

Conference on “R&D for Energy Sustainability”

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Dr. Saraswat, Member (NIT Aayog); Dr. Ajay Mathur DG(TERI), Sh. Gurdeep Singh, CMD NTPC, Sh. A K Jha, Director (Technical), Sh. R K Srivastava, ED(NETRA), distinguished invitees, participants to this Conference on “R&D for Energy Sustainability”, Ladies and Gentlemen.

I am happy to be a part of this conference that is dedicated to R&D on energy issues both present and future. NTPC is our flagship in the context of electricity production from coal the mainstay of our energy supply. Even so, it is nice to see NTPC spearheading broad based efforts to look at future of energy well beyond electricity production from coal. That this is happening as a networked activity with other stake holders in industry and academia is indeed a very welcome sign. I remember, our working together between DAE and NTPC on a 20 MWe solar thermal plant and a formal collaboration that was established between BARC and NTPC covering a number of areas in the 90's. In recent times NTPC has supported development of ultra critical technology along with BHEL and IGCAR and a solar thermal plant developed by IIT Bombay that would be capable of round the clock operation. I am therefore very happy to be here in this event being spearheaded by NTPC. Let me take this opportunity to thank and congratulate all members of NETRA, NTPC involved in organization of this conference.

Given the ongoing rapid growth of India's economy and the need to take quality of life of our people to a level commensurate with India's ambition to be among the leading countries in the world, it is clear that the need for additional energy in India is the largest as compared to any other country. This is because of the direct link between average energy consumption per capita and the Human Development Index (HDI), the present low level (~1000 units) of per capita electricity consumption in India and the fact that we are soon likely to be the largest population in the world. Our energy use is thus poised to be five or six times larger than current consumption in not too distant a future, say 30-40 years from now.

This large scale energy requirement poses two major challenges; the energy sustainability challenge in Indian context and the challenge of climate change in the global context. A simple back of envelope arithmetic would show that we would have no option but to eventually base our energy supply primarily on solar and nuclear energy. All other energy resources available on Indian land mass would start appearing grossly inadequate. Import of fossil energy, if allowed to grow unchecked, could create unmanageable strain on our economy on account of large import bill and possible greater volatility in energy prices. Maximising energy production from all available energy sources at highest possible efficiency on an urgent basis and making a rapid transition to solar and nuclear energy to feed all energy use forms, not just electricity, are the two key missions that we need to focus on. While the first one would help reduce emissions and prolong availability of our energy resources, the second one would cater to broader role of solar and nuclear as primary energy sources well beyond electricity production which is an important but smaller part of overall energy use.

Realising these objectives would necessitate demand driven R&D to be carried out in mission mode. We must recognize that there are several India specific challenges that need indigenous research efforts. Further, there are challenges which may not be so India specific, but others may not see them with same high priority as we need to; thus needing indigenous research. Issues related to high ash Indian coal particularly in the context of clean coal technologies, production of non-fossil hydrocarbons using solar and nuclear as primary energy sources are to my mind the two broad areas of R&D that need to be pursued on war footing. Each one of them encompasses a wide variety of technologies that we need to work on.

Generation sector is in the midst of a paradigm shift – one which has never been seen before in India. Govt of India has announced massive plan for renewable energy –100 GW from Solar and 60 GW from Wind by 2022. Moreover, all these renewable plants have been classified as ‘must run’ plant. The consequence is the base load fossil fired power plant shall be forced to operate in cyclic manner and with frequent shut downs. Also, most of the fossil fired plants are forced to operate at part load for sustained period. This has serious implications for life and robustness of performance of our energy generation assets requiring in depth research and development. This also calls for new developments at the

power system level. Apart from adequate storage capacity in the system, capability to ensure regulation and stability of the power system would be a serious challenge. Working together of centralized and decentralized generation with a sizeable capacity located at the user end is also a new paradigm we must prepare for. All these indicate that we are at the cusp of a new age where we will have to devise technologies and strategies to extract maximum from both renewable as well as conventional plant in a sustainable manner. Apart from development at system level, we need to focus on components and equipment. Battery technologies of course would need maximum attention.

Solar thermal for large capacity power plants as well as for high temperature source of energy, technologies for economically splitting water for hydrogen production, use of thorium for nuclear energy production, sequestration of CO₂ in biomass, are some of the new technologies that we need to master at an early date along with a large number of other developments with respect to energy systems.

For a large country like India with its more than a billion population and rapid economic growth rate, no single energy resource or technology constitutes a panacea to address all issues related to availability of fuel supplies, environmental impact, particularly, climate change, and health externalities. Therefore, it is necessary that all available and economically competitive energy resources like coal, low carbon fossil fuels, renewables including hydro and nuclear energy become an integral part of our energy mix – as diversified as possible – to ensure energy security to a country like India. Our R&D framework should be able to respond in a timely fashion to challenges that arise in the process.

I am glad to note that NETRA is currently working on important technologies like the use of Flue Gas for Desalination of Sea Water, Use of Flue Gas for Air conditioning, Automatic Weather Forecasting for Solar PV Generation, Floating Solar power plant, Use of Drone's in power sector, Geothermal energy, Indigenous Solar Thermal power plant, Development of Robotic Cleaning System of PV panels, use of Computational Fluid Dynamics in efficiency improvements, Light Weight Aggregate, Development of modified amine absorption process for CO₂ separation, PSA based CO₂ capture pilot plant, CO₂ utilization through Algae, bio-methanation of Algae and many others.

It is good to see that NETRA has collaborated with various premier academic institutes and research establishments of the country to work in chosen focus areas. A vibrant industry institute R&D partnership that promotes coordinated research focusing on basic aspects in academic institutions and technology at high readiness level for actual deployment at the industry R&D level is something that goes a long way in ensuring high quality and robustness in technologies developed. Greater collaboration with reputed International Institutions and Research establishments should also be targeted.

Looking at the programme of this two day conference it is clear that we have a very interesting and meaningful program chalked out for us. I am certain that all of you would find the opportunity to know each other's work, share ideas and network for future potential collaborations, of great value. I wish all of you a very successful conference; thank you.

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