

Minnesota Public Utilities Commission

Smartgrid Workshop – Electric Vehicles

November 2, 2012

Jonathan Adelman
Retail Market Strategy Director

Chris Punt
Distribution System Planning Engineer

Repowering Transportation

A cross-functional team responsible for creating, communicating and implementing the Company's clean transportation strategy.

Clean Transportation Strategy

1. Enable the market

Support our customers who choose to repower their transportation.

2. Get the rules right

Engage stakeholders to develop policy and regulations that support the market without harming non-participants and supports a fair regulatory compact.

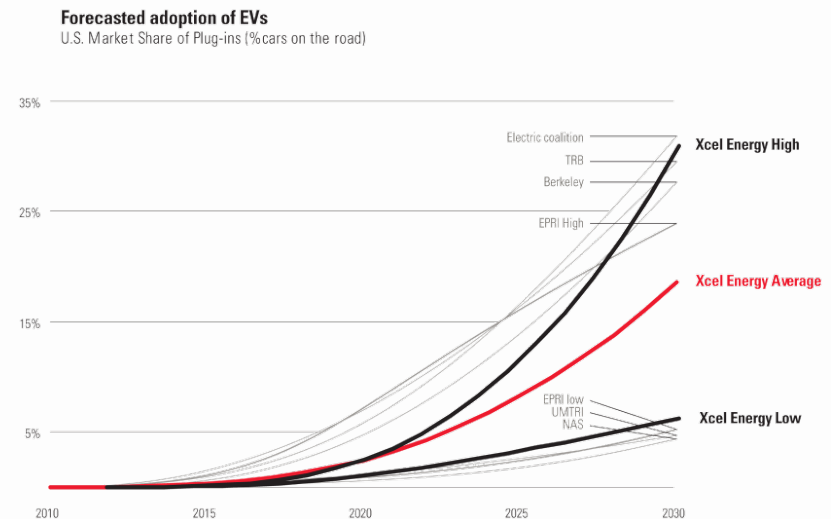
3. Manage grid impacts

Provide **reliable** and **safe** energy to fuel vehicles at a **reasonable cost** to our customers, while managing system costs.



Supporting Our Decisions

- **Electric vehicle projections**
 - Gradual adoption of electric vehicles provides time to plan
- **End-to-end process development**
 - Vehicle shopping through charging plan
- **Utility notification - tracking PEV sales**
 - OEMs, dealerships, permitting, customer
- **System design practices**
 - Distribution monitoring/planning
- **Program/rate design for load management**
 - Demand response, Time of Use rates



Enabling the Market

- **Drive Electric Minnesota**

- ▶ Transit Connect
- ▶ Public Charging Stations



- **Customer Efforts**

- ▶ Xcelenergy.com [EV page](#)
- ▶ The “Windsorce for EVs” initiative



- **Event Participation**

- ▶ GE Vehicle Innovation Center
- ▶ National Plug-in Day

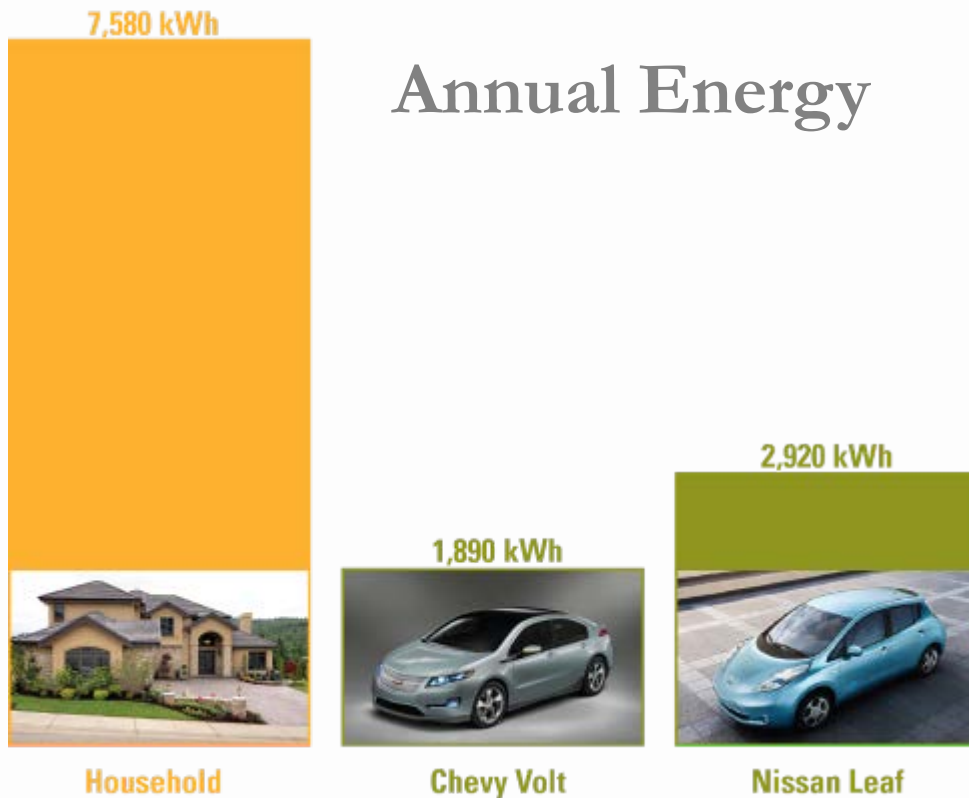
- **NSP Fleet (2012)**

- ▶ One Chevy Volt
- ▶ One all-electric Ford Transit Connect van
- ▶ Two hybrid bucket trucks

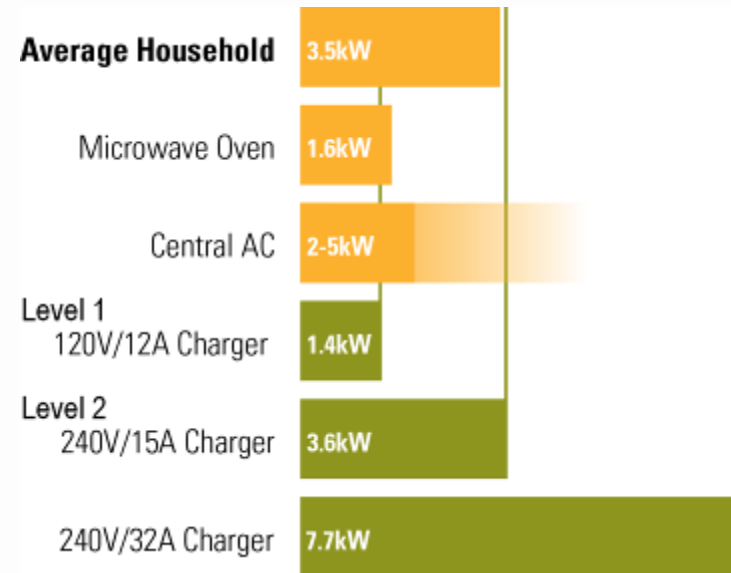


Electric Energy and Demand

Annual Energy



Peak Demand



Source: EPRI

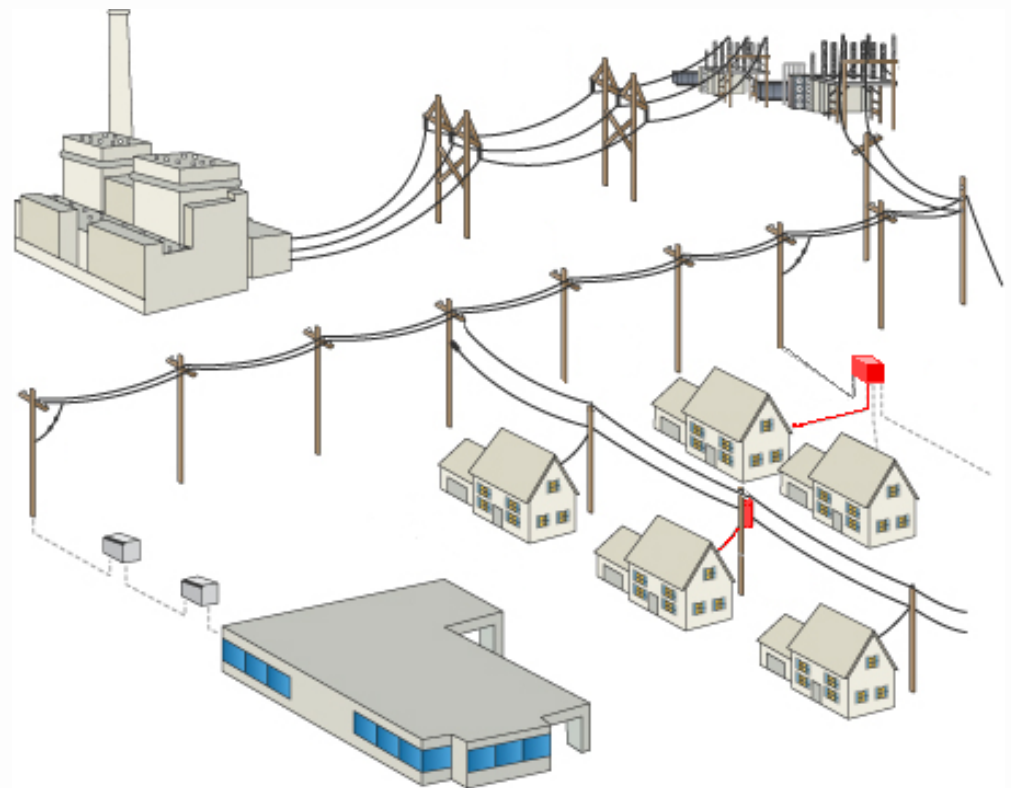


* Tesla Model S Optional 20kW charging



Potential System Impacts

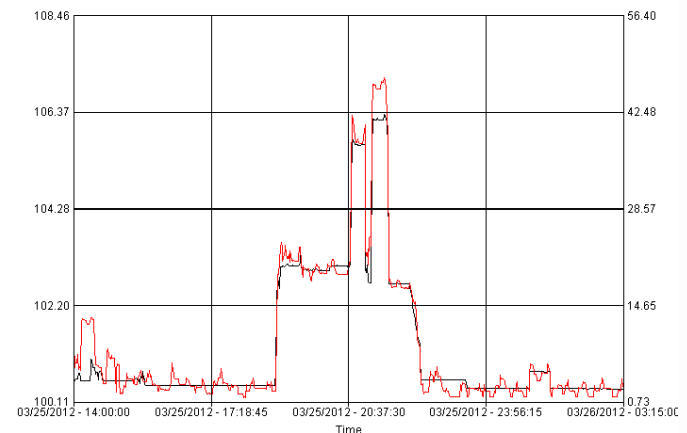
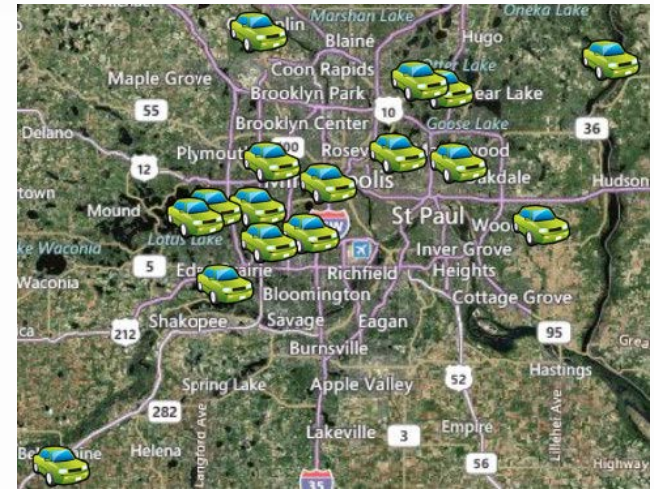
- **The existing generation infrastructure can fuel 84% of light duty vehicles**
 - Pacific Northwest National Laboratory
- **The existing transmission infrastructure will support vehicle deployment**
- **Most likely near-term impact on the distribution system**
 - One EV charging at Level 2 can equal a home's demand
 - Ownership "clustering"
 - Transformer overload
 - Thermal loading impacting transformer life



Impact Study

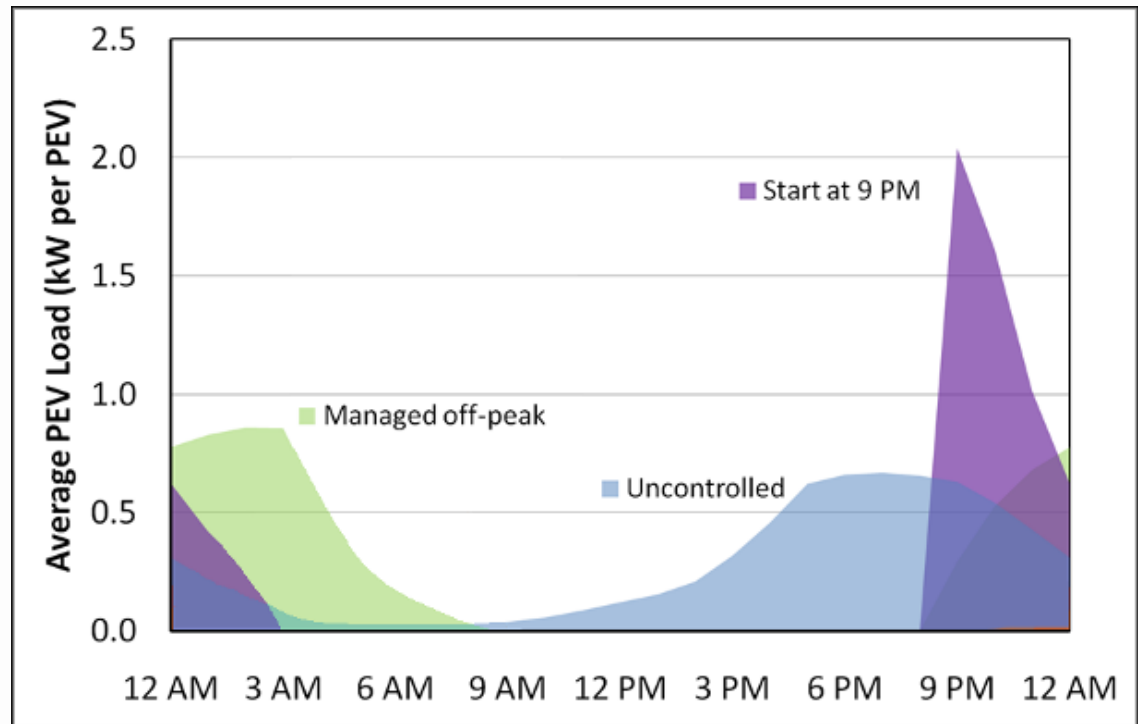
Objective: To determine how Plug-in Electric Vehicle (PEV) and Plug-in Hybrid Electric Vehicle (PHEV) chargers will increase peak distribution transformer loading in the NSP-MN Metro service territory.

- **First 16 Volts in Minnesota**
 - 5 of 16 transformers prompt further investigation
 - Metered transformer and service
- **3 recommended to be addressed**
 - Level 2 charging presented summer peak risk



Charging Challenge

- Uncontrolled charging coincides with system peak (blue)
- Rate Design – TOD/TOU creates new system peak (purple)
- Demand response technologies enable managed charging (Green)



Questions?

