No. P-11026/2/2016-Pet (P&E)
NITI Aayog
(Energy & International Cooperation Vertical)

Subject: Report of the Workshop on Energy Modeling & Launch of Energy Data Portal (dashboard) on 12th May, 2017 at NITI Aayog

Background:

The Energy Vertical of NITI Aayog has strived to harness the competencies of the best in class energy think tanks in India and overseas, towards devising a sustainable and secure energy pathway for the country. The Prayas Energy Group, Pune was engaged for development of a portal compiling data on various sectors of energy for developing a dashboard with the aim to provide a single window access to energy data in the country. Data plays a critical role in policy formulation, modeling and other analytical work. The above dashboard also incorporates some interesting visualizations of data to get an intuitive understanding of the sector. It enables easy downloading of data into convenient spread-sheet formats. The beta version is already available online on the website at (http://www.indiaenergy.gov.in/edm/) and is up for reviews.

In the above context, a workshop on Energy Modeling was held on 12th May, 2017, in NITI Aayog. The Workshop was divided into two parts. The first half focused on inter-model comparative exercise on the subjects "Energy-water-Food-Nexus" and "Decarbonisation of Transport Sector" where status of knowledge partners Centre for Study of Science Technology and Policy (CSTEP), Integrated Research and Action for Development (IRADe), The Energy and Resources Institute (TERI), Council on Energy, Environment and Water (CEEW) were shared. In the second half, Vice Chairman, NITI Aayog launched the dashboard followed by presentations from Ministry of Statistics and Programme Implementation (MoSPI), Central Electricity Authority (CEA), Coal Controller's Organisation (CCO) and Petroleum Analysis and Planning Cell (PPAC) on data aspects.

Different Sessions:

I. Opening Session:

At the outset, Shri Anil Kumar Jain, Additional Secretary, NITI Aayog welcomed the participants for the workshop and stated that the NITI Aayog has awarded various studies to knowledge partners CSTEP, IRADe, TERI and CEEW. The purpose of the instant Workshop was to review the progress made under these studies. He mentioned that erstwhile Planning Commission was known for good quality research work, which is being continued by NITI Aayog. Evidence based policy is needed for which all the knowledge partners should interact with each other to suggest guidance which may be

useful to the concerned Ministries/ Departments. He stated that the knowledge partners are yet to propose concrete outcome of research studies. Additional Secretary lauded the contribution of USAID. He mentioned that there was a need for consistent interaction between NITI Aayog, USAID and research agencies in the light of the new administration in the USA. He also stated that the earlier study approved by NITI Aayog and being carried out by TERI on demand and supply side of water for Energy sector may also be released.

II. SGWG Modeling Session

In the first session presentations were made on the subjects "Energy-Water-Food-Nexus" and "Decarbonisation of Transport Sector" for inter-model comparison by the knowledge partners CSTEP, IRADe, TERI, CEEW.

The Presentations:

Energy-Water-Food-Nexus

CEEW informed that the progress made in three scenarios viz. reference scenario with:

- water conservation policy failure,
- reference scenario with successful water conservation policy and
- low carbon scenario with successful water conservation policy.

The fourth scenario on India domestic renewable policy and NDC scenario has not been modelled yet. On the likely results of the research study, it was stated that water withdrawals are set to decline drastically if the water conservation policy of Government of India is successfully implemented. Moving to low carbon pathways would reduce water consumption substantially. Implication of water cooling technologies and their trade offs, specifically dry cooling is being analysed. Getting a higher level of understanding of the supply side is important, for which the on-going TERI study would be useful.

CEEW mentioned that inter-model comparison has advantages, but it has diverse assumptions. Further, the modelling is one of the several approaches, but solutions would not come from modelling alone. Understanding Energy mix would be important for deriving water consumption. As for solar, water requirement is less, but for nuclear it is very high. Dry cooling is important for drought prone areas, but at the same time it is expensive. Additional Secretary mentioned that suggestions from the research studies should factor-in future power plants to come in proximity to coal mines. It was suggested, that an Excel sheet with important assumptions in the studies about cost, coefficients etc. needs to be prepared for vetting by CEA. This will help the studies tune themselves with the Government's assumptions.

CSTEP mentioned that there has been high electricity generation capacity growth i.e. about 6-7% CAGR in last several decades within which, coal based generation is dominating. The studies project a growth about 6% CAGR by 2032. About 70% coal thermal power plants (TPPs) are in water stressed or water scarce areas. Inadequate water supply is causing plants to shut down. Of the total industrial water demand (9%), the demand of TPPs is about 88%. CSTEP has estimated that 84% TPPs rely on fresh water resources. CSTEP mentioned that the group has observed variations in estimates of various agencies (IEA, MoWR etc.) undertaken for the year 2010. CSTEP estimates that with existing low carbon plans and low water scenario, water consumption would increase 3-4 fold to 16 BCM, but withdrawals are expected to reduce to 3 times of 2010 levels. CSTEP is yet to complete mapping of power plants in water stressed regions, applicability of dry cooling technology, policy recommendations and submit final report to NITI Aayog. Additional Secretary mentioned that gross generation capacity of power sector being estimated in the studies is highly overstated. The studies must take into account the energy efficiency measures.

IRADe indicated various factors impacting water consumption. More than 70% water goes for agriculture use. A large amount of energy is being used in withdrawal of water for irrigation purpose. More than 50% of agriculture area is irrigated by ground water. Other supply factors are changing i.e. cropping pattern due to changing prices of agricultural goods and availability of imports etc. Water consumption in the power sector is due to cooling requirements and industrial production. IRADe indicated that in their model they are aggregating 130 sectors in I-O matrix sectors including five energy sectors and calculate water demand in the production process for each sector using coefficients from literature review. The final demand is modelled through projected consumption, investment and export. From the perspective of water, household consumption is projected in a dynamic way using non-linear demand system.

TERI presented results regarding water withdrawal and consumption up to 2050**.** It was mentioned that water scarcity analysis would include spatial breakdown of non-agricultural water demand increase between 2015 and 2100. GIS based overlaying of point source water demands and basin level supply has been completed. It is intended to integrate and come up with water scarcity at a grid level. TERI would suggest policy based actions, technological changes and possible solutions through a policy brief to enable dissemination of key findings to relevant Government departments. TERI had used coefficients for water cooling, which were developed based on their own calculation. While other groups used international coefficients of water cooling technologies.

Decarbonisation of Transport Sector:

Presentation on inter model comparison of different transportation sector policies in India was made by the modelling teams CEEW, CSTEP, IRADe and TERI. It was aimed to understand the transport sector contribution to India's Nationally Determined Contribution (NDC) target, model policy scenarios in consultation with the advisory board and initiate a dialogue between various ministries based on modelling results and develop a set of technology and policy options to reduce transport sector emission intensity and evolve a roadmap in light of the NDCs.

Common Modeling Protocol (CMP) established as part of this study includes:

- detailing commonalities amongst four models,
- commonality in scenarios to be modeled,
- scenario narrative/storyline, year wise targets under these scenarios for various decarbonisation strategies and
- commonality in assumptions with respect to socio economic drivers such as Gross Domestic Product (GDP), population.

The strategies proposed for decarbonising the road and railway transport sector were through:

- electrification,
- increased use of alternative fuels for transport,
- increased share of public transport for passenger movement,
- increased share of railways,
- increased fuel efficiency for vehicle categories and
- demand reduction for passenger and freight movement.

Additional Secretary mentioned that the numbers selected in each scenario should be based on global strategies or policy assumptions. LNG should also be included in the scenario on alternative fuels (for heavy goods vehicles). Smart city related policy targets should be included in the demand reduction scenarios. The name NDC scenario should be replaced suitably.

It was observed that not much work has been done by the research agencies. The baseline data by the agencies and assumptions are at variance with the policy decision Government made, for example electricity demand projected by the Research agencies was 4600 TWh (2030) however the accepted NDC number is 2499 TWh. Therefore, it was suggested that the research agencies should strictly consider harmonizing the assumptions matching with Government initiatives.

III. Launch of Energy Data Portal Session

Vice Chairman, NITI Aayog launched Energy Data Portal (dashboard) in the second half. In his remarks, he mentioned that Energy is a broad sector and Data is its backbone. Data is the starting point for any debate and equally

important for every sectors viz. health, education, human resource etc. Good quality data is needed for policy formulation and decision making.

The VC also released the combined research report of NITI Aayog- IEEJ (Institute of Energy Economics of Japan) and applauded the efforts taken to do policy-based research. He mentioned that if the externalities from the energy sector in the form of emissions and its effect on health could be taken into account for a cost benefit analysis that will be a big value addition and he thanked everyone associated with the exercise including Energy Vertical of NITI Aayog.

Prayas Energy Group briefly explained the development of Energy Data Portal (dashboard) by them and mentioned that the Portal compiles data on various sectors of energy with the aim to provide a single window access to energy data in the country.

The Presentations:

MoSPI presented the features of the Energy Statistics, 2017, which is 24th issue of their annual publication. Highlights of the Energy Statistics, 2017 will incorporate the improved energy flow diagram, energy indicators (economic dimension) with the involvement of working group to strengthen energy statistics. The working group headed by Additional Director General, ESD from MoSPI includes representatives from NITI Aayog, CEA, Ministry of Coal, Ministry of Petroleum & Natural Gas, Ministry of New & Renewable Energy Sources and Prayas Energy Group.

MoSPI mentioned that in Energy Statistics, 2017, wind potential is provided at different hub heights and renewables have been removed from thermal and reported separately. The coal and lignite are provided separately and coal production is given grade wise in quantity and energy terms. The LPG production numbers also include the LPG that is produced from natural gas. For natural gas, net availability is taken as gross production less flared. Thermal is split into coal, gas, diesel and others and RES has been removed. Mode wise captive generation added. Natural Gas and Electricity trade has been added for completeness. The electricity from RES will be separately reported.

CEA made a presentation on improving the collection of RE Generation Data. CEA informed that CEA is collecting RE Generation data from the year 2014-15. As the number of RE generators in States is huge, the Data is collected from State SLDCs, State agencies, Central utilities etc. and not directly from RE generators. The Generation data is collected State wise, Source wise and Month wise. At present, CEA is only collecting Data and not involved in analysis. Additional Secretary suggested that CEA and Prayas

should explore the possibility of collaboration to improve the data collection for different fuels.

CCO informed that in the present statistical system, daily coal production and despatch reports are generated for Ministry of Coal. The monthly reports are also provided for different stakeholders including Central and as State Governments. Presently, it has two annual publications, the Coal Directory (Latest 2015-16) and Provisional Coal Statistics (Latest 2015-16). The two publications provide detailed data on different coal and lignite. Data is provided company wise, grade wise and mine wise. Web portal of CCO is under construction with the help of NIC. It is intended to produce an integrated system in which statistics is the by product of administration of coal mining activity to make a holistic statistics in coal mining sector. CCO also aims to make the statistics of coal mining sector as comprehensive as possible by incorporating more number of parameters excluding the labour part.

PPAC informed that data is collected directly by the Government and private oil companies as they have been provided access to user ID and password. PPAC intends to develop tools and models for forecasting. The synergy between CSSO and PPAC was also mentioned. PPAC indicated that PPAC has made much progress and data are collected, disseminated online. They have implemented statistical check to various data before making it public.

IV. Concluding Session:

In concluding remarks Shri Rajnath Ram, Joint Adviser, NITI Aayog mentioned that Data is critical for any policy making exercise and initiating the informed debate. He referred to the remarks made by Vice Chairman during Energy Dashboard launch that good quality data is needed for policy formulation and decision-making. He also highlighted the challenges faced while collecting the data and also problems faced by agencies in matching the statistics as we lack common standards and definitions. Using different definitions lead to mismatch of statistics. He informed that NITI Aayog is keen to improve the Data system in India and for that matter, creating a dedicated data agency on the lines of EIA, USA and IEA is necessary. He thanked all the participants for joining the workshop and discussions.

The Workshop ended with vote of thanks

Sl. No	Name	Organization
1.	**Shri Arvind Panagariya, Vice-Chairman……. In Chair**	**NITI Aayog**
2.	Shri Anil Kumar Jain, Additional Secretary	**NITI Aayog**
3.	Sh. Rajnath Ram, Joint Adviser	NITI Aayog
4.	Pratima Gupta, Director	NITI Aayog
5.	Dinesh Dhawan	NITI Aayog
6.	Dr. B. Bishoi	NITI Aayog
7.	Avik Sarkar, OSD	NITI Aayog
8.	Anurag Mishra, YP	NITI Aayog
9.	Simi Thambi, YP	NITI Aayog
10.	Shafqat Mobarak, YP	NITI Aayog
11.	Ruchi Gupta,YP	NITI Aayog
12.	Ananya Bal, Consultant	NITI Aayog
13.	Satish Kumar, OSD	NITI Aayog
14.	Dr.R.K.Pradhan, SRO	NITI Aayog
15.	Ripunjaya Bansal, YP	NITI Aayog
16.	Vaibhav Chaturvedi, Research Fellow	CEEW
17.	Poonam Nagarkoti	CEEW
18.	Ashwini Dharmadhikari	Aviz Software Pvt.Ltd
19.	Rahul Dharmadhikari	-do-
20.	Rutiya Balerao,Sr.Research Associate	Prayas, Pune
21.	Srihari Dukkipati	Prayas
22.	Ashok Sreenivas	Prayas
23.	Daljit Singh	Indep. Research
24.	Dr.Probal Ghosh	IRADe
25.	Kirit Parikh	IRADe
26.	Ishita Gopal,Research Associates	TERI

27.	Kabir Sharma, Research Associate	TERI
28.	Shariff Gamar	TERI
29.	Inder Sawhney	Gujarat Samachar
30.	Sudharshan BVardhman	Reuters
31.	Nidhi. V	Reuters
32.	K.K Shankar	PTI
33.	Vijay Bhaskar	EENADU
34.	S.F. Osmany	PPAC
35.	Maninder K Narula, JD-I/c IT	PPAC
36.	JCA Anand	MOSPI
37.	Anil Chopra, Jt. Director	MOSPI
38.	Prakash Priyadarshini	ZEE Business
39.	Shailesh Yadav	ANI
40.	R.P. Dubey, Reporter	Sajha Maqsad
41.	R.B Chuhan	B Prabhat
42.	Anupam Lahiri, Director	Coal Controller Organization
43.	Abhishek Sood,Jt.Policy Associate	EPIC-INDIA
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45.	Shweta Srinivasan	-do-
46.	Varghese paul	USAID
47.	Mark Newton	-do-