



**Microgrids in New England:
A Workshop Series for Communities and Stakeholders**

**Connecticut Legislative Office Building
Public Hearing Room 2E**

*Microgrids
and
Integrated Utility Infrastructure*

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Microgrid: Defined and Redefined

□ Electric Only Microgrid = Reliability

- US DOE: “a group of interconnected loads and distributed energy resources within clearly defined **electrical** boundaries that acts as a single controllable entity with respect to the grid. . . .”
- Connecticut Office of Legislative Research: “generally refers to a small scale **electric** distribution network”

□ Integrated Utility Microgrid = Reliability+Efficiency

- Cooling and Heating Reduces Electric, Fuel and Emissions
- Integrated Demand and Supply Accommodates Renewable Electric and Thermal
- Waste Heat Utilization Reduces Water and Wastewater Impact
- Wastewater Reclamation Option Further Reduces Water Impact

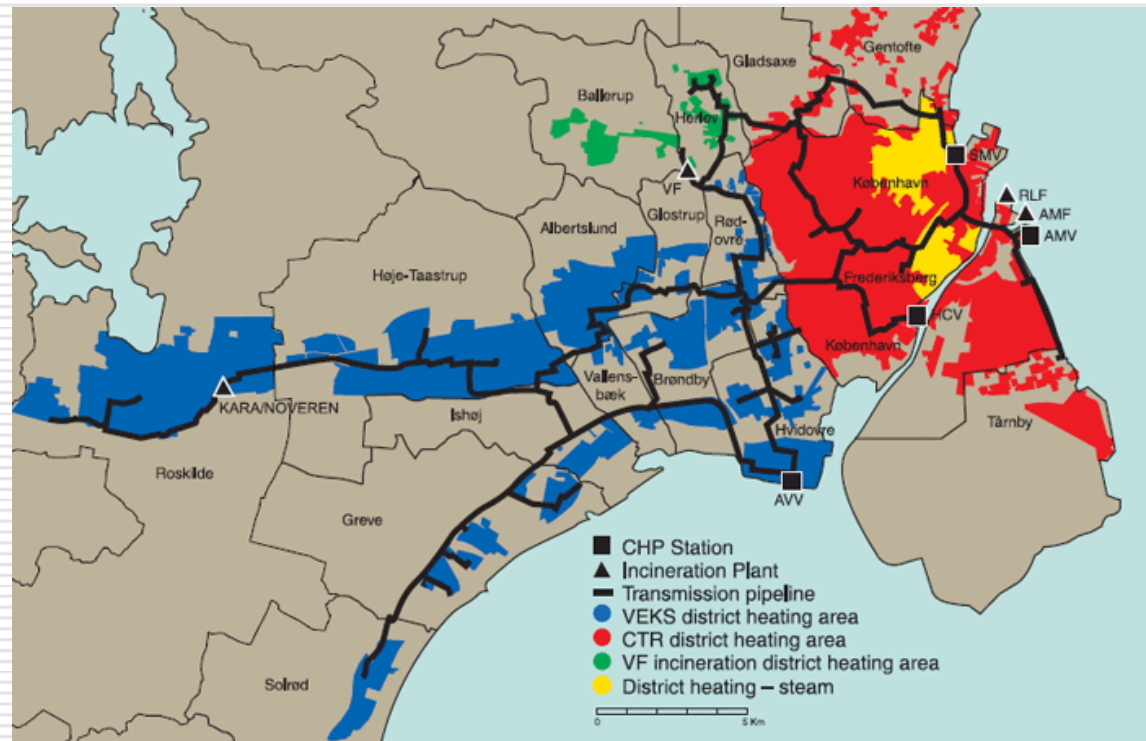
Regulatory Boundaries: Sectors as Silos

- Connecticut 2012 Comprehensive Energy Strategy (Sectors):
 - Energy Efficiency
 - Electricity
 - Industry
 - Transportation
 - Natural Gas

- “Microgrid” addressed within Electric Sector as Reliability Enhancement

Integrated Microgrid: Electric and Thermal

- ❑ >50% of Thermal from recycled heat
- ❑ Renewable Energy integral part of supply
- ❑ Electric Generation uses Minimum Water
- ❑ Requires well coordinated and integrated utility infrastructure



Greater Copenhagen, Denmark
Electric and Thermal Infrastructure

Utilities Coordination: 100+ Year Paradigm

□ First-In Wins:

- Storm Sewers
- Sanitary Sewers
- Natural Gas
- Electric
- Telephone
- Steam
- Communication
- Chilled Water & Hot Water



Courtesy Consolidated Edison Company of New York

Utilities Coordination: Paradigm Shift Opportunity

- ❑ Connecticut Utilities Projects
 - Natural Gas Expansion – Statewide (900 miles of All New Piping)
 - MDC Hartford Clean Water Project (160 miles of Sewer Separation)

Connecticut is only 70 x 110 miles !



MDC Clean Water
Project Excavation

- ❑ New England Utility Infrastructure At End of Life
 - Thousands of trench miles will be excavated
- The time is now for Microgrids and Integrated Utilities !**

Thank You!



**Marstal, Denmark 1,500 Customer Solar District Energy
Solar Thermal Provides 50% of Space Heating
Integrated Solar, Heat Pump and Biomass Boiler/ORC
Fueled on Locally Produced Biomass**



**Drakes Landing, Okotoks, Alberta, Canada
Solar Thermal Provides 90% of Space Heating
(Alberta has 5,199 Heating Degree Days/Year)**