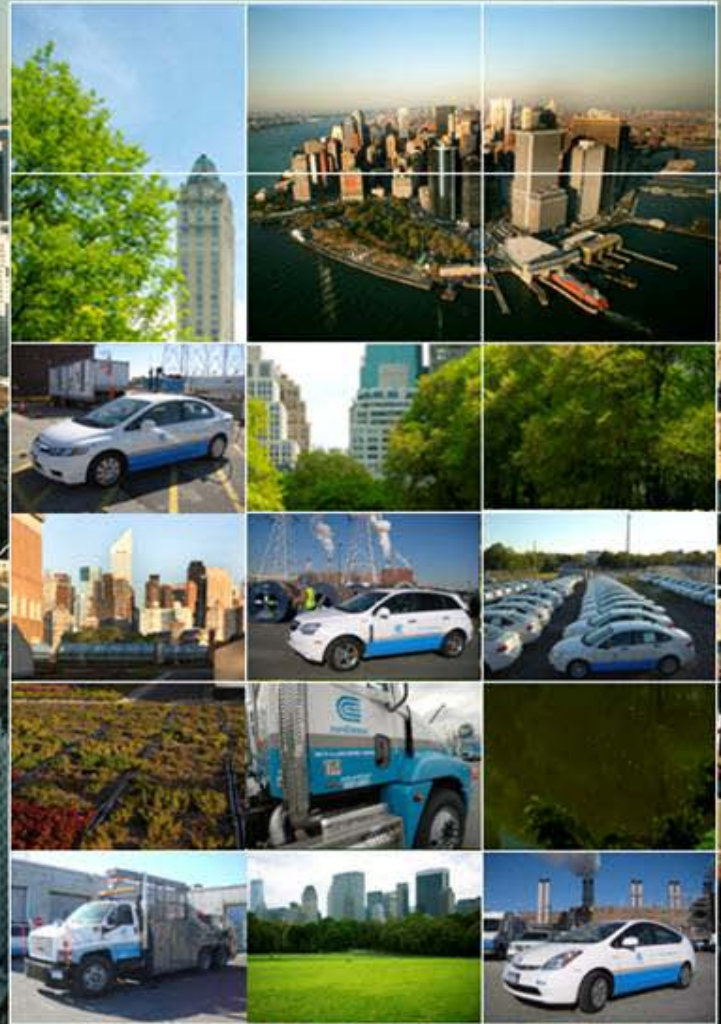


Preparing for Electric Vehicles: The Distribution System Perspective



Con Edison Provides Electricity to New York City and Westchester

- Service Area: 604 square miles
- 3.24 million customers, 9.2 million people
- 2.4 million customers are in Networks
- System is 86% underground and 14% overhead
- NYC Energy Density: 235 MW/sq mi



System Wide Smart Grid



Generation

Transmission

Substation

Distribution

Customers



Future Smart Grid

AMI

Energy Storage Integration

Renewables Integration

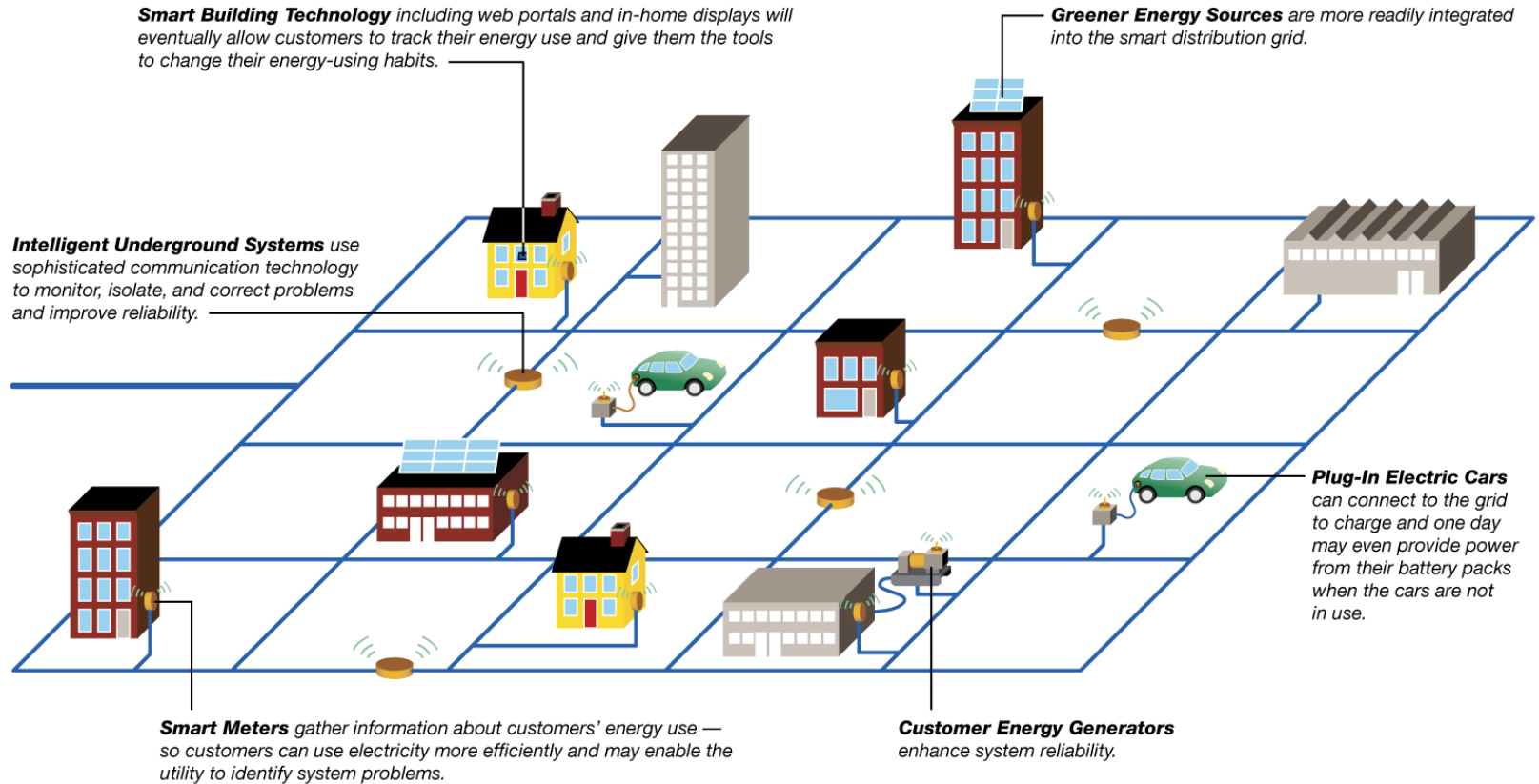
Load Management & Control

PEV Integration



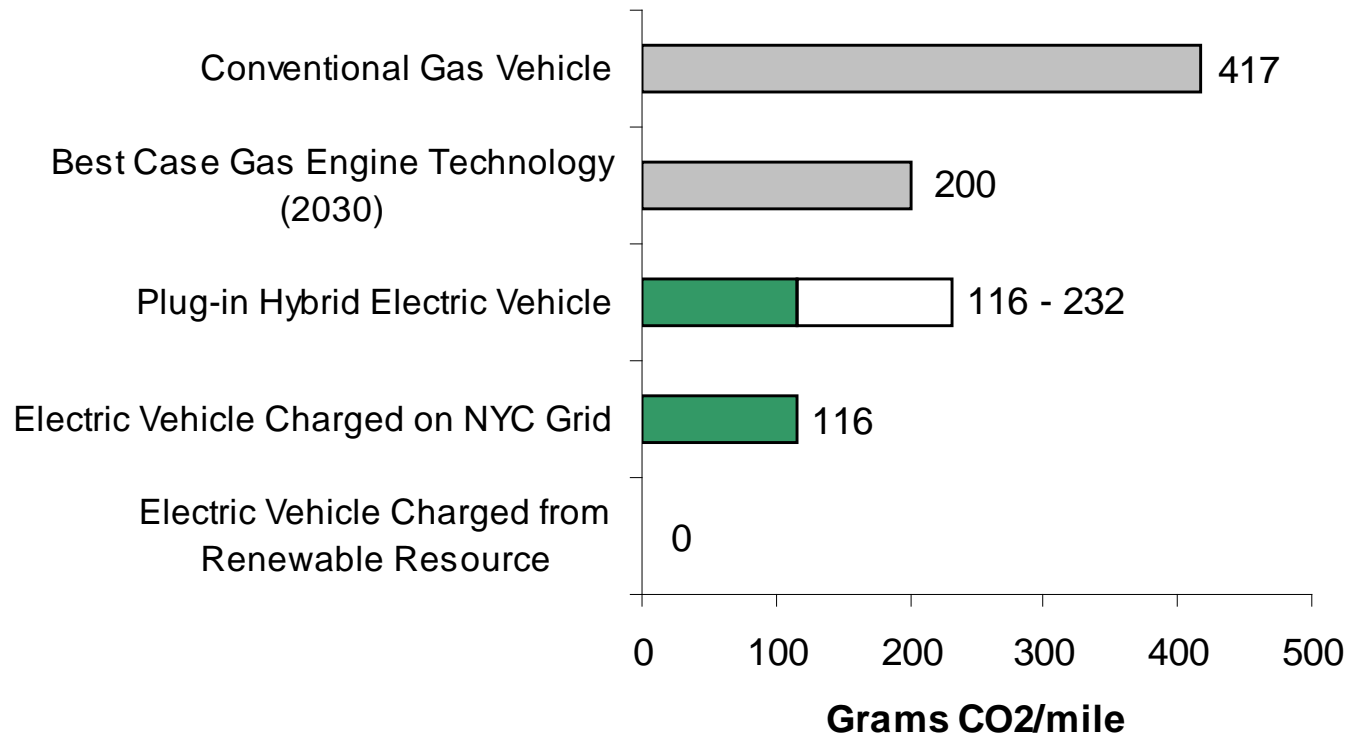
Smart Grid

Smart grid puts information and communication technology into electricity generation, delivery, and consumption, making systems cleaner, safer, and more reliable and efficient.



Why do Electric Vehicles Make Sense for NYC and Con Edison Customers?

Wheel-to-Well Emissions Comparison for Combustion Engine and Electric Driving in New York City

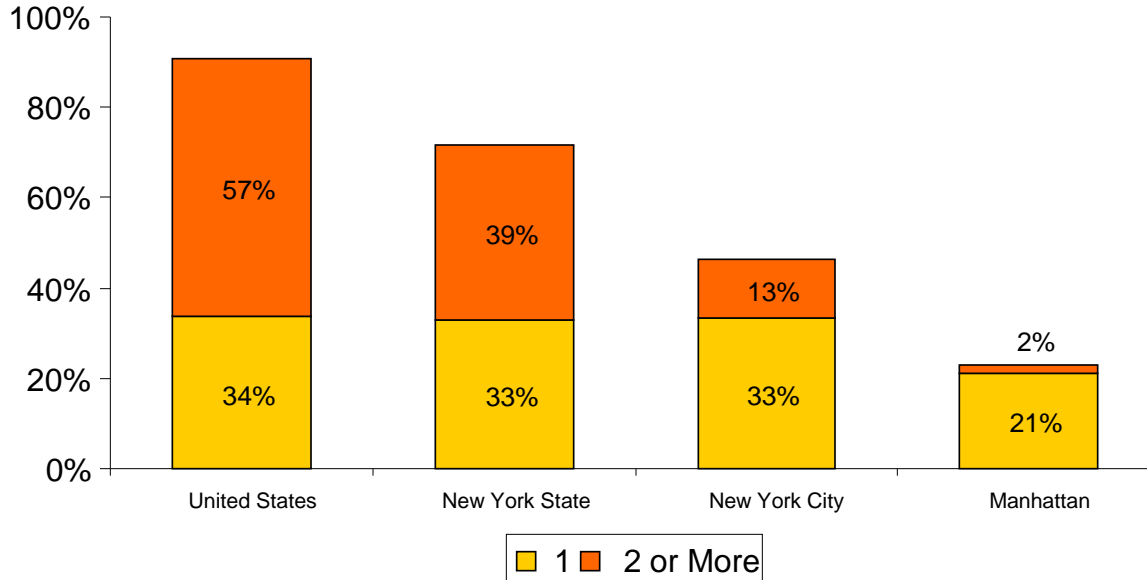


Source: "Exploring Electric Vehicle Adoption in New York City", The City of New York, January 2010

New Yorkers Own Fewer Vehicles



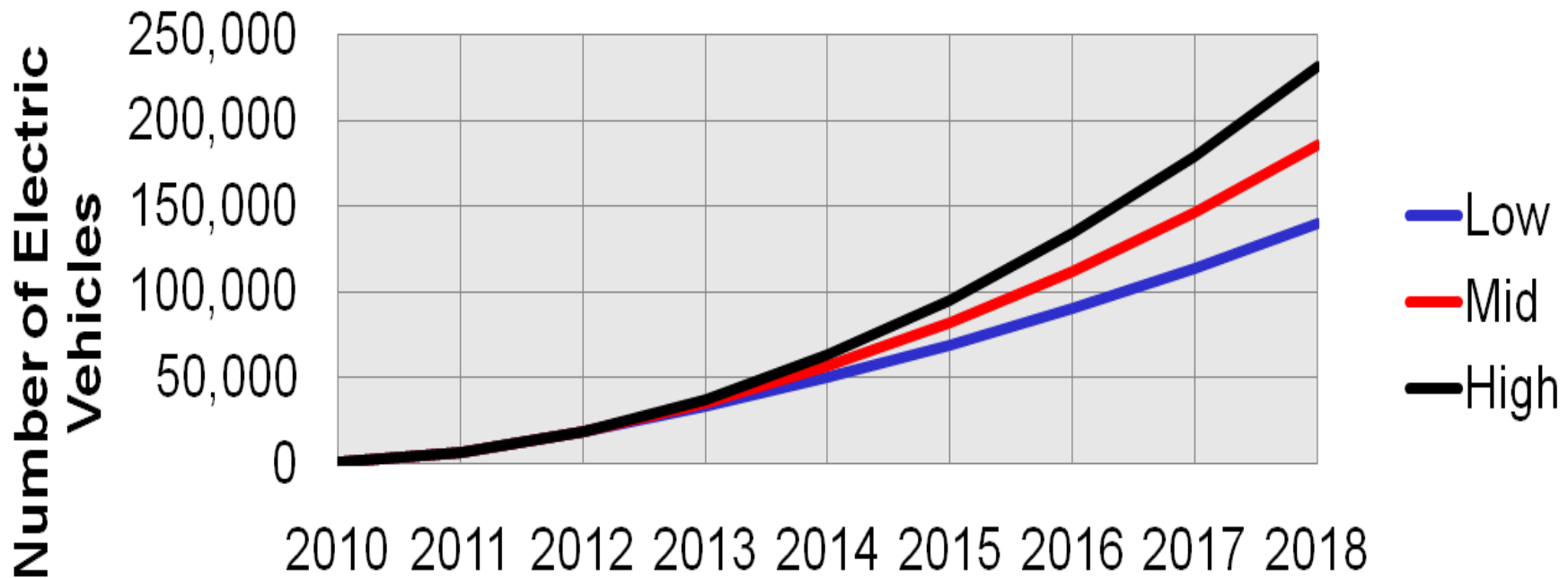
Households by Number of Vehicles Owned



Source: 2000 US Census

Electric Vehicle Sales in the Next 5 Years Likely to be Modest

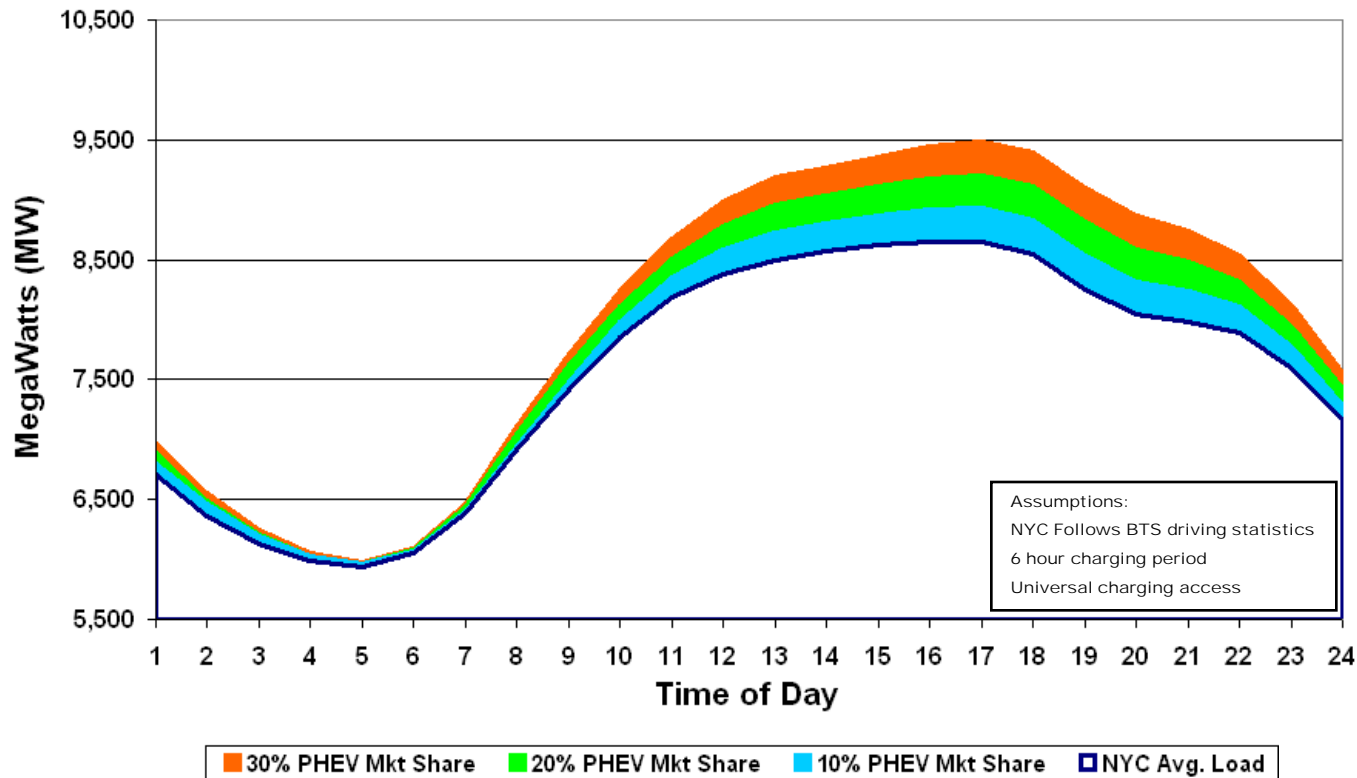
Electric Vehicle Projections in NYC



Distributed According to National Driving Patterns - NYC Peak is Increased by 9%

Illustrative

Probable Scenario BTS PHEV Load on an Average NYC Day



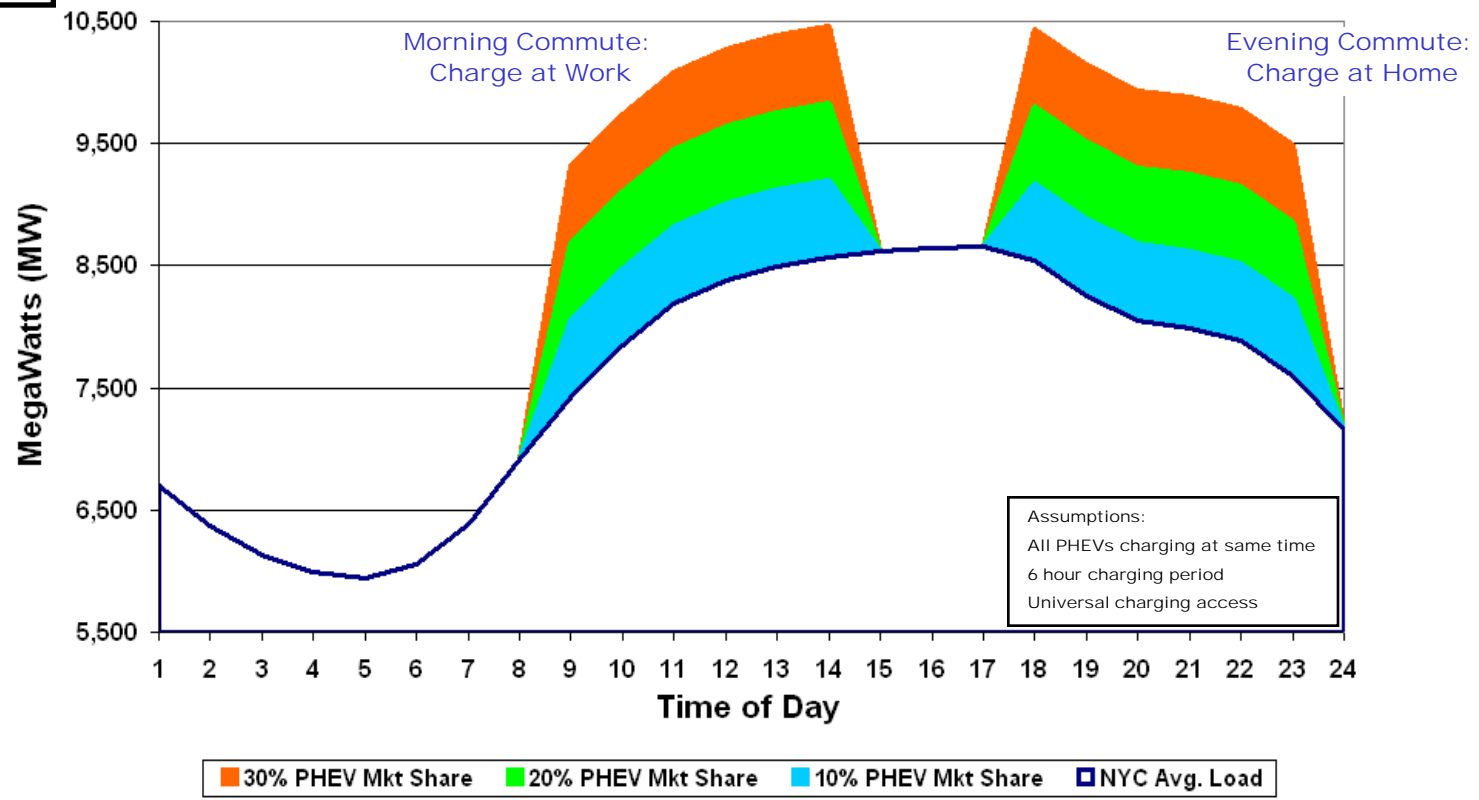
Sources: Energy Management, National Renewable Energy Laboratory, Energy Information Administration, US Census Bureau, Bureau of Transportation Statistics

Commuter Traffic Patterns Could Create Two Daily Charging Peaks



Illustrative

**Worst Case Scenario
PHEV Load Creates Two Charging Peaks**

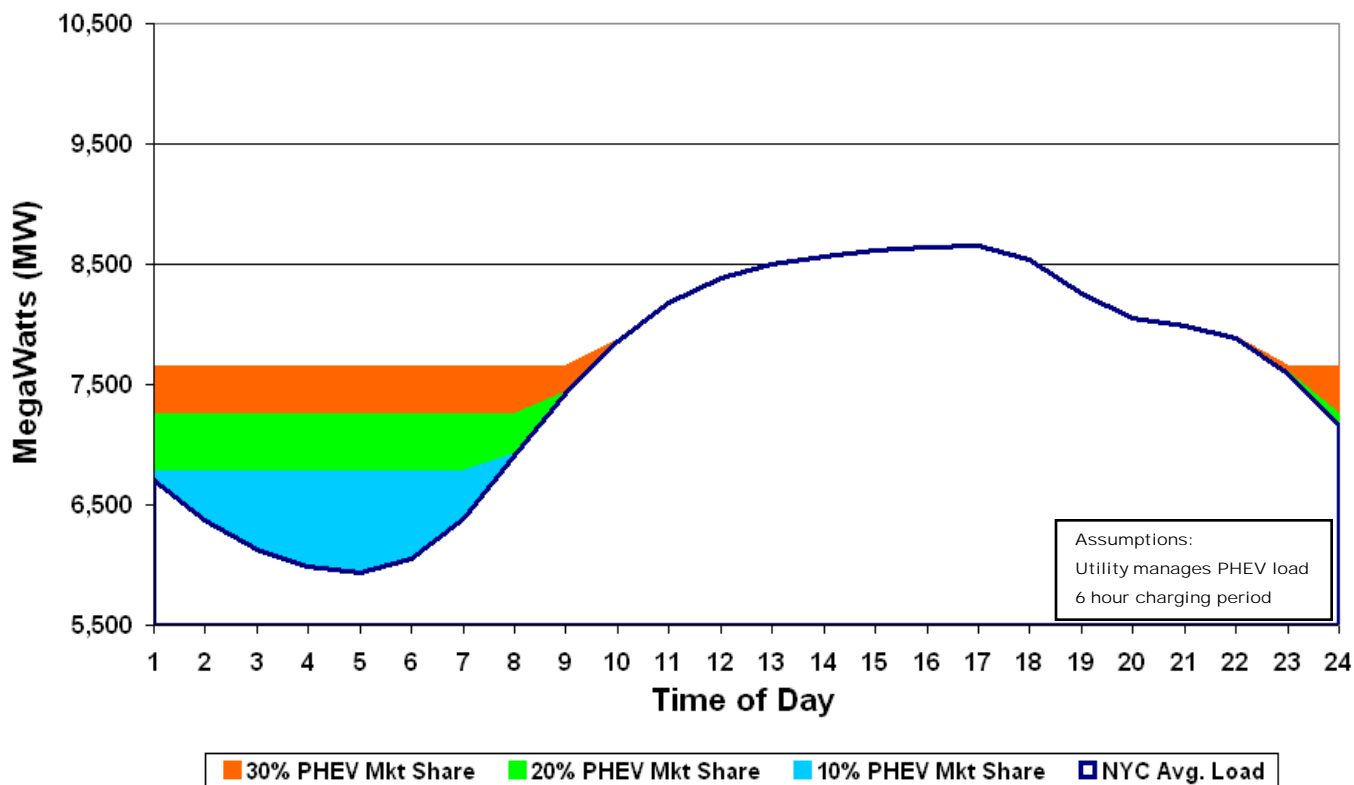


Sources: Energy Management, National Renewable Energy Laboratory, Energy Information Administration, US Census Bureau, Bureau of Transportation Statistics

Managing Demand Will Require Careful Coordination Between Utilities and Auto Manufacturers

Illustrative

Best Case Scenario PHEV Load Fills The Load Valleys



Sources: Energy Management, National Renewable Energy Laboratory, Energy Information Administration, US Census Bureau, Bureau of Transportation Statistics

Impact on Grid Infrastructure Challenges

Percent of area sub-stations impacted by low and high scenarios of EV adoption

Low scenario = 140,000 EVs in 2018
 High scenario = 230,000 EVs in 2018

■ Demand exceeds capacity
 ■ Demand within 5% of capacity



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Source: ConEd analysis, New York City Electric Vehicle Adoption Survey, 2009

Con Edison is Taking a Leadership Role

Con Ed is actively engaged in a number of PEV-related initiatives, to prepare itself to respond knowledgeably and quickly to PEV market development.

- Utility and auto OEM planning
 - Inter-industry, utility/OEM working group
- Infrastructure development
 - Inter-industry Infrastructure Working Group
 - Active dialogue with new technology vendors
- EPRI
 - Ford Pilot Program
 - GM Electric Infrastructure Study
 - BMW Electric Mini Pilot
- PEV pilot testing and demonstration
 - Prius fleet demonstration – Astoria
 - Ford Escape SUV testing and demonstration
- Distribution grid impact analysis



The Con Ed PEV program provides an opportunity to learn through inter-industry and utility collaborations what it needs to know for system and fleet planning



Technical Challenges

- Battery Technology
- “Plug” - the utility interface
 - Metering
 - Smart interface
 - Monitored and controlled charging
 - Vehicle-to-grid
- Reconfiguring network protectors for reverse power flow (V2G)



New Operational Challenges

- Increased off peak load reduces opportunities to perform maintenance at night
- The thermal cycling of delivery assets will be changed and may adversely effect the useful life of existing assets
- Current rate structure will need to be evaluated to accommodate new PEV load



Conclusion

- PEVs are real and currently being sold to customers in low volumes
- In the short-term, PEV markets will be driven by government policies and programs
- In the long-term, PEV markets will become sustainable as technology improves and commodity and carbon costs increase
- Con Edison will face new challenges as PEVs come onto our grid, however PEVs also represent a real opportunity

Preparing for Electric Vehicles: The Distribution System Perspective

