
Solar Energy Investments in Central America & the Caribbean

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THE MARKET – RESOURCE, DRIVERS & CHALLENGES

Ample sunshine has been attracting tourists to the countries in Central America and especially in the Caribbean ever since air travel made it possible. The increasing economic advantage of photovoltaic (PV) power has now put the region on the map for solar power investors as well.

The average solar insolation in the Caribbean region and South America is approximately 2,000 kWh/m²/year. This generally represents a promise for fast return on any PV investment.

However, abundance of the renewable energy resource is not the main market driver for solar power investments.

Solar PV's levelized cost of energy (LCOE) fell 86% between 2009 and 2017. (Lazard: 2017)

Over these past eight years, material declines in the pricing of system components (e.g. panels, inverters, racking, etc.), and dramatic improvements in efficiency, among other factors, have made utility-scale solar PV cost-competitive with previously conventional generation.

At the same time, small island states all over the Caribbean face daunting costs for fuel imports and a recurrent risk from global oil price volatility (IRENA:2016). Energy prices are high as there is no opportunity for economy of scale benefits that large land masses enjoy. At USD 0.20–0.50 per kWh electricity prices around the region tend to be **three to four times** more than what is paid in the U.S. or other developed countries (Rocky Mountain Institute:2017).

Furthermore, despite the high electrification rates (on average, above 90%, according to World Bank indicators), off-grid self-generation is commonly used by large hotels and some commercial establishments because of low reliability of utilities and frequent power outages. The bulk of the power grids are also old and not adequately maintained, leading to significant technical and transmission losses. (IMF:2016)

Global Horizontal Irradiation (GHI) Latin America and the Caribbean



Solar power could be the answer to both price and reliability concerns and this report will provide you with the most interesting stories of recent solar power investments in Central America and the Caribbean.

Parque Solar Juanilama in Costa Rica

Costa Rica is certainly the most famous Central American nation in terms of renewable energy development. According to the Costa Rican Institute of Electricity (ICE), last year, the nation of five million people has clocked up over 300 days of running entirely on renewables-generated electricity. Solar power still provides only about 1% of this generation but things are about to change.

Energy distribution company Coopeguanacaste R.L inaugurated in September a 5-MW photovoltaic (PV) power plant.



Inauguration of Parque Solar Juanilama . Photo by Coopeguanacaste R.L , All rights reserved.

Parque Solar Juanilama, as the facility was named, spreads on 5 hectares in Belen de Carrillo, Santa Cruz, in the northern Pacific province of Guanacaste. The plant comprises 15,456 solar panels of 325 watts each, according to data supplied by Panasonic, the company in charge of project design and construction. It is expected to generate around 9 GWh of clean electricity per year, supplying power to over 2,000 homes and businesses in Guanacaste while offsetting about 1,500 tonnes of carbon dioxide (CO₂) emissions annually.

Some USD 8.6 million was invested in the development of this solar energy generation plant through the MGM Sustainable Energy Fund (MSEF), a private equity fund that promotes energy efficiency and renewable energy projects in Latin America.

Parque Solar Juanilama is also the first Latin American project to be implemented through a bilateral agreement between the government of Japan and Costa Rica to promote the use of clean technologies that reduce emissions of greenhouse gases.

Project summary:

Project name	Parque Solar Juanilama
Location	Guanacaste, Costa Rica
Capacity	5 MW
Annual electricity output	9 GWh
CO2 emissions offset	1,500 tonnes/year
Investment	USD 8.6 million

AES and CMI team up for 100 MWp in El Salvador

AES El Salvador and Central-American company Corporacion Multi Inversiones (CMI) have entered into a partnership to develop a 100-MW solar project in El Salvador.

The Bosforo photovoltaic project will be built in three phases, with a total investment of USD 160 million. Once fully operational, it is expected to generate enough power to offset 175,000 metric tonnes of CO2 emissions per year, the local unit of AES Corporation said in September 2017.

The first phase, Bosphorus I, will consist of three solar power plants with 10 MW of installed capacity each.

Located in three different municipalities, the PV farms should start operations in March, May and July 2018, respectively. The second and third stages, of 30 MW and 40 MW, respectively, are scheduled to go online within a two-year period.

The solar project is being developed by Bosforo Ltda de CV, a partnership between the AES Corp unit and Guatemala-based CMI. Spanish company Isotron will be in charge of the construction, with JinkoSolar being the supplier of solar panels. AES Soluciones will act as operator, once Bosforo is complete.

Debt-financing (about 70% of the overall investment) is provided by the Overseas Private Investment Corporation (OPIC), the Central American Bank for Economic Integration (CABEI), the Netherlands Development Finance Company (FMO) and Finnish development finance company Finnfund.



AES, CMI team up for 100 MWp in El Salvador. Photo by AES El Salvador, All rights reserved.

Project summary:

Project name	Bosforo/Bosphorus
Location	El Salvador
Capacity	100 MW
CO2 emissions offset	175,000 tonnes/year
Investment	USD 160 million

Enel starts building 8-MW solar park in Panama

Italy's Enel SpA is currently building an 8-MW solar park in Panama for Swiss food giant Nestle SA.

Enel Green Power Panama said in November 2017 it will invest about USD 8 million in the project named Estrella Solar. Commissioning is slated for June 2018.

“The construction of a new solar plant in Panama shows our commitment to developing our business in Central America,” said Antonio Cammisecra, Head of Enel Green Power.

Consisting of 21,600 monocrystalline photovoltaic modules, the plant is estimated to produce around 12 GWh of electricity annually, or enough to supply 5,600 local homes and save over 10,000 tonnes of CO2 emissions.

The power produced by Estrella Solar will provide clean energy to Swiss company Nestlé, which has an office in the town of Jaguïto.



Solar panel installation. Photo by Team Massachusetts 4D Home, CC 2.0

Project Summary

Project name	Estrella Solar
Location	Panama
Capacity	8 MW
Annual electricity output	12 GWh
CO2 emissions offset	10,000 tonnes/year
Investment	USD 8 million

Domicem (Dominican Republic) invests in solar power

Domicem, a subsidiary of Italy-based cement producer Colacem, in November 2017 broke ground on a 1.5-MWp photovoltaic power plant in the town of Sabana Grande de Palenque, in the San Cristobal province of the Dominican Republic.

The facility will comprise a total of 4,616 solar panels of 325 Wp each. The modules will annually produce about 2.28 million kWh, saving around 56,175 gallons (212.645 liters) of fuel per year for Domicem.

In addition, the photovoltaic solar system will prevent emissions of 1,455,690 kg of CO2 per year, which corresponds to the planting of 48,523 trees, according to company calculations.



Groundbreaking ceremony. Photo by Colacem. All rights reserved.

In a second phase, the plant's capacity will be upgraded to 6 MWp. The solar power investment is part of the sustainability policies of the cement producer.

Project summary:

Project name	Domicem solar power plant
Location	San Cristóbal, Dominican Republic
Capacity	1.5 MWp (6 MWp in future)
Annual electricity output	2.2 GWh
CO2 emissions offset	1,455 tonnes/year

Guatemala's Kingo expands prepaid solar energy service

Kingo, a Guatemala-based provider of a pre-paid solar energy service, in August said it had closed a USD 8 million Series B financing round.

The company offers pre-paid solar energy kits to off-grid households at the bottom of the economic pyramid. Its model requires no loans, no installation fees and no maintenance costs.

Kingo raised financing from the FCP fund, France's Engie, Dutch development bank FMO and its French peer Proparco, as well as renewables fund H-Reff. The company has so far secured a total



of USD 19 million in financing, including the latest round.

"This financing round will allow us to increase our capabilities and improve our proprietary technology. Our goal is to service over 1 million households by 2021, and allow humanity to get a step closer to a brighter world," said Juan Fermin Rodriguez, founder and CEO of Kingo.

The company estimates it is installing its solar energy kits in around 6,000 new homes each month. By the end

Kingo prepaid solar energy kits. Photo by Kingo, All rights reserved.

of July 2017, it covered more than 48,000 households located in over 2,700 rural communities in Central America.

Nicaragua to deploy 11,000 PV systems in 2018

Nicaragua's National Electricity Transmission Company (ENATREL) announced at the start of the year that it plans to install 11,000 solar photovoltaic (PV) systems in 2018, fitting them on homes, schools, health centres, maternity homes and churches.

This initiative will support the country's goal of boosting to 95.5% the national rate of electrification, said Salvador Mansell Castrillo, head of ENATREL and the Ministry of Energy and Mines.

Renewables currently account for 54% of Nicaragua's installed capacity. This year, the government expects to switch on a 13-MW PV plant and 33 MW of biomass power capacity.



Picture Rooftop solar panels. Photo by Marufish, CC 2.0

ENATREL also stressed on the importance of the reinforcement of the National Transmission System (SNT), with 26 substations leaving the paper in 2017. At the end of last year, the country secured USD 86.5 million from the Central American Bank for Economic Integration (BCIE) to expand its electricity network.

Caribbean PV plants survive hurricanes Irma, Maria

While hurricanes Irma and Maria almost wiped out the grid in Puerto Rico in September 2017, the natural disasters had a less damaging effect on operations of locally installed solar power plants.

AES Corp said the hurricanes caused modest damage to its 24-MW Illumina solar power plant in Puerto Rico, while the 5-MW USVI Solar I facility in the US Virgin Islands was materially damaged.

French power producer Albioma SA also reported that its biomass and solar power plants on the Caribbean islands had sustained minimal damage following the Irma and Maria hurricanes. Although both Martinique and Guadeloupe were directly in the path of Maria, the company's 14 MWp of photovoltaic plants only sustained minor damage and were brought back in operation within weeks. By the end 2018, Albioma also plans to build four new PV systems, each with a capacity of 250 kWp, in La Réunion, another four 250-kWp systems and a 1.5-MWp plant in Mayotte, as well as a 250 kWp solar energy plant in Guadeloupe.

Financing opportunities for new projects

If you have been inspired by some of these projects, know that new investors in solar power may look for financing beyond the traditional debt and equity resources. Three interesting options follow.

The UAE-Caribbean Renewable Energy Fund

The UAE-Caribbean Renewable Energy Fund was set up in January 2017 to finance renewable energy projects in the Caribbean.

The UAE Ministry of Foreign Affairs and International Cooperation (MOFAIC) is managing the initiative, while Abu Dhabi-based renewables developer Masdar is in charge of the implementation.

In October 2017, Masdar announced an agreement with the Abu Dhabi Fund for Development (ADFD) finalising the financing for the USD-50-million fund.

"This agreement is a momentous step forward for Abu Dhabi entities working together to develop the energy sector in 16 Caribbean island countries for the next two to three years," said Mohammed Saif Al Suwaidi, Director General of ADFD.

The first stage of the initiative envisages providing support for projects in Antigua and Barbuda, Bahamas, Barbados, Dominica, and St Vincent and the Grenadines. Preferred technologies will be

solar photovoltaic (PV) and battery storage, while the general goal of the projects should be lowering the high energy costs in the region.

“The projects in the Bahamas, Barbados, and SVG have been tendered, and we plan to award the EPC contract in the next couple weeks during site visits”, Dane McQueen, the senior advisor on development and humanitarian affairs at the UAE Ministry of Foreign Affairs and International Cooperation, based in its mission to the United Nations in New York, told Renewables Now on January 17, 2018. “For A&B and Dominica, the project scopes are being revisited by the governments following the hurricanes, though we hope to be able to tender in the next couple months”, he added.

The UK Sustainable Infrastructure Program (SIP)

The UK government will contribute about GBP 177 million to a programme of the Inter-American Development Bank Group (IDB) that will finance sustainable infrastructure in Latin America and the Caribbean.

IDB’s private-sector arm IDB Invest has teamed up with the UK’s Department for Business, Energy and Industrial Strategy (BEIS) to establish the UK Sustainable Infrastructure Program (SIP). They made the announcement during a joint side event in the context of the COP 23 climate conference in Bonn, Germany.

The SIP will help catalyze private sector investment to implement the Nationally Determined Contributions (NDCs) of the Paris Agreement. It will support the development of sustainable, low carbon and climate resilient infrastructure through a wide range of instruments such as grants for technical cooperation and blended finance for loans, equity and guarantees.

“Infrastructure is crucial to economic growth and development, but there is an infrastructure investment gap in the region that needs to be closed,” said IDB President Luis Alberto Moreno.

EIB, CDB commit USD-110m for Caribbean climate action

The European Investment Bank (EIB) and Caribbean Development Bank (CDB) in May 2017 signed a USD 110 million financing agreement to back climate action projects in the Caribbean.

According to the announcement, this is EIB's biggest loan to the Caribbean. The Climate Action Framework Loan II will support climate change mitigation, adaptation and resilience projects in renewable energy, energy efficiency, road transport, water infrastructure and community-level physical and social infrastructure.

The loan agreement was signed by CDB president Warren Smith and EIB vice president responsible for the Caribbean Pim van Ballekom in the Turks and Caicos Islands on May 24, during the annual meeting of CDB's board of governors.

"Through this new Line of Credit, CDB will be able to provide to its BMCs [borrowing member countries] much needed low-cost financing to address the climate impacts already affecting these countries," said the CDB president.

In conclusion, the continuing decline in the price of solar power, coupled with the increasing efficiency and affordability of the technologies for energy storage, are motivating both government and businesses in Central America and the Caribbean to seek renewable energy solutions for the region where energy demand has seen a 65 per cent increase in the last 12 years.

From pre-paid solar energy kits offered to off-grid households at the bottom of the economic pyramid to utility-scale projects in the hundreds of megawatts, solar power, in particular, has an outstanding potential to open up investments in the region, disrupting the dependency on fossil fuel imports and creating climate resilient infrastructure.

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