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COAL TO CLEAN ENERGY POLICY

Asian Electricity Data Transparency

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Why data transparency is essential to accelerate the electricity transition

Asia is currently undergoing an energy transition, as many countries have recently announced net-zero commitments. **It is critical that this transition can be tracked with timely, reliable and publically available data.** Good quality data drives better decision making, and allows better understanding of what to expect in the future.

The Coronavirus pandemic opened the world's eyes to the need for accurate, real-time data to manage a crisis. The same is required to solve the climate-crisis.

In this report we examine the sources currently available for timely electricity data in Asia. We have scored each country based on the quality of the available data.

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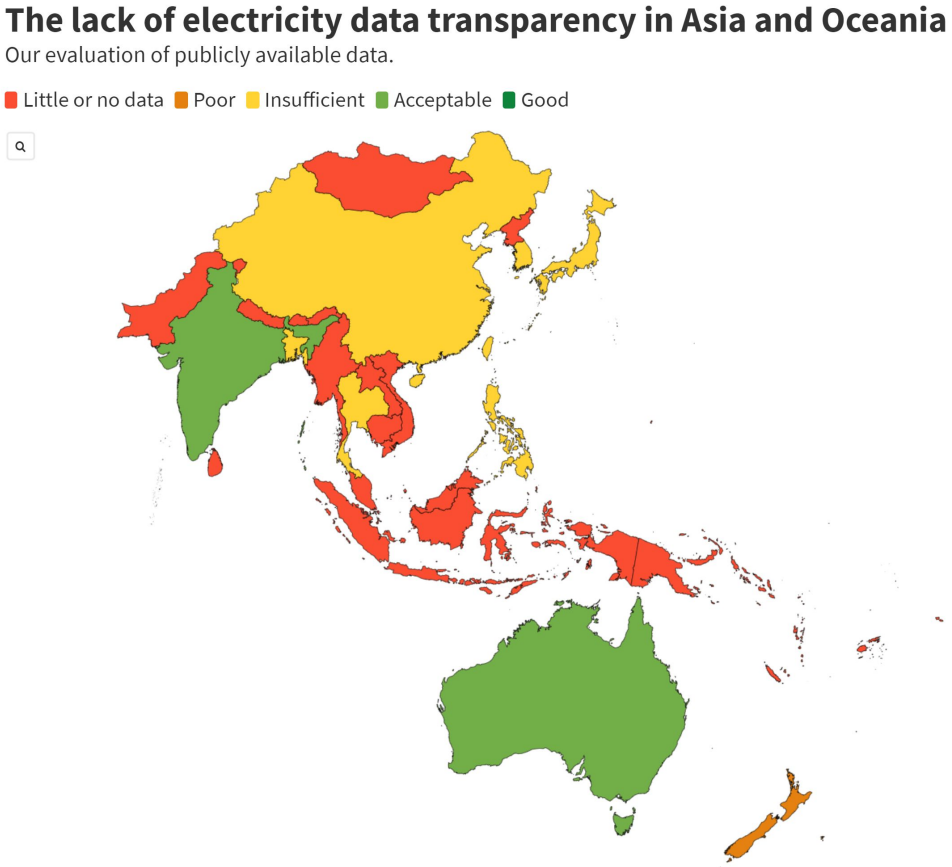
Key finding



(The IEA's regional definition of Asia and Oceania was used to determine which countries are included)

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How we scored each country

Good	Acceptable	Insufficient	Poor	Little or no data
Best case scenario, data covers all scoring criteria.	Covers the majority of criteria, minor improvements could be made.	Data is available, but misses key criteria.	Data is available, but is missing multiple key criteria.	Poor quality or no timely data available.

Scoring criteria - An ideal data source will have:

1. Real-time data, to highest time granularity
2. Generation data - full breakdown by fuel type, ideally even more (eg OCGT/CCGT gas, onshore/offshore wind), country interconnectors.
3. Sub-national generation data.
4. Unit-level generation data.
5. Capacity data - by fuel type (with additions and closures).
6. Other data - plant load factors, investment by generation type, efficiencies, consumption by sector, outages.
7. Ease of access: Free, Easy to download, English.
8. Unified national platform. Dataset consistency (real-time data summed = annual data).

Method: Each country has been been scored based on the overall quality of the available data. We used the scoring criteria to assign each country a rank (above). Further detail can be found on each countries' title slide.

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Ranking Asia's electricity data transparency

Country-by-country evaluations, scored out of five

Country	Share of global electricity demand (2019)	**Overall score**	Time granularity	Fuel breakdown	Sub national / unit data	Additional data (e.g. Capacity)	Ease of download
China	28.4%	**3**	3	3	2	4	2
India	5.3%	**4**	4	5	5	3	2
Japan	3.6%	**3**	3	4	2	3	2
S. Korea	2.1%	**3**	2	5	4	3	3
Indonesia	1.1%	**1**	1	5	2	3	2
Australia	1.0%	**4**	5	5	3	2	5
Chinese Taipei	1.0%	**3**	4	4	3	3	3
Vietnam	0.8%	**1**	3	3	1	2	1
Thailand	0.7%	**3**	3	4	1	2	3
Malaysia	0.6%	**1**	1	2	3	2	3
Philippines	0.4%	**3**	2	5	5	2	3
Bangladesh	0.3%	**3**	4	4	4	2	2
New Zealand	0.2%	**2**	2	5	1	1	4
Singapore	0.2%	**1**	3	2	1	2	2
Hong Kong	0.1%	**1**	3	1	1	1	2
Mongolia	<0.1%	**1**	3	2	1	1	4

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Many Asian countries have no publicly available electricity data

Country-by-country evaluations, scored out of five

Country	Share of global electricity demand (2019)	**Overall score**	Time granularity	Fuel breakdown	Sub national / unit data	Additional data (e.g. Capacity)	Ease of download
Pakistan	0.6%	1	-	-	-	-	-
Laos	0.10%	1	-	-	-	-	-
Sri Lanka	<0.1%	1	-	-	-	-	-
Bhutan	<0.1%	1	-	-	-	-	-
Brunei	<0.1%	1	-	-	-	-	-
Cambodia	<0.1%	1	-	-	-	-	-
Timor-Leste	<0.1%	1	-	-	-	-	-
Fiji	<0.1%	1	-	-	-	-	-
Guam	<0.1%	1	-	-	-	-	-
New Caledonia	<0.1%	1	-	-	-	-	-
Macau	<0.1%	1	-	-	-	-	-
Myanmar	<0.1%	1	-	-	-	-	-
Nepal	<0.1%	1	-	-	-	-	-
Papua New Guinea	<0.1%	1	-	-	-	-	-
Samoa	<0.1%	1	-	-	-	-	-
Vanuatu	<0.1%	1	-	-	-	-	-
North Korea	<0.1%	1	-	-	-	-	-
Solomon Islands	<0.1%	1	-	-	-	-	-
Tuvalu	<0.1%	1	-	-	-	-	-
Micronesia	<0.1%	1	-	-	-	-	-
Maldives	<0.1%	1	-	-	-	-	-

Disclaimer: These ratings were awarded based on an assessment of all timely data sources known to Ember at the time of publication.

If you are aware of any additional sources, please let us know by emailing euan@ember-climate.org.

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Despite Asia's size, there is not yet regional data

Asia and Oceania:

Generates **47%** of global electricity

Generates **75%** of Global coal power

Our data covers **93%** of generation in this region

Regional data sources: There is no single timely, region-wide Asian electricity data source - so this report focuses on national sources. Below are some useful global data sources:

- IEA - International Energy Agency. Publish annual and monthly generation statistics. Annual statistics have global coverage to 2018, but are behind paywall. Monthly statistics only cover a handful of Asian countries.
- EIA - US Energy Information Administration. Generation and capacity data for 1980-2018. Data is free to download, but fossil fuel data is not disaggregated.
- Global Coal Plant Tracker - Published by Global Energy Monitor, this resource contains coal capacity data for plants larger than 30MW, with global coverage
- IRENA - International Renewables Agency. Publishes annual renewables capacity and generation data, with global coverage. Data published in March of the following year.

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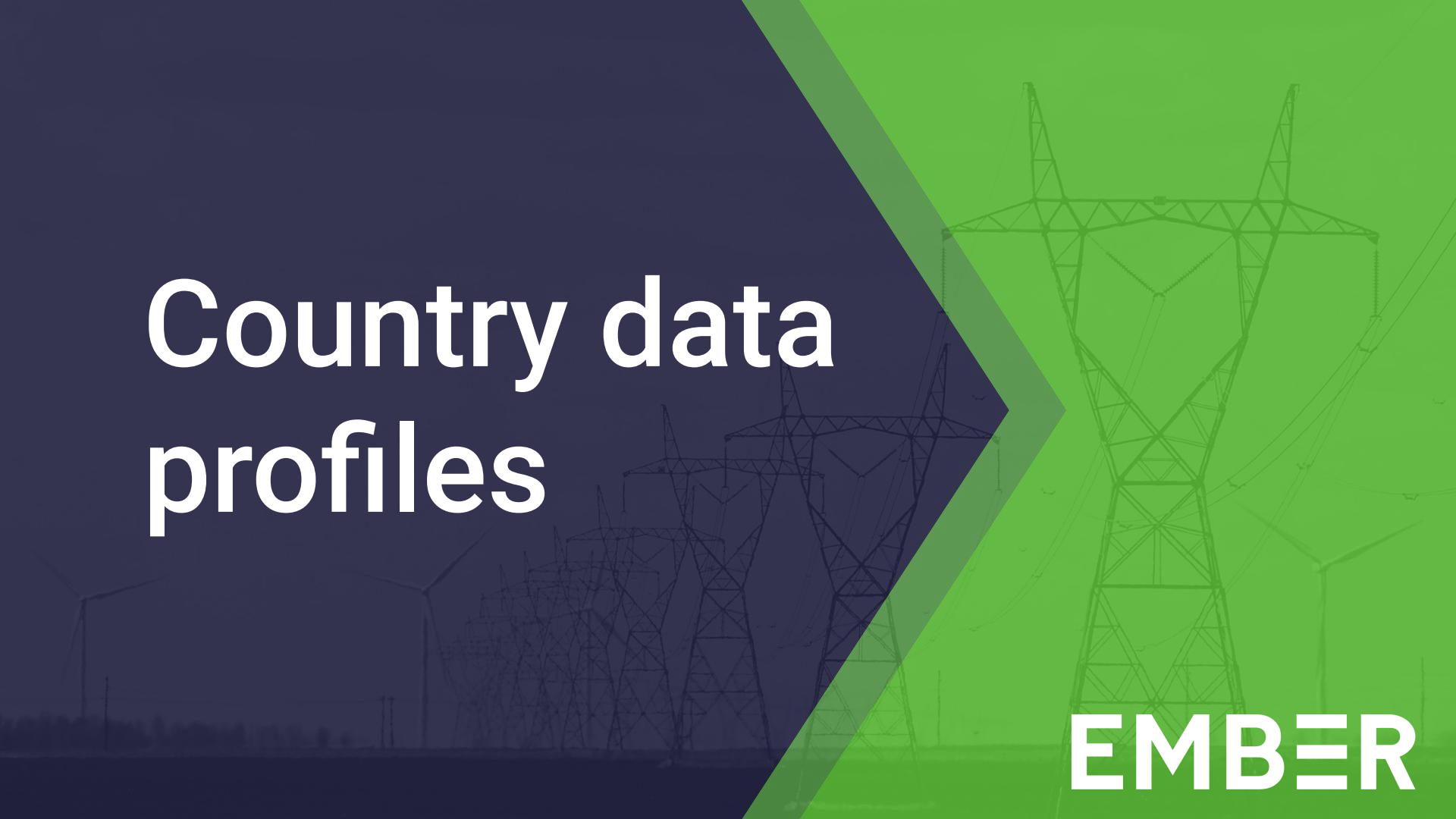
Country data profiles



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China - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity is monthly data, with a 1 month lag. **No real-time data.** Monthly data is revised but not republished, making analysis difficult.
- Monthly generation data **missing reliable solar generation and a breakdown by thermal generation**.
- Regional data is available on a monthly basis for certain data such as consumption by sector, and installed capacity of wind and solar. **No unit data is available.**
- Wide range of monthly data available, including on investment by generation technology, newly installed capacity, running hours, and efficiency of coal generation.
- Data is free to download, as a pdf in Mandarin, and later translated into English. **Separate pdf file for each month increases time required to process data.**
- Data is spread across a variety of sources, and monthly and annual data do not reconcile well for thermal generation.

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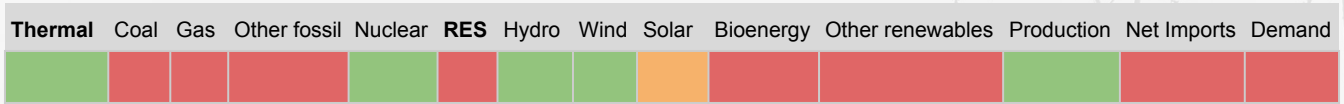
China - NBS

National Bureau of Statistics

Generation data coverage:



Data format: Monthly data, published with a lag of 1 month, available to download as a csv file. Published in English and Mandarin. Does not include breakdown on a unit level.

Detail:

Data is also released in Mandarin as a blog post midway through the following month, and is the earliest available data on China's electricity generation. Solar data is far lower than annual data, likely due to lots of installations not reporting monthly data. Previous months of data are often revised but not republished, meaning that the YoY % changes published don't tally with the monthly numbers available to download. Really useful for data on industry output: steel, cement, aluminium etc. As well as monthly economic indicators. Also publish data on changes in value of different industries, eg mining, manufacturing, but also state-owned, joint stock and private enterprises.

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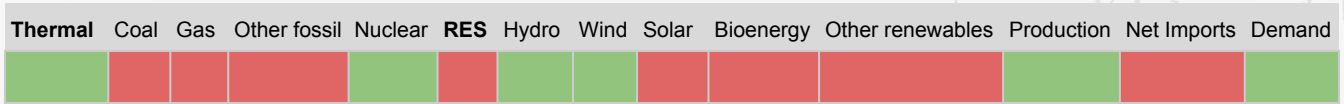
China - CEC monthly statistics

China Electricity Council

Generation data coverage:



Data format: Monthly data, published with a lag of 1 month, available to download as a pdf file. Published first in Mandarin, with English translation published a month later.

Detail:

As well as generation data, CEC reports capacity for plants over 6MW, consumption by sector, coal consumption of power supply, Line loss, heat supply, coal consumption for heat, utilization hours by fuel type, generation and grid project investments, newly installed generation, substation and transmission capacity. Source of monthly data is NBS and NEA. Mismatches between YoY % changes and monthly/annual figures indicate that data is revised, often quite significantly, without being republished.

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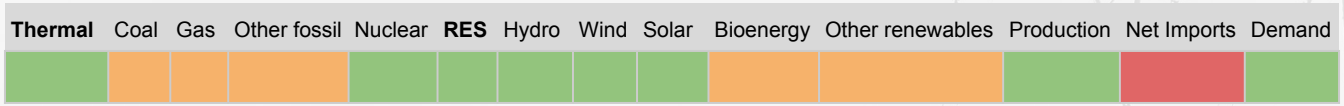
China - CEC annual statistics

China Electricity Council

Generation data coverage:



Data format: Annual data, express statistics published with a lag of 1-2 months, with a more detailed breakdown published towards the end of the following year. Available to download as a pdf in Mandarin.

Detail:

Express statistics are largely the same format as monthly statistics, but include data for solar generation. Although not included in the express statistics, data for Coal and Gas generation was available in a press release on the CEC website after the express statistics were published. Detailed annual data also includes indicators on population, GDP, foreign trade, energy consumption and production. It also breaks down generation data into more fuel types such as biomass, fuel oil, coal bed methane. Unlike the monthly statistics, revised numbers for the annual statistics are published. Sources of data are the NBS and NEA.

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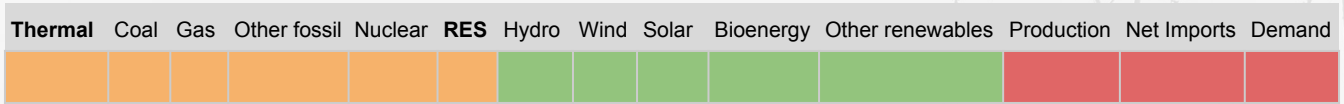
China - NEA

National Energy Administration

Generation data coverage:



Data format: A variety of data released on a monthly, and annual basis, mainly as press releases in Mandarin.

Detail:

The NEA publish a wide variety of data, but it is often more accessible via other sites. Their monthly statistics are used by the CEC in their reports, and China Energy Portal does a fantastic job of chronicling policy announcements and statistics published by the NEA. Of particular use are renewable generation statistics that are often announced in a press conference at the start of each year, including data for biomass generation. As well as this, data on solar generation is often announced at press conferences by the NEA at irregular intervals throughout the year. They are the original source of quarterly wind and solar installations by province, annual power demand by province, rooftop solar installations, solar tender results. Chronicle of information produced by NEA can be found here.

India - Data summary

Good	**Acceptable**	Insufficient	Poor	Little or no data
	Covers the majority of criteria, minor improvements could be made			

- The highest time granularity is daily data, published with a lag of 1 day. **No real-time data.**
- Generation data has a full breakdown by fuel.
- Daily data has breakdown by utility, region, sector, and unit.
- Capacity and final consumption is available. No data on efficiency, investment or load factor. **No data on investment by technology.**
- Data is free to download, in a clear format, in English. NPP acts as a single portal through which most data can be downloaded. **Each month or day must be downloaded as separate files, with separate files for different types of generation.**
- Some data requires retrieval from pdf files, making processing more time-consuming, and **annual data is only reported by financial year.**

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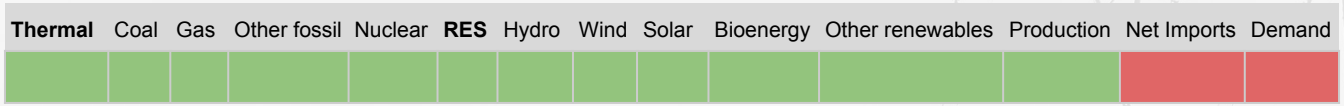
India - CEA

Central Electricity Authority

Generation data coverage:



Data format: Publish monthly and daily reports. Monthly reports are published with a 1 month lag. Includes a sub-national and unit-level breakdown of generation. Available on CEA's website as a pdf, published in English.

Detail:

The CEA is the best source of national-level generation data for India, and agrees well with global generation datasets except for thermal generation - here the IEA and BP include estimates for generation from autoproducers, which aren't provided by the CEA. The CEA provide a wealth of data, including plant load factors by fuel type and capacity mix. They also author India's National Electricity Plan, and publish projections for India's capacity mix for the next decade. Generation reports date back to April 2005.

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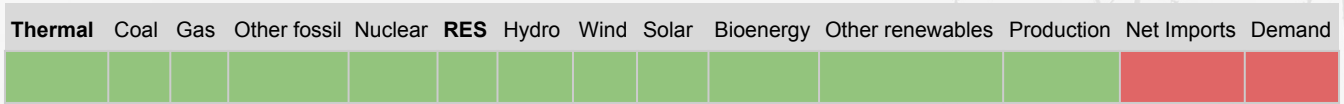
India - NPP

National Power Portal

Generation data coverage:



Data format: Download portal for CEA's monthly and daily reports. Monthly reports are published with a 1 month lag. Includes a sub-national and unit-level breakdown of generation. Available to download as both a pdf and xlsx file, in English.

Detail:

Data is often available via NPP before it is uploaded to the CEA's own website. Also hosts daily coal reports - however, CEA renewable generation reports aren't featured on the site. See the previous slide for more information on CEA data. Generation reports date back to 2018.

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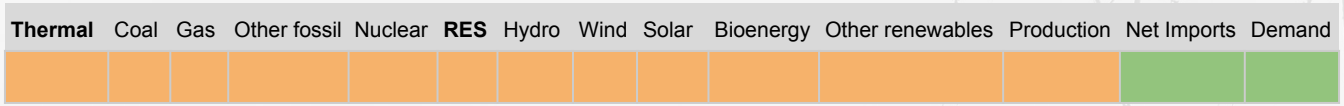
India - POSOCO

Power system operation corporation

Generation data coverage:



Data format: Publish daily, weekly and monthly reports. Monthly reports are published with a 1 month lag, daily reports with a lag of 1 day. They include a breakdown by region, and are available to download as a pdf, in English.

Detail:

Data from the daily reports are available as a csv file thanks to the work of Robbie Andrew. The generation data provided here is not as comprehensive as the monthly data published by the CEA, but the granularity and timeliness is very useful. POSOCO is also the best source of electricity imports/exports data for India.

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Japan - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity is hourly data, with a 1 month lag. **No real-time data**
- **The most timely data doesn't split fossil data by fuel**. Monthly disaggregated fossil fuel generation is only available with a 3 month lag.
- Regional data is available, but **no unit data**.
- Capacity and final consumption is available. No data on efficiency, investment or load factor.
- Data is free to download, but the format of Enecho data is difficult to aggregate.
- Dataset consistency is poor. Enecho and renewables-ei do not exactly agree with each other.

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Japan - Enecho

Government Agency for power statistics

Generation data coverage:

Thermal	Coal	Gas	Other fossil	Nuclear	**RES**	Hydro	Wind	Solar	Bioenergy	Other renewables	Production	Net Imports	Demand

Data format: Monthly data reports, csv files in Japanese, free download. Data contains national and regional data. Data is released with a 3 month lag at the start of every month.

Detail:

Also report capacity data monthly, split by fuel and region, as well as final consumption by sector. Enecho generation data reconciles will with other sources, except for large ‘Other’ fuel type, which is difficult to map to a single fuel.

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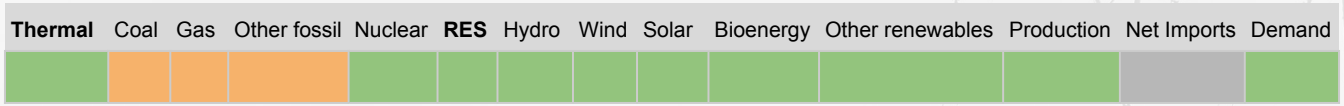
Japan - Renewables-ei

Renewable energy institute, Japanese renewables think-tank.

Generation data coverage:



Data format: Publishes aggregated hourly generation data from OCCTO, for Japan's 10 TSOs, in English. Data on a national level only. csv files can downloaded on a daily, monthly or annual basis, fossil generation is aggregated to 'Thermal'.

Detail: Renewables-ei has an easily accessible dashboard, with easy data download. This is a huge improvement on the tricky format of OCCTO (the original source of this data). Disaggregated fossil data is only available in quarterly reports, that have a lag month lag. Renewables-ei also produce quarterly reports with generation data split by fossil fuel type, and wind and solar capacity. This data reconciles very well with IEA and BP, but does not agree with Enecho data.

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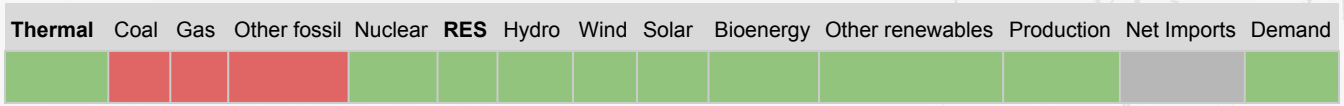
Japan - OCCTO

Organisation of power utilities in Japan

Generation data coverage:



Data format: Monthly csv files containing hourly generation data for all of Japan, broken down by region. Fossil generation data is aggregated to 'Thermal'. Data has 1 month lag, and dates back to October 2018.

Detail: Download portal is very difficult to navigate, with generation data hidden away among many other datasets. Renewables-ei publishes the same data, but in a much more accessible format. This data reconciles very well with IEA and BP, but does not agree with Enecho data.

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South Korea - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity of generation data is monthly, **with a 2 month lag. No real-time generation data, although real-time demand data is available.**
- Generation data has a full breakdown by fuel.
- Sub-national data is available, as well as generation data by plant.
- Capacity and final consumption is available. Annual data is available on data on efficiency, investment and load factor.
- Data is free to download, in a clear format, in Korean.
- KPX Epsis portal does a great job of collecting statistics from different agencies, but only displays annual generation data.

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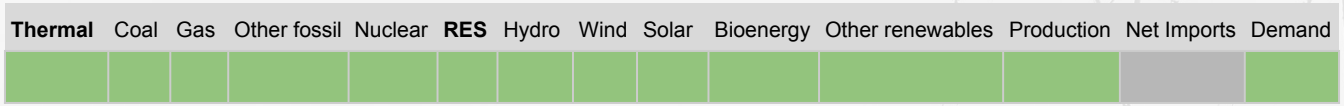
South Korea - KEPCO

Korea's largest utility, responsible for ~93% of Korean electricity

Generation data coverage:



Data Format: Monthly and annual reports, Excel file, free download. All reports written in Korean. Data covers all of S.Korea with province level breakdown.
Monthly reports: 2 month lag. Excel files date back to 2017, date back to 2012 as pdfs.
Annual reports: Released in May/June of following year. Excel files date back to 2017, pdfs date back to 2004.

Detail: Reports include generation and capacity data for all fuel types, as well as plant level data with capacity, load factor and generation. There is an extensive breakdown of renewable fuel sources in Kepco's monthly reports, however, some fuels Kepco maps to 'renewables' do not fit Ember's definitions. The reports also include a breakdown of electricity consumption by sector.

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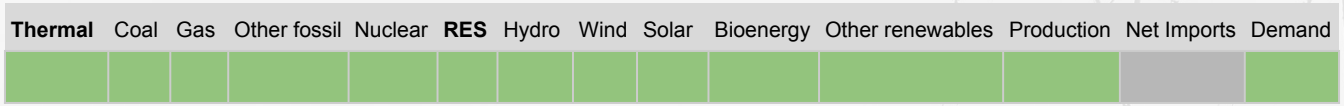
South Korea - KPX

Korea Power Exchange

Generation data coverage:



Data Format: Wide variety of data available, with most available as csv and xlsx downloads in Korean. Often include sub-national and unit-level breakdown.

Detail: Hosts ‘Epsis’ portal, which acts as a unified source of national electricity data. Includes data on real-time demand, as well as capacity of all generating units in South Korea. Hosts annual KEPCO generation statistics, going back as far as 1961. Also includes a database of ‘Approved national statistics’ covering a wide range of electricity data. Additional data on transmission and distribution, fuel costs, and electricity prices.

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Indonesia - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- **The highest time granularity is annual data, with an 8 month lag.**
- Some regional data is available in PLN's annual reports
- Generation data covers a wide range of fuel types
- Additional data available for whole energy sector, including fossil fuel consumption and exports.
- **Data is time-consuming to analyse,** as it is only published as a pdf file.

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Indonesia - ESDM

Ministry of Energy and Mineral Resources

Generation data coverage:

Thermal	Coal	Gas	Other fossil	Nuclear	**RES**	Hydro	Wind	Solar	Bioenergy	Other renewables	Production	Net Imports	Demand

Data format: Annual data, published with an 8 month lag, available to download as a pdf. No breakdown on a subnational level or unit level. Published in English and Indonesian.

Detail: The data reconciles well with IEA and BP data, and includes generation data from PLN owned, IPP, and captive plants. Also includes a wealth of data on coal and gas consumption production, consumption, imports and exports, as well as data on generation capacity by fuel type.

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Australia - Data summary

Good	**Acceptable**	Insufficient	Poor	Little or no data
	Covers the majority of criteria, minor improvements could be made			

- Hourly real-time data is available from OpenNEM.
- Generation data has a full breakdown by fuel.
- Regional data is available. Some data on unit generation is available in AEMO's quarterly reports.
- Data on efficiency, final consumption and load factor is available. **No data on capacity or investment.**
- Data is free and easy to download, in xlsx/csv format.
- Only Annual data for Northern Territory.

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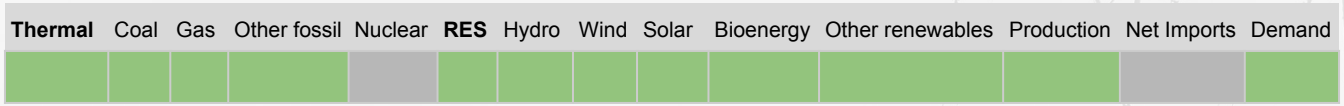
Australia - OpenNEM

Portal for viewing data from AEMO

Generation data coverage:



Data format: Hourly data, updated in real-time, with a breakdown by state. Available to download as a csv file. Date can be viewed aggregated up to monthly and yearly level.

Detail: Has recently been updated to include data for Western Australia. Breaks down gas generation by plant type, and includes data on battery storage. Additional data available on electricity prices, and emissions by fuel type. The data reconciles well with other sources, although doesn't include data for the Northern Territory (this is a very small portion of Australia's total generation). Solar generation is also broken down into Utility-scale, and rooftop installations.

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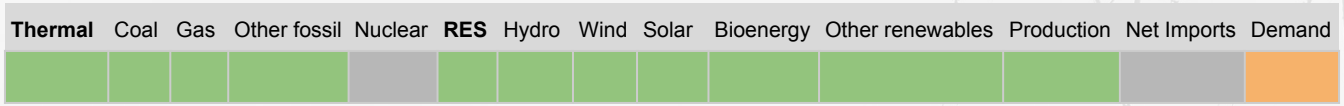
Australia - Energy.gov.au

Government agency, publish annual statistics broken down by state

Generation data coverage:



Data format: Annual data, published with a lag of 5 months. Available to download as an xlsx or pdf file. Includes a breakdown by state.

Detail: The dataset is consistent with that of the IEA and BP, and is the only source of electricity data for the Northern Territory. Coal split into black and brown coal, and solar split into large-scale and small-scale. Historical data backs to 1990, but is by financial year. Data by calendar year is available as far back as 2015.

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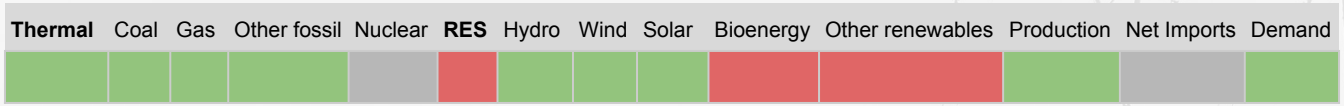
Australia - AEMO

Australian Energy Market Operator, responsible for running of NEM and WEM

Generation data coverage:



Data format: Quarterly data, published as a pdf with an accompanying xlsx file containing chart data. Some breakdown on sub national level, and some data on individual gas and coal plants.

Detail: The way data is published is inconsistent between reports, with the charts included varying each quarter. Often the way the data is reported means only the year-on-year change is displayed, rather than absolute generation values. Includes useful estimates for rooftop solar generation, and good data for Western Australia. The AEMO also has data dashboards available on their website, but OpenNEM presents this data in a much more convenient way. The quarterly reports also include data on efficiency, load factors, and consumption by sector.

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Chinese Taipei - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity is daily data, with a 1 month lag. **Real time data by unit is available, but this cannot be easily downloaded.**
- Data provides a detailed fuel split, although **data for bioenergy and other renewables is not included.**
- Data is provided on a unit level, except for wind and solar generation. **Limited regional data.**
- Capacity and final consumption data is available. No data on efficiency, investment or load factor.
- Data is free to download and published in Mandarin, but the format is tricky to use as **the units are not mapped to each fuel type.**

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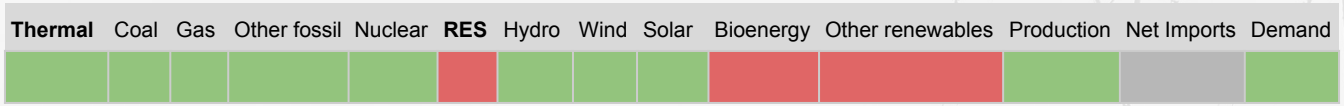
Chinese Taipei - Taipower

State-owned electric power company

Generation data coverage:



Data format: Daily data, published with a 1 month lag, available to download an an xlsx file. Data is on a unit level, but the units are not mapped to each fuel type. File is published in Mandarin.

Detail: Fossil units are mapped differently to the IEA's dataset - Gas generation is ~10TWh larger and Coal generation is ~20TWh smaller for 2018. The dataset requires mapping of each unit to a fuel type. The same dataset is used in a web app on Taipower's website, and this can be used to translate and map each unit to a specific fuel type, and get more information on the data supplied. Wind and Solar generation data is not broken down by installation/plant, just a single figure. Includes data from IPP's, as well as data on electricity consumption by sector. Real time data by unit is available, but this cannot be easily downloaded.

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Vietnam - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- The highest time granularity is monthly data, with a 1 month lag. **No real-time data**
- The **quality and quantity of data released varies by month**. This is hugely inconsistent, making it almost impossible to create a coherent time-series dataset. Often no renewables data.
- **No regional or unit data is available**
- Limited capacity data is available. **No data on efficiency, investment, final consumption or load factor.**
- **Data is difficult to access**. Released in press briefings, so must be manually extracted from webpage.
- Quality of data matches BP and IEA well, except for coal, which is lower than BP/IEA.

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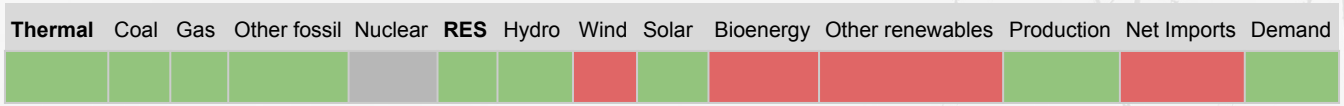
Vietnam - EVN

Electricity Vietnam, largest electricity company in Vietnam

Generation data coverage:



Data format: Monthly data, published as a press release on EVN's website with a 1 month lag. No breakdown on a sub-national level or unit level. Published in Vietnamese.

Detail: The exact data published in each press release varies from month to month, but the generation data agrees well with other sources, with the exception of coal generation which is lower than IEA and BP figures - likely due their inclusion of autogenerators. Data published is also for the year to date, and is not broken down into individual months. Additional data provided for monthly average daily power output (kWh/day), Maximum load capacity (monthly), Rooftop solar capacity (Year to date and monthly additions), Topical information eg hydro levels during current drought, New power capacity investments and construction information.

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Thailand - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity is monthly data, with a 1 month lag. **No real-time data**
- The most timely data does not breakdown renewables by fuel. Disaggregated renewables data has a 3 month lag.
- **No regional or unit data.**
- Capacity, load factor and final consumption is available. No data on efficiency or investment.
- Data is free to download, in a clear xlsx. format, in English.
- Good dataset consistency. Both data sources agree with each other.

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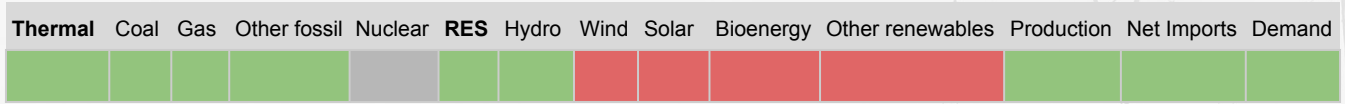
Thailand - Ministry of Energy

Government statistical portal

Generation data coverage:



Format: Monthly generation data by fuel type, typically published with a 1 month lag. Available to download in xlsx or pdf format, in English.

Detail: Renewables data is not disaggregated. Capacity data is also available but only by operator. Total system load and final consumption by sector is also published.

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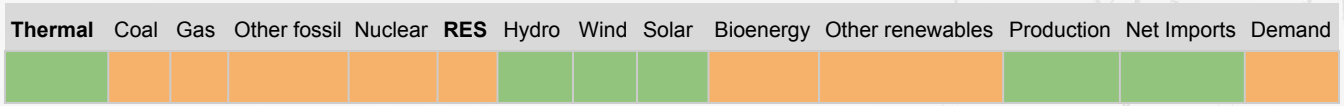
Thailand - DEDE

Gov. Department of Alternative Energy Development and Efficiency.

Generation data coverage:



Format: Monthly energy balances, typically published with a 1 month lag. Available to download in xlsx or pdf format, in English.

Detail: Monthly energy balances provide data on electricity generation and consumption by sector. Generation data is difficult to disaggregate by fuel, and fossil data is input by physical unit eg tonnes.

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Malaysia - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- The highest time granularity data is hourly, real-time data but it **doesn't cover entire country**. National data for is only available annually, with a **two year lag**
- The most timely data has a full breakdown by fuel, but is **missing renewables data. Annual data doesn't disaggregate fossil data.**
- Regional and utility level data is available.
- Capacity and final consumption is available. **No data on efficiency, load factor or investment.**
- National data available to download as an xlsx file

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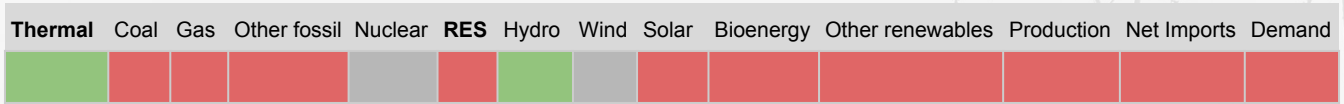
Malaysia - MEIH

Malaysia Energy Information Hub

Generation data coverage:



Data format: Annual data, published with a lag of 2 years, available to download as an xlsx file. Some breakdown on sub national level, and a breakdown by utility.

Detail: Although only thermal and hydro generation figures are available, MEIH does also provide a break down of capacity, by fuel type for each utility in Malaysia, as well as data on consumption by sector. Generation data is published in ktoe rather than GWh. Data is difficult to compare against other sources as it is fairly sparse, but thermal generation is around 5% lower than the totals reported by IEA and BP, which could be down to the difference between gross and net generation.

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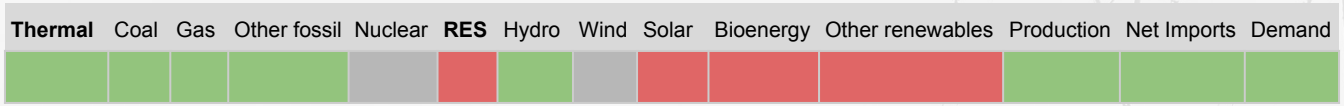
Malaysia - GSO

Grid system operator for peninsular Malaysia

Generation data coverage:



Data format: Hourly data, updated in real time, and available to download as an xml file. Only covers data for peninsular Malaysia, home to >90% of Malaysia's population.

Detail: Hourly data on demand, total generation, and imports from Thailand can be easily downloaded in separate xml files, but the fuel mix cannot be. Fuel mix is broken down into the following categories: ST-Gas, ST-Coal, OCGT-Gas, Hydro, Gas, Cogen, CCGT-Gas. Can view it as a chart for a specific date range.

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Philippines - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity data is monthly, with a **3 month lag (Real-time data exists, but doesn't cover entire country.)**
- The most timely data has a full breakdown by fuel.
- Regional data is available, and there is some unit data via one source.
- Capacity and final consumption is available. **No data on efficiency, load factor or investment.**
- Data is free to download, in a clear xlsx format, in English.
- Good dataset consistency. Data sources agree with each other.

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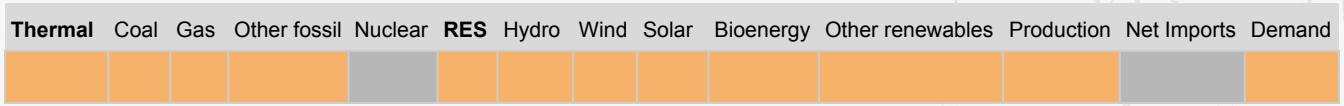
Philippines - IEMOP

Independent Electricity Market Operator of the Philippines

Generation data coverage:



Data format: Hourly and 5 minute data, published with a 1 day lag, available to download as a csv. Data is on a unit level, and broken down by Luzon and Visayas.

Detail: This site is relatively new, and currently only has data available from July 2020 onwards. Data currently only covers two of the three main islands in the Philippines - but Mindanao is due to be included soon. Market participants are not currently mapped to fuel types, so the data is very difficult to reconcile against other sources. The site also feature a dashboard where you can view real time data.

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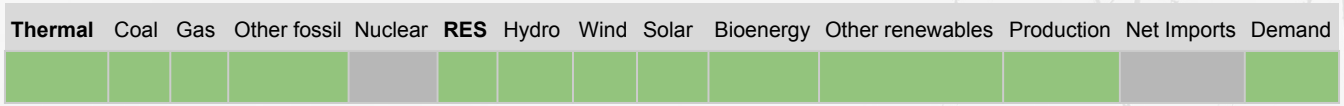
Philippines - NGCP

National Grid Corporation of the Philippines

Generation data coverage:



Data format: Release monthly generation data by fuel, broken down by region. Data covers all of Philippines. Downloadable as xlsx. file. Data is released quarterly with a 3 month lag, dating back to 2013.

Detail: NGCP data reconciles very well with IEA/BP, as well as the other national data sources. The website also publishes information on capacity, hourly total demand and peak load. Real time system demand data is available but there is no download option.

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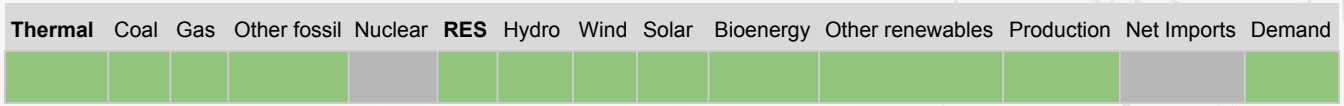
Philippines - DOE

Department of Energy

Generation data coverage:



Data format: Release annual pdf reports, with generation and capacity data by fuel by region, reports have a 5 month lag. Data covers all of Philippines. Reports written in english.

Detail: Good reconciliation between DOE and NGCP, both reconcile well with IEA. Pdf reports are broken down by region, for all regions of the Philippines. Monthly system peak demand and final consumption data is also available. Previous years have included capacity data, but this was not published in 2019.

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Bangladesh - Data summary

Good	Acceptable	**Insufficient**	Poor	Little or no data
		Data is available, but misses key criteria.		

- The highest time granularity is daily data, with a 1 day lag. Monthly data also available. **No real-time data**
- Daily data contains generation data by unit and region.
- **Capacity data is not easily accessed.** Data available on consumption by sector and total load factor.
- Data is free and easy to download, but **a separate file must be downloaded for each day or month.**

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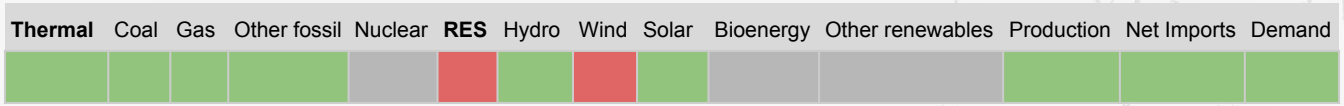
Bangladesh - PGCB

Power Grid Company of Bangladesh

Generation data coverage:



Data format: Publish monthly and daily reports. Monthly reports published with a lag of 1 month. Daily reports include a breakdown by sub-region and by unit. Reports available to download as an xlsx file, in English.

Detail: The generation data agrees well with IEA and BP data, with differences in coal generation due to PGCB figures being for net generation. Additional data available on production by type of producers - IPP, major grid companies etc. The daily reports have data on the capacity of each unit, and the monthly reports provide data on the fleet-wide capacity factor.

New Zealand - Data summary

Good	Acceptable	Insufficient	**Poor**	Little or no data
			Data is available, but is missing multiple key criteria	

- Hourly data is published in real time, **but this is not accompanied by historical hourly data, and cannot be easily downloaded.**
- **The most timely historical dataset is quarterly, published at the end of the following quarter.**
- The quarterly generation data has a full breakdown by fuel type.
- **The historical dataset has no breakdown by region or unit.**
- Historical dataset includes data on consumption by sector, and capacity by fuel type. Real-time data shows capacity utilization rate.

EMBER

New Zealand - MBIE

Ministry of Business, Innovation and Employment

Generation data coverage:

Thermal	Coal	Gas	Other fossil	Nuclear	**RES**	Hydro	Wind	Solar	Bioenergy	Other renewables	Production	Net Imports	Demand

Data format: Quarterly data, published with a lag of 3 months, available to download as an xlsx file. Some breakdown on sub national level, and a breakdown by utility.

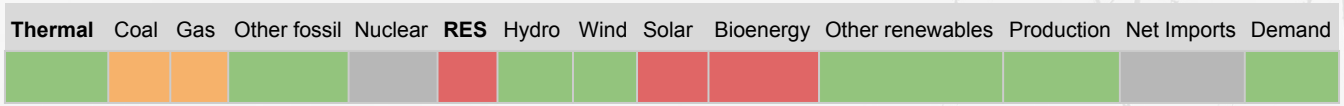
Detail: Data is well curated, and includes data on capacity and consumption by sector. No monthly data available from the department.

EMBER

New Zealand - Transpower

New Zealand grid operator

Generation data coverage:



Data format: Real time data published on website, with no accompanying download file. Breakdown between North and South island, but no data by unit.

Detail: Real-time data covers most fuel types, but doesn't fully split coal and gas generation. Additional data is published in weekly pdf reports, such as a simplified weekly fuel mix, but mostly as graphs without access to underlying data. Transpower also publishes certain year-to-date figures on its website, such as total generation by region, and RES penetration for the past week and the year-to-date.

EMBER

Singapore - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- The highest time granularity data is monthly, with a 1 month lag. **No real time data**.
- The most timely data **doesn't include solar**, and **fossil data is not disaggregated** by fuel.
- **No sub-national or unit data.**
- Efficiency, load factor, investment and final consumption data is available.
- **Inconsistencies between sources.**

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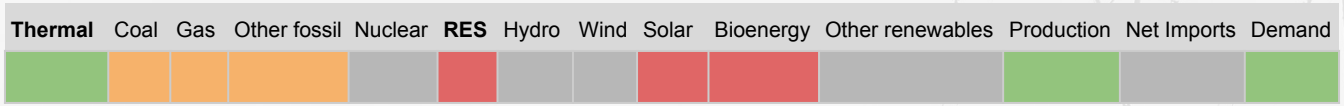
Singapore - EMC

Energy Market Company, operates Singapore's wholesale electricity market

Generation data coverage:



Data format: Monthly data, published with a lag of 1 month, available to download as a pdf. Published in English.

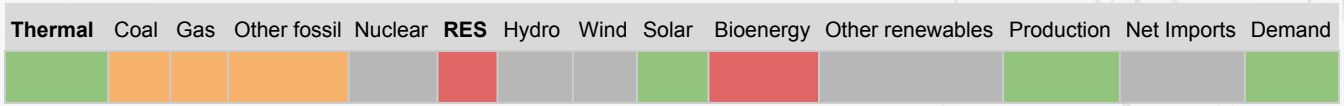
Detail: Doesn't provide solar data, and thermal data is only broken down by plant type, instead of fuel type.

EMBER

Singapore - EMA

Energy Market Authority, government agency and Power System Operator

Generation data coverage:



Data format: Monthly data published with a lag of 2 months, available to download as an xlsx or pdf file. Published in English.

Detail: Includes data on Solar generation, which EMC does not. Thermal generation is again only split by plant type as opposed to fuel type, but the breakdown according to EMA is different to that published by EMC. EMA also publishes data on capacity, load factors, and investment into different generation technologies, as well as a breakdown of consumption by sector. Data is likely more reliable as it is from a government source.

Hong Kong - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- The highest time granularity data is monthly, with a 1 month lag. **No real time data**.
- **No breakdown by fuel type**
- **No sub-national or unit data.**
- Monthly release includes data on fossil fuel imports/exports

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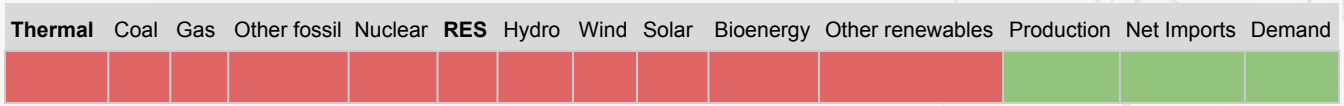
Hong Kong - Censtatd

Census and Statistics Department

Generation data coverage:



Data format: Monthly and quarterly data, published with a lag of 1 month, available to download as a pdf file, with an accompanying xlsx file. Published in English and Mandarin.

Detail: Monthly data available on electricity consumption, with partial breakdown by sector, as well as imports from China. Quarterly data also includes electricity production and distribution losses. Monthly data also includes data on coal, oil and gas imports/exports.

EMBER

Mongolia - Data summary

Good	Acceptable	Insufficient	Poor	**Little or no data**
				Poor quality or no timely data available

- The highest time granularity data is monthly, published with a 2 month lag.
- **Limited generation data available, with no breakdown by fuel type.**
- **No breakdown on subnational or regional level.**
- Capacity and final consumption is available. **No data on efficiency, load factor or investment.**
- Data published in Mongolian, available to download in a number of file formats.

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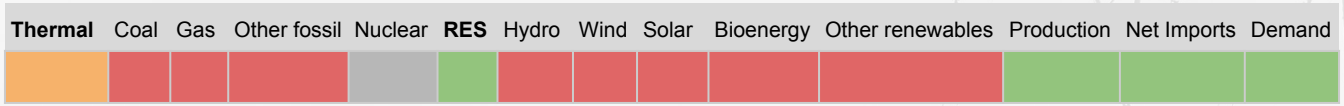
Mongolia - 1212.mn

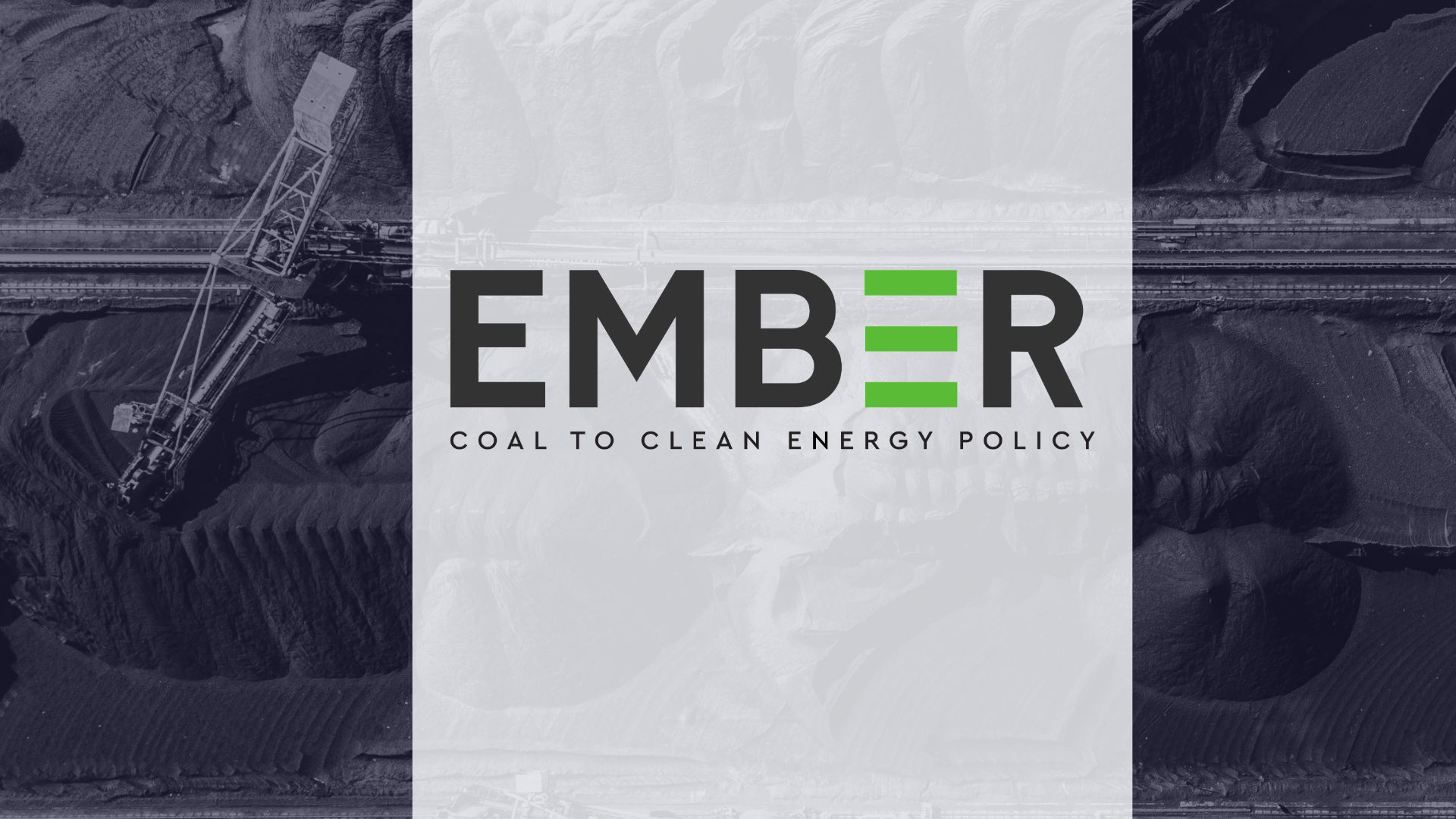
Government statistical portal

Generation data coverage:



Data format: Monthly data, typically published with a 2 month lag, available to download as an xlsx, csv, or json file. No breakdown on a subnational level or unit level. Published in Mongolian.

Detail: Thermal energy production data is supplied in Gcal, as well as data on Industrial output of key products. The portal also provides annual data on total energy supply by fuel type but data has a 3 year lag. Annual data on electricity balance, production, imports, exports, losses, and consumption by sector is also available going back to 1989, updated ~June the following year.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COAL TO CLEAN ENERGY POLICY