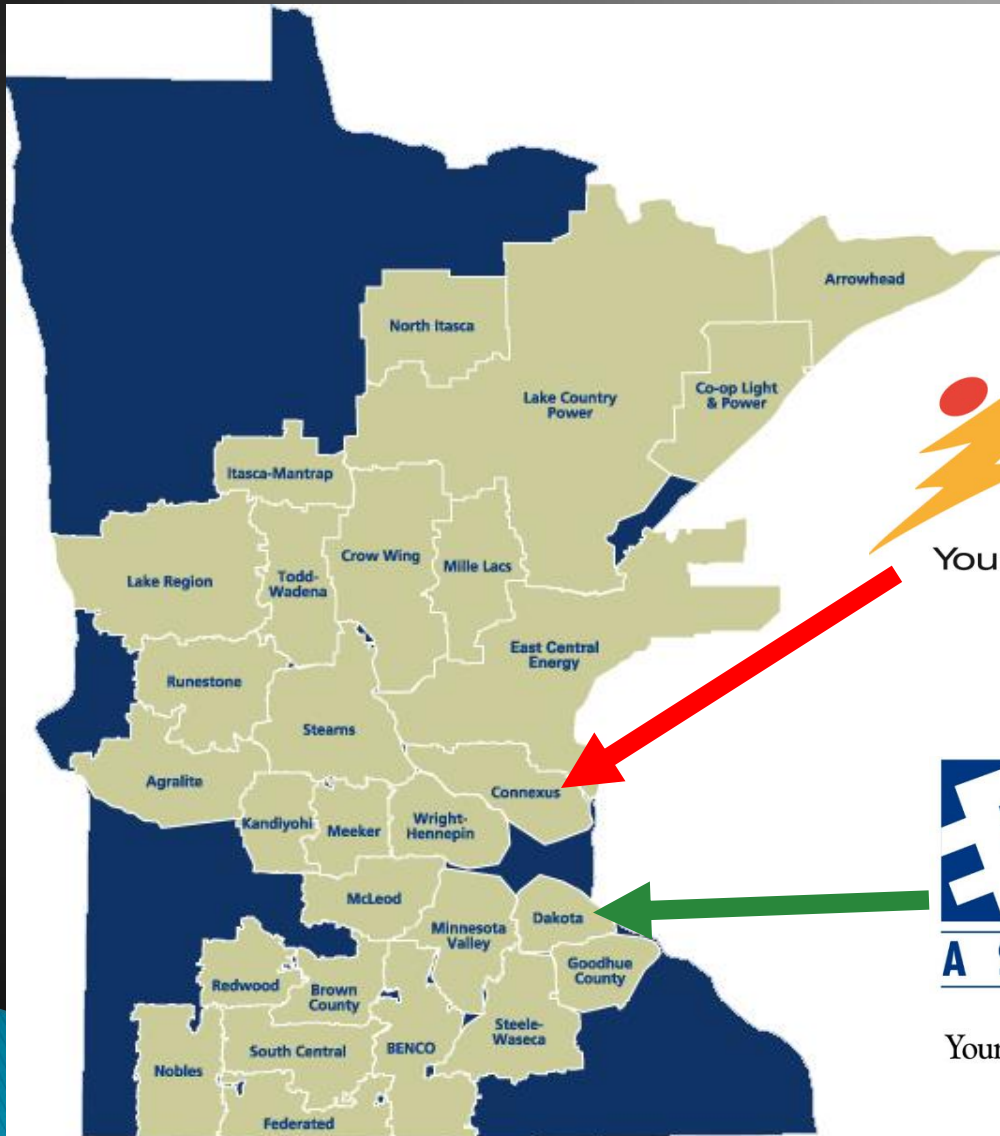


# Cooperative Rate Structures for Charging Electric Vehicles

John Gasal (Connexus Energy)  
Doug Larson (Dakota Electric Association)  
March 3, 2014

# Who we are



**CONNEXUS<sup>®</sup>**  
**ENERGY**

Your Community Energy Partner



**DAKOTA**  
**ELECTRIC**

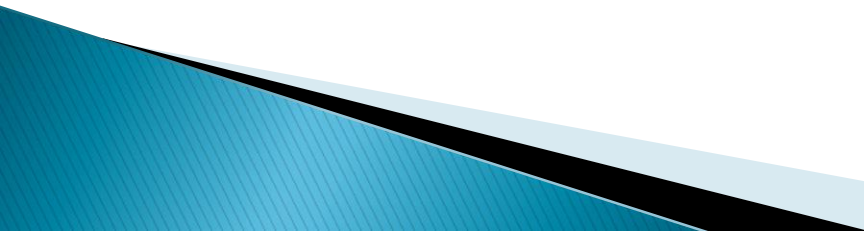
ASSOCIATION

Your Touchstone Energy<sup>®</sup> Partner 

# EV Program Goals

- ▶ Create **awareness** of importance of charging during off-peak hours
- ▶ Provide targeted rates to **encourage off-peak charging** – and discourage on-peak charging
- ▶ Gather energy and demand **information** on EV charging – daily, monthly, seasonally
  
- ▶ Perspective: This is the first time we may be ahead of load development to encourage off-peak use rather than react after-the-fact
  - Partner with our members

# EV Load Characteristics

- ▶ Mobile load
    - Potentially long distances
  - ▶ Load factor: 5% to 20%
  - ▶ Daily use profile
    - Arrive home between 5 pm and 6 pm M–F
    - Plug in charger
    - Charging will very likely occur coincident with our distribution system peak and wholesale power billing peak
- 

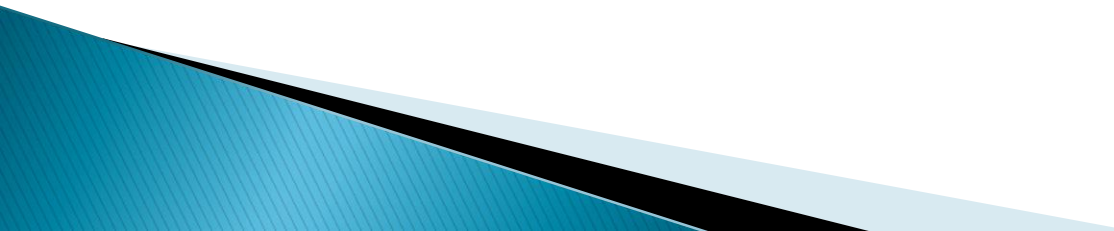
# Electric vehicle effects

- Primary effect = Financial
  - Evening peak drives G&T demand charges
- Secondary effect = Distribution System
  - Minimal impact with low saturation
  - Higher saturation, absent the TOU rate, could cause need for upgrades to system
    - Driven by EV quick chargers

# Wholesale Power Costs

- ▶ As a diversified load, Cooperative costs to serve EV can be equal to – and much greater than – air conditioning
  - Evening peak
- ▶ Annual wholesale power costs for one EV
  - Level 1  $\approx$  \$450
  - Level 2  $\approx$  \$700
  - Level 3  $\approx$  \$1,200
- ▶ Annual retail revenue at residential service
  - $\approx$  \$350

# Program Summary

- ▶ Information / Awareness
  - ▶ No load control
  - ▶ Rate to encourage off-peak charging
  - ▶ Rate to discourage on-peak charging
  - ▶ Gather load data
- 
- ▶ Provide options
- 

## Choose the "charge" that's right for you

Dakota Electric Association supports the growing electric vehicle market and wants to work with members who purchase an electric vehicle to make sure you get the most affordable rate to meet your charging needs.

That's why we have created two voluntary home charging options, so you can choose what time to charge your car and how much to pay. Whether you have a Level 1 or Level 2 charger, there is an option that will work for you.

If you have an electric vehicle, or are considering purchasing one, contact Dakota Electric's Energy Experts® at 651-463-6243 for more information on programs and pricing.

More information available:  
[www.dakotaelectric.com/residential/programs](http://www.dakotaelectric.com/residential/programs)





# Example TOU Rate Summary

## Rate

### Energy Charges:

Off-Peak:	5.85¢ per kWh
On-Peak:	37.85¢ per kWh
Other:	Schedule 31 energy charges apply
RTA	0.66¢ per kWh (changes annually)
Plus applicable sales tax	

## Definition of Periods

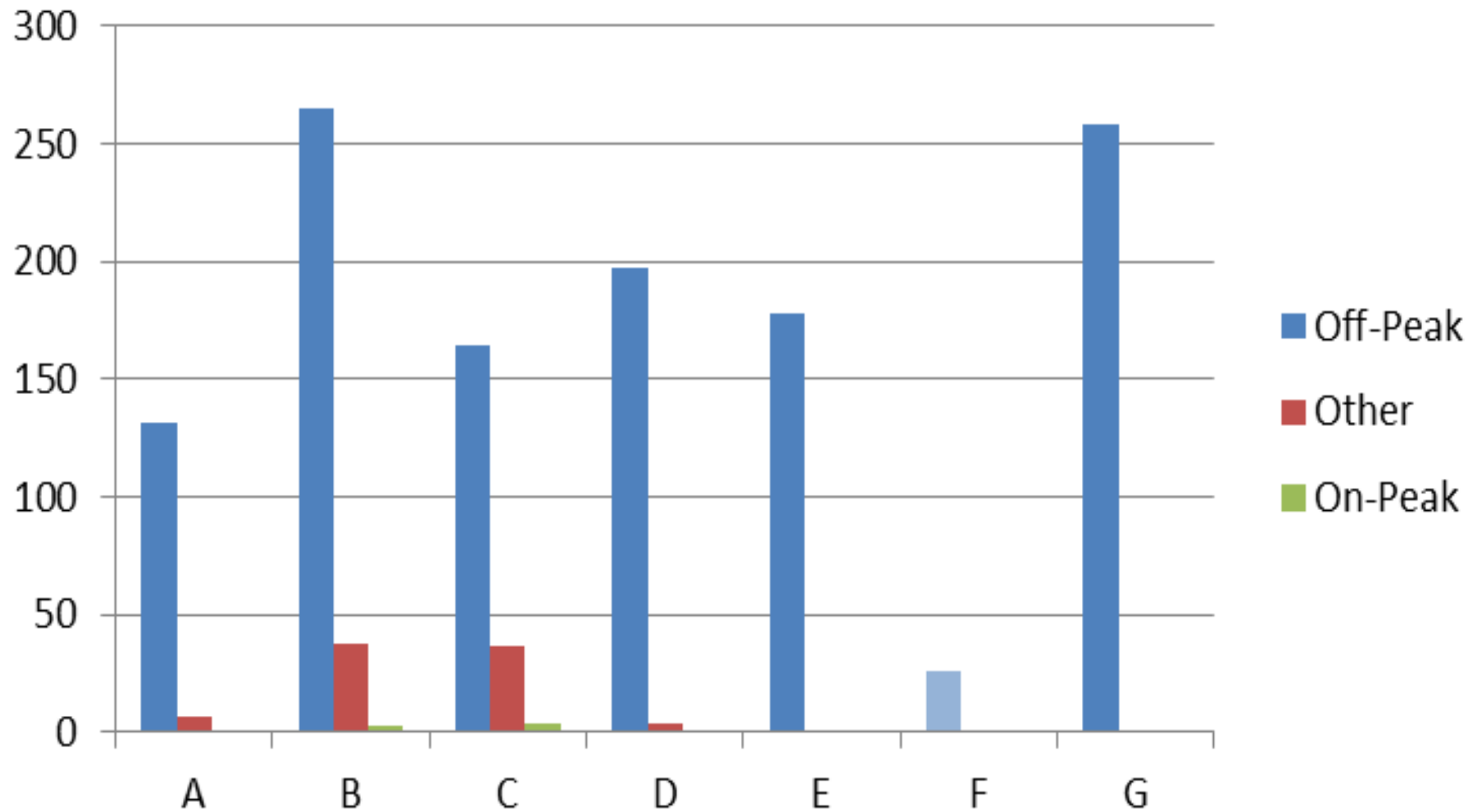
### Energy Charge time periods are defined as follows:

Off-Peak	9:00 pm to 8:00 am Mon. – Fri., and all day Weekends and Holidays
On-Peak	4:00 pm to 9:00 pm Mon. – Fri., excluding holidays
Other	8:00 am to 4:00 pm Mon. – Fri., excluding holidays

# Results (after one year)

	<u>CE</u>	<u>DEA</u>
EV on sub metered TOU	14	7
EV on Whole House TOU	4	
EV on Controlled rate		14
EV on Residential rate	?	?

# Schedule EV-1 Avg Month



# Questions

