



Smart Grid Technology Conference

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nationalgrid

The power of action.™

National Grid

Safe, Reliable, and Efficient Energy Delivery

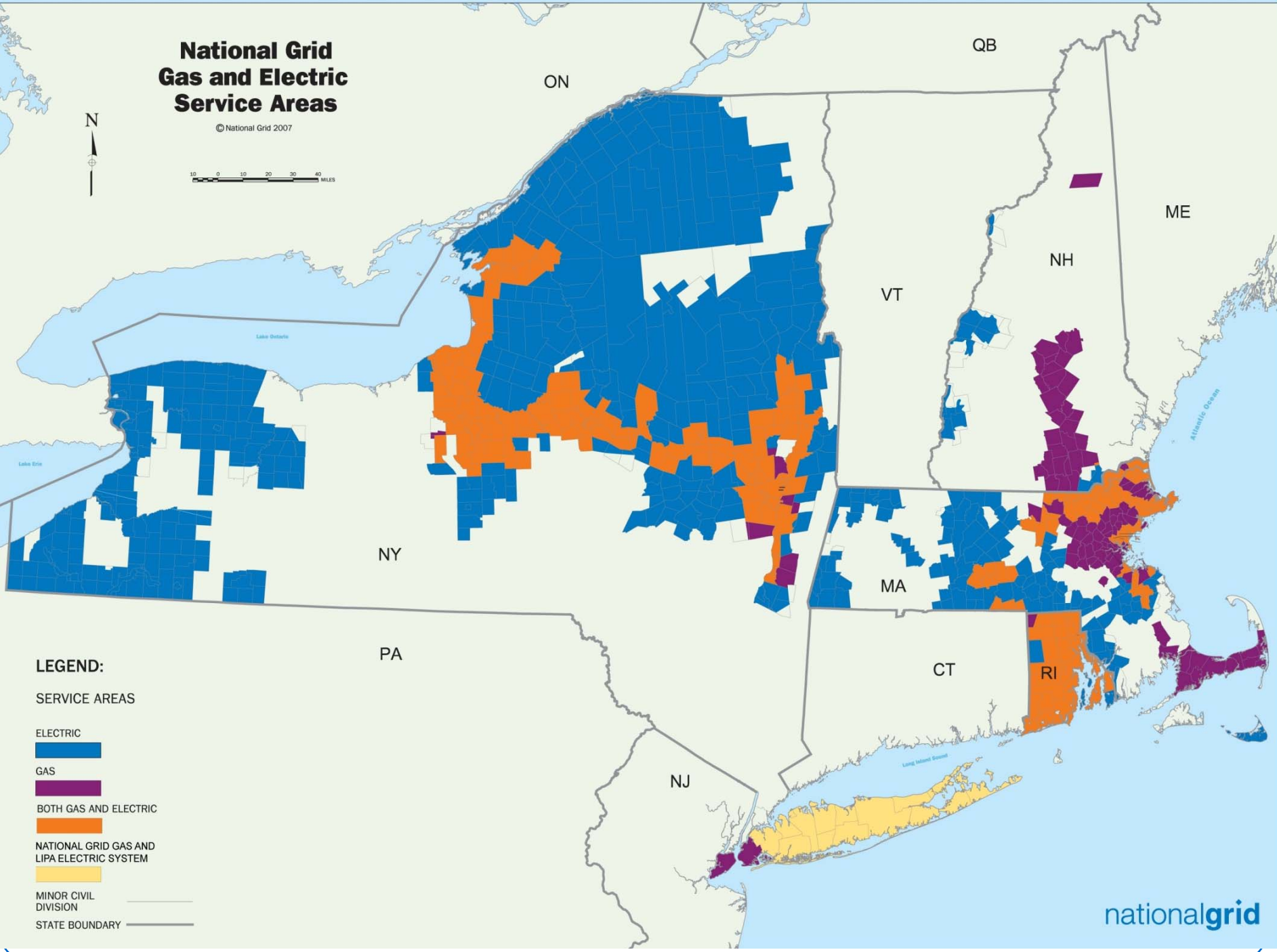
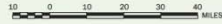
- 50% US/50% UK, 50% gas, 50% electric
- In US we operate in NY, MA, RI, and NH
 - 4.4 million electricity and 3.4 million gas customers in US
 - 20 year record of award winning energy efficiency programs
- 11 million gas distribution consumers in U.K.
- Own and operate the U.K. high voltage electric grid

We plan to invest about \$30 billion in infrastructure through 2012

New and enhanced initiatives in energy efficiency, smart grid, and renewable energy

National Grid Gas and Electric Service Areas

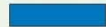
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LEGEND:

SERVICE AREAS

ELECTRIC



GAS



BOTH GAS AND ELECTRIC



NATIONAL GRID GAS AND LIPA ELECTRIC SYSTEM



MINOR CIVIL DIVISION



STATE BOUNDARY



Smart Grid Vision Statement

Our vision is to deploy Smart Grid technology in order to optimize the flow of clean energy resources, enhance the performance of our grid, and provide our customers with the ability to make informed decisions about how they use energy.

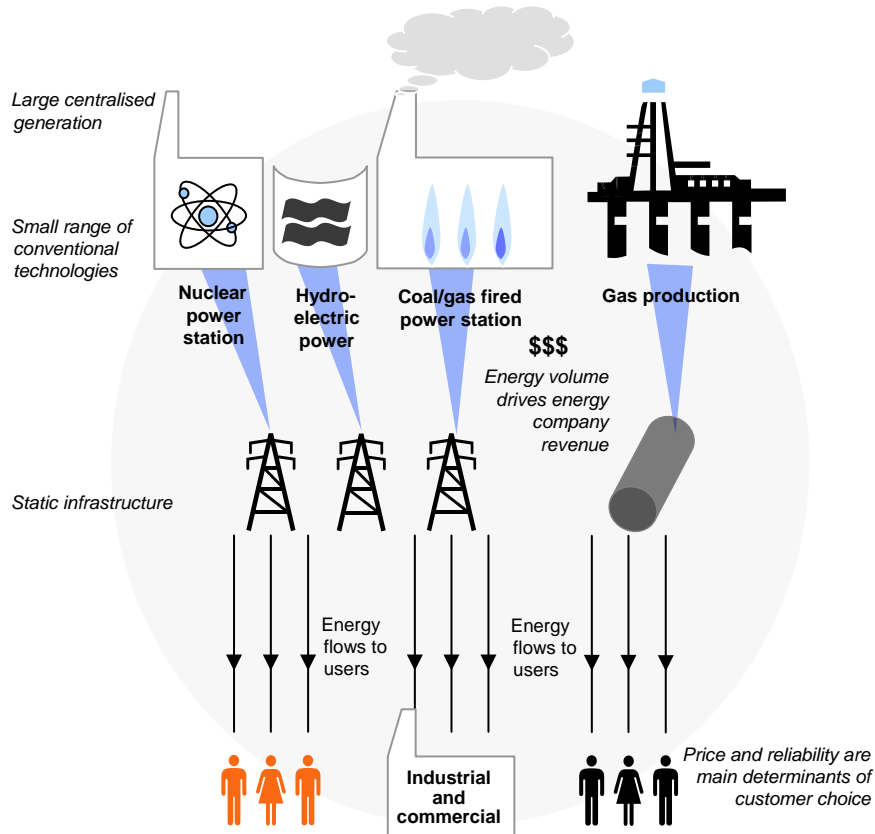
A Smart Grid will be our fundamental service platform for future years. It will help us reduce energy consumption and greenhouse gas emissions while allowing us to enhance the reliability of our aging infrastructure.

This service platform will provide and act as a catalyst for current clean technologies (e.g., energy efficiency, demand response) and the emerging next generation of clean technologies (e.g., photovoltaics, energy storage, plug-in hybrid electric vehicles) that we believe are essential to meet societal and customers' future needs.

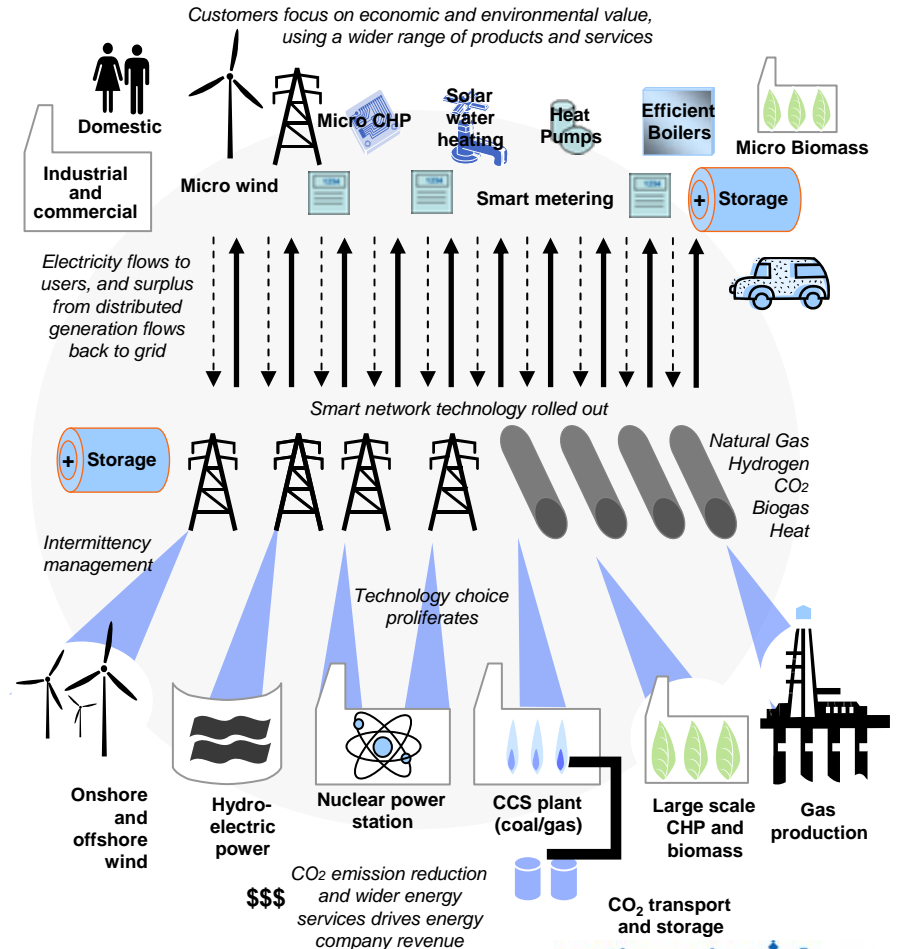
A Smart Grid will provide our customers with choice over how the electricity they use is generated and control over how and when they use energy in their homes and businesses. Through this redefined relationship with their utility, customers will be able to participate in the power of action and contribute to a sustainable future.

The Smart Grid forms an essential part of our vision

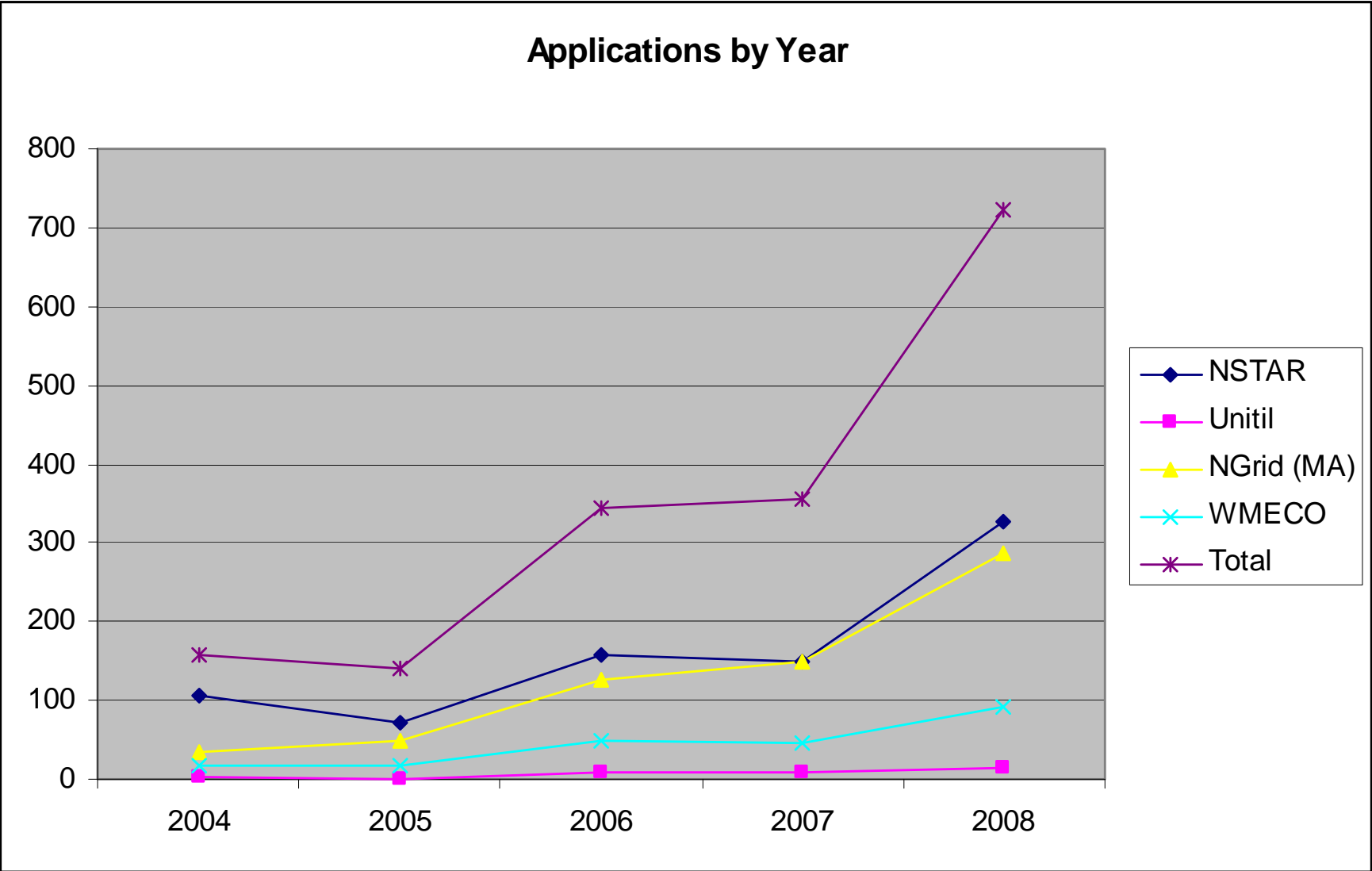
Traditional Energy Market - supply driven



Today's Evolving Market - customer driven

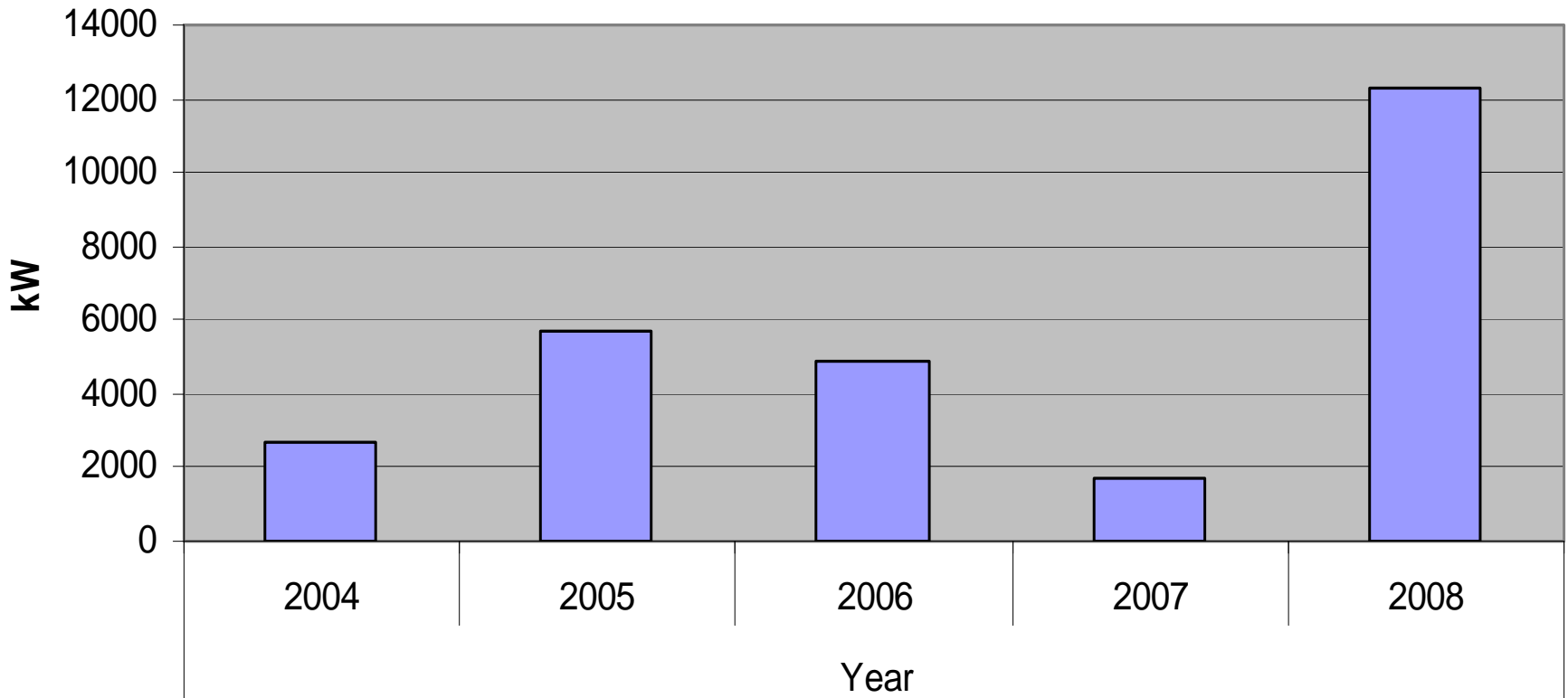


Smart Grid needs to accommodate large amounts of DG today



New DG in NG-MA service territory

MA Interconnection Applications in kW by Year



Smart technology means different things to different people – a common language and vision are essential pre-requisites for a coherent strategy

Smart Technology Definition

Technology that provides advanced information, automation and control capabilities to help us to distribute, measure and use energy more efficiently, reliably, safely and sustainably – all the way from the point of generation to consumer appliances

What is Smart Technology?

Meter

- ♦ Meter that records interval data
- ♦ 2-way communications, remote configuration
- ♦ Informative display
- ♦ Meter Data Management System

Grid

- ♦ Sensors & measuring devices
- ♦ Analytical programs e.g. pattern recognition
- ♦ Automatic switches & controls
- ♦ Decision support tools & graphical interfaces

Home

- ♦ Customer portal & Home Area Network
- ♦ Automated thermostats, switches, plugs & appliances
- ♦ Load controllers e.g. PHEV controller

What does it allow you to do?

- ♦ Automatic meter reading
- ♦ Enable customer choice and control
- ♦ Choice of tariffs e.g. time of use – peak shifting
- ♦ Catalyst and validation of Energy Efficiency programs
- ♦ Remote configuration

- ♦ Enable Distributed generation
- ♦ Remotely detect, diagnose, predict and correct network problems & faults
- ♦ Condition-based, preventative maintenance
- ♦ Automatic fault prevention, isolation & restoration

- ♦ Automatically optimize selected home appliances
- ♦ Demand response programs
- ♦ Improve satisfaction levels

The prime logic for Smart Grid? – Customer and Environmental Orientation.

The deployment of Smart Grid technologies will enable the shift in customer behavior towards Energy Efficiency, Energy Management and increase Customer Service levels.

With increasing volatility in energy prices, and climate change becoming a more prominent public concern, customer needs are changing.

Customers need the “tools” to play their part in the shift towards a new energy future.

The trend to increased consumer choice and control will be different for customers dependent upon their circumstances and needs – more segmentation will occur.

The “one ratepayer” approach to serving residential and small business customers must evolve, we will have to be more innovative to satisfy customers going forward.

We must develop detailed metrics but we believe the categories to be”

Specifically, Success for the pilots will be to show

1. Customer energy consumption and peak demand can be reduced by a minimum of 5% on average
2. Grid operating efficiency measured in terms of reductions in line loss and operating costs can be improved measurably by improved monitoring and control of the distribution grid.
3. Insight and understanding on the opportunity to optimize Transmission performance through enhanced Distribution Network and changes to Customer behavior.
4. Distribution feeder reliability measured in terms of SAIDI and SAIFI can be improved to target levels [].
5. Distributed Clean Energy resources (generation, storage and Plug In Hybrid Electric Vehicles) can be safely and reliably incorporated onto the distribution grid
6. Customer satisfaction can be improved through the implementation of Smart Grid technologies, in particular Customer Operations
7. Insight can be gained to inform the cost and benefits for full rollout.

Tariff thinking for Pilot

Information

- ◆ Existing Basic Tariff (Residential and Small C&I)
- ◆ Basic Tariff plus Peak Time Rebate for controlled loads (Residential and Small C&I)
- ◆ Time-of-Use Rate with Specified peak hours and prices (Residential and Small C&I)
- ◆ Critical Peak Pricing (Residential and Small C&I)
- ◆ Real Time pricing (Large C&I)

Incentive

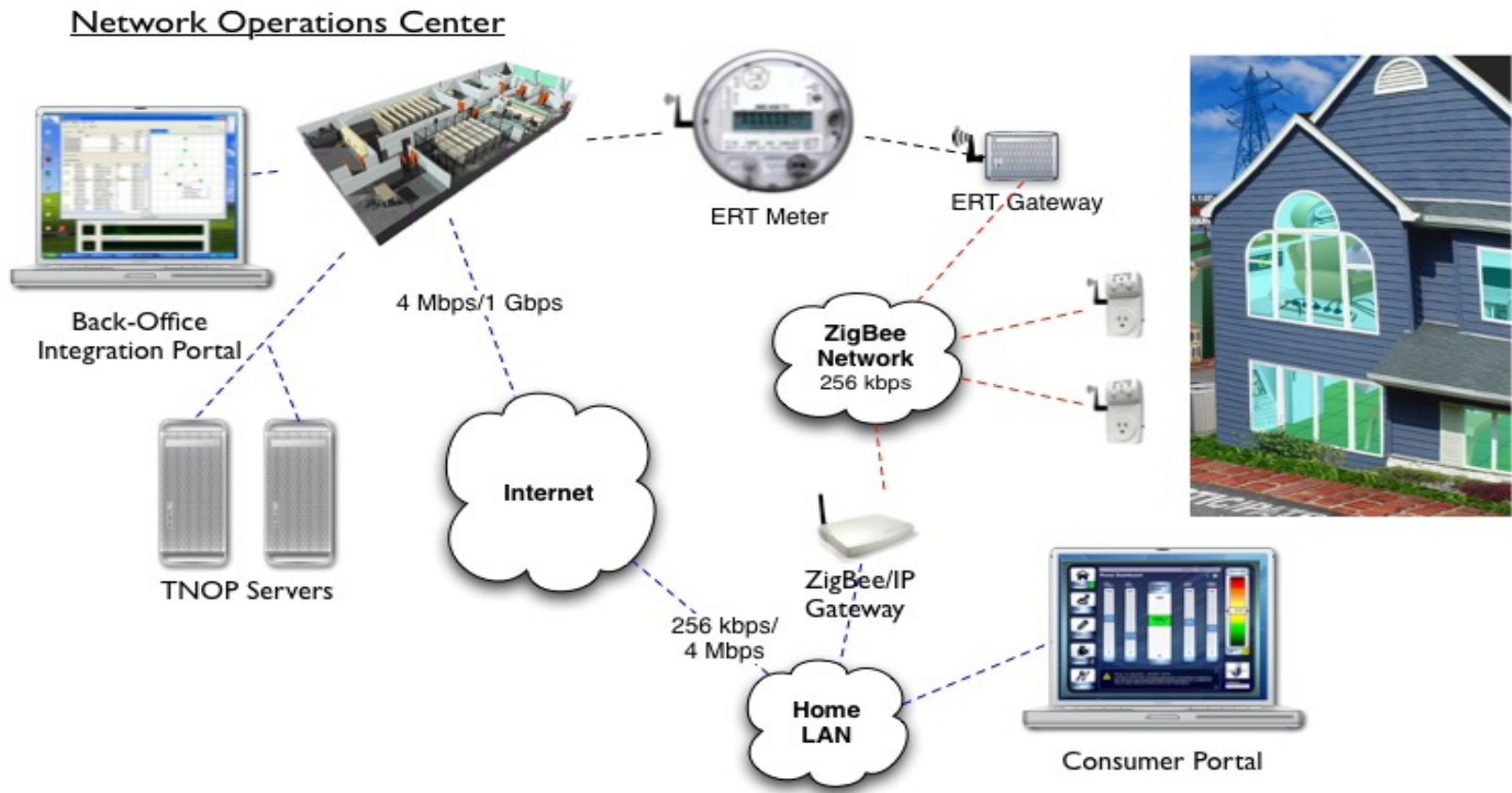
- ◆ Ability to budget their monthly bill
- ◆ Provide monthly rebate for control of loads during peak periods
- ◆ Onpeak prices are higher than Basic Service price while offpeak prices are lower.
- ◆ Capacity costs are recovered in fewer peak hours providing greater incentive for conserving during those hours.
- ◆ Customers receive day ahead hourly prices which are tied to load and price forecasts from ISO.

Intervention

- ◆ Customers employ new information to conserve and meet budget target.
- ◆ Customers use their own control technology or allow National Grid to control appliances during peaks.
- ◆ Customers use control technology or change their usage patterns to conserve onpeak or shift to offpeak use.
- ◆ Same as above except the customer has greater convenience as fewer hours will have higher prices.
- ◆ Capacity costs are bundled into even fewer hours and customers can „dispatch“ their usage based upon market prices for energy and capacity.

Sample of the types of tools needed for the Pilot

Residential Energy Management System Architecture



Technology

We have conducted a comprehensive RFI – 70+ vendors

Scope covers

- **Communications – Home, Meter and Grids**
- **Home devices – Controls, switches and systems**
- **Meters – Smart functionality**
- **Grid devices**
- **IS Systems**
- **Integration**

Currently in evaluation phase – Technical, Functional and Commercial.

Conclusion

Smart Grid is a complex and transformational investment.

It is essential we put customer needs at the centre of all our thinking and not be ‘dazzled’ by the technology.

We believe it will be central to the way utilities operate in the future but recognize there are difficult choices ahead on the best route to get to Smart Grid.

Technological possibilities are evolving every day so any Smart Grid platform represents more than a single investment, it must be adaptable so that it will become a service platform for our customers foreseeable and future needs.

Thank you for your time today