

F. No. 66/185/2016 -WE
Ministry of New & Renewable Energy

India has set an ambitious target of reaching 175 GW of installed capacity from renewable energy sources including 100 GW from solar and 60 GW from wind by the year 2022. Various policy initiatives have been taken to achieve this target.

2. Studies revealed that solar and winds are almost complementary to each other and hybridization of two technologies would help in minimizing the variability apart from optimally utilizing the infrastructure including land and transmission system.

3. The existing wind farms have scope of adding solar PV capacity and similarly there may be wind potential in the vicinity of existing solar PV plant. Suitable policy interventions are required not only for new wind-solar hybrid plants but also for encouraging hybridization of existing wind and solar plant.

4. Accordingly, draft national Wind-Solar Hybrid Policy have been prepared and being placed on the website of the Ministry for comments/suggestions/views of the stakeholders.

5. The comments/suggestions/views on the draft Policy may please be sent through email (preferably in word format) by 30 June 2016 to:

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Draft National Wind-Solar Hybrid Policy

1. INTRODUCTION

1.1 India has set an ambitious target of reaching 175 GW of installed capacity from renewable energy sources including 100 GW from solar and 60 GW from wind by the year 2022. Various policy initiatives have been taken to achieve this target. The country has already crossed a mark 26.8 GW of wind and 7.6 GW of solar power installed capacity during May 2016.

1.2 Solar and wind power being infirm in nature impose certain challenges on grid security and stability. Studies revealed that solar and winds are almost complementary to each other and hybridization of two technologies would help in minimizing the variability apart from optimally utilizing the infrastructure including land and transmission system.

1.3 Superimposition of wind and solar resource maps shows that there are large areas where both wind and solar have high to moderate potential.

1.4 The existing wind farms have scope of adding solar PV capacity and similarly there may be wind potential in the vicinity of existing solar PV plant.

1.5 Suitable policy interventions are required not only for new wind-solar hybrid plants but also for encouraging hybridization of existing wind and solar plant

2. OBJECTIVE AND GOALS

2.1 The main objective of the Policy is to provide a framework for promotion of large grid connected wind-solar PV system for optimal and efficient utilization of

transmission infrastructure and land, reducing the variability in renewable power generation and thus achieving better grid stability.

2.2 Policy aims to encourage new technologies, methods and way-outs involving combined operation of wind and solar PV plants.

2.3 The Goal of the Policy is to reach wind-solar hybrid capacity of 10 GW by 2022.

3. PERIOD OF ENFORCEMENT

This policy will remain in force unless withdrawn or superseded by the Government. The Government will undertake a review of this Policy as and when required.

4. WIND-SOLAR HYBRID SYSTEMS

Under the category of wind-solar hybrid power plants, Wind and Solar PV systems will be configured to operate at the same point of grid connection. There can be different approaches towards integrating wind and solar depending upon the size of each of the source integrated and the technology type. On the technology front, in case of fixed speed wind turbines connected to grid using an induction generator, the integration can be on the HT side at the AC output bus. However, in case of variable speed wind turbines deploying inverters for connecting with the grid, the integration can even be on the LT side before the inverter i.e. at the intermediate D.C bus. The second important aspect would be related to the sizing – which would depend on the resource characteristics. In order to achieve the benefits of hybrid plant in terms of optimal and efficient utilization of transmission infrastructure and better grid stability by reducing the variability in renewable power generation, in the locations where the wind power density is quite good, the size of the solar PVs capacity to be added as the solar-hybrid component could be relatively smaller. On the other hand, in case of the sites where the wind power

density is relatively lower or moderate, the component of the solar PV capacity could be relatively on a higher side so that the.

5. IMPLEMENTATION STRATEGY

5.1 The implementation of wind solar hybrid system will depend on different configurations and use of technology detailed below:

(a) Wind-Solar Hybrid- AC integration

In this configuration the AC output of the both the wind and solar system is integrated either at LT side using three-winding step-up transformer or at HT side. In the later case both system uses separate step-up transformer and HT output of both the system is connected to common AC Bus-bar. Suitable control equipment are deployed for controlling the power output of hybrid system.

(b) Wind-Solar Hybrid- DC integration

DC integration is possible in case of variable speed drive wind turbines using invertors. In this configuration the DC output of the both the wind and solar PV plant is connected to a common DC bus and a common invertors suitable for combined output AC capacity is used to convert this DC power in to AC power.

5.2 Hybridisation of existing wind/solar PV plants:

Existing wind power or solar power projects, willing to install solar PV plant or wind turbine generators (WTGs) respectively to avail benefit of hybrid project, may be allowed to do so with following Conditions:

- (i) The hybrid power injected in to the grid will not be more than the transmission capacity/grid connectivity allowed/sanctioned for existing wind/solar project. This will ensure that no augmentation of transmission capacity is required.

- (ii) No additional connectivity/transmission capacity charges will be levied by the respective transmission entity for installing the solar PV/wind turbine generators considering that same transmission capacity is being used.
- (iii) Assessment of solar and wind power injected in to the grid through main meter from the hybrid project will be worked out on the basis of readings of AC meters installed on LT side of the WTG and solar PV plant in case of AC integration and in case of DC integration on the basis of readings of DC meters installed at the DC output of the wind and solar PV plant.
- (iv) The additional solar/wind power generated from the hybrid project may be used for captive purpose or may be sold: (a) to the respective distribution company at FIT determined by the respective state regulator or the latest lowest bid price discovered by SECI or any other government agency through transparent bidding process whichever is lower; or (b) to the respective distribution company at APPC under REC mechanism and avail RECs.

5.3 New Wind-Solar Hybrid Plants

In case of new wind-solar hybrid projects, the developer have option to use the hybrid power for captive use or third party sale or may sell the hybrid power to Distribution Company (ies) at a price determined by the respective SERC for that hybrid power project. The hybrid power so purchased by Distribution Company may be used to offset both solar and non-solar RPO. The hybrid power may be procured through a transparent bidding process under different mechanisms. Parameters that may be considered for bidding could be total capacity delivered at grid interface point, CUF and unit price of electricity.

6. REGULATORY INTERVENTIONS

The Central Commission should lay down the guidelines for determination of generic tariff for wind-solar hybrid system. Further, the Commission is required to frame regulations for forecasting and scheduling for the hybrid systems.

7. INCENTIVES

The Government will encourage development wind-solar hybrid systems through various incentives. All fiscal and financial incentives available to wind and solar power projects may also be made available to hybrid projects. Low cost financing for hybrid projects may be made available through IREDA and other financial institutions including multilateral banks.

8. RESEARCH AND DEVELOPMENT

Government will support the technology development projects in the field of hybrid systems. Besides, support will be provided for development of standards for hybrid systems.