



www.world-kinect.com

Transportation Electrification – Are you Ready?

2021 MN Energy Expo

Golden Valley Country Club

29 September 2021

Transportation Electrification – Agenda Topics

1. Setting the stage
2. Definitions & terms
3. Promise and potential
4. Challenges and hurdles
5. Observations & Takeaways
6. Xcel Energy Programs
7. Q&A discussion



We solve energy challenges

From **electricity, natural gas, clean energy to liquid fuels**, our team of certified energy professionals ensure the energy challenges of our customers are solved safely and reliably.

The World Fuel Services commitment:

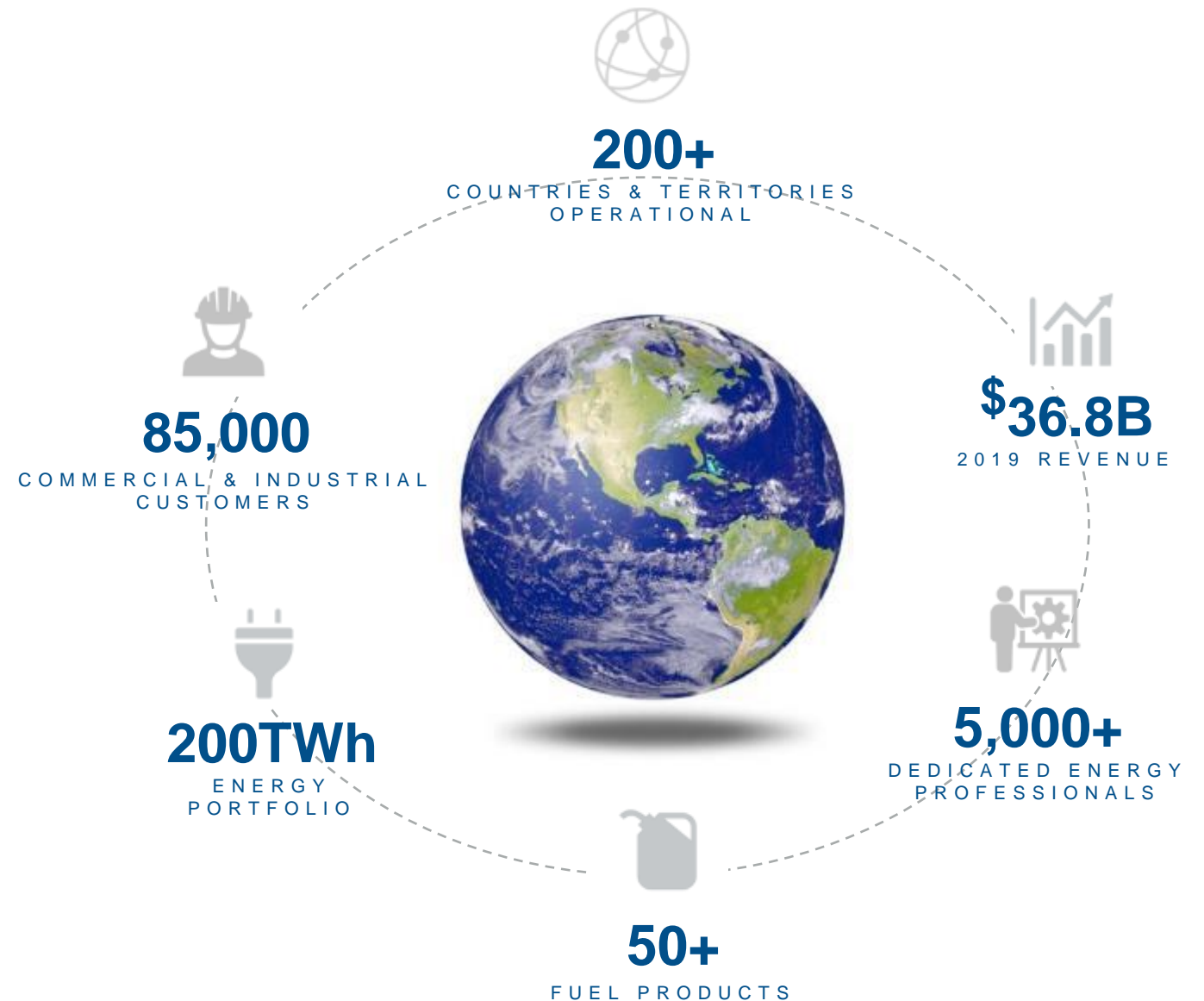
Delivering the energy you need.

Protecting your budget.

Reducing your carbon footprint.



World Fuel Services is a Fortune 100 Corporation



Partial Client Snapshot



Setting the Stage: Reasons behind the Transformation

1. Improved efficiency
2. Reduced GHG emissions
3. Improved performance (WOW factor!)
4. Reduced TCO (Total Cost of Ownership)
5. Better driver experience
6. V2G (Vehicle to Grid) benefits







POWERED BY KARMA

POWERED BY KARMA is developing commercial-grade powertrain systems for Class 3-6 vehicles, based on OEM experience delivering award-winning luxury electric vehicles with over 7.5 million miles accumulated. The flexible, modular architecture will power a variety of last mile delivery and transportation vehicles in the Class 3-6 range, including vans, busses, ambulances, flatbeds, tow trucks, box trucks and more.



Karma's Technology Includes:

- ADAS Integration Capability
- Advanced Telematics
- FOTA/OTA Updates
- Vehicle Communications Networks
- Diagnostics
- Big Data
- Driver Information Systems (UI/UX)
- Vehicle Controls
- Powertrain Controls
- SIC Inverters
- Battery System Development
- Battery Management Systems

System Configurations:

- 100% Electric Drive
- Standard/Medium/Long Range Options
- Flexible, Modular Electrification System
- Suitable for Various Class 3-6 Vehicles
- 200 kW of Tunable Power
- > 1,800 Nm of Torque
 - Up to 30% Grade
- Top Speed 80mph (Speed Limited)
- 3-Mode Regenerative Braking
- Optional Push Button Start/Stop



EVAN BONTRAGER
BUSINESS DEVELOPMENT

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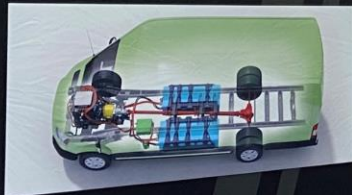
LIGHTNING
eMOTORS

COMMERCIAL EVS YOUR WAY



LIGHTNING eMOTORS

POWERING FLEETS WITH LIGHTNING



- Best-in-class efficiency
- Zero emissions
- Smooth, quiet and intuitive driving experience
- AC Level 2 and DC Fast Charging
- Active thermal management for batteries
- Advanced telematics / analytics



lightningemotors.com











The World's

KENNETH WORTH TOYOTA
ZERO EMISSIONS

ZERO
EMISSIONS



PORT OF LOS ANGELES
Store to Store Project
OCEAN 9
Clean Air Partners



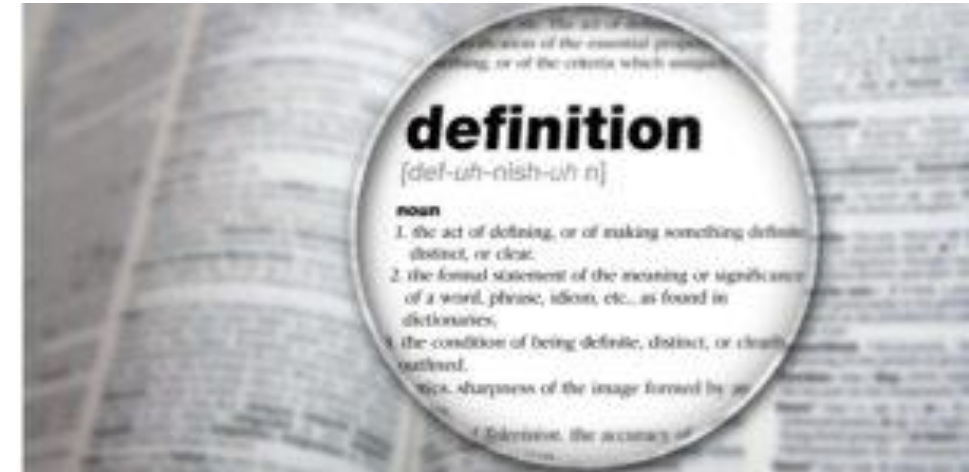
ups
FUEL CELL
ELECTRIC

991702
UPS
USDOT
021800

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Definitions & Terms

1. BEVs (Battery Electric Vehicles)
2. HEVs (Hybrid Electric Vehicles)
3. PHEVs (Plug-in Hybrid Electric Vehicles)
4. ICE (Internal Combustion Engine)
5. Vehicle classes/cars/trucks/fleets
6. Charging Levels 1,2,3
7. AVs (Autonomous Vehicles)
8. DERs (Distributed Energy Resources)...solar, wind, batteries...



A few approximations

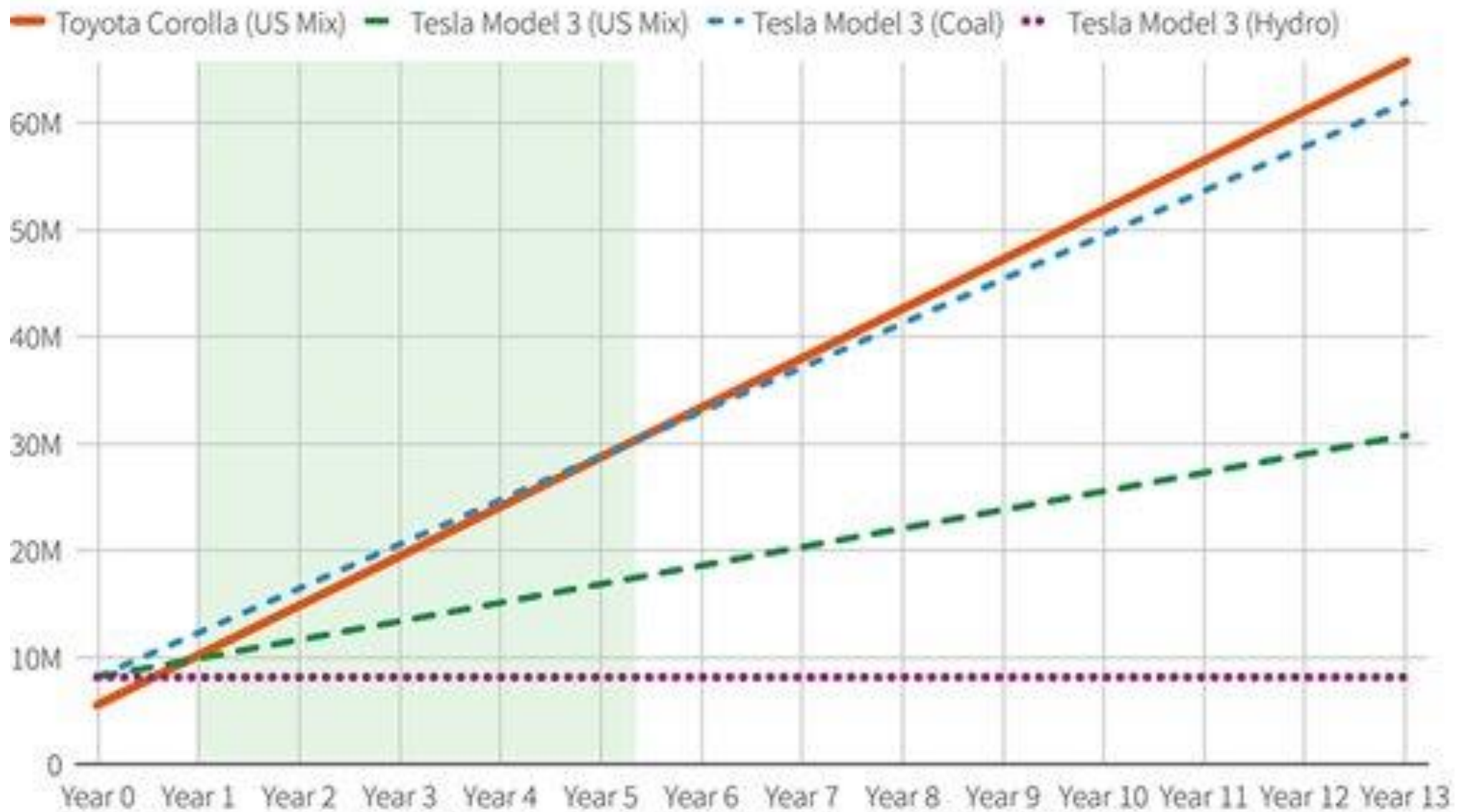
1. 3.3 miles per kWh or 0.3 kWh/mile
2. At 10 cents/kWh >> 3 cents/mile
3. \$3 gasoline @ 30 MPG >> 10 cents/mile
4. Charge times:
 1. Level 1 4-6 MPH
 2. Level 2 15-70 MPH
 3. Level 3 100-900 MPH*



Sorting Through the Hype>> Challenges and Hurdles

1. **Grid capacity and infrastructure**/lead time
2. **Vehicle 1st cost** – incentives? Ownership model “*as a Service*”?
3. **Range** issues/limitations/anxiety/HVAC impact
4. **Charger** locations and availability
5. **Transition period:** fossil + electric coexist
6. **Regulatory** issues, tariff structures
7. **Green electrons** on the grid?
8. **Myths...**BEV impacts, false range issues





Note: Total lifetime CO2 emissions in millions of grams
 Data source: Argonne National Laboratory GREET model

Observations

1. We are back in the **Wild West**...again
2. **Early movers:** Differentiate, Traffic, Data
3. **Fleets:** Infrastructure first, then vehicle...
4. **Busy and crowded** market, multiple stakeholders
 1. Energy Companies (Shell, BP)
 2. Charging equipment companies (ChargePoint, Electrify America)
 3. Electric Utilities (Xcel Energy, Duke Energy)
 4. Vehicle Manufacturers (Ford, Workhorse)
 5. Other Players (software, financial services, AV enablers, consultants)



Takeaways

1. Start preparing now. EV adoption will likely accelerate. Fleets are conducting pilot trials NOW
2. Don't get caught comparing 100+ years of ICE to ~5 years of BEVs!
3. Fuel isn't going away tomorrow, or next year – coexistence “4A”
4. Adoption not uniform – regional variation (incentives, utilities, other)



More Takeaways

5. Utility infrastructure is HUGE influencer, will affect adoption
6. V2G offers microgrid potential, part of DER paradigm
7. Requires continued grid transformation: fossil >> renewables
8. Wildcard: Fuel Cell + BEV >> possibilities and challenges





EV SERVICE PROGRAMS

Justin Durocher, Associate Product Portfolio Manager

September 29, 2021

OUR COMPANY-WIDE EV VISION



1.5 MILLION EVs

On the road in the areas we serve by 2030, replacing gas-powered models

That's **20% of all vehicles**, a **30-fold** increase in EVs



\$1 BILLION

In customer fuel savings annually by 2030

An EV would cost **\$700 less per year** to fuel than a gas-powered car



\$1 OR LESS PER GALLON

To drive an EV when charged with Xcel Energy's low, off-peak electricity prices



5 MILLION TONS OF CARBON EMISSIONS

Eliminated annually by 2030 with our clean energy

That's about **3 tons of carbon reduction** per vehicle

Program Portfolio

| | Home Charging | Fleet | | Public/Fast Charging | |
|---------------------------|---|---|--|--|---|
| | | Light-duty | Medium and Heavy Duty | Corridor | Urban |
| Advisory Services: | <ul style="list-style-type: none"> Social media Online information Dealer Outreach Electrician Outreach Digital tools Online Calculator | <ul style="list-style-type: none"> Analytics and Advisory Services | <ul style="list-style-type: none"> Analytics and Advisory Services | <ul style="list-style-type: none"> Development Assistance | <ul style="list-style-type: none"> Development Assistance |
| Infrastructure: | <ul style="list-style-type: none"> Charging Equipment as part of EV Service and Subscription Service pilots Expanded home service** <i>Multi-Unit Dwelling pilot*</i> | <ul style="list-style-type: none"> Make Ready + Optional Charger Service pilot | <ul style="list-style-type: none"> Make Ready + Optional Charger Service pilot | <ul style="list-style-type: none"> Make Ready Pilot | <ul style="list-style-type: none"> Make Ready Partnership Pilot |
| Rates and Smart Charging: | <ul style="list-style-type: none"> Whole home time-of-use Separate meter EV TOU EV Service Pilot Subscription Service Pilot <i>Smart Charging Pilot*</i> | <ul style="list-style-type: none"> Update to General Service Rate** Charging equipment capable of participating in future smart charging pilots | <ul style="list-style-type: none"> Update to General Service Rate** Charging equipment capable of smart charging <i>School bus demonstration pilot*</i> | <ul style="list-style-type: none"> Update to General Service Rate** Smart charging capable equipment | <ul style="list-style-type: none"> Update to General Service Rate** Smart charging capable of equipment |

**indicates in development*
***proposed*



FLEET ELECTRIFICATION ADVISORY PROGRAM (FEAP)



Fleet Electrification Advisory Program

Analytics and Advisory Services for Vehicles and Infrastructure



Xcel Energy is partnering with a fleet analytics company to help customers:

- Understand fleet needs and highlight opportunities for electrification
- Collect detailed data of fleet vehicle usage on a day-to-day basis
- Assess which EVs can support existing driving patterns
- Develop infrastructure options and make recommendations on charging locations
- Analyze economics and make recommendations based on fleet needs (including rate options)

MINNESOTA EV SERVICE PILOT PROGRAMS



Program Goal

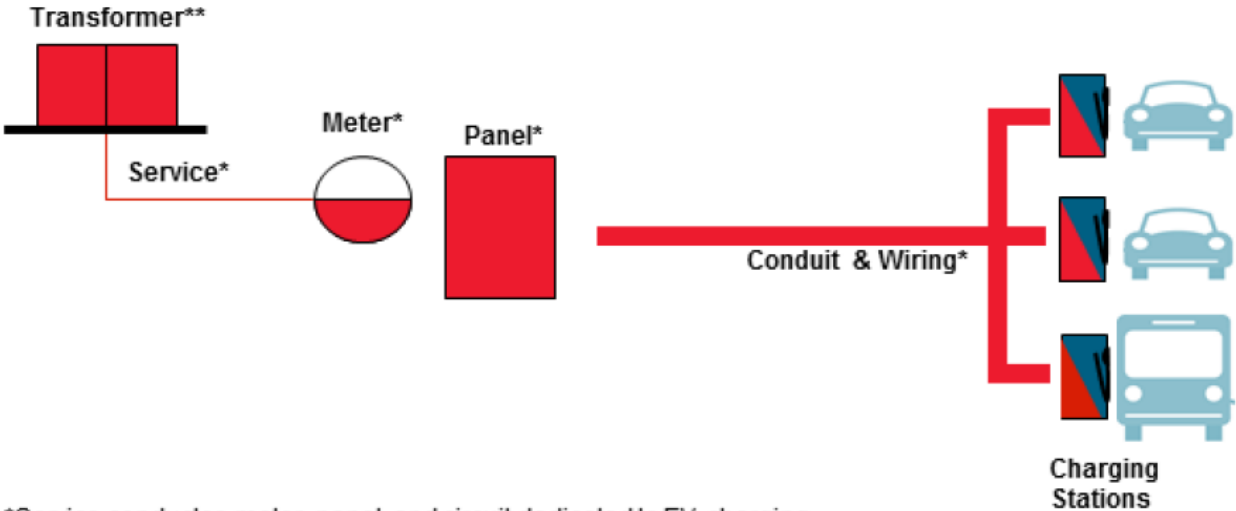
Goal

Provide commercial customers a convenient, affordable way to support infrastructure needed to charge electric transit vehicles and fleets

Approach

Reduce up-front cost of make ready-infrastructure

What is make-ready infrastructure?



*Service conductor, meter, panel, and circuit dedicated to EV charging
 **Can be overhead or underground

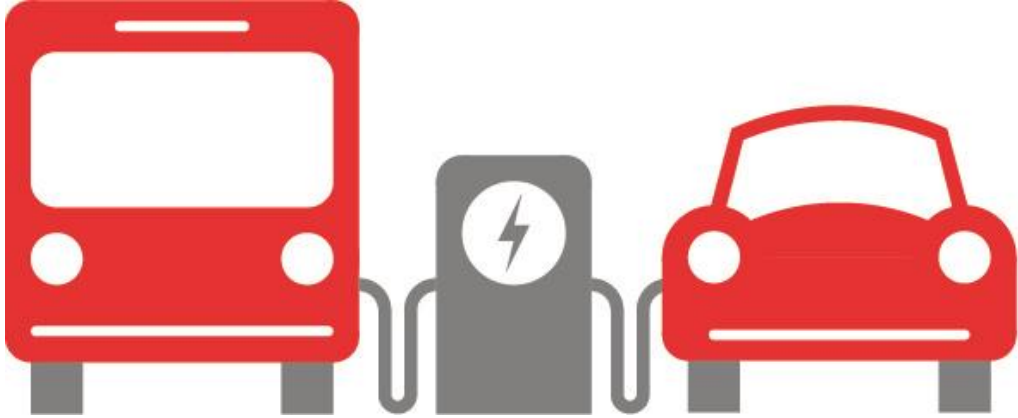
| EV Service Connection | EV Supply Infrastructure | Charging Equipment |
|-----------------------|--------------------------|--------------------|
| | | |

Fleet EV Services Pilot

- Infrastructure installed, owned, and maintained by the utility
- Infrastructure owned and maintained by participating customers
- Customer can choose between utility installing, owning, and maintaining or installing, owning and maintaining themselves

Fleet EV Service Pilot

Installation of make-ready charging infrastructure

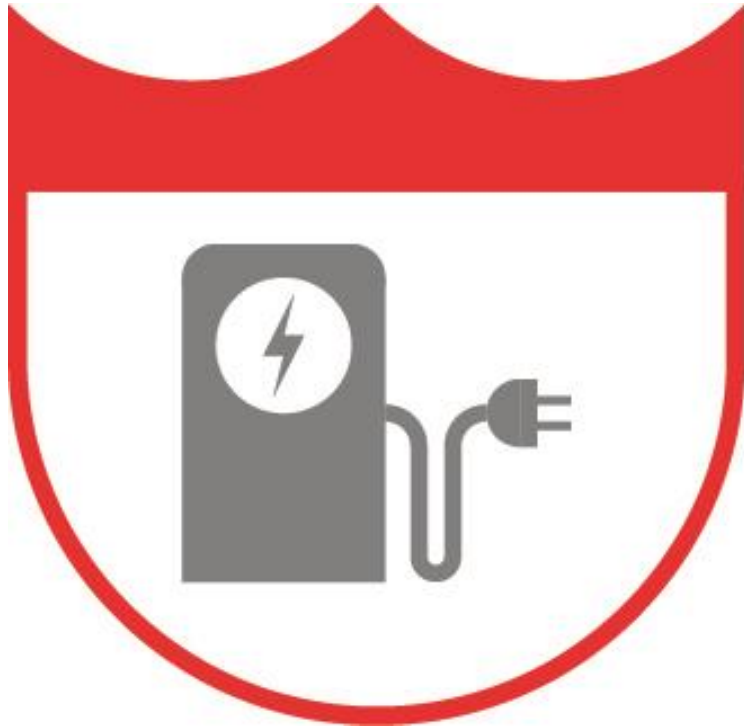


Xcel Energy is helping fleet operators transform their fleet to electric vehicles:

- Eligible customers within local, state, and other public sector or non-profit
- Provide make-ready infrastructure and charging equipment options.
- Installation services and payment options.
- Access to our low-cost EV charging time-of-use rate.
- \$14.4M budget over 3-year period
 - Open until July 2022

Public Charging EV Service Pilot

Installation of make-ready public charging infrastructure



Xcel Energy is increasing access to on-site public charging for electric vehicles:

- Installation of at least one DC fast charger at project sites
 - Within a “high use location”
- XE provides make-ready infrastructure
- Installation maintenance, post-installation
- Access to our low-cost EV charging time-of-use rate.
- Upfront technical assistance.
- \$9.2M Budget over 3-year period



MULTI-FAMILY

- Shared Parking - Site Host Provided Equipment
 - EVSI & EV Advisor
- Shared Parking – Full Service
 - EVSI & EV Advisor
 - Xcel Energy Provided Charging Equipment
- Assigned Parking – Full Service
 - EVSI & EV Advisor
 - Billing Individual Drivers
 - Xcel Energy Provided Charging Equipment



Learn more by...

Visiting the Fleet [website](#) or Public Charging [website](#):

-Contact our team by completing an intake form:

<https://mn.my.xcelenergy.com/s/business/ev/interest>





THANK YOU!

World-Kinect.com



Everything Energy.