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Scott has 20 years experience at Schneider in Utility Distribution Solutions, including delivery of information and operational technologies and services to the Utility industry. Today, Scott directs microgrid solutions serving Utilities and Prosumers in North America in collaboration with Schneider's many partners in this space.
Historical Energy Value Chain

- Consumers responsible for their own MV/LV Traditional Power Distribution Assets and Operations “behind the meter”, Many implement EE Measures
- Consumers have some partial base-load and traditional backup power generation of many varied capabilities, but few significant islanding systems (CHP and Solar do not Island from Grid)
- Beyond EE, Increasing Local, Efficient Self-Generation + Microgrid Islanding is the road ahead.

The New Energy Landscape

- Utilities house significant Grid-Connected 3rd party owned Solar PV plants with complementing BESSs. In some cases the developer is the utility, but in others it is a 3rd party or a new Energy “Prosumer”.
- Larger Prosumers and Municipalities PPA/Lease models to leverage existing and build new DERs
- Reduction in costs for DER technologies, increase in reliable delivery + new business models for Energy Services result in the new Energy Landscape, both on Grid and at Prosumer sites
Distribution System “Hosting Capacity”
The amount of variable renewables that can be utilized at the grid tied location is dynamic at all points and times, different for every feeder.

When inverter-based DERs exceed ~20% of load, voltage and frequency stability may become a challenge.

Challenges may be met with BESS or other, but adding these assets may impose additional topological restrictions on distribution operations.

Normal Management of Feeder Voltage and System Protection can require DERs to be curtailed. High Penetration of DER increases automation/operations required, but locks down topological options for the Utility.

*Illustration of DER (PV) hosting capacity based on evaluating overvoltage
Utilities must provide stability and reliability for all consumers

Distribution Microgrid Topologies using Gensets and Solar PV/Storage

Regulatory environment for “rate base” recovery of these assets is challenge for Utility

Providing key services from existing infrastructure during emergency
Microgrid Architecture – Building or Facility Prosumer Control System Solves for Economic Optimization and site Resiliency to exclusively benefit Prosumer

Cloud

Building

Advanced Microgrid with CHP, Solar PV, Energy Storage
Electric and Thermal Energy Generation and Distribution

Customer constraints
Weather forecast
Energy market pricing
Demand response requests

Advances in microgrid analytics and optimization enable buildings to act as prosumers, delivering energy to the grid and saving money.

Microgrid BMS

Building Gateway

Microgrid Controller

Modbus, DNP, DDS, IEC61850

VPN/HTTPS

Demand response requests
Weather forecast
Energy market pricing
Customer constraints

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Microgrid Architecture – Independent Power Producers
Control System Solves for maximizing sale of Energy and Ancillary Services
From their fleets of Storage, Solar, Wind and District Energy

DER Analytics and Optimization

Customer constraints
Weather forecast
Energy market pricing
Demand response requests

Cloud
Fleet of DERs

Local DER Plant Controller
Microgrid Architecture – Utility T&D Grid and Asset Fleets
Solves for Stability and Reliability for all

Utility Grid

Utility Control Center

Prosumers, IPP Fleets, DER Plants and Everyone Else

Customer constraints
Weather forecast
Energy market pricing
Demand response requests

DER
Plants

ADMS

Utility Distribution Control

VPN/HTTPS

Microgrid Advisor

VPN/HTTPS

VPN/HTTPS

Microgrid Advisor

DERMS Cloud
Campus or Fleet of Buildings

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Prosumer and IPP Assets may be curtailed by Utility
Interests of one may be disrupted by those of another, creating a “conflict” of best outcomes for all
As Prosumers increase local energy independence, Utility loads drop, Traditional Grid Role Changes

Mixed Use Case example at the Prosumer Microgrid and Utility DR participant

- Prosumer optimization of battery charge, discharge and peak shaving
- However a utility demand response event may “interrupt” prosumer operation and execute based on what utility wants.
- Algorithm Abandons Peak Shaving, and must recharge to prepare for Utility DR event

We shift from Prosumer benefit to Utility benefit case, but only as long as this provides the best economics for Prosumer
Behind the meter “Prosumer” solutions will evolve and increase in economic and technical viability. First C&I, Campus and Municipal, and over time to residential level.

Utilities will be challenged to integrate larger scale “Distribution” level DERs, owned by themselves or IPPs, given operational limitations like “hosting capacity” and regulatory issues about how rate-based asset investments are recovered. Smart Inverter and Energy Storage will allow for “increasing” hosting capacity, but the potential amount is finite.

IPPs will move from building “Distribution” level plants, once hosting capacity is reached, to building “Prosumer” level solutions, accelerating the rise of the “Prosumer” and compounding Utility Grid and Business challenges.

Utilities will consider how to rate-base, own and operate their own Prosumer offers, but this will require significant regulatory change before it can happen for many regulated wires companies.

Where does all this lead?.. Ask me tomorrow and I may say something different.

The New Energy Landscape