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India SMART UTILITY Week 2025

Session : Power System Flexibility and DERMS

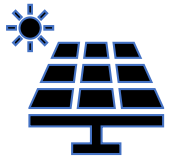
Presented By

Rahul Chakrabarti,
Director-Professional Services,
AspenTech India

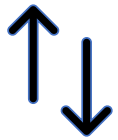
Maintaining a Fine Balance

New energy landscape, challenges, and needs

Changing Energy Mix.
Demand side participation.



Distributed resources



Bi-directional flows

Net Zero goals.
Reliability.
Cybersecurity.
Microgrids.

Increasing complexity.
Changing Workforce.

Variability

Intermittency and Volatility.

Complexity

Reducing rotating mass.
Lower power number.
Higher swings.
Optimising for new variables in addition to frequency and voltage.

Congestion

Fundamental changes in flows.
Congestion.

Demand response

DER asset proliferation.
Consumer behavior modelling.
Scaling demand-response.
Grid as backstop.

Agility and Guidance.

Agility – to tackle changing scenarios.
Guidance – to augment situational awareness & decision making.

DERMS Value add

- ADMS – Gives visibility and control to the DSO for their network upto the consumer's meter
- DERMS – Provides visibility and control for everything that's behind the customer's meter / at the grid edge.
    - DERs = renewable based generation (Rooftop solar), Storage (BESS), Controllable load units
    - Use-cases : Setpoints for Solar PVs, BESS, load shedding.

- Benefits of DERMS
    - Enhance visibility :- Real time insights such as Location, Peformance, Status
    - Controllability = Balancing supply and demand
    - Network flow optimisation / Congestion management
    - Manage network constraints (thermal limits, voltage excursions, fault levels)
    - Grid flexibility service management
        - Provide valuable resources such as Storage (Pooled through a geographical area)
        - Integrate more renewables without having to build new lines (defer or avoid CAPEX)
    - Secure endpoints to prevent cybersecurity threats and issue such as PII theft, Power grid disruptions, equipment damage
    - Customer Engagement

DER Use-Cases

- Goal
  - Transition to 100% renewable energy adoption as part of Spain's clean energy goals
  - Customer participation and Demand-side flexibility to increase renewable penetration
- Key Benefits
  - Flexible load :- Shifting loads depending on generation availability, such as charging EVs in middle of day with abundant sunshine
  - Real-time integration, visibility, control and optimisation :-Optimise DERs across several goals simultaneously
  - Dynamic forecasting based on changing load and weather conditions :- Agility in operations
  - Combine different resources with different communication protocols and responses into a Single pooled resource :- leveraging advanced interoperability via APIs
  - Unlocking Novel use-cases : Peer-to-Peer energy sharing | Solar Neighborhoods in a 2kM radius

https://www.aspentech.com/en/resources/case-studies/dgm-how-iberdrola-uses-derms-to-assess-flexibility-on-a-renewables-heavy-grid

Roadmap

- DERMS an opportunity for a transition to sustainable future
  - Enhanced situational awareness leveraging technology
  - Power in the hands of the consumers
  - Reduced capex, lower ROW issues
- Collaboration is key
  - Utilities and solution providers come together to augment products that meet the changing requirements
  - Industry Advisory Groups
- Implementation
  - Identify specific goals
  - Establish regulatory framework
    - Ex. FERC Order 2222 allows aggregated DERs to participate in wholesale electricity markets
    - Encourage VPPs to enhance commercial viability and create a thriving market
  - DER Registry for real-time monitoring & leveraging guidance systems such as Forecasting for predictive analytics
  - Adopt advanced Cybersecurity standards (NERC CIP / IEEE 1547.3 / CERT-IN), leverage secure communication protocols and identity management techniques
  - Capacity building and awareness

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THANK YOU

For discussions/suggestions/queries email: isuw@isuw.in

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Links/References (If any)