Prior to Electricity Act, 2003, the utilities were vertically integrated & the Generation, Transmission & Distribution were all under one roof and hence the resources required for overall reliable operation were an integral part of these utilities. Support services which are required for improving & enhancing the reliability & security of the electrical power system are known as Ancillary Services. However, since the liberalisation of the electricity industry, the system operator has to obtain these Ancillary Services from other industry participants. But now as the system operator has no control over individual power station, it has to purchase these services from other service providers. Hence the need of an Ancillary service market has arisen. This paper tries to address the same need.

Ancillary services are an indispensable part of the electricity industry. One of the objectives of Indian Electricity Grid Code (IEGC) is the facilitation for functioning of power markets and ancillary services and according to IEGC, operation of Ancillary Services is an exclusive function of Regional Load Dispatch Centres (RLDC). Also regulations of Central Electricity Regulatory Commission (CERC) provide for utilisation of the amount left in the Unscheduled Interchanges (UI) pool account fund towards ancillary services.

**Types of Ancillary Services**

Basically there are three types of Ancillary Services, viz. Frequency support ancillary services (FSAS), Voltage or Reactive power support ancillary services (VCAS) and Black start support services (BSAS). FSAS are required to support frequency in the grid, when the frequency in the grid falls below 0.05 Hz below the lower operating frequency range. VCAS are used to maintain the voltage level at various points in the grid using mobile reactors or capacitors. BSAS are used in blackouts to restart the grid.

![Diagram of Ancillary Services](image-url)
Frequency support Ancillary Services (FSAS):

Frequency support Ancillary services as the name suggests are required to support frequency in the grid, when the frequency in the grid fall below 0.05 Hz below the lower operating frequency range\(^1\) (49.7 Hz) as specified in the IEGC for two consecutive time-blocks (one time-block is of 15 minutes), the nodal agency (RLDCs) will give instructions to the FSAS provider to despatch in the third time block so that the frequency can be controlled.

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\(^1\) In India grid frequency operating range is 49.7 Hz to 50.5 Hz.
Voltage Control Ancillary Services (VCAS)

The Central Electricity Authority (CEA) and Central Transmission Utility (CTU) are entrusted with the responsibility of transmission system planning under the provisions of Electricity Act, 2003. The CTU fine tunes the plans prepared by the CEA over a shorter period in coordination with CEA. CEA and CTU use system studies to anticipate generators and load at various points in the grid. Reactive power requirements may change:

1) Due to variations between the anticipated and the actual for generation and load.
2) As more and more elements get added to the grid.

To maintain the voltage level, capacitor and/or reactor at various nodes need to be changed. Provision of reactive power could be allowed under reactive power support ancillary services which will result in a reduction of cost. The mobile reactors or capacitors would be a big advantage which will be used by the system operator by bidding through the power exchange when there is a critically low voltage in the grid at one or more interconnection points.

Execution of VCAS

Price bids are submitted in the power exchanges for providing VCAS on nodal basis.

Nodal agency preparing a combined node-wise stack from the stack of node-wise bids for VCAS furnished by the Power exchanges

Payment to be made on the actual node-wise reactive support subject to the maximum ceiling rate of reactive energy

The providers of VCAS to be paid

The mobile VCAS may be provided by the Government owned transmission companies
Black Start Ancillary Services (BSAS) & Execution

Central Electricity Authority Regulations mandate hydro generating stations for providing black start facility. Incentives may be provided to all flexible generators who provide black start facility when such services are sought by the system operator.

Nodal Agency & Market Surveillance

It is proposed that the system operator, namely National Load Despatch Centre (NLDC) should be the nodal agency for implementation of the ancillary services as NLDC monitors the grid real-time. The nodal agency would be responsible to issue No Objection Certificate subject to the condition that the capacity cleared for day ahead transaction in power exchanges shall not exceed the total capacity for which clearance has been obtained. Also a market surveillance Committee may be constituted comprising of the representatives from NLDC, RLDCs, RPCs, Power Exchanges and traders for successful implementation of the ancillary services market.
## ISSUES

| Need for Ancillary Service | • Ancillary Services primarily aim at improving the reliability of System Operation  
|                          | • Could be seen as a mechanism to replace UI mechanism in a long run |
| Payment Risk             | • The power exchanges would inherit the risk of default in payment by buyers. Formation of a clearing house mechanism where all trades by market participants would be routed may be evolved |
| Possible Breach of PPAs | • Necessary to ensure that generators do not give preference to FSAS at the cost of their PPAs to get better price for their power |
| Market Design            | • Energy Market would be cleared first and bid for balance unsold quantity of power can be made in Ancillary Service market |
| Commitment Charge        | • Requirement to pay a commitment charge to provide sufficient incentive to attract generators in the Ancillary Service Market viewing uncertainty in the despatch of generation |
| Forecasting              | • It is necessary that system operator provides load generation balance forecasting on daily basis for optimum decision making in procurement of ancillary services |

## OUR VIEWS

With increasing demand for power, capacity addition has seen a major boost especially in the renewable space. This has made the grid much more difficult to control & peak demands can make grid parameters go haywire. Though sufficient measures have been taken to improve the grid stability after the ‘Twin Grid shock’ last year, Ancillary services will further help in improving the reliability of the grid and also further help phase-out the UI mechanism. Moreover, states like Uttar Pradesh, Punjab, and Haryana which pay hefty sums towards UI charges can in turn bring out incentive based schemes to boost the Ancillary market which is a long term solution. Also, competition should be introduced in
this segment so as to attract more players & it will also act as an additional revenue stream for the service providers. Thus, Indian Ancillary market is at a nascent stage but has a tremendous potential & should be encourage by the concerned authorities.

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Abhishek Amarnani and Kalyan Verma are pursuing MBA in Power Management from National Power Training Institute (NPTI), Faridabad. Abhishek has done his B.E in ‘Power’ from NPTI Nagpur, while Kalyan has a B.E degree in Electronics & Instrumentation from Sathyabama University, Chennai. Abhishek wants to make a mark in Renewable sector; on the other hand, Kalyan has a special interest in the Distribution sector & Smart Grids. Earlier both had co-authored a report on Coal in India named ‘PowerPlus Coalnomics’.