S.no.	ISA member countries	Page number	S.No.	ISA member countries	Page number
53	Peru	133	67	Sri Lanka	161
54	Plurinational State of Bolivia	135	68	Sudan	163
55	Republic of the Gambia	137	69	Suriname	165
56	Rwanda	139	70	Togolese Republic	167
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58	Saint Lucia	143	72	Trinidad and Tobago	171
59	Saint Vincent and the Grenadines	145	73	Tuvalu	173
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61	Sao Tome and Principe	149	75	United Arab Emirates	177
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65	Somalia	157	79	Zambia	185
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### What to look for in each section of the country report?

### **Country snapshot**

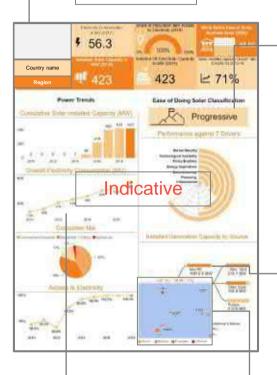
This section primarily covers country's as-is scenario with respect to the power sector indicators such as annual electricity consumption, access to electricity, installed solar capacity, Ease of doing business score, and growth of solar installed capacity.

#### **Power trends**

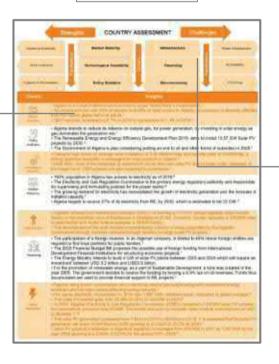
This section depicts overall power sector trends of the country through yearly trends in cumulative solar installed capacity, access to electricity, consumer mix and overall electricity consumption.

Consumer mix is not shown for a few countries where data was not available.

### Page 1



## Page 2



### **EoDS** performance

This section indicate overall classification of the country (i.e. Achiever, Influencer, Progressive and Potential). It also shows countries performance across seven drivers as detailed out in the approach and methodology section of this report.

# Installed capacity drill down

This section depicts electricity mix of the country (in capacity terms) along with the drill down on capacity of solar sub-segment such as solar mini-grid, solar home systems etc.

# Performance in the sub-region

For the countries where installed capacity drill down was not available, EoDS classification of the neighbouring countries is depicted in this section.

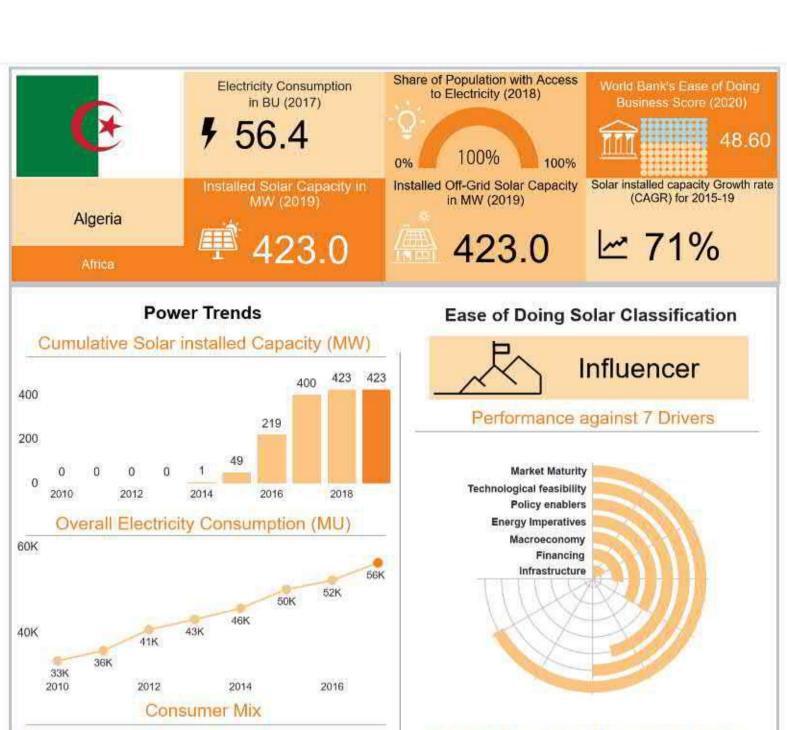
## Strengths & challenges

This section provides insights developed from the overall assessment of the member countries across seven drivers. Relative strengths(in orange) and challenges (in grey) have been identified for the country based on performance comparison within the country across sever drivers and various parameters within those drivers.

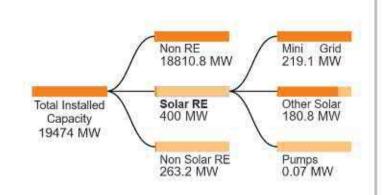
## **Qualitative** assessment

This section provides a crisp qualitative assessment of the country across seven drivers. References for the remarks under this section are provided in the Appendix of this report.

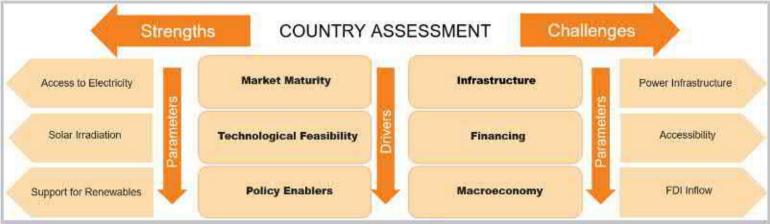
Note: Extensive list of sources are provided in the Appendix -3 of the report.







Non-Solar RE includes Wind, Hydro, Biomass, Geothermal & Marine; Non-RE includes Coal, Natural Gas, Nuclear, Oil, etc.; Other Solar includes Utility Scale Solar, Rooftop etc.; Year: 2017.



Drivers Insight



- Algeria is a Lower-middle-income economy as per World Bank's classification.<sup>1</sup>
- As oil accounts for over 90% of exports and 60% of total income in Algeria, its economy is severely affected from the recent global fall in oil prices.<sup>1</sup>
- GDP has only increased by 0.7% in 2019 in comparison to 1.4% in 2018.<sup>2</sup>



- Algeria intends to reduce its reliance on natural gas, for power generation, by investing in solar energy as gas dominates the generation mix.<sup>1</sup>
- The Renewable Energy and Energy Efficiency Development Plan 2015- aims to install 13.57 GW Solar PV projects by 2030.3
- The Government of Algeria is also considering putting an end to oil and other forms of subsidies in 2020.1



- Owing to high levels of average solar irradiation of 5.92 kWh/m²/day and specific yield of 5. kWh/kWp, a strong technical feasibility is envisaged for solar projects in Algeria.<sup>4</sup>
- Until 2020, most of the emphasis is expected to be on wind and solar PV due to lower costs. However, in the longer term, CSP projects are also expected to commence.<sup>5</sup>



- 100% population in Algeria has access to electricity as of 2018.8
- The Electricity and Gas Regulation Commission is the primary energy regulatory authority and responsible for supervising and formulating policies for the power sector.<sup>6</sup>
- The growing demand for electricity has necessitated the growth of electricity generation and the increase in installed capacity.<sup>7</sup>
- Algeria targets to source 27% of its electricity from RE, 2030, which is estimated to be 22 GW.5



- Algerian telecom and renewables company Milltech is building a 100 MW annual capacity solar module factory in the industrial zone of Boukerana in Chelghoum El Aid. Currently, Condor operates a 130 MW solar module facility and Aurés Solaire operates a 30 MW facility.
- The development of the solar module manufacturing industry is being supported by the Algerian Government through domestic demand through tenders for large scale PV projects.



- The participation of a foreign investor, in an Algerian company, is limited to 49% hence foreign entities are required to find local partners for public tenders.<sup>1</sup>
- The 2020 Financial Budget Bill proposes the possible use of foreign funding from International Development Financial Institutions for structuring economic projects.<sup>1</sup>
- The Energy Ministry intends to build 4 GW of solar PV plants between 2020 and 2024 which will require an investment between USD 3.2 billion and USD 3.6 billion.
- For the promotion of renewable energy, as a part of Sustainable Development, a fund was created in the year 2009. The government decided to source the funding by levying a 0.5% tax on oil revenues. Funds thus accumulated are used to provide financial support to RE projects.<sup>5</sup>

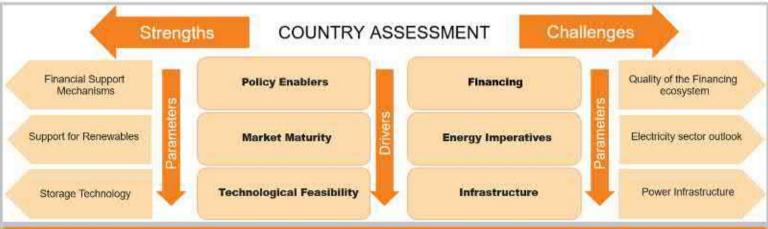


- Rapidly rising power consumption and a declining natural gas output along with substantial energy subsidies are the major issues affecting energy security.
- Per capita electricity consumption in 2019 was 1,887 kWh, relatively lower compared to global average.<sup>6</sup>
- The Solar PV market grew from 25 MW in 2010 to 423 MW in 2019.
- In 2019, Algerian Electricity & Gas Regulation Commission (CREG) tendered a 150 MW solar PV scheme, but successfully procured only 50 MW. The tender was won by domestic solar module manufacturer at USD 0.069 per kWh.11,14

The solar PV generation increased from 1 MUs in 2014 to 385 MUs in 2016. It is expected that the solar PV generation will reach 9,345 MUs by 2030 growing at a CAGR of 25.2% till 2030.8

 Solar PV capacity installation in Algeria is expected to increase from 400 MW in 2017 to 7,267 MW by the year 2030 growing at a CAGR of 22.5% for the period 2017–2030.<sup>8</sup>





Drivers Insights



- GDP (at current prices) was poised at USD 449.66 billion in 2019.4
- GDP (Real) has contracted at an annual rate of 2.2% in 2019.67
- Argentina also initiated structural reforms to strengthen the competitiveness of its economy and to create
  conditions for private sector-led growth, including reducing export taxes, easing import controls and
  implementing reforms to reduce the cost of doing business.<sup>7</sup>



- Feed-in-Tariffs and other subsidies are being offered to encourage investments in renewable energy.<sup>6</sup>
- The National Electricity Act established the National Electricity Fund which capitalized upon tax collected on power sales in the wholesale market. Under the law, 60% of these taxes are distributed to those provinces that adhere to federal schemes for distribution tariffs in order to subsidize consumers. The remaining 40% is allocated to the internal development of power sector.<sup>6</sup>
- RenovAr (Argentina Renewable Energy Auctions) program conducted four rounds of bidding from 2016 to 2019 and allocated more than 36 solar projects with approximate capacity of 1500 MW.<sup>6,9</sup>



- Owing to relatively high levels of average solar irradiation (GHI) of 5.12 kWh/m²/day and specific yield of 4.66 kWh/kWp, strong technical feasibility is envisaged for solar projects in Argentina.<sup>1</sup>
- The World Bank Country Partnership Framework (CPF), for 2019-2022, promotes the adoption of climatesmart practices through the Integrated Risk Management in Rural Agro-Industrial System.<sup>8</sup>



- Installed renewable capacity was 1.7 GW in 2018, grown at a CAGR of 10.6% from 2000 and is expected to reach 16.4 GW by 2030.6
- 100% of population has access to electricity as of 2018.5
- Total power generation was 136.2 BUs in 2018 and is expected to reach 222.5 BUs by 2030.6
- In 2018, renewable power generation was 4.1 BUs and is expected to grow at a CAGR of 18.6% between 2019-2030 <sup>6</sup>



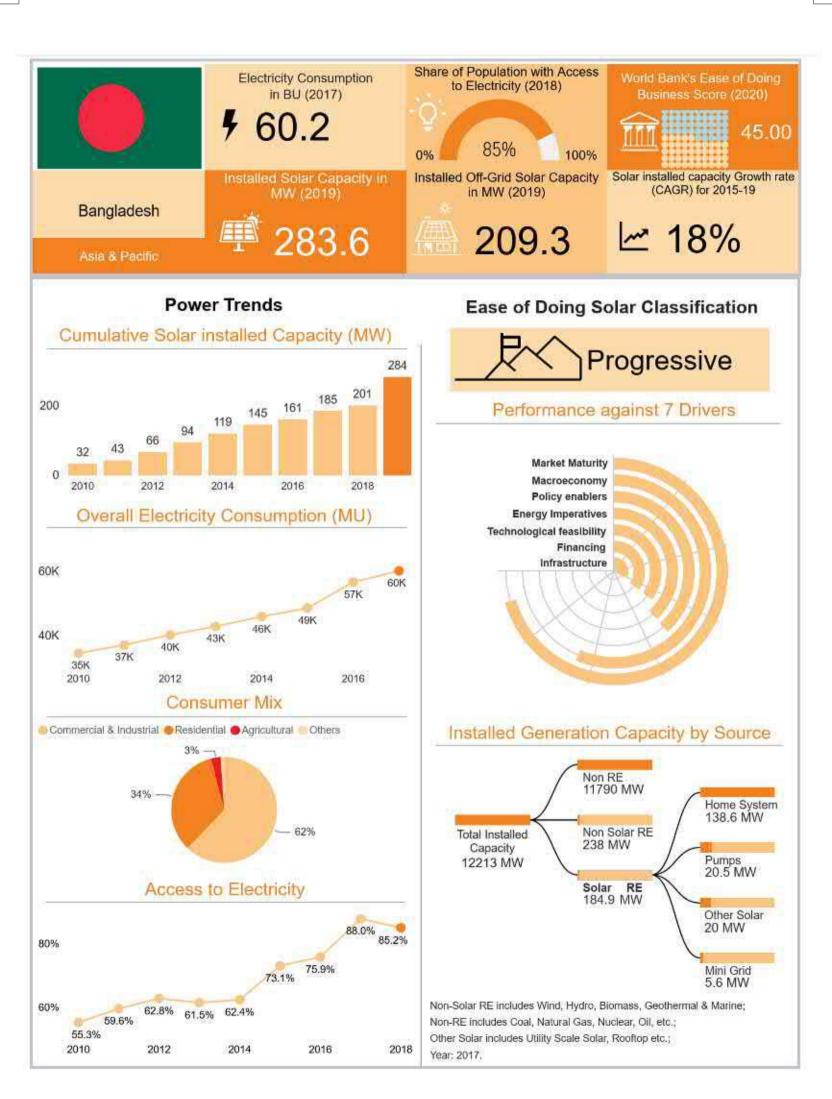
- In 2018, the total length of the transmission network was 35,563 ckm which is expected to increase to 44,886 ckm by 2025.<sup>6</sup>
- In 2018, the total distribution network length was 434,428 ckm and is expected to reach 505,762 ckm by 2025.6
- Power generation is one of the most competitive markets in which majority of capacity is owned by private and a small share is split between municipal, provincial, co-operative and national operators.<sup>6</sup>

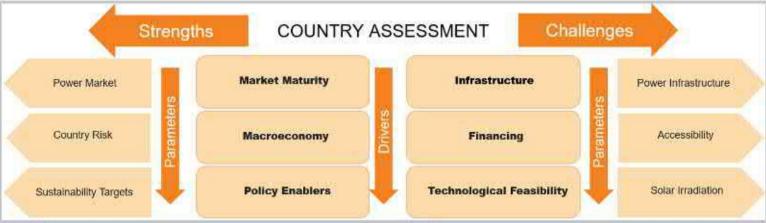


- International financial flow in 2017 was USD 490.1 million (in PPP terms) to support clean and renewable energy.<sup>5</sup>
- An annual deal value of USD 3.4 billion was achieved in 2018 from 27 deals in Argentina's power sector.<sup>6</sup>
- Large consumers, with with a demand load equal to or larger than>300 kW, have been given the option of opting out of the tendered Power Purchase Agreements (PPA) and getting their supply directly from a distributor or from the wholesale market at a price ceiling of USD 113 per MWh or through self-consumption projects.<sup>6</sup>
- The Term Market, from Renewable Energy Sources (MAT ER) regime, aims to set favourable conditions for large electricity users within the wholesale electricity market and large distribution companies to meet their demand supply obligation from renewable sources.<sup>6</sup>



- Annual consumption increased to 129 BUs in 2017, at a CAGR of 3.3% from 2000 and is expected to reach 140.6 BUs by 2023.6
- Per capita electricity consumption of 3,125 kWh, in 2019, is nearly at par with the global average.<sup>2</sup>
- Renewable energy share, in total final energy consumption, was 11% as of 2017 and is targeted to reach 20% by 2025.<sup>5,6</sup>
- The Renewable Energy Project in Rural Markets (PERMER) program aims to support rural populations by supplying renewable energy to schools and households.<sup>6</sup>





Drivers Insights



- Bangladesh is one of the fastest growing economy in the region with a stable economic performance that has helped reduce poverty and social inequalities.
- GDP (Real) has grown at an annual rate of 7.9% in 2019.1
- FDI inflows to Bangladesh fell by 56% to USD 1.6 billion in 2019 from USD 3.6 billion in 2018.2
- In 2018, Bangladesh fulfilled all three eligibility criteria for graduation from the UN's Least Developed Countries (LDC) list for the first time and is on track for graduation in 2024.



- Renewable Energy Policy aims to develop renewable energy projects to meet 10% of the total power demand by 2020 coming from renewables.<sup>3</sup>
- The Solar Home System (SHS) program is one of the most successful green energy programs in the world providing nearly 20 million people with access to electricity.<sup>4</sup>
- Bangladesh is considered to be a market leader in Solar Home Systems in the region.



- The country receives 10.5 hours of sun on an average per day, of which 4 4.5 are peak sunlight hours and 300 clear sunny days per year.
- Bangladesh receives relatively moderate levels of solar irradiation levels of 4.60 kWh/m²/day and specific yield of 3.89 kWh/kWp. Moderate technical feasibility is envisaged for solar projects in Bangladesh.<sup>5</sup>
- The power sector has a high dependence on fossil fuels as natural gas and coal are the dominating sources for power generation in the country.
- Land availability, due to one of the highest population densities in the world, is a strong deterred to large scale solar power plants.
- Floating solar is under consideration to utilize the large water resources of the country for harnessing solar power.



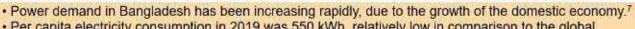
- 85% population in Bangladesh has access to electricity as on 2018.6
- Power sector is regulated by Bangladesh Energy Regulatory Commission (BERC). Power sector is unbundled into generation, transmission and distribution, largely managed by state owned utilities.
   Generation and distribution are managed by Bangladesh Power Development Board (BPDB) with some participation of IPPs whereas transmission is solely managed by Power Grid Company of Bangladesh Ltd.
- Gas-based thermal power generation is the dominant technology in Bangladesh.
- Transmission system comprises of two voltage levels, 132 kV and 230 kV lines.



- Eight solar parks with a 100MW capacity each and a 200 MW capacity solar power project is under planning while two 200MW capacity solar parks are under construction.
- Bangladesh Economic Zone Authority (BEZA) intends to develop a solar power zone that will add at least 1,000 MW PV capacity. The government agency has taken steps to acquire about 4,000 acres (1,619 ha) of land for this purpose.
- Rooftop solar is getting significant traction with many state-owned entities considering the option to reduce the electricity cost and carbon footprints.

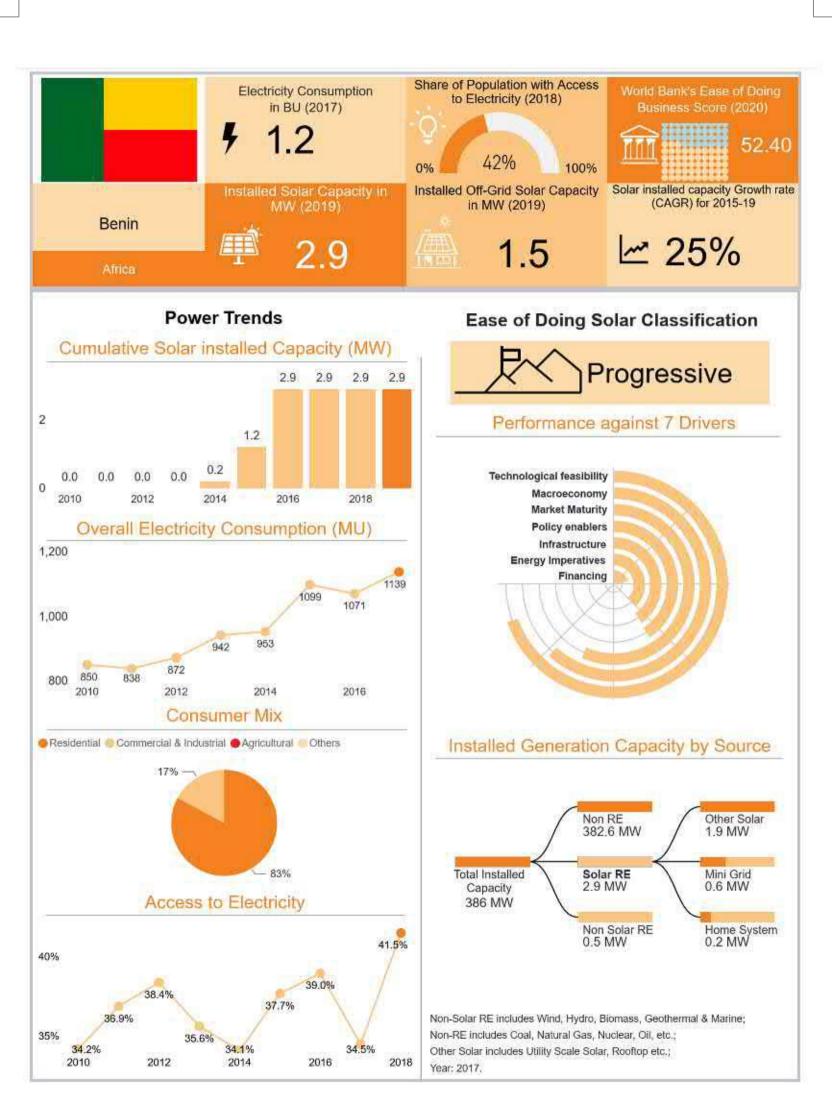


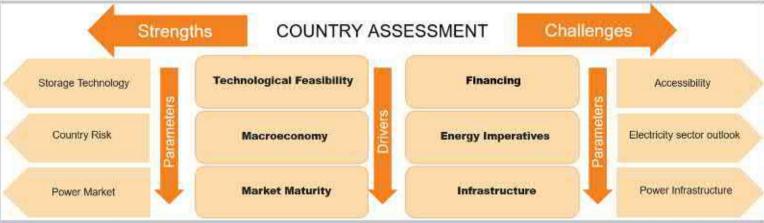
- Country has a stable financial outlook with a credit rating of Ba3 as of March 2020.<sup>8</sup>
- Financial situation of the banking sector remains weak due to a large share of non-performing loans and an increase in restructured loans.<sup>9</sup>
- Infrastructure Development Company Limited (IDCOL), Government owned financing agency, provides soft finance for Solar Home System, Solar Pumps, Roof-top systems and Solar Mini-grids /Micro-grids.



- Per capita electricity consumption in 2019 was 550 kWh, relatively low in comparison to the global average.<sup>11</sup>
- The Solar PV installed capacity grew from 32 MW in 2010 to 284 MW in 2019.







Drivers Insights



- Benin is a low-income economy as per World Bank's classification. GDP (Real) has grown at an annual rate of 6.4% in 2019.<sup>1,2</sup>
- FDI inflows have increased from USD 194 million in 2018 to USD 230 million in 2019.
- The country's external energy dependency and rapid population growth are some of roadblocks hindering economic growth.<sup>1</sup>



- The National Agency for the Development of Renewable Energies and Energy Efficiency (ANADER) was created in 2014 with a mission to facilitate promotion and adoption of renewable energies.<sup>3</sup>
- Benin government has implemented new reforms to foster investment which include creating a unified regulatory framework for public-private partnerships, a single business registration desk as well as multiple tax incentives.<sup>1</sup>
- With a target of 228 MW of RE capacity by 2030, National Renewable Energy Plan aims to implement solar PV including mini grids and Solar Home Lighting Systems to increase electricity access in rural areas.<sup>4</sup>
- An independent electricity regulator has been established with the authority to regulate tariffs, pass laws
  encouraging public-private partnerships and approve a performance plan with targets for the national utility.<sup>5</sup>



- Owing to relatively high levels of average solar irradiation of 5.33 kWh/m²/day and specific yield of 4.2 kWh/kWp, a strong technical feasibility is envisaged for solar projects in Benin.<sup>6</sup>
- Over the last decade, the power supply has relied mostly on imports representing 75-95% of the total electricity supply.<sup>7</sup>
- Conventionally rural households, in the country, use DGs to meet their electricity needs. This system of power generation is highly fuel consuming, expensive and highly polluting.<sup>7</sup>



- 42% population in Benin had access to electricity in 2018.8
- Reliability of the electricity provided by the Beninese Electrical Power-Company (SBEE) remains low by wide variations in voltage and frequent power cuts.<sup>9</sup>
- The country is highly dependent on biomass and import of energy from the neighbouring countries.<sup>4</sup>
- The Government of Benin and MCA-Benin II signed a management services contract to entrust the national electricity utility to a private company for a period of four years beginning in November 2019.



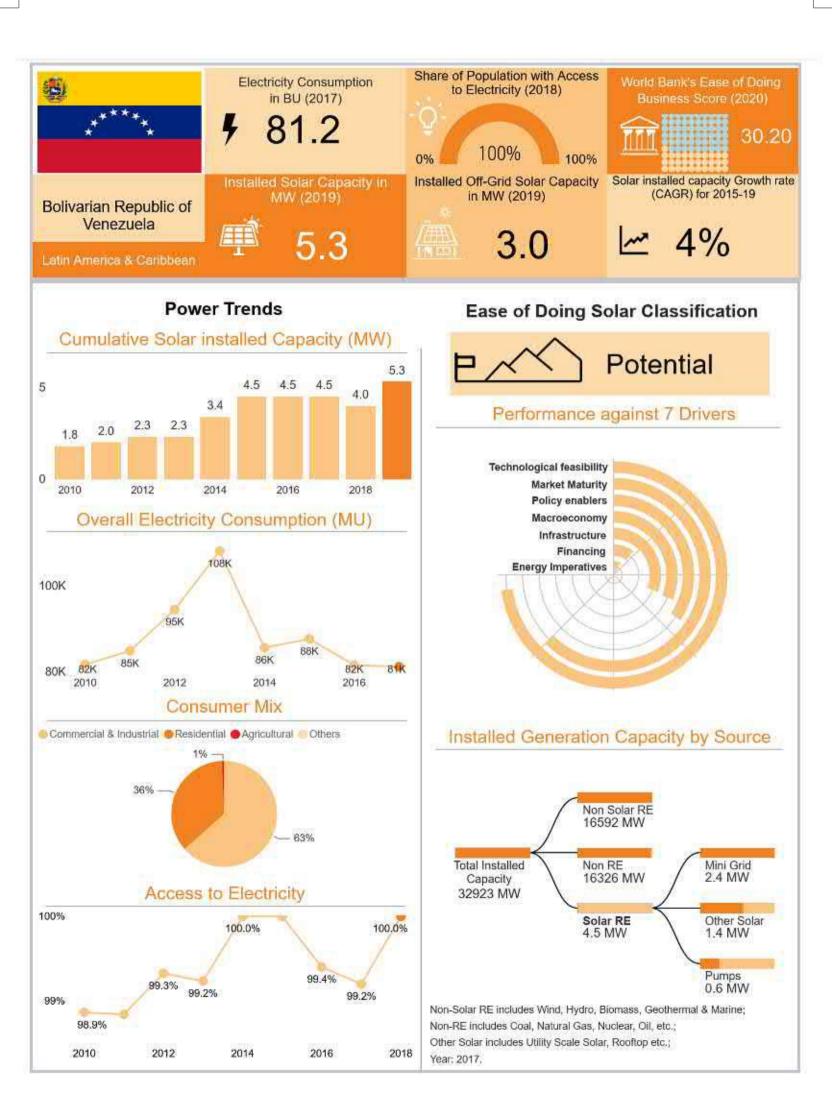
- A new electricity code has been ratified by Benin's National Assembly. In addition to opening up the energy sector to private investors the Code paves the way for the development of the solar sector.<sup>11</sup>
- Benin improved the reliability and transparency of the land administration system by publishing statistics on land transactions and land disputes for the previous year and committing to deliver a legal document within a specific time frame.<sup>1</sup>
- In February 2020, a new electricity code has been ratified by the National Assembly. In addition to opening
  up the energy sector to private investors, the code paves the way for the development of solar sector.<sup>11</sup>

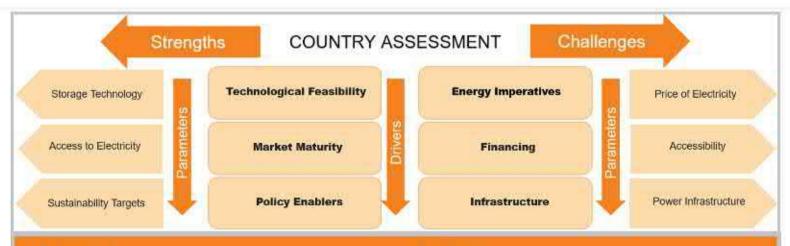


- The Millennium Challenge Corporation leads Power Africa's work in Benin through a USD 375 million grant agreement focused on strengthening the power sector. The Government of Benin is co-investing USD 28 million in the initiative.<sup>13</sup>
- Benin is supported by international partners such as AFD, GIZ and Government of India for RE projects.<sup>4</sup>
- GIZ is providing financial incentives with objectives of promotion of Entrepreneurship and small companies for production of solar components.<sup>4</sup>



- Per capita consumption, in 2019, was 100 kWh, relatively lower in comparison to the global average.
- The Solar PV market grew from 0.2 MW in 2014 to 3 MW in 2019.
- . The share of RE (hydroelectricity and solar power), in the energy mix, is still low at 1%.
- High cost of solar projects is a key challenge for large scale deployment of Solar in the country.<sup>4</sup>
- Isolated mini-grid, which are cheaper and quick to install, would be a suitable technology to supply power to rural communities in Benin.<sup>7</sup>





Drivers

nsights



- GDP (at current prices) is estimated at USD 70 billion in 2019. GDP per capita (at current prices) is approximately USD 2,548 in 2019.<sup>1</sup>
- During the 2018–2022 period, population is expected to grow at a CAGR of 1.2% to 33.4 million by 2022, implying growth in power consumption as the residential sector is one of the largest consumers of power.<sup>4</sup>



- Venezuela's Development Plan, for the National Electric System, aims to electrify 2,512 off-grid communities through solar PV and hybrid with a combined capacity of 63 MW by 2019 and plans to extend target until 2033.<sup>2</sup>
- Sowing Light Program, funded by the Public Foundation for Electric Development (FUNDELEC) in 2005, aims to spread renewable energy in remote and indigenous community areas through solar PV and hybrid systems.<sup>2</sup>
- In 2013, Venezuela began the process to develop the Law for the Use of Alternative Energy. It also developed a draft Plan for the long-term development of renewable energy in the period 2019-2031.



- Owing to relatively high levels of average solar irradiation level (GHI) of 5.35 kWh/m<sup>2</sup>/day and specific yield of 4.35 kWh/kWp, strong technical feasibility is envisaged for solar projects in Venezuela.<sup>5</sup>
- The Law of Rational and Efficient Use of Energy, 2011 promotes the use of renewable energy for thermal
  use such as hot water heating and cooling in new and existing buildings.<sup>8</sup>



- The non-hydro renewable sources, such as wind and solar, contributed to 0.3% of total installed capacity as
  of 2017.<sup>4</sup>
- 100% of population in Venezuela had access to electricity by 2018.6
- The renewable energy sector is a promising area for development, and is expected to grow at a CAGR of 4.1% between 2018 and 2030.<sup>4</sup>



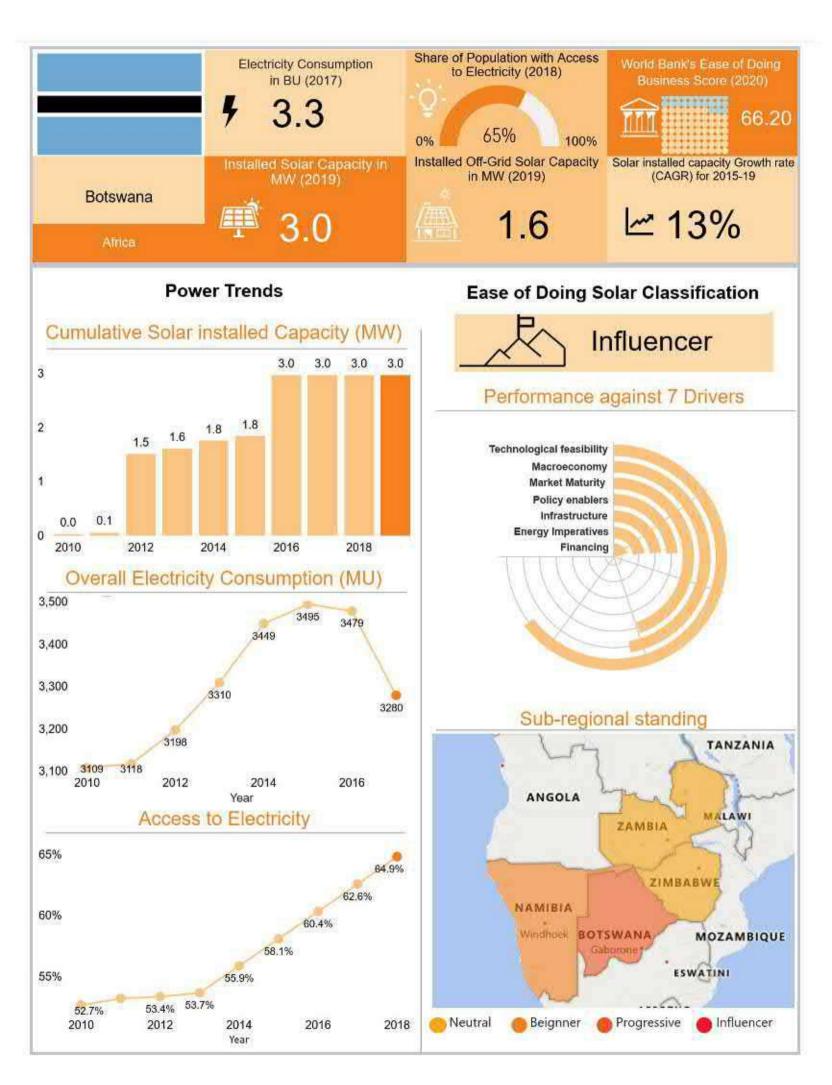
- In 2017, the electric power transmission network comprised 32,480 circuit kilometres (ckm) of high-voltage transmission lines, which increased at a CAGR of 3% between 2007 and 2017.<sup>4</sup>
- The country's electricity distribution network totalled approximately 143,375 ckm as of 2017. It increased at a CAGR of 3% between 2007 and 2017 and is expected to increase at a CAGR of 2% between 2018 and 2025 to approximately 171,900 ckm.<sup>4</sup>

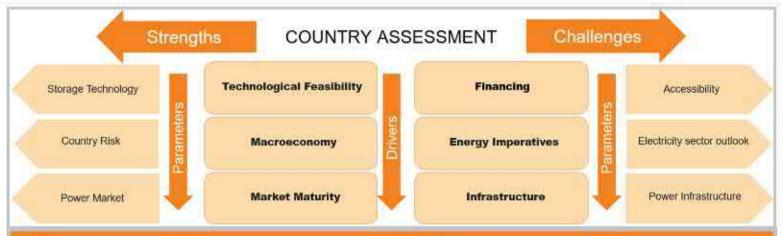


- Foreign investments are encouraged in Venezuela and protected by a new legal framework especially through the dispositions stipulated in the Decree 2095.9
- According to UNCTAD's World Investment Report 2020, the country experienced an increase in FDI inflows which reached USD 934 million in 2019 compared to USD 886 million in 2018.<sup>9</sup>



- Total power Generation grew from 82.6 BUs to 119.4 BUs over the period 2000-2017 at a CAGR of 2.2%.4
- Country's per capita electricity consumption is 2,976 kWh in 2019.<sup>3</sup>
- Power consumption is expected to increase at a CAGR of 0.2% from 2018.<sup>4</sup>





Drivers Insigh



- Botswana is an upper-middle-income economy which has witnessed one of the world's highest growth rates in the last 10 years; A major reason for this is the appropriate utilization of its diamond mines.
- International trade accounted for 77.1% of the country's GDP in 2018. Diamonds represent almost 90% of the country's total exports.<sup>1</sup>
- FDI inflows in Botswana decreased from USD 286 million in 2018 to USD 261 million in 2019.
- Botswana's GDP (Real) growth has reduced to 3% in 2019 against 4.5% in 2018 (IMF).



- Government has set national electricity access targets of 82% by 2016 and 100% by 2030.3
- Government funded Rural Electrification Programme is set to ensure rural areas get complete access to electricity.<sup>4</sup>



- Owing to relatively high levels of average solar irradiation of 6.07 kWh/m²/day and specific yield of 5.16 kWh/kWp, strong technical feasibility is envisaged for solar projects in Botswana.<sup>5</sup>
- Around 59% of Botswana's current power demand is met by fossil fuel powered generation.<sup>6</sup>



- 65% population has access to electricity in the country.
- Botswana Power Corporation (BPC), established in 1970, is the state-owned company for electrical power generation, transmission, and distribution.<sup>4</sup>



- Botswana hosts vast swathes of low-cost land that records direct normal irradiance (DNI) of over 2,200 kWh per year, indicating a good opportunity for Solar infrastructure.<sup>8</sup>
- Under a 20-year resource plan, approved in Aug 2019, procurement is also underway for a 100 MW solar PV plant due in 2022.9
- The government will launch a call for tenders at the beginning of next year for the establishment of a 200 MW solar power plant which should be completed by 2026.<sup>9</sup>



- Botswana has a negative financial outlook with a credit rating of A2.<sup>10</sup>
- The Government has opened a Renewable Energy Fund Account with a 7.9 million Pula (bwp) grant from the Global Environment Fund as seed money. The Fund is aimed at subsidizing renewable energy technologies for off-grid solutions especially for applications including solar water heating and water pumping.<sup>11</sup>



- Per capita electricity consumption in 2019 was 1,240 kWh, relatively low in comparison to the global average.<sup>12</sup>
- Total installed capacity in the country was 920 MW in 2019. Share of renewables in country's installed capacity is just 0.3% in 2019.<sup>13</sup>
- Installed Solar capacity has grown from 0.1 MW in 2011 to 3 MW in 2019.
- The Botswana Energy Regulatory Authority is responsible for providing an efficient energy regulatory framework for Electricity, Gas, Coal, Petroleum products, solar and all forms of renewable energy with the primary mandate of providing the economic regulation of the sectors.<sup>14</sup>