Research &Development Policy of Grid-India: 2024

SUBMISSION OF RESEARCH OBJECTIVE

1. Research Objective (Topic):

   Utilization of Battery Energy Storage System for providing market based Ancillary Services and Energy Arbitrage

2. Lead of project-GM and above: (Name, Designation, & Department)

   Sh. Aditya Prasad Das, General Manager, Market Operation

3. Co-Ordinator of Project (Name, Designation, & Department):

   Sh. Subhendu Mukherjee, Deputy General Manager, Market Operation

4. **Key Problem Areas**: [Briefly Outline the current Challenges to address with Research]:

   i. Control strategy for BESS operation to provide necessary frequency response ancillary services that maximizes the social welfare

   ii. Payment structure for ancillary service provision by BESS for market based tertiary frequency responses while in

   - Stand-alone basis
   - Hybrid mode with solar and wind

5. **Briefly outline the detail of methodology used for research:** [Provide a concise overview of your research write-up and methodology. Include key aspects like the research approach, data collection methods, and analytical techniques.]

   i. Infrastructure setup: Server, Computer for running the simulation

   ii. Development of economically viable computational models and simulation environment:

   This involves developing

   - Battery degradation cost model considering cooling period, number of life cycles and SoC

- Economically viable market model for energy arbitrage from the perspective of various entities – third-party storage owners and system operators – with various fixed and variable cost components in both stand-alone and hybrid modes.
- A new payment structure for ancillary services by appropriate product definition and fair compensation mechanism for flexibility that covers various costs involved.
- A simulation environment that models proposed methods.

iii. Proof-of-concept using small-scale test cases: The proposed methods will be evaluated for proof-of-concept using small scale test cases using realistic BESS parameters.

iv. Systemic performance evaluation using large-scale test cases: The proposed methods will also be evaluated using large-scale test cases using the developed simulation environment.

6. Citation/References (Relevant Literature/Technical Papers):

CERC order: https://cercind.gov.in/2024/orders/249-MP-2023.pdf

IEGC 2023 order : https://cercind.gov.in/Regulations/180-Regulations.pdf

BESS VGF scheme : https://cdnbbsr.s3waas.gov.in/s3716e1b8c6cd17b771da77391355749f3/uploads/2024/05/2024050316403335573.pdf

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