Microgrids in the Reforming Energy Vision (NY REV)

11th Symposium on Microgrids

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New York State: background

Key Facts that motivated a deep try to review of the electric system

- ✓ **Superstorms** and its consequences (e.g. Sandy)
- ✓ **Status of the electric system** in NY state
- ✓ Review **measures to boost RES**
- ✓ Push of **distributed generation**

Analysis of consequences of storms in 2011-2012 shows that **10 Counties** and New York City **had outages affecting over 5,000 customers lasting at least 6 days (144 hours)**

- System decompensated: congestion
- Increase Peak demand: congestion
- Environmental restrictions

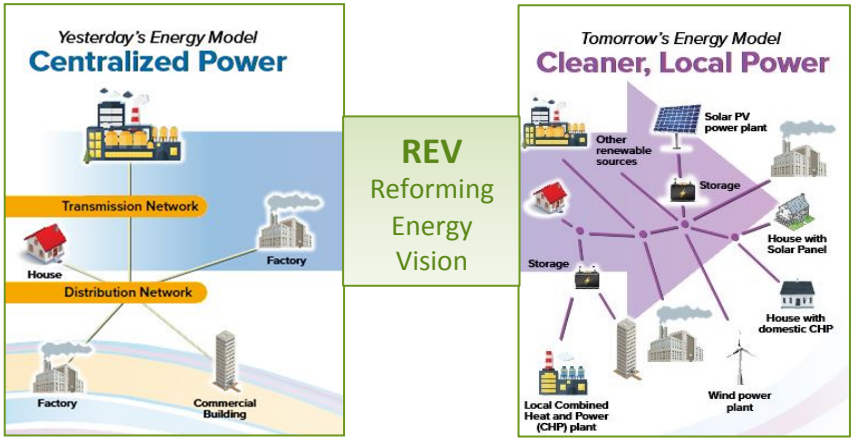
- ✓ Appearance of **new electric system actors**
- ✓ In 2014, New York had the **4th highest average electricity prices**
- ✓ **Renewable electricity production** in 2014 was 23,5%
- ✓ New York's RPS has a **renewables target of 30% by 2015**

Source: U.S. Energy Information Administration (EIA): http://www.eia.gov/state/search/#?3=25&a=true

Reforming Energy Vision (REV)

REV is an **energy modernization initiative** that will fundamentally **transforms the way electricity is distributed and used** in New York State.

The REV proceeding **was initiated** by New York's Public Service Commission (PSC) **in April, 2014.**



The REV initiative aims to accomplish **six core objectives**:

- Enhanced **customer knowledge** and tools that support effective management of the total energy bill
- **Market animation** and leverage of customer contributions
- System wide **efficiency**
- Fuel and **resource diversity**
- System **reliability and resiliency**
- **Reduction** of carbon **emissions**

Elaborated from the original image taken from http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument

Reforming Energy Vision (REV)

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Energy Cost Reduction

to meet base load or peaking energy needs or demand charge cost savings

Sustainability

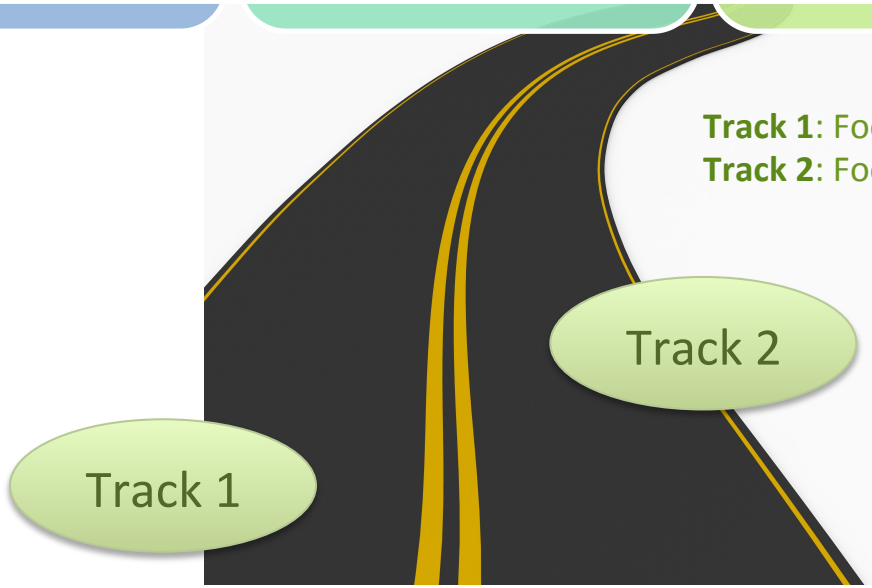
focusing on integration of renewables and reduction of transmission losses to realize carbon and other emission reduction benefits

Resiliency

emergency power sources to address grid failure and storm outages, particularly for critical infrastructure

Transmission and Distribution network optimization

to enhance the use of existing infrastructure, defer future grid upgrades, and improve reliability



Track 1: Focused on developing distributed resource market
Track 2: Focused on reforming utility rate making practices

All parties involved in the process engaged in **collaborative efforts**

Two Working Groups under five committees: Markets, Customers Engagement, Platform Technology, **Microgrids** and Wholesale Market

REV Keystones

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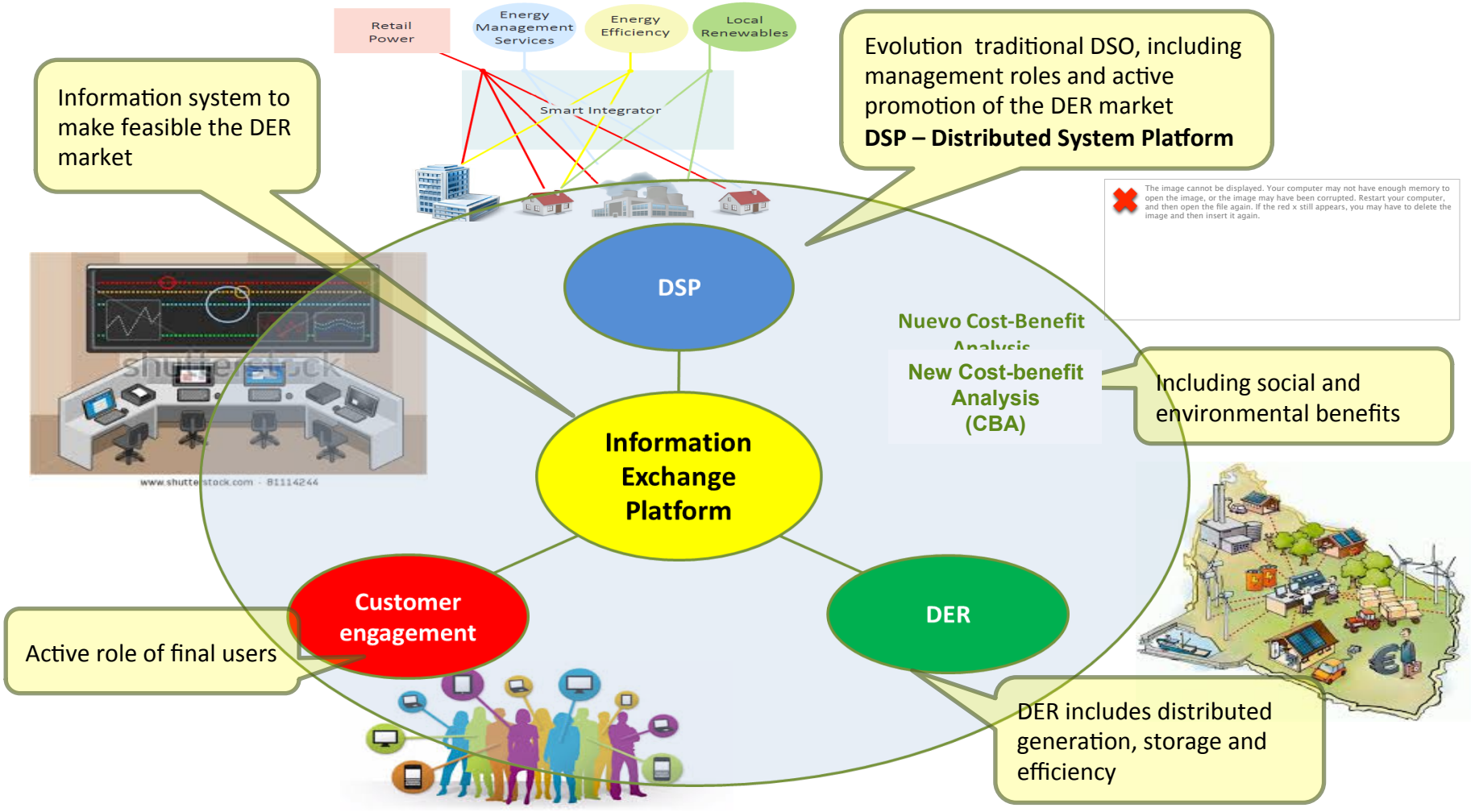

Microgrids within REV: DSP as an enabler

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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**

The reformed system – driven by consumers and non-utility providers – will be **enabled by utilities acting as DSP providers**. This new electric distribution system platform **will allow distributed energy resources** such as solar energy, wind energy, storage, and demand response to more efficiently benefit customers and the grid

NY State Department of Public Service recommends that DSP market design, including the valuation of DER, should be applicable to microgrids, and that the **DSP should incorporate microgrids into system planning when advantageous and cost effective**.

NY State Department of Public Service proposes that **consideration should be given to all ownership** models for microgrids (i.e. single or multi-owned, community grids, utility owned, etc.)

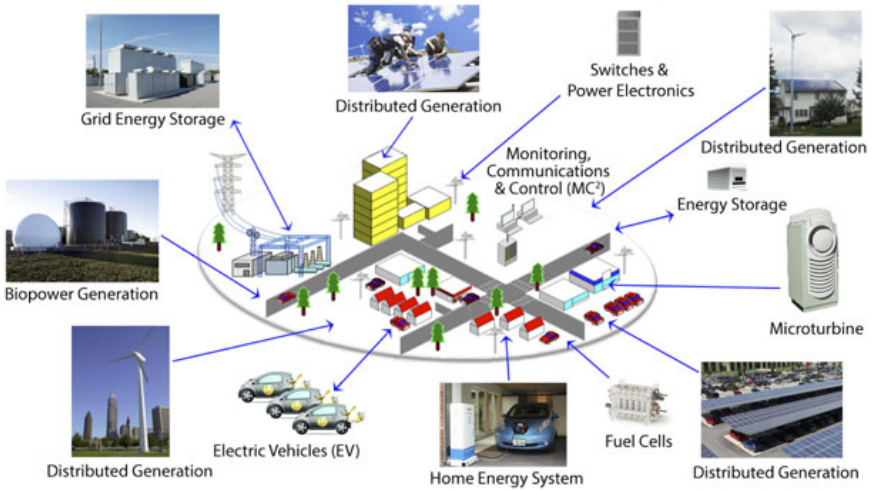

Image Courtesy of CleanCoalition

Source: CASE 14-M-0101 Straw Proposal on track one issues

Microgrids within REV: attributes

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"[a] group of interconnected loads and distributed energy resources (DER) with clearly defined electrical boundaries that acts as a single controllable entity with respect to the grid [and can] connect and disconnect from the grid to enable it to operate in both grid connected or island mode" *(The United Stes Departm,ent of Energy definition)*

Microgrids, apart for others, **have a great potential providing resilience** in case of grid outrages but also as a means of **integrating clean distributed resources** and **offering grid services** such as demand reduction and ancillary services. They are **not new** and **are not conventional backup power**.

The **REV** specific policy toward **microgrids** will be cantered on **five attributes**:

Ability to **optimize system efficiency** within the microgrid: integration of clean distributed generation and addressing grid constraints

Interconnection with the larger utility systems

Resilience and the ability to island in the event of system outage

Consumer protections for residential customers

The obligation to provide **reliable power and reasonable rates**

Microgrids within REV

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Benefits:

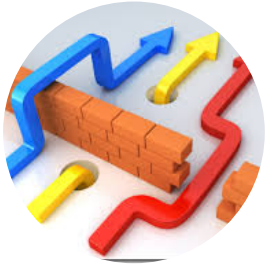
- **Deploy** forms of **distributed generation**
- Offer potential for **efficiency improvements**
- With **generation sited at or near the load**, there are **negligible line losses** compared to the typical line loss experienced in the centralized generation system
- Can offer **increased reliability and resilie**ncy
- **Critical loads** within the microgrid to be **served with little or no interruption**
- **Offer capacity, elastic load and ancillary services** to the distribution and bulk electric systems

Barriers:

- **Lack of a regulatory framework**
- **Standby rates**
- Inadequate **valuation of benefits**
- **Interconnection procedures**
- **Wholesale market** treatment and **customer engagement**

Need:

- Provision of **clear guidance** as to the configurations that will gain approval
- **Avoid constraints to innovation** by prescribing the exclusive pathways for microgrids development
- Establish and define **several configurations** that will be presumptively permissible
- Important of establishing **clear rules for potential market participants**



NY State Department of Public Service thinks these barriers may be addressed in REV through regulatory reform and DSP market development

NY Prize: boosting Microgrids within REV

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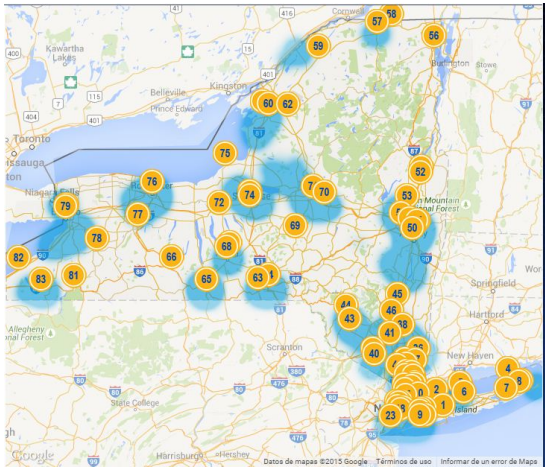
A first-in-the nation $40 million competition to help **communities create microgrids** - standalone energy systems that can operate independently in the event of a power outage. **NY Prize will inform the REV process**, ultimately serving as a demonstration of the benefits of microgrids across New York State

Traditionally, microgrids have served only one user, such as a university or hospital. NY Prize's community-based **focus is to connect multiple users through DERs** with more reliable and secure energy sources.

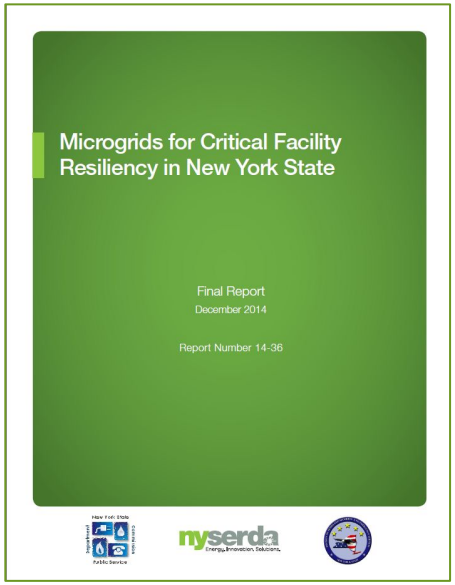
Community microgrids will often build on existing infrastructure and equipment, connecting multiple users in a neighborhood, in the event of a power outage, offering energy independence as well as local power generation and distribution. Applicants must include the local electric distribution company and more than one entity that will benefit from the microgrid



Target areas in the **NY Prize Opportunity Zone Map** show approximate geographic areas that have been identified by the local electric distribution companies in New York **where microgrids may reduce utility system constraints, and defer expensive infrastructure investment costs**. 83 Communities selected for feasibility studies.

http://www.nyserda.ny.gov/All-Programs/Programs/NY-Prize

Study: Microgrids for Critical Facility



The primary objective of the study is to **assess the practical feasibility of establishing microgrids to enhance the resiliency of facilities** that provide critical public safety, health, and security support upon loss of the electric grid for an extended period (more than 72 hours) due to natural or manmade disasters.

This report **complement** the New York Prize Initiative within REV. In particular, the Benefit-Cost Analysis (CBA) tool developed under this project provide a foundation for assessing the benefits of more broadly defined community grids.

Report cover **8 topics** for providing findings and recommendations:

- Knowledge if "**critical facilities" desire to collaborate** on successful microgrids
- Selection of **geographic areas**
- **Type** of microgrids
- How the **operation** of microgrids would conform with the current utilities
- **Regulatory** structure
- **Technical** and regulatory aspects
- Adequacy of a microgrid to **operate in emergency situations**
- **Funding** mechanisms

www.nyserda.ny.gov/-/.../Microgrids-for-Critical-Facility-NYS.pdf

Study: Microgrids for Critical Facility

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Major Findings:

- Microgrids in support of critical infrastructure **is usually not feasible based on a benefit-cost analysis** >> due to the existing robust generation available
- Microgrids **designs are highly unique** >> **difficult to compare or extrapolate** benefit and costs from one site to another
- Cost for microgrid design and installation **depends of the network** (e.g. rural vs complex urban)
- The **cost-effectiveness of a microgrid improves** if the system can economically **operate on a more frequent basis** (rather than solely as back-up generation in the event of emergencies)
- There is a **lack of information available to potential microgrid** developers on site characteristics that favour microgrids development
- **Economic constraints** (e.g. limited budgets) >> funding support needed

Major Recommendations:

- Pursue microgrid **development** at critical infrastructure sites **only if supported by favourable CBA**
- **Encourage further development** on microgrid technology and appropriate applications
- **Disseminate objective information**, tools, and other resources to **encourage development** of promising and cost effective microgrids projects that may improve resiliency of critical infrastructure
- **Perform CBA to compare** smartgrid solution and alternatives options.

Microgrids status in NY State

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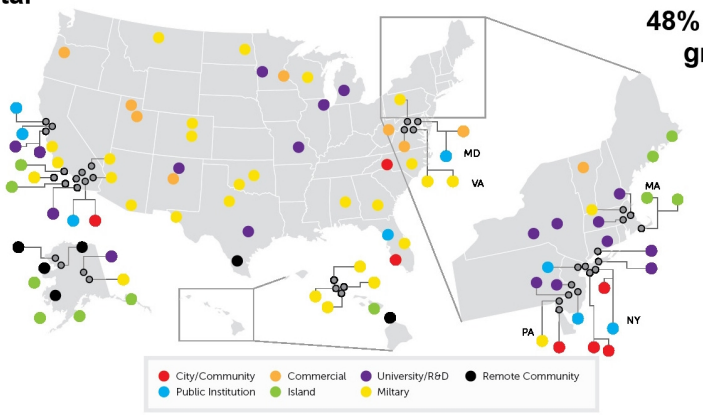
Map of U.S. Operational Microgrid Deployments

124 microgrids* are currently in operation, with a total generation capacity of 1,169 MW



48% of operational micro-grids are located in Northeast (29%) and West Coast (19%) states

Regional hotspots include California (23), Alaska (12), New York (10), and Hawaii (8).

Source: GTM Research North American Microgrids 2015

- ✓ **Applications are increasingly** developing across the country
- ✓ **Additional information about microgrids in New York is expected to be available soon**. (e.g.the New York State Smart Grid Consortium is also compiling a database of microgrid projects in NY State)
- ✓ While **CHP and wind constitute the majority** of the generation capacity supporting operational microgrid installations, the share of **PV capacity is expected to grow**.
- ✓ It is estimated that **capacity in North America** would be **2,022 MW by 2017**. The predominant segments within this estimate are **campus or institutional applications** (at 1,572 MW) and **stationary military bases** (at 450 MW). (source: Navigant)

Thank you for your attention

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