PROCEEDINGS OF WEBINAR CUM POLICY DIALOGUE ON STATE LEVEL CLIMATE ACTIONS - ASSAM

POWER | AGRICULTURE

ORGANISED ON – 14 DECEMBER, 2020

ENABLING STATE LEVEL CLIMATE MITIGATION

Submitted to

MacArthur Foundation
India Habitat Centre (IHC),
Zone VA, First Floor, Lodhi Road,
New Delhi 110 003 India

Submitted by

Integrated Research and Action for Development
C-80, Shivalik, Malviya Nagar,
New Delhi 110 017 India

PROJECT TITLE:

ENABLING STATE LEVEL CLIMATE MITIGATION

Supported by

Contents

"No matter how complex global problems may seem, it is we ourselves who have given rise to them. They cannot be beyond our power to resolve."

- Daisaku Ikeda

Background

Climate change has become a paramount policy concern as citizens show significant awareness about it. India declared its Nationally Determined Contributions (NDC) goals for 2030 in the Conference of the Parties (COP) 2015 meeting and ratified the same in October 2016. Policy measures at the state level are critical for India to attain its NDC targets. Most of the states in India have defined their state action plan for climate change between 2011 and 2015. Market-based solutions need to be brought in to achieve these targets in time.

Integrated Research and Action for Development (IRADe) is currently working on a study supported by the John D. and Catherine T. MacArthur Foundation, USA, to formulate and suggest market- based solutions and business models for state-level implementation to reduce carbon dioxide (CO_2) emissions and increase the share of renewables. Many energy-intensive sectors, viz., power, agriculture, and transport, require state-level measures. Effective state actions consistent with the national plan are needed, particularly in sectors that are likely to proliferate by 2030.

The "**Webinar cum Policy Dialogue on Environment and Climate Change**" on 14th December 2020 was an opportunity to bring relevant stakeholders on a common platform to discuss the results of IRADe's research in Assam and get their feedback and suggestions. It also facilitated broad discussion and engagement with stakeholders to solicit their suggestions and point of view. The moderated discussion brought forward new dimensions addressing improvement avenues to reinforce the research output, ultimately helping in strengthening the strategic policy framework to achieve India's NDCs.

STATE LEVEL CLIMATE ACTIONS FOR ODISHA's POWER & AGRICULTURE SECTOR

ORGANISED ON – 14th DECEMBER, 2020

Delegates

Mr. Niraj Verma, IAS
Principal Secretary,
Dept. of Energy,
Govt. of Assam

Ms. Moutushi Sengupta
Director, India Office,
MacArthur Foundation

Mr. Satyendra Nath Kalita
Member (Technical),
Assam Electricity Regulation Corporation (AERC)

Dr. Jyoti K Parikh
Executive Director, IRADe

Shri. Pankaj Batra,
Project Director IRADe- SARI/EI
Ex-Chairperson (I/c) & Member (Planning), CEA

Dr. Kirit Parikh
Chairman, IRADe

Inaugural Session

Prof. Jyoti Parikh, Executive Director, Integrated Research and Action for Development (IRADe)

Prof. Jyoti Parikh started the event by welcoming all the speakers to join this dialogue on energy and climate change in Assam. Prof. Jyoti Parikh highlighted the importance of climate change in the global and Indian context. She talked about completing five years of the Paris Agreement and the NDC goals associated with it. India's NDC Goals talk about reducing the emission intensity and increasing the share of non-fossil fuel-based generation capacity. She said that since India needs to increase its energy consumption to supplement her growth, the only way to achieve NDC Goals is by increasing the share of renewable energy.

Prof. Parikh introduced Assam as a leading state in the Himalayan region and talked of the active involvement of IRADe in the region. She highlighted that barriers, opportunities etc., that exist at the state-level are different. She said that the situation of Assam with respect to India is very similar to that of India with respect to the world, in the way that Assam has very low energy and emission intensity as compared to the Indian average and wants to grow rapidly in the coming years.

Prof. Parikh highlighted that some of the major focus points for Assam's sustainable growth were – reducing transmission losses, distribution losses, generation losses, increasing efficiency of the transport sector, promote electric vehicles, increasing the share of RE in the system, increasing reliability of power system, etc. In the agriculture sector, she added, the study focuses on reducing the losses of farmers, state and discoms by replacing/installation of solar agricultural pumps.

Prof. Parikh concluded by thanking all the Assam officials who could join the discussion to strengthen the implementation of NDCs. She hoped that the discussion would help in fostering a

better state-center partnership. She also thanked the MacArthur Foundation for their active support and their effort to fund a study that promotes the implementation of NDCs at the ground level.

Ms. Moutushi Sengupta, Director – India Office, MacArthur Foundation

Ms. Sengupta introduced the MacArthur Foundation and its commitment to build a more peaceful and vibrant world. She talked about the work of the foundation in India. She said that the foundation has focused on climate change and its solution since 2015. By supporting climate change solutions, the foundation endeavors to limit the warming of the earth to 2 degrees compared to pre-industrial levels at the end of the century. For India, they support the government and civil societies by helping her achieve the NDC Goals within the stipulated time. She talked about two of the foundation's primary goals, the first of which is supporting states in identifying policies that help them mitigate climate change. The second one is to promote market-based policies to combat climate change.

She mentioned that with this study, the foundation is pleased to support better policies and prioritize market-based solutions in the agriculture, power and transportation sector. She emphasized that state-level actions are significant to fulfill the national goals on the ground. She emphasized that it is essential that cross-sectional stakeholders to come together for planning and execution of climate level actions to fight climate change. She thanked IRADe and all the state officials who were present to participate in the discussion.

Mr. Niraj Verma - IAS, Principal Secretary, Department of Energy, Government of Assam

Mr. Verma initiated his address by thanking IRADe to undertake the study and organize the webinar and MacArthur Foundation for supporting the study. He also thanked his colleagues from the Agriculture Department and Assam Electricity Regulatory Commission for their presence.

He emphasized that it is imperative to take suitable actions for decreasing Green House Gas Emissions and achieving NDC Goals. Mr. Verma shared that Assam's major power procurement comes from central sector plants and the state's current state-owned generation capacity is around

10% of the requirement. Thus, solar energy for Assam is an opportunity to not only expand but also become more self-reliant. He said that Assam does not have a coal power plant in the state and does not plan to have one in the near future. He informed that the state currently has 200 MW of solar energy in various stages and is also building a hydropower plant in the Lower Kopili region. Thus, he concluded that any growth in the power sector of Assam would come through non-fossil sources. He said that despite Assam having a lower potential, the state has still managed to get 200 MW of solar capacity in various parts of Assam.

He also informed that Assam had signed an MoU with GIZ, as a result of which a modeling study was conducted using the LEAP (Long-range Energy Alternative Planning) model. The study resulted in four pathways based on the interventions required. The state decided to go with the Assam Energy Security Scenario (AES), which is the most ambitious scenario and will result in 47% Renewable Energy generation in Assam by 2030 and drastically reduce emissions. He also informed that the state has planned to roll out a new solar policy and biomass policy soon. He said that he was very thankful to IRADe and was optimistic that IRADe's contribution would further help the state achieve its goals. He also informed that the State Designated Agency (SDA) in Assam, which takes care of the demand side interventions, has formulated the Energy Conservation Building Code (ECBC) for Assam, and the same will be notified soon.

He informed that for the Agriculture sector, the Assam state government has adopted KUSUM and the Agriculture Department will implement it with the support of Assam Power Distribution Company Limited (APDCL). He also informed that the state would take steps to promote electric vehicles in the state.

Mr. Satyendra Nath Kalita, Member (Technical), Assam Electricity Regulation Corporation (AERC)

Mr. Kalita acknowledged all the dignitaries and thanked IRADe for being invited to the event. He informed that the AERC has notified RPO trajectory to promote RE in the state. He was of the opinion that focus is required not only on RE procurement but also in increasing the capacity of RE in the North-eastern region, especially small-hydro sources. He informed that the framework for promoting RE in the state already exists, but there are some limitations for Assam, and a need exists to bring the potential to the mainstream.

He also stressed the reduction of losses to mitigate climate change. He informed that total electric system loss for Assam (including distribution, state transmission and central transmission losses) in FY 2019-20 was 23.04%. He further stated that only a 1% reduction in losses would save 21.71 MU, which may result in an emission abatement of 16,473 tonnes of CO_2(e). AERC has been prescribing APDCL a loss trajectory following which the APDCL has brought down losses over the past few years. He informed that technical losses in Assam are also high; Some parts of the network at 11 KV run for 100-140 kms of length. Thus, there is a need to refurbish the network and improve HT- LT ratio. The commission has prescribed the utility and the state to invest more in the network so that it can be improved.

He opined that since domestic consumers predominate Assam, load shifting may not be a viable solution; a better solution would be to reduce the demand, wherever possible. Towards this step, Assam govt. And the distribution utility has distributed 4 LED bulbs to each family, and consequently, the power consumption has come down from the previous year.

He highlighted that Assam's emissions are very low as compared to other states, and the Govt. of India should come up with a policy on the lines of the Kyoto Protocol, wherein the non-polluters are incentivized. This would help the underdeveloped states to catch up with rest of India and further increase their electricity consumption. He also stressed increasing awareness about climate issues to the lowest levels, whether polluting or non-polluting.

Power Session

Theme: Adapting the Energy and Power Sector to Meet the NDC's Target

Session Chair: Dr. Kirit Parikh, Chairman, IRADe

Dr. Kirit Parikh moderated the session. He thanked all the panelists who came together to discuss with IRADe the policy framework, barriers and interventions required by the state of Assam to achieve the NDC Goals.

Theme Setting Presentation by Mr. Kumar Abhishek, Research Analyst, IRADe

Mr. Kumar Abhishek initiated the presentation by outlining the key areas of the power sector that the study will explore – Increasing RE in the state, Renewable Purchase Obligations (RPO) targets and compliance, Increasing the efficiency of the system, and Increasing the reliability of the system.

Mr. Abhishek highlighted in his presentation about the emission scenario in Assam; wherein the Energy sector was identified as the highest emitter. He noted that although Assam contributes only 1% of the total national emissions, it is the highest emitter among the north-eastern states with close to 70% of the total north-east emissions (not considering the carbon sinks). Assam's power sector targets for 2030 include increasing the state's generation capacity, Increasing the share of RE generation, reducing AT&C losses, and significantly increasing per-capita electricity consumption. He informed that the state faced a shortfall of 5% in its total energy requirement and 11% in the peak load requirement in 2019-20.

In terms of RE development, it was emphasized that the state has, to date, achieved only 6% of the RE target prescribed by the Government of India for 2022. State RPO targets, too, were lower than the national targets prescribed by the Ministry of Power. While APDCL missed the targets by a short margin, other obligated entities in Assam missed their targets by a considerable margin. The solar rooftop sector has not seen much traction in the commercial and industrial sectors. Major hurdles faced by RE in the state were found to be – the state regulations do not provide must run

status to the RE plants of capacity more than 10 MW, Small Hydro Plants (SHPs) face forest clearance issues, land availability issues to awarded solar plants, the weak financial health of commercial/industrial consumers is a deterrent for them to invest in solar rooftop plants, single-window clearance not workable at ground level, and payment delays to the RE developers.

In terms of thermal power plants, it was highlighted that some plant units of thermal power stations, including Bongaigaon and Namrup are very old, contributing to high specific emissions from these plants. In terms of the system's reliability, it was found that CAIFI (Consumer Average Interruption Frequency Index) defines the average no. of interruptions (lasting more than 10 mins) a person faces in a month was over 100 for 2017-18 and 2018-19. The circle-wise analysis showed high disparity among the circles. In terms of distribution losses, it was seen that, although there is a general decreasing trend, but the losses increased again in the past two years due to rapid electrification.

The major Policy interventions identified were - stronger enforcement of RPO targets, a stronger push for decentralized RE solutions, subsidies or soft loans for the solar rooftop sector, harnessing RE potential in the tea sector, and capacity building of the RE sector to develop a skilled workforce.

Panel Discussion - Power Session

Mr. Akhil Chandra Khatoniar, Engineer-in-Chief cum Principal Chief Electrical Inspector, Assam

Mr. Khatoniar thanked all the dignitaries present for inviting him to the event. He informed that EIC Assam is the state designated agency for energy conservation and demand-side interventions in the energy sector like PAT, UJALA etc., and looks after the electricity sector's safety.

Mr. Vinod Agrawal, Technical Director, SARI/EI, IRADe and Ex-Executive Director, POSOCO

Mr. Agrawal stated that there are three major interventions that Assam can take to strengthen its power sector. He highlighted that since Assam currently faces a shortage of energy, solar is an attractive route to fulfill its shortage. However, since Assam faces land availability issues for solar plants, Mr. Agrawal suggested that the state should procure RE capacity in other states through the Solar Energy Corporation of India (SECI), since there is a total waiver of transmission charges.

The second intervention suggested by him was strengthening the load dispatching center of the state, which will help in better forecasting, scheduling, metering accounting, and better operations. The third is capacity building of the state's load dispatch center as per the guidelines of the Forum of Regulators.

Mr. Mrinal Choudhury, Additional Director, Assam Energy Development Agency (AEDA)

Mr. Choudhary informed that AEDA was primarily responsible for the off-grid RE sector in Assam and has recently ventured into grid-connected solar rooftop in recent years. He highlighted that RE in Assam and the north-east has a different flavor than the rest of the country due to land availability issues. He highlighted that wasteland availability in Assam is very low and of what is available falls under the floodplains. About 30-40% of the total land available in Assam is in floodplains. He highlighted that off-grid RE could be a solution to increase RE in the state, especially in the far-flung hilly areas. The newly available battery technology can further help these decentralized applications.

Secondly, industries have shown great interest in the last one year to install rooftop solar plants to complement their requirements. Solar Policy for Assam is being reviewed and industrial demand for solar is being looked upon and addressed in the newer version of the policy. AEDA, as the state nodal agency, is working with the govt., and APDCL to promote solar rooftop plants in RESCO mode in institutional sectors.

On being asked about biomass energy prospects for Assam, he stressed that newer estimations are required, especially for the rice-growing areas. On being asked about any movement in the

compressed biogas plants in the state, he informed that currently, there is no such plant planned; however, the potential is high. He informed that Numaligarh Refinery Limited is putting up a plant to harness ethanol from Bamboo wastes.

He also stressed that since Assam is primarily an agricultural state, agrivoltaics (using land for both agriculture and solar PV installation) should be promoted. Additionally, he mentioned that floating solar PV plants should be promoted in Assam as there are various horse-shoe lakes in the state that can be utilized for the same.

Dr. Chandra Kiran B Krishnamurthy, Consultant - Power Sector, MacArthur Project; Assistant Professor, Department of Forest Economics, Swedish Univ. of Agricultural Sciences, UMEA, Sweden

Dr. Chandra Kiran stated that the shortages in the state of Assam were relatively high, so there is a need to look at the bigger picture of why the shortages exist rather than concentrating on individual technologies. He also suggested having a clearer plan for the industries to enhance their contribution to the state.

He was also of the opinion that in addition to RE's engineering/technological potential, the technologies' economic potential should also be carefully looked at and included in the state's target for the next 5-10 years. He also stated that how the state deals with short-term requirements will directly affect the medium-term requirements and goals.

Conclusion: To meet the NDCs targets, a rapid reduction in emissions from the consumption and energy production will be necessary. RE sources need to replace carbon-intensive sources to transition to low-carbon energy systems, alongside improved efficiency in energy consumption and production.

Dr**.** Parikh concluded the session by summarizing the significant points that emerged during the session. He highlighted that since Assam is a largely gas and hydro based power sector, which are both highly flexible, a large amount of solar capacity can be added in the state. However, this will require a highly sophisticated Load Dispatch Centre. This, however, can be done in a short period and result in a rapid reduction in the emission intensity of the state.

Secondly, older plants can be refurbished to achieve better efficiency in the sector. The central government should be more enabling to states like Assam to promote emission reduction activities in the state. Dr. Jyoti Parikh also highlighted that small biomass-based plants should also be pushed to solve both the waste and energy problem. However, better collection, sorting and transportation models are required for that. Thus, village level (or a cluster of villages) demonstration plants are required for promoting Biomass energy.

Agriculture Session
Theme: Promoting the Use of Solar Water Pump in the Agriculture Sector

Session Chair: Dr. Tushaar Shah, Senior Fellow, IWMI; Consultant - Agriculture Sector, MacArthur Project

Dr. Tushaar Shah Chaired the session. He started it with initial remarks that expensive diesel pumps dominate Assam irrigation. Electricity and solar have started making inroads but at a slow pace in the total irrigation energy mix. The cost of irrigation with diesel accounts for approximately 25-30 percent of the total cost of cultivation. The high irrigation cost constraints the agriculture sector development in Assam. To substantiate his arguments, he also quoted the example of Bangladesh; with the improvement of irrigation facilities, the country can not only meet its own demand but has become a net exporter of rice.

Dr. Shah also brought in a new aspect in the discussion by quoting about Ganges water machine. The region has one of the best aquifer systems in India. During the monsoon, season the aquifer does not have enough space to absorb water and causes flood in the region. Hence, groundwater irrigation developments not only support the development of the agriculture sector but would also minimize the incidence of flooding during the monsoon season. The region suffers from flooding in almost every monsoon season; therefore, irrigation development can be a good measure for flood-proofing.

Considering different aspects of irrigation technologies, solar pump is a very attractive irrigation

option for Assam. Farmers should be encouraged to use a solar pump more for irrigation. Considering the groundwater situation, he further suggested FiT for grid-integrated solar pumps should be designed to encourage farmers to use solar pumps either for their own irrigation use or sell irrigation water to the neighboring farmers. In his concluding remarks, he said that solar irrigation is attractive for Assam for three reasons 1) a means for flood-proofing, 2) provide surplus green electricity supply for other productive sectors apart from meeting the energy demand of the agriculture sector in energy deficient states, 3) improvement in the financial health of state DSICOMs by exonerating them from making provision of electricity supply to the low paying agriculture sector. Use of agro-voltaic technology (combining solar generation and agriculture on the same land) would reduce the dispute of competing land use for agriculture and solar energy generation in a densely populated and land-scarce state.

Theme setting Presentation by Mr. Chandrashekhar Singh, Senior Research Analyst, IRADe

Mr. Singh started his discussion by underlining the importance of agriculture to achieve India's NDC Goal 3 & Goal 4. He said the current study attempts to understand the potential of reducing overall emissions from the agriculture sector by promoting solar water pumps in Assam.

The study delves into details of the state-specific policy actions and market-based solutions to transform diesel-dominated irrigation systems into a solar-based irrigation system. To this aspect, the study has identified three broad objectives: 1) promote low carbon irrigation, 2) GHG emission saving on account of the transition fr om fossil fuel-based irrigation energy system to a solar irrigation system, and 3) explore alternative policies for Assam, which will be business-driven and either require minimum or no government support.

Presenting the current irrigation situation in Assam, he said unlike most of the western Indian states, Assam is blessed to have abundant groundwater. But due to deficient irrigation infrastructure and lack of affordable energy choices for irrigation, farmers cannot exploit groundwater for irrigation. The majority of farmers use diesel pumps. On average, a diesel pump in Assam consumes 612 liters/year of diesel, and an electric pump consumes 2448 kWh of

electricity. By a conservative estimate, a complete replacement would save 648K tCO_2 (e) for a diesel pump and 5K tCO_2 e for an electric pump.

Assam has solar irradiation of about 4 kWh/sq.m/day, but considering the groundwater situation, a solar pump is still an economically viable proposition. The analysis has assumed a 3kWp solar panel would be sufficient to meet the irrigation energy demand of most farmers. Solar pump cost specified by MNRE for the NE region is 185K, which includes the cost of the pump, installation, commissioning, and comprehensive maintenance for 5 to 7 yrs. Replacement of existing diesel and electric pumps with standalone solar pump and grid-connected solar pump respectively, will cost Rs 24 billion and Rs 450 million. Assured irrigation facilities would support the development of agriculture in the state. As per Assam government estimates, improvement in irrigation facilities has improved average cropping intensity to 146 percent. It was observed that farmers in areas having good irrigation facilities grow even three crops in a year.

Mr. Singh suggested two models for transition: 1) community-owned standalone solar pump for un-electrified areas, and 2) grid integrated solar pump with a feed-in-tariff (FiT) option for farmers in electrified areas. Water Users Association (WUAs) under the Participatory Irrigation Management, is already there in different parts of Assam. Considering the prevalent fragmented and small landholding size of most farmers, community-based irrigation systems would be a socially and economically efficient proposition. The community-based irrigation model in the study has considered a solar water pump for each WAU having pulled land of 10 hectares. The analysis took into consideration the prevailing crops kharif, winter and summer season crop grown by farmers. Apart from paddy which is grown throughout the year in many parts of Assam, irrigation is also used for potato and mustard. Considering these crops, the estimated annual irrigation water requirement for a 10-hectare field would be 198 Million liters. A 7.5 HP water pump would be able to meet the peak irrigation demand.

Irrigation cost comparison under different pumping technologies have considered fuel cost, maintenance cost and equated discounted capital cost for a 25-year period for solar pump. It found that diesel is the most expensive irrigation technology. Metered electricity tariff and electricity tariff charged at the average cost of supplies are the cheapest irrigation option for

farmers, followed by solar. Extending grid infrastructure to the far-off fields requires huge upfront capital and recurring maintenance and other electricity supply associated costs to be borne by financially stretched DISCOMs. Therefore, considering the overall economics of different irrigation systems, solar irrigation would be economically more prudent choice. It will also create an affordable water market for other farmers who would not own a solar pump as the irrigation cost will reduce substantially with the expansion of solar energy-based irrigation system.

Analysis of grid integrated solar irrigation pumps considered three major stakeholders - farmer, DISCOM and government and gains and losses to all the stakeholders are estimated. Farmers' net savings calculation considers current irrigation cost and expected future stream of income generated from selling surplus electricity to the DISCOMs. DISCOM's savings are avoided electricity supply cost to agriculture. The average cost of supply to agriculture is higher than the metered tariff per kWh charged to farmers. Society saving is the net positive saving of all the stakeholders. Costs are discounting at 6% to arrive at a net present value of capital and expected future cash flows. Analysis has considered two scenarios. Scenario -1 is a market-driven model with no subsidy, and in scenario -2, there is an upfront capital subsidy of 60 % to the farmers, similar to the proposed KUSUM scheme of the central government. The tariff offered to farmers for the surplus electricity evacuated by the DISCOM is equal to the bulk electricity purchase cost for DISCOM. The net gain to society is positive under both the scenarios. In scenarios -1 without government subsidy, farmers and DISCOMs both are making a positive gain. Whereas in scenario-2, gain to the farmer and DISCOMs are on huge cost for the government. In scenario -2, the huge fiscal strain on the government would limit the expansion of the program to a large number of beneficiaries. There are many other savings to DISCOMs like avoided generation capacity cost, avoided REC cost, avoided working capital requirement etc., which are not accounted for in the analysis.

Solar irrigation pumps are capital intensive and require substantially large upfront capital compared to other irrigation technologies beyond the means of many farmers. A schematic framework of a business model for the transition was suggested. The model considers the role of financial institutions to provide soft loans to the farmers against the solar irrigation pump as collateral or against expected cash receivable from DISCOMs as FiT. The state government can

also provide a guarantee for the loans taken by farmers to purchase solar pumps. In the case of grid integrated solar pump DISCOM can make direct payment to financial institutions on behalf of the farmer for loan servicing. In the case of standalone farmers, cooperatives have to serve the loan. Soft loan for the purchase of solar pump to farmers would help meet the upfront capital deficit and promote transition.

Based on the analysis, seven policy suggestions were given for Assam state government to facilitate the transition from fossil fuel-based irrigation system to solar irrigation system: 1) promotion of grid-connected solar pump in electrified and Standalone community solar pumping system in un-electrified areas. 2) No capital subsidy and FiT Rs.5.96 per kWh to farmers for surplus electricity evacuated by DISCOM. 3) Involvement of financial institutions for soft loan to farmers to bridge the deficit in upfront capital required for solar water pumps. 4) Provide farmers marketing support and encourage crop diversification and cropping intensity. Crop diversification will optimize the use of solar pumps as the demand for water for irrigation can be spread out to a sufficiently large period. 5) Improve existing schemes- Pump size under "Rural Infrastructure Development Fund" may be reassessed, based on the farmer's land and water demand. 6) Create awareness among farmers about solar water pumps and their benefits.7) Implementation related challenges are beyond the scope of this study. Hence, initially launch a pilot level scheme, based on learnings, improve the scheme to launch a state-wide program.

Mr. Ashok Thakuria, Director, Planning, Irrigation Department, Govt. of Assam

Mr. Thakuria presented the status o f the public sector irrigation system in Assam. He started with the submission that irrigation infrastructure created so far in the state is insufficient. Out of 27 lakh hectares of agriculture land merely 10.5 lakh hectares are covered under different irrigation schemes. There is a considerable gap between irrigation infrastructure creation and utilization as most of the created irrigation systems are defunct or not in a position to be utilized. Low maintenance and destruction of irrigation facilities in natural calamities are major stumbling blocks for irrigation infrastructure development and utilization. Government irrigation pumps are mainly run with electric power. Erratic power supplies are also responsible for the low use of public irrigation systems.

Mr. Thakuria talks about the targets and achievements of different ongoing central and state government irrigation programs. For example, under the "har khet ko pani" scheme, the government of Assam is installing 4779 solar and electric pumps in the state. All the new irrigation pumps provided to farmers are electricity (70%) or solar (30%) energy fueled.

Mr. Ashok Kr. Sarma, Executive Engineer, Agriculture Department, Government of Assam

Mr. Sarma started his intervention by saying the irrigation department and the agriculture department of Assam government are working in close coordination to improve irrigation infrastructure. Fortunately, the state's groundwater situation is quite favorable; however, we are not harnessing it properly for irrigation use so far. Over the past decade, more than 500,000 irrigation pumps were provided to the farmers under different government schemes. Irrigation schemes in the past were promoting diesel pumps. Diesel is the most expensive irrigation energy; hence the government has discontinued it completely. Under the RIDF scheme 10,000 Shallow Tube Wells (STW) with the solar pump was sanctioned. STW with solar operated pump was a massive success among farmers; many more are now coming forward and demanding solar STW.

Talking about the history of solar irrigation in Assam, he mentioned that it is a relatively recent phenomenon. The state government didn't have much experience with solar energy projects. Solar irrigation was first conceived in 2015-16 under a Word Bank supported program. So far, Assam has only standalone solar pumps.

The govt. is still working on the implementation of the central government KUSUM scheme in Assam. On the suggestion of grid integrated solar irrigation pump, he said so far, Assam does not have any policy on-grid integrated solar to feed surplus electricity from the solar panel to the grid.

Assam is an electricity deficit state, frequent power supply interruption and untimely supplies for

irrigation are constraining the development of electricity-based irrigation system. The use of solar energy has started gaining momentum recently by many departments such as Agriculture, Public Health Engineering Department (PHED), Electricity department, etc. To conclude, he said the use of solar energy in Assam will increase substantially in years to come. Diesel-based irrigation is quite costly; hence, solar will come in a big way in future irrigation projects.

Agenda

Enabling State Level Strategic Actions for India's NDC

|Assam - Power and Agriculture|

Date: 14th December, 2020

Webinar cum Policy Dialogue on Energy & Climate Change		
3:15 - 3:55 PM	**Session I – Inaugural Session**	
	Welcome Address	***Dr. Jyoti K. Parikh*** *Executive Director, Integrated Research and Action for Development (IRADe)*
	Special Remarks	***Ms. Moutushi Sengupta*** *Director, India Office, MacArthur Foundation*
	Special Address	***Shri S. N. Kalita*** Member (Technical), Assam Electricity Regulatory Commission (AERC)
	Inaugural Note	***Shri. Niraj Verma, IAS*** *Principal Secretary, Power Department,* *Principal Secretary, Urban Development Department, Personnel and A.R. Training Department Government of Assam*
3:55 - 5:00 PM	**Session II- Adapting Energy and Power Sector to meet NDC's Target**	
3:55 - 4:10 PM	**A context setting presentation based on Sectoral Discussion Paper for Assam prepared by IRADe researchers**	
	To meet the NDCs target, a rapid reduction in emissions in the power sector will be necessary. To transition to low-carbon energy systems, renewable energy sources need to replace carbon-intensive sources, alongside improved efficiency in the generation and consumption of electricity. Promotion of usage of RE generated power through Renewable Purchase Obligation (RPO) on Obligated Entities. Role of reliable grid-based power in eliminating polluting sources of energy. Given this background, this session aims to discuss and deliberate on: • Increasing the share of Renewable (RE) in the generation mix by examining the current and immediate future energy mix up to2030 • Comprehensive analysis of Energy Efficiency (EE) in power systems • Reducing T & D and Auxiliary losses, an incentive for modernization • Analysis of RPO targets met/unmet by DISCOMs in the past • Increasing reliability of the power system • Assam Power Sector Challenges and Way Ahead	
4:10 – 5:00	**Session Chair**	***Prof. Kirit Parikh*** *Chairman, Integrated Research and Action for Development (IRADe)*
	Remarks by Panelists	▪ ***Shri Akhil Chandra Khataniar,*** Chief Electrical Inspector -cum- Adviser, (i/c), Govt. of Assam ▪ ***Shri Mrinal K. Choudhury,*** Additional Director, Assam Energy Development Agency (AEDA) ▪ ***Shri V. K. Agrawal***, Technical Director, SARI/EI, IRADe Ex-Executive Director, Power System Operation Corporation ▪ ***Dr. Chandra Kiran B Krishnamurthy***, Consultant - Power Sector, MacArthur Project; Assistant Professor, Department of Forest Economics, Swedish Univ. of Agricultural Sciences, UMEA, Sweden
	Chair and Panelists remarks followed by open discussion	

5:00 – 5:55 PM	**Session III - Promoting the Use of Solar Water Pump in the Agriculture Sector**	
5:00 - 5:15 PM	**A context setting presentation based on Sectoral Discussion Paper for Assam prepared by IRADe researchers**	
	The majority of water pumps used today are either grid-connected or run on diesel. However, remote, off-grid areas, the rising prices of diesel, as well as the environmental implications of its usage, raise several questions over the efficacy of these traditionally powered pumps. As an investment, costs for solar-powered irrigation pumps (SPIP) are coming down, and subsidy schemes for SPIS are being rolled out, solar technologies are becoming a viable option for both large and small-scale farmers. SPIP will make farmers independent of grid supply and also enable them to sell surplus solar power generated to DISCOM and get an extra income. Given this background, this session aims to discuss and deliberate on: ▯ Cropping patterns and irrigation pumps by types to assess the potential of solar pumps ▯ Adoption of solar irrigation by farmers and the amount of surplus power that would be available to sell ▯ Price for electricity sale that would make solar pumping an attractive proposition to farmers ▯ A financial mechanism that will provide capital to farmers and subsidy to DISCOMs	
5:15 – 5:55	**Session Chair**	***Dr. Tushaar Shah,*** *Senior Fellow, International Institute of Water Management India*
	Remarks by Panelists	▪ ***Ms. Mina Deka,*** Senior Research Officer, Irrigation Department, Government of Assam ▪ ***Mr. Ashok Kr. Sarma,*** Executive Engineer, Agriculture Department, Government of Assam (tbc) ▪ ***Mr. Ashok Thakuria,*** Director, Planning, Irrigation Department, GoA
	Chair and Panelists remarks followed by an open discussion	
5:55 – 6:00 PM	**Closing Address** & *Vote of Thanks*	***Shri. Pankaj Batra, Project Director IRADe- SARI/EI*** *Ex-Chairperson (I/c) & Member (Planning), Central Electricity Authority*

About IRADe

IRADe is an independent advanced research institute which aims to conduct research and policy analysis to engage stakeholders such as government, non-governmental organizations, corporations, academic and financial institutions. Energy, climate change, urban development, poverty, gender equity, agriculture, and food security are some of the challenges faced in the 21st century. Therefore, IRADe research covers these, as well as policies that affect them.

IRADe's focus is effective action through multi-disciplinary and multi-stakeholder research to arrive at implementable solutions for sustainable development and policy research that accounts for the effective governance of techno-economic and socio-cultural issues. Being Asia Center for Sustainable Development, we have been carrying out policy research and its implementation for enabling socio-economic growth and charting pathways for sustainable development in South-Asia.

IRADe was established under the Society's Act, in 2002 at New Delhi. It is certified as a Research and Development Organization by the Department of Scientific and Industrial Research (DSIR), Ministry of Science and Technology (MoST). It has also been selected as a Center of Excellence by the Ministry of Urban Development (MoUD) for urban development and climate change. In addition, it provides expertise to other ministries, national and international institutions, and partners with other reputed organizations.

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Integrated Research and Action for Development (IRADe)
C-80 Shivalik, Malviya Nagar, New Delhi - 110017
Tel: 91 (11) 2667 6180, 26676181, 26682226
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