A webinar titled “Dialogue on National Solar Energy Roadmap”, hosted by the Centre for Energy Studies, BUET (CES, BUET), has taken place on January 9, 2021.The chief guest of this program was Mr. M. Alauddin, additional secretary to the GoB, and the chairman of the Sustainable and Renewable Energy Development Authority (SREDA).

Bangladesh is one of the world’s most rapidly growing developing economies with extreme vulnerability to climate change. Both of these crucial aspects necessitate the inclusion of sustainable and renewable energy (RE) sources into the country’s long-term development plans. An unambiguous vision backed by well-developed strategies are essential for the development of any sector, and renewable energy, especially the solar photovoltaic sector, is no exception to this. With active support from its various stakeholders, the Government of Bangladesh (GoB) has already taken a few measures in this regard. However, the spectrum of potential benefits of clean and renewable energy technologies is yet to be fully appreciated and attained.

Among all types of RE sources, solar energy, especially solar PV technology has experienced a remarkable growth trend globally in the last few years. The global weighted average Levelized Cost of Electricity (LCOE) of large-scale solar PV plants has reduced greatly in recent years, while the market has grown and investment has increased. Overall, the prospect is most optimistic for solar PV technology in the world as well as in Bangladesh.

Hence, the present webinar held the aim of looking into the ideas and concepts, as well as outlooks of the current solar energy status of the country and why need a national solar energy roadmap to get capacity targets for the country’s solar energy sector.

**Keynote speaker:** Prof. Dr. Md. Ziaur Rahman Khan, EEE, BUET

Dr. Khan is a professor from the department of electrical and electronic engineering, BUET (EEE, BUET). He has also been the former director of the Centre for Energy Studies, BUET. He is a recognized authority on solar energy in Bangladesh.

Prof. Zia presented a brief overview of the “National Solar Energy Roadmap” and mentioned some of his observations. The goal of this document was to help in strategic planning in the long term, to increase the share of RE in the total energy mix, to ensure energy security and sustainability, to attract private investments in RE projects, to achieve global and national RE generation targets, and to reduce the rate of GHG emissions. This document is based on the “Renewable Energy Policy of Bangladesh-2008”, mandating that 10% of the total power demand of Bangladesh by 2020 should be sourced from various RE sources.

The price of solar energy is decreasing day by day, which is below 7 cents per kWh nowadays. India and China are installing a great number of solar PV in recent times. The increasing deployment of solar PV power has already induced inverter prices to decrease sharply. And it is expected to drive the solar inverter market in the future as well.In 2016, IRENA reported that inverter costs could go down by 33-39% within 2025, owing mainly to technological progress and economies of scale driven by the increased presence of Asian players in the international market.

While presenting the document, the current solar PV conditions of India have been demonstrated as an indicator and reference, as there are similarities between global conditions, solar resource,andmentality. Globally, the solar cell has been claimed to have 47% efficiency, whereas it is around 20% for the PVs installedin our country.

Three forecasts have been presented in this document. The first one is BP Energy Outlook-2019, which indicates that the RE share would be 29% around 2050 even if the present situation remains unaltered. If technology develops, it would increase by around 7% further. Another 7% increase can be achieved if sufficient govt. support can be provided. IRENA has predicted that around 85% of energy will come from RE, of which a major portion will be contributed by solar energy. DNV-GA predicted that around 35% of energy will come from solar PV within 2050.

While referencing India’s approach to solar PV based energy generation, the “Scheme for the Development of Solar Park and Ultra Mega Solar Power Projects”, sanctioned by the MNRE, has been mentioned by Prof. Zia. They aimed at setting up a minimum of 50 solar parks, each having 500MW capacity. The current solar energy roadmap has included this strategy followed by India.

The document also compares the energy situation between India and Bangladesh. India has higher solar resources availability,land availability, the economy of scale, public grant support, and obligatory power purchase by the state utility compared to Bangladesh. On the other hand, construction cost is higher in Bangladesh compared to India. Hence, solar penetration like India is a pavement in Bangladesh.

The solar home system in Bangladesh increased up to 2013 and then started to decrease. It is because of enough grid penetration, reducing the necessity of solar home systems. The GoB is maintaining a solar home system by providing subsidies. Mini-grid programs were active for electrification of the off-grid areas. Grid penetration is taking place replacing the mini-grids targeting the 100% electrification goal. As a result, the necessity of mini-grids will be negligible in the future.Installation of solar irrigation pumps has also increased up to 2013, and now facing almost a constant phase.

The “National Solar Energy Roadmap” has studied various policies, namely Electricity Act – 2018, Bangladesh Energy Regulatory Commission Act – 2003, Sustainable and Renewable Energy Development Authority Act – 2012, Bangladesh Energy and Power Research Council Act – 2015, Private Sector Power Generation Policy of Bangladesh – 1996, Bangladesh Renewable Energy Policy – 2008, Policy Guideline for Enhancement of Private Participation – 2008, Policy Guideline for Power Purchase from Captive Power Plant – 2007, Policy Guideline for Small Power Plant in Private Sector –2008,Bangladesh Climate Change Strategy and Action Plan – 2009, Guidelines for The Implementation of Solar Power Development Program –2013, Nationally Determined Contribution of Bangladesh –2015, Energy Efficiency and Conservation Master Plan up to 2030 – 2015, Power System Master Plan – 2016, Net Metering Guidelines –2018, Bangladesh Environment Conservation Act –1995, Bangladesh Delta Plan 2100 – 2018, Prospective plan of Bangladesh 2021-2041 –2020 and Draft Eight Five Year Plan FY 2021- FY 2025.

Currently, the gap between electricity demand and generation in Bangladesh is satisfied by captive power purchase. This document provided a study that solar energy can be a good replacement for this captive power under certain conditions. The document assumes some constraints, like the PV technology faces no drastic up-gradation, forecast according to the PSMP-2016 is valid, the distinction between utility-scale solar PV projects and the solar power hubs. The document proposes three different scenarios, namely BAU (Business as Usual) scenario, Medium Solar PV Deployment Scenario, and High Solar PV Deployment Scenario.

The document recommended some general themes, including the development of a favorable policy framework, building a robust power system infrastructure, strengthening the equipment supply chain, ensuring a safe financial landscape, enhancing the demand and capacity building, etc. Prof. Zia concluded that the National Solar Energy Roadmap is an advanced document, on which SREDA should put special importance. Goals should be set accordingly as well as policies should be adopted based on the recommendations mentioned in the roadmap under the supervision of SREDA.

**Panelist:** Engr. Mizanur Rahman, ex-member, BERC

Mr. Md. Mizanur Rahman is a former member of BERC and former Chief Engineer of BPDB. Mr. Rahman hasworked in the design, IT, and Planning departments of BPDB in various capacities. He has also served in 'Power Cell' for 5 years and worked on policy issues, sector reform, and enhancement of private participation in power generation. He was a member of the Joint Technical Team (JTT) for 'Regional Grid Inter-connection and Power Trade' between Bangladesh and India.

Mr. Rahman agreed with prof. Zia on the fact that the target set on the solar roadmap is ambitious. He mentioned that an analysis from the perspective of economic viabilityis missing in this document. Financial analysis and costly structures, comparison with the existing electricity generation policy, etc. should have been given more priority while preparing the draft, as Mr. Rahman said. These analyses are important while setting targets. He praised the emphasis put on the next decade for higher implementation of large-scale solar PV. This decade is significant in another sense that the peak demandin the evening right now will be shifted to the day, which can be satisfied by solar energy. Mr. Rahman discussed some pros and cons of the financial aspects and shortcomings in the assumptions of prices in the document.

With proper regulation, 20% of the peak load can be served by solar energy in the next decade. Unfortunately, intermediate loads can’t be served in this way as it will appear to be very costly. Under certain circumstances (battery and fuel replacement), solar power can replace up to 40% of the conventional energy mix, which would surely bring economic benefit. Base loads can be served by solar energy in no way. But the impact of the cost increase on the tariff due to the integration of solar PV should be properly analyzed to decide the feasible percentage of solar energy in the energy mix. This target should be set every year and should be updated yearly, as suggested by Mr. Rahman.

**Panelist:** Prof. Dr. Abdul Hasib Chowdhury, EEE and INPE, BUET

Dr. Abdul Hasib Chowdhury is a professor from the department of EEE, BUET. He has been teaching at BUET since October 1992. He has extensive teaching, research, and consultancy experience in power system planning and reliability, optimization,vulnerability analysis, grid code and acts, rules, regulations, and policies related to the power system, grid interconnection, renewable energy integration, power plants, imparting training for the power sector in Bangladesh. He is currently the Director of the Institute of Nuclear Power Engineering, BUET.

Dr. Chowdhury demonstrated that according to the solar roadmap, the solar PV targets to be achieved by 2041 focuses mainly on solar power hub, solar PV power capacity addition by utilities and solar IPPs, and rooftop solar PV systems. 18,600MW out of 20,000MW will come from these categories and they’re grid-connected solar. The problem to be solved that it has to be grid integrated. It also requires that weaknesses or limitations of the grid need to be accounted for. Besides, after the solar PV is integrated into the grid, it should satisfy the generation expansion benchmarks.The peak demand should be shifted as mentioned by the previous speaker, which is possible by massive industrialization. In the upcoming days, solar energy will have to compete with the captive power import.

Storage is another important point. To make it viable, steps taken from the demand shifting and peak reduction point of view are not enough. Some other measures should also be taken into account, namely variable supply resource integration, energy arbitrage, frequency regulation, voltage support, spinning reserve, black start support, and T&D congestion relief as well as infrastructure investment deferral.

Dr. Chowdhury marked some weaknesses of the Bangladeshi power system. The system-level weaknesses include the radial nature of the grid, generation mix, low grid voltages, and reliability. Operational weaknesses include limited frequency support, contract with the IPPs, and the absence of SOPs. Other issues are the absence of a comprehensive restoration plan, legal imperatives, and comprehensive studies. These weaknesses should be overcome before the grid-integration of solar PV. He concluded that the solar roadmap is a good point to start a new journey toward the popularization of RE.

**Panelist:** Engr. Zahir Ahmed Khan, Dir, Renewables, BPDB

Engr. Zahir Ahmed Khan is the current director of the RE section of BPDB, Dhaka.

Engr. Khan believes that RE has always been a supplementary, never a complementary. So, RE will always be there to support conventional energy generation. He indicated the three scenarios as ambitious. He insisted that our studies should rather focus on grid studies and capabilities. Currently, the Indian power system is operating with 36% RE, out of which less than 10% is solar energy. Above 10% capacity, storage will be a requirement. Prof. Hasib has also mentioned that in the case of our grid condition, the system will be fluctuating if solar energy share becomes more than 10% all of a sudden.

Engr. Khan stated that mini-grid and solar charging stations etc. are not feasible in today’s condition. He added that BPDB has already taken around 27 projects on RE with a capacity of more than 1500MW, having slow progress in reality which is disappointing. One of the basic impediments to this development is land availability. Our honorable PM has always insisted on food security rather than energy security. Financing is the second mentioned impediment to this development. He mentioned thattariff is an important factor that determines how much solar energy will come into action.He disagreed on some points, for example, reviewing the policy and lack of capacity payment to RE, etc. Policies adopted for conventional energy and RE should be different.

**Panelist:** Engr. Md. Shahriar Ahmed Chowdhury, UIU and author of the Roadmap

Mr. Shahriar Ahmed Chowdhury is an Assistant Professor at the department of electrical and electronic engineering, United International University (UIU). He is also the Chairman at the Center for Renewable Energy Services Ltd. (CRESL) and Director at Centre for Energy Research, UIU.

Firstly,he gave answersto different questions asked by the panelists. He explainedthat the solar power price in the Middle East has come under 2 cents per unit and in India, it is under 3 cents per unit. The battery price is 375 USD per kWh according to NREL (USDOE) and it is decreasing day by day. He emphasizes reviewing the Road map every 5 years. He took India as a reference because we have many similarities with India in this case. The challenge of implementing solar power in Bangladesh is the scarcity of land. He addressed that implementing solar power in Bangladesh is an ambitious task. For this, we need a proper policy and work plan. He added that in the road map existing and future technologies are considered. The roadmap is linked with the Government delta plan. According to this road map, 20% of total energy by 2041 will come from solar. In this road map, it is recommended that 10% variable energy can be absorbed by the grid.For variable energy greater than 10%, battery storage needs to be used. The other utilization of battery storage is to reduce the ramp rate, smooth output, and peak shifting. The cost structure is missing in this road map, he agreed. He mentioned that in our country renewable energy is not given much importance. Though if we consider a worldwide scenario that portion of renewable energy is increasing. In this road map, solar energy is given the most importance as in our country it has potential among other renewable energy sources.

**Panelist:** Engr. Al Mudabbir Bin Anam, GIZ

Mr. Anam has years of prior experience in the government energy sector with utility and national ministry from policy and project planning, bidding of large-scale infrastructure projects, power system expansion planning, regional energy cooperation, power plant feasibility study, and operation management. He also possesses solid knowledge and experience with power sector development including relevance to renewable energy, energy efficiency, and climate change.

He started his speech by thanking the Centre for Energy Studies, BUET for arranging this webinar. He also addressed that the Solar Energy target is ambitious. He also added that the comparison of the cost of different renewable energy technology is needed for future energy policymaking. By 2025, the cost of solar will be less than hydro and in the upcoming years, it will be less than combined cycle power plants. He mentioned that we need to compare our policy with the countries that have emerging renewable energy technology like China and Germany. We also have to consider other developing countries' renewable energy policies.He added that we also need a technology road map besidesa solarroad map. We can also import solar power from our neighboring countries like India and China as they have huge potential in solar power. Hesuggested that the current development of solar energy in our country should be on the road map. He also added that we need to integrate this road map with our power system master plan.

**Panelist:** Mr. Dipal Chandra Barua, President, BSREA

Mr. Dipal C. Barua, Founding Managing Director, Grameen Shakti, and the Co-Founder & Former Deputy Managing Director of Grameen Bank has devoted his life to finding sustainable market-based solutions to the social and economic problems faced by the rural people. He has been a pioneer in introducing solar and renewable solutions to the rural population.

He started his speech by thanking the speakers for their speeches. He also praised the government for the improvement in the power sector. He added that good fortune for solar is coming with the improvement of the whole power system. The efficiency of the solar panel has increased over years and it will increase more in the upcoming year. He mentioned that Bangladesh has potential in solar energy as here people have accepted the technology. He emphasized technology fitting. To make it viable is the responsibility of society. He suggested that we need a proper work plan to get to our targeted solar energy. He added that the solar energy road map needs to be reviewed to make it appropriate and suitable for our country. He identified that lack of coordination is one of the major problems in implementing solar power in our country. We have to give more focus on human resource development. There are also many job opportunities in solar. By using net metering, we can solve the problem of land in solar power development and we can also use the rooftops properly. He suggested that the government should take proper initiatives to create a renewable energy division (that will eventually will lead to a ministry) to make coordinate between different organizations. He finished his speechby thanking CES, BUET for arranging this webinar.

**Panelist:** Farjana Rahman, IDCOL

Farjana Rahman is the executive vice president and unit head (investment), Renewable energy at IDCOL. She has 13 years of professional experience in the financing of private-sector infrastructure and renewable energy (RE) projects. She has been involved in project financing, financial modeling, mitigating credit and other risks, negotiating term sheets and finance documents, and other related activities. She has been engaged in the financing of at least 20 infrastructure projects including power, telecom, information communication, and technology.

She addressed the road map as a comprehensive and leading in this area. But it needs to be revised as there is no financial review in this road map. Solar irrigation pumps will be a contributing factor in the implementation of solar power in Bangladesh. Currently, solar irrigation pumps are contributing around 12 MW. If the diesel pumps are converted into solar pumps, then we can get around 1200 MW from this. But for this, we will need external financing. She added that we can get around 500 MW from rooftop solar. She also added that focus on the business model should be given in the solar road map.

**Panelist:** Engr. Tanuja Bhattacharjee, WB

Ms. Tanuja is the former senior environmental advisor and deputy team leader (environment), PES at GIZ. Currently, she is serving as an energy specialist at the World Bank. She possesses a special skill in sustainable development, sustainability, and environmental awareness. She is also skilled in renewable energy, energy management systems, environmental impact assessment, environmental compliance, environmental policy, and energy efficiency, which is endorsed by experts in the respective fields. Apart from the busy engineering life, she is also an accomplished poet.

She started her speech by thanking SREDA for the solar energy road map. She suggested that this road map should be reflected in the master plans. She emphasized the proper business model and efficient planning. To reach our 10% target, we need to involve the private sector. To reduce the tariff price, we have to enable plug and play option. She added that we have enough enabling technology but we have implemented some innovative plans. She finished by thanking all.

**Panelist:** Mr. Shayan Shafi, USAID

Mr. Shayan Shafi is a passionate and skilled energy practitioner with 10+ years of experience in the energy sector of Bangladesh. Currently, he is serving as the Senior Energy Advisor to the USAID Mission in Bangladesh. He has also provided several energy consultancies services to IFC, GIZ, and the Government of Bangladesh.

He said that we also have to give our focus on other renewable energy technology. He gave comparisons between plan vs implementation and technology vs market readiness. We have to think about market readiness. We have to scale up current technology. We have to think about how private sector investors will fill interest in the market. He suggested that a rigorous risk analysis of the whole market sector is also needed. USAID can help in many ways in reaching the renewable energy goal. He emphasized the coordination of different sectors. He finished by thanking CES,BUET for arranging this webinar.

**Chief Guest:** Mr. M. Alauddin, Addl Secretary and Chairman, SREDA

Mohammad Alauddin, additional secretary to the GoB, is the chairman of the Sustainable and Renewable Energy Development Authority (SREDA). He has several publications on introducing ‘Solar PV technology in Bangladesh’, ‘Rooftop solar power: The go-to option for industrial consumers’, ‘Power of the sun - Using water bodies for solar power generation’, ‘Transforming electricity consumers into producers’, and ‘Development of Renewable Energy in Bangladesh’

He agreed with Mr. Mizanur Rahman on the topic of financial analysis and economic viability. He also agreed that the solar road map needs to be revised. The sector will undoubtedly flourish with proper financial analysis and economic viability. He added that we have a huge potential in solar irrigation, but the main problem is the proper business model. In comparing solar plants with conventional power plants, we need to consider the negative and positive externalities. Solar power plants are environment friendly and do no pollution. By valuing the positive and negative aspects of power plants, we can compare them properly. 10% renewable energy is planned for the grid as it will not affect the grid significantly. He emphasizes the energy storage system. As the energy storage price is decreasing, it is a hope for future renewable energy integration. By using these storages, we can supply the evening peak. He added that where there is more potential, there will be more focus. The use of solar energy should be multi-dimensional. Besides producing the electricity, we can use solar in cooking, boiling water, lighting, and room temperature control. The solar road map needs to be taken into account while making a power system masterplan. He addressed the solar road map very informative. He finished his speech by thanking all.

**Moderator:**

Prof. Dr. Farseem M. Mohammedy

*Director, Centre for Energy Studies, BUET*

**Rapporteurs:**

Engr. Abdullah al Monsur, Engr. Md. Shafin Intesar

*Research Assistants, Centre for Energy Studies, BUET*

Some snips from the webinar session:



