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IEA Smart Energy Roadmap – Scaling up Smart Energy Systems
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Agility in energy- Europe Regulatory Affairs

Ahead of the challenge, ahead of the change

NY REV: Political Vision

Published in 2014 (CASE 14-M-0101) REV asks the Commission to Enable and facilitate new Energy Business Models for utilities, ESCOs and customers to be compensated for activities that contribute to the grid efficiency. Maximaze the cost effective utilization of all behind the meter resources, that can reduce the need for new infrastructure though expanded demand management, energy efficiency, clean distributed generation, and storage.

The report proposed a platform to transform NY´s electric industry, for both regulated and non-regulated participants. To address the objective of making energy efficiency and other DER a primary tool in the planning and operation of an interconnected modernized power grid

REV: Objectives

REV drivers:

- Worsening system efficiency threatens higher prices
- Aging infrastructure and flat sales means costs cannot be recovered from increased sales base
- Aging infrastructure presents opportunity to make smart, strategic choices and avoid lock-in
- Rapidly declining costs and increasing capabilities of DERs
- Increasing DER asset base with inadequate communications drives underutilization
- Need for new reliability and resilience approaches
- Need to mitigate carbon emissions

REV policy objectives:

- Enhanced customer knowledge and tools to support energy bill management
- Market animation and leverage of ratepayer contributions
- System efficiency
- Fuel & resource diversity
- System reliability & resilience
- Reduction of carbon emissions

REV: Core Idea, The Platform, DSP

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REV proposes the development of a platform to create market based, sustainable products and services that drive an increasingly efficient, clean, reliable, and customer-oriented industry

Themes:

- Distributed energy resources (DERs) as a core system resource
- Increasingly customer-centric
- Market animation over mandates
- Increasing transparency and access

Key Design Principles:

- Collaboration
- Transparency
- Standardization
- Non-discrimination
- Action-orientation

The DSP is an intelligent network platform that will provide safe, reliable and efficient electric services by integrating diverse resources to meet customers' and society's evolving needs.

Key Functions of the DSP

- Design and plan distribution system that integrates DERs as primary means of meeting system needs

- Plan for and accommodate new distributed generation and demand response

- Balance production and load in real time

- Monetize system & social values

- Coordinate interactions between customers, with the distribution system and with energy services markets (DSP markets and NYISO)
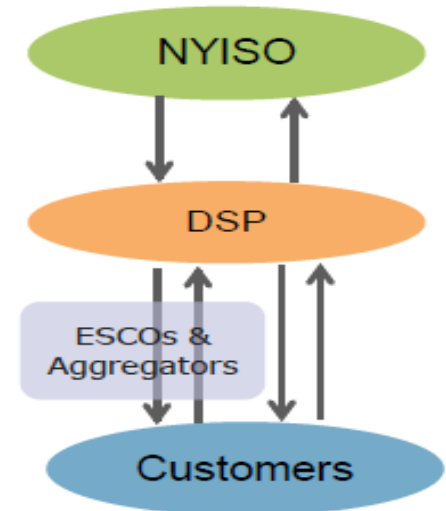
Distribution Planning

- Power flow management software
- GIS upgrade to single point-of-truth
- Simulation tools to examine DER effects
- Tools to help target automation upgrades
- Data sharing tools

Market Operations

- Standard data interface to NYISO to coordinate dispatch, voltage/reactive power
- Scaling or more likely replacement of Electronic Data Interface (EDI) to share additional customer data
- Install gross load, supply-side DER and net loading short term forecasting
- Improve DER database granularity

Transmission and Distribution Operations

- Volt/VAR optimization
- FLISR and Real-Time Load Transfer for DER integration
- SCADA Expansion
- Bi-directional high-speed communications to DER and grid equipment
- Real-time operational systems (DMS)
- Distributed energy resource management systems (DERMS)
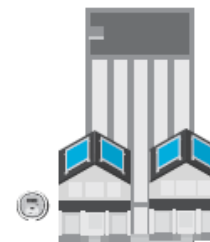
DER Provider/ Customer/Aggregator

- Deployment of sensor networks in high penetration DER areas and at DER sites greater than 300 kW
- Deployment of AMI in strategic areas with high DER penetration – limited directive otherwise

Distribution Utility Roles to enable system wide efficiency & market based deployment of DER

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Traditional Roles

CUSTOMER OPERATIONS
• Billing
• Customer service

DISTRIBUTION/TRANSMISSION
• Reliability
•Efficient O&M , including asset management (AM)
• Internal power plant integration

ENERGY TRADING
• Wholesale energy and capacity

GENERATION
• Reliability
• Optimized fleet
•Efficient O&M

New Roles

ENERGY SERVICES PROVIDER
• Default power, billing, customer service
• Energy services
• DER offerings

ENERGY SERVICES PROVIDER
• Competitive power, bill, customer service
• Energy Services
• DER offerings

Energy Services Provider

DISTRIBUTION INTEGRATOR (DSO/DNO)
• Reliability, efficient O&M, AM
• DER integration

TRANSMISSION INTEGRATOR (ISO/TSO)
• Reliability, network, O&M, AM
• Wholesale supply integration

Grid Integrator

DISTRIBUTED SYSTEMS PROVIDER (DSP)
• Platform provider

ENERGY MARKETPLACE
• Wholesale energy, capacity
• Central data hubs

Market Integrator

REGULATED GENERATION
• Reliability, fleet, O&M

MERCHANT GENERATION
• Reliability, fleet, O&M

Regulated
Lightly or unregulated

DSP Functions

1. Enhanced Distribution Planning to better integrate DERs into the system and to improve coordination between distribution and transmission planning.
WG for developing ways to inventory distribution system data that can be provided by different market actors, to ensure the process is open and transparent and that integrate transmission and distribution planning
2. Expanded Distribution Grid Operations to better optimize load, supply and other power parameters at the distribution level, to better orchestrate multidirectional DERs power flows, and to improve load and network monitoring and visibility
3. Distribution Market Operators, managing market operations and processes and administrating markets (identifying standarized products to be transacted and market rules, maintaining awareness of DERs system-wide, design and conduct DERs RFP/auctions, facilitating and processing market transactions, measuring and verifying participant performance.

4. Data requirements. DSP to make available customerss and distribution system data to markets participants in a granularity manner that facilitate market participating. DSP to prioritize areas that are in need of system capacity and operational relief.

5. Platform technologies

• Geospatial model of connectivity and system characteristics

• Sensing and control technologies needed to maintain a stable and reliable grid

• Optimation tools that consider Demand Response capability.

• DERs generation output (from existing and new)

• Supported by reliable and scalable communication network

• Need to measure DER performance recognizing advanced metring may be needed to support DER installations (upon CBA)

Why DSP

- Energy Efficiency Directive supports DR
- DSP brings harmonization and will support IEM
- EnergyUnion supports DR as integrating intermency and renewables
- New market models are emerging
  - DER energy trading market and a DER capacity market
  - DSO to offer additional services: e.g. in financing of DER plants, installation, maintenance, life cycle management and of course optimization of the return
- DSP will help provide a more dynamic grid that could more fully utilize the new DR opportunities
- DR has been acknowledged as a viable tool mitigate the impacts on the distribution system of high penetrations of distributed energy resources
- Energy Efficiency demands inclusion of transactive energy concepts in DR

Why DSP cont.

- Smart Meters investment expands the resource pool that could participate in DR opportunities which could help address distribution system issues
- Increasing DER penetration requires DR opportunities be developed to specifically distribution system needs
- Increased coordination between distribution and TSO is needed to mitigate impact of DR events
  - Transmission DR signals impact distribution capacity (balance) and vice versa
  - Participation of customer in more that one DR opportunity

EDSO for Smart Grid, Digital DSO

DSO Asset Centric towards Data Centric

DSO should be allowed to established and upgrade platforms, & protocols for exchanging Smart Meters data with TSO and other market players

Adapting Distribution Network Tariff to a Descentralized Energy Future (DSO direct contract with consumers for storage and DR)

Digitalisation for market facilitation

* Collaboration with consumer and prosumer, consumers who produce their own energy, to reduce consumption and optimise network management
* Data-enabled transactions among DSOs, aggregators and supplier, aggregator and consumers, energy start-ups
* Fast transactions allowing close-to-real-time intra-day market closure for better integration of variable renewables in the wholesale market

Digitalisation in network management

* Real-time processing of load data and generation, enabling the integration with demand/supply balancing service to optimise grid utilisation
* Predictive analytics based on sensor data, enabling smarter asset management with a fully digital allocation of spare parts, work, and logistics

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