



Workshop Report and Summary of Next Steps: First India Energy Modeling Forum Workshop

Venue: NITI Aayog

Date: 13th-14th March, 2019



Organizing Teams

NITI Aayog

Mr. Rameshwar Prasad Gupta, Addl. Secretary (Energy)

Mr. Rajnath Ram, Joint Adviser

Mr. Manoj Upadhyay, Deputy Adviser

Mr. Bansidhar Bandi, Young Professional

Ms. Aakriti Kapoor, Young Professional

Ms. Poonam Kapur, Economic Officer

USAID

Mr. Mark White, Mission Director

Mr. Michael Satin, Director (Clean Energy)

Mr. Anurag Mishra, Sr. Clean Energy Specialist

Mr. Varghese Paul, Sr. Forestry Advisor

Pacific Northwest National Laboratory

Dr. Leon Clarke, Sr. Scientist

Ms. Meredydd Evans, Sr. Staff Scientist

Dr. Nazar Kholod, Scientist

Introduction

India and the U.S. have a long-standing energy partnership. In June 2017, the Prime Minister of India and the President of United States of America reinforced the strategic importance of bilateral energy cooperation through the announcement of a new India-U.S. Strategic Energy Partnership (SEP). The SEP is aimed to elevate cooperation to enhance energy security, expand energy and innovation linkages across energy sectors, bolster strategic alignment, and facilitate increased industry and stakeholder engagement. India and the U.S. have agreed to four pillars of cooperation under SEP, as follows:

- Power and Energy Efficiency
- Oil & Gas
- Renewable Energy (RE)
- Sustainable Growth (SG)

Under the existing engagement, the various cross-cutting issues pertaining to sustainable growth is being pursued which include to work towards improving inclusive and sustainable economic growth by enhancing long-term energy development plans and strategies, and related natural resource management plans. SG Pillar is being led by NITI Aayog from the Indian side and USAID from the U.S. side.

One of the focus areas of the SG Pillar is **'Energy and Environmental Modeling for Policy Making'**. This is to promote India-U.S. Cooperation on sharing models and tools for carrying out intermodal comparative exercises, and sharing approaches and best practices. Institutionalizing the India Energy Modeling Forum would also be an integral objective of this work.

Summary of the India Energy Modeling Forum

NITI Aayog and USAID jointly organized the first India Energy Modeling Forum (IEMF) Workshop on March 13-14, 2019 in New Delhi. The objectives of the workshop were to flesh out options for institutionalizing an energy modeling forum in India, while also sharing recent, policy-relevant analysis from a range of research teams. Approximately 100 policy makers and researchers from India, the U.S., Europe and other regions participated. The workshop included eight panels with various topical research spotlights and opportunities to explore the vision of IEMF.

The participants enthusiastically supported the idea of creating an Indian Energy Modeling Forum. Priority research topics include air quality, energy-water-land nexus issues, renewable deployment, and long term strategies. At the close of the meeting, NITI Aayog invited several experts from research organizations and industry to join a small, near-term working group to work out details of the IEMF's governance structure, research priorities and potential funding approach. The working group will report back to the larger body of participants with a concrete plan, in the form of a concept note, by July 2019.

Day 1 - Wednesday, March 13, 2019

Inaugural Session

Mr. R P Gupta, Additional Secretary (Energy), NITI Aayog, welcomed the participants. Dr. Rajiv Kumar, Vice Chairman, NITI Aayog and Mr. Mark White, USAID Mission Director, made keynote speeches emphasizing the importance of data and analysis to policy making.

Dr. Kumar emphasized the importance of creating absorptive capacity in India's ministries, in parallel with research efforts to improve understanding of key energy and environmental issues. He also said that energy modeling shouldn't just be focused on specific areas/sectors but should be holistic so as to understand the entire gamut of the Indian energy sector. Mr. White talked about the existing collaborations in various areas and how USAID can take this relationship further by way of scenario building/future energy modeling exercises. He also expressed USAID's continued support for the India Energy Modeling Forum.

Session 1 - Energy Modeling Today in India and the World

Energy modeling can play an important role in decision making. This panel, chaired by Mr. R P Gupta, focused on options for coordinating modeling and examples of how modeling is integrated into decision making. Dr. Volker Krey from IIASA and Dr. Leon Clarke from PNNL presented on the importance of the workshop and examples of how intermodel comparison works to inform policy. Governance structures are particularly important to careful design in modeling forums and collaborations: three common elements and advisory board for stakeholder, a scientific steering committee for coordination among researchers, and subgroups for specific research questions. Dr. Kirit Parikh from IRADe presented on the energy analysis underpinning India's Energy Policy. Mr. Tom van Ierland from the European Commission then shared information on how the European Union has used analysis and modeling to prepare its long-term strategy on greenhouse gas emission reductions. Mr. Arghya Sardar from TIFAC built on this theme by highlighting how India is using analysis in creating its electric vehicles and other clean energy issues. Ms. Meredydd Evans from PNNL concluded the session with a brief overview of potential options for creating the IEMF, outlining three existing modeling forums and how they operate.

During the discussion, participants shared thoughts on the vision for the IEMF and key questions to address, such as the governance structure. It is clear that stakeholders play a key role in this process. Participants also noted the significant progress in building trust among research teams through the comparative modeling studies under NITI Aayog-USAID cooperation. There were also several questions on methods and data for the analysis presented.

Session 2 - Spotlight on Energy, Water and Land Use

Mr. Anil Kumar Jain, Additional Secretary, MoEFCC chaired this first research spotlight session focused on the critical intersections of energy, water and land use in India. Mr. Jain highlighted the importance of this research area: India critically needs to bring together supply and demand of both energy and water together so that there can be informed decision making for devising policies. All of India's flagship policy priorities affect the energy-water-land nexus, and as such, successfully implementing these policies will also mean addressing energy-water-land issues in a coordinated way. Currently, these issues are handled separately in the government.

Based on the presentations and discussion, a few key points emerged:

- Multi-scale modeling is critical to understand energy-water nexus issues because of the scale of the decision-making and datasets. Water, for example, fundamentally needs to be understood at the basin level, while energy data are typically only available at the administrative level.
- Currently in India, water, energy and land are overseen by separate ministries, and this makes it difficult to coordinate nexus analysis, but the government stakeholders agreed that changing this was important given the scale of the challenges that India faces.
- Key research needs include agriculture-energy-water nexus and electricity-water nexus. Business models matter: for example, if solar pumps could sell excess power to grid, farmers would have an incentive to conserve.

Session 3 - Spotlight on Air Quality and Transportation

Transportation demand is growing rapidly in India and is closely linked to air quality challenges. This panel, chaired by Mr. Anil Srivastava, Principal Adviser, NITI Aayog, highlighted recent research in India and Europe in order to foster a robust discussion on future research directions.

Mr. Satyendra Kumar from MoEFCC highlighted the need for city-level modeling and scenario building to help non-attainment cities in the National Clean Air Program. TERI, IRADe, CEEW and CSTEP shared results from India's first inter-model comparison exercise in the transport sector (presented by Ms. Shikha Bali, TERI).

The discussion focused on:

- The need for a multi-stakeholder platform where different ministries can coordinate their efforts, research needs, and ultimately, their policies.
- The benefits of incorporating sectoral models and analysis into broader energy modeling efforts.
- The importance of data and clearly thinking through key scenario elements, like vehicle occupancy rates, efficiencies, and modal shift.

Session 4 - International Perspectives on Analysis for Sustainable Futures

This session was an interactive panel to spur ideas and discussion on how the IEMF might operate and what research questions to prioritize. Universally, the group endorsed the idea of an IEMF and a standing institution to exchange results and coordinate with decisionmakers. Discussion focused on how to involve decision makers, the scale of analysis (national and state), and the need to build the understanding of policy makers regarding the role of research and different research tools. Again, the importance of data came up. Research priorities that the discussants highlighted include: a 1.5-degree scenario for deep decarbonization, and what it means for India, transportation scenarios, energy/water/land issues, grid integration of renewables, and understanding the link between the sustainable development goals (SDGs) and climate priorities.

Day 2 - Thursday, March 14, 2019

Session 5 - Spotlight on Renewable Energy and the Power Sector

This third spotlight session focused on important research regarding renewable energy expansion, grid integration, and future research needs. Highlights of the discussion include:

- The need to consider renewable energy planning as an integral part of power sector planning and analysis;
- Japanese experience to build modeling capacity in this area, with several coordinated research teams in India participating in this modeling ecosystem. Prior to the IEMF, Japanese researchers and institutions had also expressed their support of the IEMF;
- Priority research areas include building the tools for India, including to understand load profiles in the long-term perspective needed for investment and policy decisions; integrating analysis on renewables with land use, water, electric vehicle trends, storage options and other issues.

Session 6 - Assessments of Energy Analysis Needs: Perspectives from the Indian Government

This session provided the Indian policy makers an opportunity to share their vision and views on creating an IEMF and research priorities. Representatives from the ministries highlighted the research needs in their sectors. These included expanding biofuels and gas pipelines, electric vehicles and energy efficiency, renewable integration in the power sector, low-carbon growth pathways. The discussants also expressed the need to do analysis at multiple scales and to have a coordinated government strategy on analysis for energy and environmental planning. We also heard of the benefits of having internal modeling capacity in the government to spearhead the integration of modeling results. NITI Aayog would be the right body for such a modeling team.

Session 7 - Spotlight on Cities, Industry and Other Clean Energy Topics

This panel discussed several additional possible research topics. The representative from the Ministry of Housing and Urban Affairs shared insights on the planning process and indicators for the Smart Cities. These indicators, like the extent of green buildings and renewable power, can help inform local analysis needs. Several other presentations and discussion comments also focused on the need for city-level analysis, and potential approaches for doing so, like using downscaled, but integrated frameworks. Cities are particularly important to understand in the context of India's air pollution, as well as overall development trends, given the way they drive energy consumption patterns. As always, data is important. Other topics discussed were research needs and trends with industrial emissions, including the need to understand the energy and environmental pathways associated with Make in India.

Session 8 - Roundtable on Developing the Indian Energy Modeling Forum

The roundtable chaired by Dr. V.K. Saraswat, Member, NITI Aayog and Dr. Leon Clarke of PNNL, featured robust discussion of options to develop the IEMF. On governance, we heard many views, all strongly in support of creating a clear structure to help the IEMF develop. The participants recognized the benefits of the recent inter-model comparison exercises, and also the need for more inter-ministerial and think thank coordination across research efforts. Specific ideas on governance included creating a steering committee and/or a secretariat that could host meetings and drive the modeling exercises. An advisory group with representations from ministries and possibly industry is also very important. Several participants noted that the steering committee should be led by Indian research groups, working closely with government. There was also a recognition that the forum should serve in a capacity building role to expand modeling capacity and understanding of modeling. Data came up in numerous comments: good modeling requires good data.

Coordination with industry and government was seen as critical to success. There was general agreement that NITI Aayog is in an excellent position to serve as a bridge or interface between researchers and government, as well as industry. The participants also discussed the need to co-develop modeling capacity to use it in government, both at the national and state levels. For industry, such a modeling forum is necessary to understand the impacts of policy to make better business decisions. State-level analysis is also important, both for policy makers and for industry. Several NGOs also mentioned the potential conflicts of interest of including industry as a stakeholder in the IEMF. There was no general conclusion on this, other than the need to work carefully to ensure that any industry involvement would not affect study results.

Regarding funding mechanisms, it was recognized that to have a successful forum, it is necessary to provide funding for several discrete elements. These include the modeling teams, the convening institution (if it is outside government), capacity building for government and others, and outreach. In all likelihood, the modeling teams will not get funding from a single source but can raise funds for specific research exercises that the IEMF decides to pursue. It is also possible that some research

exercises could be driven by a single funder, but the IEMF could provide a platform to coordinate results with government and a broader set of stakeholders, as well as to share methods with multiple teams. Governance structures will need to adapt to these issues. It is important to recognize that a research exercise that includes stakeholder engagement, research coordination, and capacity building will take more than a year to complete in most cases. Thus, there was broad consensus on the importance of multi-year funding (for example, three-year funding cycles) to provide stability to the teams and the research. In general, there was also enthusiasm for having a central entity that can help with coordination and fundraising. This entity may not fund research itself, but rather serve as a coordination mechanism, and each team or consortium of teams can independently fundraise to support specific research exercise.

Conclusion and Way Forward

Regarding next steps, the group discussed several themes and options. The participants expressed enthusiasm for doing this, and the next step is to develop a proposal regarding how the IEMF will work. NITI Aayog and USAID will have a key role in this. The forum needs government and industry, it needs to be lasting. On structure, the consensus was that one needs something formal and that NITI Aayog should be involved. Mr. R P Gupta then suggested that a small team of experts convene in an interim working group in order to work out the concrete proposal and bring it back to the larger group. The participants recommended that the working group to include Dr. Ritu Mathur (TERI), to chair the working group, Mr. Rajnath Ram (NITI Aayog), Dr. Probal Ghosh (IRADe), Dr. Vaibhav Chaturvedi (CEEW), Ms. Shweta Srinivasan (CSTEP), Mr. Ashok Sreenivas (Prayas), and Mr. Vishal Dev (FICCI). The working group will work on defining the purpose, roles, structure, and governance of the IEMF. The working group's proposal could then be shared with foreign institutions, funders, and other research teams before finalizing. This sharing and vision for the broader group will be key to making sure that the small working group establishes credibility for the IEMF and the path forward. The goal would be to have the second IEMF workshop in approximately six months to launch the first round of research.

In his summary remarks, Dr. V K Saraswat, Member, NITI Aayog said India's several interlinked energy related challenges can only be met by long-term planning and coordinated action by various stakeholders and he emphasized that India needs an IEMF to create synergy and coherence, linking analysis and decision making. The forum's role should be energy and environment, and environment means creating the links between all important systems. He laid special emphasis on ensuring social, environmental and economic costs of energy production and consumption are accurately calculated to future-proof decision making and policy planning.

List of Participants

1. Dr. Rajiv Kumar, Vice Chairman, NITI Aayog
2. Dr. V K Saraswat, Member, NITI Aayog
3. Mr. Anil Srivastava, Principal Adviser, NITI Aayog
4. Mr. R P Gupta, Addl. Secretary, NITI Aayog
5. Mr. Harendra Kumar, Jt. Adviser, NITI Aayog
6. Mr. MK Upadhyay, Dy. Adviser, NITI Aayog
7. Ms. Poonam Kapur, Eco. Officer, NITI Aayog
8. Mr. Bansidhar Bandi, Young Professional, NITI Aayog
9. Dr. Abhinav Trivedi, Young Professional, NITI Aayog
10. Ms. Shafqat Mobarak, Young Professional, NITI Aayog
11. Ms. Aakriti Kapoor, Young Professional, NITI Aayog
12. Mr. Anil Kumar Jain, Addl. Secretary, M/o Environment, Forests & Climate Change
13. Dr. J R Bhatt, Adviser, M/o Environment, Forests & Climate Change
14. Mr. Ajay Raghava, Dy. Director, M/o Environment, Forests & Climate Change
15. Mr. Satyendra Kumar, Dy. Secretary, M/o Environment, Forests & Climate Change
16. Dr. Simi Thambi, Programme Officer, M/o Environment, Forests & Climate Change
17. Ms. Sushmita Dasgupta, Sr. Adviser, M/o Petroleum & Natural Gas
18. Ms. Indrani Kaushal, Economic Adviser, M/o Petroleum & Natural Gas
19. Mr. Gaurav Katiyar, Dy. Director, M/o Petroleum & Natural Gas
20. Mr. Gaurav Rastogi, Sr. Manager, M/o Petroleum & Natural Gas
21. Mr. Rahul Kapoor, Director - Smart Cities, M/o Housing & Urban Affairs
22. Mr. S K Das, Director - Central Water Commission, , M/o Water Resources
23. Mr. SS Barpanda, Executive Director – NRLDC, POSOCO
24. Mr. Ravi Shankar Chinnam, Manager, POSOCO
25. Mr. Riza Naqvi, Dy. Manager, POSOCO
26. Ms. Ammi Ruhama Toppo, Director, Central Electricity Authority, M/o Power
27. Mr. Abhay Bakre, Director General, Bureau of Energy Efficiency, M/o Power
28. Mr. Arijit Sengupta, Director, Bureau of Energy Efficiency, M/o Power
29. Mr. Sumit Mudgal, Project Engineer, Bureau of Energy Efficiency, M/o Power
30. Mr. Siddharth Dhar, Project Engineer, Bureau of Energy Efficiency, M/o Power
31. Mr. Arghya Sardar, Scientist, Technology Information Forecasting & Assessment Council
32. Mr. Mark White, Mission Director, USAID India
33. Mr. Michael Satin, Director, Clean Energy Office, USAID India
34. Mr. Anurag Mishra, Sr. Clean Energy Specialist, USAID India
35. Dr. Varghese Paul, Sr. Forestry Advisor, USAID India
36. Ms. Apurva Chaturvedi, Clean Energy Specialist, USAID India
37. Ms. Monali Zeya Hazra, Regional Energy Manager, USAID India
38. Mr. Uma Ravi Kumar, Project Management Assistant, USAID India

39. Ms. Tavleen Kaur, Economic Specialist (Energy), US Dept. of Energy
40. Dr. Leon Clarke, Team Lead – JGCRI, Pacific Northwest National Laboratory
41. Ms. Meredydd Evans, Sr. Staff Scientist, Pacific Northwest National Laboratory
42. Mr. Tom van Ierland, Head of Unit Strategy & Economic Assessment, DG for Climate Action, European Commission
43. Dr. Bert Saveyn, Scientific Officer, European Commission
44. Ms. Birgit Aru, Policy Officer, European Commission
45. Mr. James Newcomb, Managing Director, Rocky Mountain Institute
46. Mr. Clay Stranger, Director, O/o Chief Scientist, Rocky Mountain Institute
47. Ms. Ashpreet Sethi, Manager, Rocky Mountain Institute
48. Dr. Winfried Damm, Head, GIZ India
49. Mr. Jonas Bartholomay, Adviser, GIZ India
50. Ms. Nidhi Sarin, Technical Expert, GIZ India
51. Mr. Sudhanshu Mishra, Technical Expert, GIZ India
52. Mr. Jai Kumar Gaurav, Technical Adviser, GIZ India
53. Mr. Nishant Bharadwaj, Energy Adviser, DFID India
54. Ms. Astha Gupta, Consultant, IEA India
55. Mr. Vishal Dev, Additional Director, FICCI
56. Ms. Soma Banerjee, Executive Director – Energy, CII
57. Mr. Siddharth Chatpalliwar, Program Manager – Climate, SHAKTI Foundation
58. Ms. Avni Mehta, Programme Associate, SHAKTI Foundation
59. Dr. Kirit Parikh, Chairman, IRADe
60. Dr. Jyoti Parikh, Executive Director, IRADe
61. Dr. Probal Ghosh, Head – Modeling, IRADe
62. Mr. Vinay Kumar Saini, Sr. Research Analyst, IRADe
63. Dr. Ritu Mathur, Director – Modeling, TERI
64. Mr. Swapnil Shekhar, Research Associate, TERI
65. Ms. Shikha Bali, Research Associate, TERI
66. Ms. Kamna Mahendra, Consultant, TERI
67. Mr. Thomas Spencer, Fellow, TERI
68. Ms. Aakansha Jain, Research Associate, TERI
69. Dr. Vaibhav Chaturvedi, Research Fellow, CEEW
70. Ms. Poonam Nagarkoti, Research Analyst, CEEW
71. Ms. Pallavi Das, Research Analyst, CEEW
72. Ms. Shweta Srinivasan, Research Scientist, CSTEP
73. Ms. Ilika Mohan, Sr. Research Analyst, CSTEP
74. Mr. Tirthankar Mandal, Manager - Energy Policy, WRI India
75. Ms. Apurba Mitra, Policy Lead, WRI India
76. Mr. Vaibhav Chowdhary, Associate Director – Strategy, Energy Policy Institute of UChicago
77. Mr. Ashok Sreenivas, Sr. Fellow, PRAYAS
78. Dr. Manmohan Kapshe, Professor, NIT Bhopal
79. Dr. Tirthankar Nag, Dean, IMI Kolkata
80. Mr. Parthaa Bosu, Lead India Adviser, Environmental Defense Fund
81. Dr. Oleg Lugovoy, Senior Economist, Environmental Defense Fund

82. Mr. Sahil Ali, Associate Research Fellow, Brookings India
83. Mr. Gurpreet Chugh, Managing Director, ICFI India
84. Mr. Ameya Ghodke, Analyst – Power, ICFI India
85. Mr. Agrim Rattan, Consultant – Power, ICFI India
86. Mr. Pulkit Kapoor, Jr. Consultant – Energy, ICFI India
87. Dr. Anindya Bhattacharya, Executive Director, Celestial Earth
88. Mr. Rahul Patidar, Analyst, Celestial Earth
89. Dr. Nomesha Bolia, Associate Professor, IIT Delhi
90. Dr. Amit Verma, Assistant Professor, IIT Delhi
91. Dr. Sanjib Pohit, Professor, NCAER
92. Dr. Sarita Viswanathan, Post-Doctoral Fellow, IIM Ahmedabad
93. Mr. Omkar Patange, Ph.D Candidate, , IIM Ahmedabad
94. Mr. Sobhan Abolghasemi, Energy Analyst, SHELL
95. Mr. Sandip Gandhi, Senior Advisor, SHELL



