Federal Utility Partnership Working Group Meeting

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New Products & Services
April 14, 2010

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The Future of Energy Video

(6) Mins

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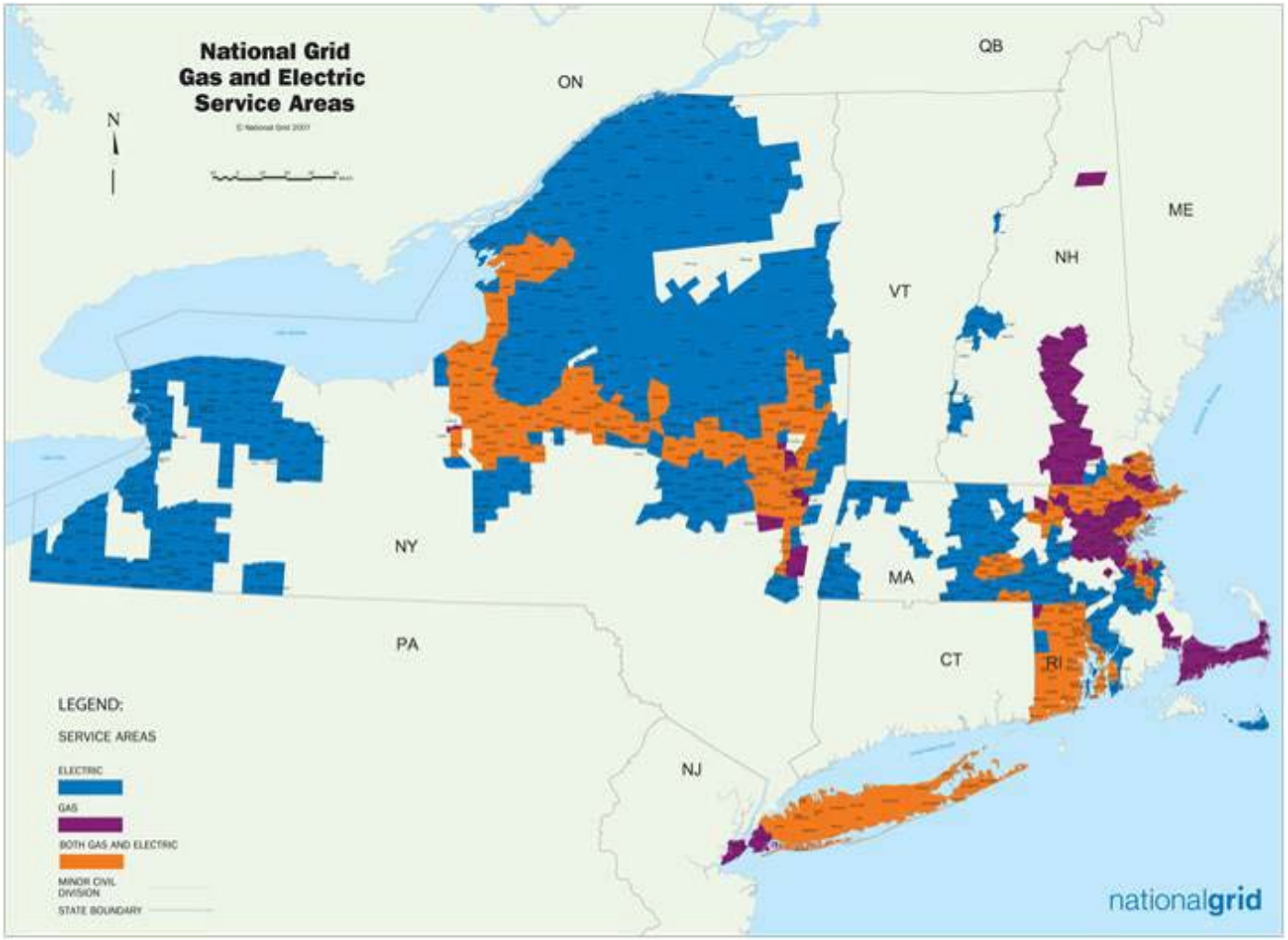
Electricity and Gas Service Areas - US



- Distributes electricity to 3.3 million customers
- Services 1.1 million customers of Long Island Power Authority (LIPA)
- Provides natural gas to 3.5 million customers
- Currently owns over 4,000MW of generation

•Based on customer numbers; includes the servicing of LIPA's 1.1 million customers

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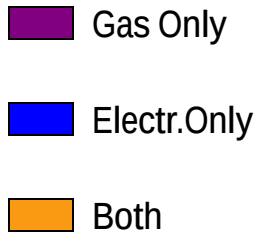
Who are we to the Public Service Commissions?
One Company with 13 Sets of Local Rates Plus LIPA

- **Boston Gas Company**
  d/b/a KeySpan Energy Delivery New England
- **The Brooklyn Union Gas Company**
  d/b/a KeySpan Energy Delivery New York
- **KeySpan Gas East Corporation**
  d/b/a KeySpan Energy Delivery Long Island
- **Niagara Mohawk Power Corporation d/b/a National Grid**
- **Colonial Gas Company (Lowell & Cape)**
  d/b/a KeySpan Energy Delivery New England
- **Essex Gas Company**

  d/b/a KeySpan Energy Delivery New England
- **Massachusetts Electric Company d/b/a National Grid**
- **Nantucket Electric Company d/b/a National Grid**
- **The Narragansett Electric Company d/b/a National Grid**
- **Granite State Electric Company d/b/a National Grid**
- **Energynorth Natural Gas, Inc.**
  d/b/a Keyspan Energy Delivery New England



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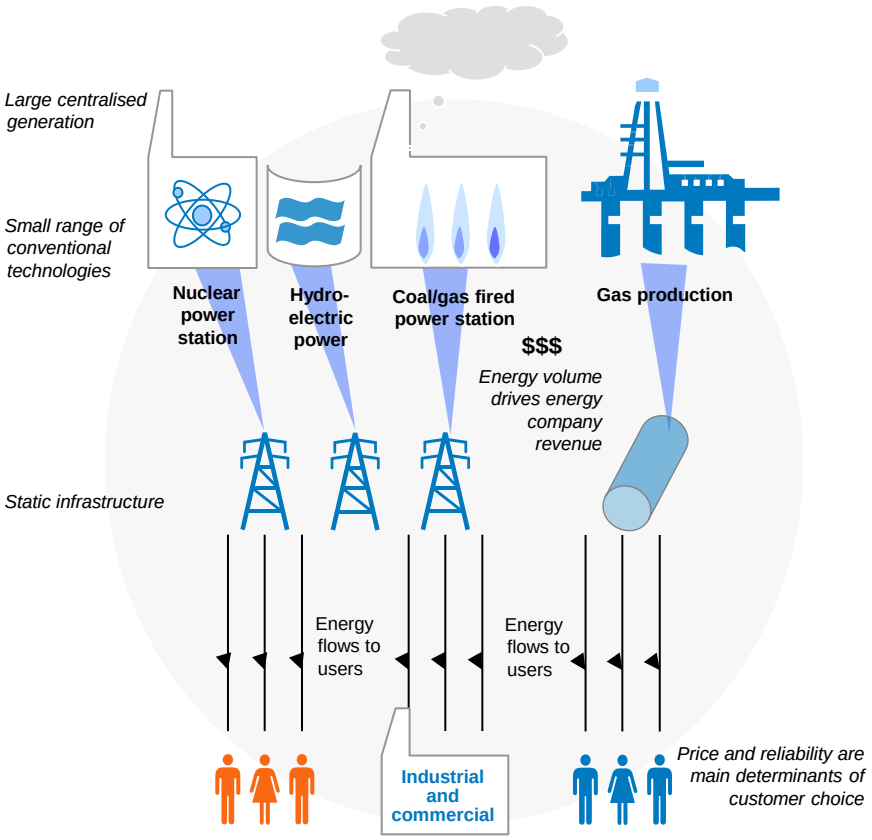
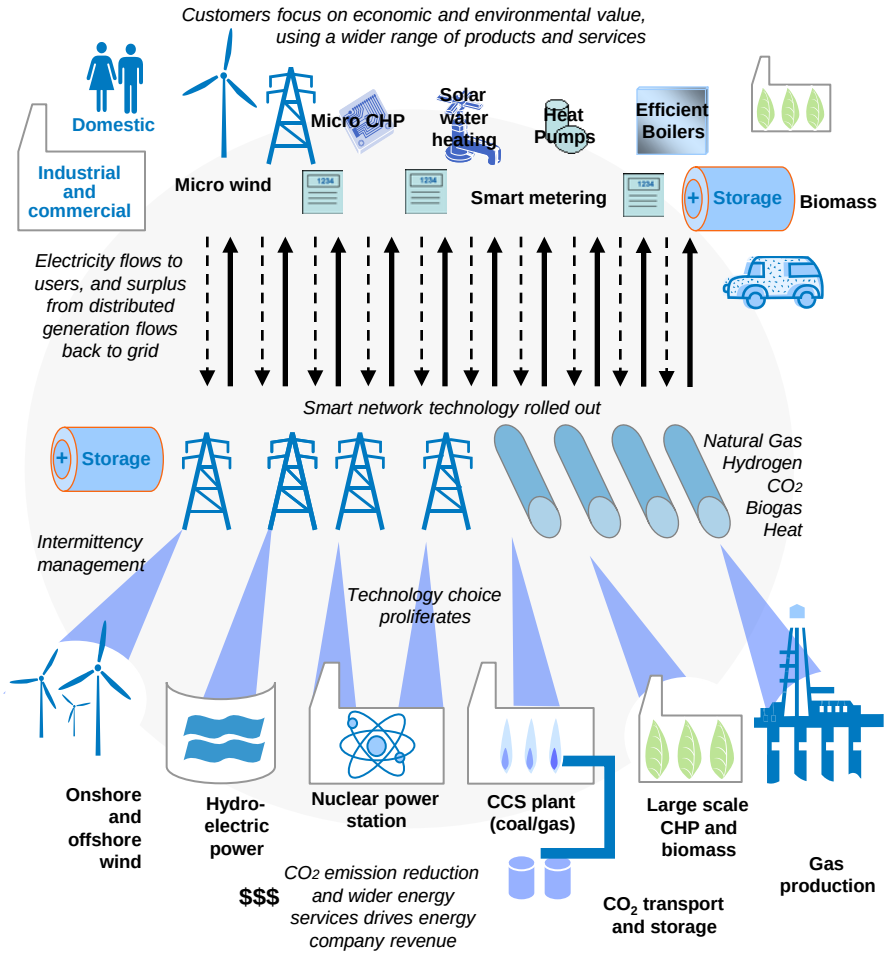
Energy Services are Transforming

Traditional Energy Market - supply driven



Today's Evolving Market - customer driven



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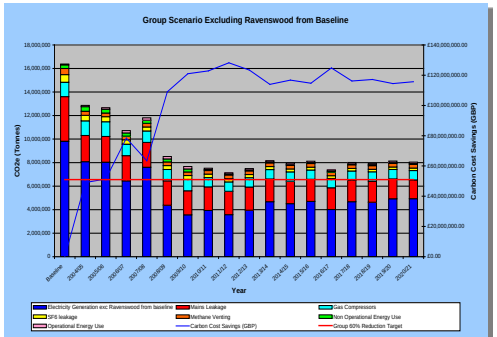
Creating a Climate for Change at National Grid

Delivering a low carbon future

- Research and Development
- Adaptation Studies
- Engineering Forum Design-in Low Carbon Solutions
- SF6 Reduction Group
- Energy Users Group, SCM, Fleet
- Carbon Budgets
- Shadow Price of Carbon

Business Plan for Carbon Emissions Reduction



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Reduce our greenhouse gas emissions

by **80%** by 2050…

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We combat climate change through energy efficiency, efficient technologies and natural gas conversion

- **April 18, 2008: National Grid will reduce GHG emissions 80% by 2050**
  - **Helping customers reach their goals**
  - **Reducing National Grid's own impact**
- **Greenhouse gas emissions already reduced by 36% in UK & 20% in U.S. through:***
  - **Gas and electric efficiency programs**
  - **Promoting development and deployment of efficient technologies (CHP, high-efficiency heating & water heating, fuel cells, solar thermal, envelope improvements, thermostats and boiler resets)**
  - **Oil-to-gas conversions (reduce GHG emissions by 27% to 40%)**

"Minimising our impact on the environment while delivering safe, secure and economic supplies of energy to customers is not an option, it is a must."

– Steve Holliday, National Grid CEO

*National Grid Facts and Background Information:
http://infonetus/corp_comm/nonhtml/fact_map_faq/fact_sheet_rev_040108.pdf

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Capabilities in Areas of Interest to Federal Agencies

- **Energy Efficiency**
  - Building Envelop
  - Energy Service Equipment
  - Demand Management
  - Combined Heat & Power (including Fuel Cells)
- **Renewable Energy**
  - Electricity: Solar & Wind
  - Gas: Renewable Pipeline Gas
- **Energy Infrastructure Expansion**
  - Oil to Gas Conversion
  - Campus Gas & Electric
- **Alterative Fuel Vehicle Infrastructure**
  - Compressed Natural Gas
  - Battery Electric & PHEV

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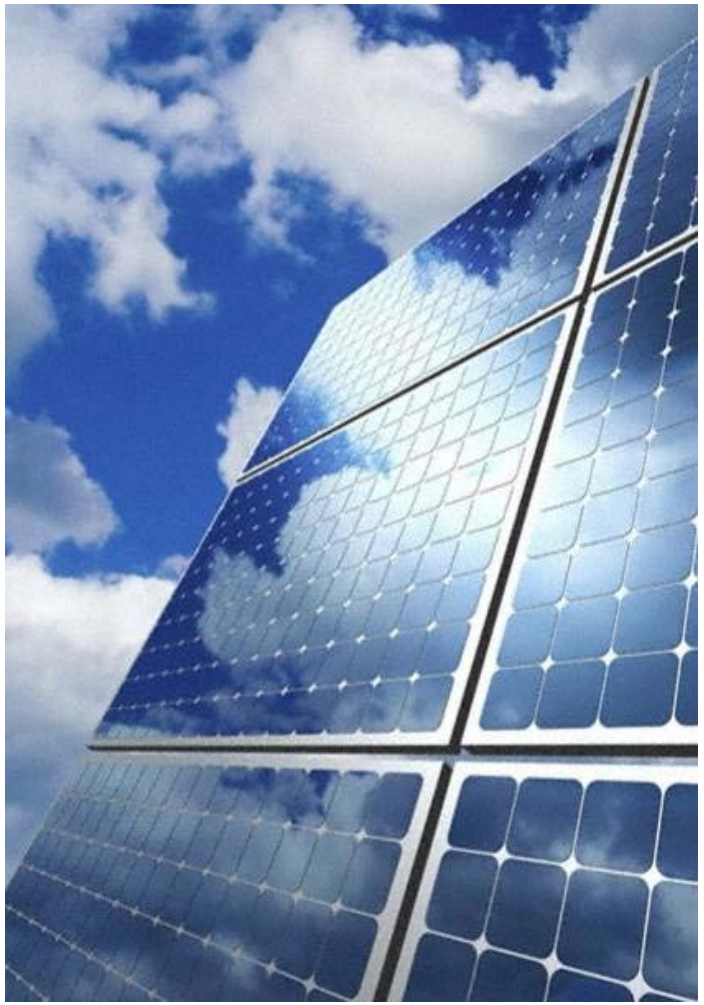
National Grid's Solar Program

- National Grid is working to implement the renewable provisions in all of our States
- National Grid Solar Program to consist of:
  - Solar on Company sites
  - Solar on state, municipal, school, commercial, low-income multifamily property
  - Solar program offering financial assistance and industry training/education

Potential exists for NG ownership of larger scale renewable investments provided it is part of the regulated utility



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MA Project Highlights

- 5 National Grid owned sites
- 4 of the sites were historically manufactured gas plants
- 1 site is an active materials distribution center
- Once approved by DPU - construction expected to begin Fall/Winter 2009

Location	Site Description	Capacity (MW)	Estimated Annual Output (kWh)	Installed Cost
Dorchester	**Former MGP**	1.3	1,557,549	$9,374,286
Everett	**Former MGP**	0.62	837,032	$3,902,902
Haverhill	**Former MGP**	1	1,327,604	$5,881,440
NEDC	**Warehouse Roof**	1.2	1,247,425	$6,513,183
Revere	**Former MGP**	0.75	886,319	$5,406,492
	Total	4.88	5,855,929	$31,078,303

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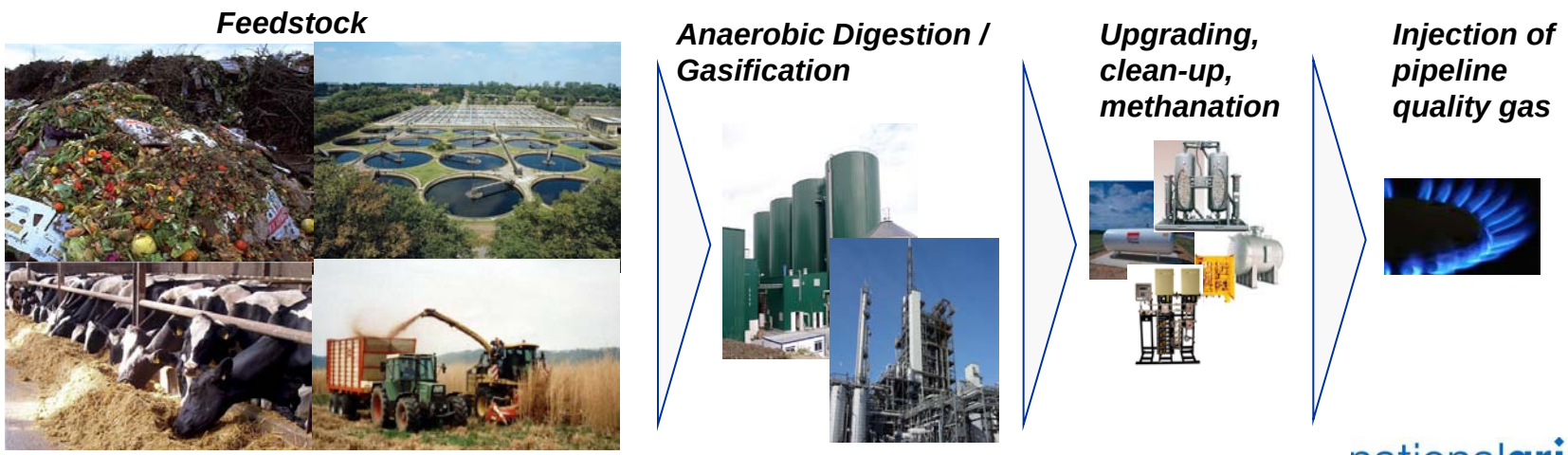
Renewable Gas is methane derived from biomass resource that is injected into the gas distribution network

- Produced from anaerobic digestion (AD) or thermal gasification (TG) of biomass
- Sources of biomass include waste water treatment plants, landfills, wood waste, livestock manure, municipal solid waste and energy crops
- The biogas produced via AD contains around 60% CH_4 and 40% CO_2 as well as small amounts of inorganic compounds such as N_2, O_2,H_2S. The gas must be upgraded and cleaned to create renewable gas before it can be grid injected.
- The TG process produces “synthesis gas” (syngas) which is a mixture of gases that can be cleaned up and upgraded to produce pipeline quality gas



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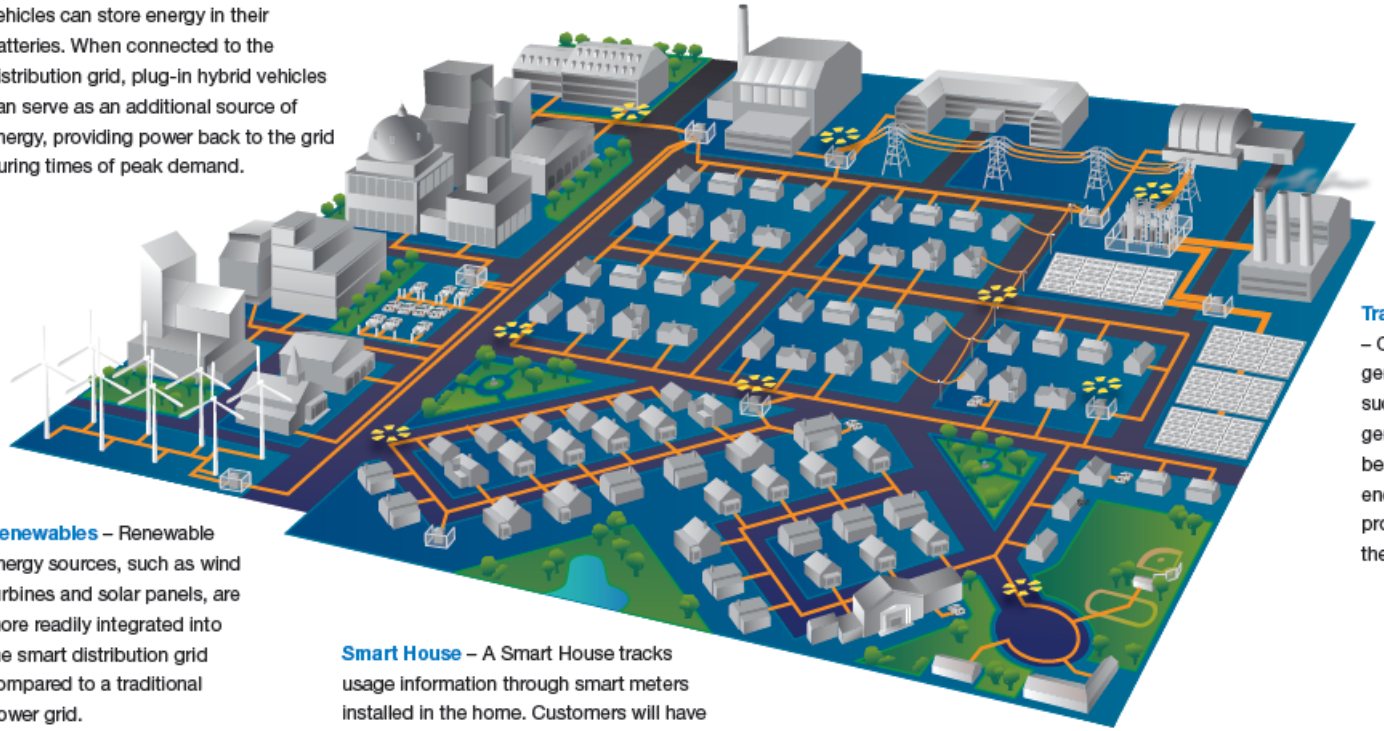
What is a Smart Grid?

Sensors – Advanced communication equipment on the grid, including sensors, enable utilities to monitor, identify and quickly correct problems. Increased reliability of power is the result.

Plug-in Hybrid Vehicles – Plug-in hybrid vehicles can store energy in their batteries. When connected to the distribution grid, plug-in hybrid vehicles can serve as an additional source of energy, providing power back to the grid during times of peak demand.



Traditional Generation – Over time, traditional generation assets such as coal-fired generation plants will be offset by renewable energy sources in providing energy to the distribution grid.

Renewables – Renewable energy sources, such as wind turbines and solar panels, are more readily integrated into the smart distribution grid compared to a traditional power grid.

Smart House – A Smart House tracks usage information through smart meters installed in the home. Customers will have a variety of options through which they can interface with to learn about the most cost-efficient energy usage patterns. Increased information empowers consumers to reduce their energy use.

National Grid Smart Grid Pilot Proposal

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Energy Efficiency Program Overview

- **Programs For All Sectors**
  - **Residential**
  - **Commercial**
  - **Industrial**
  - **Government**
- **4.7 million National Grid customer projects completed in New England**
  - **Customers saved more than $3.6 billion in energy costs**
- **Programs save customers over $300 million annually**
- **Over $1.5 billion invested in efficiency**

Electric Programs

- Electric efficiency programs introduced in 1987
- Programs first implemented in MA, RI, and NH *(upstate NY in mid 2009)*
  - *2009 budget:* ~ $188 million

Gas Programs

- Gas efficiency programs first introduced in 1991 in MA then NH, and in downstate NY and RI in 2007 *(upstate NY in October 2008)*
  - *2009 budget*: ~ $59 million*

National Recognition

- Over 10 awards received in 2008 alone (ENERGY STAR, EPA, ACEEE, Massachusetts Innovation and Technology Exchange)

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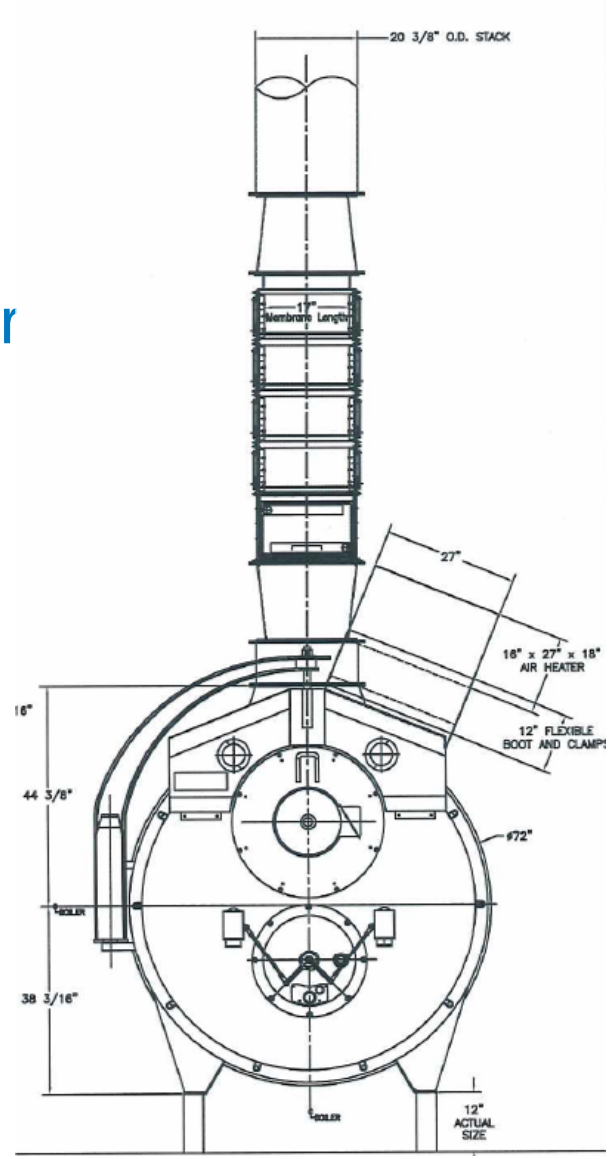
Example: Energy Efficiency in Future

DOE High Efficiency Commercial Steam Boiler



- **High Efficiency Commercial Steam Boiler**
  - **94% Steam Production Efficiency**
  - **Gas only, possible dual-fuel (not at 94% on oil)**
  - **No increase in floor space**
  - **Size: 300 hp and greater**
- **GTI Project with USDOE Support since 2003**
  - **Cleaver Brooks**
  - **Sempra & other utilities**
- **National Grid Demonstration**
  - **Richardson Brands Candy**

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National Grid Investigations with Micro-CHP

plug power

PEMEAS Fuel Cell Technologies

VAILLANT GROUP Vaillant

(1.0-kW PEM)

Climate Energy

(1.0-1.2 kW Honda Engine)

DISENCO

Kinematic Stirling
(e.g. Disenco Prodrive)

Panasonic

PEM (0.5-3kW)

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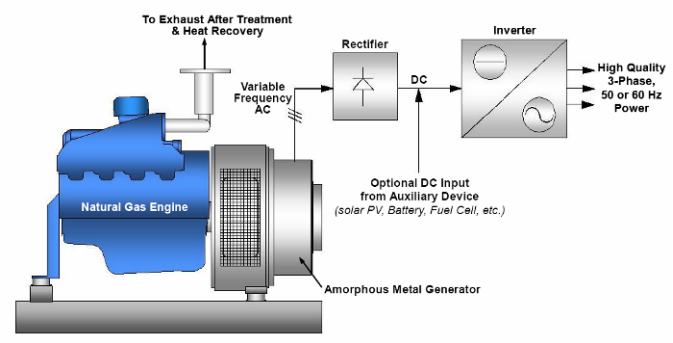
National Grid Investigations with Commercial CHP



TECOGEN®

(Tecogen CM-100 (inverter)

Capstone®

Capstone Micro-turbines

UTC Power
A United Technologies Company

UTC Fuel Cells
(1.4 MW w/Verizon)

Yanmar 25 kW
@ η_e = 29-33%

YANMAR

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National Grid Background with Alternative Fuels

- **Compressed Natural Gas**

  - National Grid delivers 30 Million gasoline gallons equivalent annually to more than 4,000 commercial vehicles at 40 stations

- **Hydrogen and Blends**
  - New Hydrogen, HCNG and CNG Fueling Station at the Town of Hempstead, Long Island

- **Plug-in Hybrid & Battery Electric Vehicles**
  - Evaluation of interactivity of PHEV's and BEV's in NY, RI & MA included in National Grid's Smart Grid Proposal under ARRA.

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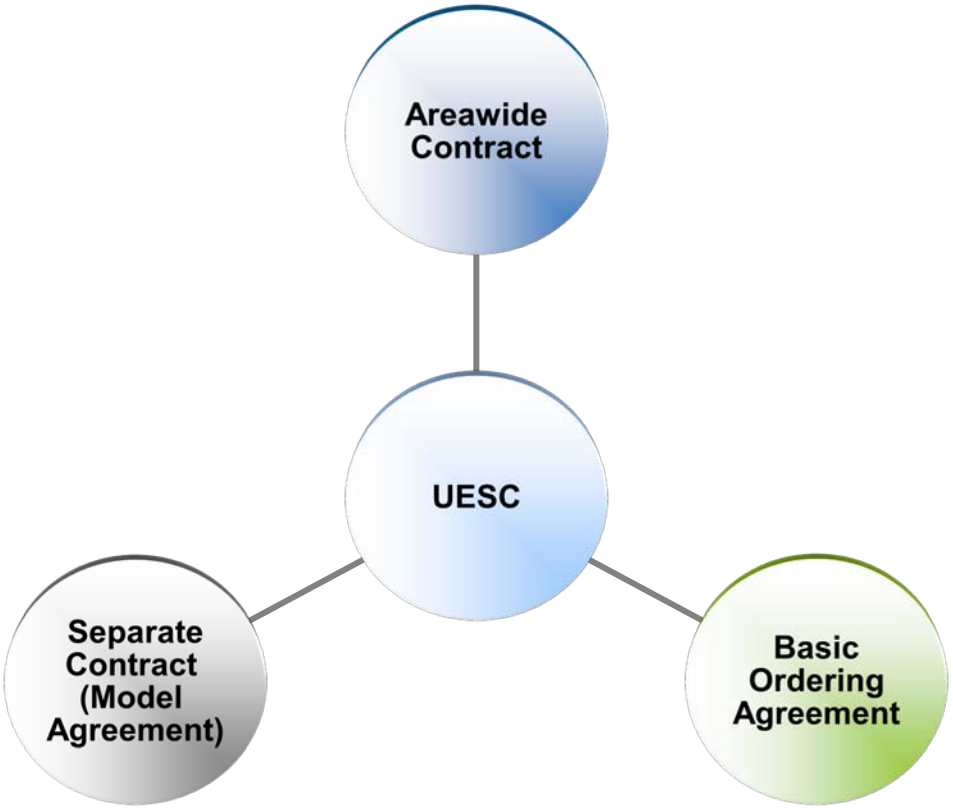
UESC Contracting Vehicles at National Grid



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With your help we can lead the way in creating the climate for change
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