
Transitioning to a High DER Future

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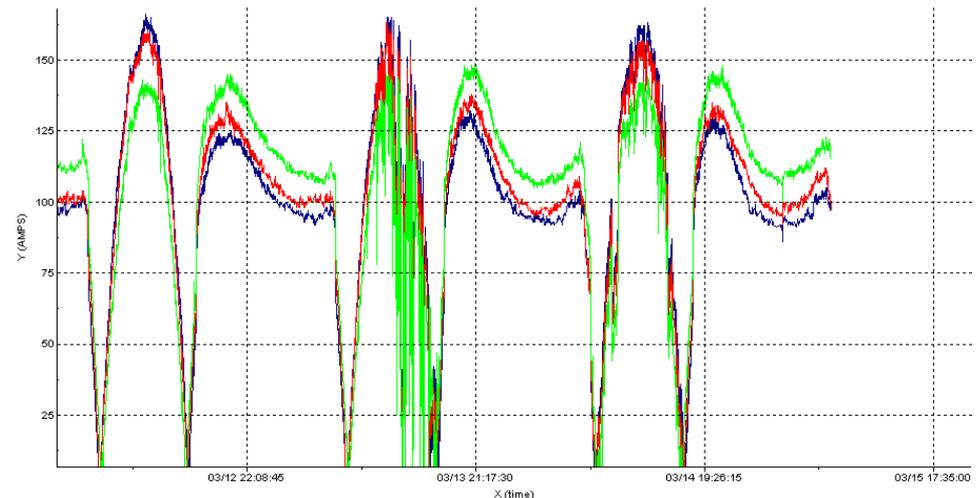
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Traditional Challenges with Increasing DER Penetration



- DERs may be clustered along a distribution feeder
- Lack of visibility to operators
- Increasing volume of interconnection requests
- Dynamic nature of distribution system often not considered in studies

- Phase Imbalance and Protection
- Voltage regulation
- Operating and switching flexibility
- Equipment loading
- Grid stability

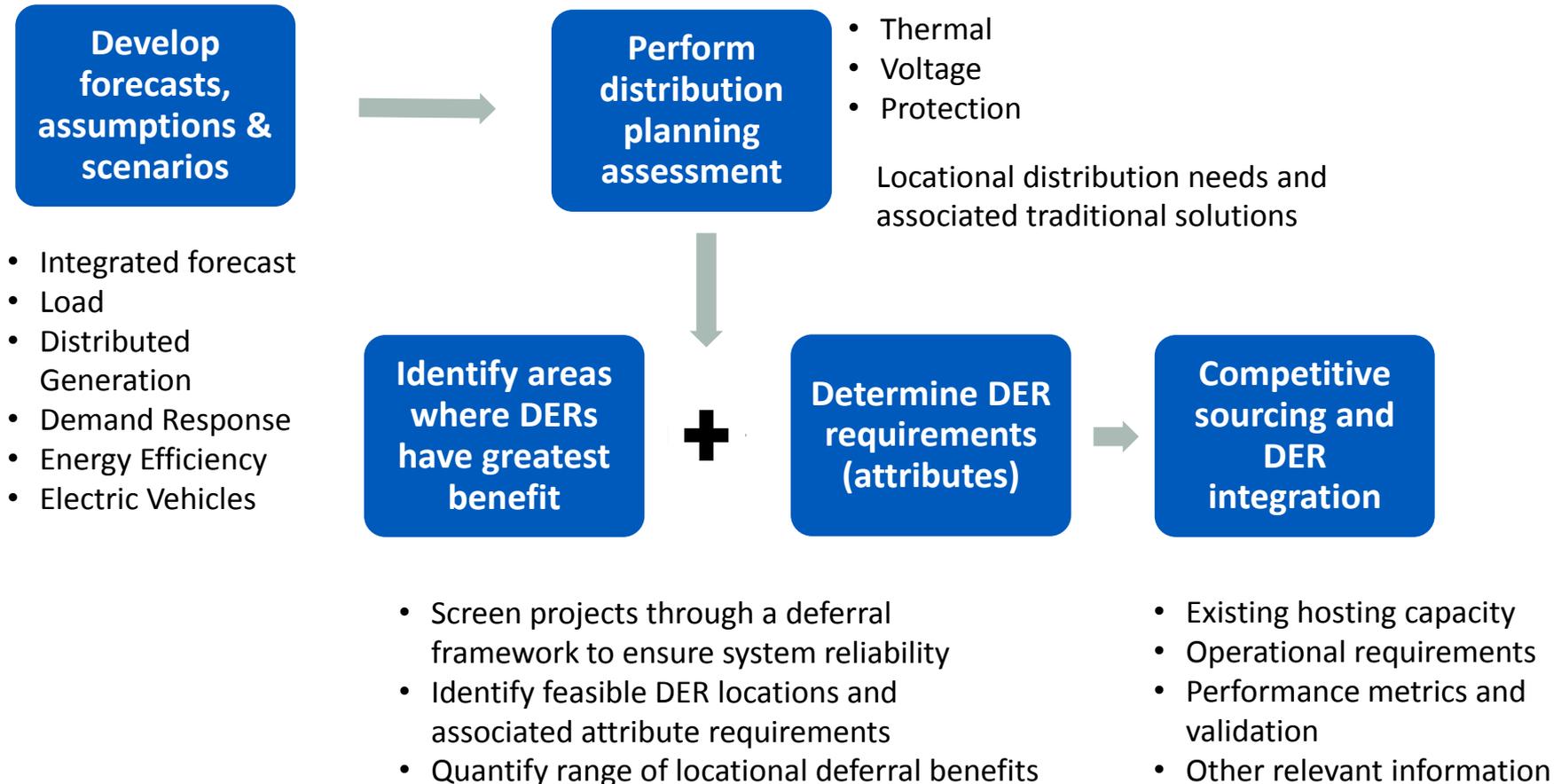


Current challenges and opportunities

- Technology and modernization of the grid need to keep pace with DER technology innovation and policy
- Greater industry alignment on needed system capabilities for grid modernization, planning tools and methodologies
- More thorough understanding of the value of DERs and how to realize them
- Development of metrics that account for reliability, resiliency, and environmental benefits
- DER portfolio optimization, understanding of performance characteristics
- Adaptive protection schemes considering changes in power system due to increased reliance on inverter-based power
- Design standards based on changes to diversity and load factors
- Workforce of the future – needed knowledge, skills, and training

A modernized distribution planning process identifies grid needs and DER solution attributes

Planning processes need to be modernized to integrate DERs, leveraging new tools, data analytics, and visualization capabilities



Grid Modernization focus for flexibility and reliability

Capabilities

Expedient
Interconnection
Processing

Increased
Situational
Awareness

Accurate
Forecasting and
Planning

Robust Grid
with Greater
Interaction with
and Control of
DERs

Investments

Distribution and
Substation
Automation

Communications
& Interoperability

Technology
Platforms and
Applications

Grid
Reinforcement

Enabled By

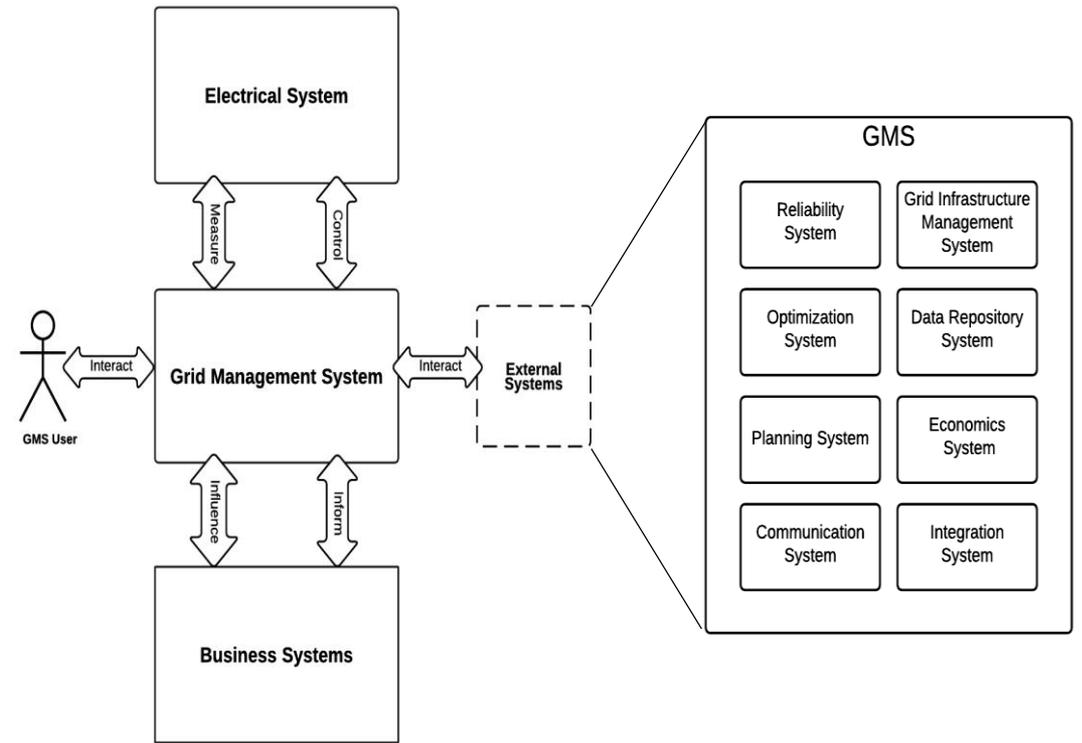
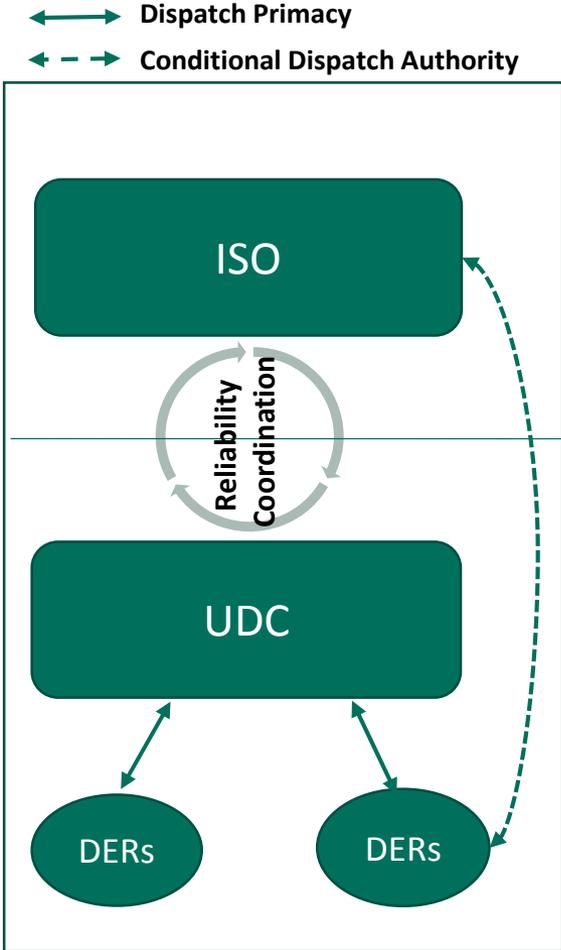
People Strategy

- Increased manpower
- New skill sets
- Training process
- Workforce Evolution

Business Processes

- Work Management & logistics
- Evaluation & process redesign
- Design Standards
- Integrated planning & procurement
- Construction and operational procedures

UDC/ISO Interface and Grid Management System Overview



The DSO will require an integrated architectural approach, ensuring planning, reliability with market operations are closely linked