

Key Recommendations

The following are the Recommendations elicited from the NEP Stakeholders Workshop (Renewable Energy and Nuclear Power) organised by CSTEP in Bengaluru on October 13-14, 2015.

Utility Scale Solar

- Use Geographical Information Systems (GIS) analysis to choose sites with appropriate radiation profiles, slopes and distances to nearest sub-stations and access to roads for resource assessment studies
- Not revise tariffs set at the time of signing the PPAs during lifetime of projects
- Use multi-criteria analysis to maximise developer's returns on investment, minimise government outlay for evacuation of infrastructure. Social and environmental impacts should be adopted by states
- Central Electricity Regulatory Commission (CERC) needs to enforce revised solar RPOs for the states with respective State Electricity Regulatory Commissions (SERCs)
- Formulate robust solar roadmaps for states in consultation with state nodal agencies, transmission companies, State Load Despatch Centres (SLDCs) and Power Grid Corporation India Limited (PGCIL)
- Lower the hedging rate for developers importing modules and green bonds for the development of solar power across all categories needs to be explored
- Create a niche demand for CSP for it to grow in terms of economies of scale as it is not economically competitive with PV.

RTPV

- Use innovative techniques such as Light Detection and Ranging (LiDAR) enabled GIS analyses and tools for identifying most suitable rooftops in cities and towns
- SERCs should conduct studies to determine the time of shift from net-metering to FiT regime once the RTPV sector gains momentum
- Investments by a third party in RTPV systems should be encouraged to increase the RTPV market across all income groups
- Mandate RTPV systems for government buildings, schools, institutions, shopping malls, large warehouses and factories, bus, metro and train stations, public sector buildings, etc.
- Encourage pure captive mode for RTPV systems to allow grid tied RTPV systems with suitable inverters to operate during times of power outages
- Introduce standards specific to Indian conditions for RTPV systems components to ensure reliable performance.

Off-grid and Decentralised Applications

- Encourage modular plug and play micro-grid systems to allow developers to connect to the central grid once extended
- Encourage PPA models in the above case with distribution utility
- Provide partial risk guarantees and interest subsidies to developers
- Explore a co-operative model where local residents can have a stake in the project and thereby avail soft loans
- Implement a prepaid metering system so that developers are assured of returns
- Introduce community-based skill building initiatives and vocational training courses for technicians.

Solar Process Heating/Cooling Applications

- Establish central or regional institutions (along the lines of Regional Test Centres of MNRE) to provide technical support for industrial solar process heat and HVAC systems
- Develop and strictly implement standards and performance certification for equipment along with quality monitoring
- Introduce performance-based subsidies for solar industrial process heat systems and HVAC systems
- Encourage Energy Service Company (ESCO) model to focus on energy savings
- Make available soft loans through bodies like IREDA and nationalised banks
- Mandate use of retrofitted/new solar HVAC systems in government organisations/institutions/sectors
- Mandate use of solar water heaters for residential and commercial water heating requirements throughout the country
- Solar cooling should have performance-based incentives based on applications and operating temperatures
- Include desalination and cold storage projects in villages and cooperatives in CSR and government initiatives
- Modify suitably Industrial Boiler Regulation (IBR) Act to ease the obtaining of certification
- Establish monitoring standards. Performance data should be monitored and maintained on the MNRE website publicly.

Utility Scale Wind

- Introduce a long-term clarity on timeline of validity of the AD and GBI incentives
- Enforce Renewable Purchase Obligation (RPO) targets across all states
- Enforce penalty mechanisms for delayed and defaulted payments by developers
- Resource rich states can explore alternate land allocation measures such as long-term leasing
- Mixed-use of agricultural land with wind farms, and design of revenue sharing mechanisms to augment income from agricultural activity of local stakeholders should be taken up
- For re-powering, PPAs can be modified such that current tariffs can be applicable to incremental generation from the upgraded turbines from the time of replacement. Mixed height cropping of turbines can also be considered by replacing only select turbines within the wind farm
- Explore 'aggregator models' for generators where individual turbine owners across an area can pool in the incremental capital costs for repowering
- Conduct detailed feasibility studies covering infrastructure assessment studies, supply chain, socio-environmental, grid infrastructure, logistics aspects in potential rich states in off-shore wind.

Grid Integration of Wind and Solar

- Enforce must-run status needs for wind generators. Alternately, a 'deemed generation' status can be given to compensate them for loss in revenue from forced curtailments
- Focus on developing indigenous capacity on forecasting is of primary importance
- Synergy between demand forecasting and renewable energy forecasting must exist at different levels, primarily between farm and grid level
- Practise inter-state banking mechanism between states to utilise complementarity in load profiles
- Commission green corridors at the same time as solar parks and wind farms
- Explore storage technologies and ancillary services for balancing purposes

- For sizing storage systems, zones with high wind and solar resource availability should be mapped with available T&D infrastructure in that area
- Develop suitable pricing mechanisms and commercial terms in the context of scheduling and dispatching renewable energy plants and potential storage systems
- Conduct studies on impact of time of day tariff and demand response should be pursued aggressively
- Use an Integrated Resource Planning (IRP) approach for upgrading evacuation infrastructure, state power transmission and distribution companies.

Biomass & Small Hydro

- Encourage grassroots level stakeholders participation and skill building for distributed generation from biomass, policies
- Explore potential assessment studies, enforceable long-term purchase contracts between suppliers and power producers, and commoditising biomass for power generation
- Explore more R&D efforts and pilots need in terms of conversion of MSW and other waste streams to energy
- Undertake R&D efforts at a central government level and academic institutions for 2nd and 3rd generation biofuels
- Focus of power generation from small hydro plants should be more on un-electrified villages rather than grid integration
- Undertake resource mapping to identify areas with potential for small hydro generation
- Design tariffs for small hydro plants to incentivise peaking and ancillary power
- Make available adequate inter-state transmission for transfer of hydro power between north-eastern states having excess hydro capacity and states which have abundant wind and solar resources.

Manufacturing and R&D for Utility-scale RE

- Focus should be on achieving higher device efficiencies and energy efficient processes in indigenous manufacturing of PV, CSP and energy storage equipment
- Make aggressive efforts in skill development and capacity building
- Make available low cost financing and cheaper electricity supply for manufacturing of RE equipment
- Explore cost-effective hybridisation of RE technologies, including retro-fitting hydro plants with pumped hydro
- Institute a national level R&D laboratory in RE sector with industry led research in closer collaboration between industry and academia

Nuclear Power

Why Nuclear?

Since standardised designs both for indigenous Pressurised Heavy Water Reactor (PHWR) and imported Light Water Reactors (LWR) are available, quick capacity addition is possible. Nuclear power represents a clean and safe source of energy. There is now a provision to import needed uranium to supplement indigenous production. The country is self-sufficient in heavy water production.

How much Nuclear till 2022?

- By next year, when ongoing construction is completed the capacity would reach 9,980 MW.
- Completion of plans initiated and in the pipeline would add 4,800 MW and raise the capacity to 14,780 MW, by 2022.

Nuclear Power till 2032

Further additions are envisaged in five phases.

1. Filling up the existing sites as announced with indigenous reactor and Russian reactor designs – to add 3,400 MW to reach 18,180 MW
2. Filling up all the identified new sites with indigenous reactors – to add 8,000 MW to reach 26,180 MW
3. First stage of imported LWRs, if liability & commercial issues are resolved – to add 10,700 MW to reach 36,880 MW
4. Second stage of LWRs, at the same sites as for 3 above, – to add 21,400 MW to reach 58,280 MW. This needs some special efforts
5. **Finding new sites at an early date would help in planning for the 63,000 MW target considered by the Government, by 2032.**

If, due to difficulties in concluding the negotiations, the LWRs to be imported from France and the US are not included, the fall-back option is to build indigenous PHWRs or Russian reactors at those sites. Indigenous LWRs are also a possibility.

Actions that would facilitate implementation

1. Timely Approval by the Government for construction of new Plants and Selection of sites, land acquisition, environmental and other statutory clearances
2. **The passing of the Bill in the Parliament for establishment of a Statutory Nuclear Safety Regulatory Authority (NSRA) at an early date.**
Rapid capacity addition of nuclear power as desired, calls for a determined effort to generate public confidence and support. Greater transparency and interaction with the public are essential. The passing of the NSRA Bill would help in generating greater trust in the Regulatory process.
3. **Extending the scope of Corporate Social Responsibility (CSR) activity to commence from the early beginnings of a nuclear power project.**
Concerns in the public mind arise mainly from the imbalance between the perceived risks and benefits from nuclear power. This step can prevent protests causing project delays from the beginning.
4. **Early ratification of the IAEA Convention on Supplementary Compensation.**
This is needed to bring Indian Liability provisions in line with International practice and facilitate entry of foreign vendors of LWRs.
5. **Sensitising the Indian manufacturing sector to develop capability for series manufacture of major nuclear components for the PHWRs.**
Indian industry is capable of taking up manufacture of components for PHWRs now and also for LWRs in course of time. But it has to be sensitised early to prepare to meet larger needs in good time. The sector will also need assurance of series orders.
6. **Creation of an enabling governance mechanism for PSUs to work together.**
Partnership between Nuclear Power Corporation of India Ltd (NPCIL) and other Public Sector Undertakings (PSU) as well as between NPCIL and private industries can help spread the burden of investment and staffing and facilitate quicker realisation of the targets.