



# Digital Utility Evolution Supporting the DER Ecosystem

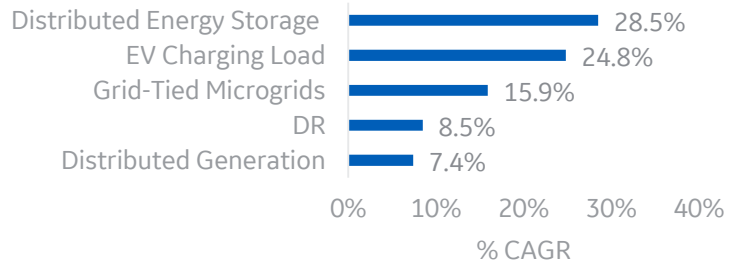
Dr. Avnaesh Jayantilal  
Product Director

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# Distributed Energy Resources Insights

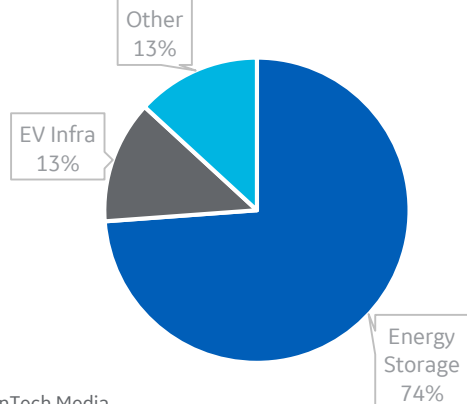
## DER Growth

Estimated CAGR, 2016-2025



Source: Navigant

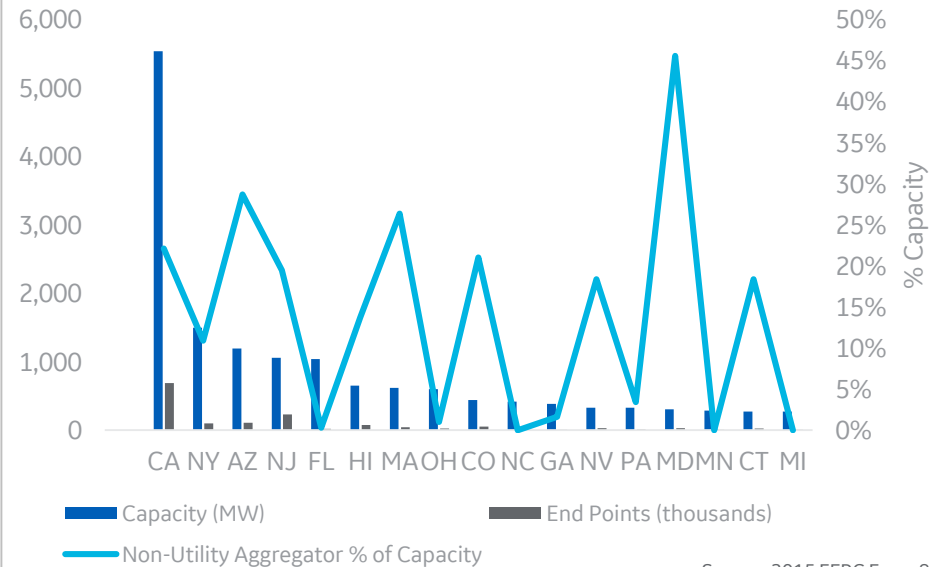
## VC & Private Equity Investments at Grid Edge, 2017 YTD



Source: GreenTech Media

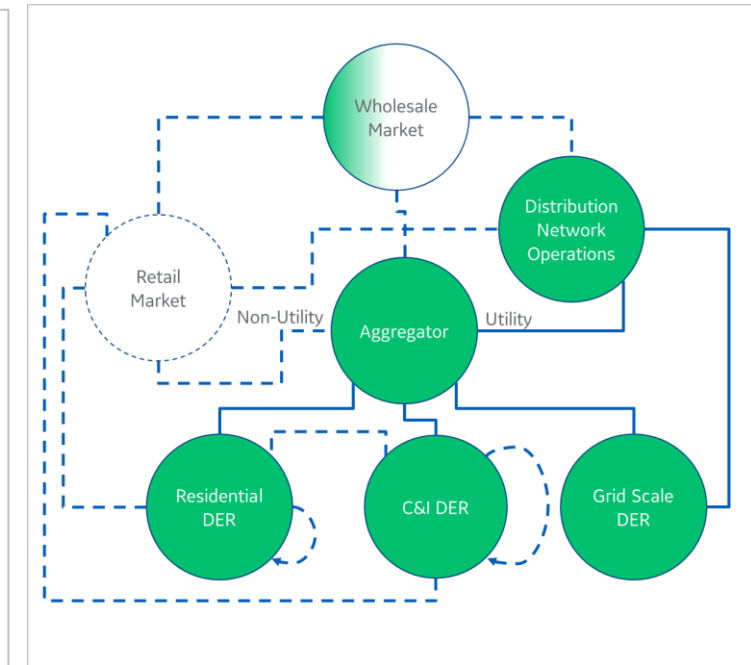
## Operational Challenges

US States with > 250MW Penetration



Source: 2015 FERC Form 861

## Markets



- Storage growth driven by EV charging and promise of markets
- EV charging will bring significant demand growth and new peak loads
- Operational complexity on the rise, scalability & coordination challenges
- Market structures uncertain, likely to evolve differently in different regions



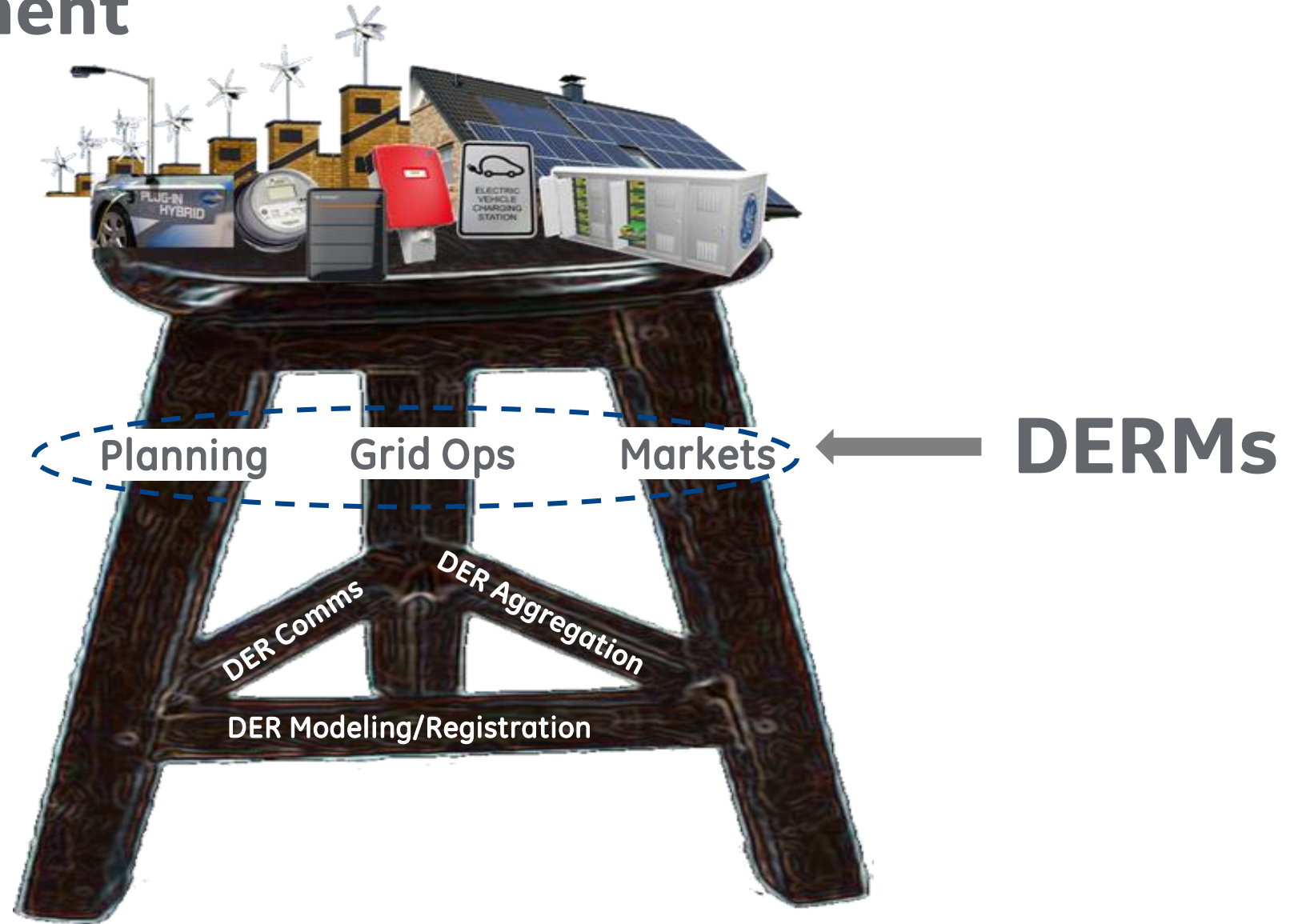
# Transmission & Distribution Processes

- Model Management
- TX Grid Management
- DX Grid Management
- Planning/Expansion
- Planned Outages
- Outage Restoration
- Switching Management
- Telecommunications
- Ancillary Services
- Customer Notification
- Customer Billing
- Reliability Reporting

**SAFTEY**



# DER Management



# DERMS Focus Areas

DER has emerged as a great disruptor, for both operations and all business models

DERM's value proposition:

- Harness & orchestrate DER's own flexibility along and that of other network assets
- Maintain reliable operation, improve OPEX, defer / eliminate CAPEX & unlock new revenue streams



## DER-Enabled ADMS

- Foundational (we need to see the entire DX network)

## Flexibility Optimization

- What DER is available and when for diff use cases

## DER & Load Forecasting

- What's behind the "meter" – is it load, DG, Flex ?

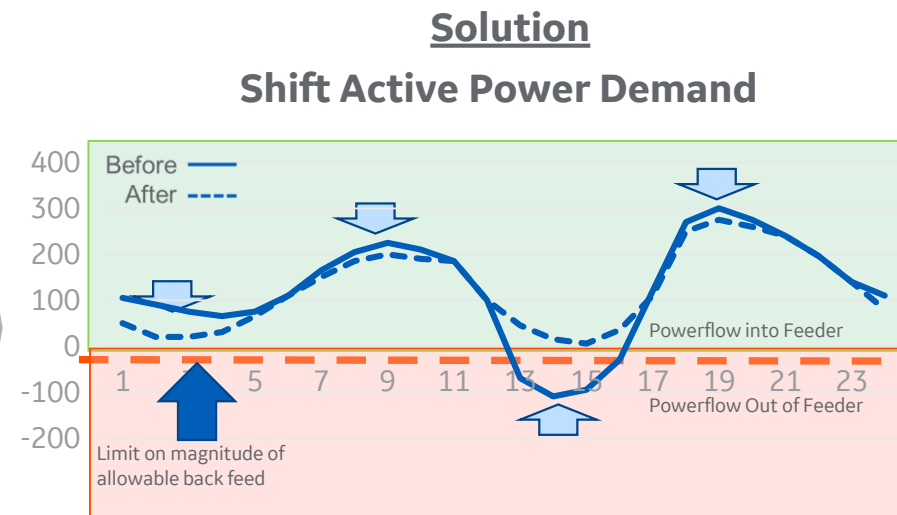
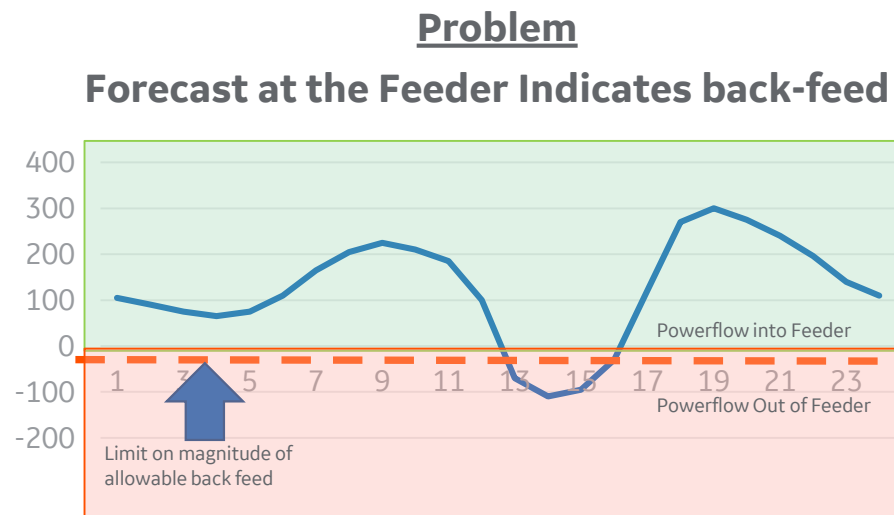
## Distributed Intelligence

- How much analysis (sensors) can be done on the edge ?



# DER & Managing Grid Reliability Through Flexibility

- Low load, high PV output can result in back-feed, high system voltages
- Load and PV generation forecasts are used to predict such situations
- **Solution: Avoid PV curtailment, shift loads & charge Batteries to absorb excess PV**

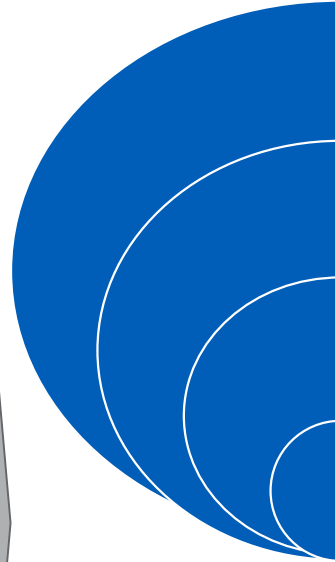


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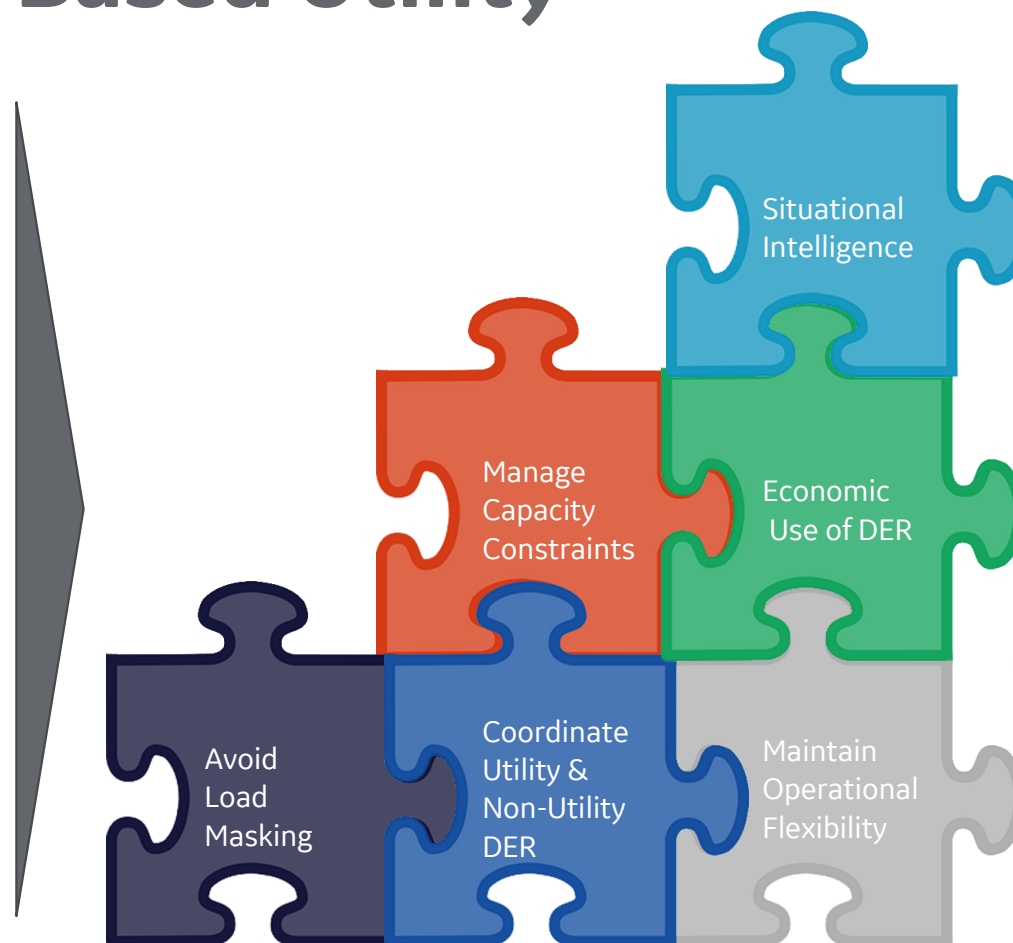
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# Pilot Project : California Based Utility

- Over 250,000 Solar-PV customers (*1 new solar customer every 7 minutes*)
- Over 85,000 electric vehicles (EVs), 1 in 5 in the USA is registered in this service area
- Pilot project to demo how DER can be used to help **OPTIMIZE** Distribution Grid operations.



**Transforming a challenge into an opportunity ...**



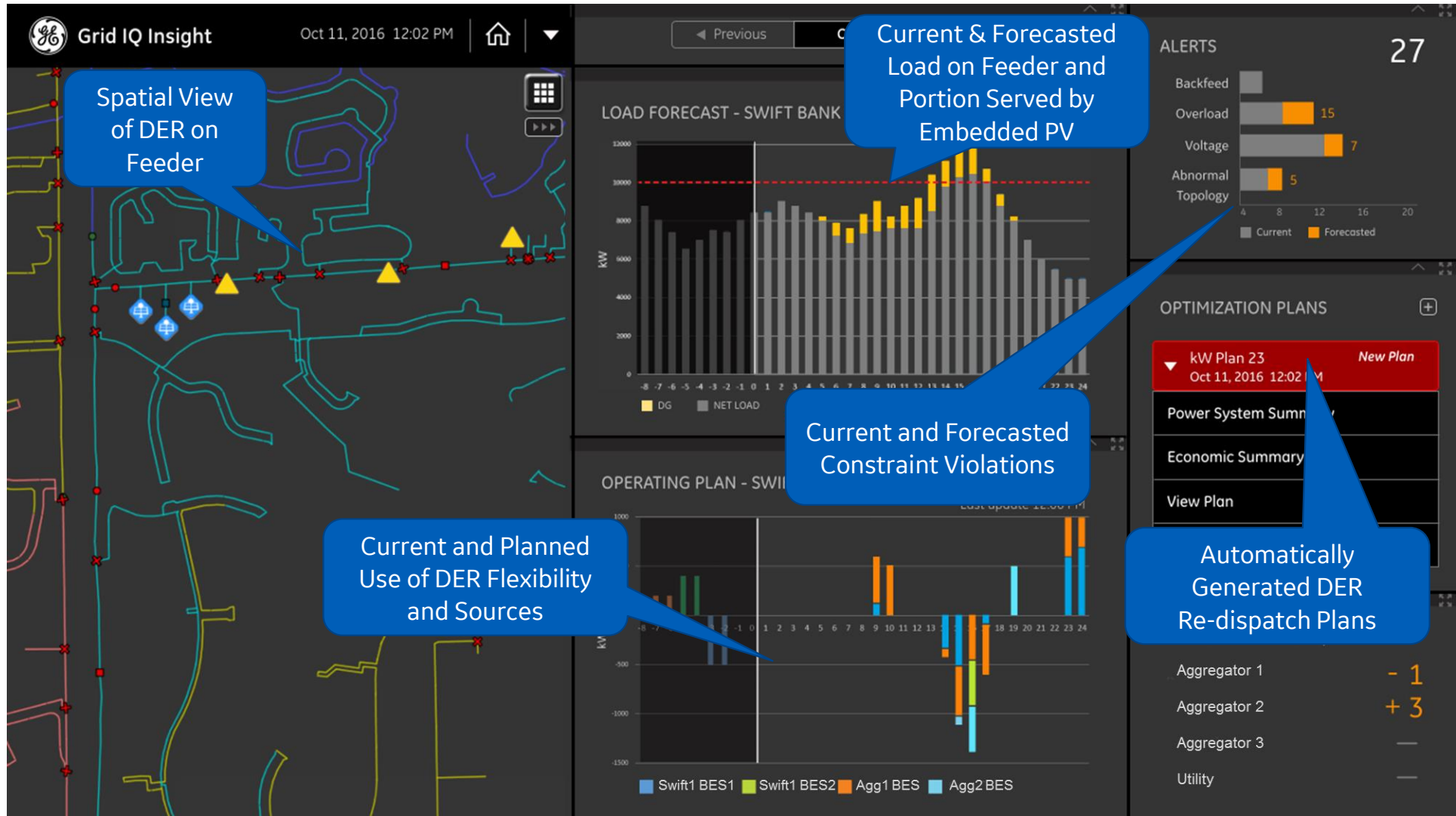


# Pilot Project Use Cases

- UC1 • Load Masking/Phantom Load
- UC2 • Manage Equipment Capacity Constraints
- UC3 • Mitigate Voltage Issues with Real Power Output
- UC4 • Mitigate Voltage Issues with Reactive Power
- UC5 • Economic Dispatch of DG and Energy Storage
- UC6 • Operational Flexibility during Switching
- UC7 • Performance Validation



# GE DERMS : Flexibility Markets & Exchanges



# Summary

- DER will challenge traditional utility business models
- DER will change how utilities maintain/manage the Grid
- DER is an opportunity for utilities to create new services with their customers
- DER is an opportunity for utilities to further enhance Grid resiliency (zero-wires)

**DER will evolve utilities towards the Digital Grid**



