increasing by 7.7% per annum from 2016 to 2020, reaching over US\$2 trillion in 2020, and electricity generation increasing by over 50% from 2015 to 2020.

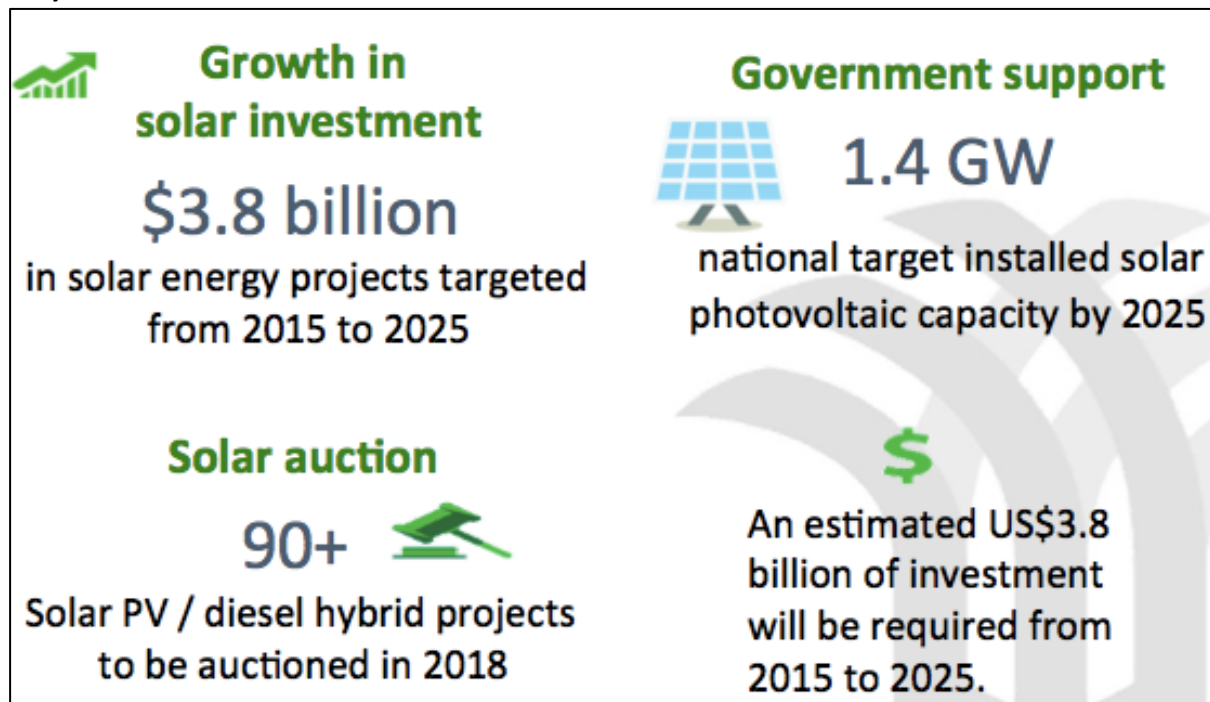
To meet its energy needs, the Indonesian government has a very strong focus on renewable energies:

- The government has a target of 25% of energy from renewable sources by 2025;
- BKPM is targeting US\$100 billion of green investment by 2019;
- In total, the Indonesian government has proposed 508 power projects (conventional and renewable) from 2015 to 2019 and introduced feed-in tariffs for biomass and hydro to encourage investment in renewable energy projects.

Based on discussions with many Canadian energy companies, the strongest interest for investing in Indonesia appears to be the solar sector. The infographic below provides a summary of the investment opportunity.



## Why Invest in Indonesia's Solar Sector?



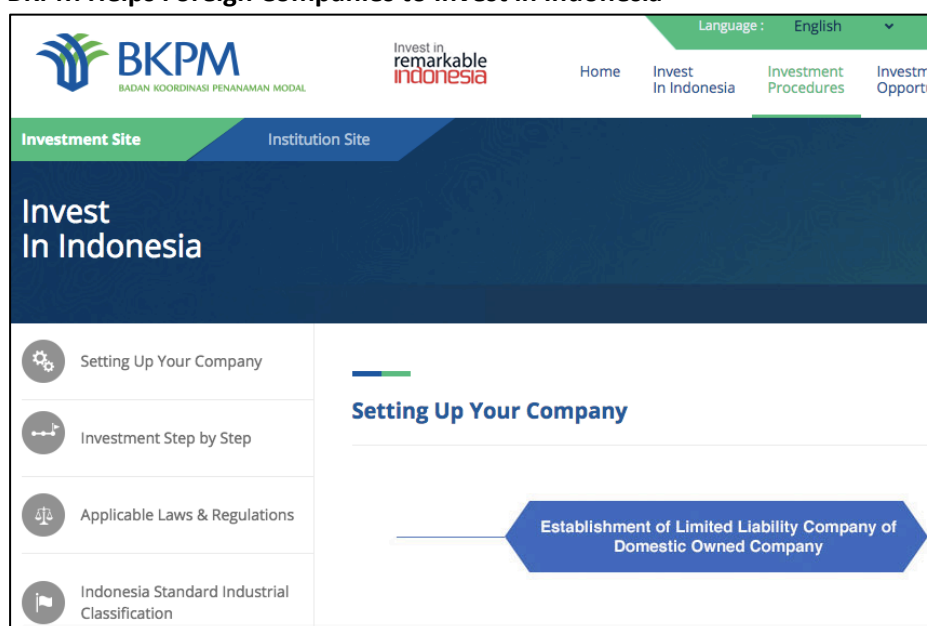
Source: WAVTEQ

## HOW TO INVEST IN INDONESIA

### Government Support for your Investments

The Investment Coordinating Board of the Republic of Indonesia (BKPM) is the Indonesian government agency established to assist foreign companies to invest in Indonesia. BKPM offers a one-stop shop and online service to help foreign investors, with targets for approval times. BKPM should be contacted to obtain the latest information on how to make energy investments in Indonesia and on possible fast-track investment set-up and financial incentives available.

### BKPM Helps Foreign Companies to Invest in Indonesia



Source: <http://www4.bkpm.go.id/en/investment-procedures/>.



## Online Licensing—National Single Window for Investment



**Online NSWi**  
National Single Window for Investment

Indonesia | English

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**Flow Process**

[Getting Access Authority](#)

**WELCOME TO**  
Online SPIPISE Service

**BKPM**

**Indonesia Investment Coordinating Board**

**Licensing Service on SPIPISE**

Online SPIPISE is an application built to serve investors in filing the licensing process for the implementation of investment activities in the territory of the Republic of Indonesia. At this time the process of licensing services held face-to-face (offline) BKPM office. Investors in this process should visit the office during office hours service which has been determined to complete the required process.

Source: <https://online-spiipse.bkpm.go.id/>.

For major investment projects, BKPM offers a fast-track service to help foreign investors get the approvals they need to set up operations in Indonesia.

## Fast Track Service for Major Projects



**BKPM**  
BADAN KOORDINASI PENANAMAN MODAL

Invest in remarkable Indonesia

Language : English

Home Invest In Indonesia Investment Procedures Investment Opportunity

**Investment Site** **Institution Site**

**3 HOURS**

**INVESTMENT LICENSING SERVICE PROCEDURE**

8 Investment Products + 1 Letter of Land Availability Information

BKPM issues 8 investment products, namely Investment License, Tax Registration Number, Establishment Deed and Decree of Legalization of the company from the Ministry of Law and Human Rights, Company Registration Certificate (TDP), Foreign Manpower Utilization Permit (IMTA), Foreign Manpower Utilization Plan (RPTKA), Importer-Producer Identity Number (API-P), Customs Identity Number (NIK) and Letter of Land Availability Information. Requirement for utilizing this service are:

**01. 100 BILLION**  
Investment value worth 100 Billion Rupiahs or above, and/or

**02. 1000 LABOURS**  
Employing at least 1,000 local workers;

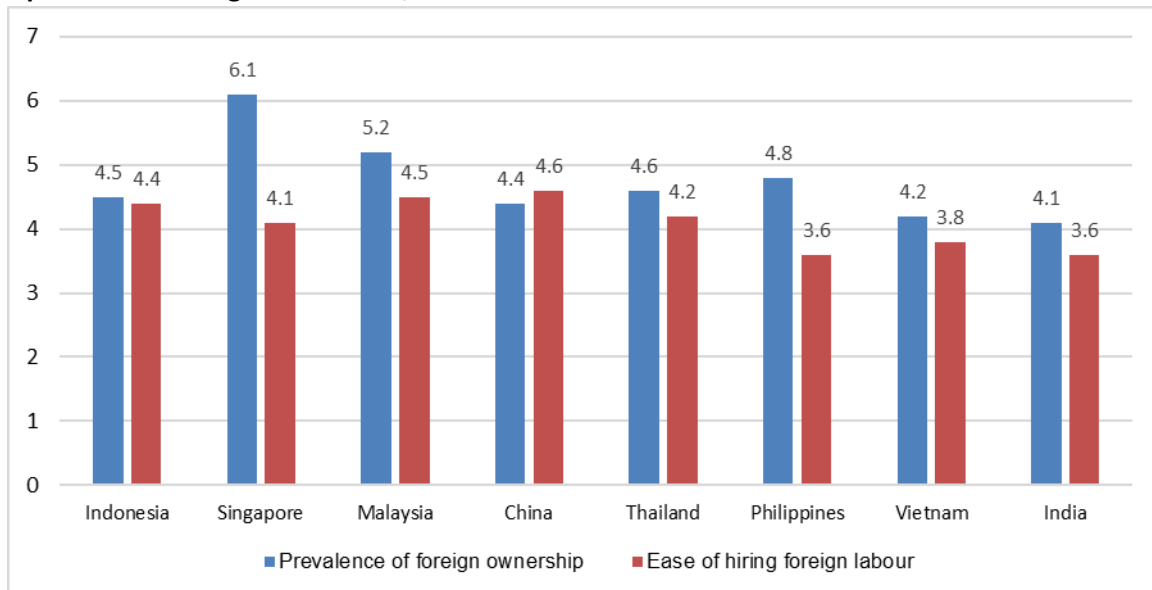
**03. SHAREHOLDERS**  
Application must be submitted in person by at least one of the shareholders

## Indonesia's Ease of Doing Business

The chart below shows that the prevalence of foreign ownership in Indonesia is higher than in China, Vietnam, and India and around the same level as Thailand. Indonesia is also one of highest-ranked

countries when it comes to ease of hiring foreign labour, performing better than Singapore, Thailand, Vietnam, and India.

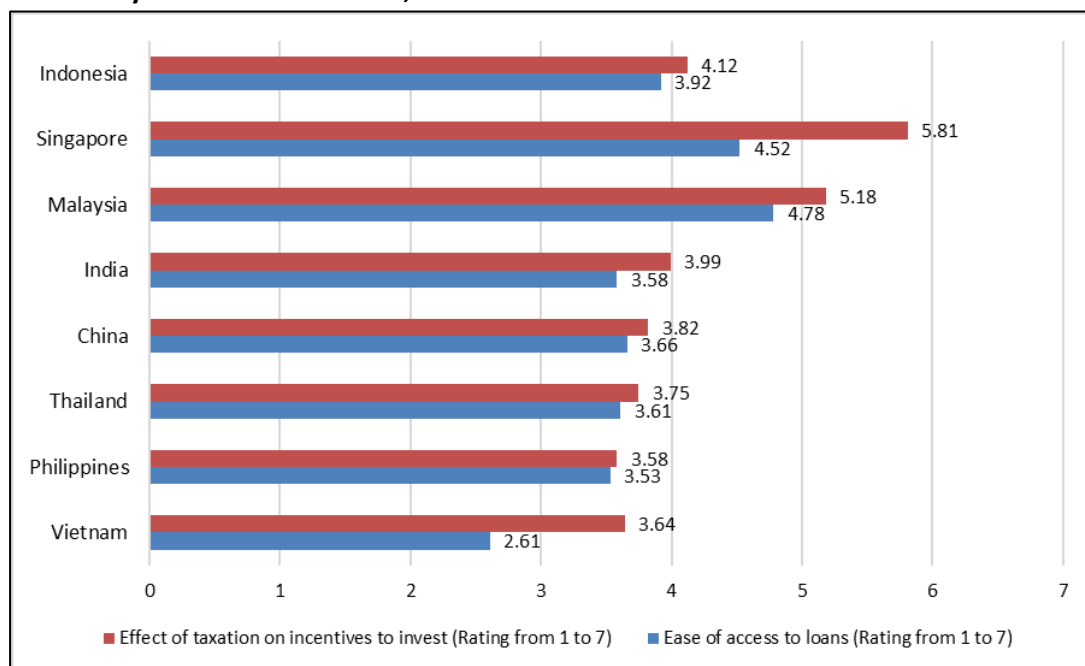
#### Openness to Foreign Investment, 2015



Source: World Economic Forum, The Global Enabling Trade Report; Travel and Tourism Competitiveness Report 2014 & Global Competitiveness Report, World Economic Forum, Switzerland, 2015-16.

In terms of availability of finance, Indonesia performs relatively well compared to most ASEAN countries, China, and India. Indonesia scores 4.12 out of 7 for the effect of taxation on incentives to invest and 3.92 out of 7 for ease of access to loans, higher than China and India and ASEAN countries except Singapore and Malaysia.

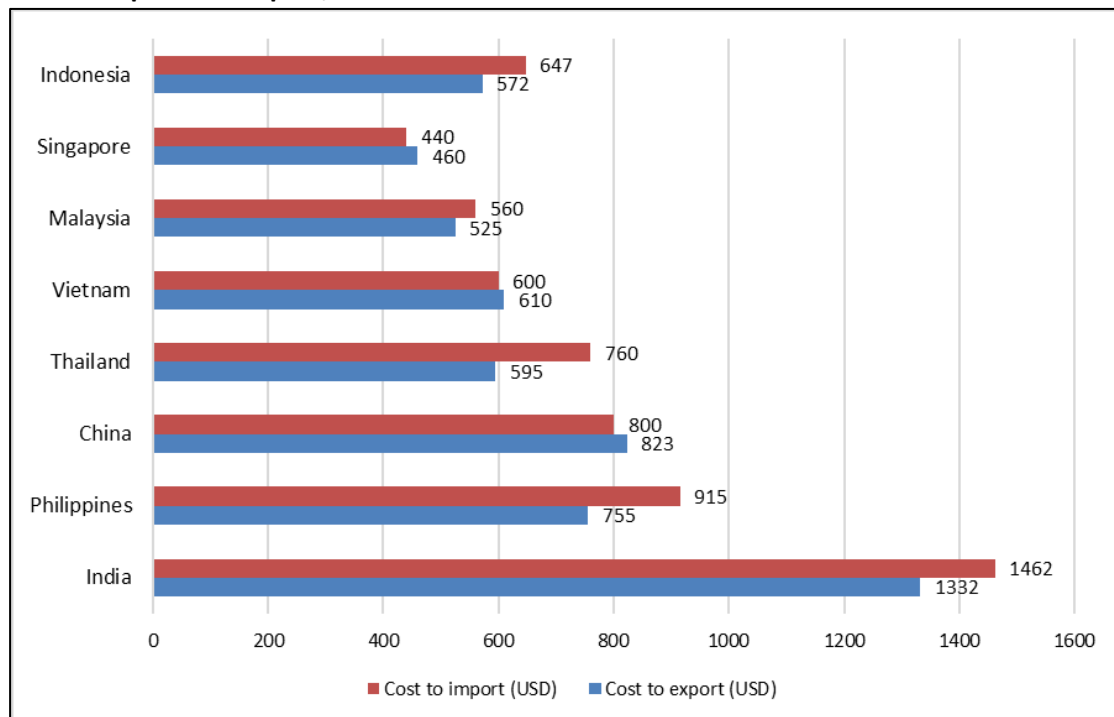
#### Availability of Finance Indicators, 2015



Source: Global Competitiveness Report, World Economic Forum, Switzerland, 2015-16.

Indonesia performs relatively well in terms of the cost to import and export, with costs much lower than India, Philippines, China and Thailand.

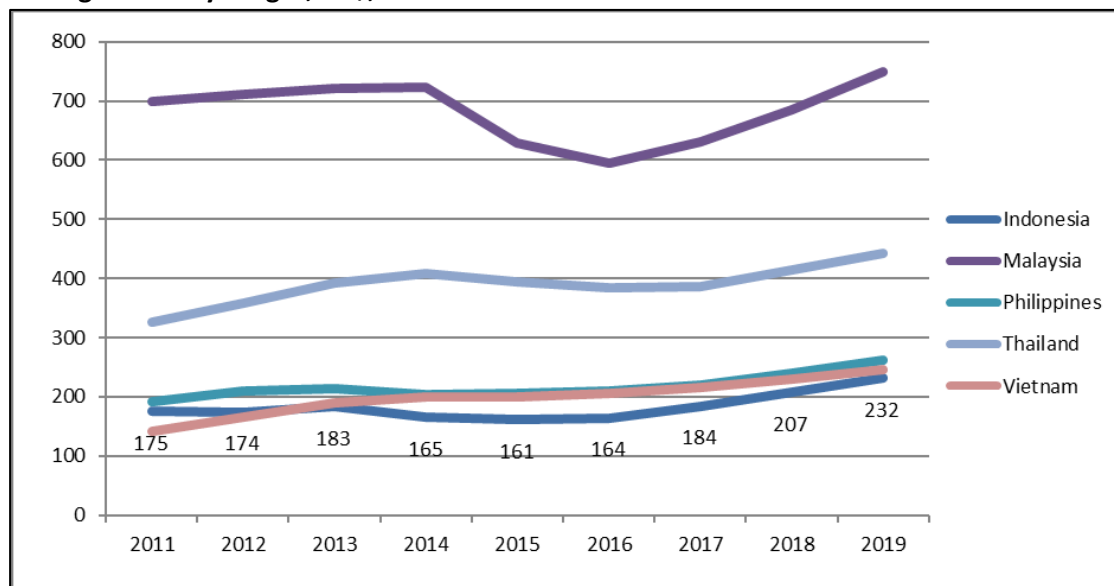
### Cost to Import and Export, 2015



Source: fDi Benchmark 2016 (The World Bank: Doing Business 2015).

Indonesia is very cost effective—the average monthly wage is US\$161 and is forecast to remain the lowest in ASEAN.

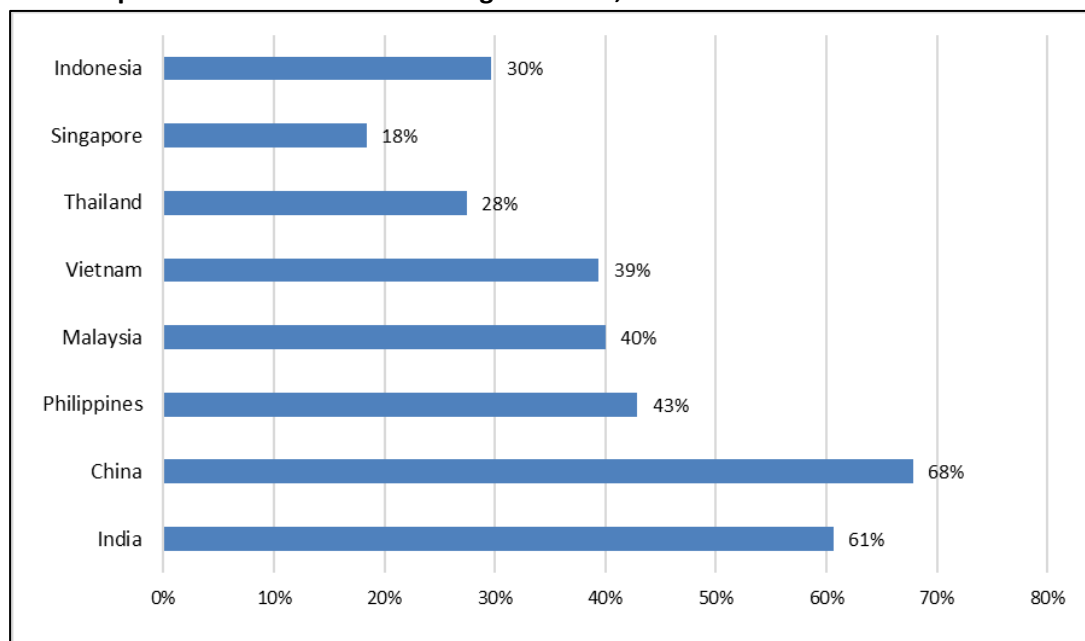
### Average Monthly Wages, US\$, 2011–2020



Source: EIU.

Indonesia's total tax rate as a percentage of profit is competitive with only Singapore's significantly lower.

## Total Corporate Tax Rate as a Percentage of Profit, 2016<sup>8</sup>



Source: World Bank Doing Business 2016, & Deloitte 2016.

## KEY CONTACTS

BKPM provides a one-stop service contact centre for foreign investors.

### One Stop Service Contact Centre

**Invest In Indonesia**

Contact Us • One Stop Service

**One Stop Service Contact Center**

For further consultation and application process below, please visit One Stop Service Contact Center at 0807 100 BKPM (2576). Operational hours from 07.30 am - 04.00 pm.

- 01 One Stop Service Center
- 02 Services on investment license and facilities
- 03 Services on access rights and and investment online system
- 04 Sectoral licenses
- 05 Complaint submission

Source: <http://www4.bkpm.go.id/en/contact-us-investment/one-stop-service-contact-center-investment#>.

<sup>8</sup> Total tax rate as a % of profit provides a comprehensive measure of the cost of all the taxes a business bears. It measures the amount of taxes and mandatory contributions payable by businesses after accounting for allowable deductions and exemptions as a share of commercial profits. Taxes withheld (such as personal income tax) or collected and remitted to tax authorities (such as value added taxes, sales taxes or goods and service taxes) are excluded.

## APPENDIX A: FEED-IN TARIFFS

BKPM should be contacted to get the latest information on feed-in tariffs in case the below tariffs have changed.

### Solar PV Power Plant

No	Region	Quota Capacity (MW)	Feed-in Tariff (cent USD/kWh)	<p><b>Note:</b></p> <p>➤ Feed-in Tariff (FIT) is levelized base price on generation bus bar applied after Commercial Operation Date (COD); including interconnection cost; with contract duration of 20 years.</p> <p>➤ Quota capacity in total of 250 MW as stated in the table on the left, is the first phase from the total quota of above 5,000 MW to be offered by the Government. FIT could be differed on each phases.</p> <p>➤ The procurement will be held online by DG NREC-MEMR (registration, initial verification, quota request, final verification on first come first served verification basis).</p> <p>➤ The State Electricity Company (PT PLN)—under Power Purchase Agreement (PPA)—is obliged to purchase electricity generated by Independent Power Producer (IPP) decided as “PLTSa Developer” by DG NREC-MEMR.</p> <p>➤ IPP should refers to National Electricity Master Plan (RUPTL) 2016-2025.</p>
1	DKI Jakarta	150,0	14,5	
2	West Java			
3	Banten			
4	Central Java and DIY			
5	East Java			
6	Bali	5,0	16,0	
7	Lampung	5,0	15,0	
8	South Sumatera, Jambi, and Bengkulu	10,0	15,0	
9	Aceh	5,0	17,0	
10	North Sumatera	25,0	16,0	
11	West Sumatera	5,0	15,5	
12	Riau and Riau Islands	4,0	17,0	
13	Bangka Belitung	5,0	17,0	
14	West Kalimantan	5,0	17,0	
15	South and Central Kalimantan	4,0	16,0	
16	East and North Kalimantan	3,0	16,5	
17	North and Central Sulawesi, Gorontalo	5,0	17,0	
18	South, Southeast and West Sulawesi	5,0	16,0	
19	West Nusa Tenggara	5,0	18,0	
20	East Nusa Tenggara	3,5	23,0	
21	Maluku and North Maluku	3,0	23,0	
22	Papua and West Papua	2,5	25,0	

Source: MEMR Regulation No. 19 of 2016.

The Indonesia Investment Coordinating Board (BKPM)

Source: MEMR Regulation No. 19 of 2016.

### Hydro Power Plant (mini/micro)

No	Region	Feed-in Tariff (cent USD/kWh)							
		River Flow				Using dam and/or irrigation channel			
		MV (up to 10 MW)		LV (up to 250 kW)		MV (up to 10 MW)		LV (up to 250 kW)	
		Y1-Y8	Y9-Y20	Y1-Y8	Y9-Y20	Y1-Y8	Y9-Y20	Y1-Y8	Y9-Y20
1	Java, Bali & Madura	12	7.5	14.4	9	10.8	6.75	13	8,1
2	Sumatra	13.2	8.25	15.84	9.9	11.88	7.425	14.3	8.91
3	Kalimantan & Sulawesi	14.4	9	17.28	10.8	12.96	8.1	15.6	9.72
4	West & East Nusa Tenggara	15	9.375	18	11.25	13.5	8.4375	16.25	10.125
5	Moluccas & North Moluccas	15.6	9.75	18.72	11.7	14.04	8.775	16.9	10.53
6	Papua & West Papua	19.2	12	23.04	14.4	17.28	10.8	20.8	12.96

**Note:**  
 ➤ FIT is levelized base price on generation bus bar applied after Commercial Operation Date (COD); including interconnection cost; with contract duration of 20 years; and based on:  
 ➤ grid connectivity: to MV (Medium Voltage, 20 kV) or LV (Low Voltage, 220 V), and  
 ➤ operating years: Y1-Y8 (year 1<sup>st</sup> until year 8<sup>th</sup>) and Y9-Y20 (year 9<sup>th</sup> until year 20<sup>th</sup>).  
 ➤ The State Electricity Company (PT PLN)—under Power Purchase Agreement (PPA)—is obliged to purchase electricity generated by Independent Power Producer (IPP) decided as “PLTMH Developer” by DG NREC-MEMR.  
 ➤ IPP should refers to National Electricity Master Plan (RUPTL) 2016-2025.

## Bio Energy Power Plant

No	Region	Feed-in Tariff (cent USD/kWh)							
		Biomass (PLTBm)				Biogas (PLTBg)			
	Capacity	≤ 20 MW		>20 up to 50 MW	> 50 MW	≤ 20 MW		>20 up to 50 MW	> 50 MW
	Grid Connection	LV	MV/HV	HV	HV	LV	MV/HV	HV	HV
1	Java Island	16.00	13.50	11.48	10.80	13.14	10.64	9.05	8.51
2	Sumatra Island	18.40	15.53	13.20	12.42	15.11	12.24	10.41	9.79
3	Sulawesi Island	20.00	16.88	14.35	13.50	16.43	13.30	11.31	10.64
4	Kalimantan Island	20.80	17.55	14.92	14.04	17.08	13.83	11.77	11.06
5	Bali, Bangka Belitung and Lombok Islands	24.00	20.25	17.22	16.20	19.71	15.96	13.58	12.77
6	Riau, Nusa Tenggara Other Islands	25.60	21.60	18.37	17.28	21.02	17.02	14.48	13.62
7	Maluku and Papua Islands	27.20	22.95	19.52	18.36	22.34	18.09	15.39	14.47
**	As Excess Power	16.00	13.50	11.48	10.80	13.14	10.64	9.05	8.51

**Note:**

- FIT is levelized base price on generation bus bar applied after Commercial Operation Date (COD); including interconnection cost; with contract duration of 20 years (except as excess power max 1 year extendable); and based on:
  - capacity: up to 20 MW, above 20 MW up to 50 MW or above 50 MW
  - grid connectivity: to LV (Low Voltage, 220 V), MV (Medium Voltage, 20 kV) or HV (High Voltage, ≥ 70 kV)
- The State Electricity Company (PT PLN)—under Power Purchase Agreement (PPA)—is obliged to purchase electricity generated by Independent Power Producer (IPP) decided as "PLTBm/PLTBg Developer" by DG NREC-MEMR.
- IPP should refer to National Electricity Master Plan (RUPTL) 2016-2025.

## Municipal Waste Power Plant

Feed-in Tariff (cent USD/kWh)											
Methane Gas Utilization using Sanitary Landfill, Anaerob Digestion or Similar Technologies			Thermal Utilization using Thermochemical Technologies								
Up to 20 MW			Up to 20 MW			Above 20 MW up to 50 MW			Above 50 MW		
HV	MV	LV	HV	MV	LV	HV	MV	LV	HV	MV	LV
16.55		20.16	18.77		22.43	15.95	-	-	13.14	-	-

**Note:**

- Feed-in Tariff (FIT) is levelized base price on generation bus bar applied after Commercial Operation Date (COD); including interconnection cost; with contract duration of 20 years; based on grid connectivity: HV (High Voltage, above 20 kV), MV (Medium Voltage, 20 kV) or LV (Low Voltage, 220 V).
- The State Electricity Company (PT PLN)—under Power Purchase Agreement (PPA)—is obliged to purchase electricity generated by Independent Power Producer (IPP) decided as "PLTSA Developer" by DG NREC-MEMR from Open Tender mechanism held by Regional Government.
- IPP should refer to National Electricity Master Plan (RUPTL) 2016-2025.



## Geothermal Power Plant

Year of Commercial Operation Date (COD)	Feed-In Tariff (cent USD/kWh)		
	Region I	Region II	Remote areas which are situated in Region I & II
2015	11.80	17.00	25.40
2016	12.20	17.60	25.80
2017	12.60	18.20	26.20
2018	13.00	18.80	26.60
2019	13.40	19.40	27.00
2020	13.80	20.00	27.40
2021	14.20	20.60	27.80
2022	14.60	21.30	28.30
2023	15.00	21.90	28.70
2024	15.50	22.60	29.20
2025	15.90	23.30	29.60

**Note:**

- Region I: PLTP located in Sumatra, Java and Bali.
- Region II: PLTP located in Sulawesi, Nusa Tenggara, Halmahera, Moluccas, Papua and Kalimantan.
- CP is levelized base price on generation bus bar applied after Commercial Operation Date (COD); not including price escalation and interconnection costs; with contract duration of 30 years.
- The State Electricity Company (PT PLN)—under Power Purchase Agreement (PPA)—is obliged to purchase electricity generated by Independent Power Producer (IPP) winning IUP (Geothermal Mining License) through WKP (Geothermal Working Area) Open Tender mechanism held by MEMR, Governor or Mayor/Regent.
- IPP should refer to National Electricity Master Plan (RUPTL) 2016-2025.

## PLN Electricity Prices

No	PLN's Local Unit (Area/Distribution)	Basic Cost of Electricity Production (as of June 2011)	
		IDR/kWh	USD cent/kWh
1	Maluku and North Maluku	3,126	22.33
2	East Nusa Tenggara (NTT)	2,988	21.34
3	West Kalimantan (Kalbar)	2,701	19.29
4	Aceh	2,683	19.16
5	Papua and West Papua	2,680	19.14
6	Bangka Belitung (Babel)	2,671	19.08
7	West Nusa Tenggara (NTB)	2,481	17.72
8	North Sumatra	2,341	16.72
9	North & Central Sulawesi and Gorontalo (Sultenggo)	2,185	15.61
10	East Kalimantan (Kaltim)	1,882	13.44
11	Riau and Riau Islands	1,711	12.22
12	South and Central Kalimantan (Kalselteng)	1,613	11.52
13	South, South East and West Sulawesi (Sulselrabar)	1,437	10.26
14	West Sumatra	1,353	9.66
15	Lampung Distribution	1,351	9.65
16	South Sumatra, Jambi & Bengkulu (S2JB)	1,340	9.57
17	East Java Distribution (Disjatim)	1,137	8.12
18	Bali Distribution (Disbali)	1,218	8.70
19	Central Java and Yogyakarta Distribution (Disjateng)	1,153	8.24
20	Jakarta and Tangerang Distribution (Disjaya)	1,113	7.95
21	West Java and Banten Distribution (Disjabar)	1,099	7.85
	INDONESIA (AVERAGE)	1,272	9.09