Bangladesh is one of the world’s most vulnerable countries to the effects of climate change. Solar photovoltaics (PV) can help manage climate vulnerabilities and also ensure energy access for all. Bangladesh is among the largest users of off grid solar home systems globally. The markets for on-grid systems such as utility scale solar parks and distributed generation on rooftops, other off-grid markets such as irrigation, public lighting, water pumping, telecom towers etc. also hold substantial promise for adoption. Stronger policy and innovation is crucial to overcome market barriers and accelerate further adoption.
Growing need to tap the cost-effective and abundantly available solar energy in Bangladesh

Bangladesh’s energy sector has witnessed strong growth in the recent years underpinned by economic growth, burgeoning population and large-scale urbanization. The country’s primary energy consumption has increased at a CAGR of 6.2% during 2010—2017 to 33 million tonnes of oil equivalent (Mtoe) – compared with the global growth of 1.6%.¹ Bangladesh heavily depends on fossil fuels and conventional energy resources (mainly gas, accounting for 58% of total installed electricity generation capacity) to meet its energy demand.² This is not only depleting the country’s gas reserves but also causing environmental degradation in the form of higher carbon emissions. Moreover, due to gas shortage, there is an increasing reliance on imported fuel oil which is attributing to rising fiscal burden. Therefore, it is crucial for the country to diversify into alternative fuels to ensure energy security without any further delay.

The Government of Bangladesh has outlined a target to provide electricity to all by 2021. Currently, 80% of the population has access to electricity, however, the supply of electricity is not adequately reliable (mainly in rural areas) due to infrastructural constraints.³ Increasing electricity demand and dwindling of gas reserves to almost half of their size in 2007 has led to greater reliance on costly imports of fuel oil for electricity generation. Consequently, the share of oil-fired electricity increased from 5% in 2009 to 22% in 2017, and simultaneously the fuel cost per kWh generated tripled from 1.1 to over 3.4 BDT/kWh (US$0.014 to US$0.04) during the period.⁴ With a strong pipeline of coal-powered plants, the country is also relying on coal to meet its future electricity demand. Heavy reliance on fossil fuels may result in higher carbon dioxide emissions in a country which is already vulnerable to climate change impacts. Bangladesh has pledged to the United Nations climate body to reduce its greenhouse gas emissions unconditionally by 5% by 2030 and by 15% if international support is provided.⁵ Therefore, there is a need to effectively tap the cost-effective and abundant supplies of renewable energy.

Amongst various sources of renewable energy, solar energy is one of the most viable options for Bangladesh as it has high daily average solar radiation levels ranging from 4-6.5 kWh/m².⁶ The Government of Bangladesh has made some progress in tapping solar energy by successfully disseminating solar home systems (SHS) throughout the country, providing electricity to people in remote off-grid areas. However, the contribution of SHS to the total amount of power generated in the country is extremely low. Moreover, the on-grid solar power generation capacity, currently at almost 47.5 MW, has been growing at a very slow pace due to certain challenges like land availability, high initial investment required, etc.⁷ This points toward the need to scale up solar power capacity in the country.
The Government of Bangladesh has outlined a target to install 1.7 GW of solar capacity by 2021 through the solar home systems (SHS) program and on-grid solar power plants. Bangladesh has been successful in developing off-grid rooftop solar power (solar home systems), however, it needs to ramp up the development of on-grid large scale solar power plants in order to achieve the target. Presently, the country’s solar power capacity is largely dominated by off-grid projects accounting for nearly 86% of the total installed solar capacity.

**What has been achieved?**

- Solar PV constitutes 1.8% (334 MW) of the total current installed power generation capacity in Bangladesh. A majority of installed solar PV capacity is off-grid solar home systems (~233 MW). On-grid capacity is ~ 42 MW and constitutes both rooftop (45%) and utility scale solar parks (55%).

- **Solar home**
  - Bangladesh among the largest users of solar home systems globally
  - 5.5 million solar home systems installed
  - Provides electricity to ~13% of the country’s population

  With SHS replacing kerosene, the government is saving US$225 million annually on kerosene imports.

- **Rooftop Solar PV**
  - Net metering policy and regulations notified by SREDA in 2018 to promote rooftop solar PV

- **Other applications of solar technology in Bangladesh**
  - 1337 solar irrigation pumps
  - 152 solar drinking water systems
  - 102191 solar street lights
  - 1933 solar telecom towers

**Future plans**

- The government targets to achieve “Vision 2021” with 1.7 GW of solar capacity

- Two solar power hubs being planned by Bangladesh Economic Zone Authority (BEZA)
  - 1,000 MW over 4,000 acres of land at Chandpur
  - 600 MW over 2,000 acres of land at Chittagong

**Recent developments**

- Proposal for setting up five solar power plants with a total capacity of 227 MW approved by the Government
- MoU signed between Joules Power Ltd (independent power producer) and BEZA to install a 100 MW solar plant in the Chandpur economic zone
- US$55 million financing approved by World Bank for second rural electrification and renewable energy development project involving installation of solar irrigation pumps, solar mini-grids and cooking stoves.

Source: Sustainable and Renewable Energy Development Authority

Bangladesh is among the largest users of solar home systems globally. Through 5.5 million SHS installed in remote locations, it provides electricity to nearly 13% of the population. Out of 5.5 million SHS, nearly 4.5 million SHS were distributed through a national programme undertaken by Infrastructure Development Company Limited (IDCOL), a government-owned non-banking financial institution. By 2021, IDCOL targets to finance 6 million SHS with an installed generation capacity of ~ 250 MW.

With the emergence of solar home systems, kerosene imports have reduced bringing down the country’s fiscal burden. The Government has also installed several solar irrigation pumps, solar drinking water systems, solar street lights and solar telecom towers benefitting the community people by ensuring food security and clean drinking water contributing to better socio-economic conditions in the country.

So far, large scale (on-grid) solar power generation capacity in the country has been growing at a relatively slow pace. Currently, an independent power producer, Joules Power Ltd, operates the largest solar power plant in the country (recently commissioned in October 2018) in Cox’s Bazar District with a capacity of 28 MW. The momentum now seems to be building as the Bangladesh Economic Zone Authority (BEZA) has drafted a plan to develop two solar power hubs with a cumulative capacity of 1600 MW in the districts of Chandpur and Chittagong. Moreover, the Government has already approved the proposals for establishing 19 on-grid solar power parks with a cumulative capacity of 1070 MW, although there is not enough clarity on the progress of these solar power parks.
Land availability, financing and conducive policy remains the major constraints for accelerated adoption

Solar PV accounts for only 0.1% of the total installed (on-grid) electricity generation capacity of Bangladesh. The slow growth of large-scale solar power generation capacity can be attributed to the following:

► **Financing challenges:** In Bangladesh, majority of financing for solar power projects is provided by government bodies (for eg, IDCOL) which have access to credit lines from multilateral and development banks. Private players lack interest in project financing due to less experience and high amount of risk involved. Hence, there is a need for diversified sources of funding. However, the project financing market in the country is still immature to provide long term financing to projects. Financiers do not possess enough experience and knowledge of utility scale renewable energy projects and have low risk appetite. Moreover, small institutional investor base and undeveloped capital markets are not equipped enough to support infrastructure financing.

► **Land availability:** A solar power plant requires 3 to 4 acres of land to generate each megawatt of electricity. Bangladesh is a densely populated agricultural country where non-agricultural unused land is not easily available. According to World Bank, agricultural land accounted for 70% of total land area in Bangladesh in 2015. The Government of Bangladesh does not allow the use of agricultural land for renewable energy projects. Therefore, it is a major challenge to find land for installing ground level solar projects.

► **Lack of government incentive:** Currently, solar industry in Bangladesh is at a nascent stage. Hence, government incentives are required to encourage investment in the industry. Lack of incentive in solar power tariff makes it economically infeasible to undertake investments in solar industry, particularly for the private players.

► **Project development:** There is limited information available for project developers due to lack of technical studies, insufficient data on resource availability and gaps in project due diligence, resulting in project development challenges. Additional factors hindering the growth of solar power capacity in the country include lack of skilled manpower, supply chain gaps, limited grid connectivity and lack of awareness.

![Installed electricity generation capacity by fuel type* (MW)](image)

Source: Bangladesh Power Development Board

*as on October 2018
Stronger policy initiatives needed to drive the growth of on-grid solar power projects in the country

The Government has implemented several policies and measures to facilitate both public and private sector investment in solar energy projects to scale up the contribution of renewable energy-based electricity production. The Government adopted the Renewable Energy Policy in 2008 which aims to source 10% of electricity from renewable sources by 2020.\(^{15}\) However, the contribution of renewable sources to electricity generation currently stands at merely 3%, much below the target outlined.\(^{16}\) This indicates that a stronger policy support from the Government is needed to boost this sector.

### Key incentives provided by the Government of Bangladesh to attract investment in solar energy projects

### Fiscal incentives
- 15-year corporate income tax exemption
- Spare parts up to 10% of the total plant cost are exempted from import duty and value added tax (VAT)
- Avoidance of double taxation on the basis of bilateral agreements
- Import of solar panels exempted from 15% VAT
- Tax waiver for foreign investors on their earnings from technical knowhow, technical assistance and royalty

### Other incentives
- Payment guarantee to project company through implementation agreement
- Assistance in getting clearances from various government agencies
- Net metering policy enables consumers to sell their additional solar electricity to the government
- Established two flagship green funds — Bangladesh Climate Change Trust Fund and the Bangladesh Climate Change Resilience Fund (BCCRF) — the main sources of green finance
- Allows foreign investors to transfer investment, income and profit to other countries

In 2014, the Government of Bangladesh established Sustainable and Renewable Energy Development Agency (SREDA) to provide policy support for the growth of renewable energy. The Government provides several fiscal incentives to solar project developers in the form of tax exemptions (corporate income tax, import duties and value added tax) under certain conditions. In an effort to promote rooftop solar energy across the country, recently the Government introduced net metering policy. It allows consumers to sell their additional solar electricity to the Government through net metering system. Despite such incentives, many solar power projects continue to face delays as project owners (mainly private players) have not made any progress even after the expiry of deadline. This lack of action by private players may be due to the absence of incentive tariffs - 10% higher tariff than the highest purchase price of electricity by the utility from private generators — which have been under debate for a long time. There is a need to provide more attractive fiscal incentives and incentive tariffs to attract more investment into the sector.
Learnings drawn from developing countries show remarkable growth in solar PV installations driven by strong policy support

Over the last couple of years, solar photovoltaic (PV) has been making significant contribution to global renewable power capacity additions. The growth in solar PV capacity is largely driven by Asia, particularly China and India, where the solar sector has been expanding rapidly driven by strong policy support creating investor interest in the market.

- **China**: China has made giant strides in solar PV installations which is evident from nearly 60% CAGR growth in its solar PV capacity during 2015-18. With a capacity of 175.2 GW at the end of 2018, China has become a global leader accounting for over one-third of the solar PV capacity in the world. Such noteworthy growth in Chinese solar market has been driven by government incentives including a nationwide feed-in-tariff system, tax incentives and funding assistance.

- **India**: The country’s solar PV capacity has increased by more than five times during 2015-18 to reach 26 GW by 2018 — 90% of utility-scale and 10% of rooftop projects. India ranks fifth in terms of installed solar capacity globally, accounting for 5% of the global capacity. Various incentives provided by the Indian Government including renewable purchase obligations for power distribution companies, subsidies, viability gap funding and tax incentives paved the way to bring investment into the sector.

- **Philippines**: The solar power market is rapidly emerging in the country, which witnessed an addition of 881 MW of solar PV capacity during 2014-16 to reach a total capacity of 903 MW (900 MW on-grid) in 2016. This rapid adoption of solar power was largely driven by the initial feed-in-tariff of

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**International experience in the development of solar energy industry**

![Solar PV capacity of India and China (GW)](chart)

<table>
<thead>
<tr>
<th>Year</th>
<th>India</th>
<th>China</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
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<td></td>
</tr>
<tr>
<td>2016</td>
<td>9.2</td>
<td>43.5</td>
</tr>
<tr>
<td>2017</td>
<td>18.3</td>
<td>78.1</td>
</tr>
<tr>
<td>2018</td>
<td>26.0</td>
<td>131.1</td>
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</tbody>
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**Key government initiatives to promote investment in solar PV installations**

**China**
- Nationwide feed-in-tariff system guaranteeing government’s purchase of power from solar developers at high prices
- Provinces required to generate a certain percentage of total energy from renewable sources
- Funding assistance for research and development activities and for projects in rural or remote areas
- Access to low-cost capital
- Tax incentives including corporate income tax exemption, partial refund of value added tax on the sale of self-produced PV power

**India**
- Power distribution companies and large industries are required to source a fixed percentage of their power requirements from renewables
- 10% of power production from coal and lignite capacity additions to come from renewables
- Subsidy of 30% of project costs and access to low-interest rate bearing loans
- Wheeling charges comparable with those offered to fossil fuel based power
- Viability gap funding assistance for ultra large solar power projects of 5,000 MW capacity
- Tax incentives including exemption from paying corporate income tax; and excise duty and basic custom duty exemption on import of solar PV-related components

Note: Few of the government policy initiatives stated above for China and India have now been discontinued due to certain local factors, however, they have still been captured here since they played a significant role in the growth of respective solar PV industry.

US$0.23 per kilowatt-hour in 2014. Additionally, the net metering policy and interconnection standards which came into effect in 2013 also contributed to a spike in industry activity. The net-metering program opened up the whole market of solar roof-top panels below 100 kW in areas that were connected to the grid.

These examples clearly indicate that a strong policy support system is essential for creating the necessary environment for industry growth. Therefore, policymakers in Bangladesh must restructure the incentives to ensure affordable technology and adequate return to solar developers.
References

1. BP Statistical Review of World Energy 2018
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About IDCOL
Infrastructure Development Company Limited (IDCOL) was established on 14 May 1997 by the Government of Bangladesh. Since its inception, IDCOL is playing a major role in developing and financing infrastructure, renewable energy and energy efficiency projects in Bangladesh. Today the company stands as the market leader in private sector energy and infrastructure financing in Bangladesh.

What IDCOL offers:
- Long Term Local and Foreign Currency Loan for Infrastructure Projects
- Agency services
- Debt and Equity Arrangements
- Corporate Advisory Services
- Training and Capacity Building Services
- Soft Loan and Grant for Renewable Energy Projects

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