

Country Assessment Report

Country/Region Name- Panama:

Panama is situated in Central America; bordered by Costa Rica and Columbia. It has a population over 4 million and GDP valued at \$65 billion, with a growth rate of 3.6%.

(World Bank 2018)

Economic structure and activity:

Panama's economy can be characterised as open, diverse, small but experiencing significant and consistent levels of high growth. The economy is also dollarized with the US representing Panama's largest trading partner.

The service sector accounts for 65.13% of the nation's GDP, dominated by services in banking, finance, transport, tourism, insurance, container ports and boats registrations. Panama is widely regarded as the financial and logistics hub of Central America. This reputation is attributed to the Panama Canal, which serves as a transoceanic gateway between the Pacific and Atlantic, providing the nation's largest revenue source. Panama is also recognised as a prime location for offshore banking services. Industry contributes 29.16% of GDP and is a function of the economy experiencing further growth due to the Colon Free Zone, which is a hub for FDI in the manufacturing sector. The main industrial activities include sugar refining, apparel manufacturing, petroleum products, chemicals, paper, printing and furniture. Panama is also well endowed with minerals, including reserves of copper, gold, manganese and iron. The agricultural sector accounts for 2.18% of GDP, producing a variety of crop types including maize, sugarcane, rice, coffee, watermelons, cocoa beans, pineapples, potatoes, coconuts, soybeans, timber, livestock and shrimp.

(Statista 2018; Santander 2020)

Top private companies with RE commitments:

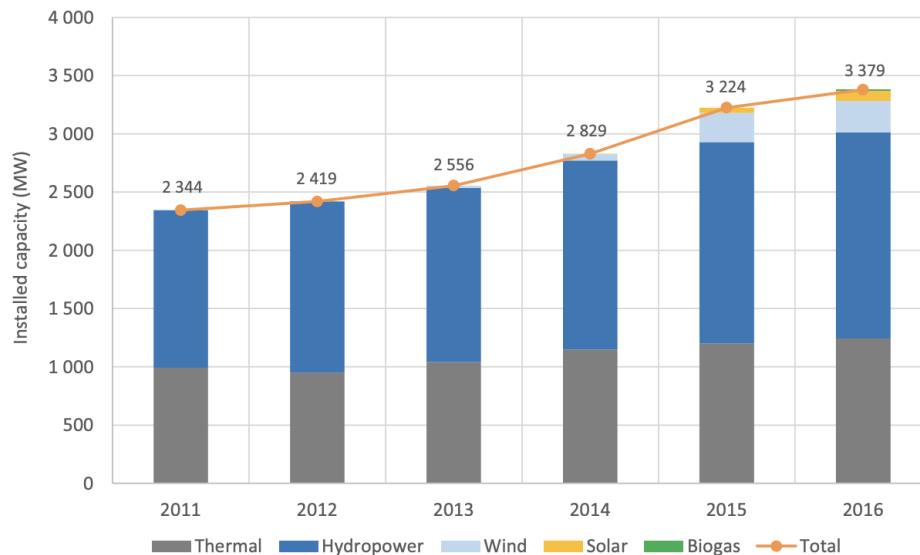
Generation and demand: (e.g. type, MW, TWh)

During 2018, electricity production was 10.909 GWh, an increase of 2% compared with the previous year. The distribution by technology is shown in Fig. 1. The system's installed capacity was 3.771 MW.

The 67% of the hydroelectric generation comes from run-of-river plants that operate mainly during the rainy season, the remaining 33% comes from two hydroelectric reservoirs that may generate year-round, including the dry season. During 2018, thermoelectric generation was produced mainly using Bunker and Diesel (59%). A 380MW natural gas plant began operations at the end of 2018, producing 26% of total thermoelectric energy. Due to its size, this plant is expected to have a greater share of the total generation during the following years, displacing other thermoelectric plants. Coal generation amounted 15% of total thermoelectric energy. Non-conventional renewable energy sources amounted to 7% of total electricity

production. In terms of installed capacity, out of 3.771 MW: (i) 1.728 MW are hydropower plants, (ii) 1.524 MW thermoelectric, (iii) 270 MW wind and (iv) 248 MW solar. The peak demand was 1.662 MW registered during April.

Figure 12: Installed power capacity in Panama (2011-2016)



Based on SNE (2015), Plan Energético Nacional (2015-2050).

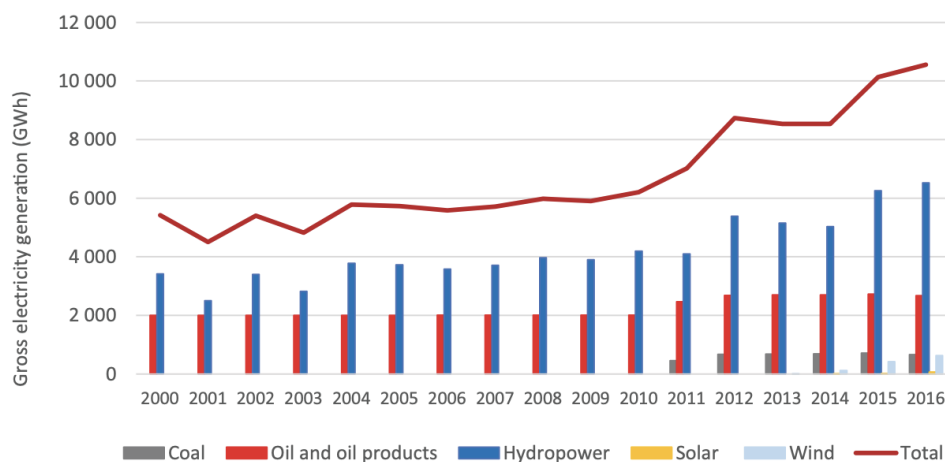
Figure 1. Installed power capacity by source between 2011 and 2016 (IRENA 2018).

National Interconnected System (SIN) capacities in MW (as of 30 June 2017)				
	Installed		Firm capacity	
Total	3 386		2 189	
Thermal	1 203	35.5%	1 090	49.8%
Bunker	691	20.4%	657	30.0%
Coal	120	3.5%	108	4.9%
Diesel	392	11.6%	325	14.8%
Renewable	2 182	64.5%	1 099	50.2%
Biogas	8	0.2%	5	0.2%
Wind	270	8.0%	0	0.0%
Hydropower	1 777	52.5%	1 094	50.0%
Solar	127	3.8%	0	0.0%

Source: SNE (2017b), El Mercado Eléctrico de la República de Panamá, www.energia.gob.pa/tmp/file/311/Sector%20Elctrico%20-%20Panama,%20170630.pdf.

Table 1. Installed and firm power capacity of SIN by source (IRENA 2018).

Figure 13: **Gross electricity generation in Panama per energy source (2000-2016)**



Source: SNE (2017a), Capacidad Instalada por Tipo de Central, años 1970-2016, www.energia.gob.pa/tmp/file/303/Generaci%C3%B3n%20El%C3%A9ctrica%202016.xls.

Figure 2. Gross electricity generation in Panama by source between 2000 and 2016 (IRENA 2018).

Electrical Interconnection and import/export:

The Central American countries (Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica and Panama) comprise a regional market called Mercado Eléctrico Regional (MER). Governed by a supra-national commission (CRIE) and administered by an independent operator (EOR), the MER is used by these countries for import/export energy transactions.

Panama is a net exporter in the regional market, having sold 327 GWh during 2018, positioning the country as the 2nd largest exporter, behind Guatemala that dominates the market with 68% of the exports market share. From the demand side, El Salvador is the largest buyer, having bought 74% of the traded energy during 2018.

Agents use this market for short-term energy transactions, one year being the longest contract horizon. In Panama, some agents use the MER to mitigate spillage conditions during the rainy season. During the dry season, and motivated by price signals, Panamanian agents import energy from this market. During 2018, Panama imported 14.6 GWh from the MER.

The map below the main transmission assets of the country and utility concession zones. Most of the hydroelectric capacity is in the west of the country, while the largest concentration of demand is located near the Panama Canal.

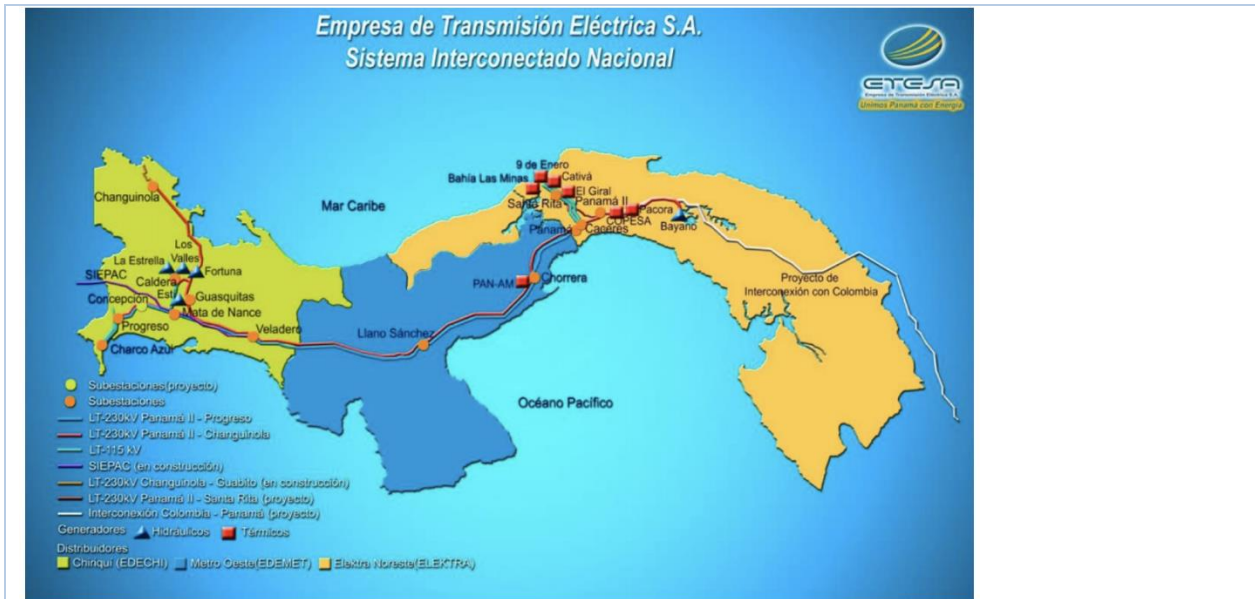


Figure 4. Transmission and distribution system in Panama (IRENA 2018).

Market Structure:

The Panamanian market is comprised of different players, classified as follows:

1. **Generators:** companies that produce energy exclusively to be sold to the Wholesale Electricity Market and companies that produce energy for their own consumption and may sell excess energy to other market agents.
2. **Transmission:** there is one government-owned transmission agent, Empresa de Transmisión Eléctrica (ETESA), responsible for the operation, maintenance and planning of the entire transmission system.
3. **Customers:** there are 3 regulated Utility companies that operate as state/private hybrid companies, with the Government retaining less than 50% of the shares. Deregulated customers (large C&I customers) buy electricity directly from generators.

The *Centro Nacional de Despacho (CND)*, a dependency of ETESA, is responsible for the economical and reliable operation of the (SIN) National Interconnected System and the coordination of all transactions within the Wholesale Electricity Market.

An external committee, *Comité Operativo (CO)*, formed by all players of the electricity market; 1 member representing CND; 1 member representing ETESA; 2 members representing Utility companies; 2 members representing Large Customers; 1 member representing small hydro and non-conventional RE; 1 member representing large hydro (>20 MW) and 1 member representing thermoelectric generators, which meet bi-monthly to elaborate regulatory proposals to CND for the creation, modification, revocation of market norms.

Utility Power Purchase Agreements (PPAs) are assigned through public bids held by ETESA and PPAs with Large C&I Customers are negotiated bilaterally between generators and customers. The generator is responsible to deliver (through its own generation or purchases in the spot market) all of the customer’s demand. Since the economic dispatch is independent of the PPA market, the balancing mechanism —i.e.,

the spot market— exist to deal with the differences between dispatch and PPAs. The hourly price of the spot market is calculated using the resulting marginal cost from the economic dispatch.

Thermoelectric plants declare their variable cost (which is audited by CND), hydroelectric reservoirs have a variable cost that is calculated with stochastic optimization and renewable energy sources such as run-of-river hydros, solar and wind plants are dispatch at 0 \$/MWh of variable cost. Ancillary services are compensated according to regulations.

Responsible Government Department: (include key contacts)

The Secretaría Nacional de Energía (SNE) is an executive branch of the government and is responsible for the formulation of the country's energy policy, with the aim to reduce costs and avoid social and environmental externalities of energy projects. It is also mandated to promote a competitive power market and regulatory framework which can facilitate a modern and efficient system.

The Autoridad Nacional de los Servicios Públicos (ASEP), regulates all activities related to electricity, telecommunications and water-sewer services. ASEP grants concessions for the distribution, transmission and generation of electricity. ASEP also licenses thermoelectric and renewable energy projects. Through public consultation, ASEP proposes modifications to current rules and also the adoption of new regulations. It enforces ASEP regulatory requirements through imposition of civil penalties and other means.

The Ministerio de Ambiente (MIAM), determines and enforces the environmental regulations. MIAM approves the environmental impact assessment of all energy projects.

The National Science and Technology Secretariat is an autonomous agency that promotes sustainable development in Panama through science and technology, and works with the public and private sectors, as well as academia. In this context, the secretariat supports renewable energy and sustainable development forums in Panama.

Existing/Planned Energy Legislation: (is there a CPO)

Law No. 6, passed in 1997 established the legal framework concerning the activities related to the generation, transmission, distribution and commercialization of electricity. This legislation gave the parameters for the restructuring of the electricity sector towards privatization. It created areas of concession for Utilities and established the rights and duties of the newly formed mixed companies (formerly state-owned companies where the state retained a fraction of the shares after privatization). There are 4 so-called generation mixed companies. The 3 existing Utilities (also mixed companies) are mandated to give free access to all customers

within their concession zone and are not allowed to own more than 15% of their demand in generation assets. There is free access for the construction of generation plants if regulatory, environmental and technical aspects are met. Generation companies are restricted to own concessions that represent more than 25% of the total national consumption of electricity. Transmission and distribution tariffs are regulated by ASEP. This law creates some subsidies and also mandates electrical companies to provide economic assistance (less than 1% of their net income) to a rural electrification fund. All activities within this energy legislation are income-tax exempt.

Environmental Legislation for RE:

Incentives for the construction and development of renewable energy sources (including small hydro) were established in Law No. 45 of 2004. Further legislation (Law No. 44 of 2011 and Law No. 37 of 2013), establishes incentives specifically for solar and wind plants. In general, renewable energy sources with a capacity of no more than 10 MW are exempt of the payment of all transmission costs and plants with a capacity between 10 and 20 MW pay 50% of these costs. Fiscal benefits include: (i) exemption of import tax for equipment, machinery and materials necessary for construction and maintenance (ii) accelerated depreciation for equipment.

Under Law No. 6 of 1997, applicable to all public bids, renewable energy sources receive a discount of 5% of their offered price when the optimal allocation of offers is performed. Utilities are obliged to pay the full offered price if the renewable agent's offer is allocated.

Under the UNFCCC framework, Panama's Nationally Determined Contribution (NDC) to the mitigation of the energy sector is to increase the percentage of electricity generation through other renewable energy sources such as solar, wind and biomass by 30% in 2050 compared to 2014. There is also an interim target of 15% by 2030. To achieve the 30% increase, Panama will rely on Law 81 of March 25, 2015 and on the 2015-2050 National Energy Plan, specifically

Existing/Planned Certificate Systems: (purpose, extent)

Currently, there is no EAC system operating or planned in the country. The I-REC standard will be implemented to operate without restrictions because the regulation allows it. The issuer of the rest of the world, the Green Certificate Company (GCC) could operate as local issuer until to find a company that can act as I-RECs local issuer for Panama or the region in the future. The information to verify the registration and the generated volumes of the devices will be the one publicly provided by ASEP through the following links:

For devices generation: https://www.asep.gob.pa/?page_id=12675

To identify the devices:

https://www.asep.gob.pa/wpcontent/uploads/electricidad/estadisticas/2019/primer_se_mestre/oferta.pdf

RE market potential:

Hydropower contributes the largest share to Panama's electricity generation. Potential for large hydro (a capacity over 100MW) has already been harness, but 42 sites have been identified for plants with under 1 MW capacity and 53 sites for a capacity over 1 MW.

Panama is well endowed with wind potential, which is dispersed throughout the country, but particularly promising along the Caribbean coast and mountainous terrain. Average wind speed estimates of 5-7 metres per second (m/s) at a height of 200 metres (m) have been recorded, as well as speeds between *6 m/s and 11 m/s with a capacity factor of 35%* at a 40 m height. In 2017, ASEP granted 662 MW of wind licenses for future development projects, allowing private develops to begin construction.

Average solar irradiation across the country is 5 kWh/m² /day, with very little of this potential currently harnessed. In 2017, ASEP had granted permanent licences for future solar development worth up to 345 MW, and provisional licences for 376 MW.

Biomass could prove another key component of Panama's diversified energy mix. Sugarcane bagasse has been used in sugar mills as a way of generating electricity and has an estimated generation potential of up to 28 GWh.

(IRENA 2018)

Market risks and challenges:

Cognisant of the government's ambition for a transition to 70% renewable energy in their national electricity mix by 2050, revised regulatory rules which offer a level playing field for renewables against conventional fossil fuel generators are required, especially in the competitive wholesale market Panama hosts. The existing conditions, specifically the PPAs, are designed for dispatchable technologies such as coal, gas, oil and hydroelectricity, and do not incentivise new wind and solar PV projects. This is because Panama's power market has been structured around the operation of its hydropower and thermal generation fleet, where generators are rewarded based on an outdated definition of firm power.

Power system operations in Panama still reflect the "old paradigm" of centralised, dispatchable generation units. Given the unique physical conditions of VRE sources, challenges emerge for system operation with high shares of variable renewables. These can largely be classified as: flexibility, system adequacy and system stability challenges. As such, reliably integrating large shares of wind and solar generation requires modifications to the CND's operational practices as well as the identification of necessary flexibility mechanisms.

(IRENA 2018)

Extent of Engagement with Government: (brief summary of any contact already made with the national government regarding certification in general and I-REC)

The I-REC Standard (I-REC) representative together with Isaac Castillo from Enel Green Power-Panamá held a meeting with the Secretary of Energy, [REDACTED], and other representatives from the Ministry of Environment. The idea that I-REC starts operating in a voluntary basis in the country has been welcomed by the authorities. It will also help to comply with the international commitment to reach the 30% of renewables by 2050 made by the country on its NDC. In addition, [REDACTED] has suggested to arrange a seminar together in order to make stakeholders aware of this certification.

Expected response from Government:

Current Environmental Reporting in Energy:

The following are the reports related to the Electricity Market: Monthly Market Report issued by CND National Energy Plan issued by SNE National Interconnected System Expansion Plan issued by ETESA

Any other Relevant Information:

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