Arthur Kressner
CON EDISON’S ELECTRIC SYSTEM
NEW YORK CITY AND WESTCHESTER COUNTY

- 3.2 million customers, 14-16 million people
- 36,000 miles of overhead lines
- 94,000 miles of underground lines
- 80 local distribution networks
OVERVIEW

**Substations**
- Transmission: 37
- Sub-Transmission (Area): 60
- Distribution Transformer Vaults: 78,700

**System Voltages**
- Transmission: 345kV, 500kV
- Sub-Transmission: 138kV, 69kV
- Primary Distribution: 33kV, 27kV, 13kV, 4kV
- Secondary Distribution: 120/208V, 460V

**Distribution Design Criteria**
- N-2 in high density
- N-1 minimum throughout entire system
- Low voltage distributed grid and spot networks
CON EDISON ELECTRIC DISTRIBUTION SYSTEM

Generating Station
(electricity generated at 13.8 to 22.0 kV)

Transmission Substation

Area Substation
(voltage stepped down to distribution voltage)

Transformers
(voltage stepped down to 480, 208, or 120 V)

Feeders

Connection To Others

60 Network Systems
Supply 86% of System Demand

Overhead System
Supplies 14% of System Demand
Is this sustainable?
Why the “Smart GRID”?

- Photovoltaic and Wind Power are getting more efficient and lower cost – intermittent and unreliable
- Electric vehicles are emerging – a mobile and large new use for electricity
- Customers want choices - to generate their own power and buy power from others, local options
- Electricity is increasingly vital to our personal, economic and societal well being
- The existing grid is aging and incompatible with these changes
FAST SWITCH DEMONSTRATION

• sectionalizing and reconfigures feeders

The “ROUTER” for the grid
CON EDISON OPPORTUNITIES / CHALLENGES

PHEV Charging Occurs at 8am and 5pm
(Normal Average System Peak is 8,121 MW)

MW

30% PEV Market Share
20% PEV Market Share
10% PEV Market Share
System Avg. Load

Morning Commute:
Charge at Work

Evening Commute:
Charge at Home

20%
PHEV Load Fills the Load Valleys
(Normal Average System Peak is 8,121 MW)
Back Office

Smart meters / secondary model validation

~ 300 locations

Home area network

~ 1500 smart meters

Integration to private network

IP routable protocol

Data collectors at selected building locations

Switch control

Internet

Command and control system

Integration of DG

Transformer / NWP monitoring

Remotely controlled underground switches

Peer to peer web-like network

Home area network ~ 300 locations