

# The Role of Flexible & Resilient Energy Generation in the U.S.

**IEA CHP/DHC Collaborative & CEM DHC/CHP Working Group  
Strategic Joint Meeting**  
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Robert P. Thornton  
President & CEO

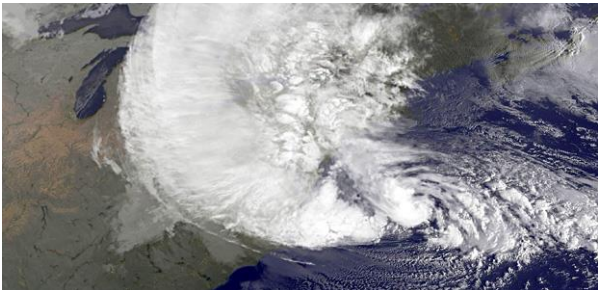
Katrina Pielli  
Senior Advisor for International Energy Efficiency  
and Clean Energy Technologies



# Today

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- ▶ US Utility Realities
- ▶ Drivers for Focus on Resiliency
- ▶ Current Key Issues – Federal
- ▶ Current Key Issues -- State
- ▶ District energy / microgrids and community planning



# Utility Realities in the U.S. = Focus on Resiliency

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- ▶ Convergence of circumstances driving fundamental change in the electric industry, including:
  - ▶ Cost pressures caused by need to replace aging supply and delivery infrastructure.
  - ▶ Increased customer reliance on reliable and high-quality electricity.
  - ▶ Need to reduce carbon emissions and the associated costs and threats to infrastructure posed by increasingly severe climate events.
  - ▶ Security threats to electric systems, both cyber and physical.
  - ▶ Technology developments in distributed generation and information systems, which challenge incumbent systems and present opportunities for transformation of those systems.
  - ▶ Electric price volatility caused by increasingly greater dependence on natural gas as a primary generation fuel source.

# Drivers for Focus on Resiliency

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- ▶ Governors, Mayors, Planners and Regulators now facing fragility of grid – seeking viable solutions due to frequent and more severe storm outages.
    - ▶ Desire to expand local tax base & replace remote generation
    - ▶ Local energy supplies improve trade balance & drive economic multiplier
    - ▶ More sustainable and reliable energy sources to help compete for high quality employers, factories, tenants
    - ▶ Cutting GHG emissions and addressing climate adaptation
    - ▶ Local infrastructure advantages in extreme weather events
  - ▶ “Microgrids,” “community grids,” and “district energy:” Best operating examples are universities with robust district energy/CHP and some military bases.
  - ▶ Beyond technical needs: Focus needed on regulatory reform; proper valuation of business continuity; grid integration and business models to ensure robust assets are deployed.
  - ▶ Favorable precedents and policies emerging but much more to do.
  - ▶ District Energy/CHP well positioned but need focus and more awareness.
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# Current Key Federal Actions

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## Congress:

- ▶ Key Congressional energy legislation introduced and stalled (again) in Senate: Shaheen/Portman Bill (S.2074 - *Energy Savings and Industrial Competitiveness Act of 2014*). Failed to pass cloture 5/12
- ▶ “*Local Energy Security and Resiliency Act*” (S.1205) – district energy loan guarantee and technical assistance; bi-partisan sponsors. To be re-introduced in 2014.

## Administration:

- ▶ Obama Administration announced climate change agenda on June 25, 2013 to include executive orders and regulatory actions.
  - ▶ Environmental Protection Agency
- ▶ US DOE CHP Technical Assistance Partnerships
- ▶ US DOE EERE Grid Integration Multi-Year Program Plan

FERC: National advocacy groups forming to improve market access and regulatory framework for microgrids

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# US DOE EERE Grid Integration Plan: Vision of the Future Grid

Cost-Effective  
and Reliable



Clean and  
Efficient



Secure and  
Resilient

Accessible to New  
Technologies

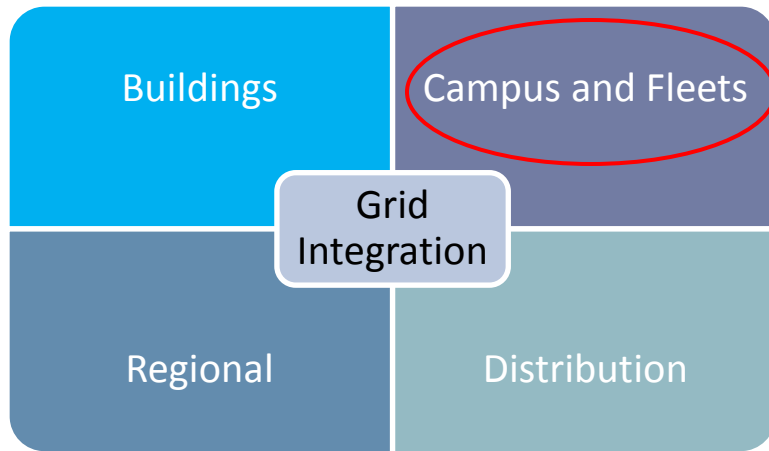


Empowered Consumers  
with Options

**A seamless, cost-effective electricity system, from generation to end-use, capable of meeting all clean energy demands and capacity requirements, with:**

- Significant scale-up of clean energy (renewables, natural gas, nuclear, clean coal)
- Universal access to consumer participation and choice (including distributed generation, demand-side management, electrification of transportation, and energy efficiency)
- Holistically designed solutions (including regional diversity, AC-DC transmission and distribution solutions, microgrids, energy storage, and centralized-decentralized control)
- Two-way flows of energy and information
- Reliability, security (cyber and physical), and resiliency

# US DOE EERE Grid Integration Plan: Addressing Challenges by Scale



Microgrids for energy reliability; integrating high penetrations of RE and EE technologies into microgrids.

1. Multi-source energy integration and optimization; how to combine and optimize the performance of multi-domain energy systems.
2. Aggregation of geographically dispersed assets; communications and control over geographically distributed areas and large numbers of devices.
3. Microgrids for energy reliability; integrating high penetrations of RE and EE technologies into microgrids.

## Energy System Physical Scales

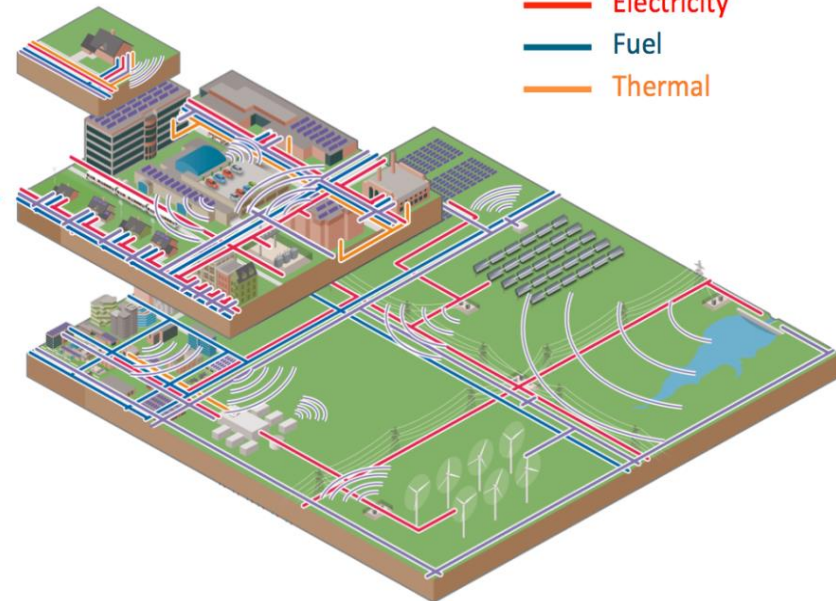
Buildings

Campus, Fleet,  
Distribution

Regional

## Energy Grids

- Electricity
- Fuel
- Thermal





# Current Key State Actions

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## ▶ **New York:**

- ▶ Gov. Andrew Cuomo announced **Reforming the Energy Vision** April 24. Utility Commission staff report and proposal (case 14-M-0101, April 24, 2014). Calls for more distributed generation; utility flexibility.
- ▶ REV would create a Distributed System Platform Provider (DSPP); a grid operator that manages distributed energy much the way independent system operators now manage bulk power markets in the United States.
- ▶ DSPP - market platform where regulated and competitive distributed energy players buy and sell. Creates tariffs and systems to monetize energy efficiency, microgrids, CHP, energy storage, demand response, distributed generation, building management systems, and other forms of distributed energy. Would also target distribution grid needs, measure programs, and handle payments and transactions.
- ▶ Jan 2014: NY Prize initiative -- \$40 million competition to jump-start at least ten independent, community-based electric distribution systems across New York State. Trend toward developing microgrids for increased reliability, resiliency, and energy efficiency.
- ▶ Oct 2013: \$20 million competition to create new microgrids in Nassau and Suffolk counties. Winner of each county contest will receive \$10 million





# Current Key State Actions (cont'd)

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## ▶ **Connecticut:**

- ▶ June 2014: Second round for microgrid grant proposals due. \$15 million available. Expanded scope beyond just municipal mission critical. Little emphasis on clean resources; more on resiliency, business continuity.
- ▶ Aug 2013: \$18 million to fund 9 microgrid projects using natural gas, fuel cells, renewables and other power sources. One project uses natural gas CHP. Primarily supporting mission critical public facilities.
- ▶ Wesleyan Univ 3.2 MW District energy/CHP for area of refuge at arena.
- ▶ 2013: Law legalizing microgrids that distribute electricity across public streets as long as the power source generates no more than 5 megawatts of electricity and serves a critical municipal facility.
- ▶ 2012: **Public Act 12-148** created a statewide microgrid program; following Governor's Two Storm Panel on widespread weather-related grid outages.



# Current Key State Actions (cont'd)

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## ▶ **Massachusetts:**

- ▶ **Jan 2014** Gov Patrick announced ***Community Clean Energy Resiliency Initiative*** - \$40 million municipal resilience grant program by Mass Dept of Energy Resources, to enable cities and towns to harden energy services at critical sites using clean energy technology.
  - ▶ Grants funded through Alternative Compliance Payments -- paid by electric retail suppliers if they have insufficient Renewable or Alternative Energy Certificates to meet their compliance obligations under the Renewable and Alternative Portfolio Standard programs.
  - ▶ **DPU Grid Modernization Study** underway since 2012; major utility rate case pending in 2015.
  - ▶ **City of Boston** Microgrid/District Energy research underway; 3 part Microgrid workshops with public utilities and regulators
  - ▶ **Green Communities Act of 2008** – Alternative Energy Portfolio Standard for CHP thermal payments to CHP operators
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# Current Key Local Actions

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- ▶ **California - California Energy Commission** awarded \$1.6 million for **UC San Diego microgrid** through R&D program, utilizing multiple stand-alone energy storage technologies.
- ▶ Numerous cities & towns studying district energy/CHP
  - ▶ Boulder, CO
  - ▶ Pittsburgh, PA
  - ▶ Montpelier, VT (construction nearly complete)
  - ▶ Grand Marais, MN



# For More Information

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**Katrina Pielli**

**U.S. Department of Energy**

[katrina.pielli@ee.doe.gov](mailto:katrina.pielli@ee.doe.gov)

U.S. DOE - Distributed Energy /  
Combined Heat & Power Program  
<http://www1.eere.energy.gov/manufacturing/distributedenergy/index.html>

U.S. DOE – Office of Energy  
Efficiency & Renewable Energy  
<http://energy.gov/eere/office-energy-efficiency-renewable-energy>

**Rob Thornton**

**IDEA**

[Rob.idea@districtenergy.org](mailto:Rob.idea@districtenergy.org)

International District Energy  
Association  
<http://www.districtenergy.org/>



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# Appendix

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# Federal Hurricane Sandy Rebuilding Task Force

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- ▶ August 2013: Federal Hurricane Sandy Rebuilding Task Force published “*Hurricane Sandy Rebuilding Strategy*”
- ▶ Describes how CHP and district energy with CHP played a successful role in keeping a number of college campuses, multifamily housing, critical medical facilities, sewage treatment plants and other facilities running during the storm and its aftermath.
- ▶ Strategy offers **two recommendations** to bolster CHP, district energy and other forms of clean distributed generation:
  - ▶ Ensuring that Sandy recovery energy investments in critical infrastructure are resilient (Recommendation 12)
  - ▶ Encouraging Federal and State cooperation to improve electric grid policies and standards (Recommendation 14).



# DOE / EPA / HUD Guidance: CHP for Reliability & Resiliency in Buildings

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- ▶ DOE, EPA and HUD “***Guide to Using Combined Heat and Power for Enhancing Reliability and Resiliency in Buildings***” to assist State and local officials and others involved in the Hurricane Sandy rebuilding process.
- ▶ Purpose: to provide practical information on CHP, including what factors must be considered when configuring a CHP system to operate independently of the electricity grid, and what steps are involved in a typical CHP project development process.
- ▶ Includes focus on district energy, microgrids and CHP.