

GAIL's comments on Discussion paper on Redesigning Ancillary Services Mechanism in India.

1. It has been discussed in para 3.6 that “Adequacy” in balancing resources needs to be defined in terms of ramping requirements (MW/min) along with MW. Further para 3.7 states that “Ancillary Services are needed to maintain power system frequency within the limits. It is critical that the market has confidence that the services enabled will actually deliver their response both accurately and in a timely manner.” Performance monitoring and verification of Ancillary Service providers needs to clearly specify: (a) Tests to ensure compliance with technical minimum, ramp rates, minimum up / down time, and (b) Procedures for regular monitoring in terms of compliance with the instruction given by the RLDC.

Comments: It is proposed that as Gas based generation is one option with high operationally flexible (high ramp rates & low start-up time), low impact on O&M maintenance cost due to frequent start/stop/ramp operations and high efficiency. Also, gas plants are much better & a preferred source of getting quick primary frequency response in case of grid disturbances. Gas based capacities may be given preference in regulation to perform to its potential and contribute as ancillary service mechanism.

2. It has been discussed in para 3.11 that as reported by the POSOCO, many plants have a reserve of less than 10 MW, which is available for despatch under RRAS. In order to avoid too many generating stations getting a very small quantum of despatch instruction, there is a need for a minimum threshold value for RRAS up or down.

Comments: Presently, almost 10 GW of Gas based power plants in India are running in a very low PLF (~20%) and balance almost 14 GW is stranded. So the minimum threshold value for RRAS up or down can be easily achieved if Gas based capacities are made available for despatch under RRAS.

3. It has been discussed in para 2.1 that All the Generators, that are Regional Entities, and whose tariff for the full capacity is determined or adopted by the CERC have been mandated to provide Ancillary Services as RRAS Providers. There are approximately 67 such power plants spread across India currently. NLDC, through the RLDCs, has been designated as the Nodal Agency for Ancillary Services Operations. The Nodal Agency prepares the Merit Order Stack based on the variable cost of generation. Separate stacks are prepared for Up and Down services.

Comments:

- *When burned, natural gas releases up to 50% less CO₂ than coal and 20-30% less than oil. When used in power generation or as a transport fuel natural gas results in negligible emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x),*

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mercury (Hg), and particulates compared with other fuels. Use of fossil fuels puts very heavy burden on health and environment in general. The current system does not allocate any costs related to environment in form of global warming, air pollution, public health and other adverse environmental impacts of fossil fuels. A recent study by IMF (Getting Energy Prices Right: From Principle to Practice) has estimated total cost of pollutants (NOx, SOx and PM) for more than 150 economies around the globe. As per the report, Indian system incurs additional cost for NOx, SOx and PM emission from coal fired power plant (in 2010 USD as base year) which leads to increase their average dispatch cost at least by INR 2.30/kWh. When compared with gas based power plants, health impact from gas based power plants are less than INR 0.25/kWh primarily because of very low PM, NOx, and SOx emissions. In a similar study done by ADB, "Valuation of Health Impacts of Air Pollution from Power Plants in Asia: A Practical Guide", it was concluded that in absence of abatement measures, the hefty cost of pollution on society is 12.58 cents/KWH (~Rs. 8.2/KWH).

- *Considering the life cycle impact on environment and health, Natural Gas is much more benign fossil fuel when compared to coal and liquid fuel. Being a clean fuel, it does not require huge amount of water for its purification and it does not contaminate the ground water.*
- *The suitable cost of externalities in respect of pollutants emitted per MW of electricity generated for respective fuel may be considered in the merit order dispatch for incentivizing the use of relatively cleaner fuels.*
- *As per India's renewable capacity addition plan, the 175GW capacity of renewables is planned to be achieved till 2022. This would translate to almost doubling the Renewable capacity share from 17% (2017) to ~33% (2022). Further, India has pledged to achieve 40% of energy from renewable by 2030. Due to inherent variable nature of the generation from renewables like solar & wind, the generations from these are likely to vary on hourly basis in a day depending upon the availability of renewable source. The typical maximum ramp rate while peaking is of the order of 200 MW/min which at times can be much higher. The generation from sources (other than renewable) is expected to support ramp down (~217 MW/min) between 7 am to 1 pm & ramp up (~220MW/min) between 2 pm to 9 pm. As per the net load projected by CEA, the lowest net load to support full integration of solar & wind in 2022 is @133 GW.*

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- *Typical ramp rates of various type of units in India. The OCGT can be ramped the fastest followed by CCGT, coal (>500MW), coal (<500MW) & nuclear. If we must choose the option to support ramping up requirement, as gas plants are having a better ramping rate, they should be utilized on priority followed up by coal plants if the demand does not get fulfilled by the gas plants.*
- *As we move from base load operation to weekly cycling and daily cyclic operation, we can look at which is economically best-suited source of generation and depend upon the location of the coal plant (pit head / away from mine) and cost of fuel available for gas plant (\$/MMBTU), and accordingly one can choose economically best-suited option for one regime of operation so that we are incurring the lowest minimum cost.*
- *We can see that as far as base load/ weekly cycling operation is considered, coal plants situated within 1000km of mines are economically best suited to support flexible operation. However, when the units are expected to cycle with daily start and stop, the gas units become increasingly attractive/ cheaper option.*