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DLA Piper

# RENEWABLE ENERGY IN **THE ASIA-PACIFIC**





# CONTENTS

Introduction .....	04
Australia .....	08
People's Republic of China.....	17
Hong Kong SAR .....	25
India.....	31
Indonesia .....	39
Japan.....	47
Malaysia .....	53
The Maldives .....	59
Mongolia.....	65
Myanmar .....	72
New Zealand.....	77
Pakistan .....	84
Papua New Guinea.....	90
The Philippines.....	96
Republic of Korea .....	103
Singapore .....	108
Sri Lanka.....	115
Timor-Leste .....	120
Thailand .....	126
Vanuatu.....	132
Vietnam .....	139
Feed-in Tariff Table.....	145
Business Environment Explanatory Note .....	148
Acknowledgments .....	149
DLA Piper.....	150

# INTRODUCTION

The modern renewable energy sector presents a range of opportunities and possibilities in the Asia-Pacific region. Entrepreneurs are seeking to disrupt the traditional, vertically-integrated supply chain of a bygone era. Inventors are looking for new and more efficient materials and storage capabilities. Developers are investing in mega-projects to service growing middle classes. And environmentalists are promoting non-hydropowered, clean sources of energy for carbon and pollution reduction. Governments are attempting to keep track of the sustained level of investment into this dynamic sector, whilst also maintaining security, stability and diversity in energy supply for their populations both on and off the grid.

DLA Piper is proud to release the 4<sup>th</sup> edition of *Renewable Energy in the Asia-Pacific*. This publication is an ambitious task, seeking to capture the key renewable energy market highlights across the vast Asia-Pacific region, and provide a reference tool for the entrepreneurs, investors, inventors, economists, developers, financiers and regulators of 21<sup>st</sup> century renewable energy issues.

For this Edition 4, we provide a high-level analysis in a standardised template of 21 Asia-Pacific jurisdictions, including:

- the two burgeoning economies of our time, which increasingly shape not only energy politics, but global politics: the **People's Republic of China** and **India**;
- the developed markets of the south (**Australia** and **New Zealand**) and the north (**Japan** and the **Republic of Korea**);
- the advanced 'city states' of **Hong Kong SAR** and **Singapore**;
- the vast, developing economies in mainland Asia: **Pakistan**, **Mongolia** and **Myanmar**;
- the growing coastal economies of South and Southeast Asia: **Indonesia**, **Malaysia**, the **Maldives**, **Sri Lanka**, the **Philippines**, **Timor-Leste**, **Thailand** and **Vietnam**; and
- two key case studies from the South Pacific: **Papua New Guinea** and **Vanuatu**.

We have also taken a sub-regional focus, particularly in large countries, where generalisations based on national boundaries can be crude when failing to take into account local policies and regulatory conditions.

Within this Introduction is a brief analysis on climate change adaptation issues, particularly in light of the historic 2015 Paris Agreement. At the back of this publication is a feed-in tariff comparison table, offering a glimpse into government investment levels as a key driver of renewables investment (we have also provided some European rates and commentary for benchmarking purposes).

## Our last edition

In DLA Piper's most recent edition of this publication (Updated Edition 3, published October 2014) we noted China's leadership of the Asia-Pacific renewables markets. We also looked at the emergence of a 'two-track' renewables economy between governments committed to fund feed-in tariffs and investment incentives, and others more reticent to altering the traditional energy mix and overcoming short term barriers to investment.

This gap remains, and China is still the clear front runner for renewables investment generally. However, another emerging pattern in the region is what might be termed an 'adjustment period'.

Moving from fossil fuels to renewable energy is a generational change that will not be easily completed. Renewables have high start-up costs and require governments to prop-up the industry in the short term, with the knowledge that cheap (or almost free) fuel from the wind, sun and rivers, will reduce electricity prices in the longer term. While renewables investments continue on a large scale across the region, there is a realisation that any gains in the overall percentage contribution of renewable energy to national electricity generation will be hard-won, particularly as electricity demand continues to rise in populous jurisdictions.

Some countries have reduced the scope, period or rates for subsidies (like feed-in tariffs), either because all capacity has been filled or the government is no longer willing to interfere in the renewables market, citing cost concerns (auctions have become more common as a way of the market determining prices, rather than government-imposed rates). While renewables investment remains healthy across the region, so does investment in fossil fuels with large coal mines and plants continuing to be built, largely out of concern for security of electricity supply and the-always-sensitive issue of short term electricity prices.

### Some highlights across Asia-Pacific

**India** is fast emerging as a renewables powerhouse, particularly in terms of solar photovoltaic. Under the Ministry of New and Renewable Energy, India has seen a real growth in large-scale solar farms. In 2007, the country was producing 10GW in renewable energy, today it is more than 42GW. While the country might fall short of its (very) ambitious 2022 solar target of 100GW, investments in non-hydropower sources of energy have seen consistent growth.

**China** remains a clear powerhouse of the renewables world, however there has been an unmistakable glut in the market resulting from excess wind turbines and solar panels. Renewables plants have become 'stranded' and lay 'idle' due to insufficient transmission infrastructure, leading to a period of consolidation for the sector. China is also expected to launch its National Carbon Scheme in the second half of 2017, which will be a key pilot for carbon pricing schemes around the world.

**Thailand** and the **Philippines** are perhaps the leading markets in Southeast Asia. About US\$2 billion was invested in the Thai solar market in 2015 alone with investors clearly unperturbed by the change in government in Bangkok. The Philippines, which experienced a boom in renewable energy projects under the previous Aquino administration

is perhaps the best regulated market in the region and has had healthy investment levels towards its 35% renewables contribution by 2030. Despite this, large coal mines continue to be built with dozens more in the pipeline. Like the Philippines, **Sri Lanka** too has historically high levels of hydropower penetration in the electricity sector. It is seeking to rely on hydropower to reach its ambitious 2020 target of 60% renewables contribution.

**Japan** was thrust into the global energy spotlight for several years following a severe earthquake in 2011 and subsequent explosions at nuclear reactors in Fukushima. Nuclear power plants remain largely offline and attempts to re-open some have been met by community-led lawsuits. Continued liberalisation of the electricity sector has been combined with steady growth in wind and solar as the country seeks 22 to 24% renewables contribution by 2030 (the nuclear target is 20 to 22%). **Vietnam** too, is seeking to liberalise its electricity supply chain. It remains in the formative stages of developing its renewables industry, however the country does have some large-scale hydropower facilities and recently announced its long-awaited solar feed-in tariff.

As part of **Malaysia's** 2016 – 2020 plan, the Government has emphasised the need for diversification. Large-scale solar has seen some success in 2016, however solar feed-in tariffs are largely closed after a strong period of investment.

Foreign investor concerns remain in **Myanmar**, which is still designing a regulatory framework for its energy sector and may yet be lured by the abundant known fossil fuel and mineral reserves in its north. **Pakistan** too suffers from foreign investor concerns, however in partnership with Beijing, it is seeking to add 10,400MW of electricity supply, including from large hydropower dams, to address its current "energy crisis". **Mongolia** has seen a shift back towards fossil fuels, although the Government is coordinating research into utilising the Gobi Desert as a renewable energy generating hub. Myanmar, Pakistan and Mongolia are each well-positioned to benefit from Beijing's 'one-belt one-road' initiative over the coming decade.





**Indonesia's** renewable energy market has not seen any notable developments at a national level in recent times, while the small 'city states' of **Hong Kong SAR** and **Singapore** have no pretences about their plans to continue to rely on importing natural gas to meet domestic energy needs, focusing instead on energy efficient building measures.

The low-lying **Maldives** has seemingly retracted its carbon neutral pledge, but still sees a role for large-scale solar photovoltaic in its archipelago.

**Papua New Guinea, Vanuatu** and **Timor-Leste** provide interesting case studies for how small nations are seeking to replace imported diesel with more sustainable options such as solar (in Timor-Leste), hydropower (in Papua New Guinea) and geothermal (in Vanuatu). Smaller-scale systems have been touted as the answer to low electrification rates, particularly as archipelagic or mountainous geography challenges transmission infrastructure and a lack of regulatory frameworks hinders nationwide coordination.

The **Republic of Korea's** renewables investments have been concentrated on two large offshore projects: a large offshore wind farm and tidal station, both near Jeju Island.

Bipartisan agreement on **Australia's** renewable energy target (33,000GWh by 2020) was a result of almost a decade of protracted political debate. Despite the current conservative government's commitment to large-scale coal mines, wind farms (particularly in South Australia) and solar photovoltaic plants continue to come online. A looming energy 'crisis' as old baseload power plants are taken offline may lead to a renewed focus on hydropower (including expanding the historic Snowy Mountains Hydro-Electric Scheme) and large-scale solar.

Finally, **New Zealand** remains a regional leader in the renewables space. It has avoided the politicisation of its energy mix (unlike its larger neighbour, Australia). Hydropower is New Zealand's major source of power generation, and nearly 20% of the country's electricity supply comes from geothermal sources. Increasingly New Zealand is exporting its geothermal know-how to countries in Southeast Asia and the Pacific. New Zealand's 2025 renewables target of 90% is far beyond the 'usual' targets in the region, of around 20 to 30% by 2020/2030.

## Post-Paris climate

After 20 years of slow international progress towards addressing climate change, the Paris Agreement was signed on 12 December 2015, and entered into force on 4 November 2016. The Paris Agreement represents universal international consensus on the manner in which climate change will be addressed. It also represents an encouraging sign for the development of renewable energy in the Asia-Pacific region, although Asia-Pacific countries are still likely to retain a diverse energy profile in the coming decades.

Under the Paris Agreement, 196 countries have agreed to:

- hold increases in the global average temperature to well below 2°C above pre-industrial levels, and strive to limit the increase to 1.5°C; and
- reach peak emissions as soon as possible and then rapidly reduce emissions levels, with the aim of essentially achieving net-zero emissions (expressed as a “balance” of anthropogenic emissions and removals) in the second half of this century.

The Paris Agreement, with its unprecedented scope, represents a high point in global action to combat climate change. In contrast to the Kyoto Protocol, which imposed emissions targets on countries in a ‘top down’ approach, parties to the Paris Agreement set their own emission reductions targets (Nationally Determined Contributions, NDCs). This allows countries to take action appropriate to their domestic circumstances. From 2020, countries will be expected to increase their NDCs every five years in order to achieve these long-term goals. The Agreement also establishes a transparency framework through which states are held accountable for their progress.

Putting to one side the uncertainty over the United States’ future role within the Paris Agreement framework, successful implementation of the Agreement will face headwinds. The voluntary carbon reduction targets currently pledged in States’ NDCs are inadequate to achieve the ambitious goal to keep global temperatures ‘well below 2°C’. Further, enforcement of NDCs will be difficult in the event a State fails to meet its commitments. Many developing countries have made their NDCs ‘contingent on finance’, which will require substantial financial contributions from developed countries.

In the Asia-Pacific region, each country faces their own unique challenges. Vast and challenging geographies, social and political uncertainty and ongoing energy security concerns will all play a role. Financing the huge scale of necessary mitigation and adaptation measures will continue to be a challenge and successful implementation will depend on innovative approaches to financing renewable energy projects. Growth in the renewables sector is essential for meeting the ambitious global imperative for carbon mitigation in the Paris Agreement. While States’ NDC pledges vary in scope and content, many include carbon reduction targets with specific ambitions to increase the national share of renewable energy or proposed policy measures to that effect. There has been growing momentum since the Paris Agreement, with renewable investment hitting new records – by March 2016, investment in renewable energy had doubled that of coal and gas. A surge in global investments in renewables to around US\$500 billion annually from 2020 will be critical for meeting the goals of the Paris Agreement and securing a safe climate future.

DLA Piper was honoured to be involved in the Paris Agreement negotiations, assisting various countries on a pro bono basis.

## Conclusion

Climate change is certainly a long-term driver of renewable energy investment, however the more immediate concern in the region is diversity and security in supply, and unease over electricity prices. While renewables costs continue to fall drastically, sustained investment levels in coal and natural gas across the Asia-Pacific suggest that varied energy mixes will likely be the norm across the region for years to come.

As always, we welcome any feedback on this publication.



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# AUSTRALIA

## OVERVIEW

**Jurisdiction:** Common Law

**Language:** English

## BUSINESS ENVIRONMENT

2017 Doing Business Report 2017: 15 of 190 (down 2 rankings)

2016/17 Global Competitiveness Index: 22 of 138 (down 1 ranking)

2017 Index of Economic Freedom: 5 of 180 (no change)

2016 Corruption Perceptions Index: 13 of 176 (no change)

2015 UN Development Programme Human Development Index: 2 of 188 (no change)

Population: 23.1 million

GNI per capita: US\$60,070

## PROFILE

Australia was inhabited by Indigenous persons for thousands of years before the British established a colony in New South Wales in 1788. Australia's six States formed a federation in 1901. The governance model was (and remains) largely a fusion of US federalism and a UK system of governance. Since World War Two, Australia has been an ally of the United States but now finds its economic security in Asia. Countries like China, Japan and India have fuelled Australia's resources boom, which saw it largely avoid the global financial crisis. While concerns have been raised about growing national debt, Australia's economy is one of the most developed in the world. Australia is a multicultural society with one in four citizens born overseas.





## ELECTRICITY INDUSTRY OVERVIEW

- Australia is heavily reliant on fossil fuels for domestic consumption and for export.
- Australia is currently the world's largest coal exporter, accounting for approximately one-third of all coal exported globally. Australia has huge onshore and offshore gas reserves, primarily within the 'mining States' of Queensland and Western Australia. Energy exports earned the economy approximately AU\$67 billion (approx. US\$51.3 billion) in 2014/15. The size of Australia's energy exports rose to prominence in March 2017 when it emerged that Australia may face a domestic gas supply shortage in 2018 unless protective steps are taken to ensure domestic supply.
- The Australian Government has recently backed a AU\$100 billion (approx. US\$76.6 billion) investment target to expand the coal industry.
- Growing demand for fossil fuels from Asia has resulted in the opening up of new mines in the Galilee Basin and Bowen Basins in central Queensland (although these mines have been subject to lengthy State and Federal approvals processes and concerns about the impact on the Great Barrier Reef have been raised from environmental groups).
- An independent review into the reliability and stability of the National Electricity Market, known as the Finkel review, was released in March 2017. The Finkel review sought submissions regarding coordinated, national reform that is needed to maintain the security, affordability, reliability and sustainability of the electricity market. Depending on how many of the reforms are adopted, the review could have far-reaching effects on how the national electricity market operates.
- The Australian Energy Market Commission, which describes itself as the "rule maker and developer for Australian energy markets", notably for the National Electricity Market; and
- The Australian Energy Regulator, which operates under the *Competition and Consumer Act 2010* (Cth). The regulator's work relates mostly to energy markets in eastern and south eastern Australia on issues like price setting, market monitoring, publishing information on energy markets and assisting the Australian Competition and Consumer Commission with energy-related issues.

### Electricity laws

- The National Electricity and Gas Rules established the National Energy Market, which is managed by the Australian Energy Market Operator.
- Together, the National Electricity Rules and the National Electricity Code govern access to transmission and distribution networks and set out the market rules including market operations, power system security, network connection, access and pricing for services in the National Energy Market.
- These rules have the force of law and are made under the National Electricity Law.

### Generation, distribution and transmission

- On the east coast of Australia there is retail competition through the National Energy Market. The market is connected by six major transmission interconnectors, which link the electricity networks of New South Wales, Queensland, South Australia, Tasmania and Victoria. The network consists of nearly one million kilometres of underground and overhead transmission and distribution lines/cables.
- Because of their geographical isolation, the Northern Territory and Western Australia have their own electricity markets.
- There is a mix of State government ownership and private ownership of electricity infrastructure. Privatisation of electricity assets owned by State governments has become politicised, receiving strong opposition from opponents of privatisation including unions.

### Regulators

Subject to any changes that may be implemented following the Finkel review, there are three main energy market regulators in Australia:

- The Australian Energy Market Operator which "operates the energy markets and systems and also delivers planning advice in eastern and south-eastern Australia";



## Energy White Paper 2015

- In April 2015, the Energy White Paper was released by the Liberal-led Federal Government. The paper set out the short and long-term strategic policy framework to address the challenges in Australia's energy sector.
- The paper has been criticised for being too generic and lacking a clear strategy, with only broad statements about increasing competition and removing regulatory barriers and taxes. The paper was also criticised for containing only one reference to climate change.
- Recommendations from the paper included the privatisation of remaining state-owned electricity assets and the rejection of a proposal for a domestic gas reserve, despite rising gas prices. Selling electricity assets is a decision made by State governments.
- The report says electricity from fossil fuels, particularly coal, will continue to play a “vital role” in “providing low-cost energy around the world” and that investment support for low emissions technology, such as carbon capture and storage, will be important for Australia. In 2017, the Australian Government launched initiatives such as the National Low Emissions Coal Initiative and the Carbon Capture and Storage Research Development & Demonstration Fund to encourage industry to reduce emissions by adopting these technologies.

## RENEWABLES INDUSTRY OVERVIEW

- According to the Clean Energy Council, in 2015, 14.6% of Australia's electricity generation was from renewable energy. This represented an increase from 12.5% in 2014. One of the more interesting statistics from the report was the variance in ‘renewables penetration’ in each State. Tasmania had 99.9% penetration (largely from hydropower) and South Australia had 41.3% (largely from wind power), however the remaining more populous States like Western Australia, Victoria, New South Wales and Queensland ranged between 12.1% and 4.4% penetration.
- Renewable energy and attempts to address climate change have been the ‘poisoned chalice’ of Australian politics for almost a decade. This has resulted in a prolonged period of uncertainty for renewables investment in the country.
- Despite this, there were positive signs in 2016 with Australian renewables investment growing by 49%, up from two weak years of renewables investment. The total clean energy investment reached AU\$4.29 billion (approx. US\$3.3 billion) however this is still below the AU\$5 billion (approx. US\$3.8 billion) plus milestone reached between 2010 and 2013. The Clean Energy Council estimates AU\$1.2 billion (approx. US\$918.4 million) was funnelled into major projects, with most of these ventures receiving support from the Australian Renewable Energy Agency (**ARENA**) or other state-based renewable energy programs.
- The key Federal Government policy in respect of renewable energy is the Renewable Energy Target (**RET**). The RET mandates that about 20% of Australia's electricity generation in 2020 will be from renewable sources. The RET is divided into small-scale and large-scale generation certificates.
- Bipartisan support of the RET target of 33,000 gigawatt hours of renewable energy by 2020 has led to considerably more investment and activity in the renewables sector.
- The Emissions Reduction Fund was established by the previous conservative government under Prime Minister Tony Abbott and replaced the carbon pricing mechanism. The fund provides incentives for reduction activities across the Australian economy. The objective of the fund is to achieve Australia's 2020 emissions reduction target of 5% below 2000 levels by 2020. The Government has so far provided AU\$2.55 billion (approx. US\$1.95 billion) to establish the fund.
- Australia has a complex regulatory regime for renewable energy, with a range of Federal and State Government laws and policy mechanisms that apply. The Council of Australian Governments Energy Council, the decision-making body of federal and state energy and resources ministers, formally recognised the critical connection between energy and climate policy in July 2015.



- The Australian Bureau of Statistics estimates the renewables industry employs 14,020 people in Australia, compared with about 55,000 direct jobs in the coal industry.

### Hydropower

- Hydropower currently accounts for 40.1% of the renewable electricity produced in Australia. The majority of this energy is generated by Tasmania's hydropower plants and the Snowy Mountains Hydro-Electric Scheme in New South Wales.
- Australia's hydropower generation capacity is currently 7,800MW. This has decreased slightly due to low rainfall.
- Hydropower production is expected to reach 18TWh by 2019-2020.

### Wind energy

- Wind generation increased by just over 20% in 2015. Current generation capacity is over 2.58GW. South Australia accounts for about half of this installed capacity.
- Five new wind farms were completed in 2015 and more than 8,000MW of wind power projects are either under construction or have planning approval.
- The land use planning regime applying to wind energy varies greatly between States. In recent years some State Governments have introduced new planning regulations which restrict where new wind farms may be built. A range of reasons have been cited for these amendments including concerns in some sectors of the community about the mental and physical effects of low frequency noise produced by wind turbines ('wind turbine syndrome'). For example, planning regulations in the State of Victoria give residents who live within 2km of a proposed wind turbine the power of veto over that project. These regulatory amendments have created an additional barrier to wind farm approvals in many areas.

### Solar energy

- Solar energy generation has increased dramatically in Australia over the last decade.

- Solar energy generation increased by just over 20% in 2015 and eight solar farms were completed. At the end of 2015, Australia had 19 operation solar projects larger than 1MW in size.
- Another large project, the 56MW Moree Solar Farm by Spanish renewables giant FRV, was launched in early 2016.
- ARENA announced a AU\$100 million (approx. US\$75.4 million) funding program for large-scale solar projects which successfully facilitated project financing for a number of projects. Large-scale solar photovoltaic electricity generation is now considered commercially viable.
- More than 2,500MW of solar power projects are either under construction or have planning approval.
- Residential-based solar photovoltaic panels have been a success story in Australia. A number of State-based initiatives (led by the Australian Capital Territory) have resulted in significant uptake of solar panels on residential dwellings. It is estimated that over one million households now have solar photovoltaic panels installed Australia-wide, capable of generating approximately 5GW of electricity.
- Solar thermal energy in Australia is still in the early stages of development. In 2012, the Australian Solar Thermal Research Initiative was founded. It is an eight-year, AU\$87.3 million (approx. US\$65.9 million) research initiative designed to support the emerging concentrated solar thermal industry in Australia.

### Geothermal energy

- Geothermal energy is an emerging industry in Australia. Australia's current geothermal production is very limited. There is only one operational facility in Australia – an 80kW plant in Birdsville, Queensland.
- Several large projects are currently in various stages of development and approval.

### Biomass/biogas energy

- Australia produces about 20 million tonnes of organic waste per year from domestic and industrial sources.
- Biogas contributed 2.0% of the total renewable energy generation in 2013. Some proponents suggest that in the future biogas could be more important than solar energy and as important as wind energy.



## Ocean energy

- There has been limited progress in assessing Australia's ocean thermal energy resources. However, with an enormous and varied coastline, and a population living predominantly in coastal areas, Australia has huge potential for ocean and tidal energy.

## Government bodies and their functions

- The Department of Environment and Energy is now the chief government department regulating renewable energy and climate change matters. It works alongside a host of other bodies at state government and federal government level, such as the Clean Energy Regulator.
- The Clean Energy Regulator, which has continued under the current Malcolm Turnbull-led conservative Government, is as an independent statutory authority under the *Clean Energy Regulator Act 2011* (Cth). The regulator's functions include managing the:
  - National Greenhouse and Energy Reporting Scheme, under the *National Greenhouse and Energy Reporting Act 2007* (Cth);
  - Emissions Reduction Fund, under the *Carbon Credits (Carbon Farming Initiative) Act 2011* (Cth);
  - Renewable Energy Target, under the *Renewable Energy (Electricity) Act 2000* (Cth); and
  - Australian National Registry of Emissions Units, under the *Australian National Registry of Emissions Units Act 2011* (Cth).
- ARENA is another key government agency. ARENA is an independent authority that aims to, among other things, improve the competitiveness of renewable energy technologies and increase the supply of renewable energy in Australia. It has supported numerous solar and wind projects.
- The Clean Energy Finance Corporation is an Australian Government-owned 'green bank' established to provide a new source of finance for renewable energy technologies, and to facilitate increased flows of finance into the renewable energy sector.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- In March 2017, in response to (perhaps exaggerated) fears of an "energy crisis" in Australia, Prime Minister Malcolm Turnbull announced a AU\$2 billion (approx. US\$1.5 billion) expansion of the historic Snowy Mountains Hydro-Electric Scheme. The announcement came after a particularly intense period of energy policy debate between major political parties and between State governments and the Federal Government.
- Australia's fifth most populous State, South Australia, has become an important proving ground for Australia's renewable energy industry. It has some of the highest levels of wind and solar generation relative to electricity demand of any region in the world. Specifically, in 2014/15, wind accounted for 37%, and solar photovoltaic installations generated 7% of South Australia's requirements. In September 2016, South Australia experienced a State-wide blackout following fierce storms. Many blamed the blackout on an over-reliance on wind electricity, however the findings of the Australian Energy Market Operator revealed that there were a number of factors, of which the renewables-heavy power mix was just one. In March 2017, South Australia's Premier announced a AU\$500 million (approx. US\$382.7 million) investment in a new, state-owned 250MW gas-fired power station and the nation's largest battery farm (with a planned 100MW capacity) in response to the perceived instability in the State's electricity supply. The State's Premier then confronted the federal Energy Minister over energy issues at a press conference in March 2017.
- Continued public debate on the RET has meant that investors perceive only a short window to benefit from current policy stability. It is clear Governments are in a bind – Australia has historically been reliant on fossil fuels and mining is a major contributor to the economy. Electricity prices, which are high by regional comparisons in Australia, are a sensitive political issue. It is often argued that any increase in renewables investment, at the expense of coal and natural gas, will see an increase in electricity prices, and that any carbon emissions reductions will be negligible on a



global scale given Australia's small population. The debate will likely continue on, but for now the Federal Government line is to maintain the revised RET, and note a modest increase in electricity prices may be experienced.

## RENEWABLES LAWS

### *Renewable Energy (Electricity) Act 2000 (Cth)*

- This Act sets out Australia's target of having 20% renewable-sourced energy by 2020. The scheme established by the Act for achieving this target (the RET) aims to stimulate investment in renewables by requiring liable entities (usually electricity retailers) to purchase and surrender a certain number of Renewable Energy Certificates (**RECs**), in order to meet their obligation under the RET each year. RECs are created for each megawatt hour of renewable energy generated or displaced.
- Following a review of the RET, in 2011 the scheme was split into two parts – the Large-Scale Renewable Energy Target and the Small-Scale Renewable Energy Scheme. Under the new scheme RECs were replaced by large-scale generation certificates (**LGCs**) (generated by large-scale renewables projects) and small-scale technology certificates (**STCs**) (generated by small-scale renewables systems).
- LGCs are sold through the open LGC market, where prices fluctuate based on supply and demand and other market factors. Between April and December 2016, the spot price of LGCs fluctuated between AU\$80 and AU\$90 (approx. US\$60 and US\$68). STCs may either be sold through the open market for an uncapped price, or through the STC clearing house at the fixed price of AU\$40 (approx. US\$30).
- In June 2015, the Australian Parliament passed the *Renewable Energy (Electricity) Amendment Act 2015 (Cth)*. As part of the amendment Act, the 2020 Large-Scale Renewable Energy Target was reduced from 41,000GWh to 33,000GWh, with interim and post-2020 targets adjusted accordingly. The amendment Act also extended the partial exemption for emissions-intensive trade-exposed industries to a full exemption. The Small-Scale Energy Scheme has no target as such.

- In its 2015 Administrative Report Annual Statement (as required under the Act), the Clean Energy Regulator reported that in 2015:
  - 15.2 million MWh was generated from large-scale renewable sources;
  - 8.9 million MWh were generated or displaced from small-scale renewable systems; and
  - 12 different ecologically sustainable sources of renewable electricity were used.
- Overall, the Clean Energy Regulator found that Australia's progress was adequate under the circumstances and that the Large-Scale Renewable Energy Target in 2020 was achievable.

## GOVERNMENT INCENTIVE PROGRAMS

- LGCs and STCs, as discussed above, are the main Federal Government incentive for renewable energy investment in Australia.
- ARENA has approximately AU\$2 billion (approx. US\$1.5 billion) in government funding, which is legislated until 2022.
- In March 2016 the Australian Government established the AU\$1 billion (approx. US\$765 million) Clean Energy Innovation Fund. The fund, which will be managed by the Clean Energy Finance Corporation and ARENA, will make available AU\$100 million (approx. US\$76.5 million) per year for 10 years to provide debt and equity for renewables projects, energy efficiency and low emissions technologies. Projects financed by the fund will be subject to a target rate of return and risk level to be prescribed by the Government. The fund marks a shift in ARENA's role from a pure grant provider to a debt/equity funder.

## MAJOR PROJECTS/COMPANIES

- In June 2016, QIC announced a AU\$800 million (approx. US\$603.4 million) investment alongside AGL Energy Limited in the Powering Australia Renewables Fund (**PARF**). The PARF is an investment vehicle developed to entice investors to contribute to a pool of around AU\$2 to 3 billion (approx. US\$1.53 to 2.3 billion) to go towards investment in large-scale renewable projects. It is anticipated that the PARF will assist AGL to meet its legislated obligations under the



RET by bringing approximately 1,000MW of renewable energy capacity online. The PARF will provide power purchase agreements for five to 10 years. The fund is the first of its kind in Australia.

- In late-January 2017, Singapore-based firm Equis Energy, which is Asia's largest independent renewable energy developer and investor, announced their AU\$400 million (approx. US\$306 million) plan to build two 100MW 'battery ready' solar plants in Australia. The plants, which are set to be built in South Australia and Queensland, will be paired with fossil fuel power generation and transmission infrastructure. The South Australian plant will be paired with a new diesel powered plant near Tailem Bend, and the Queensland plant will be paired with the existing substation in Collinsville. In their announcement, Equis also stated that they had plans for another 1,000MW worth of large-scale solar projects, to be built over the coming years, for which they have already secured land rights.
- In April 2016, the Clean Energy Finance Corporation together with Palisade Investment Partners announced a strategy to accelerate the delivery of AU\$1 billion (approx. US\$765 million) in Australian renewable energy projects. The strategy, which involves funds managed by Palisade, is aimed at obtaining institutional investment in renewable energy at an earlier stage of project development. The Clean Energy Finance Corporation will work with Palisade to identify suitable renewable projects and build a portfolio. The Clean Energy Finance Corporation is contributing an initial \$100 million in equity while Palisade will contribute AU\$400 million (approx. US\$306 million) in equity through its managed funds and its clients (including VicSuper and Qantas Super).
- Hydro Tasmania, which is owned by the Tasmanian Government, is regarded as the largest renewable energy generator in Australia. The company has proposed to build a 200MW wind farm on King Island (located between Tasmania and the Australian mainland), which could provide up to 25% of the installed generation capacity intended to be achieved by the RET. Hydro Tasmania put the AU\$2 billion (approx. US\$1.53 billion) project to a vote of the island's residents in mid-2013. The project received a 58% approval rating.
- The Snowy Mountains Hydro-Electric Scheme, which was completed in 1974, is the largest engineering project ever undertaken in Australia and regarded as a 'nation-building project'. It provides up to 10% of all electricity in New South Wales. The scheme consists of 16 major dams, seven power stations, a pumping station and 225km of tunnels, pipelines and aqueducts. As discussed above, the Federal Government (which owns 13% of the project) has proposed expanding the scheme for the first time since 1974.
- There are currently a number of large-scale wind farms under development throughout Australia. In North Queensland, construction of the 180MW Mount Emerald wind farm has commenced; with a proposed 63 wind turbines, the project is valued at AU\$406 million (US\$311 million). Also planned for 2017 are Nexif Energy's 212MW wind farm at Lincoln Gap, and a 90MW wind farm at Glen Innes.
- OneWind Australia (a consortium of Denham Capital, Enersis Australia, National Power and Kato Capital), have recently amassed a 1GW portfolio of wind farm projects, including Glen Innes (100MW), Lincoln Gap (250MW) and Cattle Hill (240MW). The three projects have an estimated cost of AU\$800 million (approx. US\$612 million).
- EnergyAustralia plans to sign power purchase agreements, worth an estimated AU\$1.5 billion (approx. US\$1.15 billion), for 500MW of wind and solar energy from new renewable projects in eastern Australia. EnergyAustralia has also agreed to purchase the entire energy output from a 42.6MW solar farm located in Manildra, New South Wales, with construction of the plant due to begin in early 2017 and expected to be completed by 2018.
- AGL's Nyngan and Broken Hill solar plants officially opened in January 2016 and in November 2016, AGL announced on behalf of the PARF that it had reached financial close on selling its 102MW Nyngan and 53MW Broken Hill solar plants into the fund. The plants are Australia's largest utility-scale solar photovoltaic power plants, and will produce approximately 360,000MWh of renewable energy, capable of powering more than 50,000 average Australian homes. In a media release, AGL Managing Director & CEO Andy Vesey stated that "[t]he two plants add to AGL's credentials as Australia's largest



non-government owner, operator and developer of renewable energy generation with over 1,900MW of renewable capacity currently in operation”.

## FOREIGN INVESTMENT/OWNERSHIP

- Foreign direct investment in Australia amounted to AU\$735 billion (approx. US\$562 billion) at the end of 2015.
- The Federal Government reviews foreign investment proposals against the national interest case-by-case through the Foreign Investment Review Board (**FIRB**).
- The *Foreign Acquisitions and Takeovers Act 1975* (Cth) provides the legislative framework for the screening regime.
- All foreign governments and their related entities should notify the Australian Government and obtain prior approval before making a direct investment in Australia, regardless of the value of the investment.
- Australia’s thresholds for investment requiring FIRB approval depend on whether the investor is from a country which has a free trade agreement with

Australia, and also on whether the investor is a government or non-government entity. In general, although some exceptions apply, foreign persons should notify the Australian Government before acquiring an interest of 15% or more in an Australian business or corporation that is valued above AU\$252 million (approx. US\$192.8 million). It is also necessary for persons to notify the Government if they wish to acquire an interest in an offshore company whose Australian subsidiaries or gross assets are valued above AU\$252 million (approx. US\$192.8 million).

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Australia ratified the Paris Agreement on 9 November 2016 and committed to reducing emissions by 26 – 28% below 2005 levels by 2030; which builds on its 2020 target of reducing emissions by 5% below 2000 levels.



## RELEVANT WEBSITES

- Clean Energy Regulator – <http://www.cleanenergyregulator.gov.au/>
- Clean Energy Map – <https://www.cleanenergycouncil.org.au/technologies/renewable-energy-map.html>
- Australian Renewable Energy Agency – <http://www.arena.gov.au/>
- Department of the Environment and Energy – <https://www.environment.gov.au/>
- Energy White Paper 2015 – <http://ewp.industry.gov.au/sites/prod.ewp/files/EnergyWhitePaper.pdf>
- RET Scheme – <https://www.environment.gov.au/climate-change/renewable-energy-target-scheme>
- Clean Energy Australia Report 2015 – <https://www.cleanenergycouncil.org.au/policy-advocacy/reports/clean-energy-australia-report.html>

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# PEOPLE'S REPUBLIC OF CHINA

## OVERVIEW

**Jurisdiction:** Civil law

**Language:** Mandarin, Cantonese and regional languages

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 78 of 190 (up 2 rankings)

2016/17 Global Competitiveness Index: 28 of 138 (no change)

2017 Index of Economic Freedom: 111 of 180 (up 33 rankings)

2016 Corruption Perceptions Index: 79 of 176 (up 4 rankings)

2015 UN Development Programme Human Development Index: 90 of 188 (down 1 ranking)

Population: 1.4 billion

GNI per capita: US\$7,930

## PROFILE

Since 1949, the world's most populous country has been governed by the Communist Party of China. The People's Republic of China (**China**) has experienced rapid economic growth since Deng Xiaoping and Hu Yaobang's economic reforms and opening up that commenced in the late 1970s. China is now predicted to become the world's largest economy (in GDP terms) by 2020. China's economic liberalisation has seen an unprecedented rise in the average living standards of many Chinese citizens. However, a number of environmental, income disparity, geopolitical and energy security challenges have arisen. Under the leadership of President Xi Jinping, the Party's 13<sup>th</sup> Five Year Plan (2016 – 2020) laid out plans to drive innovation, increase competition and continue with Premier Li Keqiang's 'War on Pollution' by encouraging clean production and diversifying China's energy mix.



## ELECTRICITY INDUSTRY OVERVIEW

- China is the world's largest energy producer and now also the world's largest energy consumer. Given its size, China-related data is difficult to verify. Nonetheless, it was estimated that by the end of 2014, China's electricity capacity was 1,505GW (predominantly fossil fuel-based), while electricity generation was approximately 5,322TWh. The 13<sup>th</sup> Five Year Plan (released in 2016) forecasts that China's net electricity generation will grow at an annual rate of 2.5%, doubling from 4.8 trillion kWh in 2012 to 9.4 trillion kWh in 2040.
- China is the largest producer and consumer of coal in the world. Much of China's coal is consumed domestically, which contributes significantly to the country's air pollution problems. At the end of 2013, coal accounted for 63% of China's installed electricity capacity, followed by hydropower at 22%, wind at 6% and solar at 1%. The Chinese Government expects coal's share to decline to 53% by 2030, as renewable electricity generation is ramped up by an average of 3.8% a year.
- China's energy market also relies heavily on domestic and imported oil as well as natural gas.
- Over 99% of Chinese households have access to electricity.

## Regulators

- China's energy sector is overseen by a vast bureaucracy across a number of organisations at national, provincial and local levels of government. The National Energy Administration, which acts under the management and supervision of the National Development and Reform Commission, is the major regulator of the energy sector. It is responsible for nation-wide energy development.
- The National Energy Commission is an inter-ministerial coordination committee created under the auspices of the State Council (China's chief administrative authority), in charge of studying and devising the nation's energy development strategy, reviewing and examining key issues relating to energy safety and development, and planning and coordinating major matters relating to domestic energy

development and international energy cooperation. The National Energy Commission is usually headed by China's Premier, with a number of ministerial-level members.

- By contrast, the National Energy Administration is more akin to a day-to-day regulator in charge of regulation and administrative matters.

## Reforms

In the past 20 years, China's power sector has undergone significant reforms:

- In 2002, the Government divided the formerly monolithic (and vertically integrated) State Power Corporation into 11 new corporations (including two grid companies, five power generation companies and four companies engaged in auxiliary businesses such as consulting and construction services). This has resulted in some competition in the wind and solar energy generation sectors. However state-owned enterprises (**SOEs**) continue to dominate the sector.
- State Grid Corporation of China, the second largest company in the world by some measures and an SOE, has taken on a 'national champion' role. The company has already invested in a number of electricity markets across the globe, including in Brazil, the Philippines, Australia, Italy and Portugal.
- In March 2013, the State Electricity Regulatory Commission (one of the main regulatory bodies in the power sector) was absorbed by the National Energy Administration.

## Generation, distribution and transmission

- There are five state-owned power generation companies: China Guodian Corporation, China Huaneng Group, China Datang Corporation, Huadian Corporation and State Power Investment Corporation.
- Besides these five 'giants', there are other power companies of note, including CR Power Holding Company, Guohua Electric Power Company, SDIC Power Holdings Co., Ltd and China General Nuclear Power Group.



- More than 90% of the total installed generating capacities are state-owned. More than 80% of electricity is distributed by the State Grid Corporation of China and China Southern Power Grid. While SOEs remain the dominant players, the drive for SOE reform saw a number of 'mixed-ownership' pilot projects approved in 2016.
- Currently, China has six regional power grids. The 13<sup>th</sup> Five Year Plan has also flagged further development in the network of smart grids and ultra-high voltage power transmission.

### Electricity laws

- The *Electric Power Law 1995* (revised in 2015) is the main legislative instrument applying to the construction, production, supply and utilisation of electricity. As is customary in China's legislative drafting, the Law uses generic language, such as the need to:
  - incorporate electric power development into national and social development;
  - promote safe production of electricity;
  - promote the 'hook-up' between power-producing enterprises and electric networks (reserving priority in utilisation to the investor);
  - require contracts between suppliers and users of electricity;
  - require unified pricing of electricity; and
  - adopt preferential policies for rural electrification.
- The *Energy Conservation Law 1998* also has a broad ambit to promote energy efficiency and has led to over 164 "energy savings standards", some of which are mandatory across the country. The Law was amended in 2007 (and again in 2016), with the amendments:
  - setting energy savings as a fundamental nation-wide policy;
  - applying a system of responsibility to achieve the goals of energy saving (including strengthening government liabilities); and
  - adopting substantial incentive measures, such as allocating special funds for energy saving and introducing preferable tax policies.
- Other relevant regulations include:
  - Central Governmental Regulations, like the *Electricity Supply and Utilisation Regulation* (revised in 2016);
  - Market Supervision Regulations:
    - *Regulation on Electric Power Supervision 2005*;
    - *Measures for the Supervision of Electric Power Market 2005*;
    - *Basic Rules for Electric Power Market Operation 2005*;
    - *Interim Basic Rules for Medium and Long-Term Electricity Transactions* (issued in December 2016); and
    - *Circular of the National Development and Reform Commission, the Ministry of Finance and the National Energy Administration on the Trial Implementation of the Renewable Energy Green Power Certificate Issuance and Voluntary Subscription Transaction System* (issued in January 2017); and
  - Pricing Regulations:
    - *Interim Provisions for the Administration of Feed-in Tariff 2005*;
    - *Interim Provisions for the Administration of Power Transmission and Distribution Price 2005*;
    - *Interim Provisions for the Administration of Power Selling Price 2005*; and
    - *Interim Provisions for Inter-Regional Electric Power Transmission Price Review 2007*.

### RENEWABLES INDUSTRY OVERVIEW

- China remains a global leader in renewable energy in almost every respect from total capacity, to current and future expenditure, and renewable technology production.



- China has a goal of producing at least 15% of its overall energy output from renewable energy sources by 2020 and 20% by 2030. That push for renewable energy is underscored by air quality concerns, water and food contamination concerns as well as geopolitical concerns about energy supply routes through the narrow Malacca Strait (as well as the Lombok and Makassar Straits). As a result, it is estimated that between 2016 and 2020, China will spend US\$363 billion on renewable power generation. Indeed, in 2015, China was the world's largest investor in renewable energy, contributing 36% of the world's total production.
- Reportedly, at the end of 2016, China has revised its 2020 renewables target, scaling back its ambitions in response to over-capacity issues. The rapid increase in renewable electricity generation has left the Chinese grid struggling to take on the additional power supplies, while idled capacity has increased.
- China is also the largest greenhouse gas emitter in the world and now accounts for about one-fifth of global carbon emissions. China has voluntarily committed to reducing its carbon intensity per unit of GDP by 40 to 45% by 2020 compared to 2005 levels.

## Hydropower

- China has the largest total installed hydropower capacity of any country at 319GW. It added more capacity in 2015 than the rest of the world combined.
- The Central Government's aim is to have 420GW of installed hydropower by 2020.
- The Three Gorges Dam includes 32 separate 700MW generators. It is the largest electricity producing facility in the world and recently celebrated its 1 trillionth kWh of output.
- Mega-dam constructions have sometimes caused social unrest with residents opposing forced evictions and some complaints of insufficient compensation packages. Geologists have expressed concern over building mega-dams in earthquake-prone areas, while environmentalists have continually lamented the impact of dams on river ecosystems.
- 'Dam diplomacy' has emerged as a significant and complex geopolitical issue for China and its relations with downstream neighbours. Myanmar and China are still deadlocked over the suspended Myitsone Dam Project, while India has expressed concern over the US\$750 million Laho project in Tibet.





### Wind energy

- Between 2005 and 2012, China increased its wind energy capacity almost 50-fold. Reportedly, by the end of 2015, China's installed wind capacity was 145GW, the largest of any nation. China's windiest areas, which include Inner Mongolia, Xinjiang, Gansu and Tibet, are located in the north and west, far from population centres and thus require extensive transmission infrastructure.
- It is estimated that in the few years leading to 2016, an average of 36 wind turbines per day were erected in China. This installation level decreased slightly in 2016, but still remains at over 24 wind turbines per day. China is however, experiencing wind energy oversupply, with curtailment levels (idling wind turbines) occurring at a rate of 19%.

### Solar energy

- China is now targeting 110GW of installed solar power capacity by 2020, with the latest estimates from 2016 suggesting solar capacity is around 77GW.
- In 2015, China produced the world's largest installed capacity of photovoltaic power, with an annual growth rate of over 33% from 2011 to 2015.
- Low interest rates and extended credit from local banks as well as other government subsidies for land, research and development, have underpinned the success of China's solar industry.
- China is the world's largest manufacturer of solar panels, and Chinese private investment group China Minsheng New Energy Investment is in the process of building the world's largest solar photovoltaic panel farm in China.
- The majority of leading global solar panel makers are Chinese. However, 2016 was the first year since 2013 that exports of Chinese-made solar equipment fell.
- The People's Daily reported in February 2017 that State Power Investment Corporation had become the world's largest solar power generator by installed capacity (approx. 7,100MW).

### Geothermal energy

- By 2020, China is expected to triple its geothermal power consumption, accounting for 1.5% of China's energy mix.
- As of 2016, China had 27MW of installed geothermal generation capacity. The country is anticipating growth to 100MW of installed capacity by 2020. Most of China's known high-temperature resources are located in Yunnan and Tibet, and geothermal exploration has been limited mostly to these provinces.

### Biogas/biomass energy

- Biogas digesters are seen as a solution to the dumping of animal waste in waterways. There have been more than 1,600 large-scale digesters and more than 30 million household biogas digesters constructed in China.
- China's estimated installed capacity of biomass was 8.5GW in 2013 and is expected to reach 30GW by 2030.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- China's National Emissions Trading System is predicted to launch in the second half of 2017. Local regulations indicate companies exceeding an allotted amount of carbon emissions will be fined, whereas companies emitting less carbon than the allotted levels can sell the surplus. It is hoped that this system has the potential to incentivise other countries to implement carbon pricing policies, ultimately assisting the implementation of the Paris Agreement.
- China continues to grapple with the need to improve the utilisation of existing wind and solar farms given reports of idle capacity. In part, this problem has arisen due to inefficient processing, storage and transportation methods. Grid upgrades have not kept pace with wind and solar power station developments. This has resulted in transmission capacity lags and problems with grid integration and transmission infrastructure. The vast geographical separation



between the major renewable farms in rural north and western China and the densely populated eastern and southern coasts has also contributed to the problem.

- The Chinese Government has recognised that idle capacity of renewable farms is linked to the continual prioritisation of coal energy supplies. Consequently, in March 2016, the National Energy Administrator announced a nine point plan to reduce curtailment and increase uptake of renewable energy in northern China. In 2016, the National Development and Reform Commission promulgated the Administrative Measures for the Guaranteed Purchase of Renewable Energy Power, a regulation which requires power grid companies to purchase a minimum quota of renewable energy. In 2016, the National Energy Administrator reportedly banned the construction of new wind farms in regions with the most significant grid integration issues.
- In 2016, the Central Government announced it would delay the construction of coal-fired power plants in fifteen regions and suspend the approval of new projects in around thirteen provinces until 2018.

## RENEWABLES LAWS

- The *Renewable Energy Law 2006* includes provisions regarding price regulation, differentiated pricing, special funds and tax relief. Importantly, under the Law, state-owned grid operators are required to purchase all the energy output generated from approved renewable generators (to the extent that output is delivered to the grid).
- The Law was most recently revised in 2009 with some of the key changes including:
  - requiring the existing provincial-level renewable energy development and utilisation plans to be submitted to the competent energy departments of the State Council and the national power regulatory authorities for filing;
  - implementing a protective full-purchase system for renewable energy power; and
  - setting-up a renewable energy development fund.

## GOVERNMENT INCENTIVE PROGRAMS

- The National Development and Reform Commission introduced a new feed-in tariff scheme which became effective from 1 January 2017. Significantly, the new scheme indirectly reduces the fixed subsidies for solar projects. These cuts reflect the lessening production and equipment costs required to establish renewable energy projects given recent technological advancements.
- In order to deal with curtailment and grid integration problems, new government guidance provides minimum electricity consumption targets for non-hydro renewable energy. Targets of between 5 to 13% have been set for 31 provinces to incentivise the integration of renewable energy, and the proportion of non-hydro renewable energy in the national electricity consumption is expected to be 9% by 2020.
- Since 2009, the Chinese Government has had an incentive program to encourage the production and purchase of hybrid or electric vehicles. However, in 2016, after reports surfaced of companies incorrectly obtaining the generous subsidies (for example by inflating the number of electric vehicles produced), tougher revised policies are said to be in the pipeline with the intention of eventually phasing out subsidies.

## MAJOR PROJECTS/COMPANIES

- China Huadian Corporation has begun construction of the first hydropower station with a capacity of more than 1,000MW in Tibet Autonomous Region. The project is known as the Suwalong hydro power project, and is due to be completed in 2020.
- The largest solar farm in the world with a capacity of 2GW is under construction in China's northwest region of Ningxia by China Minsheng Investment Group.
- Since 2015, the Chinese company BYD has become the world's largest electric car manufacturer. BYD, along with another Chinese firm, Contemporary Amperex Technology Co., Limited, continue to jostle with Tesla for the front running position in technological advancements and design of electric vehicles and lithium ion batteries.



- In December 2016, Apple Inc announced its plan to completely power its China supply chain with renewable energy through a partnership with Goldwind Science & Technology Co., Ltd, the world's largest wind turbine maker.
- Many Chinese companies are looking outside China to invest in renewable energy particularly now that the domestic market is facing a lull after numerous years of rapid development. Some notable investments made by Chinese companies in 2016 were for projects in countries including Australia, Germany, Brazil, Chile, Indonesia and Egypt.

#### FOREIGN INVESTMENT/OWNERSHIP

- The Catalogue for Guidance of Foreign Investment, amended in 2015, requires foreign investment be made in a manner that is consistent with Chinese policy and in a way that will promote the development of China. Importantly, alternative energy and energy efficient technology investment are included in the 'encouraged' category. However, there are still barriers for foreign investment in the nuclear power generation and grid industry, such as the need to create joint ventures with and controlled by Chinese companies. Even in renewable energy power generation, foreign investors may be asked to partner with a local company, although this is not compulsory.

#### UNFCCC – PARIS COMMITMENTS AND BEYOND

- China ratified the Paris Agreement on 3 September 2016 and is committed to ensuring its carbon dioxide emissions peak as soon as possible. By 2030, China aims to reduce its carbon dioxide emissions per unit of GDP by 60 to 65% as measured against 2005 levels. China has also pledged to increase the use of non-fossil fuel energy so that it accounts for 20% of total energy consumption by 2020 and promised to achieve the elimination of fossil fuels by 2100. China aims to increase the amount of forestry stock by 4.5 billion cubic metres as compared to 2005 stocks.
- China announced that it intends to spend around US\$363 billion on renewable energy development by 2020 to achieve what it has pledged in the Paris

Agreement. The National Energy Administration confirmed that China will focus investment on developing solar and wind power energy sources, and in doing so, aims to create 13 million new jobs in the renewable energy sector.



## RELEVANT WEBSITES

- National Development and Reform Commission – <http://en.ndrc.gov.cn/>
- State Electricity Regulatory Commission – <http://www.serc.gov.cn/english/index.htm>
- National Energy Administration – <http://www.nea.gov.cn/>
- China Renewable Energy Industries Association – <http://www.creia.net/index.html>
- China Climate Change Info-Net – <http://www.ccchina.gov.cn/>

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# HONG KONG SAR

## OVERVIEW

**Jurisdiction:** Common law and some aspects of Chinese Customary Law

**Language:** Chinese (Cantonese) and English

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 4 of 190 (up 1 ranking)

2016/17 Global Competitiveness Index: 9 of 138 (down 2 rankings)

2017 Index of Economic Freedom: 1 of 180 (no change)

2016 Corruption Perceptions Index: 15 of 176 (up 3 rankings)

2015 UN Development Programme Human Development Index: 12 of 188 (up 3 rankings)

Population: 7.3 million

GNI per capita: US\$41,000

## PROFILE

Hong Kong Special Administrative Region (**Hong Kong**) is a major global trade hub and financial centre. It was formerly a British territory until it was 'handed-over' or 'returned' to Chinese sovereignty in 1997. Since that time, under the principle of 'one country, two systems', Hong Kong has held a unique political and economic position, often facilitating trade between China and the West. Hong Kong enjoys a level of autonomy and operates political and judicial systems that are, in most respects, independent from mainland China. However, in 2014, there were large, student-led protests against perceived interference from Beijing in Hong Kong's political processes.



## ELECTRICITY INDUSTRY OVERVIEW

- Hong Kong has no locally-sourced energy resources. This, coupled with a scarcity of land, means that Hong Kong is heavily dependent on both direct energy imports (oil and coal products) and imported fuel inputs (gas and electricity).
- Hong Kong's electricity system is independent from mainland China, although Hong Kong does import approximately 23% of its total electricity needs from generating facilities situated on the mainland (some of these facilities are partly owned by CLP Power Hong Kong Limited (**CLP**), one of the two major companies responsible for generating power in Hong Kong).
- Hong Kong's electricity consumption per capita is just under 6kWh. This electricity consumption is divided between commercial (66%), domestic (27%) and industrial (7%).
- Coal continues to dominate the fuel mix for power generation (about 57%), followed by nuclear power (22%) and natural gas (21%).
- In response to public consultation on future fuel mix options in 2014, the Hong Kong Government aims to increase natural gas generation to 50% by 2020, and reducing coal generation to 25%. Many of the existing coal plants will start to be phased out in 2017.
- The increase in electricity consumption in Hong Kong has slowed in recent years due, in part, to the implementation of energy efficiency programs.

### Electricity laws

- The Electricity Ordinance (Cap 406) regulates the supply of electricity. It covers the registration of generating facilities, contractors and workers for electrical installations, wiring installation standards and the safe distribution and use of electricity.
- A non-statutory Energy Advisory Committee was set up in July 1996 to advise the Hong Kong Government on energy policy, including policy matters concerning energy supply and demand, as well as energy conservation and efficiency. The committee will continue in its current form until July 2018.

## Generation, distribution and transmission

- Electricity is supplied exclusively by the private sector, namely CLP and The Hongkong Electric Company Limited (**HEC**). These companies are vertically integrated, handling all aspects of the electricity supply chain including generation, transmission, and distribution.
- Electricity supply in Hong Kong is regulated through Scheme of Control Agreements. The most recent agreements were entered into by the Hong Kong Government with CLP and HEC respectively on 7 January 2008. The current agreements will be in effect until 30 September 2018 and 31 December 2018 respectively.
- The agreements ensure that the Government can monitor and regulate the performance, reliability and financial affairs of the power companies. The agreements do not confer exclusive rights to supply electricity on CLP and HEC. However the lack of available land on which a new generating station may be built presents a barrier for new entrants to the electricity market. The result is that the electricity market is controlled by a regulated duopoly.
- Some commentators have argued that the rate of return in the agreements is too high and does not provide sufficient incentives for power companies to source the cheapest fuel available nor to make a great enough effort to develop renewable energy facilities.
- With the agreements expiring in 2018, many see it as an important opportunity for reform in the electricity sector and to explore renewable energy options.

## RENEWABLES INDUSTRY OVERVIEW

- Renewable energy accounts for just 1 to 3% of the fuel mix for the supply of electricity in Hong Kong. In 2010, the Hong Kong Government set a target of 4.32% of renewable energy in the overall fuel mix by 2020. This target was proposed in tandem with Hong Kong's voluntary target to reduce its carbon intensity by 50 to 60% by 2020 and by 65 to 70% by 2030 (based on 2005 levels).



- The Electrical and Mechanical Services Department, through its Energy Efficiency Office, monitors the usage of energy and provides statistics and resources concerning renewable energy in Hong Kong. Its purpose is to facilitate the wider adoption of renewable technologies in Hong Kong.
- Hong Kong lacks suitable rivers, good tidal conditions or geothermal resources. The high-density urban environment in the city also creates difficulties for solar energy facilities.
- The Government has nonetheless addressed energy conservation issues. Since 2005, the Hong Kong Government has required renewable energy technologies to be considered during the design and construction of any new building, as well as during any major retrofit of an existing building. The Government developed an energy efficiency program known as the “Energy Saving Plan for Hong Kong’s Built Environment from 2015~2025+”. The plan sets targets for the reduction in energy consumption for 2025 and 2035.
- In recognition of the difficulty that Hong Kong faces in producing renewable energy, the current policy of the Hong Kong Government is to adopt solar or wind facilities for demonstration purposes, subject to their cost-effectiveness and meeting operational needs.
- Electricity generation accounts for approximately two-thirds of Hong Kong’s greenhouse gas emissions.

### Hydropower

- The water resources in Hong Kong are not feasible for developing large-scale hydro projects. This is due to the fact that most of Hong Kong’s rivers and waterways are located within country parks and special conservation areas.
- There are some locations that may be suitable for the development of small or micro-hydro systems, including the Tuen Mun Water Treatment Works.

### Wind energy

- The first commercial-scale wind power station in Hong Kong was commissioned by HEC and completed in February 2006 on Lamma Island. Other than this project, the development of wind energy in Hong Kong remains largely stagnant.
- HEC and CLP have both filed proposals for offshore wind farms. Although environmental permits for both proposed wind projects have been issued, neither CLP or HEC have made further progress on the projects since 2013. Both companies state they are continuing with feasibility studies.
- CLP’s wind farm project, which was to be located approximately 9km east of Clearwater Bay peninsula within the south-eastern waters of Hong Kong,





initially aimed for 67 wind turbines with a total capacity of 200MW. The estimated cost of the project is HK\$7 billion (approx. US\$901.2 million).

- HEC was granted an environmental permit in 2010 for its project, namely a 100MW capacity offshore facility close to Lamma Island. HEC initially estimated that the wind farm would be commissioned in 2015.

### Solar energy

- According to the International Energy Agency, Hong Kong utilised 1GWh of solar photovoltaic power in 2014.
- Solar energy facilities have been gradually integrated into buildings in Hong Kong since the late 1970s. Since the 1980s, solar cells have been employed to generate power for weather stations in remote locations in Hong Kong (although some of these stations have more recently switched to wind power).

- Building-integrated photovoltaic systems have been used in Hong Kong, both in Government and private structures, sometimes with connections to the grid and sometimes working in tandem with a small wind turbine placed on top of the building.

### Geothermal energy

- There are no known geothermal energy sources for power generation in Hong Kong.

### Biomass/biogas energy

- According to the International Energy Agency, Hong Kong utilised 96GWh of biogas-generated electricity in 2014.
- Biogas energy production facilities have been integrated into the Hong Kong Drainage Services Department's sewage treatment facilities since 2006. In 2014, those facilities generated over 28 million kWh – or the equivalent electricity consumption of 3,100 households. The resulting power generation was used within the sewage treatment facilities.



### Ocean energy

- Hong Kong has a low tidal range, and consequently, relatively low potential for generating tidal energy. Despite the development of specialised tidal turbines which are adapted to the low currents in Hong Kong's waters, tidal and ocean energy is unlikely to be a significant renewable energy source for Hong Kong.

### CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- The stagnation of offshore wind projects in Hong Kong suggests there is limited private sector appetite and government incentives for renewable energy projects in the territory. Hong Kong nonetheless has some of the world's most affordable and reliable electricity.
- In 2014, CLP launched Asia's first home energy management scheme, which encourages customers to reduce their consumption.

### GOVERNMENT INCENTIVE PROGRAMS

- Under the current scheme of control agreements, generation companies have a higher rate of return per kWh of electricity generated using renewable energy, compared with fossil fuel-based electricity.
- Since 2008, the Hong Kong Government has also been providing tax incentives on the capital expenditure incurred in relation to the installation of renewable energy power systems on private premises. Such capital expenditure can be deducted over a five year period, starting from the year of purchase.

### MAJOR PROJECTS

- Hong Kong's first wind/solar hybrid plant was installed at the Shek Kwu Chau Drug Rehabilitation Centre by the CLP Research Institute.
- The first commercial-scale combined photovoltaic and wind turbine hybrid plant was installed on Town Island in 2011, and has a capacity of 200kW.

- The largest solar photovoltaic system operates at the Lamma Island power plant. It has a total capacity of 550kW and is expected to generate 620,000kWh of electricity annually.

### FOREIGN INVESTMENT/OWNERSHIP

- Apart from certain restrictions applicable to the banking, civil aviation and broadcasting sectors, there are almost no restrictions on foreign investment, including in the energy sector. Therefore, it is possible, and common, to have 100% foreign equity ownership.
- Hong Kong is generally seen as an attractive centre for foreign investment in Asia owing to its relatively low taxes, good business infrastructure and proximity to mainland China.

### UNFCCC – PARIS COMMITMENTS AND BEYOND

- China ratified the Paris Agreement on 3 September 2016. As decided by the Central Government in Beijing, the Paris Agreement also applies to Hong Kong and as such Hong Kong will play a part to help fulfil the obligations that China has under the Paris Agreement. Accordingly China's Intended Nationally Determined Contribution, which commits to a 60 to 65% reduction in carbon dioxide emissions by 2030 compared to 2005 levels, informs Hong Kong's own carbon reduction targets.
- Hong Kong's current target, updated since the Paris Agreement, is to reduce its carbon intensity by 65 to 70% by 2030 compared to 2005 levels.

## RELEVANT WEBSITES

- Hong Kong Government renewable energy page – <http://www.gov.hk/en/residents/environment/energy/renewableenergy.htm>
- Energy Saving Plan for Hong Kong's Built Environment 2015~2025+ – <http://www.enb.gov.hk/sites/default/files/pdf/EnergySavingPlanEn.pdf>
- Hong Kong Climate Change Report 2015 – <http://www.enb.gov.hk/sites/default/files/pdf/ClimateChangeEng.pdf>
- Planning Ahead for a Better Fuel Mix: Future Fuel Mix for Electricity Generation – <http://www.enb.gov.hk/sites/default/files/en/node2605/Consultation%20Document.pdf>
- Public Consultation on the Future Development of the Electricity Market – [http://www.enb.gov.hk/sites/default/files/en/node3428/EMR\\_condoc\\_e.pdf](http://www.enb.gov.hk/sites/default/files/en/node3428/EMR_condoc_e.pdf)

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- Environment Bureau, *Hong Kong's Climate Change Strategy and Action Agenda* accessed at: [http://www.epd.gov.hk/epd/english/climate\\_change/files/Climate\\_Change\\_Booklet\\_E.pdf](http://www.epd.gov.hk/epd/english/climate_change/files/Climate_Change_Booklet_E.pdf)
- Environment Bureau, *Planning Ahead for a Better Fuel Mix: Future Fuel Mix for Electricity Generation*, accessed at: <http://www.enb.gov.hk/sites/default/files/en/node2605/Consultation%20Document.pdf>
- Environment Bureau, *Public Consultation on the Future Development of the Electricity Market*, accessed at: [http://www.enb.gov.hk/sites/default/files/en/node3428/EMR\\_condoc\\_e.pdf](http://www.enb.gov.hk/sites/default/files/en/node3428/EMR_condoc_e.pdf)
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# INDIA

## OVERVIEW

**Jurisdiction:** Common law

**Language:** Hindi, English and regional languages

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 130 of 190 (up 1 ranking)

2016/2017 Global Competitiveness Index: 39 of 138 (up 16 rankings)

2017 Index of Economic Freedom: 143 of 180 (down 20 rankings)

2016 Corruption Perceptions Index: 79 of 176 (down 3 rankings)

2015 UN Development Programme Human Development Index: 130 of 188 (up 5 rankings)

Population: 1.27 billion

GNI per capita: US\$1,600

## PROFILE

India is the largest democracy in the world. It is regarded as a key emerging market given its enormous, youthful population and continued economic growth. The election of Narendra Modi as India's Prime Minister in May 2014 saw renewed focus on modernising India's industry and energy sectors. Since 2014 India's political agenda has been characterised by rapid economic development and increased participation in international dialogues. The country nonetheless faces issues of widespread poverty, energy shortages, overpopulation in some areas and continued tensions with its neighbour, Pakistan.



## ELECTRICITY INDUSTRY OVERVIEW

- As of 31 January 2017, India's total installed generation capacity stood at 314.64GW, of which:
  - coal (59.9%), oil (0.3%) and gas (8.1%) accounted for 68.3%;
  - hydropower (excluding small hydro projects) accounted for 14%;
  - nuclear accounted for 1.8%; and
  - renewable energy (including small hydropower projects) accounted for 15.9%.
- In the Central Government's 12<sup>th</sup> Plan (2012 – 2017), India is aiming to add 72.34GW, 10.9GW, and 5.3GW of additional capacity in the thermal, hydropower and nuclear sectors respectively. It is also aiming to add 69.28GW and 2.54 GW of additional capacity for coal and gas.
- The Indian National Electricity Policy 2005 (**NEP**), established under the *Electricity Act 2003*, is the overarching policy for the development of India's energy sector. The NEP outlines the importance of meeting electricity demands, securing supply, mitigating climate change, promoting renewable energy sources and protecting the interests of consumers and stakeholders.
- India is the world's third largest energy consumer behind China and the US. However, electrification rates remain low, with about one-quarter of the population (roughly 300 million people) not having reliable access to electricity. The International Energy Agency estimates that to meet this demand, India will add between 600GW to 1,200GW of additional new power generation capacity by 2050.
- With a rapidly expanding economy and an ever-increasing demand for electricity, India is facing significant energy security issues. The International Energy Agency anticipates that oil demand will increase more than in any other country, approaching 10 million barrels per day by 2040, whilst India will also become the world's largest importer of coal by 2020, overtaking Japan, the European Union and China.

- Electricity prices are regarded by some analysts as unsustainably low (US\$0.08 per kWh). In 2016, solar energy prices in the country dropped to around parity with coal.
- Electricity theft is also prevalent, which reduces incentives for investment in the energy sector.

## Electricity laws

- The *Electricity Act 2003* and the *Energy Conservation Act 2001*, as well as the rules and regulations made under those acts, primarily govern the legislative framework of the electricity sector in India.
- The *Electricity Act 2003* consolidates the laws relating to the generation, transmission, distribution, trading and use of electricity. The Act has a number of important features, namely it:
  - recognises and regulates generation, transmission, distribution and trading of electricity;
  - removes the requirement for a generation licence for entities engaged in electricity generation provided that such entities comply with the technical standards regarding grid connectivity;
  - provides for private participation in the generation, transmission, distribution and trading of electricity;
  - requires the State Electricity Regulatory Commissions to set out a minimum percentage of electricity to be purchased from renewable sources by formulating regulations;
  - mandates control of the electricity supply through load despatch centres at inter-state and intra-state levels by the Central and State Government entities;
  - mandates a non-discriminatory open access regime for the transmission and distribution of electricity;
  - establishes the Appellate Tribunal for Electricity; and
  - makes provision for penal sanctions for the theft of electricity.





## Generation

- India's total electricity generation stands at over 300GW, with 40% of electricity capacity being provided privately.
- The Central Government entities providing electricity generation include the National Thermal Power Corporation, the National Hydroelectric Power Corporation Limited and the Nuclear Power Corporation of India Limited.
- Each State also has at least one generation company, examples of which include Telangana Power Generation Corporation and Andhra Pradesh Power Generation Corporation Limited.
- Entities are generally not required to have a licence to generate electricity, except in relation to nuclear projects and certain hydropower projects.
- The private sector is able to commission coal, gas or oil, hydropower, wind, solar and other renewable energy-based projects of any size. However, only Central Government owned and controlled entities are permitted to build and operate nuclear energy projects. Currently, only the National Power Corporation generates electricity using nuclear energy.

## Distribution and transmission

- The distribution and transmission system in India is a unique three-tier system consisting of distribution networks, state grids and regional grids.
- The state grids are interconnected to form regional grids. These regional grids are divided according to five geographical areas: western, northern, eastern, north-eastern and southern. The regional grids are gradually being integrated to form a national grid to enable inter-regional transmission of power. The lack of a national grid is one contributing factor to the frequent electricity outages in parts of India.
- A non-discriminatory, open-access obligation is imposed on the distribution and transmission entities to encourage competition among generators,

distributors and traders in electricity from regions that have a surplus of electricity to regions with an electricity deficit.

- Each state-owned transmission entity has a monopoly over the intra-state electricity transmission system. For example, the Power Grid Corporation of India Limited operates approximately 130,000km of inter-state transmission lines.
- The Asian Development Bank has offered a US\$500 million low-interest loan to India to improve transmission lines across the country.
- Engaging in transmission of electricity requires a licence from the Central Electricity Regulatory Commission for inter-state transmission activity and the relevant State Electricity Regulatory Commissions for intra-state transmission activity.
- Transmission licensees are prohibited from engaging in the trading and distribution of electricity.
- Distribution of electricity in India is controlled by the States. Public and private entities intending to engage in the distribution of electricity are required to obtain a licence from the relevant State Electricity Regulatory Commission.

## Regulatory bodies

- The Ministry of Power has a number of regulatory functions, including:
  - administering the *Electricity Act 2003*;
  - monitoring and updating the National Electricity Policy;
  - setting the rural electrification policy and tariff policy in consultation with the State Governments and the Central Electricity Authority; and
  - overseeing the Central Government entities in the electricity sector.
- The Central Electricity Authority performs several functions, including:
  - advising the Central Government entities on matters relating to the National Electricity Policy;



- specifying the technical standards and safety requirements for construction, operation and maintenance of electrical plants and electric lines through regulations; and
- promoting research in relation to matters affecting the generation, transmission, distribution and trading of electricity.
- The Central Electricity Regulatory Commission has a number of responsibilities, including:
  - making regulations in accordance with the grid standards specified by the Central Electricity Authority (including the Grid Code);
  - enforcing standards of quality, continuity and reliability of service by licensees;
  - regulating the tariffs of Central Government entities and private entities engaged in sale of electricity in more than one State;
  - regulating the tariffs for inter-state transmission of electricity;
  - acting as a licensing authority for granting electricity transmission and trading licences regarding inter-state operations; and
  - adjudicating disputes involving generating entities and transmission licensees in respect of the aforementioned matters and referring any such dispute for arbitration.
- The State Electricity Regulatory Commissions have responsibility to make regulations, act as the regulator, and to fulfil quasi-judicial functions concerning intra-state matters. The State Electricity Regulatory Commissions are also responsible for:
  - granting the electricity transmission, distribution and trading licences in respect of their intra-state operations;
  - stipulating the general and special conditions of the licence;
  - revoking licences or selling licences through bidding;
  - regulating the tariff of generating stations owned by a state government entity or by generating companies;
  - regulating the intra-state transmission and supply of electricity; and
  - promoting co-generation and generation of electricity from renewable energy sources by providing suitable grid connectivity measures and regulating the sale of such electricity. In this respect, the State Electricity Regulatory Commissions are required to specify the renewable energy purchase obligation for distribution licensees (both private and state-owned), open access consumers and captive power plants.

## RENEWABLES INDUSTRY OVERVIEW

- India's energy use has almost doubled since 2000, creating a need for innovative technologies in the energy sector.
- The Ministry of New and Renewable Energy (**MNRE**) is responsible for developing and promoting renewable technologies and renewable energy use in India.
- India has seen a significant increase in installed renewable energy capacity in the last ten years, growing from 10.3GW in March 2007 to 42.9GW in March 2016.
- India's National Electricity Plan 2016 set India an ambitious new target of reaching a total installed capacity of 175GW by 2022, with 100GW of that capacity expected to be drawn from solar power.
- It is predicted that by 2027, 43% of India's electricity capacity will come from renewable sources. A further 39% will be drawn from coal, 11% from large hydro, 5% from gas and 2% from nuclear energy.

## Hydropower

- India's overall installed hydropower capacity as at 31 March 2016 was approximately 47.1GW, with a further 45 schemes amounting to 12GW of additional capacity under construction.



- Over 90% of India's hydropower capacity is generated by large hydropower projects – projects with a capacity of more than 25MW.
- A number of small hydropower projects, which are governed by the MNRE, are also in operation or in the planning stages in India's northern Himalayan regions.
- India's draft 10 year energy blueprint identifies availability of land, displacement caused by submergence and technical/infrastructure challenges as key issues for developers of hydropower projects in the country.
- New solar installations in India are expected to total 4.8GW in 2016-17, with approximately 21GW of developments in the planning stage.
- A significant achievement in recent years has been establishment of the International Solar Alliance in 2015. Headquartered in India, the Alliance has 121 members (as at January 2017) and was established on the initiative of Indian Prime Minister Narendra Modi.
- The Jawaharlal Nehru National Solar Mission has been influential. The Mission aims to increase solar deployment to 100GW by 2022. This new target, which has been extended significantly from the mission's original 20GW goal, is considered ambitious.

### Wind energy

- India boasts the world's fourth largest installed wind power capacity, exceeded only by China, the USA and Germany.
- India's installed wind power capacity as at December 2016 stood at 28.7GW.
- Between April 2016 and December 2016, India increased its installed wind energy capacity by 2GW.
- The MNRE has in recent years removed the regulatory requirement that wind installations only take place at sites with a minimum wind power density of 200W/m<sup>2</sup>, which has paved the way for smaller wind power projects to play a role in the market.
- In 2015, the MNRE released a national offshore wind policy which stated that offshore wind energy is now cost-competitive with fossil fuel generated energy. The Global Wind Energy Council has released a report which has stated that, as of December 2016, no offshore wind farms were under construction.

### Solar energy

- High solar radiation levels, particularly in western regions of India, make solar energy an attractive option. Solar power has seen the sharpest growth in capacity of all renewables sub-sectors in recent years.
- As of 31 January 2017, the installed solar capacity of 9GW was enough to meet 1% of overall electricity demand.

### Geothermal energy

- Geothermal power use in India is minimal, and solely limited to private, direct use. The Geological Survey of India suggests that India has 10GW of geothermal energy potential that remains largely unexploited.

### Biomass energy

- India has significant potential for biomass energy production, due largely to its significant agricultural base.
- According to the International Energy Agency, in 2015, biomass accounted for 24% of India's primary energy demand. Many people in rural areas continue to rely on solid biomass fuels for cooking and heating. However this demand has declined comparatively since 2000 due to increased availability of coal and other fuel sources.
- The MNRE estimates India's biomass power potential at 18GW, with approximately 500 million metric tonnes available each year, largely drawn from agricultural and forestry residue. An additional 7GW of power could be generated through bagasse based cogeneration in India's 550 sugar mills.



### Ocean energy

- India has recently taken steps toward utilising its coastlines to harness ocean energy.
- The MNRE estimates India's tidal energy potential is 40GW, and wave energy potential is 9GW.
- While no ocean energy projects are currently underway, a number of projects have been proposed or remain under consultation. As an example, Atlantis energy in 2014 announced a proposal to install a tidal power plant in the Gulf of Chambej with a capacity of up to 200MW.

### CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- Sustainably funding India's enormous proposed expansion in renewable technologies is likely the most pressing issue facing developers. To date, international investment and multilateral cooperation has been a primary source of backing. This trend is likely to continue in meeting India's 2022 targets.
- In recent decades, submersion and displacement of communities as a result of large hydropower projects has been a topic of protest domestically and internationally. For example, it is estimated that the Sardar Sarovar Dam on India's Narmada river displaced 250,000 people, leading the World Bank to withdraw its financial support.
- Electricity theft continues to be prevalent in India. This disincentivises both consumers and developers from investing in potentially more expensive green energy technologies.
- The vast amounts of land needed for viable renewables projects is also an ongoing issue for renewable energy projects, given the relatively high competition for land in India.

### RENEWABLES LAWS

- The Central Government of India has taken steps toward creating a unified legal framework for renewable energy. In July 2015 the Central Government released the Draft National Renewable Energy Act 2015 (**NREA**).

- Measures set out in the NREA include creation of a National Renewable Energy Committee to oversee implementation of renewable energy policies and ensure coordination between government and private stakeholders.
- As at January 2017, the NREA had not yet been passed into law.
- Currently promotion and regulation of renewable energy is incorporated in the *Electricity Act 2003*.

### GOVERNMENT INCENTIVE PROGRAMS

- The Central Government has been proactive in establishing tax incentives for renewable energy developers and investors. These include the MNRE's generation based incentive schemes, which make renewable projects eligible for incentives of INR10 million (approx. US\$1.54 million) per MW of power fed into India's electricity grid.
- The Central Government's 'Make in India' initiative, which aims to promote investment, innovation and skill development across Indian manufacturing sectors, names renewable energy technologies as one of its key focus sectors.
- In the 2016/17 budget, the Central Government removed all excise duty on small-scale solar systems, as well as on a number of raw materials necessary for the development of solar and wind projects.
- A number of State Governments have also introduced policies to encourage renewable investment through tax relief and other measures. Recent examples include the Tamil Nadu Incentive for Domestic Solar Rooftops and the Maharashtra Renewable Energy Policy 2015.

### MAJOR PROJECTS/COMPANIES

- In 2016, Indian company Adani Group opened the 650MW solar plant in Kamuthi, Tamil Nadu. When running at full capacity, the plant will be able to power 150,000 homes.
- Tamil Nadu is also the home of India's largest wind power generator, the Muppandal windfarm with a total capacity of 1,500MW.



- One of India's largest companies, energy giant Tata, has announced its intention to source 30 to 40% of its energy from renewable sources by 2025.
- Japanese company Softbank has recently joined with Taiwan's Foxconn and Indian corporate group Bharti enterprises to commit a joint US\$20 billion to invest in solar power in India.
- French company EDF announced its intention to invest US\$2 billion in renewable wind and solar projects in India in September 2016.
- The MNRE is playing a proactive role in promoting inbound renewable energy foreign direct investment by offering a number of incentives such as generation-based incentives, capital and interest subsidies, viability gap funding, concessional finance and fiscal incentives.
- According to the Department of Industrial Policy and Promotion, foreign direct investment inflows from non-conventional energy sources during 2016 was worth US\$4.77 billion.

#### FOREIGN INVESTMENT/OWNERSHIP

- India's foreign direct investment regulatory scheme has been substantially liberalised in recent years.
- There are two routes for investment in India:
  - the 'automatic route' where up to 100% foreign ownership is permissible in certain sectors; or
  - the 'government route' which requires prior government approval for sectors not mentioned in the 'automatic route' or for investments in certain sectors beyond the permissible limits (e.g. banking, defence, strategic industries and agriculture).
- Joint ventures with local companies are a common way for foreign investors to enter the Indian market.
- Investment in both electricity infrastructure and renewable energy is actively encouraged by the Indian Government.

#### UNFCCC – PARIS COMMITMENTS AND BEYOND

- India ratified the Paris Agreement on 2 October 2016, after receiving Cabinet approval in September. The declaration made at ratification commits to "following the low carbon path to progress" while "keeping in view... the eradication of poverty and provision of basic needs for all its citizens".
- India's Intended Nationally Determined Contribution, released in September 2015, set a number of targets including lowering emissions intensity of its GDP by 33% below 2005 levels by 2030. India also signalled its intention to "follow a path cleaner than the one followed by many countries in the past", by embracing innovative technologies, engaging actively and creatively in multilateral negotiations, and promoting Gandhian principles of sustainable living.



## RELEVANT WEBSITES

- Central Electricity Authority – [www.cea.nic.in](http://www.cea.nic.in)
- Global Wind Energy Council – [www.gwec.net](http://www.gwec.net)
- India Climate Portal – [www.indiaclimateportal.org](http://www.indiaclimateportal.org)
- India Energy Portal – [www.indiaenergyportal.org](http://www.indiaenergyportal.org)
- Make in India – [www.makeinindia.com/sector/renewable-energy](http://www.makeinindia.com/sector/renewable-energy)
- Ministry of New and Renewable Energy – [www.mnre.gov.in](http://www.mnre.gov.in)
- Ministry of Power – [www.powermin.nic.in](http://www.powermin.nic.in)
- National Hydroelectric Power Corporation – [www.ntpc.in](http://www.ntpc.in)

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# INDONESIA

## OVERVIEW

**Jurisdiction:** Civil law and Islamic law

**Language:** Indonesian (Bahasa Indonesia)

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 91 of 190 (up 15 rankings)

2016/17 Global Competitiveness Index: 41 of 138 (down 4 rankings)

2017 Index of Economic Freedom: 84 of 180 (up 15 rankings)

2016 Corruption Perceptions Index: 90 of 176 (down 2 rankings)

2015 UN Development Programme Human Development Index: 110 of 188 (down 2 rankings)

Population: 257.6 million

GNI per capita: US\$3,440

## PROFILE

Indonesia is the fourth most populous country in the world and is home to the world's largest Muslim population. Its 17,000 islands foster a diverse range of cultures, languages and ethnicities, which inspired the country's motto of "unity in diversity". Indonesia was once a Dutch colony and declared its independence shortly after Japanese occupation ended in 1945. After a long period of political instability, Indonesia held legislative elections in 1999 and is now regarded as the third largest democracy in the world. Important issues within Indonesia include combating poverty and domestic terrorism, the implementation of reforms and the promotion of transparency in its governmental institutions.



## ELECTRICITY INDUSTRY OVERVIEW

- Total installed capacity in 2015 was 55.5GW. Of this amount, coal accounted for 56%, gas accounted for 24.9%, oil accounted for 8.6% and renewables accounted for 10.5%.
- Indonesia has a national electrification rate of 88.3%. The highest electrification rates are within the Java-Bali system, with a near 100% electrification rate in the capital and largest city, Jakarta. Rural electrification poses a challenge, with the outer ring of islands having a significantly lower electrification rate.
- In 2015, the average cost of electricity was US\$0.097 per kWh.
- It is predicted that electricity demand will grow to 8.5% per year to 2025.
- In 2014, in order to cater for increased demand and to improve Indonesia's electricity infrastructure, *Government Regulation No. 79/2014* revised the 2006 National Energy Plan and adopted a new (2014) plan. The 2014 plan aims to re-establish Indonesia's energy independence by reducing the export of energy resources and re-directing this to the domestic market. The plan also seeks to rebalance the energy mix, such that there is more of a focus on renewable energy.
- A number of other electricity plans have also been released in recent years, including:
  - in January 2015, the Government announced the '35GW Programme' which plans to develop 35GW of additional power capacity by 2018, and a further 45GW by 2025; and
  - in June 2016, the Ministry of Energy and Mineral Resources issued the 2016-2025 Electricity Supply Business Plan which is a 10-year electricity development plan for the operating areas of Perusahaan Listrik Negara (**PLN**), Indonesia's major electricity generator and supplier. This plan aims to achieve a 99.7% electrification ratio for Indonesia by 2025.

## Government

- The Ministry of Energy and Mineral Resources oversees electricity regulation, as well as the creation and implementation of Indonesia's energy policy which includes a National Electricity Plan. The Directorate-General of Electricity within the Ministry of Energy and Mineral Resources assists with the implementation of this plan.
- The Ministry of Finance approves Government-offered tax incentives for a power project and any Government guarantees. The Ministry also recommends the maximum electricity subsidy in the national budget which may be allocated to PLN.
- As PLN is a state-owned enterprise, the Ministry of State-Owned Enterprises supervises PLN's management.
- The National Energy Council is engaged in dealing with any future energy crisis, among other roles.

## Electricity laws

- *Electricity Law No. 30/2009* is the key piece of legislation regulating the electricity sector. Under Law No. 30/2009, the Government has the authority to issue licenses and determine electricity tariffs. Electricity supply is controlled by the State but conducted by the Central and Regional Governments. PLN occupies this role as the main electricity supplier, having priority rights over supply. Law No. 30/2009 also provides for competition in the supply and distribution of electricity, and establishes the basic framework for private entities to participate in the sector.
- The Ministry of Energy and Mineral Resources' Regulation No. 1/2015 allows power plant developers to cooperate directly with other power plant developers in supplying electricity, without the need for a new power supply license.
- *Electricity Law No. 20/2002* sought to further privatise the industry by allowing market-driven tariffs and independent regulation while also amending *Law No. 15/1985*. However, Law No. 20/2002 was ruled





as unconstitutional by the Constitutional Court because electricity is a strategic commodity that the Indonesian Government must control.

- *Energy Law No. 30/2007* outlines the management of energy resources and the Government's goals for the future development of energy mix. Law No. 30/2007 emphasised energy security as an important issue and, as a consequence, established the National Energy Council to deal with this issue.

### Generation

- PLN (including its subsidiaries Pembangkitan Jawa Bali and Indonesia Power) owns most of the power-generation, transmission and distribution assets. At the end of 2015, PLN and its subsidiaries accounted for 70% of the total installed capacity of power plants, which amounted to 38.3GW of the 55.5GW.
- Independent power producers and various electricity cooperatives also generate electricity, however PLN is the sole buyer of electricity and retains the right of first refusal.

### Distribution and transmission

- PLN is the only business entity involved in electrical distribution and transmission. In 2015, Indonesia's transmission network consisted of around 42,000km of transmission lines. With over 17,000 islands, the majority of the electricity networks in Indonesia are isolated. Only the transmission networks on the islands of Java, Madura, Bali and Sumatra are connected. However, transmission line bottlenecks present as a frequent issue on these islands.
- While electricity laws allow for private participation in power supply and access to transmission and distribution, independent power producer participation is limited to generation. The Ministry of Energy and Mineral Resources' Regulation No. 1/2015 aims to change this limited participation by allowing joint use of the networks without the need for a new power supply licence.
- Indonesia's main priorities for its distribution network are to increase the electrification rate, improve system reliability and accommodate demand growth.

## RENEWABLES INDUSTRY OVERVIEW

- Despite an abundance of renewable energy resources, renewable energy currently plays a minor role in Indonesia's energy supply. However, the Government is seeking an increase in renewables generation to 23% of total energy consumption by 2025 and 31% by 2050.
- Historical fuel subsidies, low electricity tariffs, complex regulations, legal uncertainties, logistical challenges and extensive cheap coal resources have deterred potential renewables investors. Despite the reduction of fuel subsidies and efforts by the Government to streamline regulatory processes and otherwise incentivise investment, these issues still remain significant barriers to the development of the renewables sector.
- The Directorate General of Renewable Energy and Energy Conservation, which sits under the Ministry of Energy and Mineral Resources, is the chief regulator in the renewable energy area.

### Hydropower

- Indonesia has a significant hydropower potential of up to 75GW, mostly centred in the eastern provinces. According to the Ministry of Energy and Mineral Resources, in 2015 Indonesia had an installed hydropower capacity of about 5,332MW, making it the most utilised source of renewable energy at present.
- The Government's aim to develop industrial zones in Papua and other rural areas under the 2011 Masterplan for Acceleration and Expansion of Indonesia's Economic Development could help increase the exploitation of medium and large-scale hydropower resources. PLN's Electricity Supply Business Plan (2016-2025), sets a target to install an additional 1,500MW of hydropower capacity by 2025.

### Wind energy

- In 2015, installed wind power capacity was 3.6MW, of which 1.84MW was off-grid and mainly for rural power supply. The estimated potential of wind energy in Indonesia is generally regarded to be small as wind velocity in Indonesia is relatively low.



- Wind speeds averaging between 3m/s and 6m/s have encouraged government investment in small and medium sized wind projects, however large-scale wind farms are not feasible with such wind speeds. Much like in Mongolia and China, Indonesia's most productive wind sites are located far from population centres, thus requiring extensive transmission infrastructure.
- PLN's Electricity Supply Business Plan (2016 – 2025), sets a target to install an additional 640MW of wind capacity by 2025. In September 2016, a power purchase agreement was signed between PLN and a consortium of investors led by Singaporean-based investment fund Equis to develop a 60MW wind farm in Tolo, South Sulawesi.

### Solar energy

- Indonesia has an installed capacity of about 80MW. The use of off-grid solar photovoltaic systems to harness Indonesia's considerable solar resources offer significant potential to provide electrification and replace costly diesel-fired generation in remote areas.
- In February 2016, the Government announced a target for installed solar capacity of 5,000MW by 2020.

### Geothermal energy

- Indonesia has great geothermal potential of over 28,000MW which is estimated to be 40% of total global resources.
- Despite this massive potential and the fact that the bulk of the country's geothermal resources are located near demand areas, the development of Indonesia's geothermal sector has been slow with only 1,438MW of capacity currently installed.
- PLN's Electricity Supply Business Plan (2016 – 2025), sets a target to install an additional 6,150MW of geothermal capacity by 2025.
- There is a separate legal regime for geothermal energy production in Indonesia compared to other forms of electricity. In 2014, the Government passed *Geothermal Law No. 21/2014* which replaced the regulatory regime under *Geothermal Law No. 27/2003*. The new law is designed to expedite the utilisation of geothermal resources and centralises the permit and tender process for geothermal working areas. It also introduces a mandatory production bonus payable to the local government in which the geothermal field is located.





- The 2014 Geothermal Law also marked a change from the previous regulatory regime as geothermal activities are no longer classified as mining activities. The law specifically allows geothermal activities to be undertaken in protected and conservation forest areas, where an estimated 42% of resources are found.
- In order to overcome barriers to investment and development of new geothermal sites, in early 2016 the Director for Geothermal Energy indicated that the Minister of Energy and Mineral Resources would introduce a new regulation designed to reduce exploration risk for potential investors. To date no such regulation has been introduced.
- In December 2016, President Joko Widodo inaugurated new geothermal units at Lahendong and Ulubelu, adding a total of 95MW to the capacity of these plants.
- The Ministry of Energy and Mineral Resources has two pilot projects underway, one at Nusa Penida and one in Nusa Tenggara, with a plan to have 1MW of ocean plant capacity ready by 2019.
- In April 2016, SBS International Ltd and Atlantis Resources Ltd announced a joint venture to develop a 150MW tidal stream site under a 25-year power purchase agreement with PLN. SBS International also signed a memorandum of understanding with PLN in August 2015 to develop ocean energy at several sites.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

### Biomass/biogas energy

- Indonesia has an estimated potential power generation from bioenergy of 33,000MW from biomass and 17,000MW from biogas.
- Most of the 1,800MW of current installed capacity of bioenergy is off-grid. This reflects the fact that bioenergy, especially from biomass such as wood fuel and rice husks, has traditionally been an important source of energy for households and small industry in rural areas.
- The Government has plans to grow biogas and biomass plants, including waste-to-power plants, and has already implemented incentives for electricity production generated from bioenergy.
- In 2015, the Ministry of Energy and Mineral Resources set a target of 2,872MW of total installed bioenergy capacity by 2019.

### Ocean energy

- With 54,716km of coastline, Indonesia has vast potential for ocean current, wave and tidal energy.
- In 2014, the Directorate General of Renewable Energy and Energy Conservation estimated that the 'practical' potential of ocean energy in Indonesia is 49GW. Despite this, Indonesia currently has no installed ocean energy capacity.

- Budget cuts in late 2016 by the Ministry of Energy and Mineral Resources of some Rp900 billion (approx. US\$67.6 million) saw the Directorate General for Renewable Energy and Energy Conservation's budget fall from Rp2.3 trillion (approx. US\$172.6 million) to Rp1.7 trillion (approx. US\$127.6 million). As a result some of the Ministry's renewable energy projects will be postponed including the installation of solar panels at airports in Bali, Medan, North Sumatra, Makassar and South Sulawesi, as well as the construction of a new micro-hydropower plant in Papua.
- The Indonesian Government's reduction in fossil fuel subsidies (notably the abolition of subsidies for gasoline in 2015), is generally regarded by commentators as a positive step in providing incentives for energy efficiency and increased investment in the renewable energy industry. Moreover, it has been estimated by Toft and Lontoh that reforming all of Indonesia's fossil fuel subsidies could reduce the country's greenhouse gas emissions by 7 to 12%. However, proposals to reduce electricity subsidies, which cost the Government Rp58 trillion (approx. US\$4.35 billion) in 2016, have proved to be politically unpopular, with reform postponed once by President Widodo and once by Parliament in 2016. Reform is expected in 2017.
- The slowing of commodities markets in recent years has led PLN to express concerns that the comparatively higher costs of purchasing renewable electricity would hinder it from operating at a competitive level.



## RENEWABLES LAWS

- The Ministry of Energy and Mineral Resources *Decision No. 2/2004* created the Green Energy Policy 2004, which aims to reduce the country's reliance on oil.
- *Energy Law No. 30/2007* is the framework policy which sets out the Government's basic targets for the future development of energy supplies, gives regional governments the power to develop master plans and regulations on energy and includes incentives for private and state companies involved in the distribution and development of renewable energies.
- *Government Regulation No. 70/2009 on Energy Conservation* forms the National Energy Conservation Plan, promotes energy efficiency and offers incentives for the importation of energy-saving devices.
- *Geothermal Law No. 21/2014* regulates geothermal energy production and development in Indonesia. This law is discussed in more detail above.
- *Government Regulation No. 79/2014 on National Energy Policy* sets out the definition of renewable energy and sets out the Government's target for 23% of energy production to come from renewable resources by 2025.

## GOVERNMENT INCENTIVE PROGRAMS

- Indonesia currently offers tax concessions for renewable energy projects, particularly geothermal energy projects. Incentives for geothermal projects include an investment credit of 20% of the qualifying capital investment, an extended tax loss carry forward period for up to 10 years, accelerated depreciation rates and a maximum dividend withholding tax of 10%.
- The Ministry of Finance's *Regulation No. 21/PMK. 011/2010* provides similar tax and also customs incentives for other renewable energy technologies.
- Importantly, since 2002, the Ministry of Energy and Mineral Resources has also established a feed-in tariff scheme for renewable energy. However, international developers have not been as attracted by the feed-in tariff given the fixed end-user energy prices, which are regarded by many as unsustainably low.

- *Ministerial Regulation No 04/2012 on Electricity Purchase from Small and Medium Scale Renewable Energy and Excess Power* introduces new differentiated feed-in tariff levels in Indonesia to incentivise the production of electricity from biomass, biogas, municipal waste and hydropower plants below generation capacity of 10MW. It also obliges PLN to purchase electricity generated from renewable energy installations.

## MAJOR PROJECTS/COMPANIES

- Foreign governments, international organisations and private investors are all key players in financing and supporting the development of renewables projects in Indonesia. One primary source of funding for renewable energy, particularly for the geothermal sector, has come from the US\$400 million Clean Energy Fund, co-financed by the Asian Development Bank and the World Bank.
- In April 2016, the Energy and Mineral Resources Ministry announced that Indonesia had attracted US\$327 million in renewable energy investments during the first quarter of 2016, with US\$250 million going to bioenergy and US\$75 million to geothermal power. The Ministry suggested that this sharp increase in investments was a reflection of the incentive provided by the national 'single-window' approval system for renewable energy projects and indicated that the Government would seek to further cut red tape for investors.
- The 330MW Sarulla geothermal project in North Sumatra is currently being developed by a consortium of investors from Indonesia, Japan and the US. It is expected to be completed by 2018/2019.
- A number of geothermal plants have recently become operational, including Ulubelu (55MW), Lahendong (40MW) and Karaha Bodas (30MW).
- Cisokan hydropower plant has a capacity of 1GW. The project is substantially funded by the World Bank.
- As part of Indonesia's Power Transmission Development Phase II, PLN is undertaking extensive repairs to the transmission infrastructure on grids in Java-Bali, Sulawesi and Kalimantan. This project is funded by the World Bank.



## FOREIGN INVESTMENT/OWNERSHIP

- *Investment Law No. 25/2007* requires foreign investors in the electricity sector to obtain a foreign investment license from the Capital Investment Coordinating Board (**BKPM**). In order to obtain the foreign investment license, an Indonesian company must be established under the Investment Law. The Indonesian company can then apply to the Minister of Energy and Mineral Resources for a licence to engage in the energy sector.
- BKPM provides a one-stop integrated service to handle the investment application process. Like the Philippines, Indonesia has a ‘negative list’ for foreign investment. It is set out in *Presidential Regulation No. 44/2016*. This list sets prohibitions and limits on foreign ownership in the production, transmission and distribution of electricity of up to 95%. However, foreign ownership of power plants over 10MW is allowed through partnerships or cooperatives and 100% foreign ownership is allowed in the biomass pellet industry. Geothermal facility services may have foreign ownership of up to 90%.
- Industry analysts have recognised an increase in foreign investment as crucial to growing renewable energy development in Indonesia.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Indonesia ratified the Paris Agreement on 31 October 2016 and in its Intended Nationally Determined Contribution committed the country to reduce its emissions by 26% (relative to a business as usual baseline) by 2020 and by 29% by 2030. Indonesia also set a “conditional reduction target” of up to 41% reduction in emissions by 2030, subject to availability of international support for finance, technology transfer and development and capacity building.



## RELEVANT WEBSITES

- Perusahaan Listrik Negara – [www.pln.co.id](http://www.pln.co.id)
- Pembangkit Jawa-Bali – [www.ptjpb.com](http://www.ptjpb.com)
- Indonesia Power – [www.indonesiapower.co.id](http://www.indonesiapower.co.id)
- Ministry of Energy and Mineral Resources – [www.esdm.go.id](http://www.esdm.go.id)
- Directorate General of Electrification – <http://www.djk.esdm.go.id/>
- Directorate General of Renewable Energy and Energy Conservation – <http://www.ebtke.esdm.go.id/home>

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# JAPAN

## OVERVIEW

**Jurisdiction:** Civil Law

**Language:** Japanese

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 34 of 190 (down 2 rankings)

2016/17 Global Competitiveness Index: 8 of 138 (down 2 rankings)

2017 Index of Economic Freedom: 40 of 180 (down 18 rankings)

2016 Corruption Perceptions Index: 20 of 176 (down 2 rankings)

2015 UN Development Programme Human Development Index: 20 of 188 (down 3 rankings)

Population: 126.9 million

GNI per capita: US\$38,840

## PROFILE

Following World War Two, Japan adopted western parliamentary democracy. On the back of strong government-industry cooperation, technological advancements and labour force growth, Japan's post-war economy became one of the most advanced in the world. Despite an economic slowdown in the 1990s, Japan is currently the third largest economy in the world behind the US and China. The disasters of 2011 triggered by Japan's largest-ever earthquake tested the country's institutions whilst thrusting energy issues into the national and global spotlight. Prime Minister Shinzo Abe's re-election to office in December 2012 saw Japan continue its ambitious economic and security reforms.



## ELECTRICITY INDUSTRY OVERVIEW

- According to the Federation of Electric Power Companies of Japan, in 2015 Japan generated electricity from oil (9%), coal (31%), natural gas (44%), nuclear (1.1%), hydropower (9.6%) and non-hydropower renewables (4.7%).
- Japan's energy self-sufficiency rate is a mere 7.7%. This is substantially lower than other major developed countries, however total energy consumed by end users decreased for the seventh consecutive year in 2016 largely due to increased efforts aimed at energy efficiency and slowing economic growth.
- Japan has the second highest cost of electricity in Asia. In 2015, the retail rate of electricity was US\$0.28 per kWh.
- In the Ministry of Economy, Trade and Industry's (METI) 2016 Annual Report on Energy, the Government outlined the long term energy supply and demand outlook for 2030. The Government proposes that by 2030 nuclear power will account for 20 to 22% of supply, thermal power for 56%, LNG for 27%, crude for 26%, oil for 3% and renewable energy for 22 to 24% of the total energy mix. The Government justifies this energy mix on the basis of securing Japan the so-called '3E+S'; energy security, economic efficiency, environmental protection and safety.
- Japan continues to liberalise and deregulate all aspects of its electricity sector, most recently the retail sector.

### Electricity laws

- The *Basic Act on Energy Policy* was enacted in June 2002. This Act sets out the principles regarding energy policy, energy security, adaptability to the environment and the utilisation of market mechanisms.
- The *Electricity Utilities Law* (amended significantly in 1995) aims to protect the benefits to consumers of electricity, to manage the development of the electricity utility supply business, to secure public safety and to contribute to environmental preservation by regulating the installation, construction and operation of electrical facilities.

- The Electricity and Gas Market Surveillance Commission was established in September 2015 to ensure that electricity companies comply with the *Electricity Utilities Law*. The Commission monitors issues related to consumer protection, market power, the neutrality of network operators and it can also recommend changes to the market rules.

### Generation, distribution and transmission

- The electricity producers in Japan are strictly regulated by METI. Before the liberalisation of the electricity retail sector in 2016, electric power businesses in Japan were classified as either General Electric Utilities, Wholesale Electric Utilities, Independent Power Producers, Power Producers and Suppliers or Specified Electric Utilities.
- The General Electric Utilities are responsible for supplying electricity, from power generation to distribution, to the consumers in their respective service area. There are 10 General Electric Utilities in Japan, namely, Hokkaido Electric Power Company, Tohoku Electric Power Company, Tokyo Electric Power Company, Chubu Electric Power Company, Hokuriku Electric Power Company, Kansai Electric Power Company, Chugoku Electric Power Company, Shikoku Electric Power Company, Kyushu Electric Power Company and Okinawa Electric Power Company. In the past, the electric power business in Japan was dominated by General Electric Utilities, which had monopoly control in their respective areas.
- As part of the deregulation of the electricity sector, 280 electricity retailers were registered in April 2016 and approximately 530,000 applications for switching power suppliers were filed. By March 2016, approximately 80% of consumers were considering changing power suppliers. This deregulation is set to intensify competition between power retailers. By 2020, the whole market is set to open up, with regional power companies losing monopoly on infrastructure.



- The Organisation for Cross-regional Coordination of Transmission Operators was established in April 2015 with the purpose of strengthening the capacity to transmit electricity beyond each of the service areas of the ten general transmission utilities.
- Currently 1,200MW of electricity can be transmitted between Japan's western and eastern regions. However, the difference in frequency (60Hz in the west as opposed to 50Hz in the east), makes east-west power transmission relatively difficult.

## RENEWABLES INDUSTRY OVERVIEW

- Prior to the Fukushima nuclear accident, nuclear power plants generated approximately 30% of Japan's energy. Since the accident, almost all of Japan's nuclear power stations have been switched off, and there have been unprecedented renewable energy opportunities in Japan. Some nuclear plants were shut down as a result of residents seeking injunctions in local courts.
- There was initial uncertainty in the renewables industry following the re-election of the pro-nuclear Liberal Democratic Party in 2012. However, Japan continues to be one of the most promising renewables markets in the Asia-Pacific.
- Japan has one of the most generous feed-in tariff schemes in the world.

### Hydropower

- Hydropower is the largest renewable energy contributor to Japan's overall electricity supply.
- About two-thirds of Japan's estimated hydropower reserves have already been developed.

### Wind energy

- Hilly and mountainous terrain has presented challenges to wind energy development. However, Hokkaido and Tohoku are two of the regions where large-scale wind farms continue to be constructed. Within these two prefectures, the Japanese Government has also committed to the construction of a high voltage transmission network to help wind producers gain grid access.

- Offshore wind continues to be a promising area for many investors. The 2016/17 financial year is expected to be a record year for offshore wind investment in Japan fuelled by feed-in tariffs and relaxed rules on developing offshore wind farms in harbours and ports. According to the Japan Wind Power Association, from March 2016 to March 2017, approximately 300MW of wind capacity was added, up from around 157MW for the same time the previous year.

### Solar energy

- Japan ranked first on the International Trade Administration list of top solar export markets in 2016. Japan is a leading producer of photovoltaic panels and regarded as a global pioneer in the residential solar market. Approximately 45% of photovoltaic cells in the world are manufactured in Japan (although Japan faces increasing competition from Chinese manufacturers).
- On 22 February 2016, METI's feed-in tariff pricing committee proposed to reduce rates by 11.15% for above 10kW solar usage, which was a sign of tightening government budgets and a period of reduced incentives.
- To promote the use of photovoltaic cells in households, the Government offers installation cost subsidies.

### Geothermal energy

- The potential for geothermal power is significant, but strict regulations have kept geothermal power from growing quickly. For example, nearly 80% of Japan's geothermal resources are located within national parks or protected hot springs, which are designated restricted zones with limits on the type and location of work that can be done.
- METI is considering 36 additional geothermal projects in addition to the 537MW of capacity at the 17 facilities that currently exist. Japan aims to increase geothermal capacity by another 50MW by 2020.



- Japanese petroleum company Idemitsu Kosan began construction of a 5MW geothermal power plant in Japan's south-western prefecture of Oita. The project will be one of the largest binary power plants in Japan.
- In June 2016, the Japan Oil, Gas and Metals National Corporation (an organisation under the jurisdiction of METI), established an Advisory Committee for Geothermal Resources Development, aiming to support regional municipalities in playing increasing roles as coordinators for appropriate management of geothermal resources. Many regional municipalities are facing challenges regarding this issue, including a lack of accumulated expertise on the development of geothermal resources and a shortage of networks to find appropriate experts.

#### Biomass/biogas energy

- Japan has the fifth largest biomass market in the world.
- In November 2015, 85MW worth of biomass capacity was commissioned, the largest amount since the feed-in tariff regime was launched.
- The Government sees biomass energy as a key renewables source, and has introduced a range of support measures such as start-up grants to biomass-power producers, and policies to assist in raw material procurement to boost the domestic biomass-power market.

#### Ocean energy

- In late 2014, Japan's New Energy and Industrial Technology Development Organisation selected two major industrial corporations, IHI Corp and Toshiba Corp, to start field testing ocean energy generation in the near future in the form of a turbine system driven by the ocean current.

### CURRENT ISSUES IN THE RENEWABLES INDUSTRY

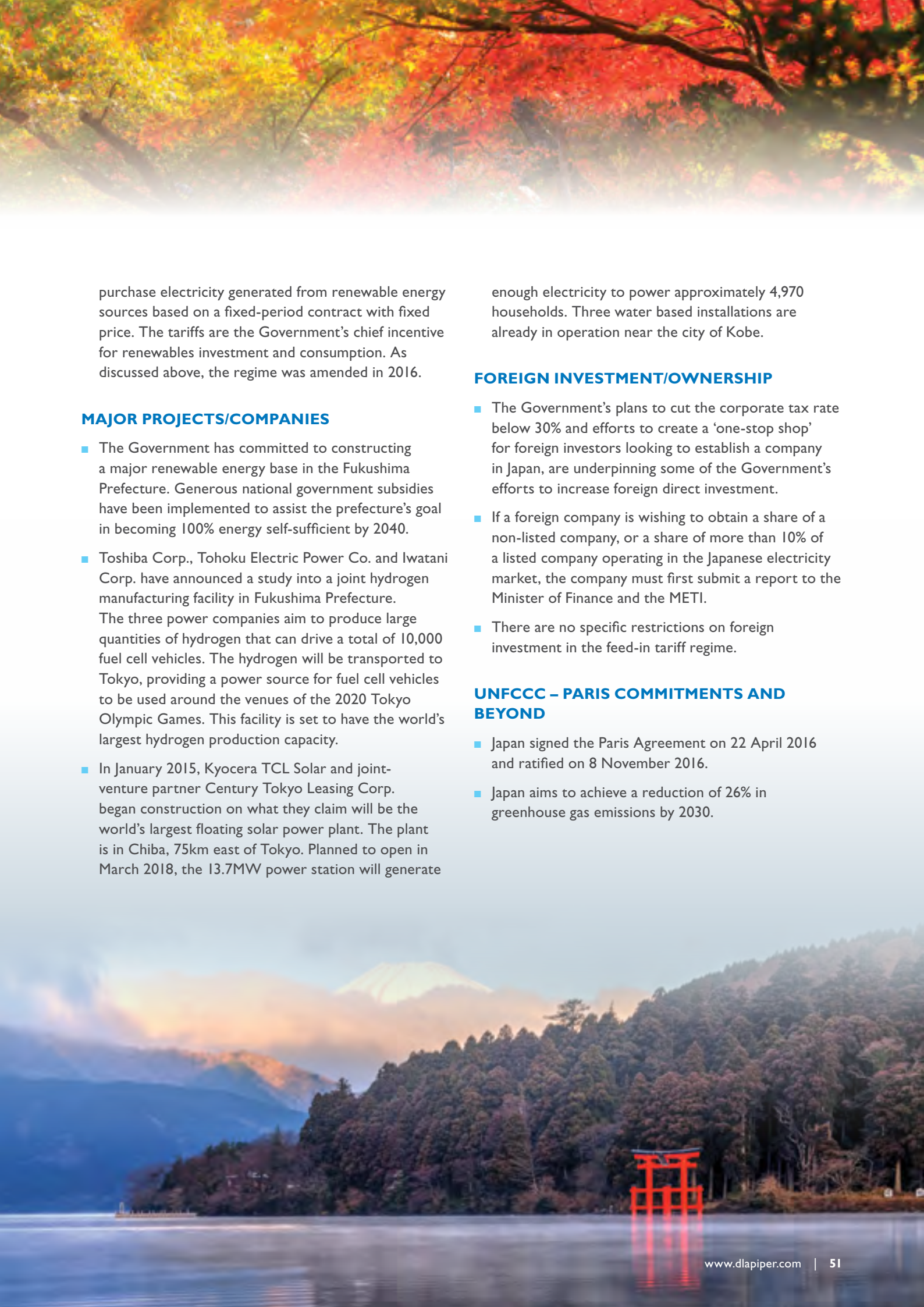
- Nuclear energy remains unpopular amongst the Japanese public, with support for renewable energy options continuing to rise despite the likelihood of electricity price rises if renewable energy options are developed more rapidly.
- In 2015, the Government published a "Long-term Energy Supply and Demand Outlook" to present the ideal structure of energy supply and demand for 2030. Energy efficiency and renewable energy was said to play a key role in achieving this objective.
- The Government has been undertaking substantial reforms of the electricity sector and also the specific legislation governing renewable energy.
- Complex environmental impact assessments and zoning restrictions continue to be significant barriers to guaranteeing power markets for investors.

### RENEWABLES LAWS

- The *Act on Special Measures Concerning Procurement of Renewable Energy-Sourced Electricity by Electric Utilities* promotes the use of renewable energy sources for electricity, recognising that renewable energy is a "stable and appropriate" source of energy for the economic and social environment in Japan and abroad. The Act was amended on 3 June 2016, to reflect the Government's revised 2030 goal of having 22 to 24% contribution from renewable energy sources to overall capacity. The 2016 amendments also introduced a new certification system for feed-in tariff eligibility and introduced a tender bid system for feed-in tariffs, initially for large-scale solar projects.

### GOVERNMENT INCENTIVE PROGRAMS

- The *Act on Purchase of Renewable Energy Sourced Electricity by Electric Utilities* established a feed-in tariff regime in 2012, by requiring electric utilities to



purchase electricity generated from renewable energy sources based on a fixed-period contract with fixed price. The tariffs are the Government's chief incentive for renewables investment and consumption. As discussed above, the regime was amended in 2016.

### MAJOR PROJECTS/COMPANIES

- The Government has committed to constructing a major renewable energy base in the Fukushima Prefecture. Generous national government subsidies have been implemented to assist the prefecture's goal in becoming 100% energy self-sufficient by 2040.
- Toshiba Corp., Tohoku Electric Power Co. and Iwatani Corp. have announced a study into a joint hydrogen manufacturing facility in Fukushima Prefecture. The three power companies aim to produce large quantities of hydrogen that can drive a total of 10,000 fuel cell vehicles. The hydrogen will be transported to Tokyo, providing a power source for fuel cell vehicles to be used around the venues of the 2020 Tokyo Olympic Games. This facility is set to have the world's largest hydrogen production capacity.
- In January 2015, Kyocera TCL Solar and joint-venture partner Century Tokyo Leasing Corp. began construction on what they claim will be the world's largest floating solar power plant. The plant is in Chiba, 75km east of Tokyo. Planned to open in March 2018, the 13.7MW power station will generate

enough electricity to power approximately 4,970 households. Three water based installations are already in operation near the city of Kobe.

### FOREIGN INVESTMENT/OWNERSHIP

- The Government's plans to cut the corporate tax rate below 30% and efforts to create a 'one-stop shop' for foreign investors looking to establish a company in Japan, are underpinning some of the Government's efforts to increase foreign direct investment.
- If a foreign company is wishing to obtain a share of a non-listed company, or a share of more than 10% of a listed company operating in the Japanese electricity market, the company must first submit a report to the Minister of Finance and the METI.
- There are no specific restrictions on foreign investment in the feed-in tariff regime.

### UNFCCC – PARIS COMMITMENTS AND BEYOND

- Japan signed the Paris Agreement on 22 April 2016 and ratified on 8 November 2016.
- Japan aims to achieve a reduction of 26% in greenhouse gas emissions by 2030.



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# MALAYSIA

## OVERVIEW

**Jurisdiction:** Common law, Islamic law and Sharia law

**Language:** Bahasa Malaysia (official), English, Chinese dialects, Tamil, Telugu, Malayalam, Panjabi and Thai

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 23 of 190 (down 1 ranking)

2016/17 Global Competitiveness Index: 25 of 138 (down 7 rankings)

2017 Index of Economic Freedom: 27 of 180 (up 2 rankings)

2016 Corruption Perceptions Index: 55 of 176 (down 1 ranking)

2015 UN Development Programme Human Development Index: 62 of 188 (no change)

Population: 31.7 million

GNI per capita: US\$10,570

## PROFILE

Malaysia federated in 1963. The early years of the country were marred by a number of internal conflicts, territorial claims from neighbouring countries and Singapore's secession from the federation in 1965.

Presently, Malaysia comprises 13 states and three federal territories. Former Prime Minister Tun Dr. Mahathir bin Mohammad (1981 – 2003) is largely credited with transforming Malaysia's economy. The pro-business policies of successive governments have ensured that manufacturing, services and tourism are Malaysia's dominant industry sectors. In recent years, the country has faced a corruption scandal involving the national sovereign wealth fund, IMBD.



## ELECTRICITY INDUSTRY OVERVIEW

- Malaysia's total installed electricity capacity is approximately 30GW (not including private generation). Of this amount, gas and coal-sourced electricity contributed over 90% of capacity.
- Malaysia has nearly achieved 100% electrification. This is a significant recent increase considering electrification was only 80% in 1990.
- Key government bodies in the energy sector include the:
  - Energy Section of the Economic Planning Unit of the Prime Minister's Department;
  - Ministry of Energy, Green Technology and Water which facilitates and regulates the energy sector; and
  - Energy Commission, which was established under the *Energy Commission Act 2001* to also regulate the energy sector with a particular focus on the electricity supply and piped gas supply industries in Peninsula Malaysia and Sabah.
- The Sustainable Energy Development Authority (**SEDA**) is the statutory authority empowered under the *Sustainable Energy Development Authority Act 2011* to:
  - promote Malaysia's national policy objectives for renewable energy;
  - promote investment in the renewable energy sector; and
  - advise the Malaysian Government on sustainable energy.

### Electricity laws

- The *Electricity Supply Act 1990 (ESA)* regulates a number of aspects of electricity supply, including the:
  - supply of electricity at reasonable prices;
  - licensing, registration and control of any electrical installation, plant and equipment with respect to matters relating to the safety of persons; and
  - efficient use of electricity.

- In 2015, the Malaysian Parliament approved a bill to amend the ESA with the aim of enhancing governance in the electricity supply industry by ensuring better efficiency, reliability and safety. This bill received Royal Assent on 30 October 2015 and commenced operation on 1 January 2016.
- The *Energy Commission Act 2001* is another principal piece of legislation. It provides for the establishment of the Energy Commission. The Energy Commission has powers to regulate energy supply activities in Malaysia, and to enforce the energy supply laws.
- Other laws regulating the electricity industry include the:
  - *Electricity Regulations 1994*;
  - *Electricity Supply (Compounding of Offences) Regulations 2001*; and
  - *Licensee Supply Regulations 2008*.

### Generation, distribution and transmission

- Despite some privatisation, Malaysia's electricity industry is mostly vertically integrated and monopolistic. The three main utility companies that are responsible for generation, transmission and distribution of electricity are:
  - Tenaga Nasional Berhad (**TNB**) for Peninsula Malaysia, a state owned enterprise that is wholly owned by the Malaysian Government;
  - Syarikat SESCO Berhad (**SESCO**) (formerly known as Sarawak Electricity Supply Corporation) for Sarawak, fully privatised in 2005; and
  - Sabah Electricity Sdn Bhd (**SESB**) (formerly known as Sabah Electricity Board) for Sabah, a mixed ownership enterprise owned by both TNB (80%) and the State Government of Sabah (20%).
- The three main utility companies are now complemented by Independent Power Producers and, to a lesser extent, by dedicated power producers and co-generators.



- In 1993, licenses were issued to Independent Power Producers to build, operate and own power plants. In 2015, there were 27 Independent Power Producers, which contribute approximately 43% of the total installed electricity generation capacity in Malaysia.
- TNB also transmits and distributes electricity. SESB and SESCO respectively generate, transmit, and distribute electricity in their respective state grids.

## RENEWABLES INDUSTRY OVERVIEW

- According to SEDA, Malaysia's total installed renewables capacity is 440MW. Continued economic growth (predicted at up to 3% per year to 2030), is likely to ensure continuing growth in electricity demand.
- Malaysia's target is to have 2,080MW of renewable energy capacity by 2020, comprising 11% of total electricity capacity nation-wide.
- In 2010, the National Renewable Energy Policy and Action Plan was approved, followed by the introduction of feed-in tariffs as a key stimulus for development of renewable energy (see below). The plan provides long-term renewables goals and is updated every five years. The Ministry of Energy, Green Technology and Water has confirmed a new plan will be released soon.
- There is a renewable energy component to the Government's general 2016 – 2020 plan. Under the plan, the Government will focus on diversifying Malaysia's energy mix in a more sustainable manner, creating employment opportunities and skills enhancement. The industry is expected to create about 15,300 jobs with training provided to 1,740 personnel in the biomass, biogas, mini hydro and solar photovoltaic energy sectors.

### Hydropower

- TNB oversees three major hydroelectric power generating schemes including the Kenyir Sultan Mahmud Power Station (400MW), Pergau Hydroelectric Power Station (600MW) and the Temenggor Hydroelectric Power Plant (348MW).

- Sarawak energy has two hydroelectric power stations, each producing 108MW and 944MW of energy respectively.
- Malaysia is also focusing on the development of small hydro with a goal of adding 490MW by 2020 to increase renewable energy.

### Wind energy

- Onshore wind sites are limited, however they have exhibited potential for small and medium scale projects, with average wind speeds of 4.1m/s recorded in the eastern peninsula region of Malaysia.
- While the wind industry is underdeveloped at present, SEDA have confirmed that a wind mapping exercise has recently been completed and the estimated capacity for wind energy will be published in due course.

### Solar energy

- According to SEA, Malaysia has a solar photovoltaic capacity of 292MW.
- With the support of the United Nations, Malaysia initiated the Malaysian Building Integrated Photovoltaic project in 2005 with the aim of promoting grid-connected photovoltaic systems and developing a solar photovoltaic policy framework. From 2006 to 2010, around 2MW of grid-connected photovoltaic systems were installed.
- Under the national renewable energy plan, Malaysia aims to install cumulative solar photovoltaic capacity of 399MW by 2025 and 854MW by 2030. This aim looks set to be fulfilled well ahead of time based on the current pace of development of the solar photovoltaic market.
- According to the Ministry of Energy, Green Technology and Water, feed-in tariff subscriptions for individual solar photovoltaic installations are closed. However, the Government is still accepting feed-in tariff subscriptions for community solar photovoltaic installations. The tariff is guaranteed for 21 years under the nation's *Renewable Energy Act 2010*.



### Geothermal energy

- Malaysia's first geothermal power plant in Apas Kiri is set to be operational by June 2018. It is expected to export approximately 30MW of power to the Sabah electricity grid.
- The Government is also increasing geothermal exploration as part of the nation's 'Eleventh Plan'.

### Biomass/biogas energy

- According to SEDA, biogas has a total installed capacity of approximately 34MW nation-wide, with biomass capacity at approximately 88MW.
- Some of the challenges faced by the biomass industry are the limited development of policy and limited coordination among local agencies and biomass industry, a lack of reliable and clear data on the potential of biomass in the market, and limited funding support.
- Palm oil, which is more readily associated with environmental destruction, is also a major source of renewable energy in the country. Malaysia is the largest palm oil producer in the world, with potential biomass and biogas production from palm oil mill waste estimated to be well over 1,000MW.

### Ocean energy

- Ocean energy is currently not a source of renewable energy in Malaysia. The viability of ocean energy is nonetheless being considered as part of the Government's 'Eleventh Plan'.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- Fragmented governance and multiple agencies with overlapping roles, authorities, responsibilities and jurisdictions have created complexities in governing the energy sector.
- Malaysia faces an uphill battle in meeting its renewable energy target (2,080MW by 2020), considering that current installed capacity is approximately one-quarter of the target amount. The country was well short of the 2015 target (985MW) and, even if all planned renewable energy installations are constructed, the 2020 target will not be achieved. Commentators have noted the Government's chief mechanism incentivising renewable energy – the feed-in tariff scheme – is not sufficiently funded to meet the ambitious target.
- Despite these concerns, a number of large-scale solar farms were announced for development in 2016 (see below).

## RENEWABLES LAWS

- The principal piece of legislation governing renewables in Malaysia is the *Renewable Energy Act 2011*. The Act sets out the mechanics for a feed-in tariff for renewables-sourced energy.
- Numerous rules have been issued under the Act, including the:
  - Renewable Energy (Feed-in Approval and Feed-in Tariff Rate) Rules 2011;
  - Renewable Energy (Technical and Operational Requirements) Rules 2011;
  - Renewable Energy (Renewable Energy Power Purchase Agreement) Rules 2011;
  - Renewable Energy (Criteria for Renewable Resources) Regulations 2011;
  - Renewable Energy (Allocation from Electricity Tariffs) Order 2011;
  - Renewable Energy (Recovery of Moneys by Distribution Licensee) Rules 2011; and
  - Renewable Energy (Administrative Fees) Rules 2011.
- Guidelines have been introduced to administer the Net Energy Metering Scheme including the Guidelines of Solar Photovoltaic Installation on the Net Energy Metering Scheme.





## GOVERNMENT INCENTIVE PROGRAMS

- The feed-in tariff is Malaysia's main mechanism incentivising the generation of renewable energy for facilities up to 30MW. Special approval from the Minister will need to be obtained for renewable energy installations with an installed capacity of more than 30MW. The feed-in tariff system is financed by electricity consumers themselves, who contribute 1% of their total electricity bill towards the renewable energy fund.
- While individual solar photovoltaic installations are now closed, community-based solar photovoltaic, biogas and biomass are still eligible for distribution licences under the scheme, with solar photovoltaic guaranteed for 21 years and biogas and biomass for 16 years. It is hoped the long-term government commitment to the scheme will give investors sufficient confidence.

## MAJOR PROJECTS/COMPANIES

- The Sabah and Sarawak Biomass Industry Development Plan, launched in February 2016, hopes to leverage the rapid growth in the biomass industry, building on an already accelerating level of interest. In 2014, 12 biomass projects worth a total RM82.9 billion (approx. US\$18.75 billion) had been approved.
- In May 2016, it was announced that Edra Power Holdings is set to build a RM400 million (approx. US\$90.5 million) solar power plant in Kedah with an estimated capacity of 50MW.
- In 2016, a consortium consisting of MMC Corporation-linked Malakoff Corporation and a DRB-Hicom unit announced they will also build a large-scale solar plant.
- Sarawak Energy received approval to build Sarawak Energy's biggest hydroelectric project in 2016. The project will produce 1,285MW of electricity.

## FOREIGN INVESTMENT/OWNERSHIP

- According to Rule 3(c)(i) of the *Feed-in Tariff Rules 2011*, foreign companies must partner with a Malaysian company. This is because only 49% foreign ownership is permitted under Malaysian law.
- Malaysia nonetheless has a relatively liberal foreign investment policy allowing investments across a range of industries. Recent legislative amendments relating to the regulation of companies and taxation incentives have attempted to encourage business growth in the face of the IMBD scandal, which damaged the country's investor reputation.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Malaysia signed the Paris Agreement on 4 November 2016 and committed to reduce its 'carbon intensity' by 45% by 2030 subject to conditions regarding financing assistance and transfer of technology.
- Malaysia also committed to maintain at least 50% of land areas as forest and tree cover.
- Malaysia is yet to introduce domestic legislation enforcing the Paris Agreement.

## RELEVANT WEBSITES

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- The Energy Commission – [www.st.gov.my](http://www.st.gov.my)
- Sustainable Energy Development Authority of Malaysia – <http://seda.gov.my/>
- Tenaga Nasional Berhad – <http://www.tnb.com.my/>
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# THE MALDIVES

## OVERVIEW

**Jurisdiction:** Common law and Islamic law

**Language:** Dhivehi

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 135 out of 190 (down 6 rankings)

2016/17 Global Competitiveness Index: Not listed

2017 Index of Economic Freedom: 157 out of 180

2016 Corruption Perceptions Index: 95 out of 176

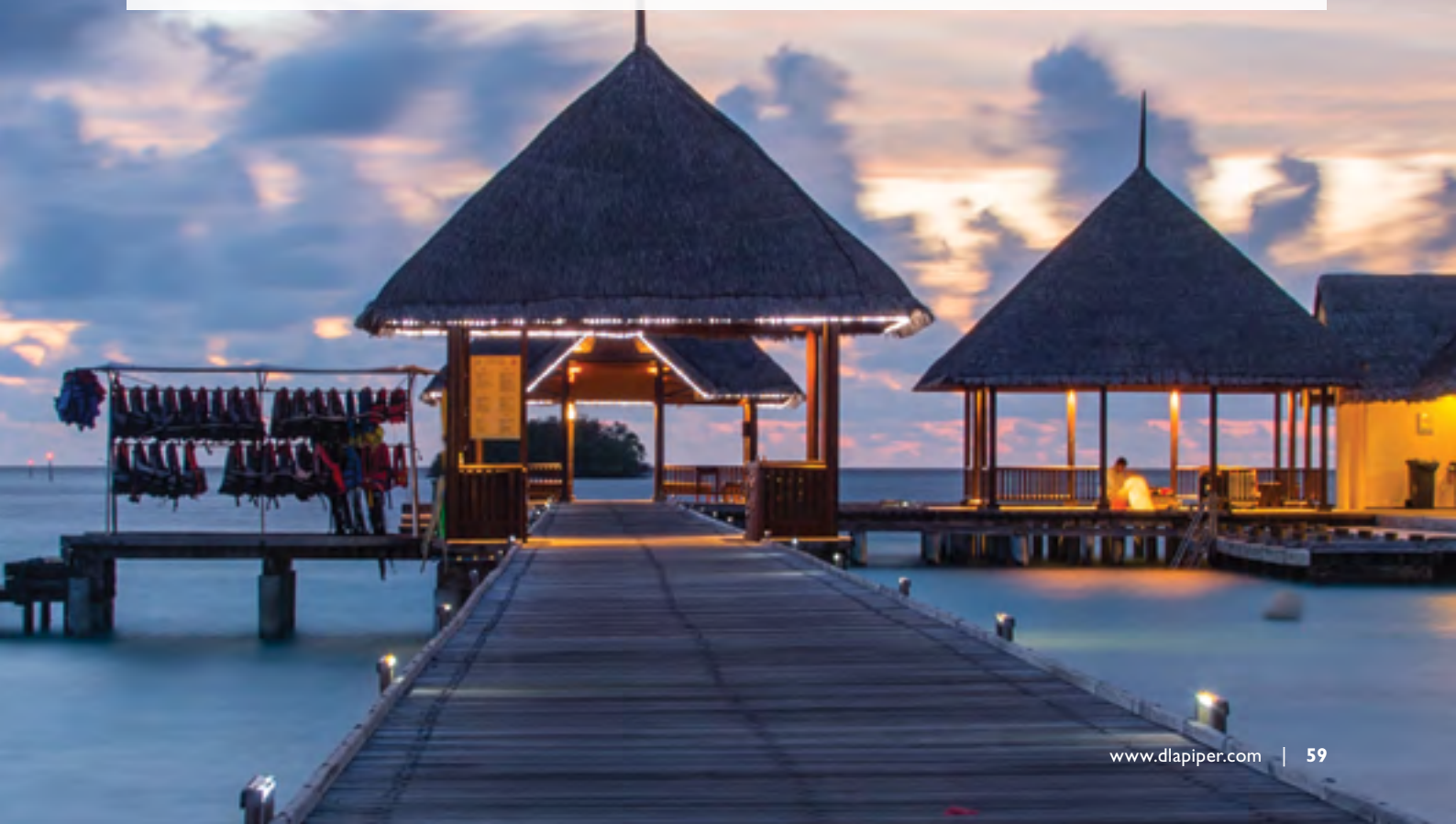
2015 UN Development Programme Human Development Index: 105 of 188

Population: 407,660

GNI per capita: US\$6,950

## PROFILE

The Maldives is comprised of 1,192 low-lying coral islands scattered across 90,000 km<sup>2</sup> of the Indian Ocean. It is the smallest country in Asia by land area (300km<sup>2</sup>) and the 'lowest' country in the world (average of 1.5m elevation above sea level). The Maldives was a British protectorate for 78 years until the country declared its independence in 1965. From 1978 to 2008, Maumoon Abdul Gayoom was elected to six successive presidential terms in single-party elections. In 2008, a new constitution was introduced and multi-party elections were held. The Maldives' economy is reliant on its tourism and fishing sectors, which have recovered since the country's people and infrastructure were badly affected by the 2004 Asian tsunami. The Maldives recently left the Commonwealth bloc.





## ELECTRICITY INDUSTRY OVERVIEW

- In 2015 (the latest reliable data), the Maldives' total installed electricity capacity was 330MW. Almost all electricity is generated from imported petroleum.
- Each of the 186 inhabited islands of the Maldives has a separate electricity powerhouse.
- Although all the inhabited islands have had an electricity supply since 2008, as at 2015, about 80 of these islands had a constant electricity supply.
- Tourist resorts both produce and consume approximately 60% of the Maldives' electricity.

### Regulators

- The end-cost of electricity in the Maldives is US\$0.27/kWh.
- In February 2016, the Government discontinued electricity subsidies and revised tariff rates. Due to public complaints, the President has indicated that this tariff will be further revised.
- In June 2016, the Government regulator hiked tariff rates for large businesses.

### Generation, distribution and transmission

- Electricity generation, distribution and transmission infrastructure is owned and operated by the public State Electric Company Ltd (**STELCO**), FENAKA Corporation Ltd (**FENAKA**), Malé Water and Sewerage Company Pvt. Ltd (**MWSC**) and by private island development committees.
- STELCO and FENAKA are 100% owned by the Maldives Government, while MWSC is 70% owned by the Government.
- There is no national electricity generation, distribution or transmission grid.

## RENEWABLES INDUSTRY OVERVIEW

- With much fanfare (including an underwater cabinet meeting highlighting the Maldives' vulnerability to climate change), former President Mohamed Nasheed announced ambitious renewables targets for the

Maldives in 2009, which included carbon neutrality for the nation by 2020 and 100% renewables use by 2020. Successive administrations following President Nasheed have downgraded the Maldives' commitments. Most recently, as part of the Paris Agreement, the Maldives pledged to reduce greenhouse gas emission by 10% before 2030. The Government has indicated that the chief manner in which it will achieve these reductions is through increasing renewable energy generation.

- The current contribution of the renewables industry to energy supply is limited (confined largely to solar water heaters in resorts). However, there are significant incentives for the Maldives to increase its renewables contribution, including the energy insecurity caused by its almost complete reliance on imported fuel, the cost of subsidising electricity generation and the difficulty in maintaining a constant electricity supply across its archipelago.
- A 2011 joint report by the Scottish and Maldivian Governments estimated that the Maldives' installed renewables capacity was 209.8kW.
- Impediments to renewables development in the Maldives include the scarcity of land and the visual impact of any renewables projects in a nation reliant on tourism.

### Hydropower

- No wide-ranging assessments have been made as to the Maldives' hydropower energy potential (although this is considered limited due to flat topography and land constraints).

### Wind energy

- Limited assessments have been made of the Maldives' wind prospects. An IRENA report indicated that onshore wind could be the second most lucrative renewables sources in the Maldives (see below).
- Concerns over the visual impact of wind farms on 'island landscapes' near tourist areas have been raised.



### Solar energy

- The Maldives is located close to the equator and its islands have an average insolation of 5 to 5.5 kWh/m<sup>2</sup> per day, which ideally positions the country for solar energy usage. Currently, the use of solar energy is largely restricted to tourist resorts, which use solar heating for half of their water heating requirements.
- IRENA has identified solar photovoltaic as the most viable renewables source in the Maldives (see below).

### Geothermal energy

- No assessments have been made as to the Maldives' geothermal energy potential.

### Biomass/biogas energy

- The outer islands of the Maldives have used coconut husks and shrubs as their primary energy source for domestic purposes, but these households are increasingly using kerosene and liquefied petroleum gas for cooking.
- Landfill gas has been identified as a potential energy source.

### Ocean energy

- In 2011, the Scottish and Maldivian Governments partnered to produce a report on the potential for the development of wave, tidal and ocean thermal sources of renewable energy in the Maldives. The report noted that ocean energy does not have the “visual footprint” associated with solar and wind energy (which would be a concern for the Maldives because of its reliance on the tourism industry). Although the report commented that “in the foreseeable future marine energy from currents will be part of the renewable energy portfolio in the Maldives”, it concluded that “it is unlikely that ocean thermal energy will form part of that portfolio”.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- In September 2015, IRENA released a comprehensive report into renewable energy development in the Maldives. Some of IRENA's key recommendations included:
  - current efforts at exploiting renewable energy could be better directed;
  - the Government should set “ambitious, achievable and clearly identified” renewable energy goals. This was due to a government announcement calling for 30% of daytime peak load in all inhabited islands to come from renewables by around 2020;
  - solar photovoltaic has the highest generation potential in the Maldives, with onshore wind the second highest potential;
  - the Maldives should consider importing “renewables fuels” such as biodiesel for use in existing diesel generators, which currently operate on a blend of traditional diesel and biodiesel. IRENA noted that biodiesel generators could support renewables generators;
  - any renewables deployments should promote renewables use in resort islands and tourism facilities given the significant proportion of installed generation capacity from these islands and tourism facilities;
  - the Maldives should consider revising its current policy framework which “is not conducive to large-scale renewable energy deployment”; and
  - before large-scale renewables deployment, interconnectors should be built between the main islands by undersea cables.
- Despite some political uncertainty in recent years, the country is nonetheless performing well economically and anticipating strong investment.



## RENEWABLES LAWS

- The Maldives does not have a renewable energy law, however the country has initiated many policies concerning renewable energy. Some of the most important Maldivian energy policies include the:
  - Renewable Energy Technology Development and Application Project (2004);
  - Maldives Energy Action Plan (2009 – 2013);
  - Maldives National Energy Policy & Strategy (2010);
  - Maldives Renewable Energy Framework (2011);
  - Maldives Energy Policy (2011); and
  - Maldives Energy and Policy Strategy (2016).
- In addition, the Maldives is participating in the Scaling-Up Renewable Energy in Low-Income Countries Program, which is backed by the Climate Investment Fund and involves renewables investments into a number of developing countries. The Government is implementing this program through the Maldives Scaling up Renewable Energy Investment Plan (2013 – 2017). Two important sub-programs ‘sit’ underneath the plan:
  - Accelerating Sustainable Private Investment for Renewable Energy program (**ASPIRE**), which among other objectives, is seeking to commission around 4MW of rooftop solar projects in Malé and Hulhamale, with an eventual target of 35MW to 50MW of solar photovoltaic generation that will require more than US\$60 million investment; and
  - Preparing Outer Islands for Sustainable Energy Development Programme (**POISED**). This programme will support achieving full renewable energy systems on 25 electricity consuming islands through rehabilitating inefficient generators and making other necessary adjustments. The Asian Development Bank will be the lead agency. The Asian Development Bank has provided the Maldives’ Government with a loan to support the POISED project, which will provide 24-hour electricity supply to 40 outer islands.
- Many energy plans focus on the capital of Malé, which is one of the highest density cities in the world and is home to a large proportion of the country’s population.

## GOVERNMENT INCENTIVE PROGRAMS

- Renewable energy equipment is exempt from Maldivian duties.
- General investment incentives are offered through the Ministry of Economic Development and Invest Maldives.

## MAJOR PROJECTS/COMPANIES

- The Government will provide special incentives and concessions for those investing and doing business in the country’s Special Economic Zones. These zones have been described as an integral part of the ongoing work to stimulate economic growth in the Maldives.
- Despite being a small country, the Maldives sits at the juncture of major powers. The country is culturally aligned with India, but also attracting significant interest from China as the Maldives sits along President Xi Jinping’s ‘maritime silk road’. The Maldives is increasingly attracting foreign investment from the Arab world too, especially Saudi Arabia and Qatar.

## FOREIGN INVESTMENT/OWNERSHIP

- In recent years, the Maldives’ Government has initiated a number of policies and laws aimed at increasing foreign investment. For instance, under a 2015 revision to the Maldives’ Constitution, foreigners are permitted to own land if the investor reclaims more than 70% of the land and invests more than US\$1 billion. Leases to foreign companies within the tourism sector are common.
- Under the recently-passed *Special Economic Zone Act (Act No. 24/2014)*, a company with 51% Maldivian holding is allowed to take a freehold interest in property.
- Relevant laws in relation to foreign investment include:
  - *Law on Foreigners Doing Business in the Maldives (No. 4/79)*, which concerns the formation, registration and operation of all foreign investments in the Maldives;
  - *Companies Act (10/96)*; and
  - *Regulation of Employment of Foreign Nationals (2011/R-22)*, which requires employers to apply for a foreign worker quota.



- The Maldives' Government has also established a one-stop shop for foreign investors called Invest Maldives, which advertises that foreign investors enjoy no foreign exchange restrictions, no restrictions on the repatriation of earnings and capital proceeds and right to 100% foreign ownership (although this excludes land).
- Taxation rates in the Maldives are low by regional standards, with a:
  - 6% general goods and services tax;
  - 12% tourism goods and services tax (in addition to a small daily 'green tax' on tourists);
  - 10% withholding tax if certain payments are made to a person not resident in the Maldives in a tax year;
  - 15% business profits tax; and
  - 15% tax on property transfer (although this is not applicable to foreigners because of the restrictions on foreign land ownership).
- There is presently no personal income tax (a bill proposing personal income tax in 2012 subsequently lapsed) nor different tax rates for foreigners as compared with Maldivian nationals. In October 2016, the Government introduced a 3% remittance tax on money transferred out of the Maldives by expatriate workers.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- The Maldives was among the first countries to ratify the Paris Agreement on 4 April 2016 and in its Intended Nationally Determined Contribution committed the country to reducing its greenhouse gas emissions by 10% before 2030. The Maldives also set a conditional target of up to 24% by 2030 "in the context of sustainable development, supported and enabled by availability of financial resources, technology transfer and capacity building".
- At the Paris Conference in December 2015, a message delivered on behalf of the Maldives' President underlined the importance of climate change mitigation and adaptation efforts for the future of the country: "The Maldives believes that climate change poses as the most pressing developmental and security challenge of the 21st Century. As one of the world's lowest lying island nations, our country faces potentially devastating impacts if bold climate action is not taken immediately."



## RELEVANT WEBSITES

- Invest Maldives – <http://investmaldives.gov.mv/index.php>
- Republic of Maldives, Strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation 2010-2020 – <http://ndmc.gov.mv/assets/Uploads/Strategic-National-Action-Plan-for-Disaster-Risk-Reduction-and-Climate-Change-Adaptation-2010-2020-Provisional-Draft.pdf>
- Republic of Maldives, National Energy Policy and Strategy – <http://www.environment.gov.mv/v1/wp-content/blogs.dir/1/files/publications/20131212-Pub-Maldives-National-Energy-Policy-and-Strategy-2010.pdf>
- Guide for investing in Maldives Special Economic Zones – [http://www.sez.gov.mv/downloads/Guidelines\\_for\\_SEZ\\_application.pdf](http://www.sez.gov.mv/downloads/Guidelines_for_SEZ_application.pdf)
- Scaling-Up Renewable Energy Program – The Maldives – <http://www.climateinvestmentfunds.org/country/maldives>
- Renewable Energy Maldives – <http://test.renewableenergymaldives.com.mv/AboutUs/>

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- IRENA, *Renewable Energy Roadmap: The Republic of Maldives*, accessed at: <http://www.irena.org/EventDocs/Maldives/Maldivesroadmapbackgroundreport.pdf>
- Maldives Economic Vision 2013 - 2018, *Building a Sustainable & Vibrant Economy*, accessed at: [http://presidencymaldives.gov.mv/Documents/maldives\\_open\\_for\\_investment.pdf](http://presidencymaldives.gov.mv/Documents/maldives_open_for_investment.pdf)
- President Abdulla Yameen Abdul Gayoom's message for the opening day of the 21st session of Conference of the Parties (COP), accessed at: <http://www.presidentmaldives.gov.mv/Index.aspx?lid=11&dcid=16136>





# MONGOLIA

## OVERVIEW

**Jurisdiction:** Civil law

**Language:** Mongolian

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 64 of 190 (down 2 rankings)

2016/17 Global Competitiveness Index: 102 of 138 (up 2 rankings)

2017 Index of Economic Freedom: 129 of 180 (down 29 rankings)

2016 Corruption Perceptions Index: 87 of 176 (down 15 rankings)

2015 UN Development Programme Human Development Index: 90 of 188 (up 13 rankings)

Population: 3.1 million

GNI per capita: US\$3,870

## PROFILE

Mongolia is the second largest landlocked country and the most sparsely populated country in the world. Mongolia gained international recognition as a sovereign State in 1945. Due to its location, both the Chinese and Soviet Union heavily influenced the development of the country's culture, economy and institutions. Following the collapse of the Soviet Union, Mongolia became a democratic republic in 1990. However, more ethnic Mongols live in present-day Inner Mongolia, which is a northern province of China on Mongolia's southern border. The capital, Ulaanbaatar, is currently home to 45% of the population. Approximately 30% of Mongols are nomadic or semi-nomadic.



## ELECTRICITY INDUSTRY OVERVIEW

- Much of the foreign interest in Mongolia centres around its mineral wealth. Several large fossil fuel and metal-based mines have now opened in Mongolia. At present, the majority of electricity generating capacity comes from coal-fired thermal plants, which in 2015 accounted for 85% of total electricity capacity. The remaining 15% comes from diesel (7%), wind power (5%), hydropower (2%) and small-scale renewable energy (1%).
- Mongolia's energy sector is currently struggling to meet the country's growing need for electricity. Energy consumption is also increasing across the domestic and industrial sector, as mining activities continue and individual household energy demand increases. In response, the Government has commissioned various renewable and non-renewable projects in an attempt to meet demand.
- Mongolia has seasonal variations in electricity demand. Very cold winters require additional energy to be imported from Russia for heating. Electricity is also imported from China to supply the country's southern border towns and the Oyu Tolgoi mine, which is located in the Southern Gobi Desert.
- The increasing price of Russian electricity, inefficient infrastructure and the low cost of electricity for consumers is threatening the financial viability of Mongolia's electricity providers. The World Bank and USAID estimate that the price of electricity will need to increase by at least 60% for the energy industry to cover the costs of providing electricity to consumers. According to the 2016 Doing Business Project, the price of electricity in Mongolia is US\$0.069 per kWh.

### Present and future demand

- Industry (principally, the mining industry) is the biggest consumer of electricity in Mongolia, followed by household users. According to a 2014 study from the International Energy Agency, industry consumed approximately 3,100GWh of electricity, compared to approximately 1,200GWh consumed by the residential sector. The Government of Mongolia estimates that 500 to 600MW will be added to existing demand by 2020.

## Electricity laws

- The following laws, regulations and legal documents relate to the energy regulation process in Mongolia:
  - Energy Law;
  - Energy Conservation Law;
  - Concession Law;
  - Economic Activity Licenses Law;
  - Civil Code;
  - Administrative Responsibility Law (to be invalid from 1 July 2017);
  - Violations law to be effective from 1 July 2017;
  - Consumers Rights Protection Law;
  - Minerals Law;
  - Renewable Energy Law; and
  - Competition Law.

## Generation, distribution and transmission

- The Mongolian electricity distribution system is made up of four independently operating grids, namely the:
  - Central Energy System, which provides more than 90% of the national electricity supply and serves Ulaanbaatar and surrounding areas. It is comprised of five coal powered plants and an interconnection with Russia;
  - Eastern Energy System, which has one combined heat and power plant;
  - Western Energy System, which relies on the importation of electricity from Russia; and
  - Altai-Uliastai Energy System.

## Government

- The Mongolian Government plays an active part in the renewables industry through a number of ministries and authorities:
  - The Ministry for Energy is responsible for formulating energy policies and also approves foreign investment;



- The Energy Regulatory Commission of Mongolia undertakes broad research into and technical monitoring of the energy sector. One of the divisions within the Commission is the Renewable Energy Division. The Energy Regulatory Commission is responsible for fixing energy prices, issuing licenses, setting tariffs and generally regulating the sector;
  - The Authority for Fair Competition and Consumer Protection is tasked with addressing anti-competitive behaviour;
  - The National Committee on Reduction of Air Pollution is charged with reducing the high pollution levels in Ulaanbaatar; and
  - The National Renewable Energy Centre and the Ministry of Environment and Tourism.
- Mongolia has an abundance of renewable energy resources, and has tried to adopt renewable energy technologies in line with local needs. According to its 2009 findings, the National Renewable Energy Centre estimates that Mongolia’s wind energy and solar potential could be as high as 2.6TW. Further, according to the 7<sup>th</sup> National Renewable Energy Forum, there is potential to deliver wind and solar energy of over 2.5 trillion kWh per year.
  - In response to these findings, the President of Mongolia, Mr. Tsakhia Elbegdorj, has established the Gobitec concept, which aims to connect locations of high energy demand with the Gobi Desert region, which has a large renewable energy potential. As part of the concept, research is being conducted to determine how the energy produced in the region can be delivered via power corridors that would connect Russia, Mongolia, China, South Korea and Japan.

## RENEWABLES INDUSTRY OVERVIEW

- The Mongolian Government set targets in its 2014 Green Development Policy to increase the share of renewable energy in the total installed power generation capacity, with a view to reaching 20% by 2020 and 30% by 2030. Given the significant role fossil fuels play in Mongolia’s current energy mix, the country has an urgent need to diversify its fuel portfolio in order to achieve these ambitious targets.

### Hydropower

- Mongolia’s 3,800 small and big streams and rivers, which are located primarily in the northern and western areas of the country, have the potential for the generation of up to 6.4GW of hydropower and are able to deliver 56.2 billion kWh of energy per year.





- While a feasibility and environmental impact assessment for the Egiin Hydropower Power Plant was completed in 2013, the project has stalled. The Government cited trans-boundary issues and environmental concerns as the reason for the halt of the 315MW capacity project. As of February 2017, the Mongolian Government is negotiating with the Russian Government to resolve issues related to this project.

### Wind energy

- About 10% of Mongolia's total territory has been deemed as suitable for wind projects, with the country's wind energy potential amounting to at least 1.1TW. The Gobi Desert is a suitable place for the construction of wind power plants.
- The Salkhit wind farm (52MW) has been in operation since 2013. Another 52MW wind farm project commenced in 2016 in Sainshand, with an expected completion date in 2017.

### Solar energy

- Solar potential in Mongolia is quite high. The Gobi Desert is particularly suitable, with 300 days of sunshine per year, low moisture and high temperatures. The largest solar power plant, located in Darkhan, officially commenced operations on 19 January 2017 and has begun supplying electricity to the city's main electricity grid. The 10MW power station was built by Solar Power International, in cooperation with two Japanese multinational corporations. The plant also contains 32,000 solar batteries, with most equipment being supplied by the German company SMA Solar Technology AG and the Swedish company ABB.
- Since 1999, the Government of Mongolia has run the '100,000 Solar Ger Program' with the aim of providing rural families, mostly nomadic households, with a set of basic mobile solar photovoltaic systems, to supply electricity for basic needs such as lighting, radio and TV. The project is jointly funded by the World Bank and Dutch Government and provides a 50% subsidy on the cost of solar systems.

- Today, the 100,000 household target has been exceeded. However, given the limited capacity these systems can provide, it only meets very basic energy demand. There may be a need to upgrade these systems given more domestic appliances are used today, as a result of improved living standards.

### Geothermal energy

- Comprehensive geothermal resource surveys have not been undertaken in Mongolia. Geothermal energy is yet to be fully explored and developed. So far, 43 possible geothermal sites have been identified, with projects at Tsenkher, Khujirt and Shargaljuut in the Khangai region deemed the most feasible.

### Biomass/biogas energy

- The biofuel potential of the country has not been extensively explored. The Japan International Cooperation Agency reportedly conducted research into Mongolian biofuel as early as 1993, however there are no such facilities currently in Mongolia.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- A major issue currently affecting the renewables industry is the insufficient financing for projects under the Government's Renewable Energy Fund. Without sufficient finance, the incremental cost of projects is placing strain on the Government's budget and may discourage future investment in the renewables sector.
- In 2013, China announced its 'One Belt, One Road' policy, which would see the development of six major economic corridors connecting China, Central Asia, West Asia and parts of South Asia. One of those corridors would connect China, Mongolia and Russia and would be the site of new energy and industrial clusters. Construction has not yet commenced.
- The Mongolian Government has actively explored the possibility of developing a regional integrated power market in northeast Asia through which it can export wind and solar electricity to other countries.



- Despite its vast potential, the Government may choose to reduce renewables investment given the urgency of power shortfalls and the affordability of coal-generated electricity. In recent years, proposals have been made to export coal-fired power to China. One proposal involved a coal-fired power plant of 3,600MW with a high voltage direct current power line extending from the Shivee Ovoo coal field to Beijing.

### RENEWABLES LAWS

- The *Energy Law 2001* regulates matters of energy generation, transmission, distribution and dispatching, opens the industry to private investment and coordinates supply activities, as well as infrastructure matters. It was last amended in December 2015.
- The *Renewable Energy Law 2007* regulates the setting of tariffs in order to facilitate the development of clean energy production from renewable energy sources. The law also introduced the first long-term Power Purchase Agreement between the Central Energy System Transmission Network, a state-owned stock company, and Newcom Holdings.
- The *Concession Law 2010* laid the foundations for private investment in state and locally owned assets, without privatisation. Under this law, energy sources developed with private investment are eligible for government concessions.

### GOVERNMENT INCENTIVE PROGRAMS

- The Government offers a variety of incentives for renewable investments, particularly from the feed-in tariff rates. The most generous tariffs are provided in solar energy, with tariffs also for wind and hydropower energy.
- The feed-in tariff system in Mongolia has experienced issues in the past few years with the stipulation that the rates should be paid in US dollars. While this favours foreign investors by reducing the currency exchange risk, the Mongolian currency has dramatically depreciated against the US dollar. In 2016 alone, the Mongolian tugrik dropped nearly 12% against the US dollar. This has placed financial pressure on the Government to deliver on its promised tariffs.

### MAJOR PROJECTS/COMPANIES

- In 2013, the European Bank for Reconstruction and Development invested US\$47 million to help Mongolia build its first wind energy project. The Salkhit wind farm was Mongolia's first-ever private energy enterprise, and was developed by the Newcom Group. It is located 70km south of Ulaanbataar, and has a 50MW capacity, which represents 5% of the country's total electricity needs. It was connected to the country's central electricity grid in June 2013.
- In September 2016, Clean Energy Asia LLC, Japan International Cooperation Agency and the European Bank for Reconstruction and Development signed financing agreements for the construction of a 50MW wind farm in Southern Mongolia. Operations are intended to commence in December 2017.
- Newcom Group signed a memorandum of understanding in July 2016 with Korea Electric Power Corporation and Softbank Group to jointly explore investment opportunities in Mongolia's renewable energy sector. The intention behind the memorandum is to develop up to 10GW of power production.

### FOREIGN INVESTMENT/OWNERSHIP

- Foreign direct investment is critical for Mongolia's economic growth, and the foreign investment regime is considered to be very open. In 2013, the Mongolian Government introduced the Investment Law to protect the rights and interests of foreign investors in Mongolia. The law regulates the provision of tax stabilisation certificates that provide for fixed taxation rates, strengthens arbitration rights and facilitates the repatriation of profits. It was last amended in November 2016.
- In 2015, foreign investment in Mongolia decreased due to delays in decision-making regarding mining activities. In response to this slump, the Government decided to lift the moratorium on exploration licenses. However, foreign investors remain wary in response to the Government suspending a number of exploration permits in 2014 due to a corruption investigation. Mongolia's main investment partners are China, Canada, Russia, Great Britain and the United States.



## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Mongolia ratified the Paris Agreement on 21 September 2016 and committed to curbing its greenhouse gases and measuring corresponding results.
- Almost one-third of Mongolia's population still relies on traditional sectors such as agriculture and pastoral animal husbandry. These communities are vulnerable to extreme weather that often results in economic loss. In response, part of Mongolia's Intended Nationally Determined Contribution outlines measures to be adopted to support sustainable development and improve Mongolia's resilience to climate change.
- Mongolia has also committed to a number of policies and measures across the energy industry, and the agriculture and waste sectors. The expected impact of these measures will be a 14% reduction in projected emissions by 2030. Achieving this goal is contingent upon gaining access to new technologies and finance through internationally organised mechanisms and instruments.



## RELEVANT WEBSITES

- National Renewable Energy Centre – <http://www.renenergy.com/start1.html>
- Newcom Group – <http://www.newcom.mn/en/company/26>
- Asian and Pacific Centre for Transfer of Technology of the United Nations – Economic and Social Commission for Asia and the Pacific report: Mongolia’s Renewable Energy – [http://recap.apctt.org/Countries/PDF/Mongolia\\_CountryReport.pdf](http://recap.apctt.org/Countries/PDF/Mongolia_CountryReport.pdf)

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- International Renewable Energy Agency, *Mongolia Renewable Readiness Assessment*, accessed at: [http://www.irena.org/DocumentDownloads/Publications/IRENA\\_RRA\\_Mongolia\\_2016.pdf](http://www.irena.org/DocumentDownloads/Publications/IRENA_RRA_Mongolia_2016.pdf)



# MYANMAR

## OVERVIEW

**Jurisdiction:** Common law and customary law

**Language:** Burmese

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 170 out of 190 (up 1 ranking)

2016/17 Global Competitiveness Index: Not listed

2017 Index of Economic Freedom: 146 out of 180 (up 12 rankings)

2016 Corruption Perceptions Index: 136 of 176 (up 11 rankings)

2015 UN Development Programme Human Development Index: 148 of 188 (up 2 rankings)

Population: 51.5 million

GNI per capita: US\$1,293

## PROFILE

Myanmar (or Burma) attained independence in 1948. This was the start of a long period of military rule, civil unrest, ethnic conflict and isolation from the outside world. In November 2015, Aung San Suu Kyi's National League for Democracy secured victory in the country's elections. The country is now embarking on a major political and economic transformation, led by Suu Kyi and Myanmar's President, Htin Kyaw. International commentators have expressed concern over human rights issues in Myanmar's west.





## ELECTRICITY INDUSTRY OVERVIEW

- As of January 2015, Myanmar's total electricity capacity was estimated to be 4,456MW.
- In 2016, electricity capacity consisted of:
  - hydropower (65%);
  - gas (33%);
  - coal (2%); and
  - other renewables (negligible).
- In 2016, most of the country's generation capacity came from 39 power plants consisting of 25 hydropower plants, 13 gas-fired and one local coal fired power plant.
- In January 2016, the National Energy Management Committee released the Myanmar Energy Master Plan. This Master Plan is the first comprehensive energy policy since the recent elections. Projections from the Master Plan for contributions towards total electricity generation include:
  - hydropower to decrease from around 70% (at 2012 levels) to 57% by 2030;
  - natural gas to decrease from around 28% to 8% in 2030;
  - solar photovoltaic to increase from 0% to 5% in 2030; and
  - coal to increase from 2% to 30% by 2030.
- At a December 2016 conference, 422 civil society organisations called on the new government to halt plans for new coal plants and mega dams.
- Myanmar's consumption of electricity has skyrocketed in recent years. Power consumption in 2013 was 164.46kWh per capita, an increase from 78.3 kWh per capita only a decade earlier.
- Despite the significant increase in per capita consumption of energy, in 2013 Myanmar still had one of the lower rates of energy consumption in the world.

- Yangon has a relatively high electrification rate (approximately 78%), with rural areas averaging about 20% electrification. The Government wants uniform 100% electrification by 2030.

## Electricity laws

- The *Electricity Law 2014* was enacted by Parliament on 27 October 2014, replacing a previous 1984 Act. The Law established the Electricity Regulatory Commission, which has powers to regulate and control electricity rates. It is responsible for formulating policy, preparing tariffs, setting standards, advising the Ministry of Electric Power and performing inspections. The Law also grants permission for foreigners to invest in the electricity sector.
- Other important electricity regulations include the:
  - Electricity Rules 1985, which are still in effect, to the extent that they do not conflict with the new electricity laws. At the time of publication, electricity regulations and a rural electrification law have been drafted but not yet implemented; and
  - National Environment Policy 1994. At the time of publication, a New National Environmental Policy is in the final stages of drafting and is expected to be implemented in 2017.

## Government

- In broad terms, Myanmar's electricity is structured around a state-owned single buyer model with two 'off-taker' entities.
- The Ministry of Electric Power was merged into one ministry and is now both the supervisor and facilitator of the power sector in Myanmar. A number of departments with varying roles exist under the Ministry.

## RENEWABLES INDUSTRY OVERVIEW

- Myanmar has significant potential for growth and development in its renewable energy sector. Geographically, Myanmar is the largest country in



Southeast Asia and has an abundance of natural resources. The utilisation of these materials for renewable energy has been hampered due to decades of civil unrest and political and economic isolation.

### Hydropower

- Myanmar currently boasts a total of 26 hydropower plants generating a total of 9,398.98GWh. The installation capacity of this power includes 3,185MW installed on grid, and 34MW off grid.
- Myanmar has a hydropower potential of over 100GW from its four main river basins: Ayeyarwaddy, Chindwin, Thanlwin and Sittaun.
- By early 2015, there were 302 hydropower projects in the country with a theoretical capacity of 46,330MW. However, only 3,011MW is connected to the national grid.
- Environmental concerns surrounding hydropower resulted in the cancellation of Myitsone dam in 2011, followed by the cancellation of two more large-scale hydropower projects in the Htamanthi and Shwezay region. A relatively recent hydropower project in the Shan region, which is expected to generate more than 7,000MW of electricity has also attracted some local opposition due to environmental concerns.

### Wind energy

- The wind sector is very undeveloped in Myanmar. Wind speeds are generally low throughout the country. Further research is underway to determine the effectiveness of small-scale or off-grid wind power.

### Solar energy

- Despite high solar radiation levels, mountainous terrain, dispersed populations, lack of financing and poor transmission infrastructure are some current inhibitors to utility-scaled solar farms.
- The country is targeting 5% of total electricity generation to come from solar by 2030. Given the very undeveloped state of the solar sector, this will require significant investment.

### Geothermal energy

- Eastern Myanmar has been identified as an area with great opportunity for geothermal energy production. Different organisations have taken an interest in this potential, with the Myanmar Engineering Society already nominating at least 39 locations suitable for geothermal energy production.

### Biomass/biogas energy

- A majority of the country's energy comes from biomass, chiefly for lighting and cooking in rural areas.
- Biogas generators have been used to supplement fuel wood scarcity.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- Like many other sectors of the economy, a lack of regulation is hampering the development of the renewables industry. The Energy Master Plan was a big step forward for the energy sector, as were reforms to the electricity legislation. However, the country will likely require a specific renewable energy framework to have a strong chance of achieving its ambitious 2030 renewable energy targets.
- An abundance of untapped fossil fuel resources, especially in northern regions, may prove a distraction to any serious government efforts at commissioning large-scale solar photovoltaic farms.
- Adequate transmission infrastructure is also a particular problem. Myanmar's mountainous terrain, the need for local community support across an ethnically diverse nation, and Myanmar's size are all contributing factors to Myanmar's transmission infrastructure challenges.
- The Myanmar Investment Commission has permitted 100% foreign ownership in small and medium-scale hydropower plants and coal-fired plants.

## RENEWABLES LAWS

- There is presently no renewable energy law in Myanmar.



## GOVERNMENT INCENTIVE PROGRAMS

- Despite no incentives specifically targeting renewables, foreign investors can still have general incentives applied to renewable projects. According to the Asian Development Bank, these include five-year tax holidays, tax reductions of up to 50% for exports, research and development expense reductions and exemptions from customs duties for certain imports.

## MAJOR PROJECTS/COMPANIES

- Development is underway for a 220MW solar photovoltaic plant which will be built in Minbu, in the Magway region of Myanmar. The project is a collaborative venture from Thailand's Green Earth Power and Black and Veatch, an engineering and construction firm.
- In 2016, a 300MW solar deal was signed between Yangon-based Won Toll and Thailand's Kumrai Panit.
- Eleven solar micro-grid projects in remote communities are contracted to be developed by Sunlabob Renewable Energy, a Laos based company, which will be funded by the Japanese International Cooperation System.
- In 2015, Myanmar secured a US\$400 million loan from the World Bank targeting solar, wind and diesel generation.

## FOREIGN INVESTMENT/OWNERSHIP

- The *Myanmar Foreign Investment Law 2012 (FIL)* which was passed by the Myanmar National Assembly on 2 November 2012 and approved by President Thein Sein the next day, is a crucial part of the Government of Myanmar's push to attract foreign investment and re-form the country's once isolated economy.
- The effect of the FIL is to incentivise investors, and so it restricts investment in only a small number of industries. The objectives and 'fundamental principles' of the FIL recognise the need to create jobs, develop basic infrastructure and reform the country's once-isolated industry.

## Myanmar Investment Commission

- The Myanmar Investment Commission (**MIC**) is created under the FIL. The MIC's chief duty is to scrutinise the investment proposals and to accept proposals that are in the State's interests. It is comprised of members from various Ministries, government departments and organisations as well as other non-government persons. The MIC will grant the final confirmation/approval for foreign investors to utilise land for power plants. On top of this, foreign investors must ensure they obtain an investment licence from the MIC.

## Restricted and prohibited activities

- The FIL has both general and specific restrictions and prohibitions. The general restrictions and prohibitions relate to preserving cultures and customs of ethnic nationalities, activities detrimental to public health, natural resources, the environment and biodiversity, as well as the importation of toxic waste products or the use of hazardous chemicals.
- The specific restrictions and prohibitions relate to industries that "can be operated by [Myanmar] citizens" such as agricultural activities, livestock activities and fishery activities. There are also restrictions on manufacturing and service activities, subject to regulations underneath the FIL. As regulations have yet to be passed, there is no guidance as to whether any particular industry is 'restricted' or 'prohibited'.
- Nonetheless, the MIC may permit investments in restricted or prohibited sectors with approval from the Union Government Board. It is also important to note that the *State-Owned Economic Enterprises Law* gives the Government the sole right to carry out economic enterprises in a number of sectors.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Myanmar signed the Paris Agreement on 22 April 2016 and committed to playing its part in the global effort to mitigate emissions. In its Intended Nationally Determined Contribution, Myanmar indicated its initial focus would be on 'carbon sinks' and combatting deforestation.

## RELEVANT WEBSITES

- Ministry of Electric Power – <http://www.moep.gov.mm/>

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# NEW ZEALAND

## OVERVIEW

**Jurisdiction:** Common Law

**Language:** English, Maori and New Zealand Sign Language

## BUSINESS ENVIRONMENT

2017 Ease of Doing Business Report: 1 of 190 (no change)

2016/17 Global Competitiveness Index: 13 of 138 (up 3 rankings)

2017 Index of Economic Freedom: 3 of 180 (no change)

2016 Corruption Perceptions Index: 1 of 176 (up 3 rankings)

2015 UN Development Programme Human Development Index: 9 of 188 (down 2 rankings)

Population: 4.6 million

GNI per capita: US\$40,020

## PROFILE

New Zealand (Maori: Aotearoa) is an island nation located in the south-western Pacific Ocean. The country geographically comprises two main landmasses. The North Island, or Maori Te Ika-a-Māui, and the South Island, or Te Waipounamu. New Zealand was colonised by the British in the 19<sup>th</sup> century. In 1840, the Maori Indigenous chiefs agreed to the Treaty of Waitangi, which ceded sovereignty to the British Crown whilst also retaining territorial rights for the Indigenous Maori population. In the 1980s, government policies transformed the economy into an open and free market, which contributed significantly to the high standard of living which New Zealanders enjoy today. The agriculture and tourism industries are the two key sectors in the economy today. New Zealand is a constitutional monarchy with parliamentary elections every three years.



## ELECTRICITY INDUSTRY OVERVIEW

- In 2015, 42,876.5GWh of electricity was generated in New Zealand. New Zealand does not rely heavily on fossil fuels. 80.8% of electricity is generated from renewable sources. In 2015, electricity generation comprised of:
  - 56.6% from hydropower;
  - 17.2% from geothermal;
  - 14.9% from gas;
  - 5.4% from wind;
  - 4.1% from coal;
  - 0.8% from wood;
  - 0.5% from biogas;
  - 0.1% from waste heat; and
  - 0.08% from solar.
- Electricity demand is expected to grow at 1% per annum until 2030.

## ELECTRICITY LAWS

- Like many sectors in the economy, the energy sector underwent major reforms during the 1980s and 1990s. The reforms deregulated the market and limited the reach of state monopolies. The *Electricity Act 1992* sets out the overall regulatory framework for the electricity industry. The *Electricity Industry Participation Code 2010* governs the operation of the electricity market.
- The *Electricity Industry Act 2010* was a result of a ministerial review of the electricity sector. The Act has sought to improve competition within the electricity market, enhance security of supply and it also abolished the Electricity Commission, replacing it with the Electricity Authority.
- The Ministry of Business, Innovation, and Employment advises the Government on energy efficiency and renewable energy matters. The Minister of Energy and Resources is responsible for the New Zealand Energy Efficiency and Conservation Strategy. The National Energy Research Institute conducts energy research within New Zealand.

- Transpower New Zealand Limited, being the sole owner and operator of the New Zealand national bulk electricity transmission grid, is subject to individual price-quality regulation under Part 4 of the *Commerce Act 1986*.

## Generation, distribution and transmission

- In New Zealand, electricity is generated by five major electricity generating companies. Genesis Energy, Mighty River Power and Meridian Energy operate under a mixed ownership model in which the Government holds a majority stake. Contact and Trustpower are private sector companies.
- In 2014, the generation share comprised:
  - Meridian Energy (35%);
  - Contact Energy (23%);
  - Mighty River Power (16%);
  - Genesis Energy (14%);
  - Trustpower (6%); and
  - the remainder made up from a number of smaller generating companies.
- Generation companies own and operate power stations across the country. Most of New Zealand's electricity is generated at remote locations and requires an efficient transmission system to transport it to the main centres. More than 200 generation plants are able to supply electricity to the national grid. Some of the smaller scale generation is 'embedded' and feeds directly into local distribution networks.
- Transpower New Zealand Limited is the sole owner and operator of the New Zealand national bulk electricity transmission grid.

## RENEWABLES INDUSTRY OVERVIEW

- In 2015, New Zealand generated over 80% of its electricity needs from renewable energy. The country is a global leader in renewable energy generation, particularly for geothermal energy. The International Energy Agency released a report in 2016, stating that New Zealand has the third highest contribution of



renewable energy to total primary energy supply in the Organisation for Economic Co-operation and Development, behind Iceland and Norway.

- The Government has set a renewable energy target of 90% by 2025. This is significantly higher than any other country in the region and reflects the advanced state of renewable energy in the country.
- The Energy Efficiency and Conservation Authority is the chief government body for the promotion of renewable energy. It reports to the Minister of Energy and Resources. The Ministry for the Environment also plays an active role in the renewable energy industry, particularly insofar as it affects New Zealand's climate change program.
- New Zealand has had an emission trading scheme since 2008, however its success to date has been limited due to subsequent amendments lessening the impact of the scheme and the slow international pickup with such schemes.
- Historically, geothermal energy and hydropower have contributed the largest proportion of New Zealand's renewable energy growth. Future growth is expected to come from wind energy, given the country's attractive wind speeds, and also from further geothermal projects.

### Hydropower

- Hydropower contributes about 56% of the country's total electricity use. Most of the country's hydropower capacity and potential is located in the South Island. New Zealand's two largest river systems, the Waikato in the North Island and the Clutha in the South Island, hold many of the country's largest hydropower stations. Many of the country's most lucrative hydropower sites have already been developed. Proposals for the development of further sites have been met with stiff environmental opposition. Due to New Zealand's reliance on hydropower, drier months have resulted in electricity shortages in the past.
- New Zealand has a long history of hydropower facilities. The Waipori scheme (commissioned in 1903) and the Coleridge plant (commissioned in 1914), were the earliest hydropower stations in the country. By

the 1950s, New Zealand had over 1GW of installed hydropower and in 1965 a high voltage transmission line from Benmore in the South Island to Haywards in the North Island was constructed. This line resulted in more hydropower stations in the South Island (such as the 540MW Benmore station, the 750MW Manapouri station and the 432MW Clyde dam) and hydropower generation reached 5GW by the 1990s. New Zealand's hydropower capacity has remained steady since then.

### Wind

- Wind-sourced electricity accounts for over 5% of New Zealand's total electricity needs. Natural conditions throughout New Zealand are highly conducive to developing wind projects, both onshore in mountainous areas and along the coast, as well as offshore. New Zealand has 18 wind farms either operating or under construction. These range from a single small turbine at Southbridge (100kW) to the three stages of the Tararua wind farm, which has 134 turbines with a capacity of 161MW. West Wind, near Wellington, is the largest wind farm built in one stage in New Zealand. Its 62 2.3MW turbines have a combined generating capacity of 142.6MW.
- There is currently 2,500MW of wind generation consented in New Zealand and developers are exploring sites throughout New Zealand for new wind farm sites.
- Both national and local standards regulate the maximum noise levels that can be emitted from wind turbines.
- Wind power capacity increased 19% from 2010 to 2011, and increased over 6% from 2014 to 2015. Overall, wind generation capacity has increased by an average of 30% per year over the last decade.

### Solar

- Solar generation is currently a small proportion of New Zealand's energy supply, making up only 0.08% of its total renewable energy.
- Price reductions in solar photovoltaic equipment have made it more popular with homeowners and businesses, despite the fact that for most it remains



more costly than grid-supplied electricity. Residential solar power is likely to contribute to changes in New Zealand's energy market design, energy policy and pricing structures in the future.

### Geothermal

- All of New Zealand's geothermal generation is in the North Island, mostly around the Taupo Volcanic Zone. Geothermal-sourced electricity makes up more than 17% of the country's electricity needs.
- Geothermal capacity is approaching IGW, which is largely due to two older, large-scale geothermal plants and several more recent, smaller-scale geothermal plants. Geothermal energy is used for direct heating in some parts of New Zealand. As a world-leader in geothermal generation and research, New Zealand has signed agreements with other countries who are seeking to boost their own geothermal capacity.

### Biomass/biogas

- The biomass industry is also well-established in New Zealand, in the biomass such as converting organic waste from landfills to energy, liquid biofuels developing alternative transport fuel and wood energy. Wood-processing facilities produce a lot of the country's biomass energy.

### Ocean energy

- The Kaipara tidal power station was a proposed tidal power project to be located in the Kaipara Harbour with an ultimate size of 200MW at a cost of NZ\$600 million (approx. US\$420 million). However, in 2013, it was announced that the project had been put on hold. This remains the case at time of writing.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- In 2016, it was announced that New Zealand is phasing out all coal-fired power generation, with Genesis Energy advising it will permanently shut its last two coal-burning generators by December 2018 amid ample supplies of cheaper renewable energy generation and subdued demand. The New

Zealand Commerce Commission announced that Transpower plans to invest around NZ\$5 billion (approx. US\$3.5 billion) in critical infrastructure upgrades.

- In the electricity retail sector, a report released by the Electricity Authority, shows that small and medium sized electricity companies are chipping away at the market dominance long enjoyed by giants such as Meridian Energy and Contact. The Electricity Authority statistics show smaller companies have quadrupled their market share since 2009. In 2016, small and medium-sized retailers were recorded as serving over 195,000 residential customers, which is four times higher than it was in 2009.
- In 2017, the New Zealand Government announced it had earmarked NZ\$3.5 million (approx. US\$2.45 million) to fund 15 projects for its Low Emission Vehicles Contestable Fund.

## RENEWABLES LAWS

- The *Energy Efficiency and Conservation Act 2000* was the first legislative effort to promote renewable energy in New Zealand. The Act established the Energy Efficiency and Conservation Authority which produces regular reports on New Zealand's energy use and energy targets. The Act largely sets out the ambit of the Authority's reporting requirements.
- The National Policy Statement for Renewable Electricity Generation 2011 is the main government policy paper coordinating the renewable energy drive throughout New Zealand. The paper's main objective is to "recognise the national significance of renewable electricity generation activities by providing for the development, operation, maintenance and upgrading of new and existing renewable electricity generation activities".

## GOVERNMENT INCENTIVE PROGRAMS

- New Zealand does not have a feed-in tariff scheme for renewable energy generators. Although there are no central government incentives to assist consumers or businesses in New Zealand to implement solar or other onsite renewable generation technologies,





there are some local authorities that have initiatives in place to encourage renewable energy generation at a residential level.

- The Government has established the Low Emission Vehicles Contestable Fund as part of a package of initiatives to help stimulate electric vehicle uptake and meet the target of 64,000 electric vehicles on New Zealand roads by 2021.
- The New Zealand Emissions Trading Scheme, as well as the electricity market reforms are perhaps the greatest government incentives for renewable energy in New Zealand.

## MAJOR PROJECTS/COMPANIES

- Hydropower generation has remained relatively steady since 1993. The only major hydropower project since then was the completion of the second Manapouri tailrace tunnel in 2002, increasing the station from 585MW to 750MW. Further expansion of hydropower generation is constrained because of community concerns over environmental impacts and loss of amenity values, as well as competing demands for water resources.
- Future electricity generation investment is likely to be in a mix of generating plants, predominantly wind and geothermal, with gas-fuelled plants for peaking and





dry-year support. The 2010 streamlining of resource management legislation is intended to assist the development of new generation plant.

- In addition to the 19 wind farms that are either operating or under construction, there are about 13 projects that have been ‘consented’. However, not all projects with ‘consent’ will be built. Many are currently on hold as developers wait for demand to increase enough to make the wind farm commercially viable.

#### **FOREIGN INVESTMENT/OWNERSHIP**

- The *Overseas Investment Act 2005* is the main legislative instrument governing foreign investment in New Zealand. It established the Overseas Investment Office, which coordinates foreign investment in New Zealand. Under the Act, a non-resident only requires the Office’s approval in three circumstances if:
  - investing more than NZ\$100 million (approx. US\$70 million) to establish a business;
  - planning to purchase an equity share of greater than 25% in a New Zealand company worth more than NZ\$10 million (approx. US\$7 million); or
  - investing in land or an interest in land that is “sensitive land”. Sensitive land includes land that is the foreshore or seabed, the bed of a lake, land on islands (other than the North Island and South Island) and non-urban land that exceeds five hectares.

#### **UNFCCC – PARIS COMMITMENTS AND BEYOND**

- New Zealand signed the Paris Agreement on 22 April 2016, and ratified the agreement on 4 October 2016. New Zealand has committed to reducing greenhouse gas emissions to 30% below 2005 levels by 2030. New Zealand also has a longer term target of reducing emissions to 50% below 1990 levels by 2050.
- The New Zealand Emissions Trading Scheme is the Government’s principal policy response to climate change. It supports global efforts to reduce greenhouse gas emissions while maintaining economic productivity. The scheme puts a price on greenhouse gas emissions, and provides an incentive for people to reduce emissions and plant forests to absorb carbon dioxide. Certain sectors are required to acquire and surrender emission units to account for their direct greenhouse gas emissions or the emissions associated with their products. An emission unit represents one metric tonne of carbon dioxide, or the equivalent of any other greenhouse gas (carbon dioxide equivalent).

## RELEVANT WEBSITES

- Ministry of Business, Innovation & Employment – <http://www.mbie.govt.nz/>
- Electricity Authority – <http://www.ea.govt.nz/>
- New Zealand Energy Strategy 2011 – 2021 – <https://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-strategies/documents-image-library/nz-energy-strategy-lr.pdf>
- The New Zealand Energy Efficiency and Conservation Strategy 2017-2022 – <http://www.mbie.govt.nz/info-services/sectors-industries/energy/energy-strategies/consultation-draft-replacement-new-zealand-energy-efficiency-and-conservation-strategy/draft-replacement-nzeec-strategy.pdf>
- National Policy Statement for Renewable Electricity Generation 2011 – <http://www.mfe.govt.nz/publications/rma/nps-renewable-electricity-generation-2011/index.html>
- New Zealand's Emissions Trading Scheme – <http://www.mfe.govt.nz/climate-change/reducing-greenhouse-gas-emissions/new-zealand-emissions-trading-scheme>

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# PAKISTAN

## OVERVIEW

**Jurisdiction:** Common law with Islamic law and customary influences

**Language:** Urdu, English and regional languages

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 144 of 190 (up 4 rankings)

2016/17 Global Competitiveness Index: 122 of 138 (up 4 rankings)

2017 Index of Economic Freedom: 141 of 180 (down 15 rankings)

2016 Corruption Perceptions Index: 116 of 176 (up 1 ranking)

2015 UN Development Programme Human Development Index: 147 of 188 (down 1 ranking)

Population: 195.4 million

GNI per capita: US\$1,440

## PROFILE

Pakistan emerged as a sovereign State out of the partition of the Indian subcontinent in 1947. Since independence, Pakistan has shown significant economic progress despite facing regional tensions, terrorism and territorial disputes, especially with neighbouring India. Pakistan holds much economic potential as the world's sixth most populous country, strategically placed in the intercept between South, Central and Western Asia. Despite strong economic expansion in the 2000s, the industrial production sector in Pakistan faces chronic energy shortages. Recently, Pakistan launched the China Pakistan Economic Corridor, in collaboration with the Government of the Peoples' Republic of China, to meet the energy challenges faced by the country and develop major transportation infrastructure.



## ELECTRICITY INDUSTRY OVERVIEW

- Pakistan has suffered major power shortages in recent years. Electricity generation remains a top priority. The country remains heavily reliant on fossil fuels, and imports oil from neighbouring countries. Under the China Pakistan Economic Corridor program, Pakistan proposes to add 10,400MW of energy capacity to meet its energy shortages. At present approximately 33% of the population does not have access to electricity.
- Pakistan's generation capacity has risen in recent years. From July 2015 to March 2016, Pakistan generated 73,209GWh of electricity. Of this, 45,252GWh (62%) was from thermal sources, 24,544GWh (34%) from hydropower and 3,078GWh (4%) from nuclear power.
- The electricity industry is regulated by the National Electric Power Regulatory Authority (**NEPRA**), which was established in 1997. NEPRA is responsible for setting tariffs, issuing licenses, and transmitting and distributing power.
- The average retail rate of electricity sits at around US\$0.07 per unit, which is cheap by global standards.

### Electricity laws

- Primarily, the *Electricity Act 1910*, as well as the rules and bylaws made under that Act, govern the legislative framework of the electricity sector in Pakistan. The *Electricity Act* has been amended a number of times since 1910, including to define renewable energy, and impose heavy criminal sanctions for electricity theft.
- The *Regulation of Generation, Transmission and Distribution of Electric Power Act 1997* established NEPRA to oversee the generation, transmission and distribution of electricity.

### Generation, transmission, and distribution

- Electricity is generated across the country by numerous power station operators. There are two coal stations and 23 thermal power stations, the biggest (in terms of capacity) being the Kot Addu power plant in Punjab and Hub Power Co Ltd's

Hub power plant outside Karachi. Independent Power Producers account for around 30% of energy production. The two key players are the public Water and Power Development Authority and the private Karachi Electric Supply Corporation.

- National Transmission and Dispatch Company, a government-owned company, manages the majority of transmission infrastructure in the country. Two grids provide electricity transmission across Pakistan. The larger national grid services the majority of the country, while the largest and most populous city, Karachi, has its own dedicated grid. The two grids are interconnected but operated separately. The distribution functions are managed by various government-owned distribution companies operating across the country.

## RENEWABLES INDUSTRY OVERVIEW

- The Alternative Energy Development Board exists to facilitate and promote a greater market share for renewable energy in Pakistan. Hydropower is already a major contributor to Pakistan's energy sector. Pakistan also has good potential for wind and solar. The Alternative Energy Development Board, in collaboration with the World Bank, has conducted extensive wind and solar mapping projects.

### Hydropower

- Hydropower exists as a major established form of power generation in Pakistan. Hydropower accounts for 34% of all electricity generated in the country. According to the World Energy Council, Pakistan currently has an installed hydropower capacity of 7.26GW.
- The Nelum-Jhelum Hydroelectric Project (969MW), which commenced construction in 2008, is near completion. The Water and Power Development Authority has indicated the project will be ready by February 2018.
- Work has recently started on two major hydropower projects: Diamer Basha Dam (4,500MW) and Dasu Hydropower Project (4,320MW). The Dasu Hydropower Project is funded by the World Bank



and is expected to be completed in 2023. Civil works related to the first stage of the Dasu project (worth approx. US\$1.72 billion) were awarded to a Chinese firm in March 2017.

### Wind energy

- There are currently 27 wind power projects either in operation or at various stages of development, with a cumulative capacity of 1,347.4MW. Of these, six have commenced commercial operation, with a combined capacity of 308.2MW.
- Pakistan's Planning, Development and Reforms Ministry has announced plans to lift the country's wind power capacity to more than 3,500MW by the end of 2018. Construction of three wind power projects (totalling 200MW) has commenced under the auspices of the China Pakistan Economic Corridor program.

### Solar energy

- Pakistan has a high solar potential, with an average of eight to 10 hours of sunlight per day.
- After World Bank scoping studies, it was suggested that photovoltaic power systems could be a competitive alternative in powering small appliances

in remote areas. Photovoltaic systems present a significant opportunity to provide power to large sectors of the population who live off-grid.

### Geothermal energy

- Pakistan does not currently produce electricity from geothermal sources, however early assessments indicate a potential of approximately 80,000MW.

### Biomass/biogas energy

- There are currently four operational sugar mills generating biomass energy, and a further nine other mills in various stages of planning and construction.

### Ocean energy

- Pakistan does not currently have any operational tidal power capacity. Research and feasibility studies commenced in 2013 with a view to building a 10MW tidal power facility at Sonmiani Bay in Balochistan. Future potential will likely focus on creek systems of the Indus delta in Sindh.





## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- A mix of commercial and regulatory issues is presenting a barrier to investment in the renewables industry. Small-scale projects are hindered by tariff procedures despite efforts by the Alternative Energy Development Board to minimise red-tape.
- While successful steps have been taken to develop a local renewables industry, chiefly led by hydropower, there are continuing security and profitability concerns in respect of investment into Pakistan's renewables sector.
- The Pakistan Government is working with foreign donors to increase its renewables capacity. In 2016, the Government signed a US\$30 million agreement with the United States' Government to generate 3,000MW of renewable energy. Germany and Iran are also reportedly negotiating energy agreements with Pakistan.

## RENEWABLES LAWS

- The *Alternative Energy Development Board Act 2010* which established a board of the same name, is responsible for the implementation of various policies, programmes and projects related to alternative or renewable energy technologies. In 2006, the Board released a policy paper that focusses on hydropower, wind and solar.
- The Board has released policies on biomass production and a revised financing scheme designed to significantly streamline the approval process for renewable energy projects.

## GOVERNMENT INCENTIVE PROGRAMS

- The Government has implemented trade policies to stimulate the renewables sector, including removing import duties on key components, value added tax exceptions on solar home system components and minimising non-renewable energy subsidies.
- NEPRA has recently published new solar feed-in tariff rates for public comment. The proposed rates stand at an average of US\$0.097 per kWh.

- The Alternative Energy Development Board has recommended a waiver of import duties on photovoltaic panels and assembled solar home systems and lanterns, though customs levies remain at 15% and 30 to 35% respectively.
- Under the Power Policy 2015, the following incentives have been offered by the Government of Pakistan for power generation projects:
  - exemption from income tax;
  - sponsors would be allowed to import plant and equipment not manufactured locally at a concessionary customs duty rate of 5%;
  - companies will be completely exempted from the payment of income tax, including turnover rate tax and withholding tax on imports; and
  - repatriation of equity along with dividends is freely allowed subject to the prescribed rules and regulations.

## MAJOR PROJECTS/COMPANIES

- Pakistan hosts over 75 hydropower generation stations, the biggest being the Tarbella and Managala dams and the Ghazi-Barotha hydropower project. In December 2016, Pakistan began construction of the 84MW Matiltan hydropower project, which is expected to help provide uninterrupted power supply to one million people in the Swat region.
- The Alternative Energy Development Board is currently involved in 28 different solar power projects with a combined capacity of 956.52MW. Of those, one is currently commercially operative and a further three are under construction.
- The 1,000MW Quaid e Azam Solar Park has been constructed in Bahawalpur. The plant is producing an average of 169GWh against an initial target of 153GWh.
- Shanghai Electric Power was given domestic approval to acquire a 61.4% stake in Pakistan's K-Electric for approximately US\$1.7 billion. The deal is believed to be the biggest public sector acquisition in Pakistan and underpins the close infrastructure ties between Beijing and Karachi.



## FOREIGN INVESTMENT/OWNERSHIP

- Foreign direct investments for the period July 2016 to January 2017 stands at just over US\$1.1 billion out of which US\$245.3 million was in the power sector. The Pakistani Government is actively encouraging foreign investment, especially in the energy sector. With a strategy to increase growth to 7 to 8%, the Government has in part looked to establish special economic zones to enhance the nation's competitiveness.
- The Investment Policy 2013 allows investment in all sectors of the economy, unless specifically prohibited or restricted for reasons of national security and public safety. There is no minimum requirement for the amount of foreign equity investment in any sector. Under the 2013 Policy, foreign investors are granted the same status as that of local and domestic investors, and all facilities available to local and domestic investors are extended to foreign investors on an equal basis. There is no upper limit on the share of foreign equity allowed, except in specific sectors, including airlines, banking, agriculture and media.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Pakistan ratified the Paris Agreement on 10 November 2016.
- Pakistan's Intended Nationally Determined Contribution was submitted in November 2015, and is grounded in the country's 'Vision 2025' strategic plan for development. Pakistan noted the need for international financing, technology development and transfer, and capacity building, however it did not appear to set a specific carbon reduction target.
- At the Paris Conference in December 2015, Pakistan's Minister for Climate Change called for 'undivided focus' and a holistic approach to tackling climate change.





## RELEVANT WEBSITES

- Alternative Energy Development Board – [www.aedb.org/](http://www.aedb.org/)
- Pakistan Council of Renewable Energy Technologies – [www.pcret.gov.pk/](http://www.pcret.gov.pk/)
- National Electric Power Regulatory Authority – [www.nepra.org.pk/](http://www.nepra.org.pk/)
- National Transmission & Dispatch Company – [www.ntdc.com.pk/](http://www.ntdc.com.pk/)
- Private Power Investment Board – [www.ppib.gov.pk/](http://www.ppib.gov.pk/)
- Board of Investment – [www.boi.gov.pk/](http://www.boi.gov.pk/)
- Quaid-e-Azam Solar Power (Pvt.) Ltd – [www.qasolar.com/](http://www.qasolar.com/)
- Ministry of Planning, Development & Reform – [www.pc.gov.pk/](http://www.pc.gov.pk/)

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# PAPUA NEW GUINEA

## OVERVIEW

**Jurisdiction:** Common law and customary law

**Language:** Tok Pisin, English, Hiri Motu and other Indigenous languages

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 119 of 190 (up 14 rankings)

2016/17 Global Competitiveness Index: Not listed

2017 Index of Economic Freedom: 152 of 180 (down 12 rankings)

2016 Corruption Perceptions Index: 136 of 176 (up 3 rankings)

2015 UN Development Programme Human Development Index: 158 of 188 (down 1 ranking)

Population: 7.6 million

GNI per capita: US\$2,240

## PROFILE

Papua New Guinea (**PNG**) occupies the eastern half of the island of New Guinea and numerous offshore islands. PNG was subject to fierce fighting during World War Two. After the war, Australia administered PNG until the country gained its independence in 1975. PNG is one of the most culturally diverse countries in the world with around 848 languages in the country. It is also one of the most non-urbanised countries in the world, with over 80% of its people living in rural areas. In recent years, the economy has been boosted by mining and resource sector investments. Despite this, many people live in extreme poverty, with about one-third of the population living on less than US\$1.25 per day.



## ELECTRICITY INDUSTRY OVERVIEW

- In 2010 (the latest found reliable data), installed electricity capacity was 582MW. Of this amount:
  - 39.5% was from hydropower;
  - 37.3% from diesel generators;
  - 14.1% from natural gas; and
  - 9.1% from geothermal.
- A draft renewable energy policy report from the PNG Government also estimates a similar break-down in power sources.
- The PNG National Statistical Office has estimated that just 12% of PNG's households have access to electricity. Accordingly, one of the country's goals in its Strategic Development Plan 2010-30 is to increase electricity access to 21% of the population by 2020, and to 70% by 2030. As yet, there is no clear plan on how this is to be achieved.
- Over two-thirds of new electricity demand is likely to arise beyond PNG's current or future electricity grid. Meeting this will therefore require substantial new power generation resources.
- PNG is a net energy exporter, with an estimated 65% of energy produced consumed locally, with the remaining 35% being exported overseas (chiefly, natural gas).

### Market regulators and generators

- PNG Power Limited (**PPL**) is the peak power authority in PNG, and is responsible for the generation, transmission, distribution and retail of electricity. PPL provides regulatory oversight to activities such as certifying electrical equipment, providing advisory services and approving electrical licenses. PNG Forests, Hanjung Power, New Britain Palm Oil (now Sime Darby), Western Power (part of PNG Sustainable Ltd) and Pacific Energy are also notable utilities which sell power to PPL.
- PPL is responsible for 17 'electricity centres' throughout PNG. Three of these centres are hydropower schemes with over 10MW capacity, while the other 14 centres are thermal-based.

- In its draft renewable energy policy, the PNG Government noted that "PPL assets have almost surpassed their life time [and] there is a severe and critical power generation shortage experienced throughout the country".
- PPL works alongside the Department of Petroleum and Energy, the Department of Environment and Conservation and the Independent Consumer and Competition Commission to regulate and coordinate the energy sector.

### Distribution and transmission

- PNG does not have a national grid system. Instead, the country is powered by three urban grids and 14 provincial systems. The three urban grids are the Port Moresby, Ramu and Gazelle Peninsula Systems.
- The reliability of the existing grids is poor due to difficult terrain, high rainfall, vandalism and an underdeveloped road network. Transmission and distribution losses are around 20%.

## RENEWABLES INDUSTRY OVERVIEW

- PNG has enormous untapped reserves of renewable energy. In 2013, Bloomberg New Energy Finance ranked the country in the top 10 for potential renewable resources, with only 2% of an estimated 2.5GW exploited. The PNG Government, in its draft renewable energy sector policy report, estimated the country currently has 272MW of renewables capacity. However, it noted the "conventional sources of thermal and the current hydropower sources are now aging" and that the 272MW figure is perhaps ambitious given that two major hydropower facilities at Ramu and Rouna are no longer operating at full capacity. Further, most of the renewable resources are in remote locations, where there is limited demand and exploitation is not straightforward.
- PNG's Strategic Development Plan 2010-30 estimates that installed capacity in the period to 2030 will need to increase from 500MW to 1,970MW to reach growing energy needs. Hydropower is to contribute the most, growing from an (already substantial) 215MW to 1,140MW. Diesel use in the period is expected to fall from 160MW to 30MW. Other



renewables, mainly geothermal, but also solar, wind, biomass and biogas, are expected to grow to 380MW (about 20% of total capacity).

- Recently, it has been the private sector largely driving renewable energy use. Such examples include the palm oil industry using wastes for electricity production, the coffee industry using wood-burning driers and a number of sugar mills proposing to use wood for combustion in bagasse boilers, designed to increase their energy production. Several thousand new solar home lighting systems are expected to be installed in rural PNG each year, generally through private initiatives.

### Hydropower

- Hydropower is the largest source of electricity in PNG. There is also significant potential growth. The World Bank estimated a gross theoretical hydropower potential for PNG at 175TWh per year. PNG currently has nine large hydrological drainage basins, including the Sepik, Fly, Purari and Markham catchments.
- Transmission of hydropower sources to population centres is a problem in PNG, especially considering the rugged terrain of much of the country. Small hydropower dams have accordingly received some attention. A 2004 study found that there may have been as many as 200 small hydropower systems installed in rural PNG between 1960 and 2004, of which perhaps 20 to 25% are still functioning.

### Wind energy

- It is believed that there has been no thorough assessment of wind energy potential in PNG since the 1970s. A pilot wind energy project has been installed in the Duke of York islands to power the local hospital and other facilities. This was jointly funded by the PNG and Chinese Governments.

### Solar energy

- Solar energy is among the largest potential renewable energy sources in PNG. Average insolation in most of the country is 400 to 800W/m<sup>2</sup>, with 4.5 to 8 sunshine hours a day.
- Stand-alone solar photovoltaic systems have been touted as an answer to the country's heavy reliance on diesel and kerosene lamps for lighting. Solar energy has spread gradually in PNG over the past 30 years, with small independent solar systems marketed by private suppliers and used mainly for lighting and communications.

### Geothermal energy

- The Geothermal Energy Association estimates PNG's geothermal potential at 21.92TWh. The association also categorises the country as an economy that could, in theory, meet all its electricity needs well into the future from geothermal sources alone.

### Biomass/biogas energy

- A 2013 International Renewable Energy Agency report noted that despite two-thirds of PNG being covered in forest, most of the land is inaccessible or unsuitable for biomass due to regular erosion and flooding. The report also notes the missed opportunity to capitalise on the country's logging industry and developing biomass facilities from various byproducts.
- Traditional biomass consumption (generally burning wood) is estimated to have accounted for over 50% of PNG's national energy consumption in 2010, though there have been no recent surveys to document its use.

### Ocean energy

- There is very limited knowledge of PNG's potential for ocean thermal energy, tidal energy or wave energy. Near Port Moresby, the tidal range is



2.7 metres, compared to 1.1 to 1.6 metres in most of the country. Reportedly, there is a 6 metre range in parts of the Torres Strait.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- The Government's strategic plan is seeking to phase-out diesel and basic biomass use, in favour of sources like solar whilst also looking towards developing further hydro facilities, likely through small-scale plants that do not require extensive transmission infrastructure.
- The Government itself recognises the need to upgrade aging infrastructure generation and transmission infrastructure which is inhibiting the capacity of the country's existing hydropower dams and thermal power plants. It appears likely the Government's preference is to update current infrastructure ahead of developing new infrastructure, in addition to developing local expertise to maintain more remote facilities.
- Other challenges for the nation's electricity sector include its rugged terrain, high rainfall, dispersed and isolated populations, and lack of project finance.

## RENEWABLES LAWS

### Policy statements

- The Energy Division (part of the Department of Petroleum and Energy) is responsible for renewable energy and electricity policy. Despite numerous draft policies, no formal renewables policy has been adopted.
- Key draft policies include the National Energy Policy, Rural Electrification Policy and Strategy, Geothermal Energy Policy, Electricity Industry Policy and Renewable Energy Policy (discussed throughout). The Strategic Development Plan 2010-30 also addresses energy issues.

## Laws

- PNG does not have a specific renewable energy law. Generic electricity laws include the:
  - *Electricity Supply Act*, which states the powers of the Minister for Energy for generation, supply and extension of electricity from those power facilities built with government funds;
  - *Electricity Industry Act*, which states the functions and powers of PPL; and,
  - *Independent Consumer and Competition Act*, regulating electricity, petroleum and pricing.

## GOVERNMENT INCENTIVE PROGRAMS

- PNG currently has limited incentive programs such as feed-in tariffs, low-cost loans, reduced import duties or reduced taxes for the production of renewable energy technologies. The Government incentive programs largely support the manufacturing and agricultural industry.

## MAJOR PROJECTS/COMPANIES

- The Karimui hydropower dam in Chimbu is expected to commence construction in 2017 and be completed by 2023. Once in operation, the facility will generate 1,800MW of electricity, making it the largest hydropower station in the country.
- The Ramu System Power Development Master Plan and Lae Area Distribution Network Improvement Project is in its final stages of planning. This has involved research, study, assessment and formulation by PPL and the Japan International Cooperation Agency.
- The Edevu hydropower plant is being constructed by PNG Hydro Development Ltd and will have a capacity of 50MW.



## FOREIGN INVESTMENT/OWNERSHIP

- The Investment Promotion Authority was established to provide assistance to foreign investors and promote investment in PNG. The Authority provides services such as business registration, regulation and certification, and also offers information on export opportunities to international markets.
- After the completion of a major liquefied natural gas project in 2014, foreign investment in PNG has slowed. Barriers to foreign investment include lack of equipment, the State's monopolies, political instability and security issues.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- PNG ratified the Paris Agreement on 21 September 2016 and committed to reduce emissions from land use change and forestry. PNG intends to reduce deforestation and promote forest conservation and sustainable management of its forests. As there is a growth in fuel use, PNG has also stated its intention to reduce fossil fuel emissions in the electricity generation sector by transitioning to renewable energy.
- PNG has very low absolute emissions and relatively low per capita emissions. The country, however, is still committed to reducing greenhouse gas emissions.



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- Investment Promotion Authority: Papua New Guinea – <https://www.ipa.gov.pg/>
- Renewable Energy Sector Development Policy in PNG, available on Google (PDF only)

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# THE PHILIPPINES

## OVERVIEW

**Jurisdiction:** Mixed legal system of civil, common, Islamic and customary law

**Language:** Filipino and English (official)

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 99 of 190 (no change)

2016/17 Global Competitiveness Index: 57 of 138 (down 10 rankings)

2017 Index of Economic Freedom: 58 of 180 (up 12 rankings)

2016 Corruption Perceptions Index: 101 of 176 (down 3 rankings rankings)

2015 UN Development Programme Human Development Index: 115 of 188 (up 2 rankings)

Population: 100.7 million

GNI per capita: US\$3,550

## PROFILE

Republic of the Philippines (**the Philippines**) is an archipelagic nation comprising 7,107 islands. The country is a former Spanish colony and was also under American rule for a period in the early 20<sup>th</sup> century. Following Japanese occupation during World War Two, the Philippines gained its independence in 1946. Since then, the country has had periods of political stability intermingled with 'people power' movements to overthrow presidents in 1986 and 2001. While the Philippine economy has continued on its growth trajectory under President Rodrigo Duterte, some international commentators are concerned about unpredictable policy making. Tensions with China over territorial claims in the South China Sea appear to be receding, with President Duterte adopting a more conciliatory approach.





## ELECTRICITY INDUSTRY OVERVIEW

- The electricity market in the Philippines is divided into three grids: Luzon, the Visayas and Mindanao.
- The primary sources of electricity in the Philippines are coal (46%) and natural gas (24%), with geothermal (14%) and hydropower energy (7%) the most significant renewable energy sources.
- Electricity in the Philippines is said to be the third most expensive in Asia, with an average retail rate across the country of US\$0.15 per kWh.
- As of 2016, around 11 million people do not have electricity in the Philippines. Dwellings with an electricity connection experience frequent power fluctuations. In 2014, then President Benigno Aquino requested emergency powers from the Philippine Congress to lease additional capacity and take measures to prevent outages in Luzon, the largest of the three grids.
- The electricity generation capacity of the country is expected to increase significantly from 20,055MW in 2016 to 25,800MW in 2030.

## Electricity laws

- The *Electric Power Industry Reform Act of 2001 (EPIRA)* sought to comprehensively restructure the industry from “a vertically integrated, extensively publicly-owned utility business, [to an] industry [which] was envisioned to be broken down into its main components with a deregulated and effectively privatised generation and supply sectors”.
- The EPIRA established the Energy Regulatory Commission, which regulates the Filipino energy sector and has quasi-judicial functions.
- While the transmission and distribution sectors remain regulated, the generation sector has been fully deregulated. Generation prices are largely governed by market forces or settled on a commercial basis.

## Generation

- Following the privatisation of generation assets held by the National Power Corporation, the generation sector is becoming more competitive as barriers to entry have been reduced and more private sector investors have entered the market.

- The Energy Regulatory Commission regulates power generation. Interested parties must receive a certificate of compliance with EPIRA standards, as well as other health, safety and environmental laws from the relevant agencies.

## Distribution

- A number of bodies distribute electricity throughout the Philippines, including investor-owned utilities such as the Manila Electric Company (**Meralco**), local government-owned utilities and consumer-owned electricity cooperatives.

## Transmission

- The transmission assets held by the National Power Corporation were transferred by EPIRA to the National Transmission Corporation. The operation, maintenance and upgrade of the assets, on the other hand, was privatised by way of concession contract undertaken by the Power Sector Assets and Liabilities Management Corporation (**PSALM**).
- PSALM then awarded the 25-year concession contract to the National Grid Corporation of the Philippines. As concessionaire, the National Grid Corporation is required to prepare the Transmission Development Plan and is authorised to collect wheeling charges and other fees, as approved by the Energy Regulatory Commission.

## Reforms

- There have been significant reforms in the industry following the implementation of EPIRA including:
  - privatisation of more than 85% of the National Power Corporation’s generation assets and Independent Power Producer’s capacities in Luzon, and ongoing privatisation of assets and capacities in Visayas and Mindanao;
  - privatisation of the operation and maintenance of the transmission assets;
  - commercial operation of the Wholesale Electricity Spot Market in Luzon and Visayas, as well as trial operations in Mindanao; and
  - unbundling of electricity rates to indicate generation, transmission, distribution, metering and ancillary services.



## RENEWABLES INDUSTRY OVERVIEW

- The Philippine Government's goals for the renewable energy sector, as set out in the National Renewable Energy Program, include:
  - increasing renewable energy-based capacity to 15.304GW by 2030, which will constitute 35% of the Philippines' total energy capacity;
  - becoming the number one geothermal energy producer in the world (currently second);
  - becoming the number one wind energy producer in Southeast Asia; and
  - expanding the contribution of biomass, solar and ocean energy by 131MW.
- The latest statistics released by the Department of Energy as of June 2016 indicate renewable sources constitute 34.3% of total energy production. A Department of Energy announcement from January 2016 suggests that the installed capacity of renewable projects may reach 20GW by 2030.
- Despite a relatively advanced renewable energy contribution, the Philippines has significant potential for further clean energy development. To this end, the Philippine Congress passed the *Renewable Energy Act of 2008*.
- In late May 2013, the Department of Energy issued guidelines on the selection and awarding of certificates for renewable energy projects. The Department of Energy has announced that it will continue the 'first come, first served' approach. Under the guidelines, upon a project being declared commercially viable, a developer must compete with other project proponents in building a renewable energy facility before being awarded a feed-in tariff.
- With the Department of Energy's guarantee of current feed-in tariff rates for 20 years, several solar and wind power projects have commenced commercial operations over the last two years while hydropower projects advance in various stages of development.

## Hydropower

- Hydropower is a significant energy source in the Philippines. As at June 2016, there was 3,609MW installed, which represents 18% of the Philippines' total energy capacity.
- According to the Department of Energy, there are currently 135 hydropower plants, including 22 large hydropower plants in the country.
- Estimated potential from small hydropower is approximately 1.3GW.
- Major hydropower sites include Kalayaan Pumped Storage Power Plant (739.2MW), San Roque (411MW) and Magat (360MW).

## Wind energy

- The Philippines has a theoretical wind generation capacity of 70GW. While there has been a significant increase in the number of wind power projects over the last few years, the wind industry is still underdeveloped and the distance of potential sites from population centres presents a challenge.
- The currently installed capacity is 427MW, with an additional 1,200MW projected to potentially come online over the next few years.
- Despite this underdevelopment, the Department of Energy is focusing on wind power to meet increasing energy demand. The Department of Energy's increased installation target for wind of 200MW, set under the feed-in tariff system in April 2015, was immediately subscribed.

## Solar energy

- While solar energy traditionally comprised a small percentage of overall capacity, there has been rapid growth in recent years. The total installed capacity, as of June 2016, was 684MW. Solar power is expected to contribute 8.7GW by 2030.



- The decreasing cost of solar resources, government incentives under the feed-in tariff regime and policy imperatives, both from climate change and energy security perspectives, are expected to continue this growth trend.
- Toward the end of 2016, Meralco – the largest distribution utility in the Philippines – entered into long-term power purchase agreements for solar projects that failed to qualify under the feed-in tariff system.

#### Geothermal energy

- Geothermal energy is a major source of renewable energy in the Philippines, with a total installed capacity of about 2GW.
- The Philippines is the second largest producer of geothermal energy globally. Major geothermal sites include Unified Leyte (610.2MW) and Tiwi/MakBan (747MW).

#### Biomass/biogas energy

- The Philippines had 233MW of installed biomass capacity in June 2016.
- Fuel wood is a dominant energy source in rural parts of the country, however this has led to deforestation. Alternative sources, such as bagasse from sugar cane and rice husk, are being utilised and further developed as fuel for power projects.
- The Philippines has large agriculture, forestry and livestock industries, which results in the consumption of biomass energy widely throughout the country.

#### Ocean energy

- Ocean energy is seen as a major potential energy source in the Philippines. As at 31 January 2016, a number of projects have received approval subject to on-going study and permits, including the Cabangan Ocean Thermal Energy Conversion project. Despite announcing the Cabangan project in 2011, the Department of Energy is yet to fix a feed-in tariff rate for ocean energy, which has caused delays.

- H&WB Asia Pacific (Pte. Ltd.) Corp. and French energy development firm Sabella SAS are reportedly interested in establishing Southeast Asia's first ocean tidal power plant project in the Philippines in the first half of 2017.

#### CURRENT ISSUES IN THE POWER INDUSTRY

- In late 2016, the National Bureau of Investigation received allegations of bidding irregularities at the Energy Regulatory Commission. President Duterte called for several senior officials to resign and requested that Congress abolish the Commission. The investigation and political response are ongoing.
- The Energy Regulatory Commission, in a March 2015 resolution, expanded the capacity for the solar feed-in tariff from 50MW to 500MW. The resolution fostered an immediate growth in solar projects.
- The Philippines' archipelagic geography makes for a costly transmission and distribution of electricity. Analysts have called for increased renewable energy in remote areas as a cheaper, long-term alternative to diesel-run plants. However, the 40% foreign ownership limit for renewable energy projects and the absence of regulatory standardisation beyond the feed-in tariff regime are impediments to renewable energy electrification in these more remote areas of the country.
- Some environmental groups have criticised the Government for continuing to commission coal plants, despite advocating renewable energy as the country's energy priority. Department of Energy figures show that there are currently 23 coal-fired power plants in the pipeline.
- The Department of Energy has laid down a new energy mix that will not put a limit on any technology to foster competition so that the country will have adequate and reliable electricity supply moving forward.



## RENEWABLES LAWS – OTHER ELEMENTS

- The *Renewable Energy Act of 2008* seeks to accelerate the exploration and development of renewable energy sources and increase the utilisation of renewable energy. The Department of Energy is the lead agency mandated to implement the Act's objectives.
- The Act requires the Department of Energy to establish a Renewable Energy Market, which is operated under the Wholesale Electricity Spot Market.
- The Renewable Energy Market facilitates the trading of renewable energy certificates to ensure compliance with the Renewable Portfolio Standard. This standard requires electricity suppliers to source a minimum amount of energy from "eligible renewable sources".
- The Act also created the National Renewable Energy Board. Its functions include recommending specific actions to implement the National Renewable Energy Plan. The plan sets targets for renewable energy capacity (as outlined above) and aims to provide a comprehensive approach for development of renewable resources.
- The Act also established a Renewable Energy Trust Fund to enhance the development and greater utilisation of renewable energy, to be administered by the Department of Energy as a special account in government financial institutions.
- Consumers may choose to source their power from renewable sources (known as the "Green Energy Option" under the Act).

## GOVERNMENT INCENTIVE PROGRAMS

- The main incentive for renewable energy developers is the feed-in tariff regime. The rates offered for wind, solar, hydropower and geothermal energy are relatively high by regional standards and second only to Japan.
- The feed-in tariff also includes priority connections to the grid for renewable energy; priority purchase and transmission of, and payment for such electricity by the grid system operators; and for the National

Renewable Energy Board to recommend for the Energy Regulatory Commission to approve the fixed tariff rate.

- There are a number of other incentives under Chapter VII of the Act for investors and developers, including seven year income tax holidays, low corporate tax rates, duty-free importation of machinery and other tax incentives.

## MAJOR PROJECTS/COMPANIES

- In May 2016, the World Bank approved US\$67 million for renewable energy under the Philippines Renewable Energy Project and the Access to Sustainable Energy Project. The latter will be used to introduce solar power to remote communities.
- The first hydropower project – the Ambuklao Hydropower Plant – was commissioned in 1956. The facility is now owned and operated by a joint venture between SN Power of Norway and Aboitiz Power of the Philippines.
- Explorations for the Tiwi and MakBan Geothermal Power Plant Complex commenced in 1964, with the first unit in Tiwi commencing operations in 1976. The generation assets are owned by the Aboitiz Group.
- North Wind Power Development Corporation developed the first commercial wind farm in the Philippines, the 33MW Bangui Bay North wind farm in Ilocos Norte. The largest wind farm, Burgos, owned by First Gen Holdings, is also located in Ilocos Norte and generates 150MW.

## FOREIGN INVESTMENT/OWNERSHIP

- In the Philippines 1987 Constitution, foreign ownership in a number of sectors, including land, natural resources and (implicitly) the renewable energy sector, is limited to 40%. This is seen as a major limiting factor for foreign investors in the renewable energy sector in the Philippines.
- The *Foreign Investments Act of 1991*, as amended, provides for the regular issuance of a "Foreign Investment Negative List", which limits foreign investment in certain industries. The Department of Finance will review the Negative List in May 2017. It was last updated in 2015.



- The Board of Investments regulates and promotes investment in the Philippines.
- The Government's Investment Priorities Plan nonetheless recognises renewable energy investment as a priority investment area.

### **UNFCCC – PARIS COMMITMENTS AND BEYOND**

- The Philippines signed the Paris Agreement on 21 April 2016 and committed to an Intended National Determined Contribution of 70% reduction in carbon emissions by 2030 (relative to business as usual levels).
- However, the Philippines' submission to the UNFCCC indicated that the target is "conditioned on the extent of financial resources, including technology development and transfer, and capacity building, that will be made available to the Philippines".
- The Philippines is yet to ratify the Agreement and President Duterte recently suggested that the Paris Agreement may lead to "stifling" the economic growth in the Philippines.



## RELEVANT WEBSITES

- Department of Energy – <http://www.doe.gov.ph/>
- Energy Regulatory Commission – <http://www.erc.gov.ph/>

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# REPUBLIC OF KOREA

## OVERVIEW

**Jurisdiction:** Civil law

**Language:** Korean

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 5 out of 190 (down 1 ranking)

2016/17 Global Competitiveness Index: 26 out of 138 (no change)

2017 Index of Economic Freedom: 23 out of 180 (up 4 rankings)

2016 Corruption Perceptions Index: 53 out of 176 (down 16 rankings)

2015 UN Development Programme Human Development Index: 17 out of 188 (down 2 rankings)

Population: 50.6 million

GNI per capita: US\$27,450

## PROFILE

The Republic of Korea (**Korea**) regained its independence after World War Two. However the Korean War (1950 – 1953) resulted in an armistice which split the country in two. The division along the 38<sup>th</sup> parallel remains to this day. It was not until 1987, after decades of economic growth, that Korea held its first free and direct presidential election under a revised constitutional structure. Korea is now a highly developed economy (Asia's fourth largest). However, it continues to face a threat from the unpredictable North. The impeachment and subsequent trial of Korea's first female President, Park Geun-hye, was reflective of broader public outrage over 'influence-peddling' across government as well as the nation's large, domestic companies (known as *the chaebols*).



## ELECTRICITY INDUSTRY OVERVIEW

- Korea is the ninth largest energy consuming nation in the world, and despite an abundance of gas and coal reserves, imports are used to satisfy 98% of its fossil fuel needs.
- In its 2016 Annual Report, the Korea Electric Power Corporation (**KEPCO**) reported that 528,091GWh of electricity was generated from the following sources:
  - coal: 38.7%;
  - nuclear: 31.2%;
  - liquefied natural gas: 19.1%;
  - oil: 6.0%;
  - alternative: 4.0%; and
  - hydropower: 1.0%.
- Korea has a 100% electrification rate. Household electricity prices in Korea are among the cheapest in the OECD at around US\$0.1346/kWh (as at 2014).
- The Electricity Regulatory Commission (**KOREC**) oversees the electricity industry. It is part of the Ministry of Trade, Industry and Energy.

### Electricity laws

- The *Electric Utility Act* created the Korea Power Exchange to run the market and power system and also created the Electricity Regulatory Commission. Other provisions of the Act include provisions regarding safety and Ministerial planning for the industry.
- The *Electricity Business Law* governs the renewable energy sector and allows renewable energy generators to sell electricity to the grid at a fixed price. The Act also mandates the Ministry of Trade, Industry and Energy to prepare the ‘Basic Plan of Long-term Electricity Supply and Demand’, which outlines policy directions for the electricity sector. The most recent Basic Plan was announced in 2008 and runs to 2022.

## Generation, distribution and transmission

- Despite efforts to privatise parts of the electricity sector in the late 1990s and early 2000s, the Korean Government has retained a 51% interest in KEPCO. KEPCO has 10 subsidiaries in Korea and a further 30 overseas.
- KEPCO continues to control 100% of the transmission and distribution in the market and 93% of total power generation.
- The Ministry of Trade, Industry and Energy (formerly known as the Ministry of Knowledge Economy), through its ordinance, plays a central role in regulating the industry under the *Electric Utility Act*.

## RENEWABLES INDUSTRY OVERVIEW

- Despite a relatively modest goal of 11% renewables contribution by 2035, the Government intends to invest over US\$36 billion in renewables by 2020. A large tidal power station and offshore wind farms near Jeju Island are two notable projects (see below).
- Between 1993 and 2012, the Government spent US\$2.6 billion on fostering a domestic market for renewable energy.
- On 15 August 2008, the Government announced the Low Carbon and Green Growth strategy, which is a plan to reduce carbon emissions and also to promote renewable energy, energy efficiency and environmentally conscious buildings.
- The Seoul Metropolitan Government has been active in promoting renewable energy. Seoul recently announced the introduction of its own feed-in tariff program and is also seeking to halt the expansion of all nuclear power plants. Korea’s capital accounts for around 10% of the country’s electricity consumption.
- Between 2021 and 2030, Korea hopes to complete a nationwide “Smart Grid”.
- A test bed for a Smart Grid has been built on Jeju Island, which was chosen due to its abundant wind and solar energy resources. The Government has announced its plans to make Jeju island 100% free of carbon emissions.





### Hydropower

- In its 2016 Annual Report, KEPCO noted that hydropower generated 5,796GWh of electricity.
- Estimates have been made that the country has a small-scale hydropower potential of 1.5GW. There are significant untapped resources, given that installed capacity is less than 5% of domestic potential.

### Wind energy

- Korean conglomerates have begun to invest significantly in offshore wind farms, however most wind farm developments to date have been onshore. In 2014, cumulative installed wind power amounted to 608.5MW.
- In 2011, the Government announced a strategy to attract US\$8.2 billion to develop offshore wind farms with a capacity of 2.5GW by 2019.

### Solar energy

- The greatest economic potential for solar thermal is in Korea's southern coastal area.
- In 2015, Korea's cumulative installed photovoltaic power capacity was 3.43GW.

### Geothermal energy

- Korea's installed geothermal capacity is 835.8MW.

### Biomass/biogas energy

- In 2015, the biggest biomass plant in Asia was opened in Korea.
- By 2010, 4,000 residential boilers capable of using biomass pellets had been installed.
- KEPCO and most of its subsidiaries are focusing on biomass as a means of achieving the Renewable Portfolio Standard.

### Ocean energy

- Tidal flows around the Korean coastline are highly conducive for ocean energy, and the country is a clear leader in ocean energy in the region. Korea has the largest tidal energy station in the world (see below).

- The country has a basic three-stage strategic plan for ocean energy development. Between 2008 and 2012 the Government's focus was on funding new technologies. From 2012 to 2020, the strategy is to increase industry involvement and to "exploit relevant technologies". From 2020 to 2030, the industry will take the lead on the commercial development of ocean energy.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- The renewable energy industry in Korea faces a number of structural difficulties. These include entrenched reliance on fossil fuels, a natural environment which is challenging for the renewables industry and the competitiveness of other forms of energy.
- Wind power development has been hampered by the country's terrain, as well as problems in land availability. The competitiveness of natural gas also inhibits the viability of new renewable energy-generated electricity.
- In recent years, reductions in government subsidies for solar power generation equipment has resulted in a decline in small-scale producers.

## RENEWABLES LAWS

- The *Basic Law on Low Carbon Green Energy 2010* establishes a national strategy for low carbon, green energy.
- It also establishes and supports the Green Industries Investment Company. The Government may provide funds for a public institution to invest in the Green Industries Investment Company.
- Under the Law, the Government must establish and enforce a basic energy plan every five years. Such plans must include measures for the supply and use of renewable energy.
- The *Promotion Act on Development, Use, Deployment of New and Renewable Energy 2010* requires that where public entities carry out construction of new buildings or renovation of existing buildings the design of these buildings must incorporate certain renewable energy features.



## GOVERNMENT INCENTIVE PROGRAMS

- Korea no longer has a national feed-in tariff regime. Instead, Korea relies on a Renewables Portfolio Standard to encourage renewable energy generation.
- Introduced in 2012, the Renewables Portfolio Standard applies to power providers with more than 500MW of power generating capacity. Power providers can meet the standard by installing qualifying technologies. For example, by using stationary fuel cells or by buying renewable energy credits.
- A fee of US\$0.04 per renewable energy certificate is charged at the time of issuance and subsequent purchase and sale of renewable energy certificates.
- In the case of a sale/purchase sale transaction, both the buyer and the seller are required to pay this fee.
- The scheme mandates the 18 largest public and private utilities to purchase or generate renewable energy at a rate equal to 10% of their share of total energy generation by 2024.

## MAJOR PROJECTS/COMPANIES

- The largest biomass plant in Asia is located in Dangjin. It has a capacity of 105MW and generates electricity mostly from palm kernel shells and some coal.
- Ten coal plants are to be closed by 2025, two of which will be converted to biomass plants.
- In 2010, Korea announced plans to launch its first utility-scale offshore wind farm. While the project has been delayed since, several smaller scale offshore wind

farms have been installed in the waters off Jeju Island. The overall goal is for these offshore wind farms to produce 2.5GW.

- Lake Sihwa tidal power station is the largest of its kind in the world. Completed in 2011, it has total output capacity of 254MW. The project was partly funded by the Korean Government.
- Hyundai Heavy Industry, Samsung Heavy Industry, Daewoo Shipbuilding and Marine Engineering and STX are some of the big names that have taken an interest in offshore wind energy.

## FOREIGN INVESTMENT/OWNERSHIP

- The *Foreign Investment Promotion Act 1998* grants foreign-owned companies the same rights as domestic companies, and applies the same taxes as would apply to Korean companies and nationals.
- Foreign ownership of Korean companies is common and the rules governing the formation of companies allows for 100% foreign ownership.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- South Korea ratified the Paris Agreement on 3 November 2016.
- South Korea has stated that it intends to reduce emissions by 37% from 'business-as-usual' rates by 2030.



## RELEVANT WEBSITES

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- Ministry of Trade, Industry and Energy – <http://english.motie.go.kr/www/main.do>

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# SINGAPORE

## OVERVIEW

**Jurisdiction:** Common law

**Language:** English, Malay, Mandarin and Tamil

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 2 of 190 (up 1 ranking)

2016/17 Global Competitiveness Index: 2 of 138 (no change)

2017 Index of Economic Freedom: 2 of 180 (no change)

2016 Corruption Perceptions Index: 7 of 176 (up 1 ranking)

2015 UN Development Programme Human Development Index: 11 of 188 (down 2 rankings)

Population: 5.5 million

GNI per capita: US\$52,090

## PROFILE

Singapore was founded as a British port in 1819, and was occupied by the Japanese during World War Two. Singapore was part of the Federation of Malaya for two years until it declared independence in 1965. Singapore is now one of the world's most prosperous nations in economic terms and has a highly developed economy. Geographically, the city-state is confined by its small land area (about 700 km<sup>2</sup>, 20% of which is reclaimed land), but its strategic location, on the Strait of Malacca, has helped to boost its export capabilities. By virtue of its history, location and rapid development, Singapore sits at the juncture of many cultures and economies. Singapore's revered founder, Mr Lee Kuan Yew, died in 2015. Traditionally, Mr Lee's party, the People's Action Party, has dominated Singapore's political scene.



## ELECTRICITY INDUSTRY OVERVIEW


- Singapore is heavily dependent on fossil fuels for electricity generation with at least 90% of electricity sourced from Liquefied Natural Gas (LNG).
- LNG and other fossil fuels are predominantly imported from neighbouring Indonesia and Malaysia, as well as Australia and the Middle East.
- 99.9% of Singapore is serviced by a single grid.
- The Energy Policy Group is an inter-government agency organisation chaired by the Permanent Secretary of the Ministry of Trade and Industry. In its National Energy Policy Report, published in 2007, the Energy Policy Group outlined six principles for Singapore's energy sector:
  - promoting competition to keep energy affordable;
  - diversifying energy supplies to guard against supply disruptions, price increases and other threats;
  - improving energy efficiency;
  - investing in the energy industry and research and development;
  - improving international cooperation methods; and
  - taking a whole-of-government approach to energy security.
- All of Singapore's electricity is bought and sold through the Energy Market Company in the National Electricity Market of Singapore.
- The market acts as a real-time electricity trading pool where power generation companies compete to sell electricity every half-hour.
- A commercial or industrial consumer with an average monthly electricity consumption of at least 2,000kWh is eligible for 'contestability'. If an eligible consumer chooses to be contestable, it will switch to buy electricity from an electricity retailer or from the wholesale electricity market.
- This is generally more cost-effective than continuing as a non-contestable consumer buying electricity at a regulated tariff (revised quarterly) from SP Services Limited. SP Services Limited is a subsidiary of Singapore Power, the energy utility company owning and operating Singapore's electricity and gas transmission and distribution networks. For households, the regulated electricity tariff for the period from 1 January 2017 to 31 March 2017 is S\$0.202 (approx. US\$0.14) per kWh.
- Over the past few years, the threshold for contestability eligibility has consistently dropped, with the Government intending to remove it eventually, such that all electricity consumers in Singapore will become contestable when the retail electricity market is fully liberalised.

## Electricity Market

- Since the late 1990s, Singapore has progressively liberalised its electricity market. The electricity generation and retail components were separated in 2001.
- The Energy Market Authority was formed in 2001 to provide a new legal and regulatory framework for the electricity and gas industries. Progression to full retail market liberalisation is currently in progress.
- Also in 2001, the Energy Market Company was established to operate as an exchange for wholesale electricity trading, and it has implemented the wholesale market systems, rules and business processes since 2002. In 2003, the National Electricity Market of Singapore opened.
- The Electricity Management System enables operators to monitor and control generation plants and transmission networks in Singapore. The system provides operators with information about generation plants, transmission stations as well as equipment and transmission lines.

## Generation, distribution and transmission

- As a general rule, a company is required to hold a generation licence issued by the Energy Market Authority if it generates electricity by means of one or more generating units of 10MW or more but less than 100MW and the generating unit is connected to the power grid.

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- For generating units of less than 1MW that wish to be paid for the electricity they export to the power grid, the generating unit(s) must be registered with the Energy Market Company and may have to compete to secure dispatch in the National Electricity Market. If the aggregate capacity of the generating units owned by the company in a single location exceeds 10MW, these generating units will have to bid in the electricity market to secure dispatch.
  - Singapore currently has 15 power generation companies connected to the grid. The following three entities together supply approximately 87% of the country's electricity:
    - PowerSeraya, which is wholly owned by Malaysia's YTL Power International;
    - Senoko Energy, which is owned by a consortium led by Japan's Marubeni Corporation; and
    - Tuas Power, which is wholly owned by China's Huaneng Power International.
  - The remaining generators are SembCorp Cogen, PacificLight Power Pte Ltd, Keppel Merlimau Cogen, National Environment Agency, Shell Eastern Petroleum, Senoko Waste-To-Energy, ExxonMobil Asia Pacific, Keppel Seghers Tuas Waste-To-Energy Plant, Tuaspring, TP Utilities, Singapore Refining Company and TuasOne.
  - SP PowerAssets, a subsidiary of Singapore Power (which is wholly owned by Temasek Holdings), is the sole owner and provider of electricity transmission and distribution services in Singapore. SP PowerAssets has appointed SP PowerGrid (being a further subsidiary of Singapore Power) to manage the operations of the transmission and distribution networks.
  - provides the Minister with the power to issue a special administration order (whereby an electricity licensee shall be managed directly or indirectly by the Energy Market Authority);
  - controls electricity licensees and entities with interests in transmission systems;
  - establishes the wholesale electricity market; and
  - stipulates various offences.
  - The energy market regulatory functions were taken over by the Energy Market Authority under the *Energy Market Authority of Singapore Act (Chapter 92B)*.

## RENEWABLES INDUSTRY OVERVIEW

- The primary renewables focus of the Singapore Government is directed at research and development, environmental technology and energy efficiency, rather than renewable energy generation.
- Solar energy and bioenergy are considered the best opportunities for renewable energy production in Singapore. Further research and development of these technologies is continuing, with the Government and private companies supporting a number of pilot projects.
- The Energy Market Authority, together with the National Environment Agency, leads the Energy Efficiency Programme Office, to promote energy efficiency.
- The Ministry of the Environment and Water Resources deals with climate change issues, and the Ministry of Trade and Industry is responsible for drafting and implementing energy market policy.
- The Sustainable Singapore Blueprint 2015 plans for implementation of the next phase of sustainable development. The blueprint sets out achievements from the past 10 years and sets targets for 2030, particularly for better green spaces, resources security, mobility and community stewardship and air quality and drainage in flood prone areas.

## Electricity laws

- The *Electricity Act (Chapter 89A)* is the chief legislative tool to “create a competitive market framework for the electricity industry, to make provision for the safety, technical and economic regulation of the generation, transmission, supply and use of electricity”. Broadly, the Act:
  - sets out licensing requirements;



### Hydropower

- While the country has a number of large reservoirs through its 'green corridor', there is limited means to produce hydropower.

### Wind energy

- Singapore's low wind speeds average, at 2m/s, is generally too slow for commercial wind turbines.
- However, one local distributor, Cygnus Power, is working on a number of projects in conjunction with Nanyang Technological University's Energy Research Institute to harvest wind power with vertical axis turbines that are able to operate at low wind speeds.

### Solar energy

- Solar energy is regarded as the most feasible source of renewable energy in Singapore.
- The Government has prioritised the research and development of solar energy systems that can be integrated into the urban environment given the city-state's limited land space. Two notable projects include installing solar panels on rooftops of high-rise public housing developments and solar panel installations on water surfaces in nature reserves.

- The Government has invested in a number of funding and incentive programmes, including a 20% funding subsidy for companies' investment in energy efficient equipment or technologies and 50% subsidy for new facilities or expansions, though these programmes are by no means limited to solar energy.

### Geothermal energy

- Researchers from the Singapore Magazine of Research, Technology and Education have found that Singapore is situated on a world class heat flow anomaly with potential for geothermal energy, and recommend that feasibility studies be undertaken to realise this potential.

### Biomass/biogas energy

- Bioenergy currently only makes up a small percentage of Singapore's energy production.
- With more research and infrastructure, bioenergy will be an important and economically viable renewable energy source.
- A new incineration plant is to be built by 2019 which will generate 800kWh of electricity per tonne of waste.





### Ocean energy

- Singapore's opportunities for ocean energy are limited by calm seas and commercial shipping routes through the busy Strait of Malacca.
- However, test centres have been installed to explore further the potential ocean and tidal energy holds.

### CURRENT ISSUES IN THE ENERGY SECTOR

- Singapore is deeply reliant on natural gas and crude oil imports from neighbouring Indonesia and Malaysia. Diversification of this supply is a continuing challenge.
- In 2016, the Minister of Trade and Industry announced that steps were being taken towards improving flexibility and diversity of Singapore's LNG supply. Singapore's new tranche of LNG imports will come from the United States, Australia, Norway, Russia, Qatar and Brunei, as it seeks to maintain its status as a LNG hub.
- Due to the small land availability in Singapore, it is unlikely the city-state will progress as a mass renewable energy generator. Rather, the Government's vision for Singapore is to play a major role in the development and manufacture of renewable energy technology.

### RENEWABLE ENERGY LAWS

- The *Energy Conservation Act (Chapter 92C)* introduced minimum energy management standards for large energy users in the industry sector from 1 July 2012. The standards only affect companies that consume more than 54 terajoules of energy per calendar year. The *Energy Conservation Act* is part of Singapore's plan to achieve its target of 35% improvement in energy efficiency by 2030 from 2005 levels.
- In 2017, there are discussions about possible amendments to the *Energy Conservation Act* to spur further improvements in energy efficiency. The laws were promised to deliver a 0.7% increase in energy efficiency in 2014 but had only delivered a 0.4% increase.

### GOVERNMENT INCENTIVE PROGRAMS

- Alongside its renewables focus, the Government has been actively pushing for energy efficiency and conservation.
- The Government supports a number of clean energy and energy efficiency grants and incentives. These grants are primarily targeted at the improvement of energy efficiency, research and innovation programs to develop new renewable energy technologies.
- The Singapore Economic Development Board is piloting the Energy Efficiency Financing Programme where a third-party financier provides companies with upfront capital to implement energy efficiency projects, and the energy savings are shared between the various stakeholders.
- The Government also offers a one year depreciation allowance tax incentive to encourage large companies to invest in energy saving equipment.

### MAJOR PROJECTS/COMPANIES

- In 2016, the Renewable Energy Corporation completed the first stage of its committed solar power generation by installing 8,038 solar panels on the rooftops of Tuas plants owned by Asia Pacific Breweries Singapore. This project is expected to generate 2.3 million kWh of clean energy per year and will reduce 1,500 tonnes of carbon emissions per year.
- Singapore currently has the largest floating solar test bed in the world, with systems installed from eight companies comprising three local start-ups and five international companies.
- Apple announced in 2015 that it would partner with a Singapore solar energy provider to power 100% of its facilities with clean energy.
- Goldman Sachs has agreed to finance projects in Singapore with Sunseap Leasing for an estimated capacity of more than 30MW. This collaboration is expected to create the funding platform for further investment above the initial 30MW target.





- CleanTech One, a 'green' industrial estates developer, officially opened an eco-business park in Singapore in 2013. This 'green complex' is part of a joint government and private sector (primarily the JTC Corporation) initiative to drive clean technology industry in Singapore and encourage more businesses to embrace sustainability.
- Vestas Wind Systems will reportedly invest up to S\$500 million (approx. US\$356 million) by around 2020 in Singapore. Vestas is currently a part of a project to power micro grids with wind turbines which could have potential application across Southeast Asia.

#### FOREIGN INVESTMENT/OWNERSHIP

- Singapore is a hub for multinational corporations and foreign investment. The city-state's financial stability, tax incentives, advantageous loans and minimal restrictions on foreign corporations make it an attractive financial centre.
  - The industries that are restricted include media, broadcasting, legal, property ownership and retail banking.
- #### UNFCCC – PARIS AGREEMENT COMMITMENTS AND BEYOND
- Singapore signed the Paris Agreement on 22 April 2016 and ratified the agreement on 21 September 2016. Singapore has committed to cut emissions intensity from 2005 to 2030 by 36%, and stabilise greenhouse gas emissions with the aim of peaking around 2030.
  - Singapore accounts for approximately 0.11% of global emissions but acknowledges its heavy dependence on fossil fuels.
  - Singapore has committed to harness solar energy and invest in other innovative forms of renewable energy to meet its commitments.



## RELEVANT WEBSITES

- Ministry of Environment and Water Resources – <http://app.mewr.gov.sg>
- Ministry of Trade and Industry – <https://www.mti.gov.sg/>
- Energy Market Authority – <http://www.ema.gov.sg/>
- Sustainable Energy Association of Singapore – <http://www.seas.org.sg/>

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# SRI LANKA

## OVERVIEW

**Jurisdiction:** Common law, civil law and customary law

**Language:** Sinhala and Tamil

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 110 of 190 (down 1 ranking)

2016/17 Global Competitiveness Index: 71 of 138 (down 3 rankings)

2017 Index of Economic Freedom: 112 of 180 (down 19 rankings)

2016 Corruption Perceptions Index: 95 of 176 (down 12 rankings)

2015 UN Development Programme Human Development Index: 73 of 188 (no change)

Population: 21 million

GNI per capita: US\$3,800

## PROFILE

Sri Lanka was colonised in the 16<sup>th</sup> century and became independent from British rule in 1948. The nation went through a civil war spanning 26 years between the Liberation Tigers of Tamil Eelam and the Sri Lankan Government. The civil war ended in 2009. Since the end of the conflict, Sri Lanka's social and economic indicators have significantly improved, evidenced by 98% adult literacy and strong, steady economic growth. In January 2015, President Maithripala Sirisena representing the Sri Lanka Freedom Party ousted the former President Mahinda Rajapaksa amidst allegations of misappropriation of public funds. Sirisena began his time as President with a focus on forging equally strong relationships with India, China, Pakistan and Japan.



## ELECTRICITY INDUSTRY OVERVIEW

- In 2014, total electricity generation was 12,357GWh. Electricity generation comprised of 36.7% from hydropower (including small hydro), 60.76% from thermal power (including biomass, coal and all other fuel-oil sources) and 2.54% from other renewables (including solar and wind power). Total installed capacity in 2014 was 3.932GWh.
- The share of thermal power in total generation has dramatically increased from 1% in 1986 to 60.76% in 2014.
- As at 2016, Sri Lanka's electrification rate was 98%, with only a small number of remote parts of the island still off the grid. In July 2016, the Asian Development Bank approved a loan of US\$115 million (approx. Rs17.4 billion) to help Sri Lanka achieve 100% electrification.
- More than half of Sri Lanka's consumers get access to very cheap electricity (around the equivalent of US\$0.03 (approx. Rs3.44) per kWh). The most expensive bracket of electricity is available at US\$0.10 (approx. Rs11.46) per kWh.
- Sri Lanka's electricity demand is expected to increase by 36% between 2015 and 2020.
- The Ministry of Power and Energy is responsible for the management of the power sector, and plays a role in the following state-owned energy institutions:
  - the Public Utilities Commission of Sri Lanka (PUCSL), which since 2009 has been the regulator for energy;
  - the Ceylon Electricity Board, which was created in 1969; and
  - the Lanka Electricity Company, formed in 1983 as a company under the *Companies Act 1982*.

### Electricity laws

- The *Electricity Act 2009* (as amended in 2013) is the main piece of legislation governing the electricity sector. It creates licence requirements and requires the Government to own shares in any company that operates a generation plant with more than 25MW.

- The *Public Utilities Commission Act 2002*, together with the *Electricity Act 2009*, establishes PUCSL as the independent regulator of the generation, transmission, distribution, supply and use of energy.
- The *Ceylon Electricity Board Act 1969* establishes the Ceylon Electricity Board.

### Generation, distribution and transmission

- The Ceylon Electricity Board generates approximately half the electricity in the country, while the other half is generated by private or semi-private small power producers. The Board also distributes approximately 90% of all electricity to customers, while the Lanka Electricity Company (Private) Limited purchases electricity from the Ceylon Electricity Board and distributes the remaining 10%.
- The Board is the monopoly operator of a single transmission network for the entire country, which is comprised of overhead transmission lines.

## RENEWABLES INDUSTRY OVERVIEW

- Currently, 39.24% of Sri Lanka's total installed power generation capacity comes from renewable energy sources.
- Sri Lanka's target is to increase the contribution of renewable sources to 60% of total power generation by 2020 and to 70% by 2030.

### Hydropower

- Central Sri Lanka's mountainous topography, combined with biannual monsoons, creates excellent opportunities for hydropower and is a key source of energy generation.
- Hydropower has been in operation since 1950, and has been extensively developed. All 16 major hydro plants are owned by the Ceylon Electricity Board. Major hydropower accounts for 50% of electricity generation, 41.3% of installed capacity and 13% of energy supply.



- Small private hydro producers sell power to the national grid. The number and contribution of small hydro has increased significantly due to higher electricity demand, competitive feed-in tariffs and delays in government-owned projects.
- In 2016, Laugfs Power Limited acquired Pams Power Limited for 200 million rupees (approx. US\$1.7 million) in order to build a small hydropower plant in Sri Lanka.
- In January 2017, the PUCSL released a statement outlining its concern that if the drought continued in Sri Lanka, hydropower could only be generated until the end of February 2017.

### Wind energy

- US studies have indicated that Sri Lanka has 'good to excellent' wind resources, especially in the north and north-west coastal regions and in the central highlands.
- It is estimated that there is approximately 5,000km<sup>2</sup> of windy areas that could conservatively support 25,000MW of potential installed capacity.

### Solar energy

- Sri Lanka has well over 100,000 solar home or remote power systems installed, both on and off-grid.
- In September 2016, the Sri Lankan Government launched a plan to add 220MW of solar power to the country's grid by 2020 (which is the equivalent of roughly 10% of the nation's current daily electricity demand). The Government hopes to increase its solar energy output to 1,000MW by 2025.

### Geothermal energy

- According to geologists, there is a potential geothermal belt running from the north of Trincomalee to Hambanota which has about ten identified thermal springs situated along the line. This suggests that a sufficient reservoir of geothermal energy exists in Sri Lanka.

### Biomass/biogas energy

- Firewood and bagasse (sugar cane waste) are the most common energy source in Sri Lanka, used in the domestic sector because of its abundant availability.
- Biomass energy consumption has been increasing consistently at around 3% per year.

### CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- Sri Lanka has an ambitious target of reaching 60% renewable energy contribution by 2020, which is a jump of approximately 20% on current renewables levels.
- As energy demand has increased nationwide, so too has reliance upon fossil fuels. Coal power plants have been built in Norochcholai to significantly increase total capacity.

### RENEWABLES LAWS

- The *Sri Lanka Sustainable Energy Authority Act 2007* created the authority of the same name which is charged with regulating renewable natural resources.
- According to the *Electricity Act 2009*, the Government must own shares of privately-owned renewable energy facilities with a capacity exceeding 25MW.
- The *National Environmental Act* requires environmental clearance to be obtained for thermal power plants exceeding 25MW, or hydro power plants exceeding 50MW.

### GOVERNMENT INCENTIVE PROGRAMS

- Sri Lanka has had feed-in tariffs since 1997. In 2010, the Sri Lanka Energy Authority implemented more sophisticated cost-based, technology-specific feed-in tariffs. These are available for power plants with capacities of less than 10MW, however investors are able to negotiate for a lower tariff for power plants between 10 to 25MW.
- Investors can opt for either a three-tier tariff, which offsets higher start-up costs, or a fixed rate tariff, both of which run for a period of 20 years. Sri Lanka also offers higher feed-in tariff rates for wind and hydro facilities that use locally-manufactured turbines.



## MAJOR PROJECTS/COMPANIES

- The Asian Development Bank loaned Sri Lanka US\$300 million in two instalments for Sri Lanka's Clean Energy and Network Efficiency Improvement Project. The first instalment in 2014 was for a 30MW hydro plant in Moragolla and upgrades to transmission capacity. The second instalment in 2016 funded the expansion of transmission and voltage lines to connect wind farms to the grid.
- The Uma Oya Hydropower plant is in construction and will add another 120MW of renewable energy to the national grid. The project is set to be completed by 2018.
- In late 2016, President Sirisena initiated a project to install solar panels on the rooftops of households, which is expected to add 200MW of solar electricity to the national grid by 2020 and 1,000MW by 2025.
- In March 2017, the Government also announced an international bid process to build a 100MW floating solar power plant in the Madura Oya reservoir.

## FOREIGN INVESTMENT/OWNERSHIP

- Significant Chinese and other investment in Sri Lankan ports, combined with Asian Development Bank funding of domestic transport infrastructure, has made transport of building and other materials significantly easier in recent years.
- Whilst foreign direct investment is crucial to allow Sri Lanka to meet its plans for economic growth, the nation is still protectionist in relation to its policy on imports. The high transaction costs and economic instability make constant flows of FDI difficult to attain.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Sri Lanka ratified the Paris Agreement on 21 September 2016 and committed to pursue more environmentally-friendly renewable energy projects.



## RELEVANT WEBSITES

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# TIMOR-LESTE

## OVERVIEW

**Jurisdiction:** Civil law

**Language:** Tetum and Portuguese (Official Languages); Bahasa Indonesia and English (Working Languages) as well as various local languages and dialects

## BUSINESS ENVIRONMENT

2017 Ease of Doing Business Report: 175 of 190 (down 2 rankings)

2016/17 Global Competitiveness Index: Not listed

2017 Index of Economic Freedom: 173 of 180 (no change)

2016 Corruption Perceptions Index: 101 of 176 (up 22 rankings)

2015 UN Development Programme Human Development Index: 133 of 188 (down 5 rankings)

Population: 1.2 million

GNI per capita: US\$2,180

## PROFILE

Timor-Leste was a Portuguese colony for nearly 500 years. Following a period of Indonesian occupation from 1975 to 1999, Timor-Leste emerged as the first newly created sovereign State of the 21st century. East Timor (as it has been previously known) has since built a strong foundation for ongoing stability through a consultative and unity-focussed governance structure and through successful management of the country's Petroleum Fund. The country continues to implement its Strategic Development Plan 2011 – 2030, which sets out an ambitious vision for the nation's future as a stable democracy and upper-middle income economy. Timor-Leste is seeking full membership of the Association of Southeast Asian Nations.





## ELECTRICITY INDUSTRY OVERVIEW

- Timor-Leste's infrastructure, including its electricity assets, were destroyed by pro-Indonesia militias in 1999. According to the United Nations however, by 2014 Timor-Leste had a total electricity capacity of 236MW. This represents a significant increase on the 44MW capacity it had only five years earlier.
- In 2015, a new 17MW power station in Sacato came online, providing electricity to the enclave of Oecusse-Ambeno.
- The capital and largest city, Dili, has an electrification rate of 85%, yet rural electrification rates range from between 5% and 18%, with estimates of total nationwide electrification at just 22%. Only Dili and Baucau (the second largest city) have a constant electricity supply, though power outages occur.
- The majority of Timor-Leste's power supply is based on imported oil for diesel power generation, and while the price of crude oil has halved since mid-2014, these generators continue to be uneconomical.
- The Timor-Leste Government has commissioned a new 150kV, 715km long transmission line. The line will circumvent the country linking the Hera Generating Station, the Betano Generating Station, nine substations and the Dili control centre.
- In its five year legislative agenda (2012 – 2017), the former Xanana Gusmão-led Government committed to the continued upgrade and expansion of the national grid. An additional 10 substations have also been proposed to deal with an expected increase of 210MW in generating capacity.
- The program of the Sixth Constitutional Government, led by Prime Minister Dr. Rui Maria de Araújo, includes a pledge to ensure that all of Timor-Leste has access to electricity 24 hours a day, and has stated that renewable energy and complete rural electrification are two priorities for the Government.
- The Government has also stated that it will be considering the most appropriate status of the state-owned electricity producer, Electricidade de Timor-Leste (**EDTL**), with a view to increasing revenue.

## Electricity laws

- There were a number of attempts to commence electricity regulation by the United Nations Transitional Administration in Timor-Leste (**UNTAET**) and now the Timor-Leste Government. These include:
  - UNTAET Directive No. 2001/10 on Fees and Charges for Electricity and Related Services;
  - UNTAET Directive No. 2002/07 on Amendment on the Schedule of Fees and Charges for Electricity and Related Services; and
  - Government Decree Law No. 13/2003 establishing the Basis for the National Electricity System (**the Basic Law**).
- Perhaps the most important aspect of the Basic Law is its provision for the future establishment of a Universal Service Operator for the generation, distribution and transmission of electricity. When established, the Universal Service Operator will have public utility status bringing with it various public and private rights, responsibilities and duties.
- The Basic Law provides that if a private body corporate is appointed as the Universal Service Operator, it must be through a concession contract. Concession contracts must be announced and open to an international tendering process.
- Other key points of the Basic Law include the:
  - appointment of a Regulatory Authority (however government ministries and the State Secretariat for Energy Policy currently act as de facto regulators);
  - establishment of binding producers after the Regulatory Authority's tendering process;
  - establishment of non-binding producers who may obtain either domestic or commercial licences; and
  - establishment of tariff regulations governing the "criteria and methods for formulating and fixing tariffs and rates for electricity".



### Generation, distribution and transmission

- EDTL has a monopoly on the supply and distribution of electricity to Dili and the II district capitals. EDTL is almost completely funded by the Government, however donor countries provide technical assistance.
- The World Bank has funded projects aimed at improving electricity supply, including financing the repair of the Comoro power station and work on Dili's power distribution infrastructure.
- The Asian Development Bank is also actively involved in financing projects in the country.

### RENEWABLES INDUSTRY OVERVIEW

- An Asian Development Bank report highlights hydropower and wind as the most promising renewable energy sources for Timor-Leste. However, cheap stand-alone solar photovoltaic systems are seen as a solution to rural electrification for houses that cannot be connected to the grid.
- Timor-Leste's mountainous terrain poses difficulty for much of the country's infrastructure development, including for large-scale power plants and transmission infrastructure.

- NGOs (often with donor-country support) have been actively involved in Timor-Leste. For instance, the Alternative Technology Association has (since 2003) sent volunteers to install solar and wind installations in schools, hospitals, offices and other community buildings.
- Government, World Bank and other feasibility research into renewable energy has been undertaken.

### Hydropower

- HydroTimor oversees the development of hydropower in the country.
- It is estimated that Timor-Leste has a total potential of between 80MW and 252MW of hydropower capacity. The 27MW Ira Lalaro hydropower project is the most feasible project.
- The steep topography and frequent small earthquakes in Timor-Leste pose some obstacles to hydropower.
- Micro and mini hydropower projects may become an interim power source for villages unlikely to be connected to the national grid within the next 10 to 15 years.





### Wind energy

- Studies have shown that there is great potential for wind power generation (approximately 72MW) in East Timor.

### Solar energy

- Timor-Leste has high rates of solar radiation and is well-suited to solar photovoltaic installations.
- It is estimated that between 10,000 and 50,000 solar photovoltaic systems will be needed for households that will not be connected to the national distribution network in the next 15 years. Capital subsidies will be needed to reduce start-up costs, however operation and maintenance costs are low.
- An Australian not-for-profit known as the Alternative Technology Association has, since 2003, installed solar panels in over 1,500 East Timorese school, homes, and hospitals.

### Geothermal energy

- Based on geological surveys, it is unlikely that East Timor could use geothermal energy as a large-scale means of energy production. However, the country is geologically active with large unexplored areas, particularly on the south coast.

### Biomass/biogas energy

- The majority of energy in rural and remote areas is sourced from biomass fuels.
- 78MW of biomass, biogas and waste-to-energy projects are currently being developed by the Government.

### Ocean energy

- Timor-Leste's coastline is characterised by steep underwater drop-offs, which may prove beneficial to the future development of ocean energy.





## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- The lack of a settled land law and difficulties around project financing are two common concerns of investors in Timor-Leste.
- It is likely that Timor-Leste will require financial support either from the Asian Development Bank, a foreign government or an NGO to construct a viable renewables industry. An alternative would be for the Government to consider guaranteed feed-in tariff rates, as has occurred in other Asia-Pacific jurisdictions.
- The Government has entrusted the country's first Prime Minister, Dr Mari Alkatiri, with administering 'special social market economy zones' in the enclave of Oecusse-Ambeno and on the island of Ataúro respectively. These zones have a broad development focus and could include the development of renewable energy facilities.

## RENEWABLES LAWS

- At time of writing, the Council of Ministers was considering establishing regulations for the renewable energy sector and the establishment of a National Renewable Energy Council.

## GOVERNMENT INCENTIVE PROGRAMS

- At time of writing, the National Parliament is considering a revised foreign investment regime which is broadly seen as more favourable to foreign investors. For now, however, the governing law is the *Private Investment Law No. 14/2011*. The law offers various incentives for foreign investors such as income tax exemptions and customs duty exemptions.

## MAJOR PROJECTS/COMPANIES

- The Government has committed to complete construction on the Lariguto wind farm as well as the Bobonaro wind farm and to connect them to the national grid.

- The Government has also vowed to establish a solar centre in Hera. Recently, Dutch beer giant Heineken, commenced construction on a US\$40 million manufacturing hub near the existing Hera power plant, which is seen as an historic investment in the country and an indication of the reliability of the power supply in the area.
- The Ira Lalaro hydropower project has the potential to meet a significant amount of Timor-Leste's electricity needs. It is considered the most cost effective hydropower project, in part due to the Ira Lalaro Lake which would provide natural storage for the plant.
- Other hydropower projects are run-of-river type plants at Gleno, Belulic and Laclo.
- A 10MW to 15MW wind power project has been identified in Foho Bagarkoholau, 10km south of Dili.

## FOREIGN INVESTMENT/OWNERSHIP

- While a new foreign investment regime is currently before National Parliament, the existing regime is the *Private Investment Law No. 14/2011*. The law establishes a legal framework to attract and promote foreign investment.
- In 2011, Timor-Leste's Parliament established the National Investment Agency to further streamline and encourage foreign investment.

## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Timor-Leste signed the Paris Agreement on 22 April 2016. Timor-Leste released its Intended Nationally Determined Contribution in January 2017. While the document did not set a specific carbon reduction target, it focuses on economy-wide plans and actions.

## RELEVANT WEBSITES

- Timor-Leste Government website – <http://timor-leste.gov.tl/?lang=en>
- Program of the Sixth Constitutional Government (2015-2017) – <http://timor-leste.gov.tl/?cat=39&lang=en#prog2.3>
- TradeInvest Timor-Leste – <http://easttimornow.com.au/trade/tradeinvest.aspx>

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# THAILAND

## OVERVIEW

**Jurisdiction:** Civil law system with common law influences

**Language:** Thai, English, ethnic and regional dialects

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 46 of 190 (no change)

2016/17 Global Competitiveness Index: 34 of 138 (down 2 rankings)

2017 Index of Economic Freedom: 55 of 180 (up 12 rankings)

2016 Corruption Perceptions Index: 101 of 176 (down 25 rankings)

2015 UN Development Programme Human Development Index: 93 of 188 (down 4 rankings)

Population: 67.9 million

GNI per capita: US\$5,720

## PROFILE

The Kingdom of Thailand was the only country to avoid colonial takeover in Southeast Asia. Numerous military coups have occurred throughout the country's modern history. The most recent military coup ousted Prime Minister Yingluck Shinawatra in 2014. Despite this political unrest, Thailand remains one of the most advanced economies in Southeast Asia and has a liberal and pro-investment economy. In late 2016, the country went into a period of mourning following the death of King Bhumibol Adulyadej, the longest-serving head of state in the world. His son, Maha Vajiralongkorn has since been crowned King. Democratic elections are tentatively scheduled for 2018, to allow time for necessary legislative reforms transitioning the country back to civilian rule.



## ELECTRICITY INDUSTRY OVERVIEW

- Thailand is heavily reliant on energy imports, notably oil and gas. Foreign imports constitute 57% of Thailand's natural gas usage.
- Total energy expenditure in 2014 was US\$66 billion.
- Over the last decade, energy consumption has grown 3.2% year on year.
- Natural gas (66%) is the largest source of energy, followed by coal (20%). Renewable energy represents 12% of total consumption.
- A rural electrification program instigated in the 1970s has resulted in 98% electrical coverage in households throughout Thailand.

### Generation, distribution and transmission

- The Thailand Power Development Plan was introduced in 2015. The Plan prioritises energy security, cost-appropriateness of power generation and energy efficiency, and reducing the environmental and social impacts of carbon pollution.
- The plan envisages large hydropower, nuclear energy and fossil fuel sources as the dominant contributors to meet Thailand's growing electricity demand.

### Government bodies

- The Electricity Generating Authority of Thailand, a state-owned company, controls 60% of generation capacity as well as the entire transmission system (the remainder of generation is supplied by independent producers such as the Electricity Generating Company and the Ratchburi Electricity Generating Holding Public Company Ltd (**RATCH**)).
- The Electricity Generating Authority of Thailand sells electricity to two retail suppliers, the Metropolitan Electricity Authority for Bangkok and the Provincial Electricity Authority for areas outside Bangkok.
- The Ministry of Energy oversees all other government bodies in the sector, including the:

- National Energy Policy Council, which is comprised of cabinet members who prepare guidelines for the implementation of the energy program which are then administered by the National Energy Policy and Planning Office;
- Department of Alternative Energy Development and Efficiency;
- Department of Energy Business;
- Department of Mineral Fuel, which regulates the business of exploration and exploitation in oil and gas activities in Thailand;
- Energy Regulatory Commission, which regulates the activities of operators in the electricity sector and enforces the Energy Business Act 2007. It is chaired by the Prime Minister; and
- Energy Conservation Centre of Thailand, which provides technical expertise and services to promote energy conservation.

### Electricity laws

- The *Energy Industry Act 2007* governs and regulates energy business in Thailand. The Act seeks to allow more participation in the energy sector by private enterprise. The Act is pitched in broad terms, which provide for the promotion of adequate and secure energy services, protection of energy consumers, promotion of competition, fairness and efficiency. The Act also establishes the Energy Regulatory Commission, and delegates certain powers to the Commission.
- The *Small and Very Small Power Purchase Agreements Act 2007* regulates the connection of small producers to the electricity grid, being a base for solar, wind, biomass and mini hydropower. This Act was amended in 2009. Small producers have been further supported by government policies including the Thailand Power Development Plan 2015 and the Alternative Energy Development Plan 2015.
- The *National Policy Council Act 2008* establishes the National Energy Policy Council which approves project plans and energy policy developed by the National Economic and Social Development Board.



## RENEWABLES INDUSTRY OVERVIEW

- Thailand is considered to be a leading renewable energy provider in Southeast Asia, particularly for solar power. The Thai Government was one of the first countries in the region to develop incentives for renewable energy generation.
- The goal of renewable energy policy in Thailand is characterised by a shift in reliance on large utilities towards a decentralised model comprising renewable energy projects.
- Around US\$2 billion was invested in solar projects alone in 2015, a large increase from the US\$1.5 billion invested in all renewable energy in 2011.
- The Alternative Energy Development Plan organises the Ministry of Energy's strategy for energy consumption leading up to 2036, passed by resolution of the National Energy Policy Council in 2014.
- The Ministry of Energy also drafts Distribution Network Development Plans every five years, containing targets to ensure connectivity, implementing guidelines and regulatory frameworks established by the Thailand Smart Grid Masterplan.

### Alternative Energy Development Plan

- The Thai Government approved the revised Alternative Energy Development Plan (2015 to 2036) in June 2015.
- The Alternative Energy Development Plan establishes strong objectives, with a renewable energy capacity target of 20GW by 2036, comprising:
  - 6,000MW of solar energy;
  - 3,002MW of wind energy;
  - 3,282MW of hydropower;
  - 5,570MW of biomass energy;
  - 1,280MW of biogas energy;
  - 680MW of energy crops;
  - 600MW of wastewater energy; and
  - 550MW of waste-to-energy energy.

- The Alternative Energy Development Plan contemplates a renewable energy consumption target of 30% by 2036 (the more generic Power Development Plan also has similar renewables targets).

### Hydropower

- Hydropower has strong potential in Thailand. Despite being historically underutilised and heavily imported from other countries, hydropower capacity has increased.
- There is strong potential for small hydropower projects in the east and central part of Thailand.
- Hydropower capacity has increased substantially, with a total installed capacity of 3,484MW.

### Wind energy

- Thailand's wind power generation is increasing. In 2015, total production was 234.5MW, more than double that of 2012 and far larger than the 7.3MW generated in 2011.
- Central, western and coastal regions of Thailand have been investigated as possible turbine sites.

### Solar energy

- The north and north-eastern regions of Thailand receive an average of six to eight sunshine hours per day, making Thailand an attractive destination for solar photovoltaic projects.
- At approximately 1,300MW, Thailand has the largest solar power capacity in Southeast Asia.
- The Alternative Energy Development Plan's target for solar power generation is a capacity of 6,000MW by 2036.

### Geothermal energy

- The geothermal industry will likely not contribute significantly to Thailand's renewable energy target. A geothermal target of just 1MW by 2021 underlines Thailand's reliance on other sources of renewable energy.





### Biomass/biogas energy

- Biomass energy represents a significant component of Thailand's renewable energy capacity, amounting to 2,679MW in 2015.
- The 2036 target prescribed by the Alternative Energy Development Plan for biomass is 5,570MW, an increase from the 2,679MW generated in 2015.
- The 2036 target for biogas is lower, at 600MW. This is almost double the 359MW figure for 2015.

### CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- As with other nations in Southeast Asia, energy security is a major issue in Thailand. The country is reliant on natural gas imports from other countries including Myanmar, as well as hydropower imports from Laos. The total cost of energy imports is estimated to be about 12% of the country's GDP. This reliance, coupled with growing electricity demand, has created a strong incentive for increasing domestic energy production through renewable resources.
- Analysts have noted a lack of a balanced renewable energy portfolio in Thailand with solar and biogas generation being substantially larger than wind and hydropower. The targets in the Alternative Energy Development Plan reflect the need to develop a more diverse supply of renewable energy.

### RENEWABLES LAWS

- The *Energy Development and Promotion Act 1992* gives the Department of Energy Development and Promotion broad powers to regulate production, transformation, utilisation and conservation of energy sources.
- The *Energy Conservation Promotion Act 2007* promotes the efficient use of electricity.

### GOVERNMENT INCENTIVE PROGRAMS

- A new feed-in tariff scheme commenced in 2013, focussing on solar. The tariff differentiates between rooftop solar photovoltaic, community-owned solar and ground-mounted installations.

- The Board of Investment Promotion (chaired by the Prime Minister) allows an eight year corporate income tax exemption for manufacturing solar cells, generation of alternative source energy, manufacturing of energy saving machinery or renewable energy equipment and machinery and energy services consulting firms who provide consulting services on the use or installation of energy-saving machinery and equipment.
- Furthermore, a Board of Investment certificate grants foreign companies who make a "major investment" under the *Investment Promotion Act 2002* a number of benefits including permission to conduct a "restricted business" as defined under the *Foreign Business Act 1999* to bring in foreign skilled workers, permission to own land (not normally allowed for foreigners), exemption on import duties and reduction of corporate income tax.

### MAJOR PROJECTS/COMPANIES

- Asia Biogas began the commercial operation of its waste-to-energy plant in the Thai region of Krabi in 2016.
- Gunkul Engineering PCL will commence the construction of 33 new turbines in the first quarter of 2017 at Sarahnlom wind farm. It will have a total capacity of 67.5MW. The wind turbines, which will be the tallest in Asia, will be supplied by the Spanish manufacturer Gamesa.
- Energy Absolute PCL's 90MW solar farm in Nakhon Sawan began operation in 2014 and has announced that a 126MW capacity wind farm will be built in Nakhon Si Thammarat in 2017.
- National Energy Development Co's Lopburi Solar Farm, which was constructed from 2010 and financed by a US\$70 million loan from the Asian Development Bank, increased its operational capacity to 84MW in 2013.
- The Asian Development Bank has contributed funding to other solar projects in Thailand. It announced lending of US\$85 million to Solarco for three solar plants with total capacity of 57MW.



- Thailand's largest solar power project is run by Solar Power Co Ltd. The project involves the construction of 6MW of solar facilities at 34 different sites, predominantly in north-eastern Thailand.
- Wind Energy Holding Co is planning to develop three wind power plants north of Bangkok. The proposed project would generate 270MW of electricity and is valued at US\$550 million. Another US\$400 million, 270MW wind farm is currently being developed.

#### FOREIGN INVESTMENT/OWNERSHIP

- The *Foreign Business Act of 1999* has superseded the earlier *Alien Business Law of 1972*. The Act sets out a number of sectors and activities in which foreign capital is limited to less than a 50% stake. The new Act divides foreign ownership into three categories,

ranging from 'absolute prohibition' in certain sectors through to sectors requiring 'administrative' or 'executive approval'.

#### UNFCCC – PARIS COMMITMENTS AND BEYOND

- Thailand ratified the Paris Agreement on 1 December 2015 and committed to a 20% reduction in emissions by 2030. Thailand also proposed to commit to a 25% reduction target conditional upon receiving international support.



## RELEVANT WEBSITES

- Ministry of Energy – [www.energy.go.th](http://www.energy.go.th)
- Electricity Generating Authority of Thailand – [www.egat.co.th](http://www.egat.co.th)
- The Metropolitan Electricity Authority – [www.mea.or.th](http://www.mea.or.th)
- The Provincial Electricity Authority – [www.pea.or.th](http://www.pea.or.th)
- Thailand Power Development Plan (2015-2036) – [https://www.egat.co.th/en/images/about-egat/PDP2015\\_Eng.pdf](https://www.egat.co.th/en/images/about-egat/PDP2015_Eng.pdf)
- Thailand Alternative Development Plan 2015-2036 (summary presentation) – [http://thailand.ahk.de/fileadmin/ahk\\_thailand/Projects/Biogas\\_Presentation/AEDP-Biogas-GT-\\_08-06-15.pdf](http://thailand.ahk.de/fileadmin/ahk_thailand/Projects/Biogas_Presentation/AEDP-Biogas-GT-_08-06-15.pdf)

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# VANUATU

## OVERVIEW

Jurisdiction: Common law, French law and customary law

Language: Bislama, English, French and local languages

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 83 of 190 (up 5 rankings)

2016/17 Global Competitiveness Index: Not listed

2017 Index of Economic Freedom: 52 of 180 (up 37 rankings)

2016 Corruption Perceptions Index: Not listed

2015 UN Development Programme Human Development Index: 134 of 188 (down 3 rankings)

Population: 280,000

GNI per capita: US\$3,170

## PROFILE

Vanuatu is an archipelago in the South Pacific Ocean consisting of 86 islands. Many islands are uninhabited and some bear active volcanoes. Prior to independence in 1980, Vanuatu's islands, then called the New Hebrides, were subject to joint colonial rule by Britain and France. Vanuatu is now a parliamentary democracy with a unicameral parliament of 52 members. The Indigenous inhabitants of Vanuatu, referred to as ni-Vanuatu (meaning 'of Vanuatu'), are ancestrally Melanesian and Polynesian. A majority of Vanuatu's population rely on subsistence farming. With over 115 local dialects, Vanuatu possesses the world's highest linguistic density per capita. In March 2015, Vanuatu was devastated by Cyclone Pam – 90% of housing in Vanuatu's capital, Port Vila, was badly damaged and repairs to national infrastructure are ongoing.



## ELECTRICITY INDUSTRY OVERVIEW

- In rural Vanuatu (where 75% of ni-Vanuatu live), only 17% of people have access to electricity. The rates of electrification in Vanuatu are therefore low by regional standards.
- 95% of the rural population continue to cook with biomass fuels such as wood. Approximately 106 kilotonnes of fuel wood are consumed yearly.
- Vanuatu's energy mix is significantly reliant on imported fuels. According to Vanuatu's Utilities Regulation Authority, in July 2016 diesel combustion accounted for 81.11% of electricity generation.
- The Department of Energy reported that Vanuatu's consumption of imported petroleum products will grow by 50% to 2030 if unchecked by effective sustainable energy policies.
- As at July 2014, the average electricity bill for a domestic consumer in Vanuatu was approximately US\$211 per month, which is comparatively high for a South Pacific island nation.
- In March 2015, Cyclone Pam further worsened access to electricity. Cyclone Pam caused widespread damage to the high and low voltage networks across the Efate and Tanna islands. The overall costs of repair work on electricity and water infrastructure were in the vicinity of US\$2.2 million.

### Electricity laws

- Under the *Electricity Supply Act no. 21 of 2000*, the Government can enter into an electricity concession contract with a private entity, which will empower the entity to manufacture and supply electricity in a specified area, during a specified period. Under the Act, it is an offence for any person other than the concessionaire to generate, distribute or supply electricity in the area of a concession.
- The *URA Act no. 11 of 2007* establishes the Utilities Regulatory Authority and prescribes its powers. The Authority is an economic regulator for water and electricity services in Vanuatu.

- The Department of Energy launched the National Energy Road Map in April 2014. The road map is Vanuatu's policy framework for achieving affordable, secure, reliable and sustainable energy access for a majority of ni-Vanuatu by 2030. Described as a 'living document' by the Minister for Climate Change and Energy, the plan was revised in June 2016 to expand on the role of renewable energy and energy efficiency in Vanuatu's policy vision.
- Under the road map, changes are planned to the *Geothermal Energy Act*, *Petroleum Act*, *Electricity Supply Act*, *URA Act*, and *Government Tenders and Contracts Act*. If implemented, the Utilities Regulatory Authority will be empowered to monitor and regulate liquefied petroleum gas prices. Further, petroleum storage will be subject to increased environmental, health, safety and quality standards.
- The Parliament has passed a Bill to create mandatory minimum energy performance standards for electrical appliances.

### Generation, distribution and transmission

- In 2013, Vanuatu established a Ministry for Climate Change and Natural Disasters. It includes the Department of Energy, the Department of Environment and Conservation and the Project Management Unit.
- The Department of Energy is responsible for administration of the energy sector and has played a key role in identifying, developing and implementing energy supply projects.
- The Project Management Unit works with the Department of Energy to, among other things, manage the funding of projects by external donors.
- Four of Vanuatu's 86 islands have urban electricity grid systems. They are managed by two private electric utilities: the Union Electrique du Vanuatu Limited (**UNELCO**), a subsidiary of French multinational Engie, and Vanuatu Utilities & Infrastructure (**VUI**), a subsidiary of multinational Pernix Group.
- UNELCO manages grids on the Efate, Malekula and Tanna islands. VUI manages a grid in Luganville (the second-largest city in Vanuatu) and a village mini-grid



on Espiritu Santo Island. UNELCO and VUI operate these systems through concession contracts with the Government of Vanuatu.

- As at July 2014, UNELCO and VUI were respectively the third and fifth most expensive electricity suppliers in the Pacific region.
- Several nongovernmental organisations are involved in implementing energy projects in Vanuatu. They include the Vanuatu Renewable Energy and Power Association, the International Union for Conservation of Nature and Alternative Communities Trade in Vanuatu.

## RENEWABLES INDUSTRY OVERVIEW

- The Government's target, expressed in the National Energy Road Map, is ambitious – 65% renewable energy in the energy sector by 2020 and 100% by 2030. The road map recognises that renewable energy projects are a key opportunity to boost the country's unusually low electrification rates and increase overall energy stability.
- Data from UNELCO, VUI and the Utilities Regulatory Authority shows that between 2012 and 2015, the proportion of Vanuatu's energy mix that was generated from renewable sources increased from 19% to 29%.
- As at July 2016, 11.27% of Vanuatu's energy generation came from wind power, 6.31% came from hydropower and 1.31% came from solar power.
- The Department of Energy describes the country's solar, geothermal, hydro and wind energy sources as "substantial" though "not yet utilised".

### Solar energy

- On average, Vanuatu enjoys 2,000 to 2,300 hours of sunshine per year. Solar is therefore a high potential energy source.
- In 2016, an Abu Dhabi company Masdar, a subsidiary of a UAE state-owned enterprise, installed three grid-connected solar photovoltaic plants in Vanuatu,

totalling 767kW. One component of the project was to install ground-mounted and car park photovoltaic systems at Vanuatu's parliament building.

- The Department of Energy estimates that the Masdar solar photovoltaic plants save Vanuatu from importing 324,000 litres of diesel fuel per year.
- The project was delivered under the UAE-Pacific Partnership Fund, which disburses US\$50 million in grants for renewable energy projects in Pacific island countries.
- A further 501kW grid-connected solar photovoltaic system, located in Undine Bay, opened in May 2016, and reportedly supplies electricity to over 300 local households. This project was delivered by Vanuatu Services Limited, a subsidiary of UNELCO.
- The Government's highest priority solar projects for the period spanning 2016 to 2018 include installing a photovoltaic micro-grid for the White Sands village on Tanna Island and delivering the proposed 1,000kW Efate grid-connected solar photovoltaic project by 2018. The latter project is estimated to cost US\$5.6 million and will be delivered by UNELCO.

### Hydropower

- The first phase of the Sarakata hydropower station was completed in 1995 with funding from Japanese bilateral aid agency, Japan International Cooperation Agency. Phase three was completed in 2009, increasing the station's generation capacity to 1,200kW. VUI has operated the station since 2011.
- A fourth extension to the Sarakata hydropower station is planned for the period spanning 2018 to 2021. The Government anticipates that the expansion will cost in the vicinity of US\$42.5 million and increase the station's electricity generation by 600kW.
- The Government's highest priority proposed hydropower project is the Brenwe hydropower project, which is planned to be installed on Malekula Island by 2021. The project will likely cost somewhere between US\$5.6 million and US\$6.45 million.



- The Brenwe hydropower project will be jointly funded by the Asian Development Bank and the Scaling-Up Renewable Energy Program, a funding window of the Climate Investment Fund.

### Wind energy

- UNELCO and Vergnet Group partnered to deliver the Devil's Point wind farm, which consists of 13 55-metre high demountable wind turbines, cumulatively producing 3,600kW of electricity. The wind farm, which commenced operation in 2008, received funding from the European Investment Bank in the amount of 4.3 million Euros (approx. US\$6 million) It is operated by UNELCO.
- The National Energy Road Map's implementation plan for the period spanning 2016 to 2030 does not disclose any proposed wind energy projects.

### Geothermal energy

- Twelve of Vanuatu's islands are believed to have geothermal potential.
- In 2013, the Government issued KUTh Energy with a 30 year exclusive production license for the development of geothermal electricity in the north of the Efate Island. KUTh Energy was acquired by Geodynamics, an Australian company, in 2014.
- The Government is considering the construction of a geothermal power plant on the island of Efate near the village of Takara. The geothermal energy plant's proposed date of operation remains undecided. Implementation of the project is described in the National Energy Road Map as subject to funding and capacity.

### Biomass/biogas energy

- Vanuatu is a leader in the use of coconut oil as a biofuel to replace diesel fuel. In theory, coconut oil could replace a substantial proportion of the diesel fuel currently used. Diesel generators in Port Vila run on a blend of 20% coconut oil and 80% diesel fuel.
- The National Energy Road Map recognises, however, that "[c]oconut oil has a lower energy content than diesel fuel, so more fuel (in litres) is required

to produce the same amount of electricity". This means that while the use of coconut oil may assist to achieve increased renewable energy generation, it will negatively affect energy efficiency.

- In 2016, a 48kW biofuel system was installed on Banks Islands and a 144kW biofuel system was installed in East Ambae. Both projects were co-financed by the European Union and the Government of Vanuatu.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- Given the remote and dispersed nature of Vanuatu's islands, there are high upfront capital costs for renewable energy projects.
- The lack of clarity in land ownership and land use laws is a barrier to energy access in Vanuatu and the development of renewable energy projects.
- Other challenges include the archipelago's mountainous topography and poorly developed infrastructure.
- Further, according to the Department of Energy, there is limited scope for large amounts of new renewable capacity unless either electricity demand or grant funding increases.
- In the face of these obstacles, Vanuatu's target of 100% renewable energy by 2030 is highly ambitious. It is not, however, impossible. Vanuatu enjoys an advantage over comparable small island nations owing to its superior geothermal and biomass resources.
- The policy proposals presented by the Government through the National Energy Road Map, including the mobilisation of a National Green Energy Fund, aim to address and alleviate the identified challenges.

## RENEWABLES LAWS

- The Government has proposed several regulatory reforms to assist Vanuatu to increase the proportion and reliability of renewable energy in its energy mix.
- A policy framework for public private partnerships is currently being developed. The underlying aim is to accelerate investment in major energy projects, including renewable energy projects.



- To mobilise the funds necessary to achieve Vanuatu's renewable energy target, the Government proposes to establish the National Green Energy Fund.
- The Government plans to reform import duties, tariffs and value-added tax with a view to increasing the importation of renewable energy equipment particularly with respect to solar, wind and biomass energy systems.
- Subject to funding and capacity, the Government has flagged the possibility of establishing national biofuel standards by 2019.

#### GOVERNMENT INCENTIVE PROGRAMS

- The likelihood of Vanuatu achieving its renewable energy target of 100% renewable energy by 2030 is likely contingent on the Government obtaining funding from external sources.
- To implement all proposed initiatives in its National Energy Road Map, including the renewable energy target, the Government estimates that it will require "at least US\$250 million between 2016 and 2030".
- The Government aims to mobilise at least US\$20 million via the National Green Energy Fund to extend electricity access. The fund will channel existing and new sources of finance, both at home and abroad, to support renewable energy based electricity projects in Vanuatu. It will be managed by a board of government officials from the Ministry of Climate Change, the Department of Strategic Policy, Planning and Aid Coordination, the Department of Finance and Treasury and the Ministry of Internal Affairs.

#### MAJOR PROJECTS/COMPANIES

- As discussed above, the major ongoing or planned renewable energy projects in Vanuatu include the fourth extension to the Sarakata hydropower station (estimated to cost in the vicinity of US\$42.5 million), the construction of the new Brenwe hydropower station (estimated to cost between US\$5.6 million and US\$6.45 million), the proposed 1,000kW Efate grid-connected solar photovoltaic project (estimated to cost US\$5.6 million), and the long term possibility of a geothermal power plant on the island of Efate.

#### FOREIGN INVESTMENT/OWNERSHIP

- Foreign direct investment accounted for 2% of Vanuatu's GDP in 2014.
- The *Foreign Investment Promotion Act 1998* regulates foreign investment in Vanuatu. The Act establishes the Vanuatu Investment Promotion Authority. Would-be foreign investors must apply to the Authority to attain an approval certificate prior to investing in Vanuatu.
- There are no income or company taxes for residents and no capital gains taxes or withholding taxes in general in Vanuatu. There is currently ongoing consultations being carried out in respect of introducing income tax in Vanuatu, but no legislative changes have been implemented as at February 2017.
- Australia is one of the highest sources of foreign investment in Vanuatu. Australian investment totalled US\$127 million in 2014 and US\$84.5 million in 2015.
- There is also significant Chinese investment in Vanuatu. The majority of China's aid in the South Pacific takes the form of concessional loans to fund large infrastructure projects. In 2014, China and Vanuatu signed several agreements including the Economic and Technical Cooperation Agreement, by which China granted Vanuatu close to US\$15 million in aid (Vt1.67 billion). The Chinese funded the construction of Vanuatu's National Convention Centre in Port Vila. It cost close to US\$14 million (Vt1.56 billion) and was built by Chinese company, Jiangsu Provincial Construction Group Ltd.
- Vanuatu has sought to capitalise on the influx of Chinese tourism in the region. Vanuatu's Prime Minister, the Honourable Charlot Salwai, has stated that he wishes there to be direct flights between China and Vanuatu. Additionally, Vanuatu has capitalised on China's appetite for ni-Vanuatu fish products and timber – Vanuatu's exports to China were worth US\$14 million (Vt1.56 billion) in 2015.





## UNFCCC – PARIS COMMITMENTS AND BEYOND

- Vanuatu ratified the Paris Agreement on 22 April 2016 and, subject to receiving adequate funding from external sources, committed to transitioning to “close to” 100% renewable energy in the electricity sector by 2030.
- Vanuatu’s Intended National Determined Contribution states that in order to achieve the 2030 target, Vanuatu will develop wind, solar and geothermal energy generation infrastructure and replace fossil fuels with coconut oil. Vanuatu states however that the feasibility of implementing its target is conditional on receiving funding of around US\$180 million (approx. Vt20 billion) from external sources.



## RELEVANT WEBSITES

- Vanuatu's revised National Energy Road Map (2016 – 2030) – <http://www.nab.vu/sites/default/files/documents/NERM2016-30.compressed.pdf>
- The Utilities Regulatory Authority – <http://www.ura.gov.vu/>
- A database of Vanuatu's written law provided by the Pacific Islands Legal Information Institute – <http://www.paclii.org/countries/vu.html>
- The Vanuatu Investment Promotion Authority – <http://www.investvanuatu.org>
- The Vanuatu Daily Post – <http://dailypost.vu/news>

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- Government of Vanuatu, *Vanuatu's Intended Nationally Determined Contribution*, accessed at: <http://www4.unfccc.int/ndcregistry/PublishedDocuments/Vanuatu%20First/VANUATU%20%20INDC%20UNFCCC%20Submission.pdf>
- Government of Vanuatu (Department of Energy), *Energy Sector in Vanuatu – Current Status & Way Forward (Pacific Update Conference, Suva, 18 to 19 July 2016)*, accessed at: [http://devpolicy.org/Events/2016/Pacific%20Update/Plenary%205\\_Renewable%20Energy/Plenary5\\_Anthony%20Garae\\_Vanuatu%20Min%20of%20Climate%20Change\\_2016%20Pacific%20Update%20Conf.pdf](http://devpolicy.org/Events/2016/Pacific%20Update/Plenary%205_Renewable%20Energy/Plenary5_Anthony%20Garae_Vanuatu%20Min%20of%20Climate%20Change_2016%20Pacific%20Update%20Conf.pdf)
- Peter Johnston and Dr Herbert Wade, *Inception Report: Consultancy Services to Develop a Renewable Energy-based Off-grid Electrification Master Plan for Remote Islands of Vanuatu along the Example of Four Islands*, accessed at: <http://doe.gov.vu/uploads/training/1.%20Inception%20Report%20Vanuatu%20RE%20GIZ%208Apr2016.pdf>
- Utilities Regulatory Authority, *Electricity Market* (website), accessed at: [http://www.ura.gov.vu/index.php?option=com\\_content&view=article&id=38&Itemid=228&lang=en](http://www.ura.gov.vu/index.php?option=com_content&view=article&id=38&Itemid=228&lang=en)



# VIETNAM

## OVERVIEW

Jurisdiction: Civil law

Language: Vietnamese

## BUSINESS ENVIRONMENT

2017 Doing Business Report: 82 of 190 (up 9 rankings)

2016/17 Global Competitiveness Index: 60 of 138 (down 4 rankings)

2017 Index of Economic Freedom: 147 of 180 (down 16 rankings)

2016 Corruption Perceptions Index: 113 of 176 (down 1 ranking)

2015 UN Development Programme Human Development Index: 116 of 188 (up 5 rankings)

Population: 89.7 million

GNI per capita: US\$5,730

## PROFILE

The communist north united Vietnam in the 1970s after decades of war with southern Vietnam and foreign forces. Vietnam has now emerged as one of Asia's fastest growing economies due largely to the Doi Moi reforms which started the country's transition from a planned economy to a socialist-orientated market economy. Continued economic liberalisation has resulted in improved living standards, however political freedoms remain limited. In 2007, Vietnam joined the World Trade Organisation which has further encouraged foreign players to explore investment opportunities in the country.



## ELECTRICITY INDUSTRY OVERVIEW

- Total installed electricity capacity in 2016 was 34GW. Of this amount:
  - hydropower accounted for 45%;
  - natural gas accounted for 22%;
  - coal accounted for 29%; and
  - oil products accounted for 3%.
- Over the last 25 years Vietnam's economic growth has exceeded 6% per year.
- Presently, demand for electricity is forecast to grow at 10 to 12% per annum due to advances in industrialisation. This is expected to outstrip installed capacity growth in the near term.
- Capacity shortfalls will be bridged by importing electricity from Laos through upgraded transmission grids being installed over the next four years.
- Vietnam's energy mix is set to change over the next 15 years, with the growth in coal power surpassing the growth in renewable energy sources. In March 2016, the Government issued the revised *7th Power Development Plan for 2011 to 2030 (Revised PDP 7)* and placed a stronger emphasis on renewable energy. Under the Revised PDP 7, coal is expected to account for 53.2% of the nation's power generation by 2030, with renewables accounting for 10.7% of the energy mix by that time.
- It was not until June 2005 that the national power grid reached all of Vietnam's provinces. Around 66% of Vietnam's population lives in rural areas, yet the Government has achieved a country-wide electrification rate of 99%.
- Vietnam experiences relatively frequent power shortages and blackouts, particularly in rural areas where more than 20 power outages lasting longer than five minutes occurred in 2013. The nation is ranked 113 out of 144 countries for power reliability.

### Electricity laws

- The *Law on Electricity of 2004*, as subsequently amended by *Law 24/2012/QH13 of 2012 (Law on Electricity)* outlines the major principles for the

establishment of the power market in Vietnam. It is the first law to regulate the country's energy sector. The Law on Electricity aims to stimulate development and diversify forms of investment in the energy sector and encourage economical use of electricity. It introduced the move towards a competitive electricity market.

- *Decision 1208/QD-TTg (PDP 7)* dated 21 July 2011, amended by (*Decision 428/QD-TTg*) of 18 March 2016 implements the above-mentioned Revised PDP 7.
- *Decision 26/2006/QD-TTg* dated 26 January 2006, later revised by *Decision 63/2013/QD-TTg* dated 8 November 2013 promotes the establishment of a competitive electricity market to attract investment. The first phase of the project was completed in 2016, which saw electricity generation privatised, but Electricity Vietnam (**EVN**) remains the sole purchaser and distributor of electricity. The pilot phase for a fully competitive market will take place over the next five years, and by the end of 2023, Vietnam aims to be in a position to implement a fully competitive market at the retail level.

### Generation, distribution and transmission

- The electricity market in Vietnam is currently monopolistic. The state-owned enterprise EVN is the major producer and distributor of electricity. EVN accounted for about 68% of the country's installed capacity in 2009.
- The country is moving towards a competitive electricity production model, with regulations on a competitive wholesale market scheduled for completion in early 2017, after which EVN will no longer be the single buyer in the generation market.
- Two notable power stations that are operating in Vietnam are the coal-powered Quang Ninh Power Station (1,200MW) and the hydropower Hoa Binh Dam (1,920MW). Together these power plants make up around 10% of the country's installed capacity.
- The Vietnamese Government has stated that it is focused on updating the electricity grid so that all rural households will have electricity by 2020.



## RENEWABLES INDUSTRY OVERVIEW

- The Revised PDP 7 gives priority to the development of renewable energy as a source of electricity. The percentage of electricity generated from renewable resources is expected to increase from 2% in 2010, to 7% of total electricity production in 2020 and 10% in 2030.
- Vietnam's first nuclear power plant was set to come online in 2028 and to produce about 5.7% of the nation's electricity. However, in November 2016, the National Assembly suspended the nuclear power plant project (*Resolution 31/2016/QH14*), reportedly due to "economic reasons and not because of any technological considerations". In the same Resolution, the National Assembly has instructed the Government to focus on developing new sources of renewable energy and other safe, efficient sources of energy, in order to protect the environment.
- Total wind power capacity is expected to increase from its current level of almost 0% to 0.8% by 2020 and 2.1% by 2030 of total electricity supply, while the Revised PDP 7 envisages that wind power will account for about 20% of total renewables capacity.
- Biomass power and power co-generation at sugar plants are expected to make up 1% of installed capacity by 2020 and 2.1% by 2030.
- The Renewable Energy Development Project, which was launched by the World Bank in 2002, serves as the framework for renewable sector development. Its aim is for large-scale development of renewable projects to deliver rural electrification.
- Diversification and reduction of Vietnam's reliance on imported fossil fuels have been key themes within government renewable energy policies, however in the medium term the country's reliance on coal electricity production will likely increase as a percentage of total production. After 2025, energy sourced from fossil fuels will likely begin to fall as a percentage of total energy production.

## Hydropower

- Vietnam has 2,400 rivers of 10km or longer, which confers a high potential for small and large-scale hydropower production. Indeed, hydropower already contributes nearly half of the country's energy supply.
- The Son La Dam (discussed below) in North Vietnam is the country's largest electricity generator.
- There are a number of hydropower plants either under construction or recently commissioned, including the Son La Project.
- Vietnam's theoretical potential for hydropower capacity is estimated at over 10,000MW.

## Wind energy

- Vietnam's extensive coastline and wind speeds averaging between 6 to 8m/s in coastal regions means the country is moderately suited to wind energy production. Unfortunately the technical capacity of the nation is far less than the theoretical potential due to systematic limitations.
- Currently there are over 65 wind projects at various stages of development, each with a power generation range from 6MW to 150MW.

## Solar energy

- Vietnam has approximately 2,000 to 2,500 hours of sunshine per year. Southern Vietnam is particularly suited to solar energy production due to the high levels of solar radiation. By 2030, Vietnam hopes to produce 12GW of solar energy annually.
- Unfortunately the mountainous terrain of Vietnam makes about one-third of the country unsuitable for solar photovoltaic power generation.
- Around 5,000 sites around the country have stand-alone solar photovoltaic systems. Due to the high cost of solar power in Vietnam, it is generally only economically feasible in rural areas.



- The Solar Laboratory of Vietnam Science Institute, the Institute of Energy and the Renewable Energy Centre are particularly active in the solar energy space in Vietnam.

### Geothermal energy

- Vietnam has over 300 hot streams, with temperatures ranging from 30 to 148°C.
- It is estimated that 400MW of electricity could be produced with geothermal energy by 2020.

### Biomass/biogas energy

- Biomass, including wood fuel and agricultural residues (rice husk, rice straw, coffee husk and bagasse), is commonly used in rural areas as home energy.
- The waste from the large livestock population in Vietnam has the potential to provide significant biogas energy resources to the nation. Over 114,000 household biodigesters have been installed throughout Vietnam.

### Ocean energy

- There are no detailed assessments of ocean energy potential in Vietnam but the country has a long coastline and a number of offshore islands.

## CURRENT ISSUES IN THE RENEWABLES INDUSTRY

- The privatisation of the electricity market has been a priority for the Government. EVN's influence in the market has been gradually diminishing, notably in 2016 when the generation sector was privatised. The Government aims to have a fully competitive market at the retail level by 2023.
- The need to rapidly increase electricity capacity means that in the medium term, the Vietnamese Government has increased the focus on coal power as demonstrated in the revisions to the PDP 7.

- Due to a lack of feed-in tariffs, solar energy production is currently minimal.
- The nation's reliance on hydropower has caused widespread deforestation and concerns about unsafe dam construction. Additionally it is expected that climate change will have a significant impact on Vietnam's management of water resources including their hydropower production which may pose a challenge to development in the hydroelectric industry.

## RENEWABLES LAWS

- There is currently no 'renewable energy act' or designated renewable energy regulation. A study conducted in 2012 identified the lack of clear legal framework on renewable energy as a key hindrance to renewable energy development in Vietnam.
- The *Law on Energy Efficiency and Conservation 50/2010/QH12* took effect in 2011 and has helped to establish a framework for meeting longer-term renewable energy development targets.
- The *Electricity Law 28/2004/QH11*, as amended by *Law 24/2012/QH13*, outlines the need for investment incentives in renewable energy.
- *Decree 21/2011/ND-CP* dated 29 March 2011 on energy savings and the efficient use of energy, introduces a raft of energy-saving measures, particularly for large consumers of electricity.
- *Decision 37/2011/QD-TTg* dated 29 June 2011 provides a feed-in tariff mechanism to support the development of wind power projects in Vietnam (see below).
- *Decree 19/2015/ND-CP* dated 14 February 2015 provides for certain regulations on incentives and supports for environmental protection activities and renewable energy.

## GOVERNMENT INCENTIVE PROGRAMS

- Vietnam has a feed-in-tariff which was introduced by the Ministry of Finance in 2012. It is generally offered to wind power generation at US\$0.078 per kWh (under



Decision 37/2011/QD-TTg of 29 June 2011), however there is a specific case for Bac Lieu Wind Power Project which enjoys a feed-in tariff of US\$0.098 per kWh. This feed-in tariff has been effective in promoting investment in wind projects.

- The Vietnamese Prime Minister approved *Decision No. 11/2017/QD-TTg* dated 11 April 2017, which established a solar feed-in tariff. The rate is competitive by regional standards (about US\$0.0934 per kWh) and applies to certain on-grid projects.
- Many renewable energy projects fall into the categories of ‘encouraged sectors’ or ‘encouraged industries’ which enjoy reduced corporate tax rates and accelerated depreciation.

### MAJOR PROJECTS/COMPANIES

- The Bac Lieu Wind Farm (99.2MW) is the first wind farm to be developed in the Mekong Delta region, and it is Asia’s first offshore wind farm. It is now fully operational and has an operational life of 22 years. In the next stage of the project, 71 more turbines will be constructed, with an operational date at the end of 2018.
- The Phu Cuong wind project located in the Soc Trang Province, due to reach financial close in 2018, will have a capacity of 150 to 200MW.
- The Son La hydropower plant, which is the largest hydropower plant ever built in Vietnam, and cost over US\$3.2 billion, was officially put into operation in December 2012, three years ahead of schedule.

Its installed capacity is approximately 2.4GW and will also increase the capacity of the Hao Binh hydropower station (which is downstream). The Son La project is still the largest power plant in Vietnam. It required the displacement of approximately 91,000 people.

- The Dong Nai hydropower plant in the Lam Dong province comprises around 100 major plants and enterprises. The power plant is owned by EVN and generates around 520MW of electricity.

### FOREIGN INVESTMENT/OWNERSHIP

- Through the Revised PDP 7, foreign investment has been encouraged through additional land incentives, import tax exemptions and corporate income tax reductions. Foreign investment in Vietnam has begun to increase in the past eight years due to the country’s central geographic position, growing consumer market and relatively stable political climate. Vietnam now sustains over US\$12 billion of foreign direct investment per year.
- There is no policy discrimination against foreign investors in Vietnam, and the licencing requirements for foreigners are in certain cases more favourable than they are for locals.

### UNFCCC – PARIS COMMITMENTS AND BEYOND

- Vietnam ratified the Paris Agreement on 3 November 2016 and committed to reducing greenhouse gas emissions by 8% by 2030.



## RELEVANT WEBSITES

- The Asian Development Bank Report on Vietnam's energy sector – <https://www.adb.org/sites/default/files/institutional-document/178616/vie-energy-road-map.pdf>
- Ministry of Industry and Trade (MOIT), *Vietnam Renewable Energy development project to 2030 with outlook to 2050*, accessed at: <http://www.vn.undp.org/content/dam/vietnam/docs/Publications/Mr%20Thuc.pdf>

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- Vietnam Briefing, *Industry Spotlight: Vietnam's Renewable Energy Market*, accessed at: <http://www.vietnam-briefing.com/news/industry-spotlight-vietnams-renewable-energy-market.html/>
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# FEED-IN TARIFF TABLE

Note: exchange rates as at early April 2017

	Hydropower	Wind	Solar	Biomass
<b>China</b>				
<b>RMB/kWh</b>	No fixed rate	0.47 to 0.60 <sup>1</sup>	0.65 to 0.85 <sup>2</sup>	0.75
<b>US\$/kWh</b>	No fixed rate	0.068 to 0.087	0.094 to 0.123	0.109
<b>Indonesia<sup>3</sup></b>				
<b>IDR/kWh</b>	1,597.94 to 1,917.62	Yet to be introduced	1,930.94 to 3,329.19	1,438.21 to 2,130.68
<b>US\$/kWh</b>	0.12 to 0.144 <sup>4</sup>	Yet to be introduced	0.145 to 0.25	0.1080 to 0.16
<b>Japan<sup>5</sup></b>				
<b>JPY/kWh</b>	14 to 34 <sup>6</sup>	22 to 55 <sup>7</sup>	24 to 35	13 to 40 <sup>8</sup>
<b>US\$/kWh</b>	0.126 to 0.306	0.198 to 0.495	0.216 to 0.315	0.117 to 0.36
<b>Malaysia<sup>9</sup></b>				
<b>MYR/kWh</b>	0.24 to 0.26	Yet to be introduced	0.3538 to 0.7424	0.2687 to 0.3085
<b>US\$/kWh</b>	0.05 to 0.06	Yet to be introduced	0.08 to 0.17	0.06 to 0.07
<b>Mongolia</b>				
<b>MNT/kWh</b>	110.362 to 147.149	196.199 to 232.986	367.872 to 441.447	Yet to be introduced

<sup>1</sup> A feed-in tariff for offshore wind has also been introduced (0.75 to 0.85).

<sup>2</sup> The feed-in tariff for Tibet Autonomous Region is 1.05.

<sup>3</sup> All Indonesian feed-in-tariff rates (excluding solar) are multiplied by a location factor. Indonesia also has a feed-in tariff rate for biogas (US\$0.085 per kWh to US\$0.1314 per kWh), and for municipal waste (US\$0.1655 per kWh to US\$0.2016 per kWh).

<sup>4</sup> This rate is for mini-hydro projects using a river water source. The rate varies for mini-hydro projects using dams or irrigation (US\$0.1080 per kWh to US\$0.13 per kWh).

<sup>5</sup> The feed-in tariff rates for Japan vary depending on the purchase period and the level of output.

<sup>6</sup> For small and medium hydropower. This rate varies depending on whether existing canals are used, or new facilities are installed.

<sup>7</sup> For onshore wind. The feed-in tariff rate for offshore wind is JPY 36 per kWh.

<sup>8</sup> Rates for biomass in Japan depend on the material used (wood or waste materials).

<sup>9</sup> Malaysia also has a feed-in tariff for biogas (MYR 0.2786 per kWh to MYR 0.3184 per kWh) and for geothermal (MYR 0.45 per kWh).

# FEED-IN TARIFF TABLE

	Hydropower	Wind	Solar	Biomass
<b>US\$/kWh</b>	0.045 to 0.06	0.08 to 0.095	0.15 to 0.18	Yet to be introduced
<b>Pakistan</b>				
<b>PKR/kWh</b>	8.3194 to 10.8941 <sup>10</sup>	10.6048 <sup>11</sup>	13.6994 to 14.7634 <sup>12</sup>	Yet to be introduced
<b>US\$/kWh</b>	0.079 to 0.104	0.101	0.1307 to 0.1409	Yet to be introduced
<b>Philippines</b>				
<b>PHP/kWh</b>	5.90 <sup>13</sup>	7.40	8.69	6.63
<b>US\$/kWh</b>	0.118	0.147	0.173	0.132
<b>Sri Lanka<sup>14</sup></b>				
<b>LKR/kWh</b>	16.70 <sup>15</sup>	20.62	25.09	17.71 <sup>16</sup>
<b>US\$/kWh</b>	0.11	0.14	0.17	0.12
<b>Thailand<sup>17</sup></b>				
<b>THB/kWh</b>	4.90	6.06	5.66 to 6.85 <sup>18</sup>	1.85 to 5.34 <sup>19</sup>
<b>US\$/kWh</b>	0.142	0.176	0.164 to 0.198	0.054 to 0.155
<b>Vietnam<sup>20</sup></b>				
<b>VND/kWh</b>	Yet to be introduced	1,614	2,124	Yet to be introduced
<b>US\$/kWh</b>	Yet to be introduced	0.071	0.0935 <sup>21</sup>	Yet to be introduced <sup>22</sup>

<sup>10</sup> For low-head hydropower projects with head of 20 meters and below. The rate differs for high-head hydropower projects with head of more than 20 meters (PKR 7.6177 per kWh to PKR 9.9960 per kWh).

<sup>11</sup> This is the levelised wind feed-in tariff rate. Pakistan has proposed a decrease of this rate to PKR 9.6066 per kWh, but it has yet to be approved.

<sup>12</sup> There is a proposed decrease of the solar feed-in tariff rate which has yet to be approved (PKR 11.1283 per kWh to PKR 11.7829 per kWh).

<sup>13</sup> This rate is for run-of-river hydropower.

<sup>14</sup> The feed-in tariff rates above are all inclusive. Developers can select a second option at their discretion which has a fixed rate, an escalable operations and maintenance rate, and an escalable fuel rate.

<sup>15</sup> For mini-hydro.

<sup>16</sup> For agricultural and industrial waste.

<sup>17</sup> The feed-in tariff model in Thailand is to be replaced soon by competitive bidding (except for solar PV).

<sup>18</sup> For community ground-mounted solar projects up to 800MW.

<sup>19</sup> Thailand also has a feed-in-tariff for biogas (2.55 THB per kWh – 5.34 THB per kWh).

<sup>20</sup> Vietnam has also introduced a feed-in tariff for waste-to-energy projects of VND 2,114 per kWh.

<sup>21</sup> For on-grid projects with capacity of 16% per solar cell or solar module being over 15%.

<sup>22</sup> Vietnam has a feed-in-tariff for biogas of up to 4 US cents per kWh.

## EUROPEAN COUNTRIES

	Hydropower	Wind	Solar	Biomass
<b>Austria<sup>23</sup></b>				
<b>EUR/kWh</b>	0.0314 to 0.0802	0.0895	0.0824 <sup>24</sup>	0.105 to 0.22 <sup>25</sup>
<b>US\$/kWh</b>	0.034 to 0.086	0.097	0.089	0.113 to 0.237
<b>France</b>				
<b>EUR/kWh</b>	0.0607 <sup>26</sup>	0.082 <sup>27</sup>	0.0596 <sup>28</sup>	0.0434
<b>US\$/kWh</b>	0.066	0.0885	0.064	0.0468
<b>United Kingdom<sup>29</sup></b>				
<b>GBP/kWh</b>	0.0443 <sup>30</sup>	0.0082 <sup>31</sup>	0.0052 <sup>32</sup>	0.00 <sup>33</sup>
<b>US\$/kWh</b>	0.0549	0.01	0.006	0.00

**Europe's move away from feed-in tariffs:** In 2013 the European Commission issued a communication advising member States to avoid extensive public interventions in the renewable energy market.<sup>34</sup> They advised that although public intervention may have been necessary during the initial implementation stages, the renewables market is now at a stage where extensive intervention can be harmful and lead to market distortions. They recommended that feed-in tariffs be phased out and replaced by other incentive-based instruments such as feed-in premiums. They advised that feed-in tariffs do not encourage active market participation, and should be removed to ensure competitiveness in the renewables market.

As a result, a number of EU member States have been phasing out their feed-in tariff schemes, often replacing them with feed-in premiums or auctions. Germany replaced their feed-in tariff scheme with an auction system used to determine the reference value of renewable energy. A market premium is also offered to producers of renewable energy. Norway has introduced a shared subsidy scheme with Sweden, through the issuance of electricity certificates to producers which can be sold to suppliers in the electricity certificates market.<sup>35</sup> This Europe-wide move away from feed-in tariff schemes appears to be a reaction to the Commission's recommendations.<sup>36</sup>

<sup>23</sup> Austria has a feed-in tariff for geothermal energy (EUR 0.0736 per kWh).

<sup>24</sup> For PV installations with capacities >5kW and <200kW.

<sup>25</sup> For solid biomass <100MW. The rate is EUR 0.0551 per kWh for liquid biomass.

<sup>26</sup> For maritime current and run-of-river. France has also introduced a feed-in tariff of EUR 0.15 per kWh for wave and tidal power.

<sup>27</sup> For onshore wind.

<sup>28</sup> For all installations <12MW.

<sup>29</sup> These rates are valid from 1 January to 31 March 2017. The rates are adjusted quarterly.

<sup>30</sup> >2MW.

<sup>31</sup> >1.5MW.

<sup>32</sup> >1MW.

<sup>33</sup> The UK does not have a biomass feed-in tariff, but has introduced a feed-in tariff for anaerobic digestion (GBP 0.057 per kWh for >500kW), a process used to produce biogas from biomass sources.

<sup>34</sup> European Commission, European Commission guidance for the design of renewables support schemes (2013) <[https://ec.europa.eu/energy/sites/ener/files/com\\_2013\\_public\\_intervention\\_swd04\\_en.pdf](https://ec.europa.eu/energy/sites/ener/files/com_2013_public_intervention_swd04_en.pdf)>.

<sup>35</sup> KPMG, *Norway Taxes and incentives for renewable energy* (2015) <<https://home.kpmg.com/xx/en/home/insights/2013/10/norway-taxes-and-incentives.html>>.

<sup>36</sup> Renew economy, *Germany confirms end to renewable energy feed-in tariffs* (2016) <<http://reneweconomy.com.au/germany-confirms-end-to-renewable-energy-feed-in-tariffs-97024/>>.



# BUSINESS ENVIRONMENT EXPLANATORY NOTE

## DOING BUSINESS REPORT

The World Bank Group's annual Doing Business report "measures aspects of business regulation affecting domestic small and medium-size firms defined based on standardised case scenarios and located in the largest business city of each economy". The criteria used in the report include: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency and labour market regulation. The 2017 report assessed 190 national economies, and also included city-based and sub-regional assessments.

Source: <http://www.doingbusiness.org/>

## GLOBAL COMPETITIVENESS INDEX

The Global Competitiveness Report 2016/17 "assesses the competitiveness landscape of 138 economies, providing insight into the drivers of their productivity and prosperity". The report is released on an annual basis by the World Economic Forum and ranks countries across 12 pillars: institutions, infrastructure, macroeconomic environment, health and primary education, higher education and training, goods market efficiency, labour market efficiency, financial market development, technological readiness, market size, business sophistication and innovation.

Source: <https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1>

## INDEX OF ECONOMIC FREEDOM

Authored annually by the Heritage Foundation in partnership with the Wall Street Journal, the Index of Economic Freedom measures the "impact of liberty and free markets around the globe". The index evaluates each country based on 10 criteria, which include: property rights, freedom from corruption, fiscal freedom, government spending, business freedom, labour freedom, monetary freedom, trade freedom, investment freedom and financial freedom. The 2017 index, which assesses 180 countries, uses these criteria to arrive at a ranking for each country with the first ranked country being the 'most free'.

Source: <http://www.heritage.org/index/>

## CORRUPTION PERCEPTIONS INDEX

Transparency International's Corruption Perceptions Index ranks countries according to the perceived levels of public sector corruption. The index also gives each country a score out of 10. A score of zero means a country is perceived as highly corrupt, while a score of 10 denotes that a country is perceived as clean of corruption. There are 176 countries assessed in the 2016 index.

Source: <http://www.transparency.org/>

## UN DEVELOPMENT PROGRAMME HUMAN DEVELOPMENT INDEX

The UN's Human Development Index is a "summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and hav[ing] a decent standard of living". The Human Development index ranks countries across these three main criteria. The 2015 report analyses 188 countries.

Source: <http://hdr.undp.org/en/content/human-development-index-hdi>

## OTHER INFORMATION

The five business environment reports used (described above) are the most recent published by the respective organisations at time of writing. A comparison is provided for each country indicating whether it has improved (i.e. moved 'up the rankings') or achieved a lower score (i.e. moved 'down the rankings').

The population and GNI per capita (in US\$) are based on data supplied by the World Bank from 2015. In some cases, we have used domestic sources where the information is reliable and more recent than the World Bank data. All local currencies are expressed in US\$ on particular days in March 2017 and provided for generic benchmarking purposes.

Source: <http://wdi.worldbank.org/table/1.1>

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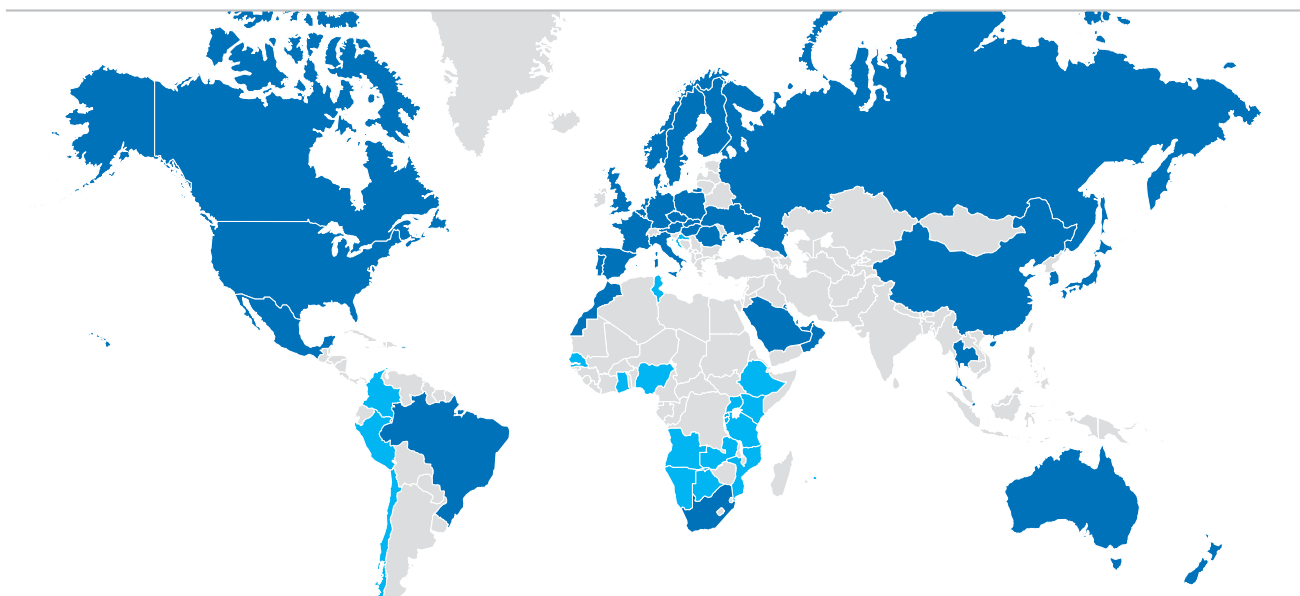
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