

Proceedings of Meeting of MI-India Workshop on Off Grid Access to Electricity Innovation Challenge” on 23rd May, 2017 at 09:30 AM at IITD

The event was inaugurated by Dr. Renu Swarup, Senior Adviser, DBT & Indian Chair(MI). Dr. Rajiv Sharma Head (TMD) welcomed the participants. Prof. Su Kumar Mishra, IITD presented the draft country status report. Prof. S.C. Srivastava, IIT Kanpur informed about the expected outcome of the workshop. The list of participants is attached (Annexure-I). The following points were made.

1. India is committed to MI goal of promoting clean energy research, development and demonstration to accelerate clean energy innovation and presents a significant opportunity to meet objective of economic growth as well as INDC goals for climate change.
2. DST has mounted several missions for clean energy, including Solar energy, clean coal, cleaner fuel, energy efficiency and electric mobility. Under MI, DST has committed to double its R&D spend by 2019. However, this budget has already been achieved in 2016-17 (Rs. 147 cr) and we will be ramping it up exponentially in coming years.
3. MI Innovation challenge are global calls for mobilising global research efforts for reduced GHG, improved access and economic growth. They cover entire spectrum of R&D from need assessment to technology demonstration. Out of 7 Innovation challenges identified, DST is co-ordinating 2 Innovation challenges, while DBT is leading one Innovation Challenge.
4. The highlights of the country status report were presented by Prof. Sukumar Mishra based on inputs provided by stakeholders.
5. Innovation challenges on “Off grid access to electricity” has larger objectives to support significant reduction in price and increase performance of renewable power systems by 2020 for individual homes in off grid region and, for remote communities, the objective is to demonstrate in diverse geographic and climate conditions, the robust, reliable, autonomous operation of renewable power systems less than at a significant lower cost than today.
6. The expected outcome highlighted identification of R&D gaps, possible areas for collaboration, modalities of collaboration and possible contours of funding opportunity.
7. This was followed by a detailed discussion in 4 thematic breakout groups as enumerated below. The composition of the groups is enclosed at Annexure-II.
8. Each group identified its own rapporteur and discussed R&D status in the country, need assessment for R&D and possible areas of collaboration with MI countries. The modalities of collaboration were also discussed. The rapporteur presented the outcomes of their individual groups.

9. In the subsequent discussion the entire group reassembled and thoroughly discussed the status report of the country, identified R&D activities and potential areas of collaboration. It was agreed across the board that there was need for a focussed funding opportunity involving MI countries. It was felt that off Grids access to electricity is one of the top research priority areas in the energy sector. There was a definite need to initiate joint research & development projects, exposure to advance research facilities, virtual centres for research to meet the growing requirements of research expertise in the country. The R&D areas identified for mounting research offered are placed at Annexure III.

10. The event concluded summarising of the outcome of the deliberation and defining and recommending the contours of joint research programme in the area of off Grid access to Electricity leveraging capabilities and competence of participating MI countries. The future steps would involve implementation of identified work programme engaging the stakeholders and measuring success based on cost and performance goals. The synergy of expertise available nationally, bilaterally and multilaterally, amongst all stake holders including government researchers and private sectors was strongly recommended.

11. The India status report on research, development and demonstration of Off grid access to electricity Innovation Challenge as well as scope and objectives of funding opportunity announcement to be announced by Hon'ble Minister on during MI Ministerial meet (6-8th June 2017) was agreed by the participants.

The participants resolved to commit themselves to the objectives of MI IC# 2 on Off grid access to Electricity.

MI-India Brainstorming on “Off Grid Access to Electricity- Innovation Challenge” on 23rd May, 2017 ,IITD

List of Participants

S. No	Name	Organisation/ Institute Name
1	Dr. Arun kumar Verma	Electrical Engineering Department, Malviya National Institute of Technology (MNIT), Jaipur
2	Dr. Bhagwan Das	Department of Electrical Engineering Dayalbagh Educational Institute, Dayalbagh, Uttar Pradesh,
3	Prof. Chetan Solanki	Department of Energy Science and Engineering, Indian Institute of Technology Bombay
4	Dr. Gon Choudhari	NB Institute for rural Technology, 220, Madurdaha, Plot no. C21, Kolkata
5	Prof. G.N. Tiwari	Ex- Indian Institute of Technology Delhi, Energy studies
6	Dr. Kumud Wadhwa	Power Grid corporation of India Limited, Delhi
7	Dr. Konika Das	Centre for Excellence for Green Energy and Sensor Systems, Bengal Engineering and Science University, West Bengal Howarah
8	Prof. N. P. Padhy	Indian Institute of Technology Roorkee
9	Prof. Sukumar Mishra	Indian Institute of Technology, Delhi
10	Dr. Prabodh Bajpai	Department of Electrical Engineering, Indian Institute of Technology, Kharagpur
11	Dr. Renu Swarup	Senior adviser, Department of Bio Technology
12	Dr. Rajesh	NISE, Gurgaon
13	Dr. R. P. Saini	Indian Institute of Technology, Roorkee
14	Dr. Rajendra Kumar Pandey	Director, NPTI/ Indian Institute of Technology BHU
15	Dr. Rajiv Sharma	Department of Science and Technology, Delhi
16	Dr. Rabinder Kant Sikri	Energy and Energy Consultants, Delhi
17	Prof. S.C. Srivastava	Indian Institute of Technology Kanpur
18	Dr. Sunil Dhingra	TERI Delhi
19	Ms Sasmita Patnaik	Council on Energy, Environment and Water (CEEW), New Delhi
20	Prof. Suryanarayana Doola	Dept. of Energy Science & Engineering, Indian Institute of Technology Bombay
21	Mr. T Sarkar	Indian Institute of Engineering Science and Technology, Shibpur
22	Dr. V.K. Jain	Amity University E- 3 Block, 4th Floor, Amity University Campus Sector – 125, Noida
23	Dr. Vishal Verma	Delhi Technical University, New Delhi
24	Prof. T. S Bhatti	Indian Institute of Technology Delhi
26	Mr.Vineet Saini	Department of Science and Technology, Delhi
27	Mr. Neeraj Gouhar	Department of Science and Technology, Delhi
28	Ms. Indira Srihari	Department of Science and Technology, Delhi
29	Dr. J.B.V Reddy	Department of Science and Technology, Delhi
30	Mr. Amit Golkair	L&T India
31	Dr. B.K Panigrahi	Indian Institute of Technology Delhi

32	Mr. Rajendra kumar Sethiya	Tata Power Delhi Distribution Limited
33	Mr. Porush Garg	Tata Power Delhi Distribution Limited
35	Dr. G. Bhuvaneshwari	Indian Institute of Technology Delhi
36	Dr. Ashu Verma	Indian Institute of Technology Delhi
37	Dr. Sanjay Bajpai	Department of Science and Technology, Delhi
38	Dr. Saikat Chakrabarti	Indian Institute of Technology Kanpur
39	Ms. Rubi Rana	Indian Institute of Technology Delhi
40	Dr. C. Vyjayanthi	Indian Institute of Technology Delhi
41	Dr. A. K Pradhan	Indian Institute of Technology Kharagpur
42.	Prof. Gurunath gurraa	Indian Institute of Science, Bangalore

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COMPOSITION OF BREAK OUT GROUP

Group I: Generation Hybridization and Power Management

Expert Name	Institute Name
Dr. Konika Das	Centre for Excellence for Green Energy and Sensor Systems, IEST, Shibpur
Dr. Prabodh Bajpai	IIT Kharagpur
Dr. Sunil Dhingra	TERI, New Delhi
Dr. T.S. Bhatti	Professor, Centre for Energy studies, IIT Delhi
Dr. R. P. Saini	IIT, Roorkee
Prof. Suryanarayana Doolla	Dept. of Energy Science & Engineering IIT Bombay
Prof. G.N. Tiwari	Retd. Professor, Centre for Energy studies, IIT Delhi
Mr. P.Garg	Tata Power (TPDDL)
Mr. Vineet Saini	DST

Group II : Power Delivery Systems

Expert Name	Institute Name
Prof. Arun kumar Verma	Electrical Engineering Deptt, MNIT, Jaipur
Prof. Gurunath Gurraa	IISc Bangalore
Prof. Saikat Chakraborty	IIT Kanpur
Prof. A K Pradhan	IIT Kharagpur
Ms. Kumud Wadhwa	NSGM , Power Grid corporation of India Limited, Gurgaon
Prof. N. P. Padhy	Elect. Eng. Dept., IIT Roorkee
Dr. Prabodh Bajpai	Elect. Eng. Dept., IIT Kharagpur
Dr. Vishal Verma	Elect. Eng. Dept., DTU Delhi
Er. Amit Golkair	Larsen & Turbo

Group III: Utilization (DC & AC systems)

Expert Name	Institute Name
Dr. V K Jain	Amity university ,Noida
Dr. Gon Chowdhary	NBRIT, Kolkatta
Dr. D. Bhagwan Das	Dayalbagh Educational institute, Agra
Dr. Arun Kumar Verma	MNIT, Jaipur
Dr. Rajesh Kumar	NISE, Gurgoan (MNRE)
Dr. Sanjay Bajpai	DST
Er.T.Sarkar	IIEEST, Shibpur
Prof. Chetan Solanki	Department of Energy Science and Engineering, Bombay

Group IV: Policy, Regulation, Market, Awareness and Business Models

Expert Name	Institute Name
Prof R.K Pandey	Director General -NPTI
Dr. Rabinder Kant Sikri	Energy and Energy Consultants, Delhi
Ms. Sasmita Patnaik	Council on Energy, Environment and Water (CEEW), New Delhi
Prof. Su Kumar	Elect Deptt, IIT Delhi
Dr. Ashu Verma	CES, IIT Delhi
Dr. C. Vyjayanthi	IIT Delhi
Mr. Rajendra Kumar Sethiya	TPDDL

Identified Research and Development Areas: Off Grid Access to Electricity

Power Management- Generation & Hybridization

- Addressing technology gaps in hybridization and integration of various local RE sources
- Building integrated RE systems
- Optimizing generation mix for off-grid applications
- Distributed management systems – Remote monitoring and control
- Instability issues (Both small signal and transient for diesel generators)
- Plug & Play Modular and Scalable Generation System
- Defining standards for remote areas
- Optimum sizing of energy storage
- Design, Operation and Maintenance
- Modeling, Analysis and Design Tool development
- Performance Analysis and Monitoring of off-grid systems and components

Power Delivery Systems

Convertors, Protection and Controls:

- Plug & Play, high efficient, modular and cost effective smart convertors
- Self Healing Control for community off grid
- DC micro grids
- Hybrid AC-DC Architectures
- Fast acting Protection Schemes and current limiters

Communication

- Grid formation (Control co-ordination among distributed generators with/without communication)
- Intelligent multirole measuring devices
- Low cost wireless and wired systems for supervisory control for community off-grid.

Grid readiness (limited grid access)

- Network Architectures
- Net Zero Energy Neighborhood
- Demand Side Management

Dynamic Energy Management and controls:

- Low cost (preferably open source) Energy Management System
- Storage Management
- Demand response, pricing and billing

- Grid connection and Isolation
- PCC voltage regulation
- Inertial response, voltage transient, transient damping, unbalance management
- *Standardization: Voltage (DC system)*
- Fault ride through capability
- Margin for operation for frequency and Voltage (AC system)
- Power Quality Issues

Utilisation (DC & AC systems)

- Lighting & device charging
- Appliance Standardization
- Irrigation System, Cultivation
- E- Rickshaw charging station
- Intelligent DC Micro-grids
- Integrated application
- Small Cold Storage and Drying
- Primary Health Care Centers
- Vaccine storage
- Addressing specific requirement (occupational specific loads)
- Efficient appliances and Smart loads
- Remote Monitoring
- Intelligent Street Lighting
- Telecom Power Supply
- Renewable powered pumped hydroelectric energy storage systems
- Land use optimization for solar PV systems

Policy, Regulation, Market, Awareness and Business Models

- Localization of manufacturing and maintenance
- sustainable business models
- Payment security
- Capacity building and multi-skill development
- Customer awareness and education
- Off-grid complementing not competing
- Integrated financing mechanism
- Policy encouragement for off-grid solutions