



smarter  
grid solutions

# Advanced Energy Conference 2018

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# About Smarter Grid Solutions



ESTABLISHED 2008



80+ EMPLOYEES



DER INTEGRATION PLATFORM



GLOBAL COMPANY



300+ MW OF DER MANAGED



SOLUTION DELIVERY IN NA/UK



LAUNCHED US BUSINESS IN 2014



FULL R&D LABS NY & UK



GLOBAL PARTNER NETWORK

- **Enhancing grid flexibility, utilization and reliability with high penetrations of renewables**
- **Exploiting the full portfolio of DER and grid devices to generate new revenue streams and business models**
- **Serving regulated utilities and DER owner / operators with world-class technology coupled with power systems and market expertise**

# Our Customers

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# Market Observations – what is changing?



Growth of DER



Visibility and control needed at the grid edge to support DER growth



Diverse & intermittent resource mix



Inability to coordinate resources leads to conservative operations at higher cost



Complex distribution systems



Centralized and model based systems cannot meet all DER control requirements



Changing regulatory mandates



New platforms are needed for utilities and third parties

# Market Observations

- DER growth is impacting planning and operation of distribution networks
  - New tools, processes and technologies are being implemented
  - New frameworks and architectures are emerging
  - Interactions with wholesale and distribution markets are emerging
- How are distribution utilities responding? In general:
  - Waiting.... Watching
  - Some doing commercial DERMS procurement
  - Many trying to bend existing DMS/EMS/SCADA to accommodate DER
  - A smaller number are taking an incremental approach with sensible phasing of activity

# Our DERMS Platform's Use Cases



## INCREASE HOSTING CAPACITY

Manage voltage and thermal constraints



## INTEGRATE DER

Faster and cheaper interconnections



## COORDINATE MICROGRIDS

Leverage assets more effectively



## NON-WIRES ALTERNATIVES

Mitigate multiple constraints



## VISIBILITY

Real-time monitoring at the grid edge



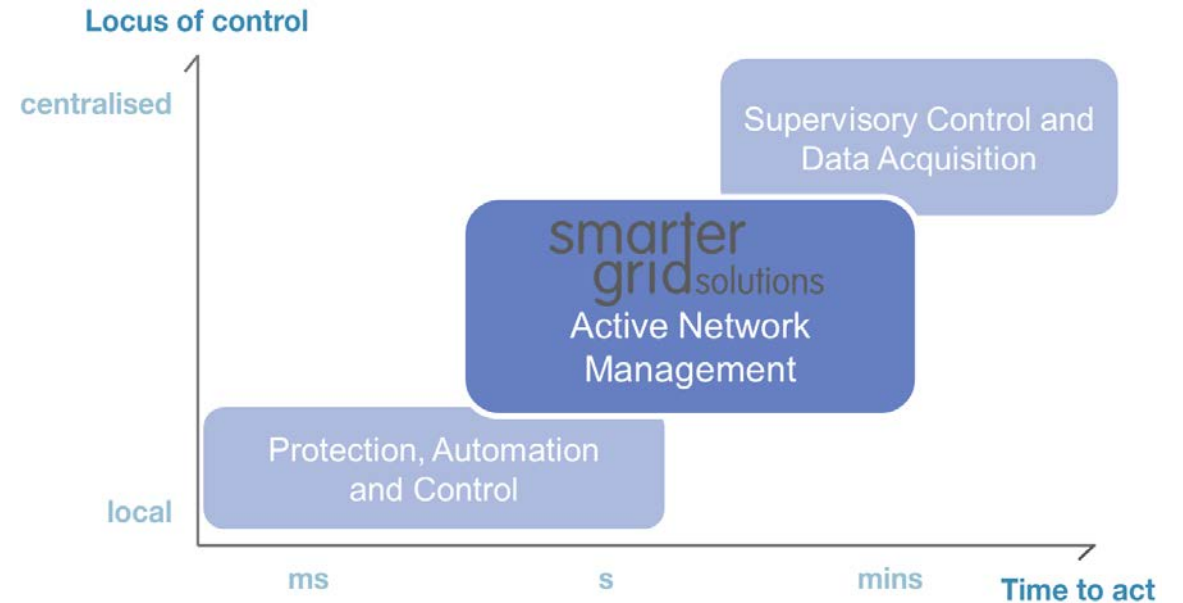
## STACKED VALUES

Monetizing benefits for multiple stakeholders

# Active Network Management (ANM)

- Our DERMS Platform is built on our unique ANM Technology
- Maximizes (2-3x) grid hosting capacity by managing DER in response to grid constraints in real time
- Layers between existing utility systems
- Aligns with REV principles as a Non-Wires Alternative (NWA) to traditional grid upgrades

*Why pay for an expensive grid upgrade to cover a worst case scenario when ANM can monitor grid conditions and take action when the rainy day scenario arises?*



# ANM STRATA



## Enterprise utility-grade DERMS software platform



### Most Mature and Most Deployed

100 combined years of proven operational experience in 15 live distribution systems, on two continents.



### Most Adaptable

Managing and controlling all sizes and types of DER using optimization and real-time control and coordination.



### Most Scalable

Scalable to 1000s of DER and expanding.



### Most Reliable

Failover, redundancy, high-availability and interoperability designed in and proven in the field.

- ⌚ DER hosting capacity and distribution constraint management
- ⌚ Energy storage management, scheduling and optimization
- ⌚ Demand response, aggregation and grouping

- ⌚ Electric vehicle fleet management
- ⌚ Non-wires Alternatives Coordination
- ⌚ Smart Campus and Smart Distribution use cases



# ANM ELEMENT



## Utility-grade software platform for the grid edge



### Most Mature Grid Edge Solution

Site specific, autonomous control controlling 300+MW.



### Localized Intelligence and Fail to Safe Functions

Import/export constraints, scheduling, real/reactive power, voltage management.



### Fast Acting

Sub-second and deterministic, ready for closed loop mission critical power systems applications.



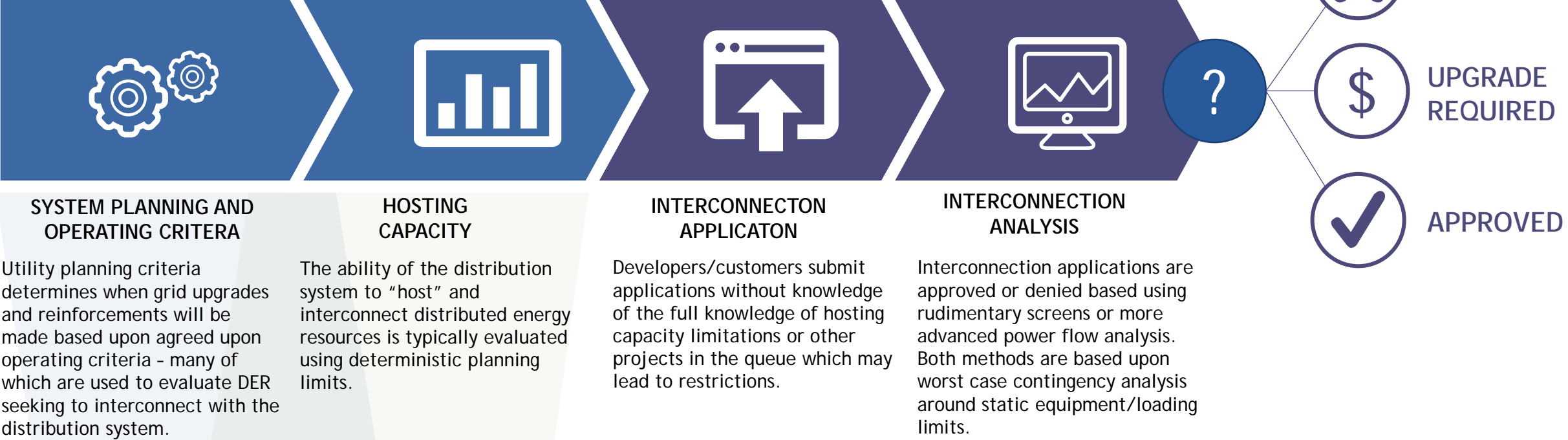
### Interoperable

Full suite of protocol adapters for field devices.

- ⏻ Autonomous real-time control of DER
- ⏻ Multi-DER coordination
- ⏻ Real and reactive power control

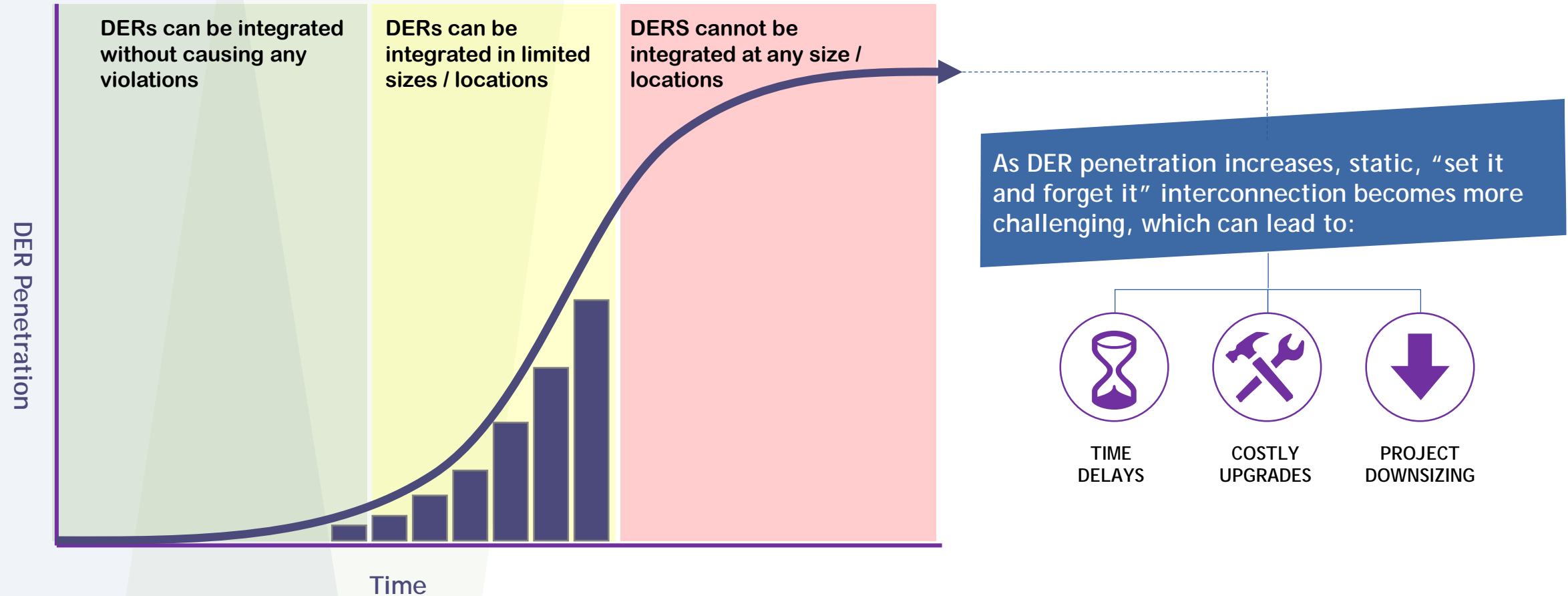
- ⏻ Scheduled control with real-time intervention
- ⏻ Circuit breaker trip and delayed auto-reclose
- ⏻ Gateway for market participation

# DER and the static grid today

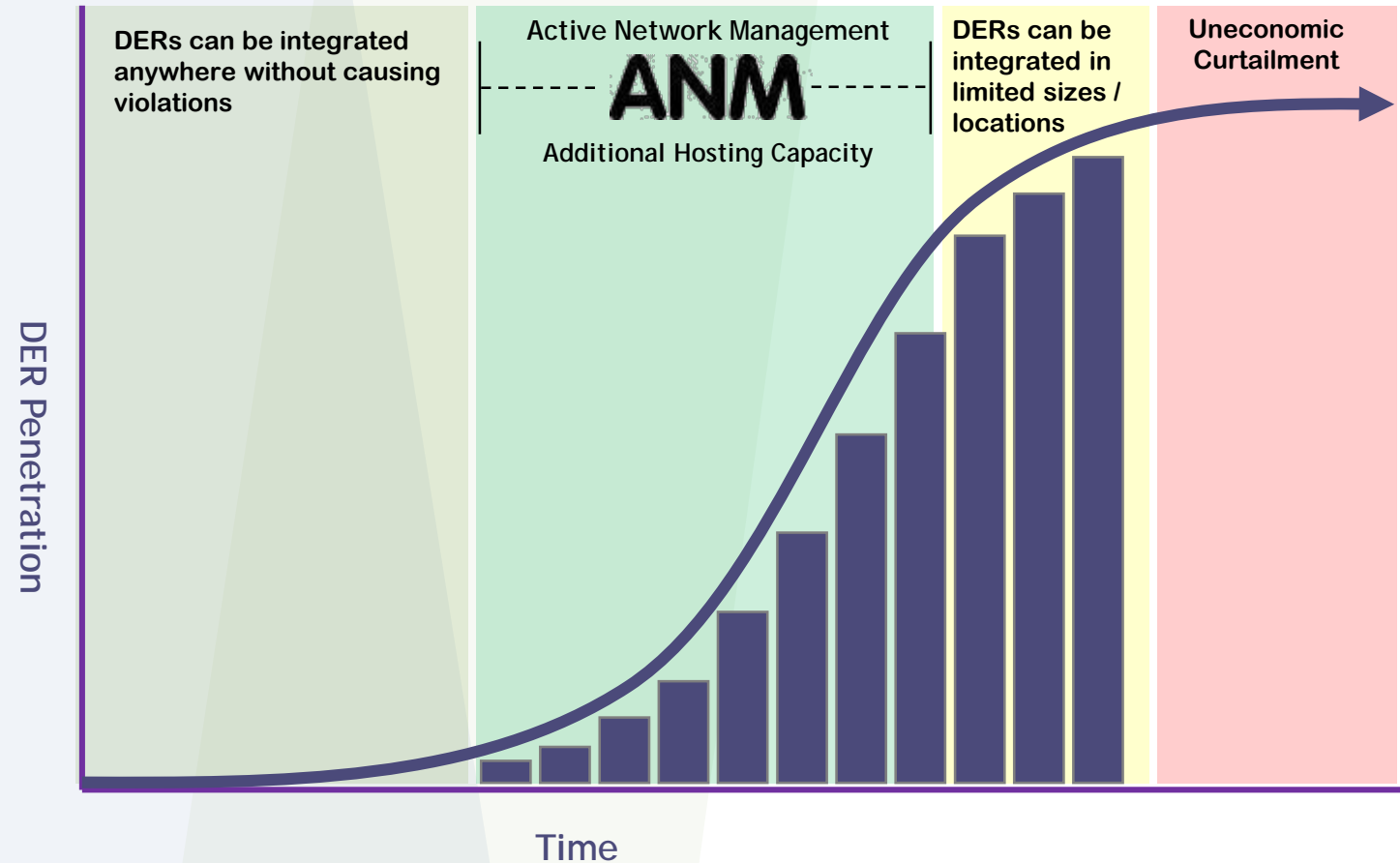


At low DER penetration, the grid has inherent ability to accommodate DER in an uncoordinated manner.

# However, increasing penetrations of DER pose new challenges without visibility and control.



# Active Network Management is an innovative solution to getting projects interconnected at their proposed size and expected energy yield.



Active Network Management unlocks additional hosting capacity by eliminating network constraints through tactical curtailment.

Generator	Size (MW)	Production Factor AFTER Curtailment
1	0.9	37.1%
2	2.3	47.7%
4	4.5	45.4%
5	0.9	37.2%
6	0.9	40.1%
7	0.9	40.8%
9	0.9	31.8%
10	0.9	34.0%

# ANM Cost-Benefit Example

Capacity (MW)	Generator Type	Business as Usual Interconnection Cost	Flexible Interconnection Cost	Curtailement	Capacity Factor after Curtailement	Lifetime Savings	% Lifetime Savings
8.0	Wind	\$5,300,000	\$1,322,000	2.7%	36.2%	\$3,555,696	67%
10.0	Wind	\$7,200,000	\$885,000	5.3%	28.4%	\$5,479,189	76%
0.5	Wind	\$1,200,000	\$236,000	5.3%	28.4%	\$788,040	66%
0.5	CHP	\$3,800,000	\$176,000	1.7%	98.6%	\$3,448,040	91%
6.6	PV	\$13,500,000	\$2,601,000	2.6%	10.9%	\$10,740,636	80%
10.3	Wind	\$7,800,000	\$2,376,000	5.3%	28.4%	\$4,561,795	58%
0.5	Wind	\$2,700,000	\$351,000	5.3%	28.4%	\$2,173,040	80%
1.5	Wind	\$2,900,000	\$236,000	5.3%	28.4%	\$2,400,060	83%
0.5	Wind	\$ 5,300,000	\$1,322,000	5.3%	28.4%	\$3,802,040	72%

# Key Ongoing Projects: New York

## FLEXIBLE INTERCONNECT REV DEMONSTRATION

Smarter Grid Solutions is working with AVANGRID subsidiaries NYSEG and RG&E as part of one of the first Reforming the Energy Vision (REV) demonstration projects to integrate increasing quantities of renewable generation with the distribution system using its Active Network Management technology as an alternative to network upgrades.

## INTEGRATED ONLINE APPLICATION PORTAL

Smarter Grid Solutions is working with AVANGRID, Clean Power Research and CYME to document and revise the interconnection process to facilitate developers to apply for interconnection using the FICS technology solution as an alternative to incurring costly upgrades.

## CONSERVATION VOLTAGE OPTIMIZATION

Smarter Grid Solutions has designed and tested algorithms specifically built to optimize voltage profiles on Con Edison's distribution system, with specifications that can be deployed using SGS' ANM Strata platform.

## INNOVATIVE MODEL FOR FTM STORAGE

Smarter Grid Solutions is working with Con Edison and GI Energy to provide the control systems and architecture for an innovative in front of the meter energy storage demonstration project, allowing multiple value streams be realized. GI will finance and develop the battery while providing Con Ed priority dispatch rights for load relief and contingencies.

## DISTRIBUTION STATE ESTIMATION

Smarter Grid Solutions is working with NYSERDA to review the state of the art in distribution state estimation (DSE), examine the dependencies on data sets and provide a toolkit for utilities and vendors to tackle the deployment of DSE techniques.

## OPTIMAL EXPORT REV DEMONSTRATION

Orange & Rockland is partnering with Smarter Grid Solutions and working with the project development community to identify 3-5 solar PV projects and deploy our local, intelligent ANM Element controller. This will enable projects to be built at/near full proposed size without incurring system upgrades which would typically makes projects uneconomic.

# Questions?

Thank you for listening!