

ADMS for Enabling the Clean Energy Transition

Ozan Baskan

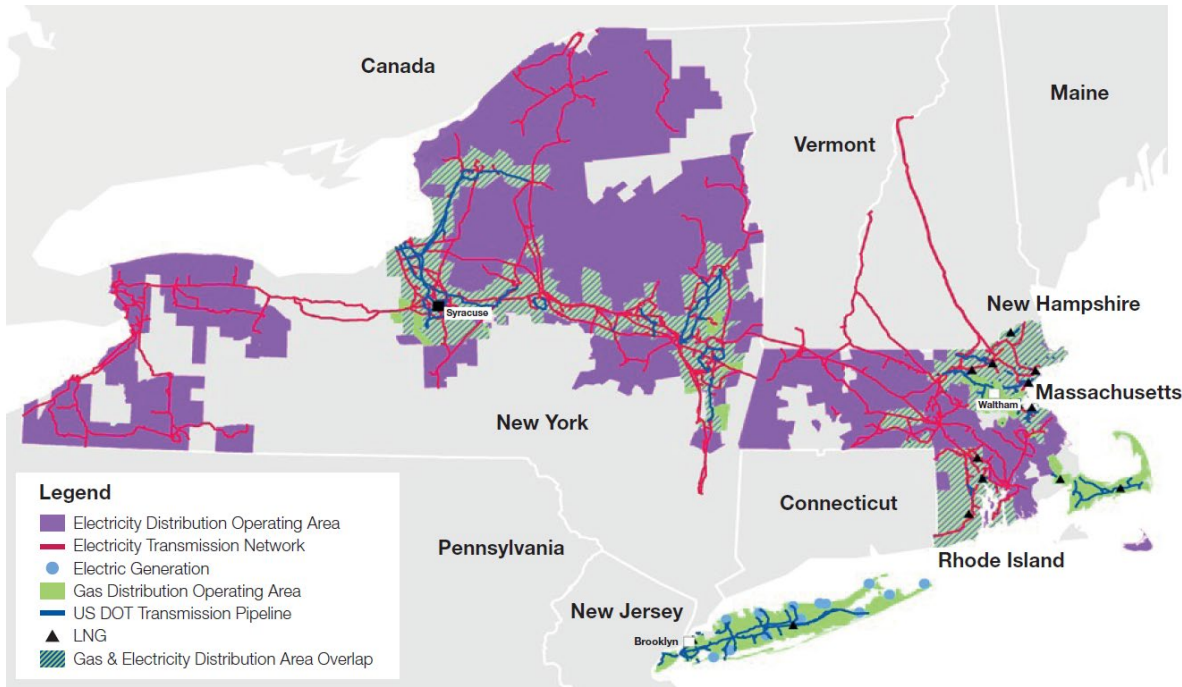
Andy Grant

October 18, 2021

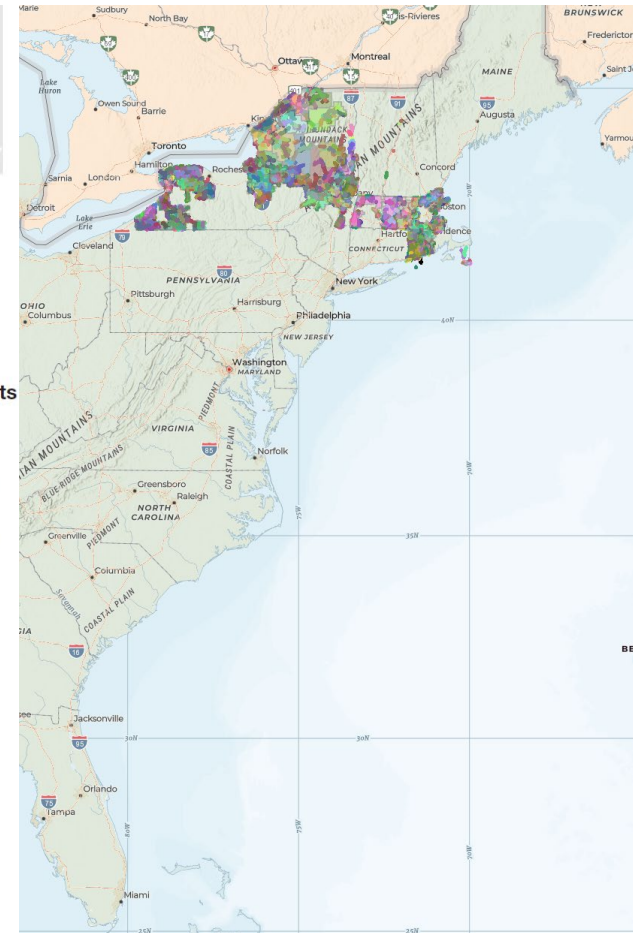
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About National Grid



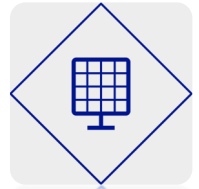
- Serving Electric and Gas to 20 million people in MA, NY, RI with ~17,000 internal employees
- The core business is multinational formed by acquisition of multiple utilities in New England and New York as well as mergers in the UK.
- Non-regulated businesses (NG Ventures) focus on clean energy such as sub-sea cable links and renewable generation
- Focuses on new technologies, innovation, startups via a dedicated team, National Grid Partners



Electric Distribution Service Territory on US East Coast

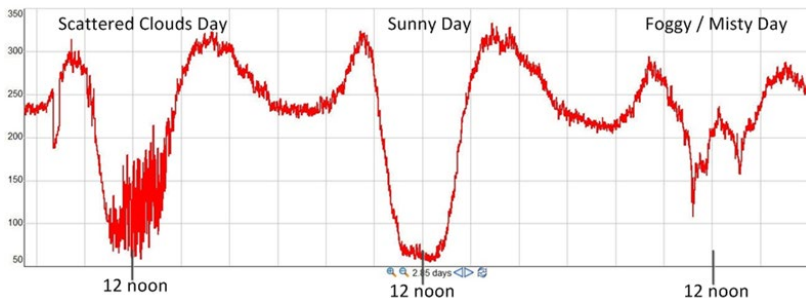
The Electric Distribution System

- Mainly 15 kV class overhead construction – Currently our preferred construction and ADMS's focus. (~3000 feeders)
- Both underground and overhead 5 kV and 35 kV (and anything in between) can be found across our footprint
- Generally, 15 kV class overheads feeders are ~600 A rated, ground and phase overcurrent protected circuits.
- Distributed Generation (mainly solar and energy storage) has significant support from our customers and regulators to grow in hundreds of megawatts in the foreseeable future.
- Though not very affordable at this point, electric vehicle usage is increasing. Some of our communities are adopting EVs in public transportation as well.
- Aggregated residential and commercial energy management technologies are also growing with FERC Order 2222 and through non-wires alternatives.
- Electrification of heat is increasingly becoming popular as innovations in heat pumps and other technologies continue to create a sustainable and feasible market for customers.
- Electric System Resiliency and Reliability are ever increasingly important as the impacts of climate change become more significant during severe weather events.
- Blue sky days require us to be less conservative and rely more on system data to ensure clean resources can come online and stay online during slight abnormalities.

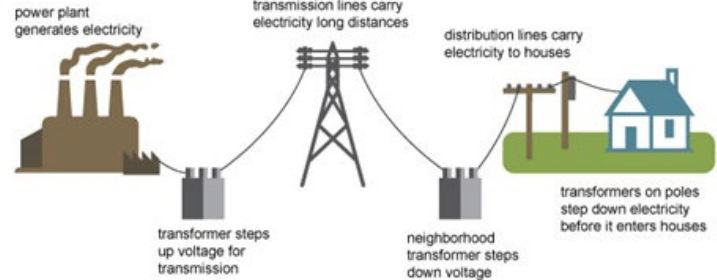


Why is ADMS Necessary?

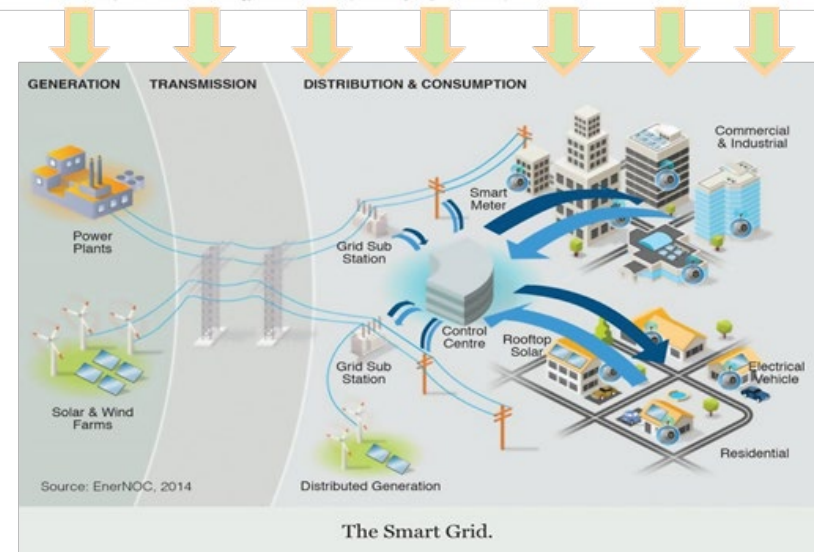
- Intermittent clean energy resources create unprecedented complexity in distribution and transmission throughout the day
- Unpredictable load and generation characteristics as users continue to adopt innovations that enable carbon net neutrality goals
- Electricity is becoming increasingly vital as the society becomes technology dependent as well as climate change amplifying the weather impacts



Electricity generation, transmission, and distribution



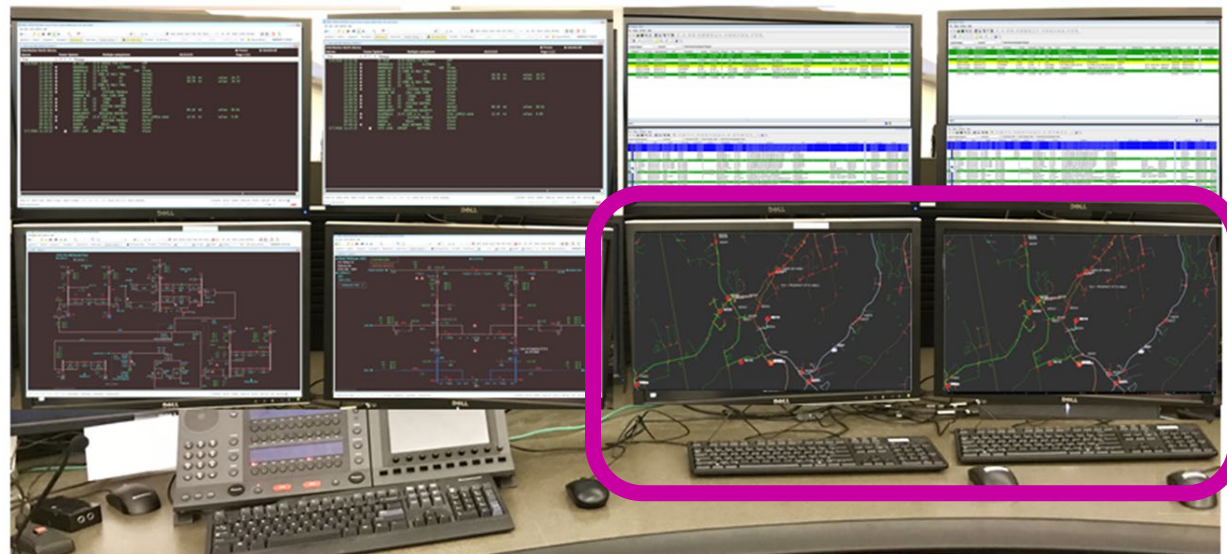
Source: Adapted from National Energy Education Development Project (public domain)



Source: EnerNOC, 2014

Minimum Expectations from ADMS

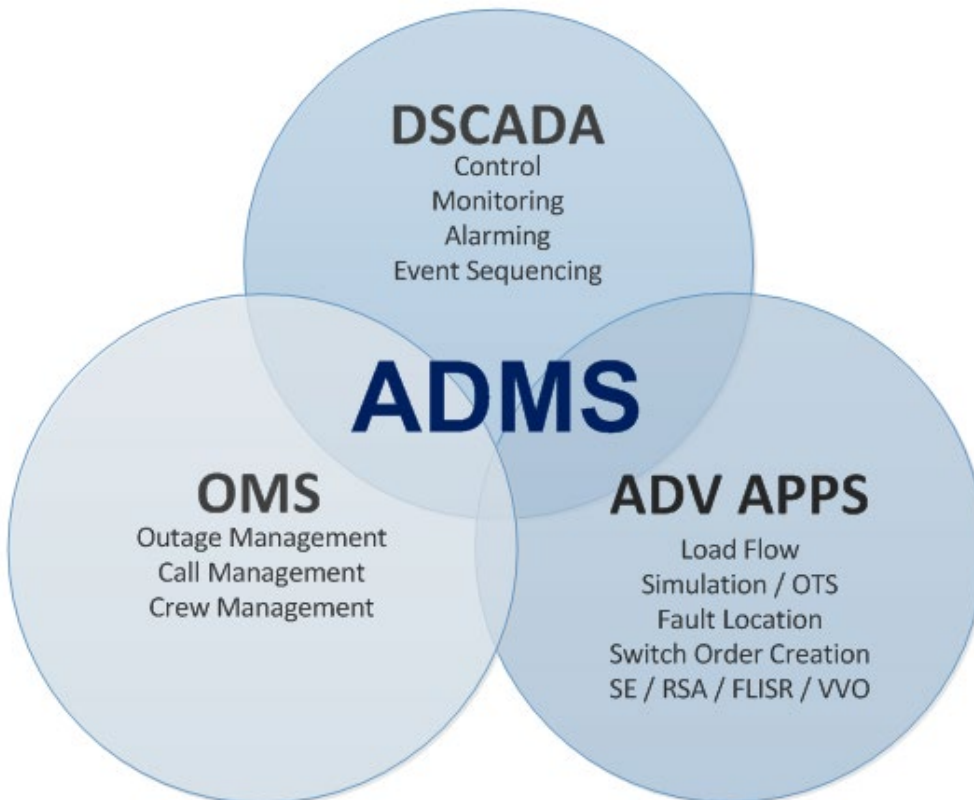
- Serves as a real-time load flow platform that monitors and predicts numerous changes in the distribution feeders with +/-10% accuracy to assist in human decision making
- Becomes the power system platform for enabling DERMS and provides assurance for both distribution and transmission operators that our system remains reliable and dependable
- Provide the visibility to keep the clean energy resources online in both blue sky and during weather abnormalities



ADMS
(Phase 1)

What is ADMS - Core Platform

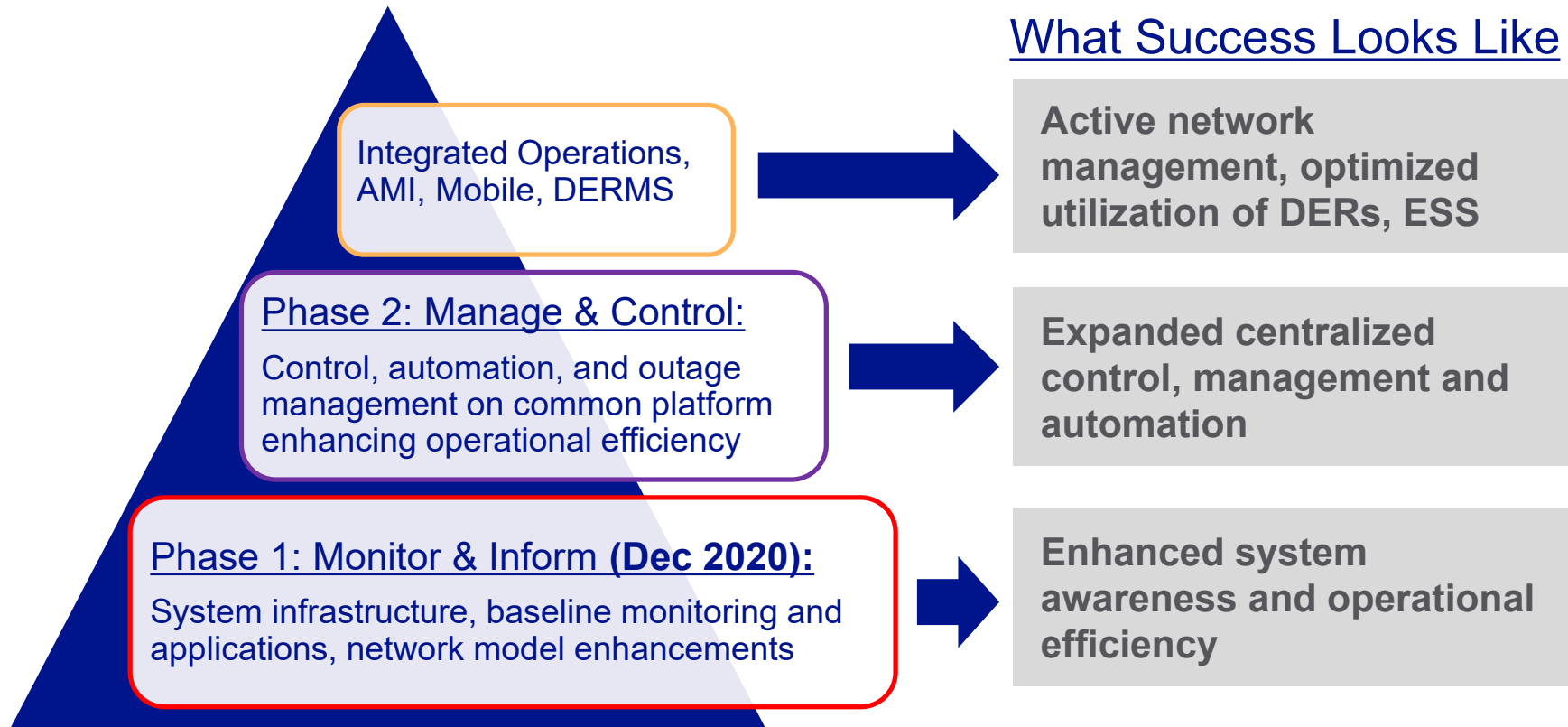
- **Advanced Distribution Management System (ADMS)**
 - Distribution Supervisory Control and Data Acquisition (DSCADA)
 - Advanced Applications - Distribution Management
 - Outage Management System (OMS)



- Enables operations to maintain or improve reliability under growing system complexities
- Centralizes, monitoring, control, and automation capabilities
- Promotes Operational Integration of DER and AMI
- Foundational for DSP (Distributed System Platform)

ADMS / DSCADA Why Phased Approach

- Supporting today's operational needs with tomorrow in view
- ✓ Capital in service early on adding operational value and efficiency
- ✓ Leverages lessons learned from past control center projects
- ✓ Allows for full depreciation of production systems before their upgrade/replacement
- ✓ Users and support staff gain familiarity before full integration



ADMS Phase 1 Operational Benefits Summary

Phase 1: Monitor and Inform (2021):

System infrastructure, baseline monitoring and applications, network model enhancements

- ✓ Allows operators to simulate future states for emergency and planned work optimizing switching (reduced steps, maximizing asset utilization)
 - Transition from using historic data and rough calculations to simulating future state (planned and emergency work)

- ✓ Supports enhanced operations with Distributed Energy Resources (DER)
 - Transition from an all or nothing approach to utilizing resources to support system reconfigurations (planned and emergency work)

- ✓ Enhanced network model enabling larger scale integration of devices
 - Transition from simplified connectivity model to model with all elements and attributes for heightened situational awareness (sizing, settings, data)

Human Capital for ADMS

A dedicated transformation organization along with a “servant” leadership mentality to manage and tailor towards the needs of core business is critical for success

Lessons learned and changes that are pursued shall benefit the entire organization

Electric Transformation

- Power System Engineering & SCADA
- Business Integrator and Consulting
- Project Management
- IT, Security, Digital Partnership
- Change Management
- Data Transformation

Core Business

- Control Rooms
- Operations IT Support
- Asset Data Governance
- Electric System Planning & Engineering

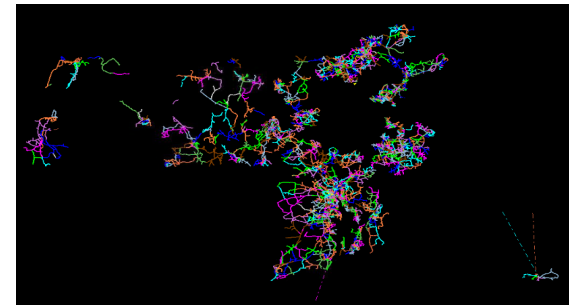
Data Transformation & “ADMS Ready Feeders”

ADMS increases the bar for the “Minimum Viable Product” (MVP) across the organization. Especially from a Data Governance perspective..

Component	Before ADMS Phase 1	After ADMS Phase 1
Line Capacitor State (on/off, exact size)	Address issues as needed (Operations) Choose best state for long term system planning model (Engineering)	We need the exact size and state of a capacitor bank to model a feeder in real-time
Distributed Generation Information (on/off, size)	Abide by defined criteria for all DG during abnormality (Operations) Estimate worst case scenario as defined in Planning Criteria (Engineering)	ADMS can recommend a criteria override if the real time model in abnormal conditions shows no violations
Primary Conductor Size / Type	Engineering judgement and field check if needed (Engineering and Operations)	Model requires correct data for dependable recommendations. Very limited time to “fix” issues in real-time.

ADMS Ready Feeder?

- Minimum 90% accuracy of the model
- Requires experienced set of eyes to check each feeder for errors 🕒
- Many issues require field check and source data changes 🕒 🕒 🕒





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