# The Growing Impact of Electrical Vehicles on the Grid

Scott Benson, *Lincoln Electric System*
Kirk Estee, *Omaha Public Power District*
Thad Kurowski, *Tesla*
Joe Francis, *Nebraska Department of Environment & Energy*

**Moderator:** Anne McCollister, *Nebraska Community Energy Alliance*

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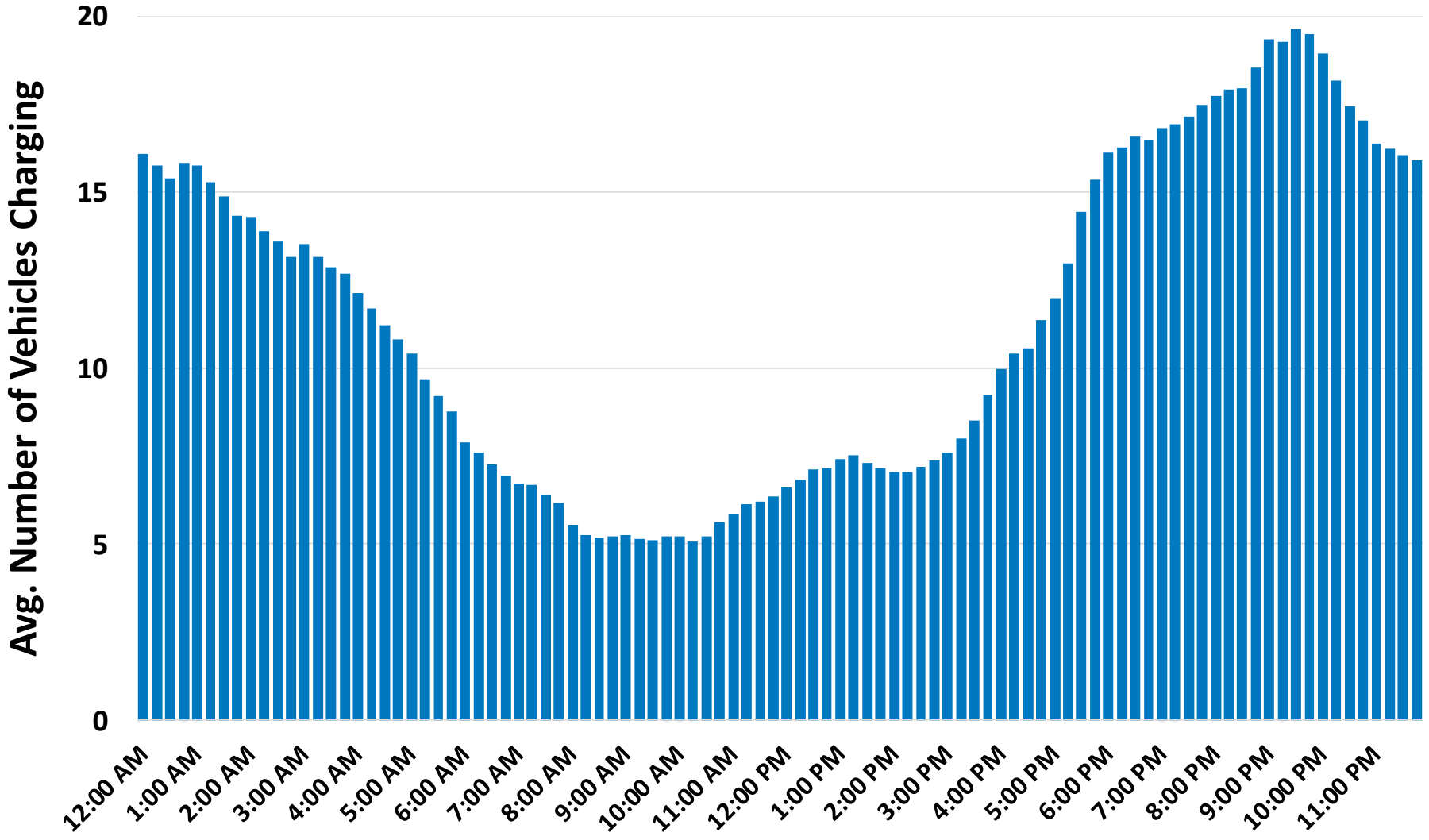
Wind & Solar
CONFERENCE & EXHIBITION

Submit Questions at Slido.com - Code #K126

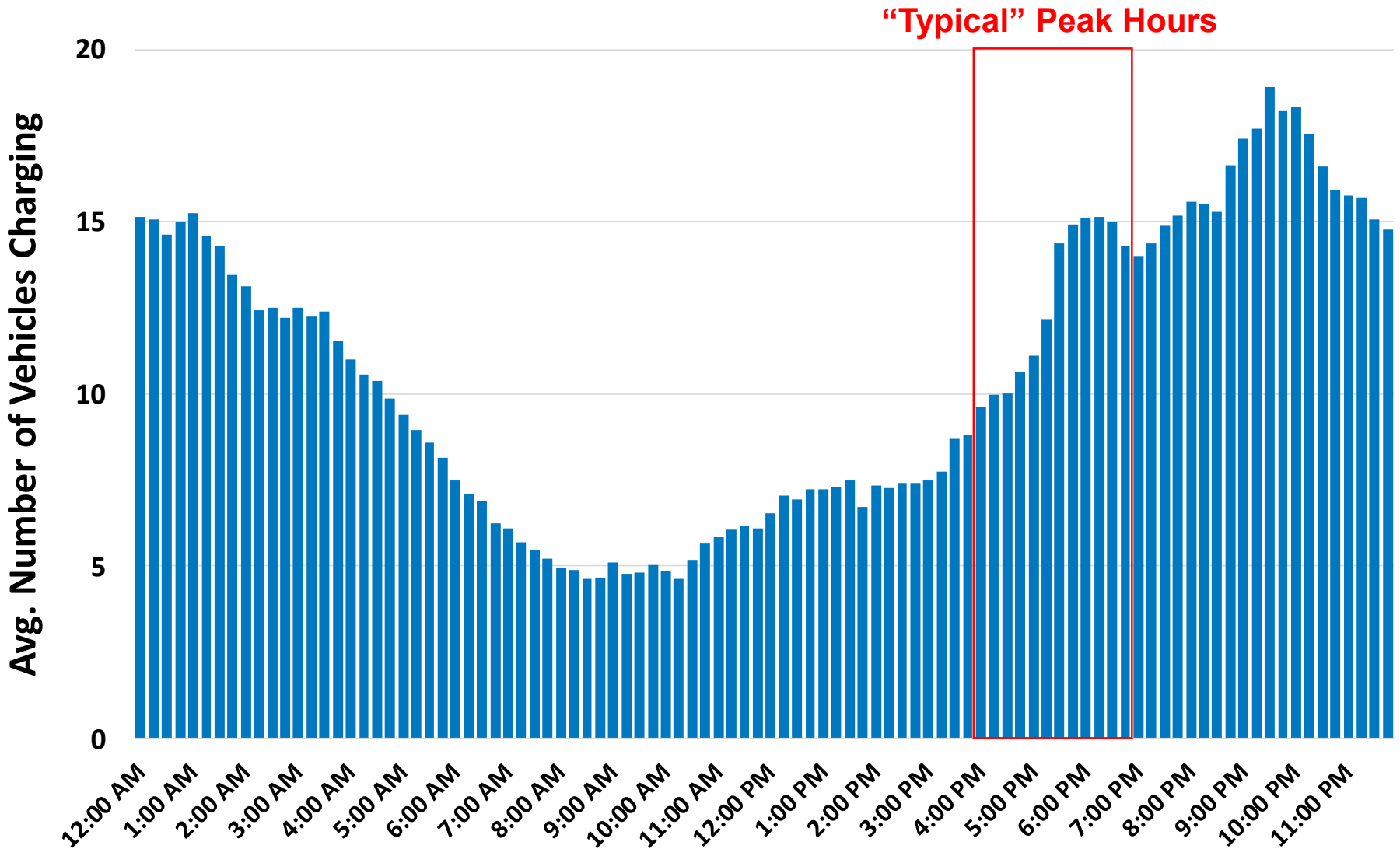

# LES EV Research

***Preparing for a plug-in future***

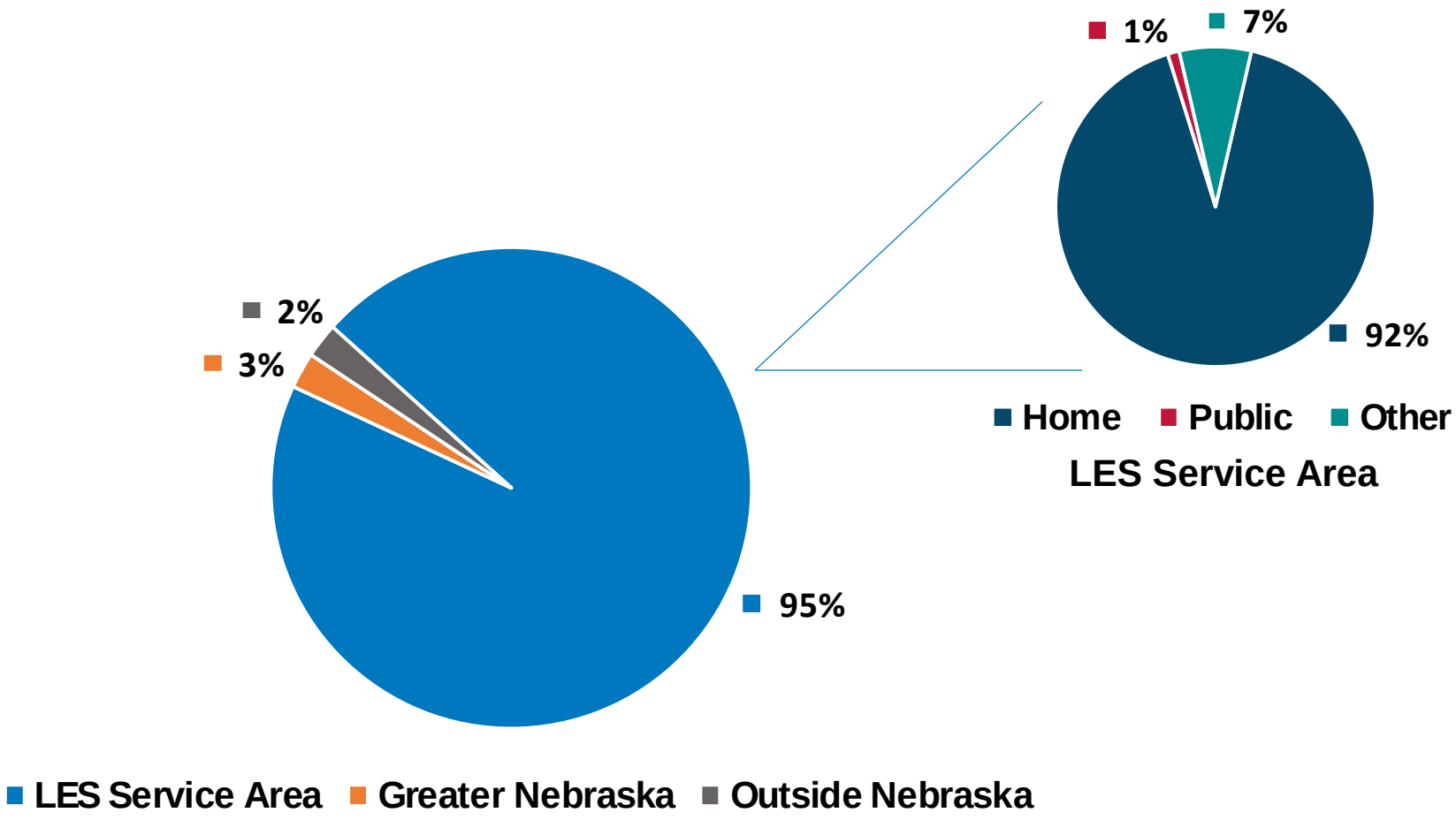
# Customer Charging Data (Jan 2019 – Sep 2019)



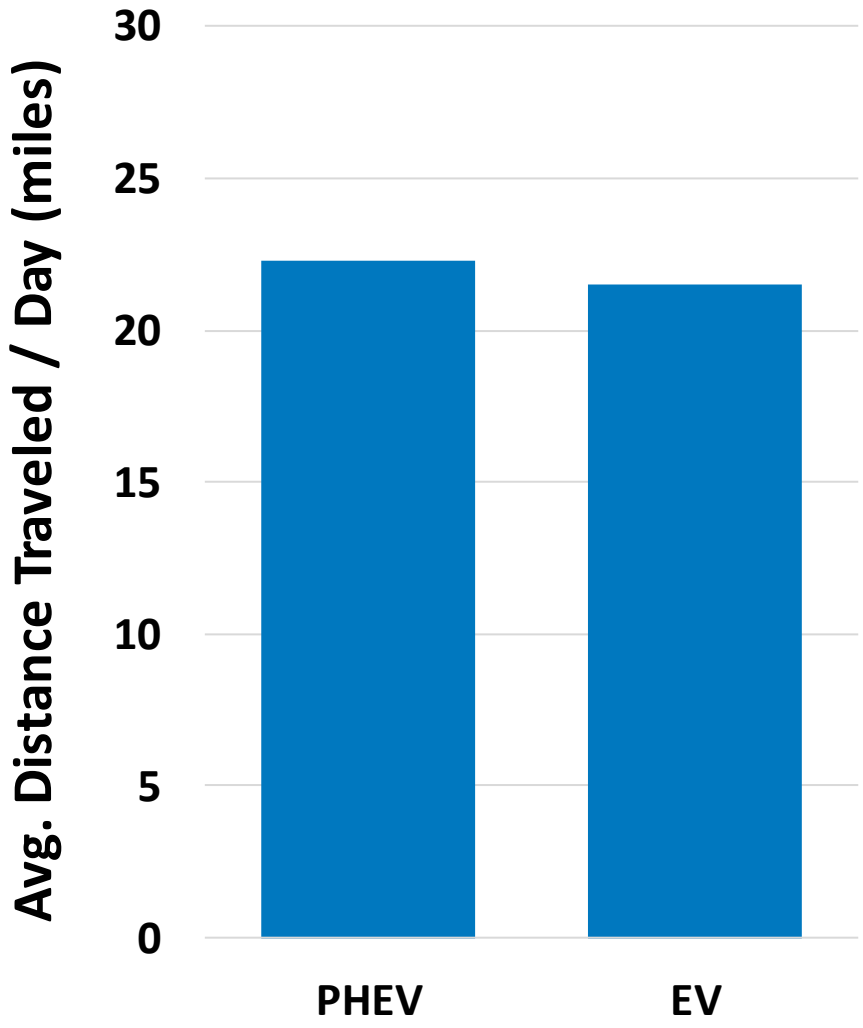
# Customer Charging Data (Jul 2019)

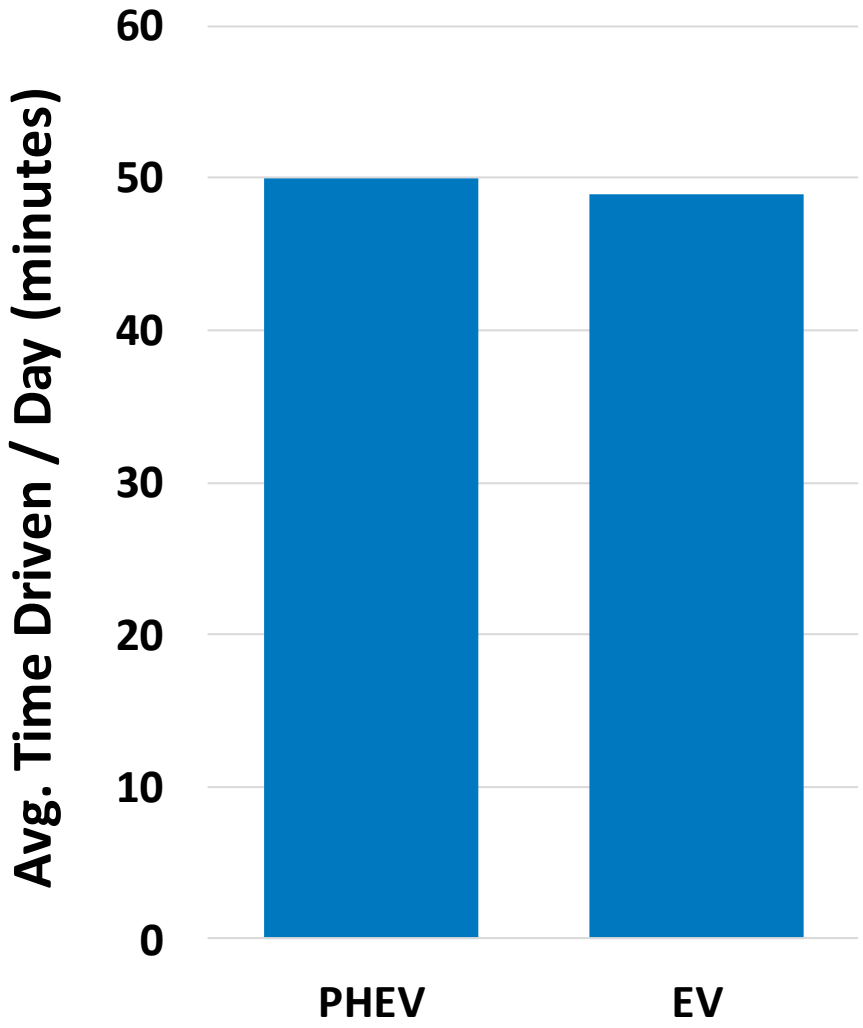


# Customer Charging Location Data (Jan 2019 – Sep 2019)



# Customer Trip Data (Jan 2019 – Sep 2019)



# Thank you!


Data analysis made possible in part through grant funding from:

The Nebraska Environmental Trust
preserving NATURAL NEBRASKA™ for future generations

DEED PUBLIC POWER RESEARCH & DEVELOPMENT™
American Public Power Association

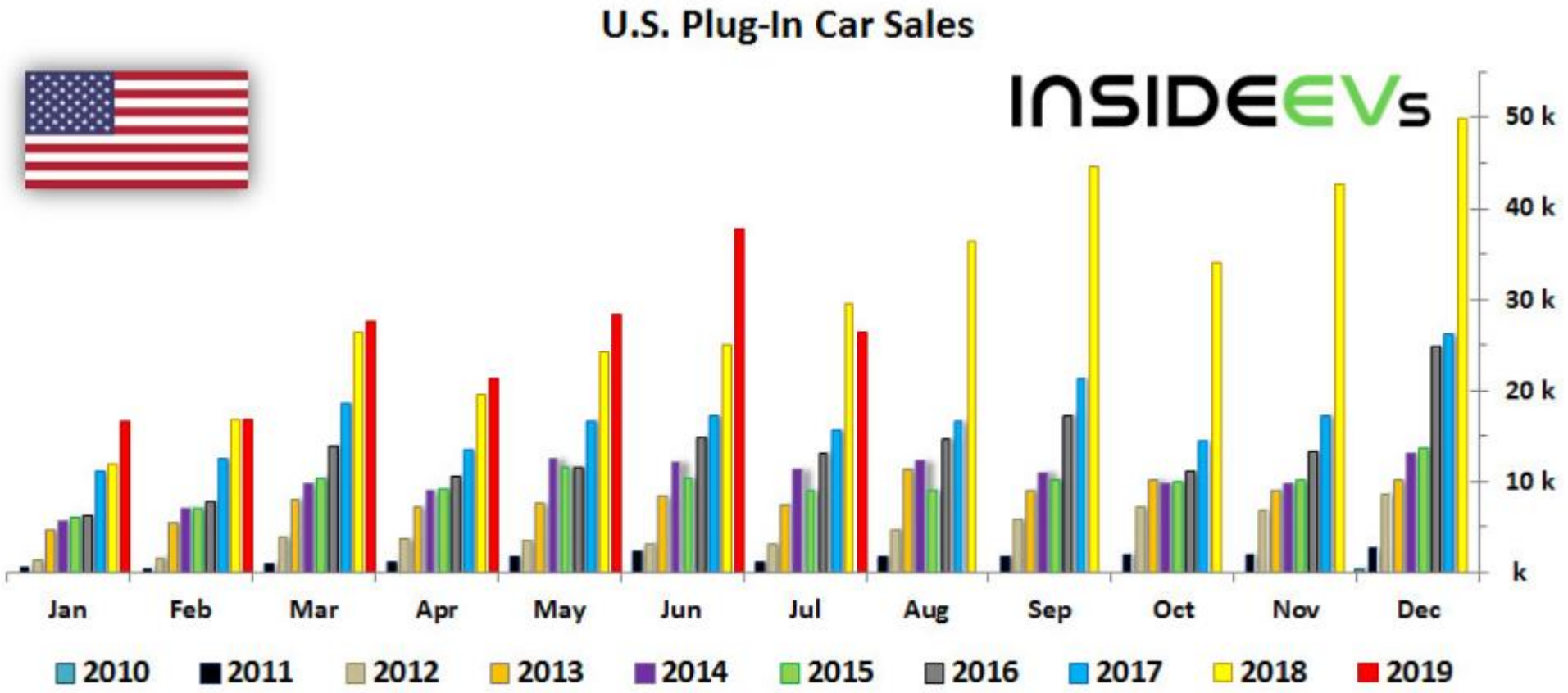
OPPD
Omaha Public Power District

# Programs to Support EV Adoption

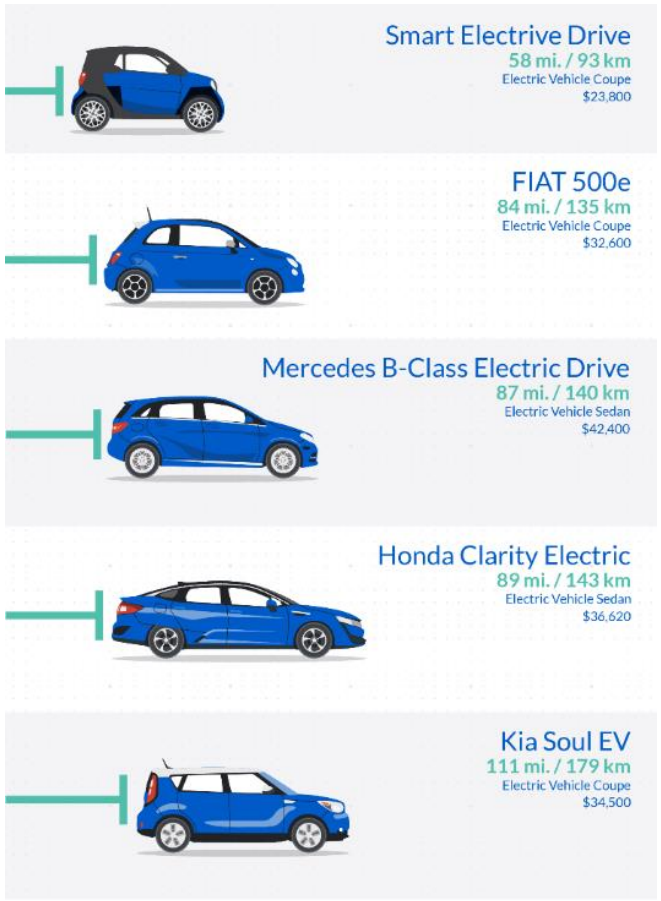
# Goals & Objectives

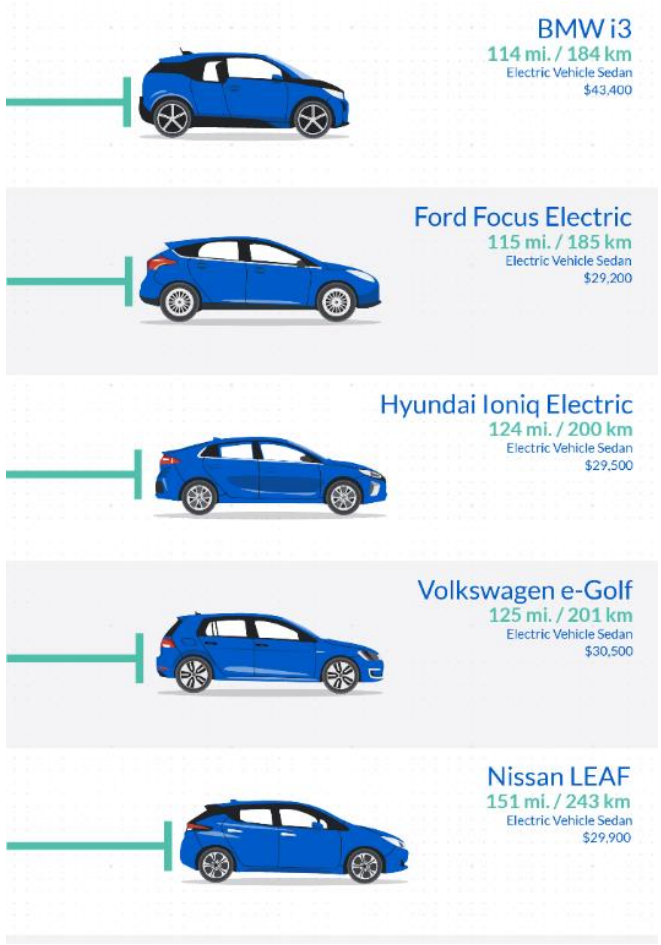
- Increase # of EV's on Nebraska roads
- Understand impact of EV's on our grid
- Reduce carbon emissions
- Reduce EV costs for potential buyers
- Provide education on EV's
- Provide education on OPPD renewable generation

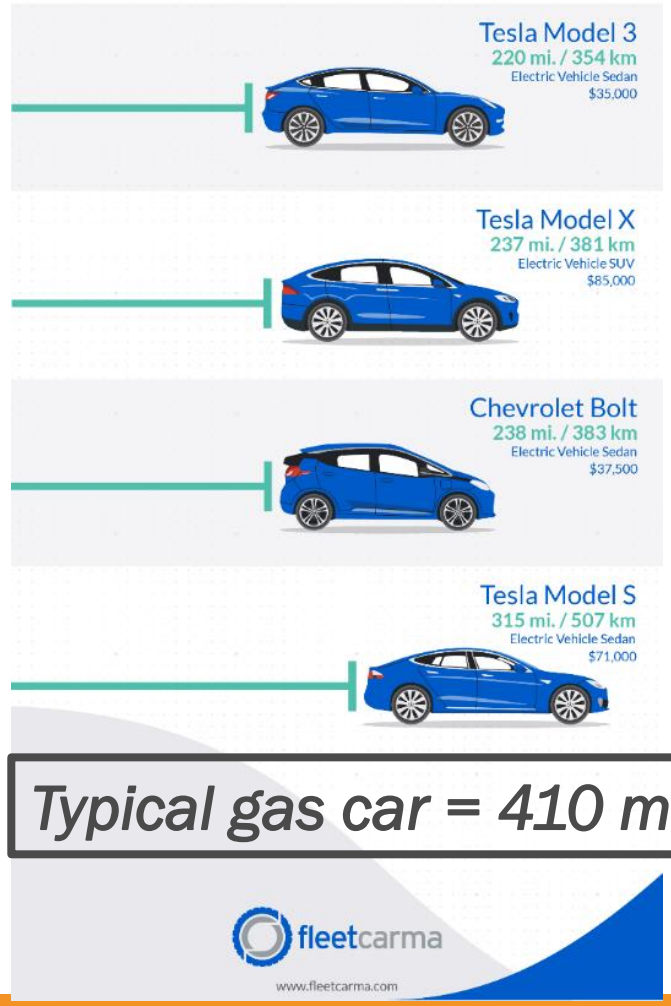
# Background: EV Sales Increasing



# Background: EV Ranges are Approaching Gas Levels



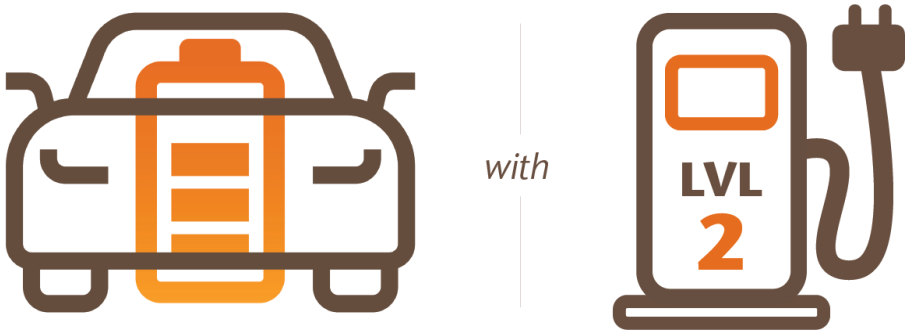




*Typical gas car = 410 miles*

*Source: EVadoption.com*

# EV Rebates Journey 2018

52 - $4,500 Rebates



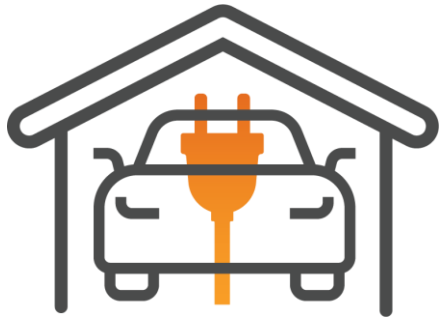

90 - $500 Rebates


- 53,794 kg of green house gas emissions savings
- Equivalent 1,518 trees growing for 10 years

# EV Rebates Evolve 2019

100 - $100 Rebates

(58 left)



50 - $2,500 Rebates

(0 left)

*with*


50 - $500 Rebates

(21 left)


- 177,130 kg of green house gas emissions savings
- Equivalent 4,403 trees growing for 10 years

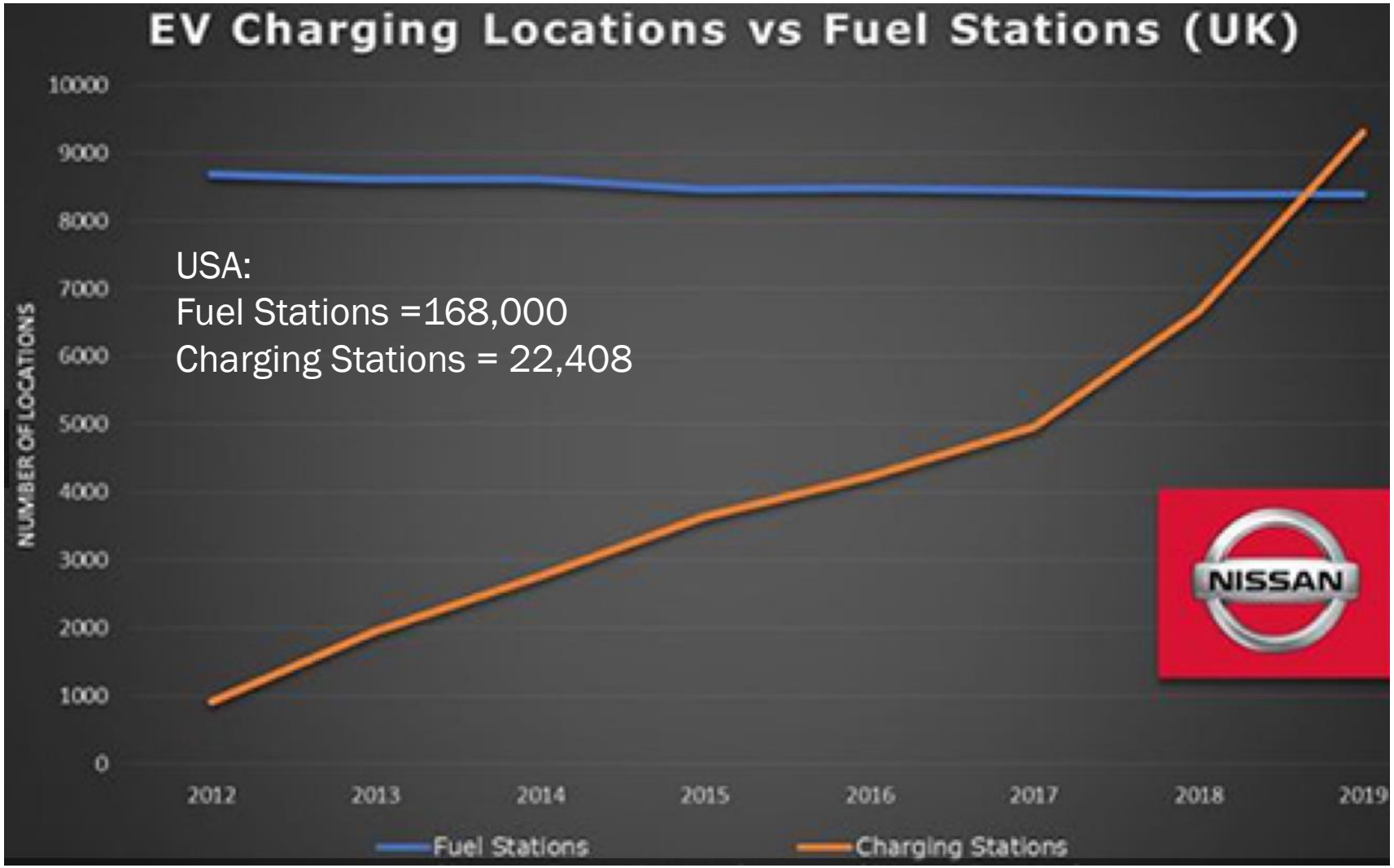
# Creating Partnerships

- Worked with several local dealerships to promote EV car and charger rebates

-Huber
-Woodhouse Nissan
-Sid Dillon Blair
- Nissan of Omaha
- H&H Jaguar
- Audi of Omaha

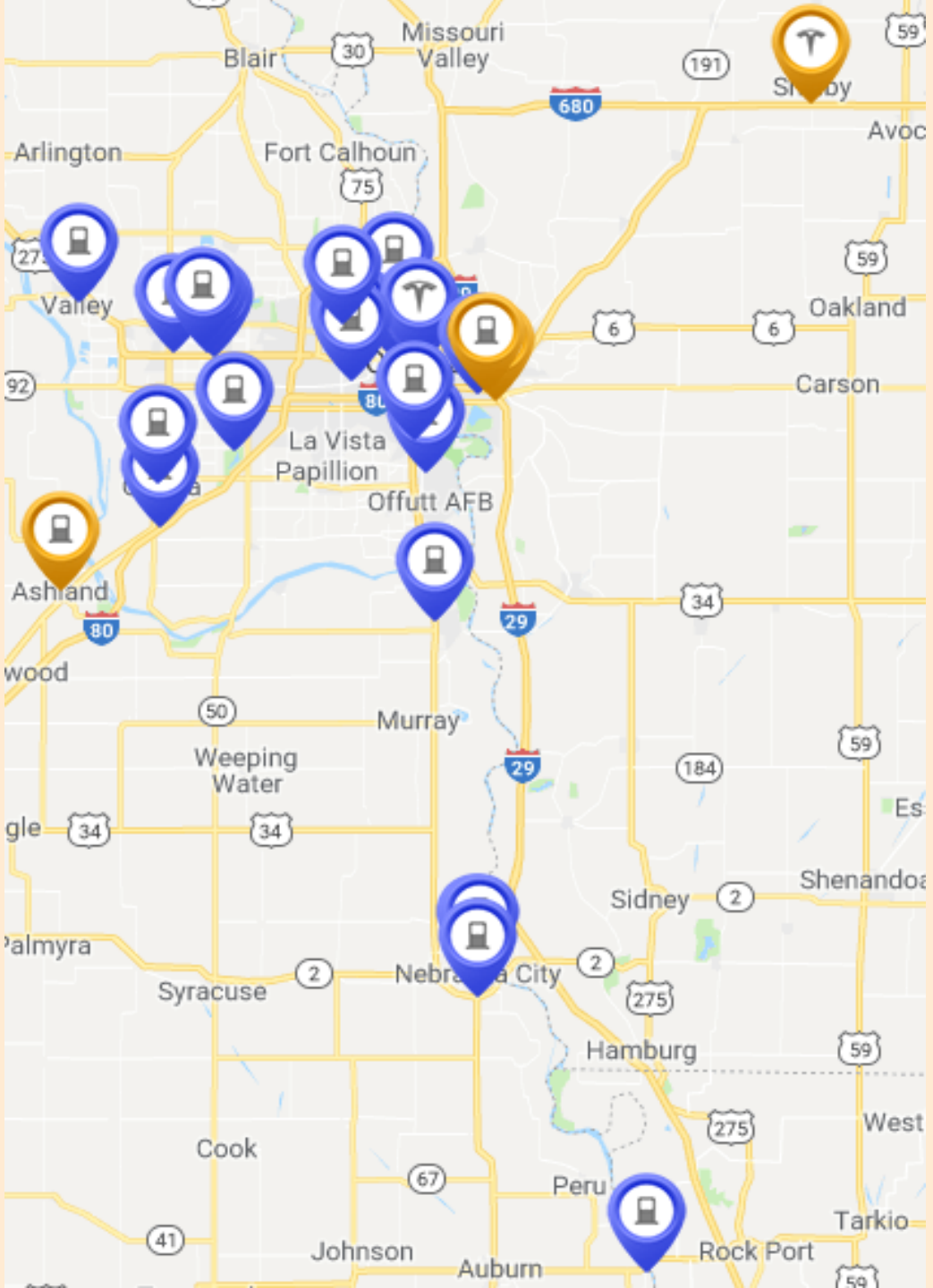
- Manufacture incentives from Nissan, Chevy & Audi

# Background: Macro Trends in Public Chargers



# Public Charging in OPPD Service Area

Currently approx. 30 stations (ChargeHub.com)



# What is coming from OPPD…

- Six Level 2 Chargers
- Obtained With Help From NCEA Grant
- *High Utilization* Sites
  - Henry Doorly Zoo
  - UNMC
  - New NPDodge Development
- One For Public Use at Energy Plaza


- Purpose:
  - Study Utilization of Public EV Charging Stations
  - Learn About O&M Costs
  - Learn About Infrastructure Needs and Challenges

Program made possible by a grant from the Nebraska Environmental Trust (NET) and a partnership with the Nebraska Community Energy Alliance (NCEA).

# What is coming from OPPD…

- Pursuing funds from the VW Settlement Trust
  - $1.2M in funding available
  - Maximum 25% in any one county
  - Notification of award in January 2020
- Priorites
  - EV charging on N-S hwy corridors
  - Increase number of fast chargers
- Working with community partners in the following counties:
  - Cass
  - Dodge
  - Douglas
  - Nemaha
  - Otoe
  - Sarpy
  - Washington

NEBRASKA
Good Life. Great Resources.
DEPT. OF ENVIRONMENT AND ENERGY

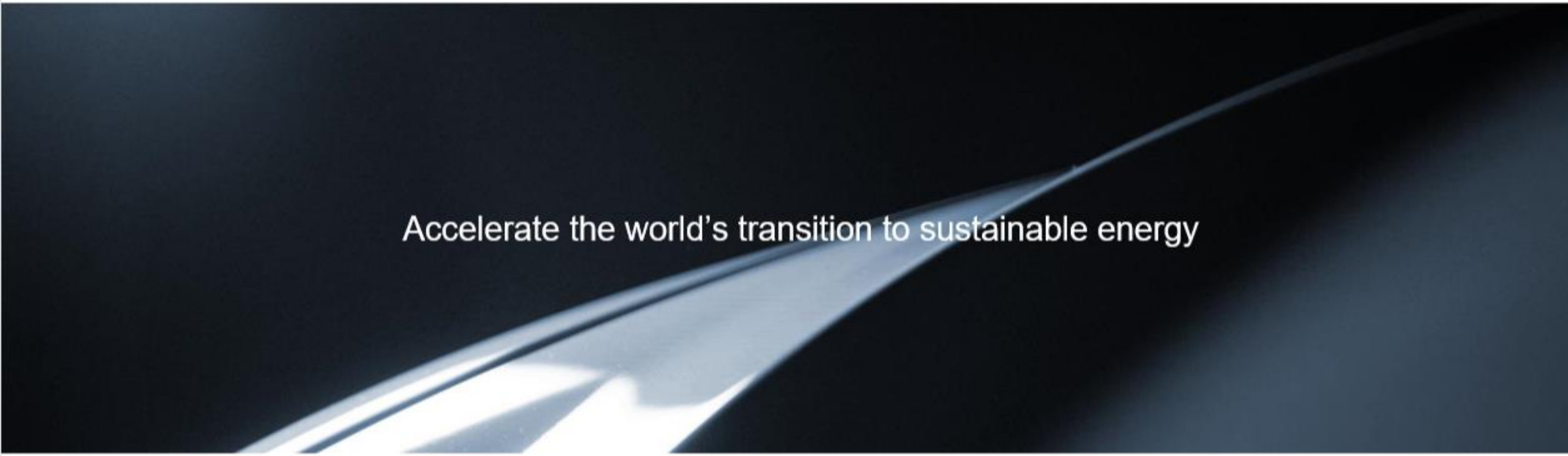
Program made possible by a grant from the Nebraska Department of Environment and Energy on behalf of the Volkswagen Settlement Trust

# Thank You!!!

Kirk Estee
Customer Alternative Energy Solutions Manager
krestee@oppd.com
402-616-2666


TESLA

# OUR MISSION



# PRODUCT SUITE

Vehicles | Semi | Charging | Solar | Powerwall | Powerpack | Software

# THE TESLA FAMILY

# TESLA CHARGING

Supercharging

Destination Charging

Where You Park

# CHARGING INFRASTRUCTURE OVERVIEW

- **What is Level 1 Charging?**
  - Single-phase 110v outlet found at your home
  - Limited use cases (only long-dwell times. E.G Airports)
  - 3 to 5 miles of charge per hour: full charge over multiple days

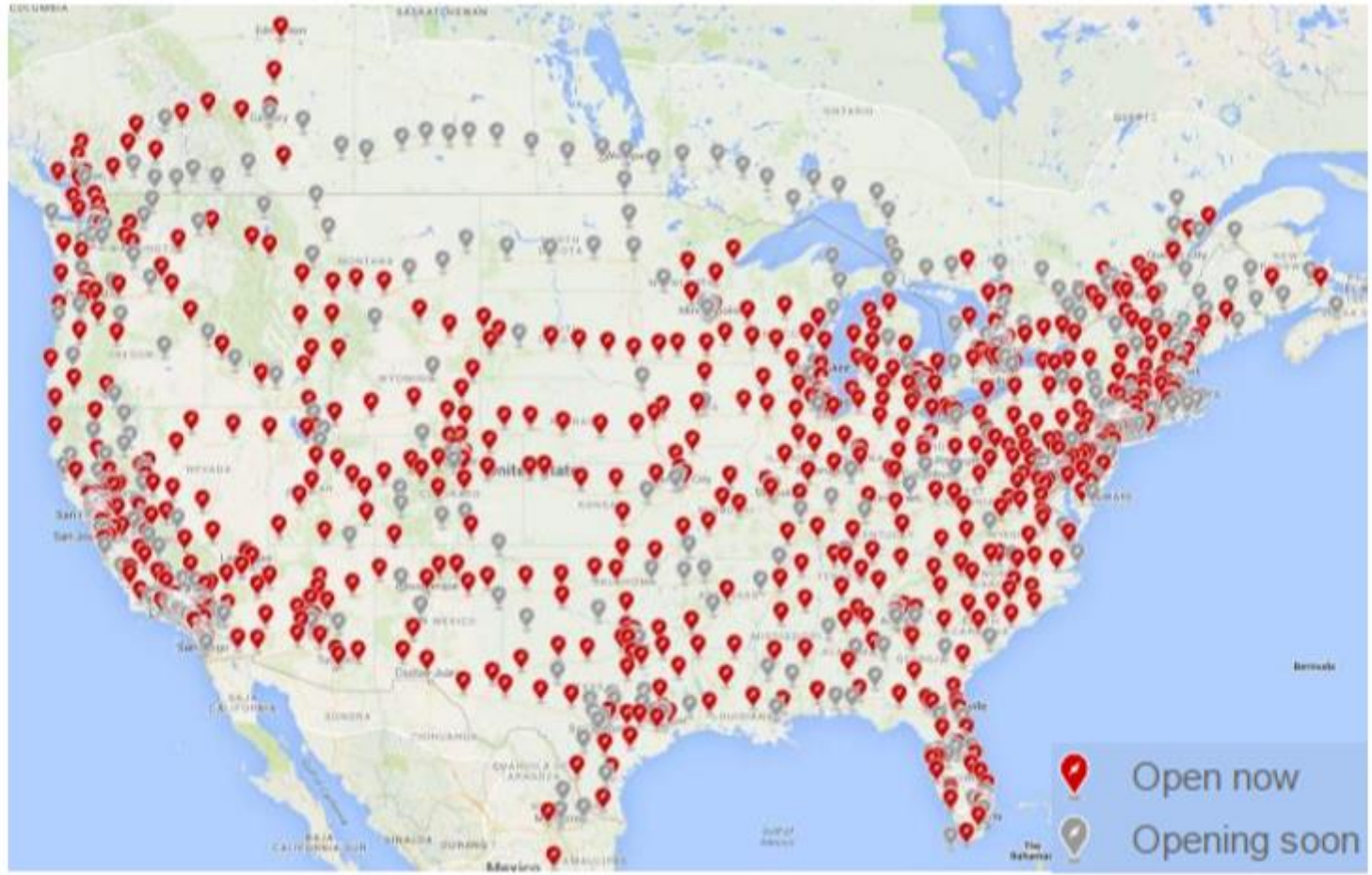
- **What is Level 2 Charging?**
  - Your home single phase 208,220,240v outlet
  - Recommended for medium to long dwell time use-cases (2 - 8 hours)
  - Home, work, hotels, resorts, parking garages, and even shopping malls
  - Between 23 and 52 miles of charge per hour – full charge over night

- **What is Level 3 (DCFC) Charging?**
  - Commercial three phase 480v power
  - Recommended for short dwell time use-cases, <1 hour
  - Rest stops, shopping centers, and malls
  - As high as 75 miles of charge in as little as 5 minutes of charging

# TESLA CHARGING EQUIPMENT

| | Supercharger V3 (250 kW) | Supercharger V2 (150kW) | Supercharger (72kW) | Wall Connector |
|---|---|---|---|---|
| |  |  |  |  |
| Max Output Power | 250 kW | 150 kW | 72 kW | 7-17 kW |
| Typical Charge Time | 20-30 minutes | 30-40 minutes | 50 minutes | 4-8 hours |
| Target Use Case | Long Distance | Long Distance | Urban Fast Charging | Destination Charging (Public + Work + Home) |

# THE SUPERCHARGER NETWORK




1,636 Supercharger stations  14,497 Superchargers

# SUPERCHARGING IN NEBRASKA


- Sidney – 8 stalls
- Ogallala – 8 stalls
- Gothenburg – 8 stalls
- Grand Island – 8 stalls
- Lincoln – 8 stalls

5+ Supercharger stations  40+ Superchargers

# EV GROWTH NEBRASKA

- ~1,700 BEVs in NE (June 2019)
- ~.15% of vehicles on road in NE are EVs

## Your Results

In Nebraska, to support 38,216 plug-in electric vehicles you would need:

**930** Workplace Level 2 Charging Plugs

**631** Public Level 2 Charging Plugs

*There are currently 150 plugs with an average of 2.0 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

**114** Public DC Fast Charging Plugs

*There are currently 63 plugs with an average of 5.3 plugs per charging station per the Department of Energy's Alternative Fuels Data Center Station Locator.*

**Change Assumptions**

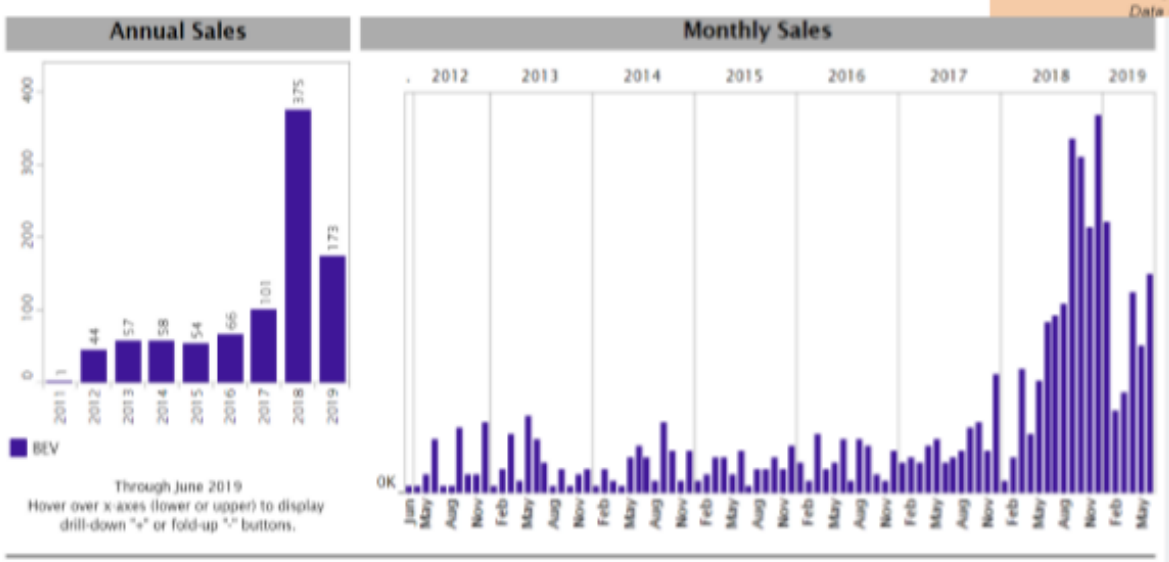
Plug-in Electric Vehicles (as of 2016): 890

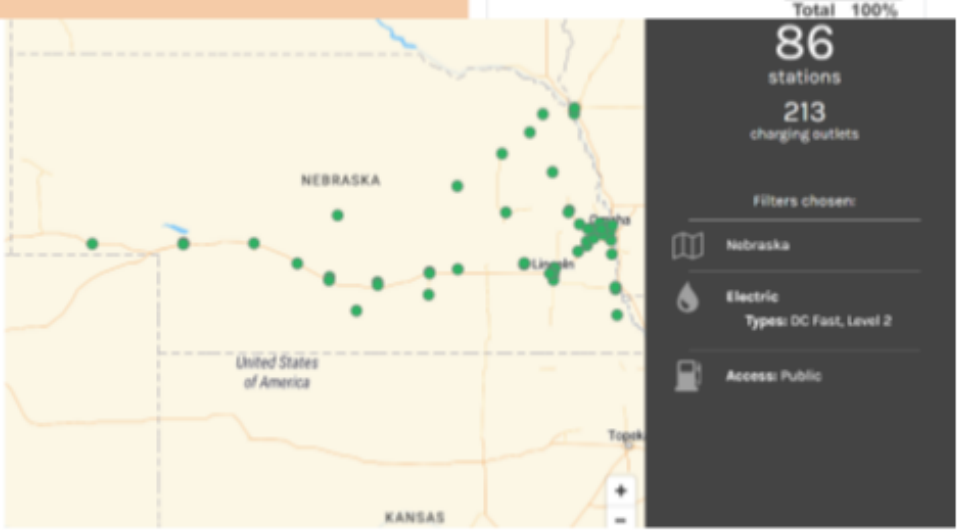
Light Duty Vehicles (as of 2016): 1,910,800

**Number of vehicles to support** 38,216

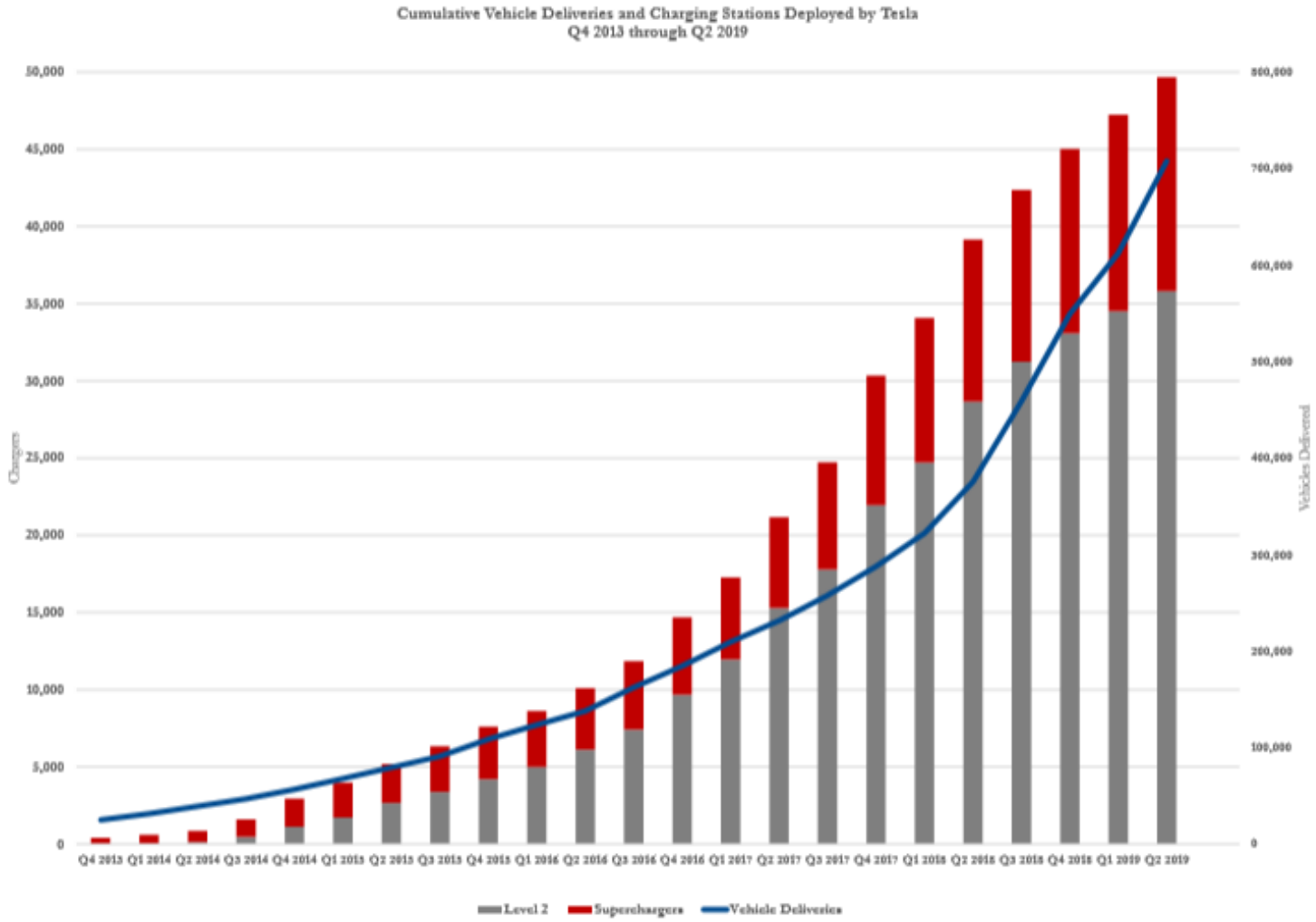
**Vehicle Mix**

| | | |
|---|---|---|
| Plug-in Hybrids 20-mile electric range | 15 | % |
| Plug-in Hybrids 50-mile electric range | 35 | % |
| All-Electric Vehicles 100-mile electric range | 15 | % |
| All-Electric Vehicles 250-mile electric range | 35 | % |
| Total | 100% | |



# WITH VEHICLES COMES CHARGING



# TYPICAL CHARGING

**Approx. 85%** of your charging

**<10%** of your charging

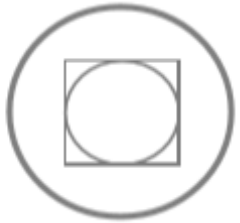
**<10%** of your charging

Full Charge Every Morning | Supercharge on the Way | Recharge at Your Destination

Unlike refueling, charging happens mostly at home or at work

# DAILY CHARGING DOES NOT REQUIRE ATYPICAL POWER LEVELS

Air conditioning
~13 kWh



Dryer
~2-3 kWh


Washing Machine
~2-4 kWh

Iron
~1 kWh

Any electric vehicle
(with small or large battery)

~25 miles per day
=
8 kWh of energy needed per day

# RATE DESIGN CONSIDERATIONS

Public Fast Charging

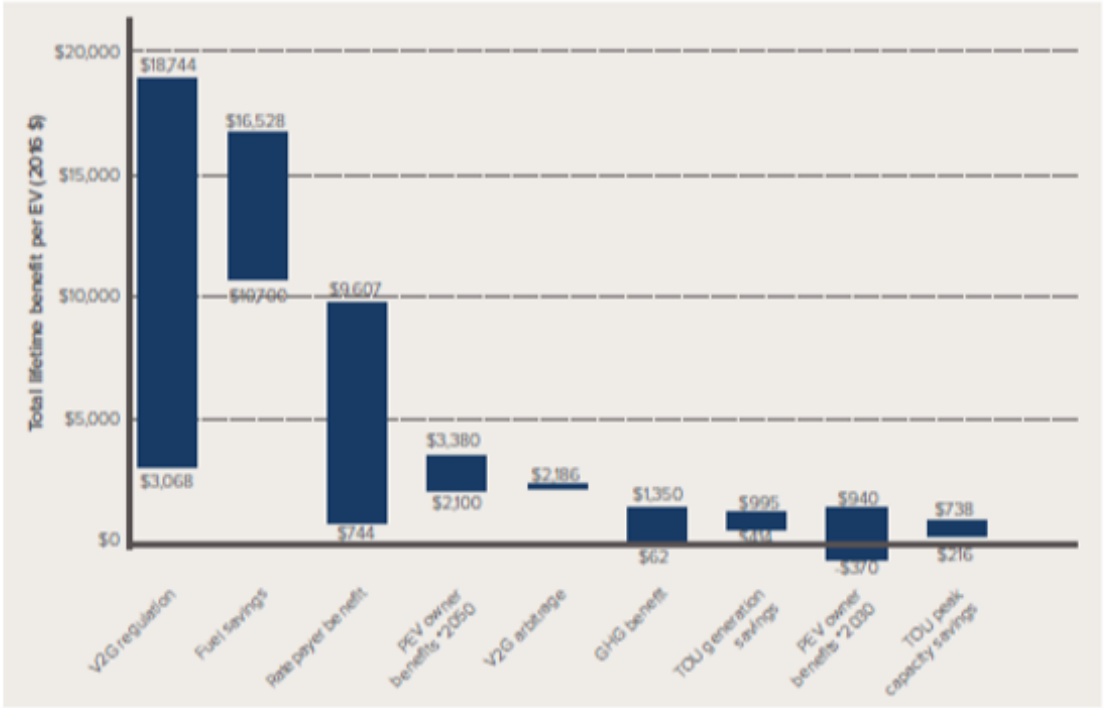
Home Charging

Fleet Charging

# RATEPAYER BENEFITS OF EVs

- Higher system utilization during off-peak hours.
- Additional electricity sales at average rates that significantly exceed marginal costs.
- **Reduced rates for all ratepayers.**

- Rocky Mountain Institute (RMI) estimated ratepayer savings per EV ranged from $744 to $9,607 over the lifetime of the vehicle.



# SUMMARY AND KEY TAKEAWAYS

- Utilities have a role to play in **driving investment in charging infrastructure** and spurring EV growth
- **Benefits** to all ratepayers
- **Customer experience and customer choice** is key
- **Create programs that are simple to understand**
- Provide rate options that align with customer use cases
- Work with stakeholders to determine long term EV strategy for Nebraska

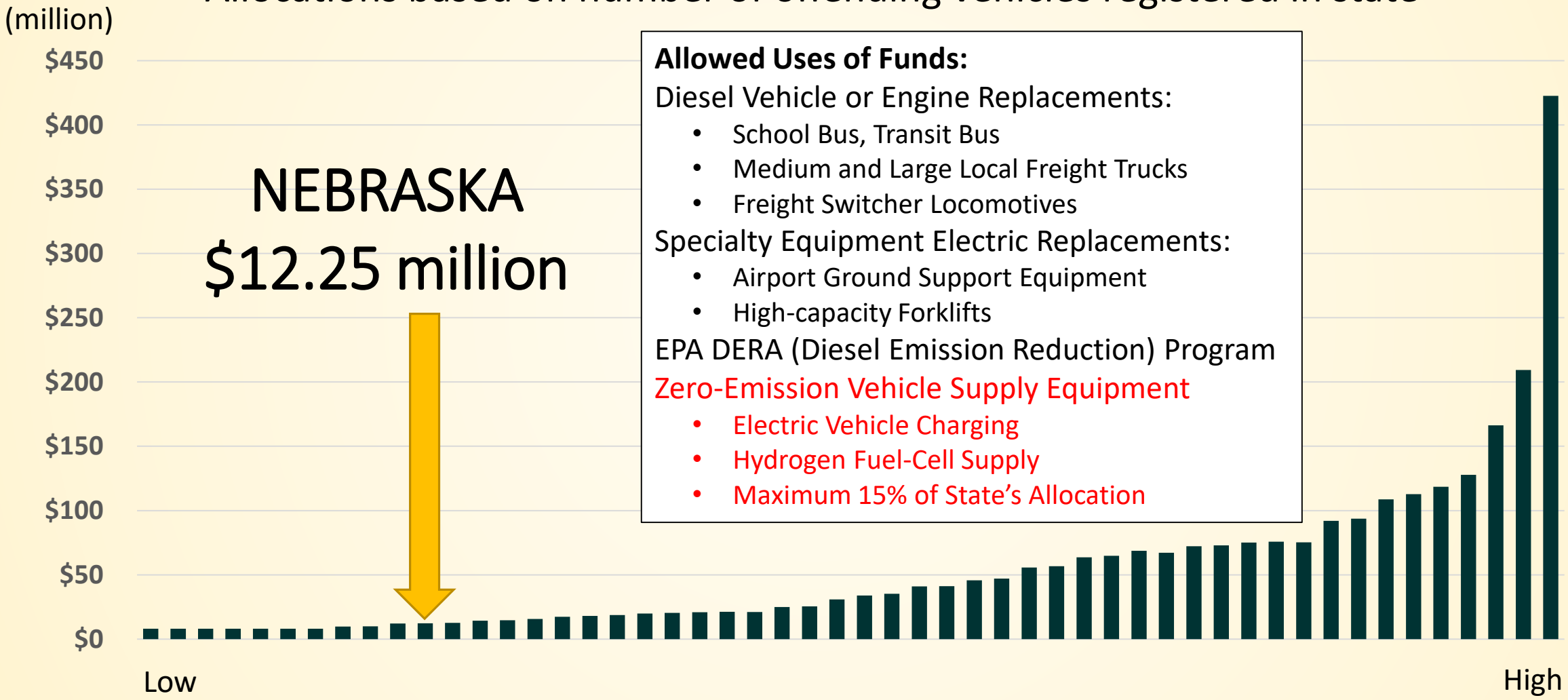

# Nebraska 2019 EV Charging Equipment Rebate Program

RANDY SMITH (VIA JOE FRANCIS)

NEBRASKA DEPARTMENT OF ENVIRONMENT AND ENERGY

# VW Trust Initial State Allocations Ranked

Allocations based on number of offending vehicles registered in state




**Allowed Uses of Funds:**

Diesel Vehicle or Engine Replacements:

- School Bus, Transit Bus
- Medium and Large Local Freight Trucks
- Freight Switcher Locomotives

Specialty Equipment Electric Replacements:

- Airport Ground Support Equipment
- High-capacity Forklifts

EPA DERA (Diesel Emission Reduction) Program

Zero-Emission Vehicle Supply Equipment

- Electric Vehicle Charging
- Hydrogen Fuel-Cell Supply
- Maximum 15% of State's Allocation

# Nebraska's Selected Mitigation Actions



School Bus Replacements, 25% (~ $3 million)

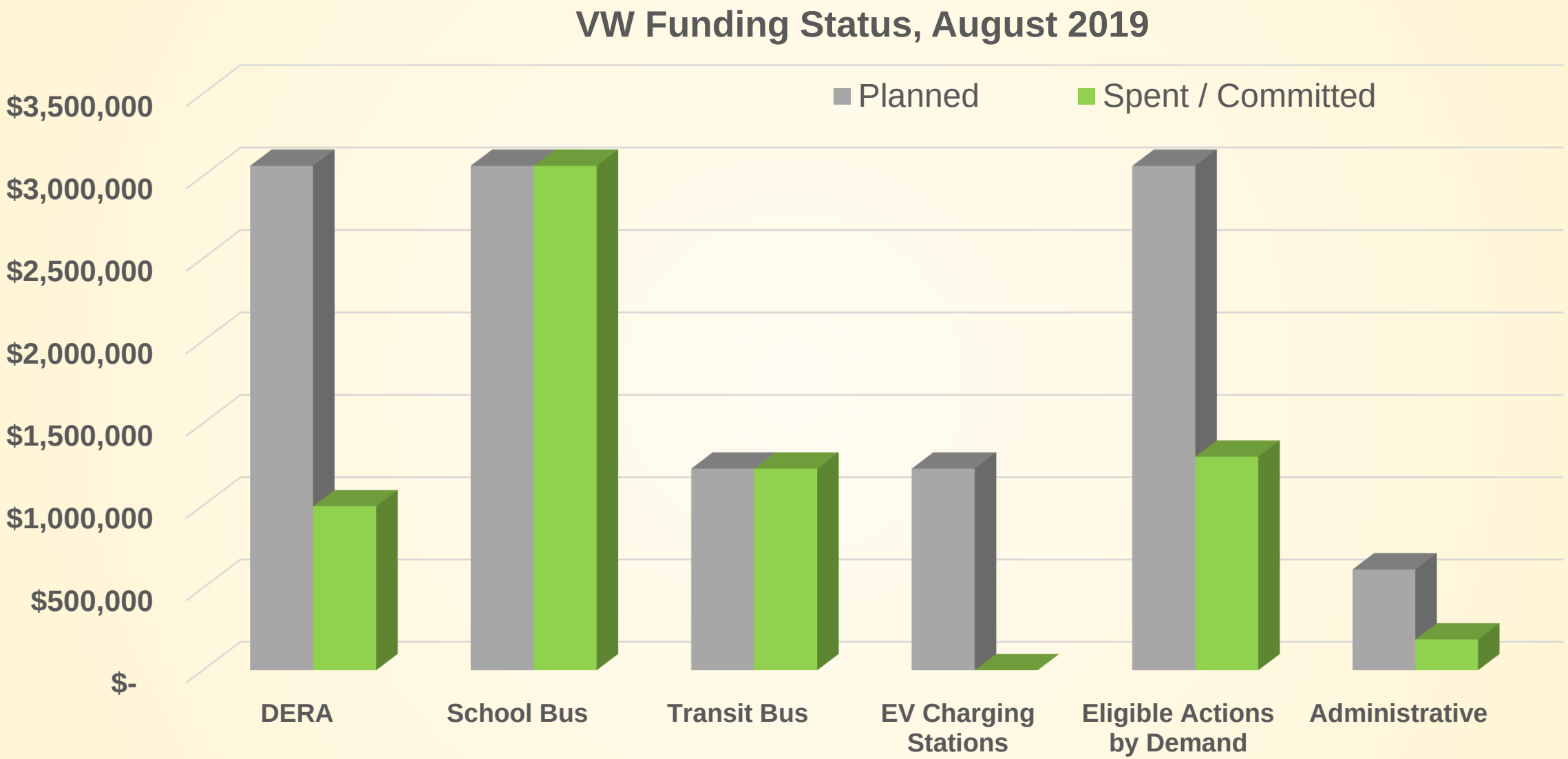
EV Chargers, 10% (~ $1.2 million)

Transit Bus Replacements, 10% (~ $1.2 million)

Administrative, 5% (~ $0.6 million)

Eligible Actions Based on Demand, 25% (~ $3 million)

Clean Diesel DERA Program, 25% (~ $3 million)



VW Funding Status, August 2019
Planned
Spent / Committed
$3,500,000
$3,000,000
$2,500,000
$2,000,000
$1,500,000
$1,000,000
$500,000
$-
DERA
School Bus
Transit Bus
EV Charging Stations
Eligible Actions by Demand
Administrative

# EV Charging Equipment Rebate Program

## Eligible Applicants:

- Businesses
- Federal, State, Local, or Tribal Governments
- Educational institutions
- Metropolitan Planning Organizations
- Public Utilities
- Nonprofit Organizations

# EV Charging Equipment Rebate Program

NDEE is providing $1.2 million in rebates as incentives to install electric vehicle (EV) charging equipment that will be available to the public at qualified locations in Nebraska.

- Highway corridor, community/destination, and workplace locations
- Chargers at single-family residences are not eligible for funding
- Payments will be made as reimbursements after work is completed
- Application deadline is 15 November 2019
- Awards anticipated in early January 2020
- Funding is the result of the court settlement of Volkswagen's diesel emission test violations

# Cost-Share Requirements / Eligible Costs

| Charging Station | Max. Reimbursement | Min. Recipient Match |
|---|---|---|
| DC Fast Charging Station | 80% | 20% |
| Level 2 Charging Station | 50% | 50% |

- Charging equipment, shipping, and installation
- Electric service upgrades and connection costs
- Site preparation, signage, and lighting
- Networking costs and equipment warranties for 5 years
- Administrative costs (maximum 5% of project costs)

# Eligible Charging Sites

- Highway Corridor Sites:
  - DCFC + Level 2

- Public community/destination sites:
  - DCFC + Level 2 or Level 2 only

- Workplace sites:
  - Level 2

One site may qualify under more than one location category

# Highway Corridor Sites

- Within 3 mi driving distance of state/federal highway
- Must include at least 1 DC fast charger and 1 Level 2 charger; both 80% reimbursement
- Hotel sites are not required to install DC charger (Level 2 OK) (50% reimbursement)
- Sites along priority highway corridors preferred

# Highway Corridor Sites

## Priority Highway Corridors

US 75: Auburn-Nebraska City-Omaha-Blair-South Sioux City
US 77: Beatrice-Lincoln-Fremont-South Sioux City
US 81: Hebron-Geneva-York-Columbus-Norfolk
US 281: Hastings-Grand Island
US 30: Fremont-Columbus
US 275: Omaha-Fremont-Norfolk
NE Hwy 2: Lincoln to Nebraska City

# EV Charging Equipment Rebate Program

- NDEE reserves the right to award less than the maximum reimbursement
- Awards expected to be announced in early January 2020

## QUESTIONS?

Randy Smith: 402-471-4272 randy.smith@nebraska.gov

Joe Francis: 402-471-4371 joe.francis@Nebraska.gov

More information: http://deq.ne.gov/publica.nsf/pages/19-011