

# I-80 STAKEHOLDER CONVENING & FUNDING UPDATES

**WHEN:** TUESDAY, AUGUST 16, 2022

**WHERE:** WESTERN ILLINOIS UNIVERSITY - QUAD CITIES



*I-80 MID-AMERICA*  
**CLEAN FUELS  
CORRIDOR**  
A greener way across the USA

Argonne  
NATIONAL LABORATORY



IOWA  
DOT



Bi-State  
Regional Commission



2030  
Coalition

Coalition

CHICAGO AREA  
CLEAN CITIES



Illinois Department  
of Transportation



IOWA CLEAN CITIES COALITION

IOWA  
economic development





IOWA CLEAN CITIES COALITION





# Mayor's Welcome



Mayor Sangeetha Rayapati  
Mayor of Moline, Illinois

# Overview and Purpose



Photo by Warren Gretz / NREL

# Participating Via Zoom

- Participants are in listen-only mode
- Post your questions at any time in Q&A
- Event recording and slides available this week
- Please complete event questionnaire

# Introductions

Argonne National Laboratory, Marianne Mintz

Bi-State Regional Commission, Gena McCullough

Chicago Area Clean Cities & Green Ways 2Go, Tim Milburn

Illinois Department of Transportation, Chris Schmidt

Iowa Clean Cities & Iowa Economic Development Authority, Abbie Christophersen

Iowa Department of Transportation, Craig Markley

Q2030, Kate Jennings





# Bi-State Regional Commission

**Gena McCullough**  
Bi-State Regional Commission  
Asst. Executive Director/Planning Director



*I-80 MID-AMERICA*  
**CLEAN FUELS  
CORRIDOR**  
A greener way across the USA



# I-80 MID-AMERICA CORRIDOR QUAD CITIES CONVENING



**MARIANNE MINTZ**

Principal Transportation Energy Analyst

August 16, 2022



Argonne National Laboratory is a  
U.S. Department of Energy laboratory  
managed by UChicago Argonne, LLC.

This work was supported by the Clean Cities Program in the USDOE's Office of Energy Efficiency and Renewable Energy, under Contract DE-AC02-06CH11357.



# Fixing America's Surface Transportation Act – FHWA's Alternative Fuels Corridor Program

FHWA designated highest volume portions of I-80 Corridor "Ready" or "Pending" in November 2016

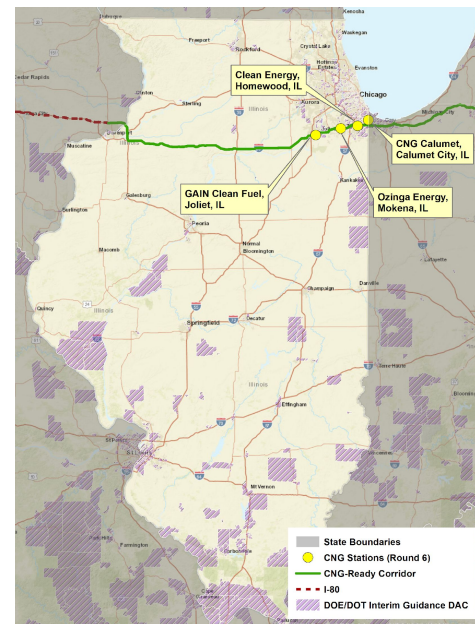
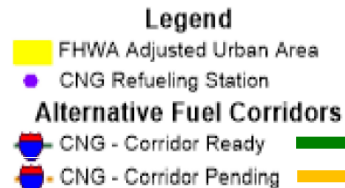
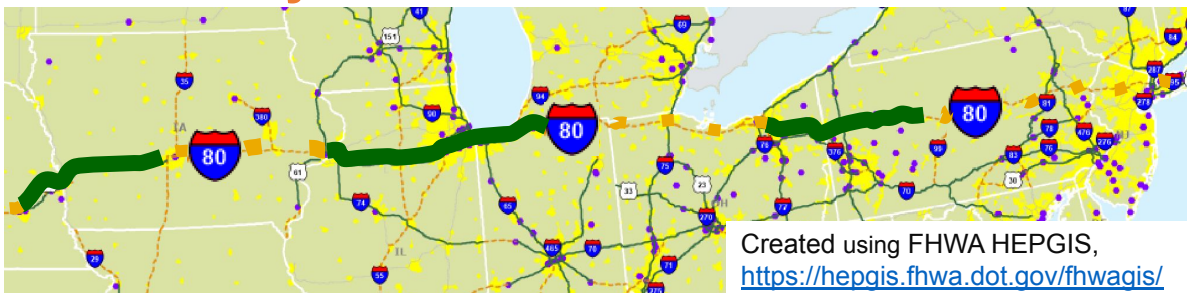
FHWA designated highest volume portions of I-70 Corridor "Ready" or "Pending" in April 2019



- IDOT/Argonne collaboration to develop alternative fuel corridors and multi-state nominations
- **FHWA funding to flip I-80 to EV and NGV Ready by developing deployment plan with outreach and education**
- Multiple jurisdictions and partners in planning (FHWA, Argonne, 6 state DOTs, 7 Clean Cities Coalitions, multiple utilities, stakeholders and infrastructure providers)

# FHWA-Designated I-80 CNG Corridor

## CNG-Ready in Illinois and Western Iowa



### CNG readiness criteria:

- Public fueling available within 5 miles of exit
- Locations no more than 150 miles apart
- Locations providing fast fill



**Today, a growing share of CNG is renewable natural gas (RNG) produced from landfills and other waste.**

# US Gain's Joliet CNG Station, August 15, 2022

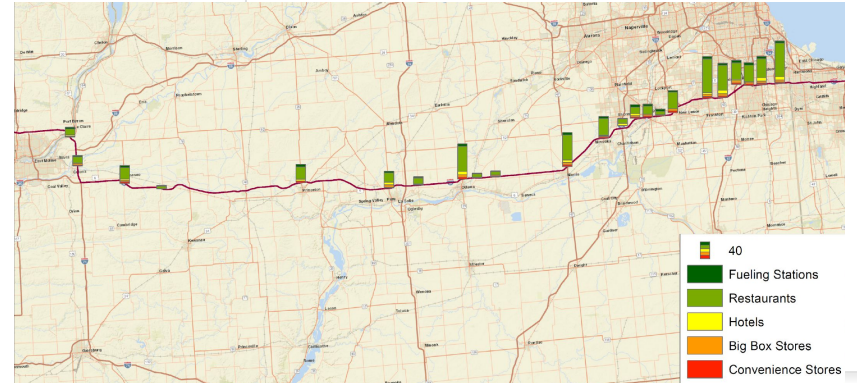
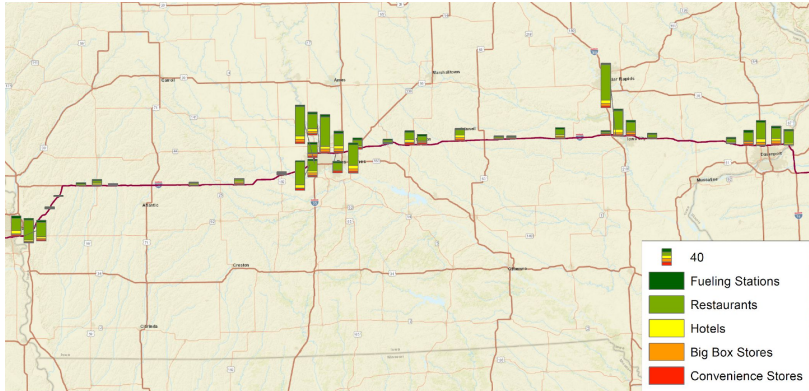
- Industrial area, large “truck-friendly” footprint
- Two dispensers, up to 3600 psi
- \$3.75/gal equivalent





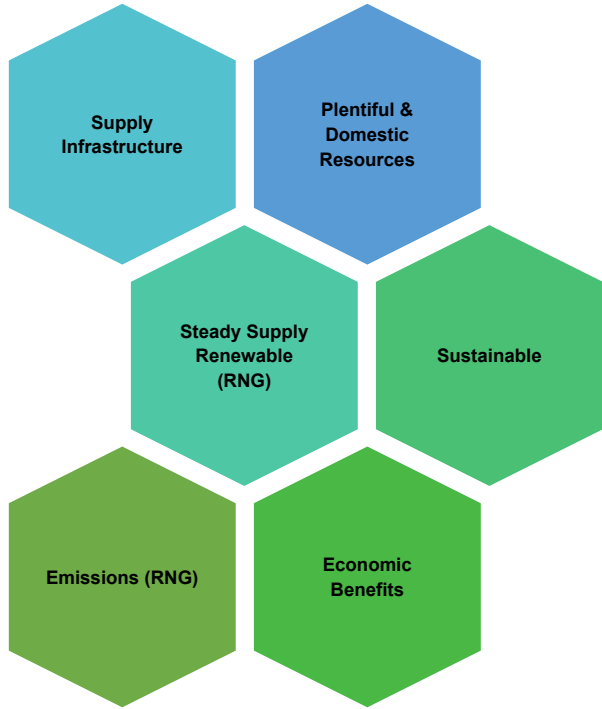
# Other Useful Siting Criteria: Where People (or Trucks) Go or Stop Enroute

- Amenities tend to be concentrated in and around urban areas and major interchanges
- Most amenities have ample parking and serve other travel needs
- Suitability differences: EV charging aims to increase access in underserved communities while NG fueling aims to reduce emissions and traffic burden on disadvantaged communities



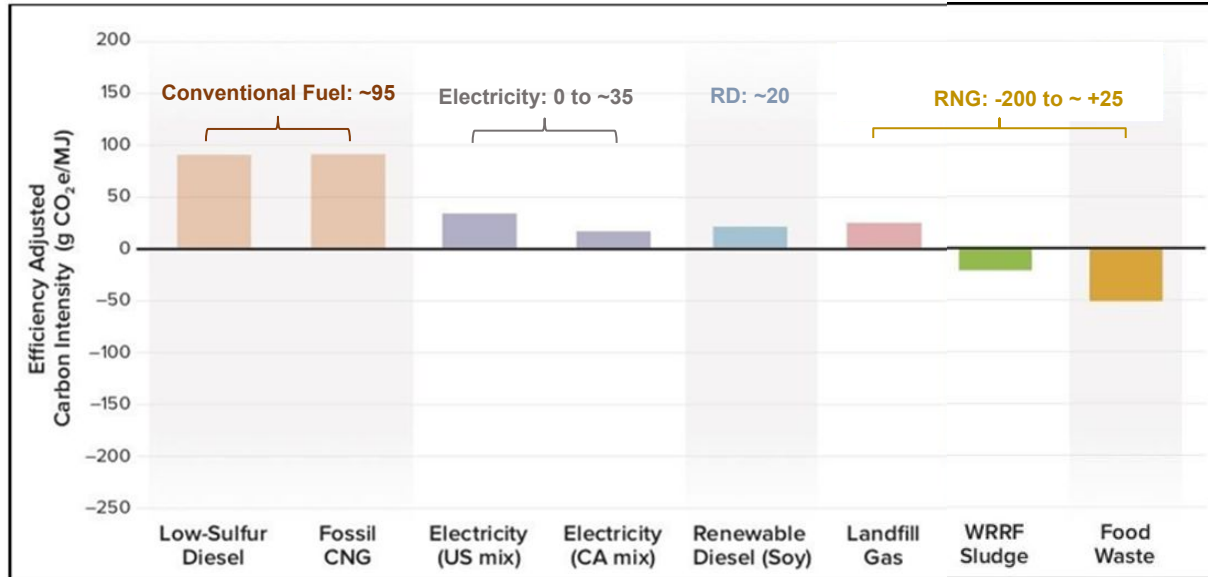
# Benefits of Electric and Compressed Natural Gas (CNG) Vehicles

# Electricity & RNG Are Domestic Energy Sources That Build on Existing Experience & Infrastructure



- Electric and natural gas grids are ubiquitous
- RNG and electricity — produced from plentiful domestic and increasingly renewable feedstocks — are readily available here and now
- Support sustainability goals
- Create jobs due to increased energy demand and infrastructure expansion
- RNG can provide additional environmental benefits (reducing odor and runoff) and a steady supply of renewable energy

# Electricity & Renewable Natural Gas (RNG) Can Cut GHG Emissions from Heavy Trucks by 75% or More



- Greenhouse Gas (GHG) emissions are typically measured from “well-to-wheel” to capture the full fuel cycle of energy production and use.
- GHGs for EVs depend on how electricity is generated.
- Because RNG production often prevents emissions of methane (more powerful than CO<sub>2</sub>) it can have NEGATIVE Carbon Intensity.
- Carbon Intensity of RNG from animal manure (not shown) varies greatly and is often below -200 (It reduces GHG that would have been emitted to the atmosphere).

<https://www.anl.gov/esia/reference/renewable-natural-gas-rng-for-transportation-frequently-asked-questions>.

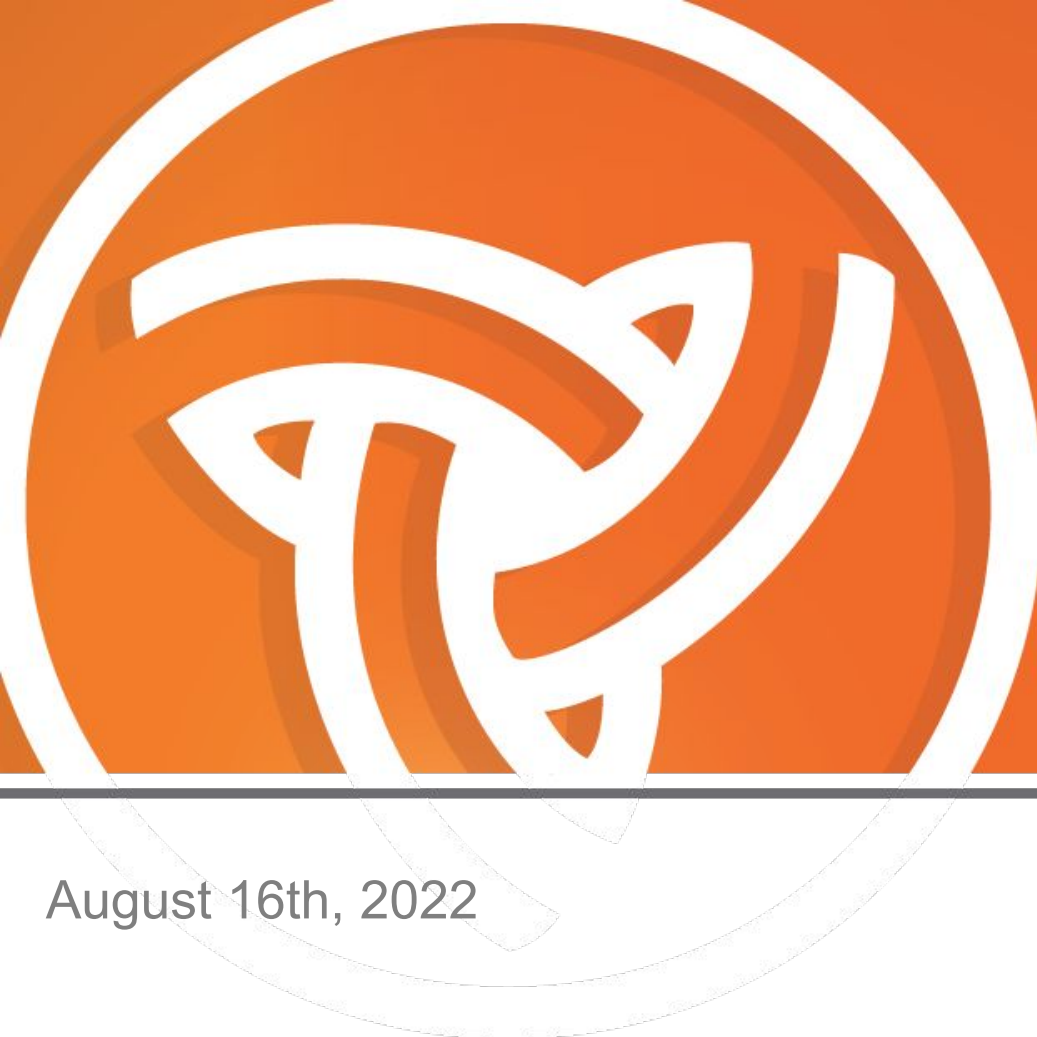
Based on GREET 2020 <https://greet.es.anl.gov/>.



# Policies & Programs Supporting Alternative Fuels



Photo by Clean Cities - Georgia

A large, white, stylized logo is centered on the left side of the slide. The logo consists of a circular outer ring and an intricate, interlocking internal design that resembles a stylized 'E' or a similar symbol. The background is a solid orange color.

# Illinois Electric Vehicle Programs

August 16th, 2022

# Covered Today

- 1.** What is NEVI and how did we get here? (Federal)
- 2.** State of Electric Vehicles (EV) and EV Infrastructure in Illinois (State)
- 3.** Status of the Illinois Electric Vehicle Infrastructure Plan
- 4.** Status of the Illinois NEVI plan and next steps on stakeholder engagement and implementation





# WHAT IS NEVI?

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# National Electric Vehicle Infrastructure Program

- On November 15, 2021, President Biden signed the \$1 trillion bipartisan infrastructure bill Infrastructure Investment and Jobs Act or IIJA.
- IIJA includes \$7.5 billion in dedicated funding to help make EV charging accessible to all Americans for local and long-distance trips.
- That \$7.5 billion is comprised of a \$5 billion formula program and a \$2.5 billion discretionary grant program



# NEVI Formula Program

- Provides dedicated funding to states to strategically deploy **public EV charging infrastructure** and establishes an interconnected network to facilitate data collection, access, and reliability.
- Illinois will receive **\$148 million** from this federal program between 2022-2026.
- Initially, funding under this program is **directed to designated Alternative Fuel Corridors** for electric vehicles including **stations every 50 miles and no more than 1 mile off the designated corridor.**
- When the national network is fully built out, funding may be used on any public road or in other publicly accessible locations.



# What do we mean by Public EV Charging?

- **Public Charging**= stations available to the public **24 hours a day, 7 days a week**
- Public charging **does not** mean free charging. Charging stations can charge a fee, which will be subject to regulations
- **Fast Charging**= at minimum, 4 combined charging system (CCS) plugs capable of each charging at 150 kilowatts per hour (kW)
- This means, at minimum, **4 vehicles can charge at the same time**, at a charging speed that will **fully charge an average EV in under a half hour**



# NEVI State EV Infrastructure Deployment Plan

- States must submit EV Infrastructure Deployment Plan to the federal government **on or before August 1, 2022**
- Outlines how a state plans to begin implementing the NEVI program
- Does not identify specific sites for charging stations, or how procurement process will work, but **sets a framework** for accomplishing those things **with additional stakeholder input**





# Detailed Specifications Still Under Development by Federal Government

- On June 22, 2022, the Federal government released a Notice of Proposed Rulemaking for the NEVI program. This draft guidance is subject to public comment through mid-August and will not be final until the fall. It includes:
  - Specifications on contracting and service requirements
  - Installation, operation, and maintenance standards
  - Americans with Disability Act (ADA) requirements and other accessibility considerations
  - Justice 40 and Environmental Justice considerations
  - Stakeholder and outreach suggestions
  - Data and uptime reliability minimums

# \$2.5 Billion Discretionary Grant Program

- The **Federal Highway Administration** will be running separate competitive grant programs to support EV charger deployment.
- **Corridor Charging Grant Program.** This program will strategically deploy publicly accessible EV charging infrastructure and hydrogen, propane, and natural gas fueling infrastructure along designated Alternative Fuel Corridors.
- **Community Charging Grant Program.** This program will strategically deploy publicly accessible EV charging infrastructure and hydrogen, propane, and natural gas fueling infrastructure in communities.



# **STATE OF ELECTRIC VEHICLES (EV) AND EV INFRASTRUCTURE IN ILLINOIS**

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# State goal: 1 million EVs by 2030

- **June 2019** - Rebuild Illinois
- **April 2021** - Ex. Order 2021-08
- **September 2021** – Climate and Equitable Jobs Act
- **November 2021** – Reimagining Electric Vehicles in Illinois Act



“Here in Illinois, we enacted a nation-leading climate action plan. That includes putting 1 million electric vehicles on the roads by 2030 & providing \$4,000 electric vehicle rebates.” -Gov. Pritzker

# Illinois EPA Vehicle Rebates/Grants

- Existing : Illinois residents that purchase a new or used all-electric vehicle after July 1,2022 will be eligible for a rebate. Low-income customers are prioritized
  - \$4,000 rebate for the purchase of an all-electric vehicle that is not an electric motorcycle
  - A \$1,500 rebate for the purchase of an all-electric motorcycle
- Future: IEPA will also develop grants/rebates for vehicles with funds from the VW settlement
  - \$27 million for all-electric public transit buses and public passenger/commuter locomotives
  - \$27 million for all-electric school buses
  - \$16 million for all-electric Class 4-8 local freight trucks (including municipal trucks, refuse trucks, dump trucks, concrete mixer trucks, delivery vehicles, and Class 8 port



Illinois Environmental  
Protection Agency

# Illinois Charging Rebates/Grants

## CEJA grants

- \$70 m towards supporting 80% of installed cost of charging infrastructure
  - Rules being developed at IEPA

## VW settlement

- \$12.6 m towards light duty charging
  - To issue Notice of funding opportunity by Q4, 2022



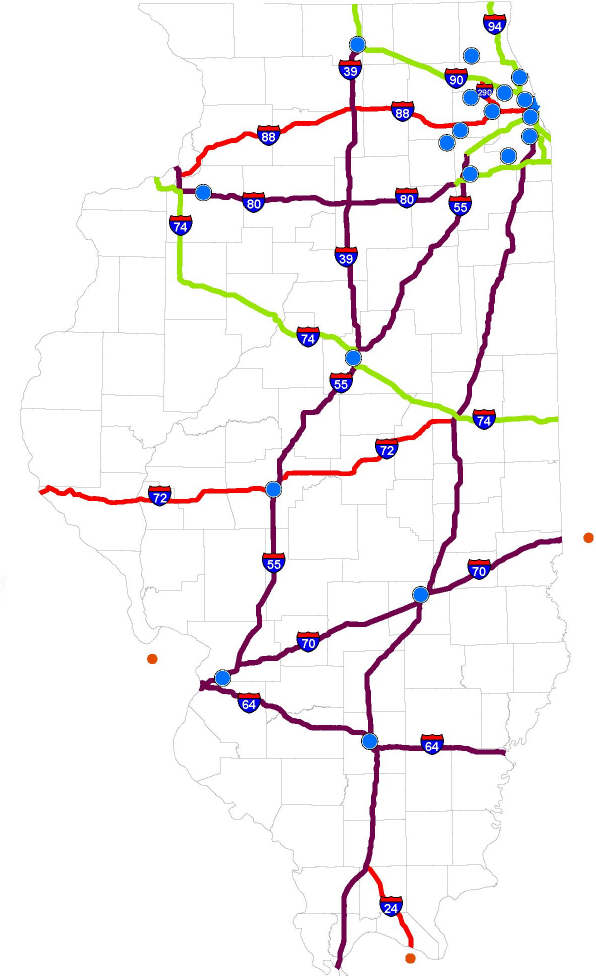
Illinois Environmental  
Protection Agency

# Illinois Alternative Fuel Corridors

- **Electric Vehicle Signage Ready**
  - I-39 from Rockford IL to Sun Prairie WI
  - I-55 from Chicago IL to Bolingbrook, IL
  - I-74 from IL/IA border to IL/IN border
  - I-80 from IL/IN border to Joliet IL
  - I-90 from IL/IN border to Sun Prairie WI; and, from La Crosse WI to Sparta WI
  - I-94 from Sun Prairie WI to IL/IN border
- **Electric Vehicle Signage Pending**
  - I-39 from Normal IL to Rockford IL
  - I-55 from Joliet IL to St. Louis
  - I-80 from Joliet IL to IL/IA border
  - I-70 from St. Louis to Indiana boarder
  - I-57 from Chicago to Missouri border
  - I-64 from St. Louis to Indiana boarder

## Legend

-  IL NEVI Compliant Stations
-  Neighbors States NEVI Compliant Chargers
-  Alternative Fuel Ready EV Corridors
-  Alternative Fuel Pending EV Corridors
-  Undesignated Corridors
-  Illinois Counties



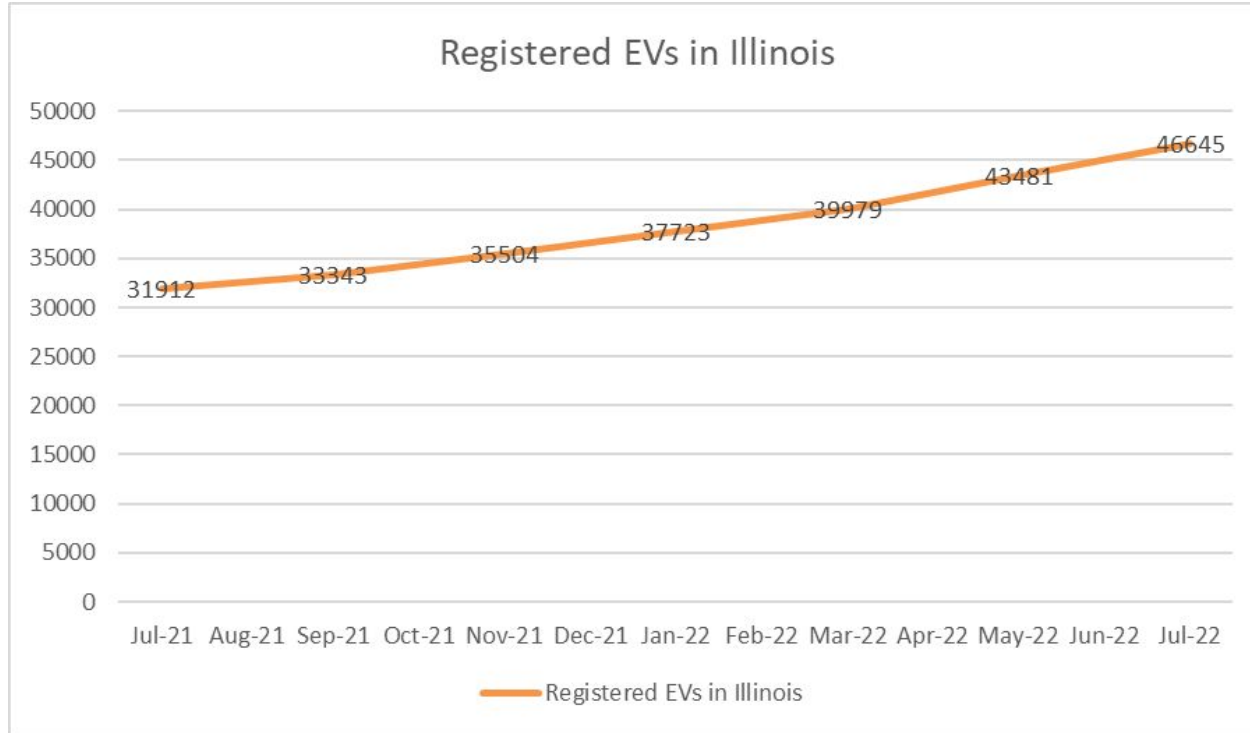
# Illinois Alternative Fuel Corridor Award

- In 2019 IDOT and 8 other states were awarded funds to study I-80 from Nebraska to New Jersey
- This was a multistate effort including: Iowa, Illinois, Indiana, Ohio, Pennsylvania, and New Jersey.
- Other partners include Argonne National Laboratory and Trillium





# Number of Electric Vehicles Registered In Illinois



# Current Direct Current Fast Charge Charging Network

Public Stations | Advanced Filters | Fuel Corridors

**Filter by Location**

Location: U.S. and Canada

Fuel: Illinois

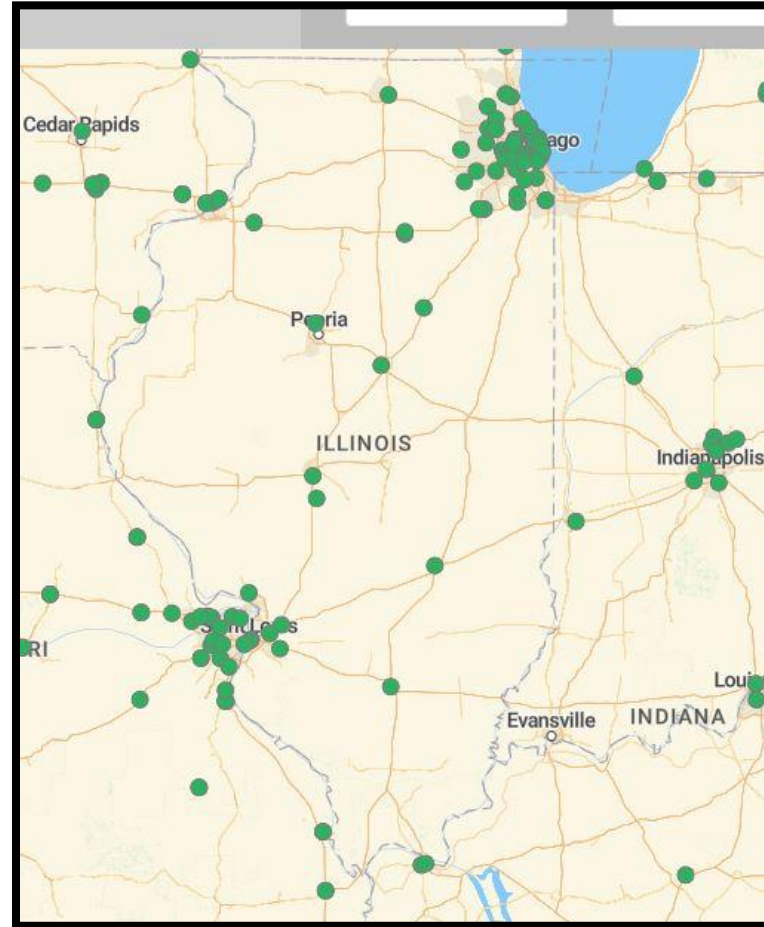
Station: clear all filters

Map Results: 71 station locations, 158 EVSE ports

Filters chosen:

- Illinois
- Electric Types: DC Fast
- Connectors: CCS
- Access: Public

Download Results



# Electric Vehicle Coordination in Illinois

- In 2021 the state of Illinois formed the Interagency Working Group on Electric Vehicles. Meeting monthly these state agencies coordinate efforts to increase EV adoption and develop policies to entice EV manufacturers to the state. This group includes:
  - Illinois Department of Transportation (IDOT)
  - Illinois Commerce Commission (ICC)
  - Illinois Environmental Protection Agency (IEPA)
  - Department of Commerce and Economic Opportunity (DCEO)
  - Central Management Services (CMS)
  - Illinois Finance Authority (IFA)
  - Illinois Power Agency (IPA)
  - Illinois Department of Natural Resources (IDNR)

# Starting Planning in Illinois (University of Illinois)

- In Spring of 2021 IDOT started work on an EV Deployment Plan. The plan included these goals:
  - EV adoption level projection
  - EV charging infrastructure investment allocation and placement optimization
  - Benefits/cost analysis of EV transitions
  - Statewide EV infrastructure steering committee
  - Final report preparation

## Electric Vehicle Infrastructure Plan in Illinois

Eleftheria (Ria) Kontou, PhD  
Assistant Professor CEE

Joint work with graduate assistant: Yen-Chu Wu





# **STATUS OF THE ILLINOIS ELECTRIC VEHICLE INFRASTRUCTURE PLAN**

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# Illinois NEVI Plan

The current Illinois NEVI Plan (like many other states) is a plan for a plan. It identifies:

- A vision and goals for the NEVI program
- Key risks and challenges
- Initial analysis on potential charging station locations to meet program requirements
- Important considerations around contracting, labor and workforce, equity, and support for medium/heavy duty electrification
- A plan for further stakeholder and public engagement

# Next Steps in NEVI Program Implementation

- **August 1, 2022:** Deadline to submit state NEVI plans
- **August 22, 2022:** Comment period closes on Notice of Proposed Rulemaking for NEVI minimum standards and requirements
- **September 30, 2022:** Deadline for Federal Highway Administration to approve state plans or notify State DOTs that changes are needed
- **Fall 2022:** NEVI Funds available for states to begin investing in public charging



# Ways you can provide input

- Suggest a charging station location

<https://idot.click/drive-electric>



## Comments

Comments can be seen by the public.

1000 ↕



# Draft Illinois NEVI Plan Available Online



## Illinois Electric Vehicle Infrastructure Deployment Plan

Draft plan- Submitted to Joint Office of Energy and Transportation and pending review and approval from Federal Highway Administration

August 1, 2022



# Ways you can provide input: attend future meetings

- Working to schedule meetings this fall on specific topics, including:
  - Justice40/equity benefits
  - Prioritization considerations for locations, providers, and site hosts
  - Program evaluation and performance indicators
- **Next meeting: September 8th, 2022, 6pm (online)**

# Resources

- IDOT Email: [DOT.DriveElectric@Illinois.gov](mailto:DOT.DriveElectric@Illinois.gov)
- IDOT EV Webpage: <https://idot.click/drive-electric>
- IEPA Webpage: [Electric Vehicle Rebate Program - Climate and Equitable Jobs Act \(Illinois.gov\)](#)



Thank you for attending today's public outreach for I-80!!!

Contact info:

[DOT.DriveElectric@Illinois.gov](mailto:DOT.DriveElectric@Illinois.gov)

Comment form and place a charger interactive map found at:

<https://idot.illinois.gov/home/drive-electric-illinois>





# Iowa EV Infrastructure Deployment Plan

Craig Markley, Iowa DOT



# Iowa's Approach to Develop NEVI Plan



Iowa DOT partnered with the Iowa Economic Development Agency (IEDA) to oversee development of an EV Infrastructure Deployment Plan that supports the transportation electrification efforts for Iowa.

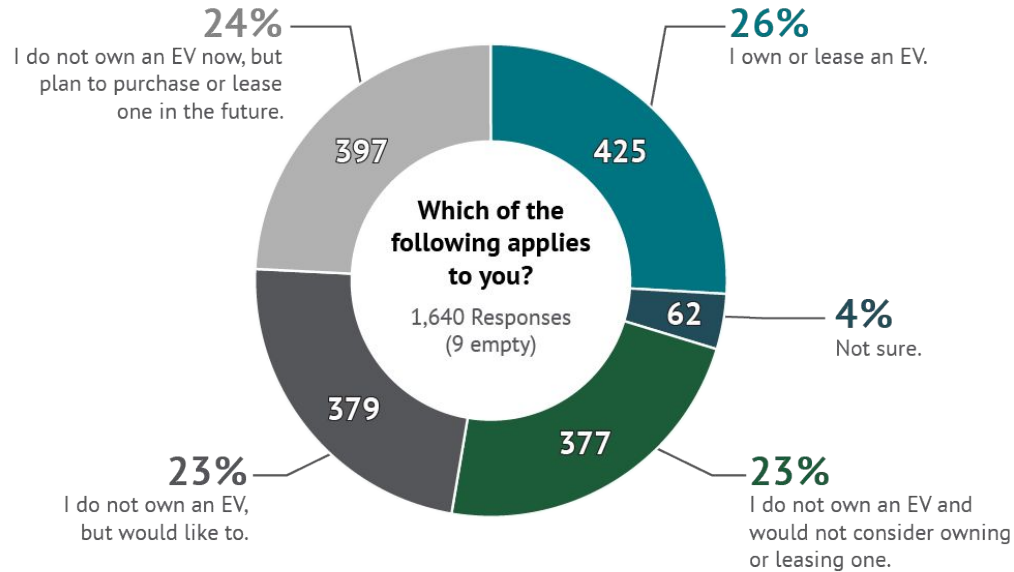


# Iowa's Commitment to Fuel Diversity

- Iowa is a proud and nationally recognized leader in renewable energy and biodiesel and ethanol production. Our state has made a significant investment in renewable fuels infrastructure. State leaders, local communities, private companies, and utilities are making solid progress to add electric vehicle infrastructure to our diverse fuel mix.
- Iowa will remain unwavering in our support for varied fuel resources and associated infrastructure, including ethanol, biodiesel, propane, renewable natural gas and electric.



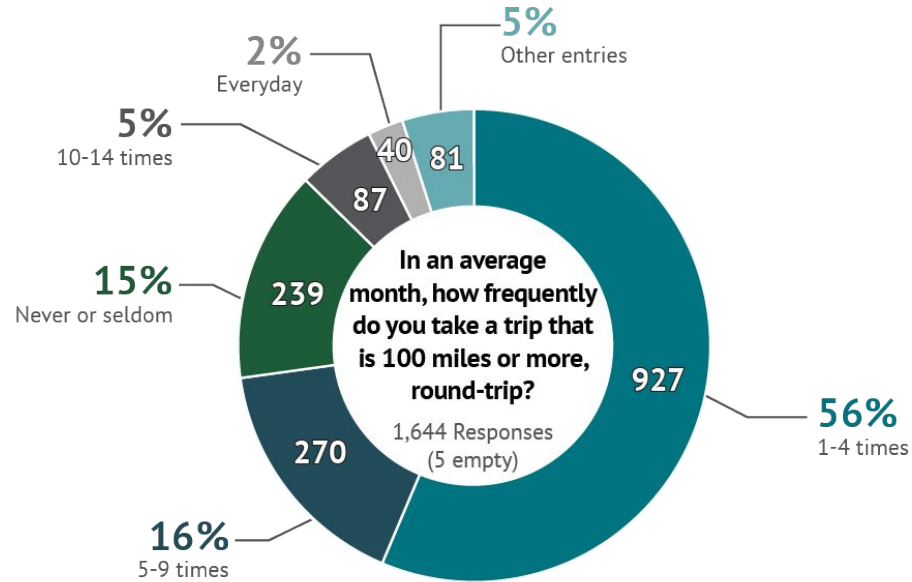
# Iowa DOT EV Plan Survey Results





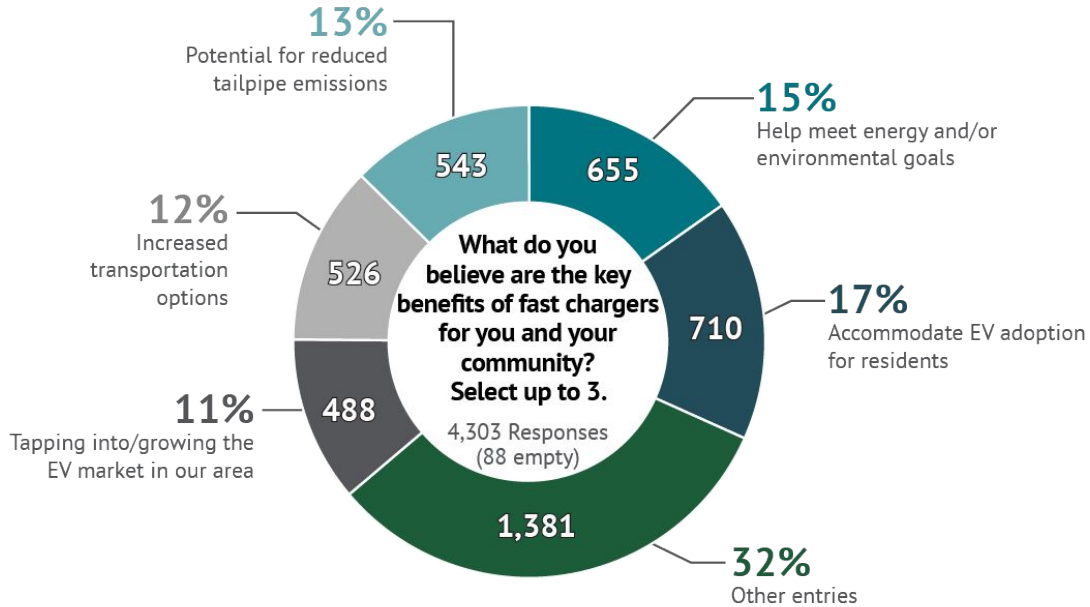


# Iowa DOT EV Plan Survey Results



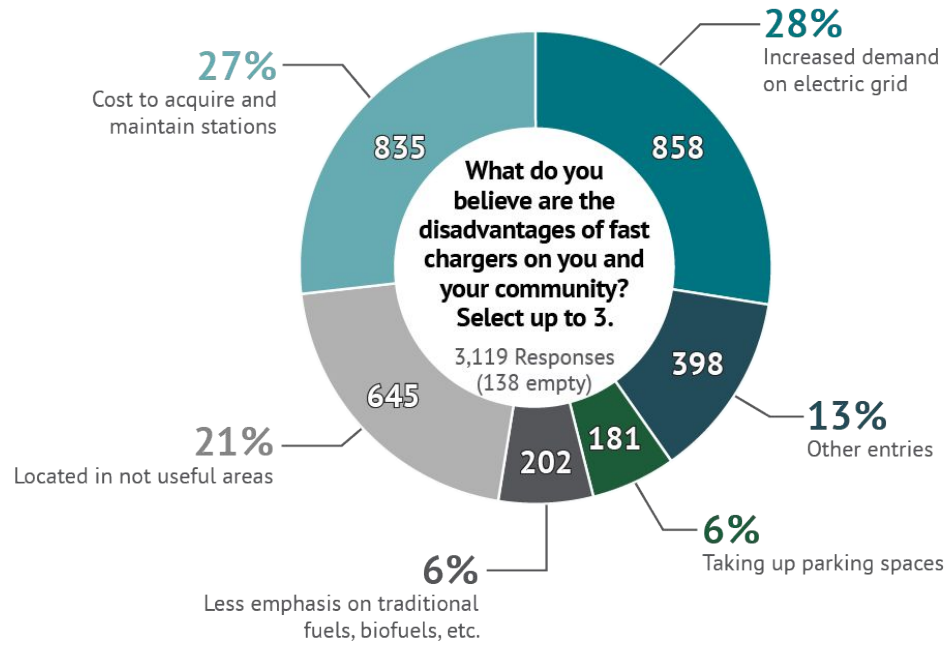


# Iowa DOT EV Plan Survey Results





# Iowa DOT EV Plan Survey Results





# Iowa DOT EV Survey Results

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1,649 survey responses

713 comment responses

- 30% positive 😊
- 45% neutral 😐
- 25% negative 😞

Comment themes

- Station amenities and location
- General support
- Power needs
- General opposition
- Affordability
- Cost/funding of infrastructure
- Range anxiety
- Disadvantaged communities

# Iowa's Existing & Future Stations

## LEGEND

- Interstate
- Roadway

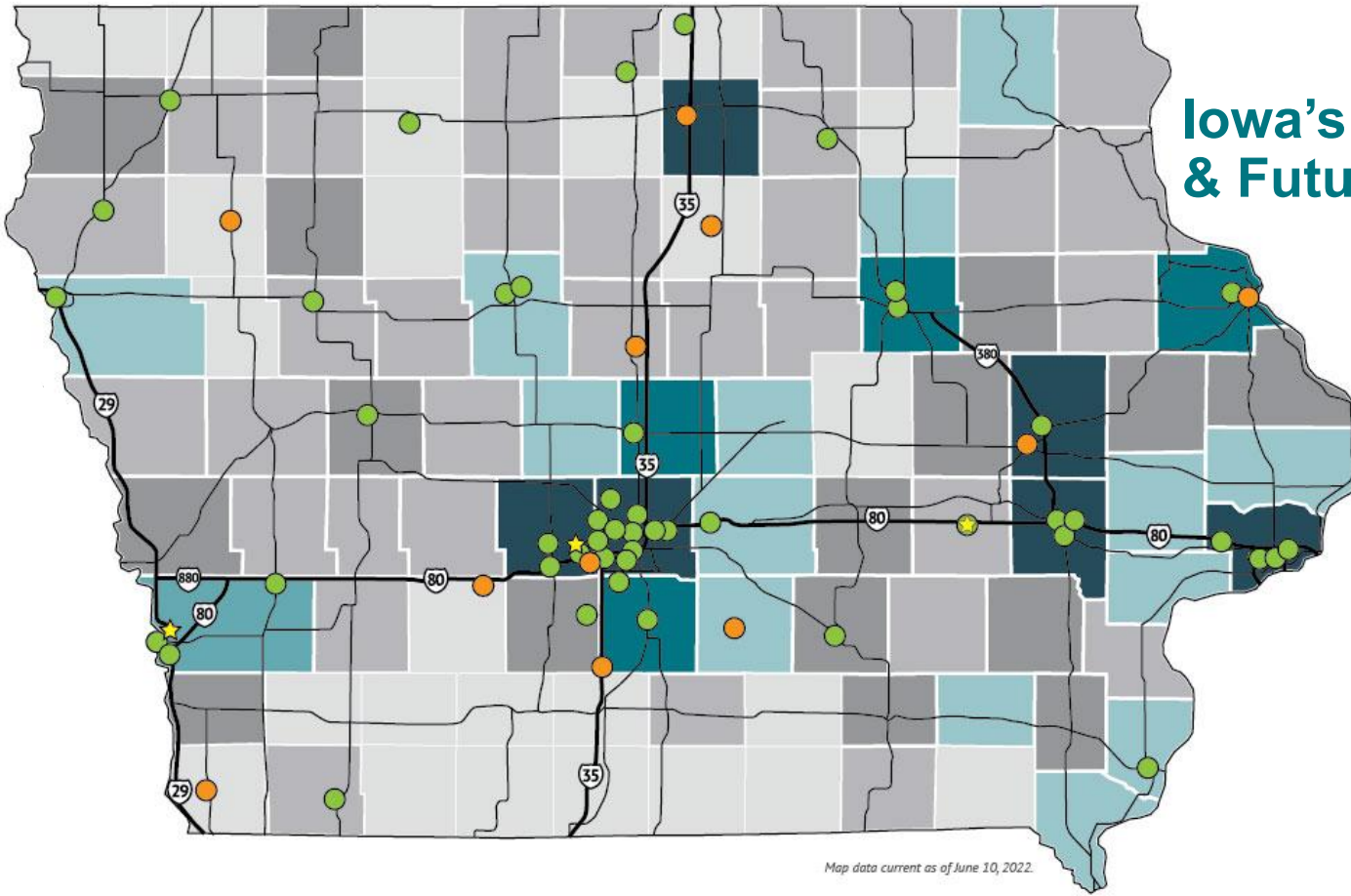
### Type of Charger

*(Does not include stations exclusive to Tesla vehicles.)*

- Level 3/Fast Charging
- Pending Charging Stations
- ★ NEVI Compliant Station

### Registered EVs by County

- |       |         |
|-------|---------|
| 1-10  | 51-100  |
| 11-25 | 101-200 |
| 26-50 | 201-500 |
|       | 501+    |

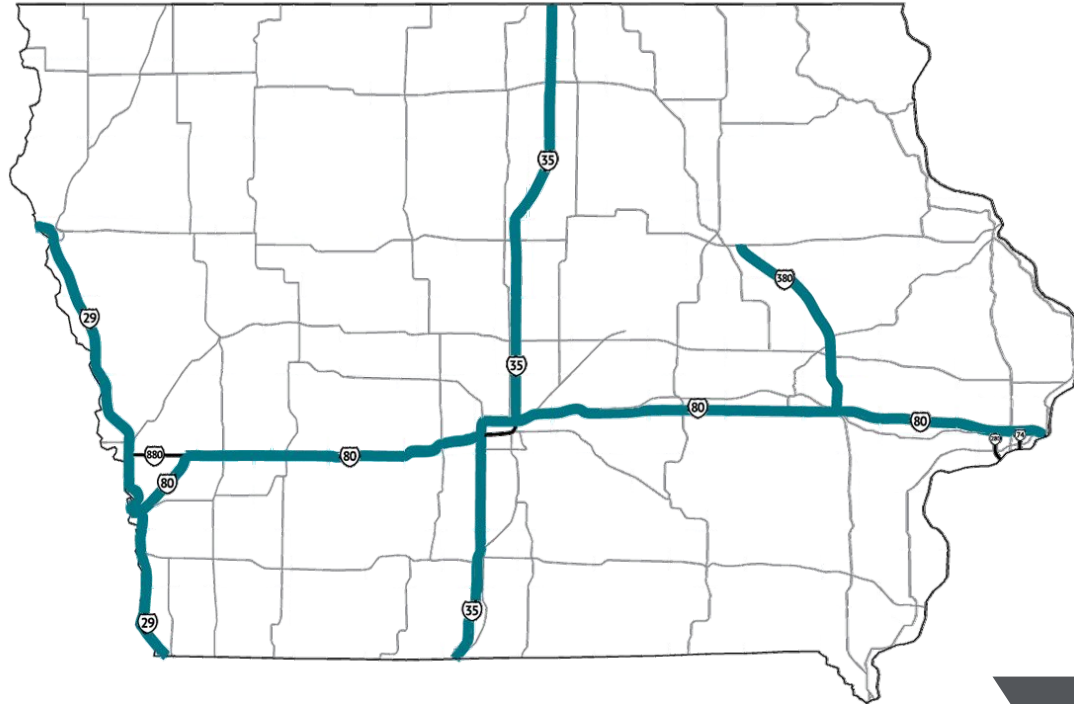


Map data current as of June 10, 2022.

View the map at: [iowadot.gov/iowaEVPlan](http://iowadot.gov/iowaEVPlan)



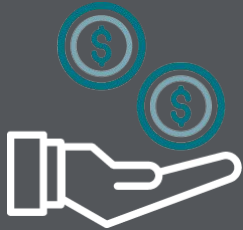
# Iowa's EV Alternative Fuel Corridors



# Iowa's Allocated NEVI Formula Funds

**\$7.6 million**  
Federal Fiscal Year  
2022 Funding

**\$51.4 million**  
5-Year NEVI  
Federal Funding



## NEVI Formula Funds and Matching

Funds (Millions)

FEDERAL FISCAL YEAR	FORECASTED NEVI FUNDS (80%)	MINIMUM NON-FEDERAL MATCH FUNDS (MIN 20%)	TOTAL (100%)
2022	\$7.6	\$1.5	\$9.1
2023	\$10.95	\$2.2	\$13.15
2024	\$10.95	\$2.2	\$13.15
2025	\$10.95	\$2.2	\$13.15
2026	\$10.95	\$2.2	\$13.15
<b>Total (5 Year)</b>	<b>\$51.4</b>	<b>\$10.3</b>	<b>\$61.7</b>



# Gap Analysis and Scoring

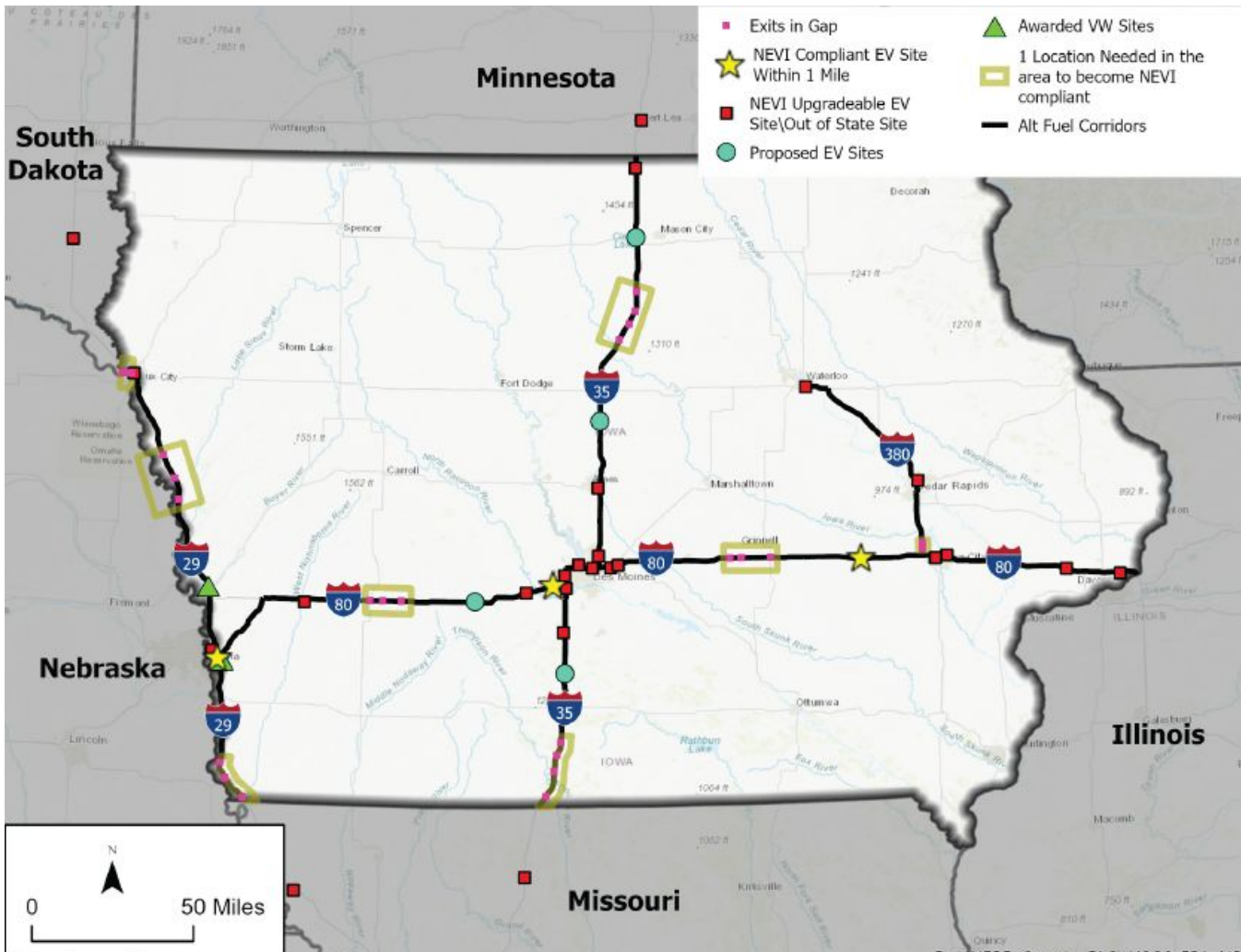
- A weighted scoring analysis tool was developed to identify and prioritize suitable areas that could host NEVI-compliant fast-charging sites.

- The tool considered several factors, including:
  - Voltage of nearest power source
  - Amenity density
  - Urban vs. rural areas
  - Disadvantaged areas
  - AFC corridor location
  - Miles covered





# Gap Analysis





# Stay Informed

- Visit the website: [iowadot.gov/lowaEVPlan](https://iowadot.gov/lowaEVPlan)
- Understand the grant cycle and when funding is expected to be available
- Start conversations with your peers and communities
- This is just the beginning of a five-year process
- [Iowa.EvPlan@iowadot.us](mailto:Iowa.EvPlan@iowadot.us)



# VW EV Focused Funding

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- Volkswagen Settlement funding to Iowa totaled approximately \$21,000,000 with Iowa taking advantage of allocating 15 percent for electric vehicle chargers.
- The third and final round coincided with release of NEVI guidance so Iowa requested applications to meet NEVI requirements – recently awarded 6 out of 8 applications.
- [Volkswagen Clean Air Act Settlements - State of Iowa \(iowadot.gov\)](#) for more information about Iowa's awards.



# Iowa's Electric Vehicle Fees

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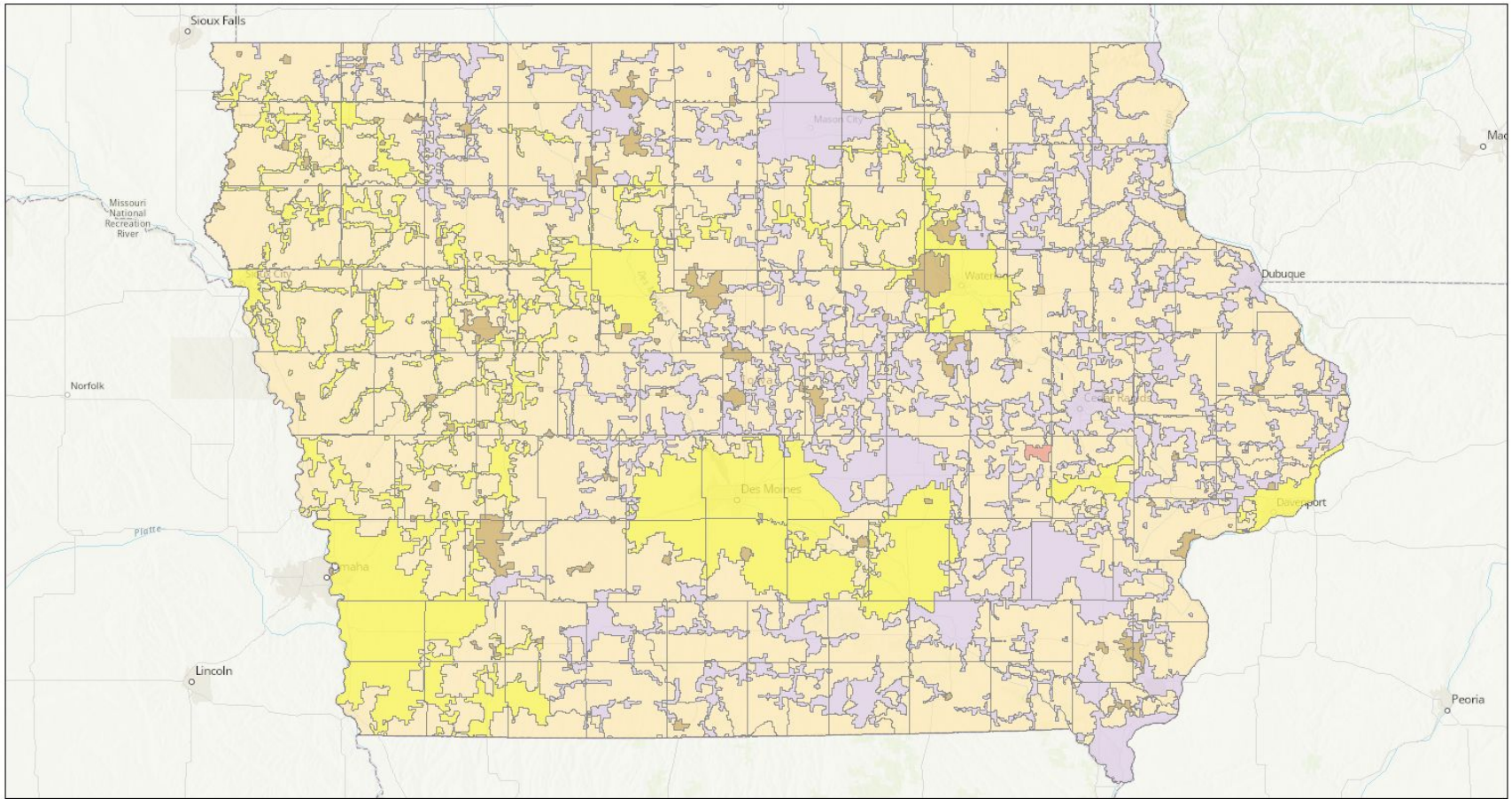
- Nearly 40% of Iowa's state roads are funded by fuel taxes. 2019 Legislative Session passed the following to help offset the decline in fuel tax revenue due to electric vehicles:
- Beginning January 1, 2020 electric vehicle owners began being charged an extra annual registration fee phased in over 3 years – now extra amounts are Battery Electric - \$130, Plug-in Hybrid - \$65.00 and Motorcycles - \$9.00.
- Beginning July 1, 2023, there will be a \$0.026 per kilowatt hour excise tax for charging at non-residential locations.
- A similar hydrogen fuel excise tax went into effect January 1, 2020 and is \$0.65 per diesel gallon equivalent.



# Introduction to the Role of Utilities



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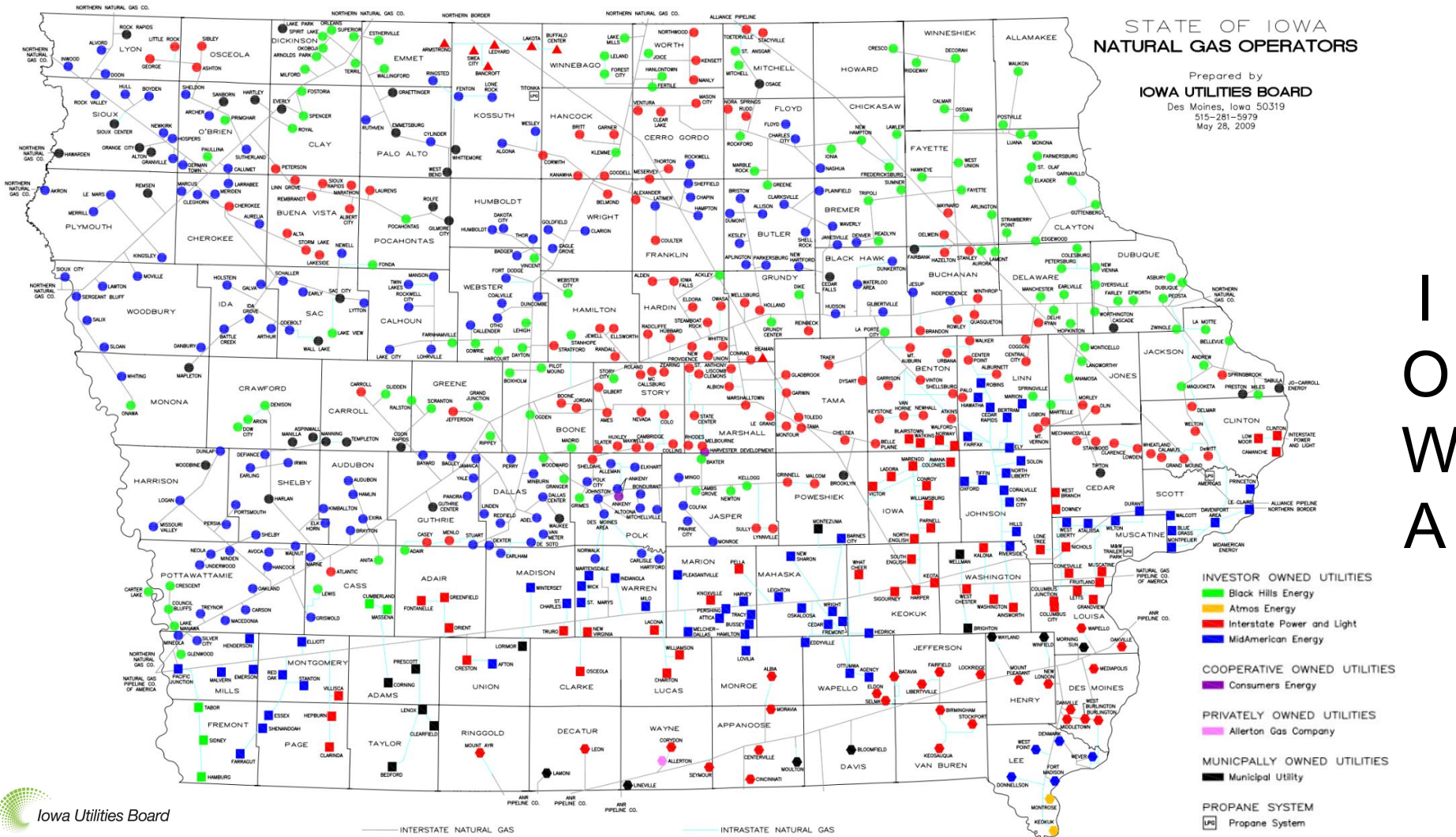
Electrical Service Boundaries

- Amana Society
  - Interstate Power and Light Company
- MidAmerican Energy
  - Municipal
  - REC

# STATE OF IOWA NATURAL GAS OPERATORS

Prepared by  
**IOWA UTILITIES BOARD**  
Des Moines, Iowa 50319  
515-281-5979  
May 28, 2009

# I O W A

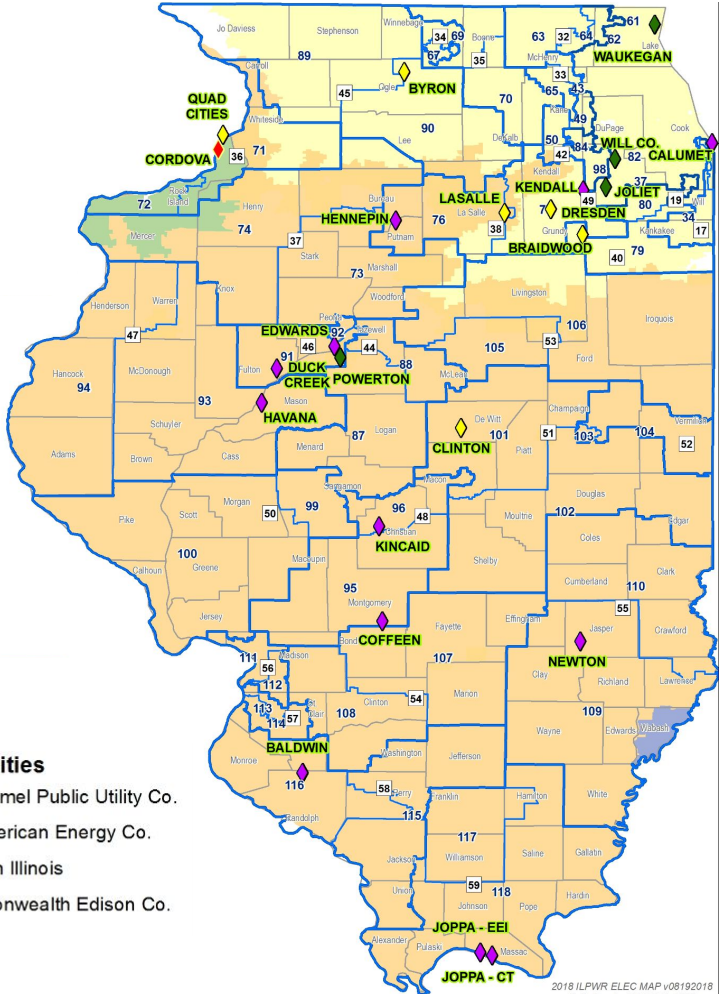


- INVESTOR OWNED UTILITIES**
- Black Hills Energy
  - Atmos Energy
  - Interstate Power and Light
  - MidAmerican Energy
- COOPERATIVE OWNED UTILITIES**
- Consumers Energy
- PRIVATELY OWNED UTILITIES**
- Allerton Gas Company
- MUNICIPALLY OWNED UTILITIES**
- Municipal Utility
- PROPANE SYSTEM**
- LPG Propane System

# ILLINOIS

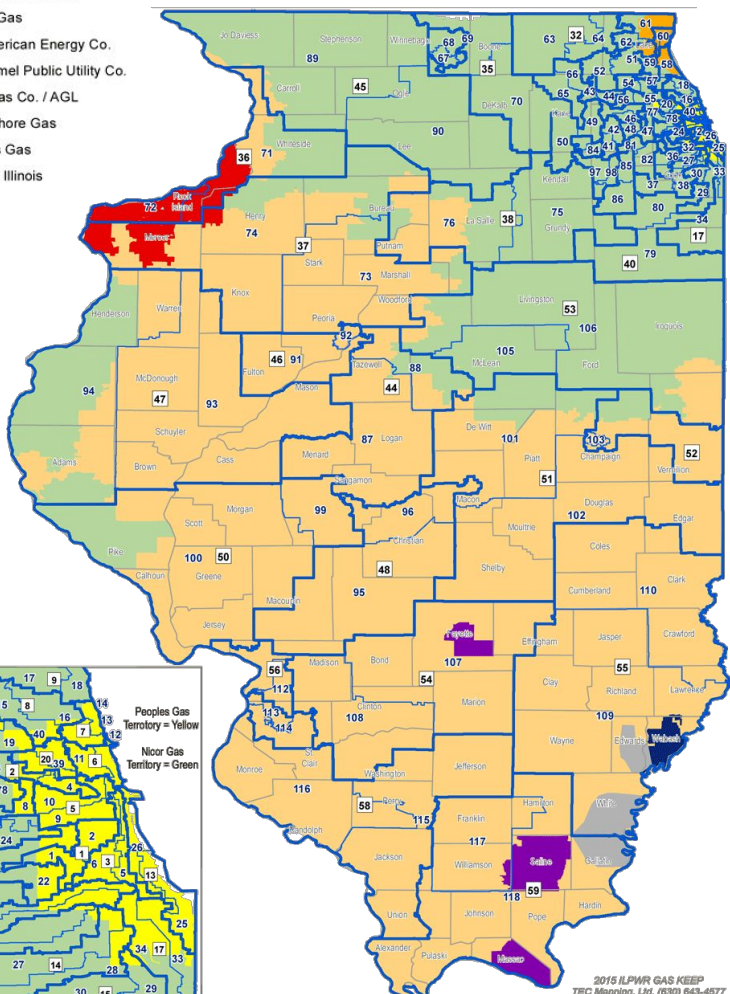
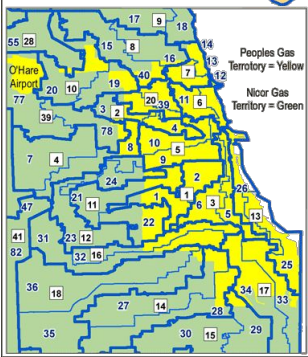
## Electric Utilities

- Mt. Carmel Public Utility Co.
- MidAmerican Energy Co.
- Ameren Illinois
- Commonwealth Edison Co.



2018 ILPWR ELEC MAP v08192018  
T. E. Cronin (630) 643-4577  
tecmapping@gmail.com

- Consumers Gas Co.
- Liberty Gas
- Mid American Energy Co.
- Mt. Carmel Public Utility Co.
- Nicor Gas Co. / AGL
- North Shore Gas
- Peoples Gas
- Ameren Illinois



2015 ILPWR GAS KEEP  
TEC Mapping, Ltd. (630) 643-4577  
tecmapping@gmail.com



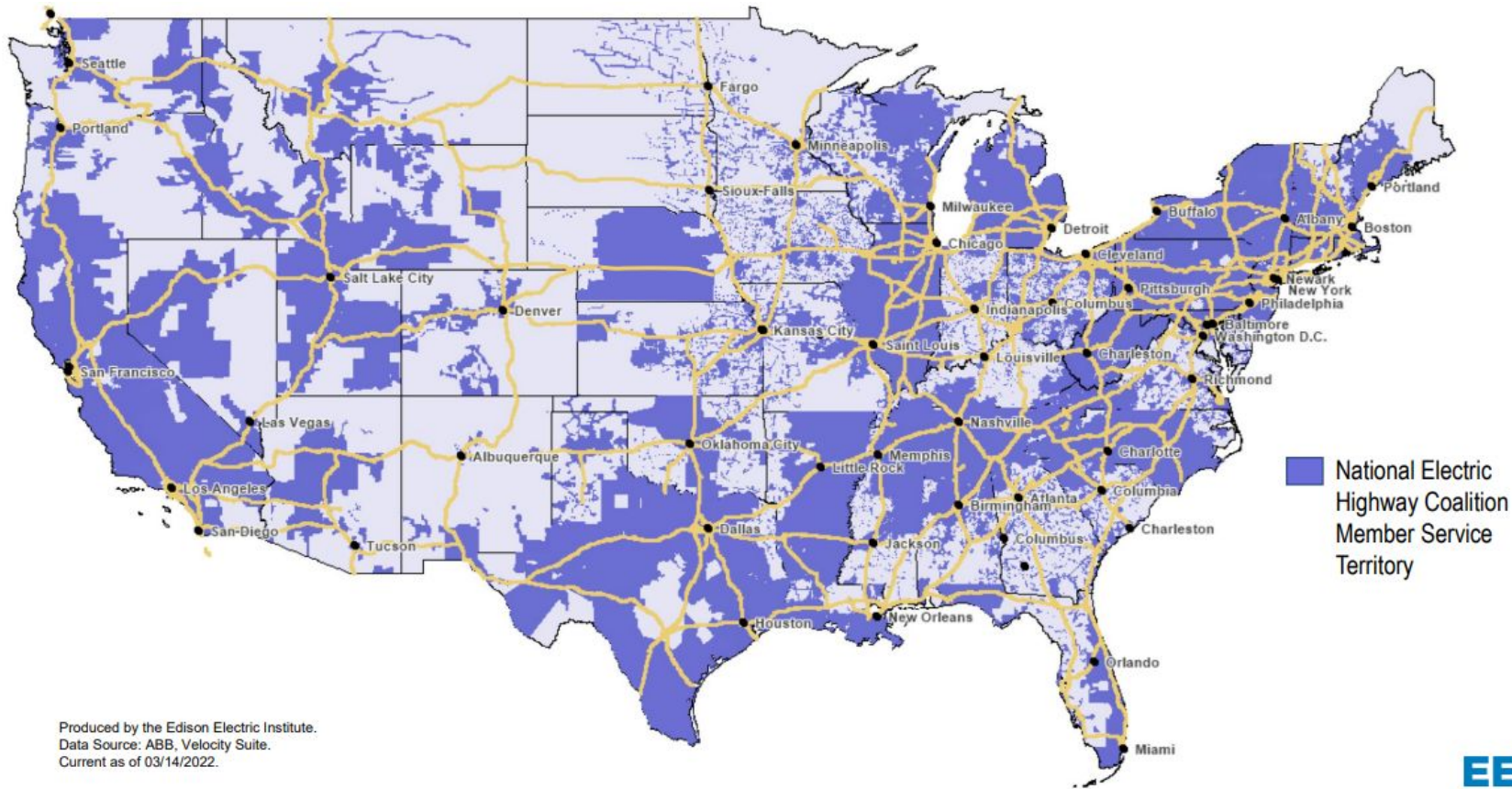


# Utility Collaboration

Jarred Bruce  
Engineer  
MidAmerican Energy Company

# National Electric Highway Coalition

- The NEHC is a collaboration among electric companies that are committed to providing electric vehicle (EV) fast charging stations that will allow the public to drive EVs with confidence along major U.S. travel corridors by the end of 2023. The NEHC is the largest alliance of electric companies that have organized around the common goal of deploying EV fast charging infrastructure to support the growing number of EVs and to help ensure that the transition to EVs is seamless for drivers.
  - The National Electric Highway Coalition (NEHC) started in early 2022 and currently consists of **more than 60** investor-owned and municipal electric companies and electric cooperatives and collectively serve more than 120 million U.S. electric customers across 48 states and the District of Columbia.
  - To date, EEI's member companies have invested more than \$3.7 billion in customer programs and projects to deploy charging infrastructure and to accelerate electric transportation.
  - As EV sales continue to grow, EEI estimates that we will need 140,000 EV fast charging ports, a more than ten-fold increase over today, to support the nearly 27 million EVs projected to be on U.S. roads in 2030.
-



# MidAmerican's DC Fast Charging Network

- Targeting 50 locations throughout Iowa in MidAmerican's service territory

  - 35 currently in service

  - 6 planned for 2022

- Areas of focus

  - Major travel corridors

  - Rural areas

- Charging capacity

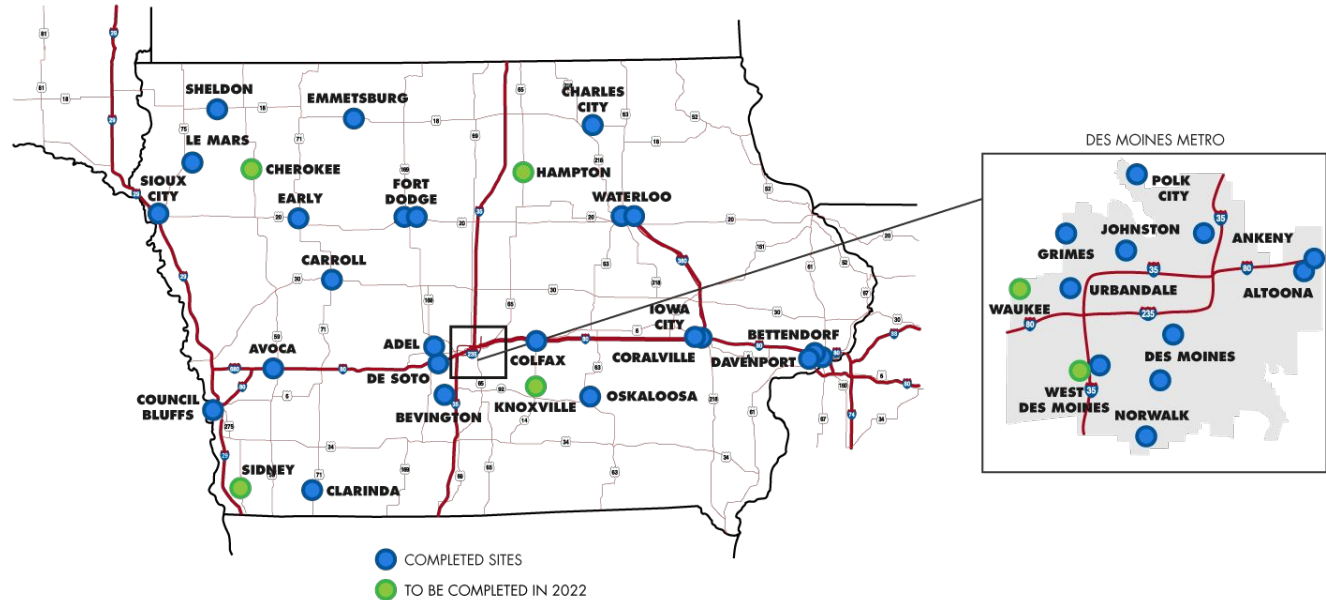
  - 50 kW chargers

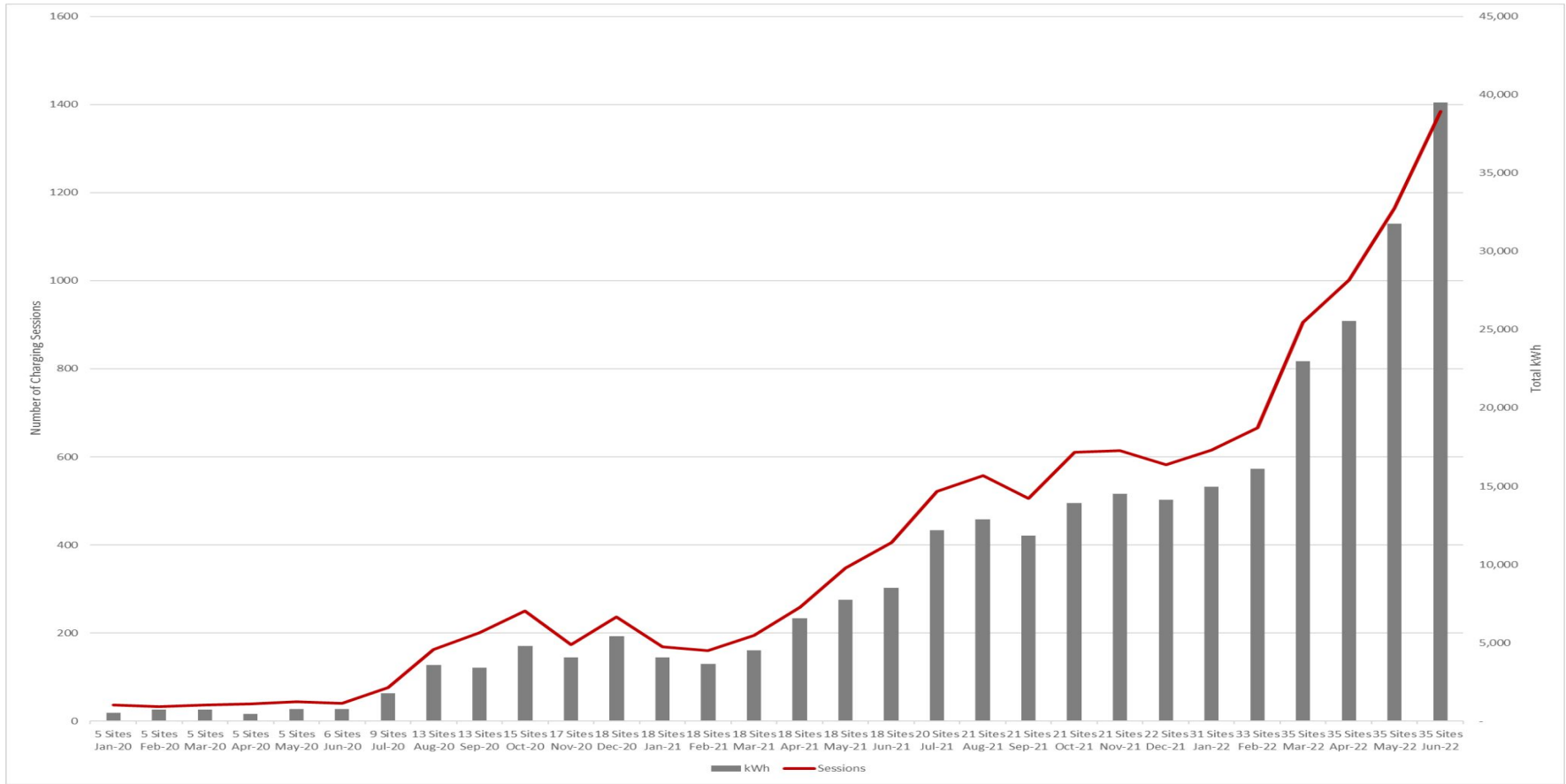
  - 150 kW chargers

- Charging connectors

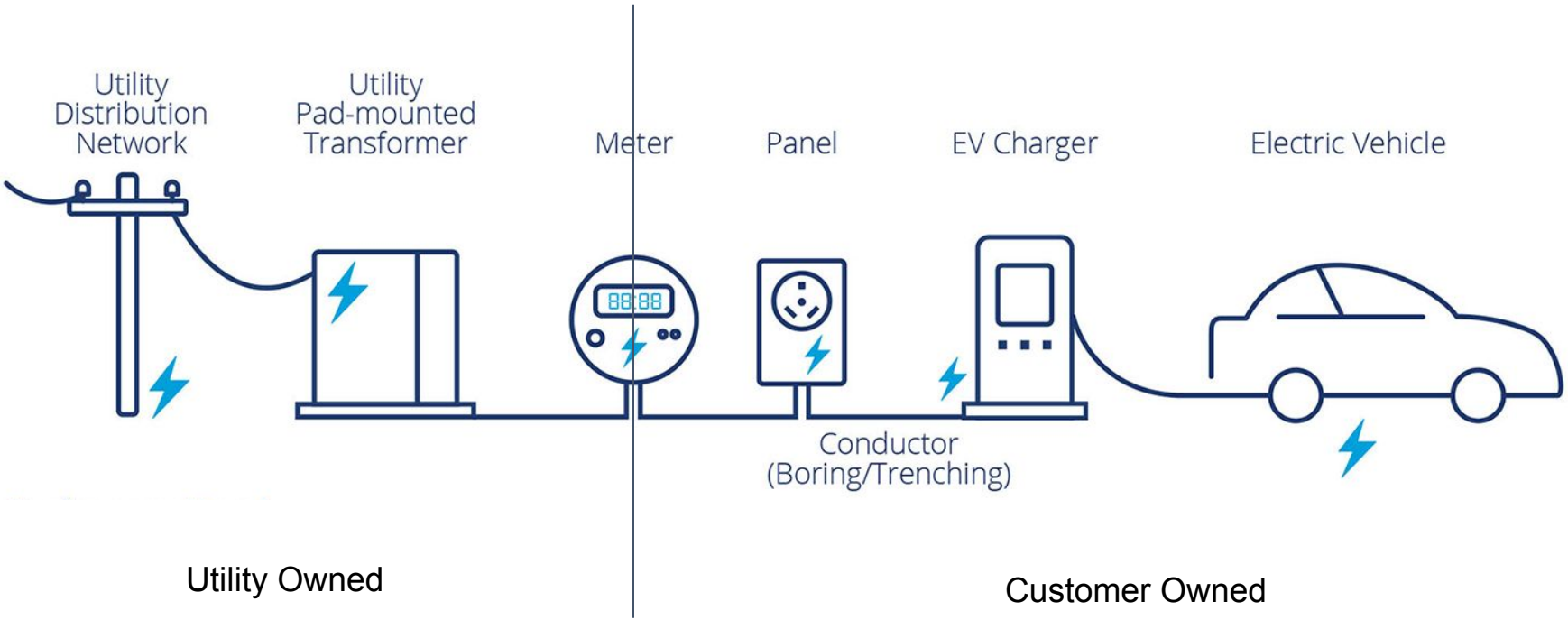
  - CCS Combo

  - CHAdeMO





# Customer Installed EV Charging



# MidAmerican Customer Incentives

## Residential

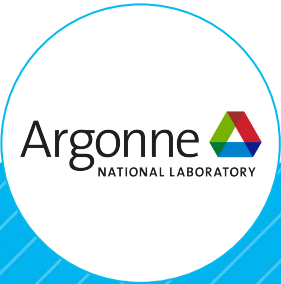
- \$500 rebate for Iowa residential customers for the purchase or lease of a new electric vehicle

## Commercial

- \$1,500 rebate for Iowa non-residential customers for the purchase a Level 2, dual-port charger



# Questions



Marianne Mintz



Gena McCullough



Chris Schmidt



Craig Markley



Jarred Bruce





# Break



10:00



# Investments and Resources



Photo by Brinley Wilson / Utah Clean Cities

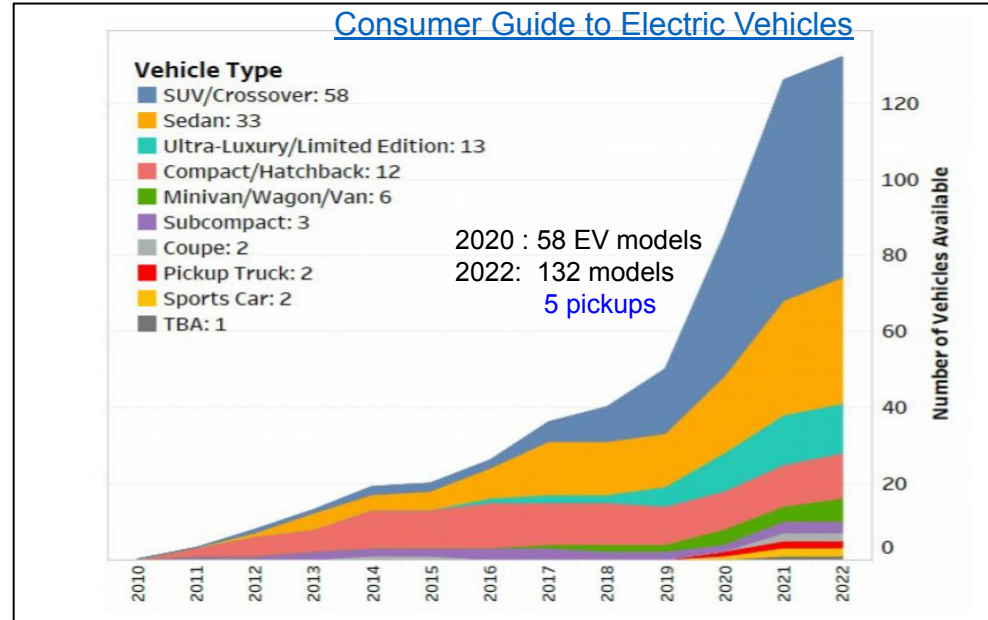
## Challenge: Vehicle Availability: CNG



- CNG vehicles available across full range of sizes
- Mature technology
- Mainly qualified 3<sup>rd</sup> party converters of Original Equipment Manufacturers (OEMs)
- Choices:
  - Gasoline spark ignited to natural gas spark ignited engines and fuel trains = dedicated or bi-fuel
  - Compression Ignition engines – add CNG to diesel fuel system
- Lower emissions

# Challenge: Vehicle Availability: EV

- 5% of new vehicle sales are EVs: 2022
- Many more models coming – passenger through pickups and trucks up to semis, buses, trains, motorcycles
- Rivian with 500-mile range: 2022
- GM plans:
  - 30 models by 2025
  - End production of gas and diesel by 2035
- Ford announced \$22 billion in EV investment through 2025
- Toyota is aiming for 40% of US sales to be EV by 2025



# Finding EVs

## Electric Cars: Types and Availability

- [AFDC Hybrid and Electric Vehicle Information](#)
- [Plugstar](#)
- [AFDC, EV Model Availability](#)
- [Plug In America](#)
- [Plugin Cars](#)
- [ComEd EV Ready Program](#)
- [Plug in Midwest: Illinois PEVs:](#)
- [EV Available Models – EV Adoption Website](#)
- [Consumer Reports, “Hot New Electric Cars”](#)
- [EV Database Webpage, “Newest EVs”](#)
- [My EV Website, “EVs are Better”](#)
- [CNET Road Show webpage, “Here's every electric vehicle on sale in the US for 2020 and its range”](#)
- [Digital Trends Webpage, “The Best Electric Cars for 2020”](#)

## Pre-owned EVs

- [Carmax](#)
- [Auto Trader](#)
- [MyEV](#)

## Assessing the True Cost of Ownership

- [Edmonds Website, “Cost of Car Ownership”](#)
  - [AAA, “Your Driving Costs”](#)
  - [Fuel Economy.Gov](#)
-

# Electric Trucks and Buses

## General Lists of Electric Trucks (2021 and later)

- [Wikipedia. Electric Trucks](#)
- [Top 8 Hybrid and Electric Pickup Trucks Worth Waiting For](#)
- [8 Electric Truck and Van Companies to Watch 2020](#)

## Light Duty EVs and Medium Duty EVs

- Pickups/ SUVs
- [Rivian R1T – Pickup](#)
- [Ford 150 Electric – Pickup](#)
- [Bollinger B1 & B2 – Pickup](#)
- [Nikola Badger – Pickup](#)
- [Lordstown Endurance – Pickup](#)
- [Atlis XT- Pickup](#)
- [Workhorse C1000 - Pickup](#)
- [GMC Hummer EV SUT – Sport Utility Truck](#)
- Vans / Shuttles
- [Chanje](#) (“Change”) - Panel Vans
- [Brightdrop EV600](#) - Panel Van
- [Arrival](#) - Panel Van
- [Lightning](#) Electric Vans
- [GEST Shuttle](#)
- [Adomani](#) Class 3-6

## Heavy Duty EVs - Class 6 to 8

- [Kenworth Electric \(Class 6\)](#)
- [Tesla Cybertruck \(Class 8\)](#)
- [Tesla Semi](#)
- [Daimler Freightliner](#)
- [eCascadia \(Class 8\)](#)
- [BYD Day Cab \(Class 8\), Terminal Tractors \(Class 8\), Class 6 Trucks, Class 6 Refuse Truck, Class 8 Refuse Truck](#)
- [Nikola – Hydrogen Fuel Cell Electric Vehicle](#)
- [Lion Electric – Class 6 and 8 Trucks and Buses \(Illinois Manufacturing\)](#)

## General List of Electric Buses (Many Manufacturers)

- [Wikipedia. Electric Buses](#)
- [Wikipedia. “List of Electric Bus Makers and Models”](#)
- [EV Trader Website. All Electric Bus Manufacturers](#)

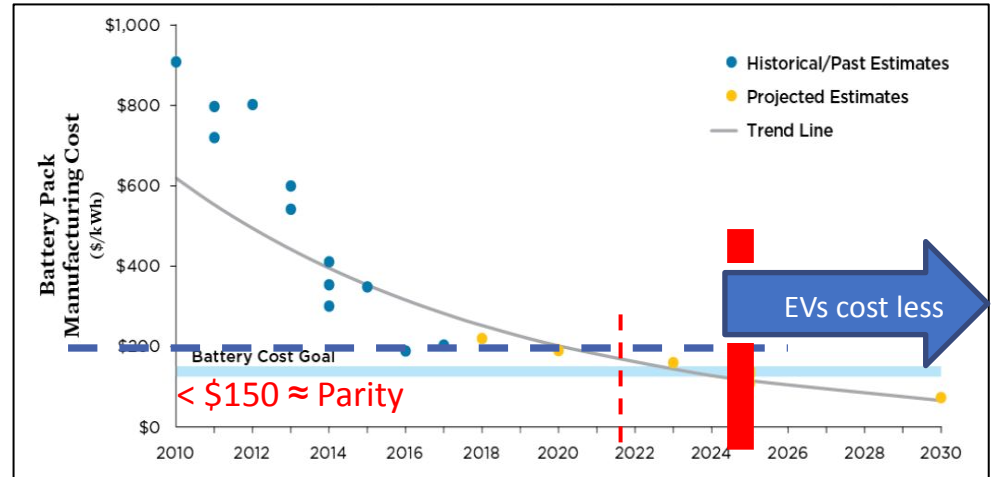
## General Information on Electric Trucks

- [North American Council for Freight Efficiency \(NACFE\)](#)

# Achieving Cost Parity: Game Changer

## Reducing battery costs is key

- Battery Costs dropped 3.5:1 since 2010
- Estimate: when EV battery costs drop below \$100-150/kWh storage
- **Passenger** \$ EV = \$ Gasoline Vehicle between 2024 and 2026 = **Cost Parity**



### SOURCES:

[Union of Concerned Scientist, 2017. "Accelerating US Leadership in Electric Vehicles"](#)

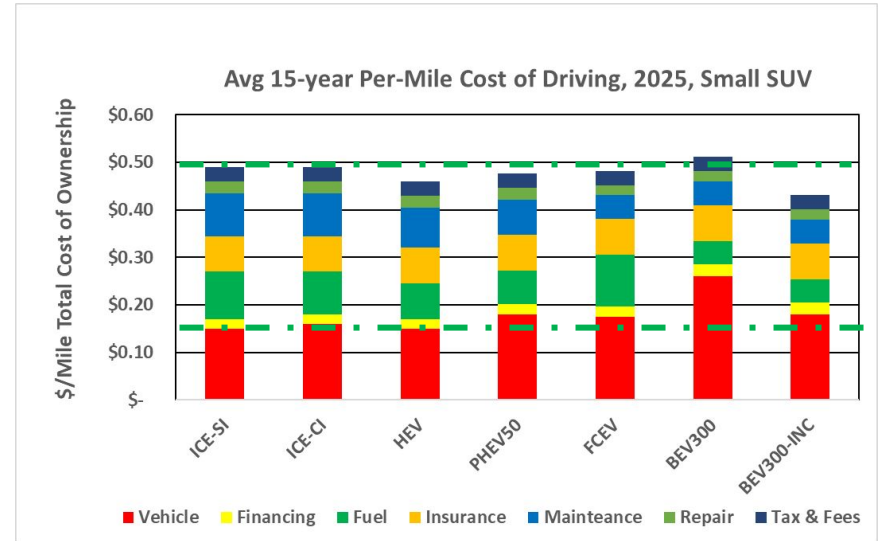
[US Department of Energy. "Batteries"](#)

[McKinsey Report/ Sept, 2021, "The Turning Point for US Auto Dealers: The Unstoppable Electric Car": "](#)

# Electric Vehicles Can be Affordable to Own

- BEVs compete with comparable gasoline vehicles: **Total Cost of Ownership**
- Today: EV demand is growing, and prices remain higher than gasoline counterparts
  - Good deals may be hard to find, even for used EVs
- Tax credits and rebates are available for EVs
- Running costs (electricity, maintenance) are much less for EVs
- Medium and heavy-duty vehicles still not competitive on Total Life Cycle Cost, but ROIs may work with incentives

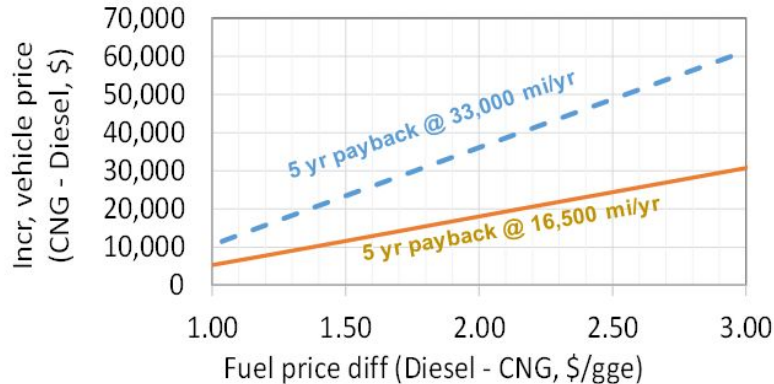
80



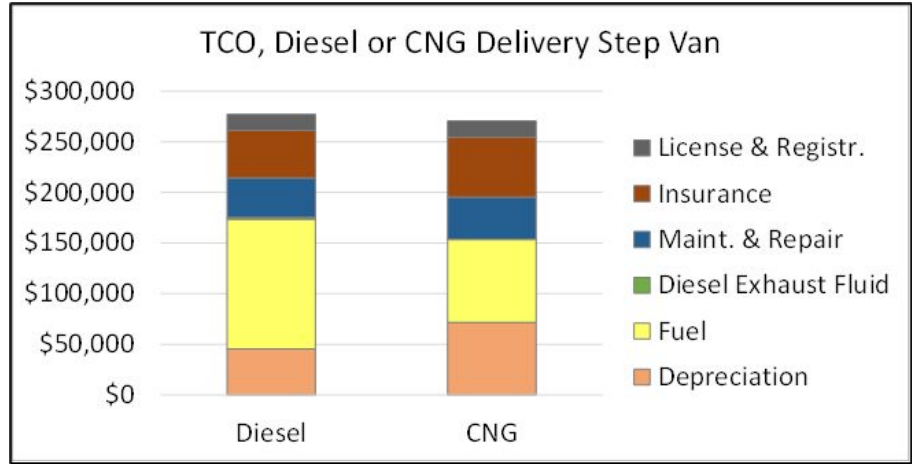


# CNG Vehicles Can be Affordable to Own

- A CNG delivery step van can cost less to own than a comparable diesel van – **without incentives**
- CNG adds \$7,000 to \$60,000 - size dependent
- If vehicle incentives are available, affordability improves



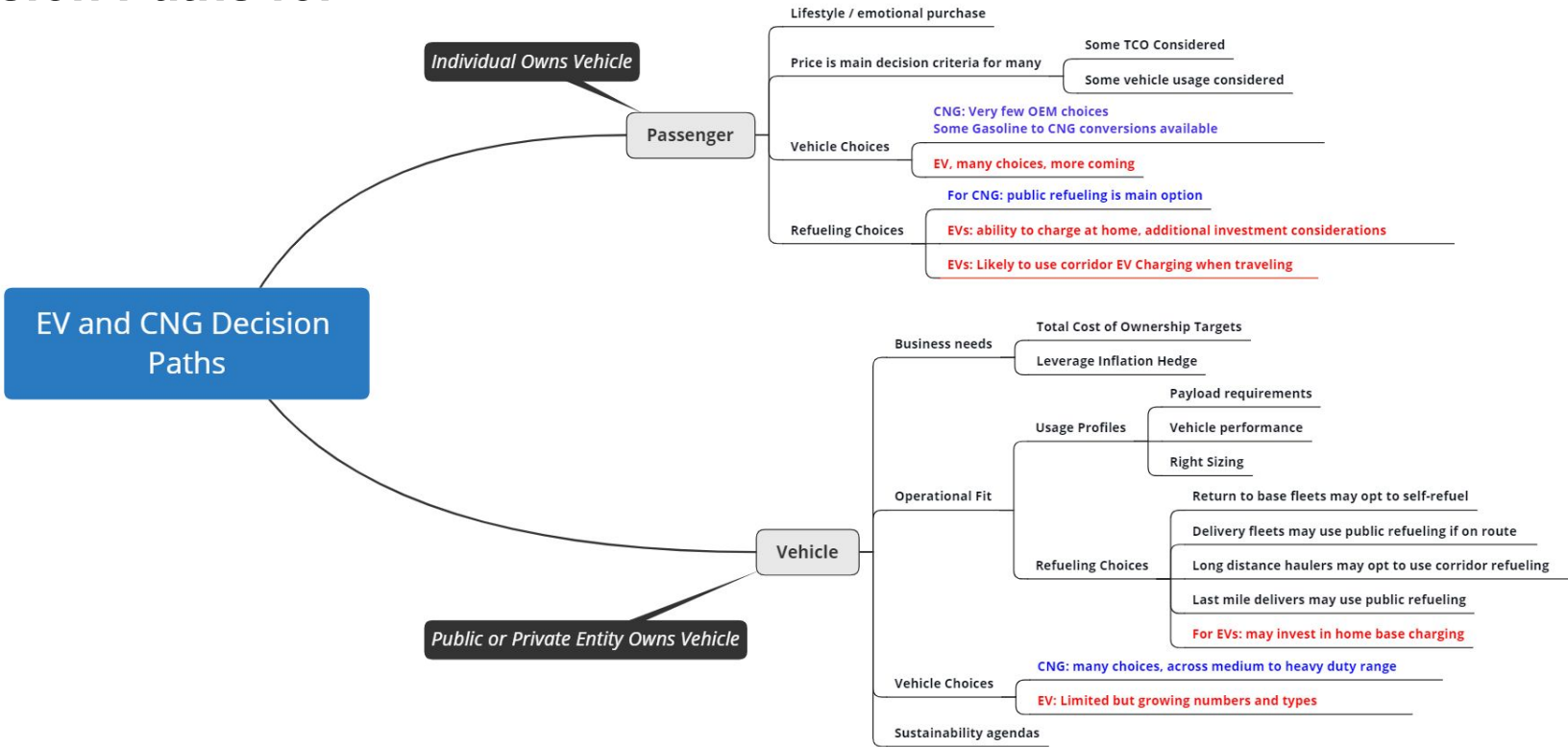
31



Payback time for a CNG vehicle depends on

- Relative prices of fuels
- Price of vehicles and amount of applicable incentives
- Annual mileage

# Vehicle Owner Decision Paths for Nat (NG) Vehi



# Economics of Alternative Fuel Infrastructure Investments

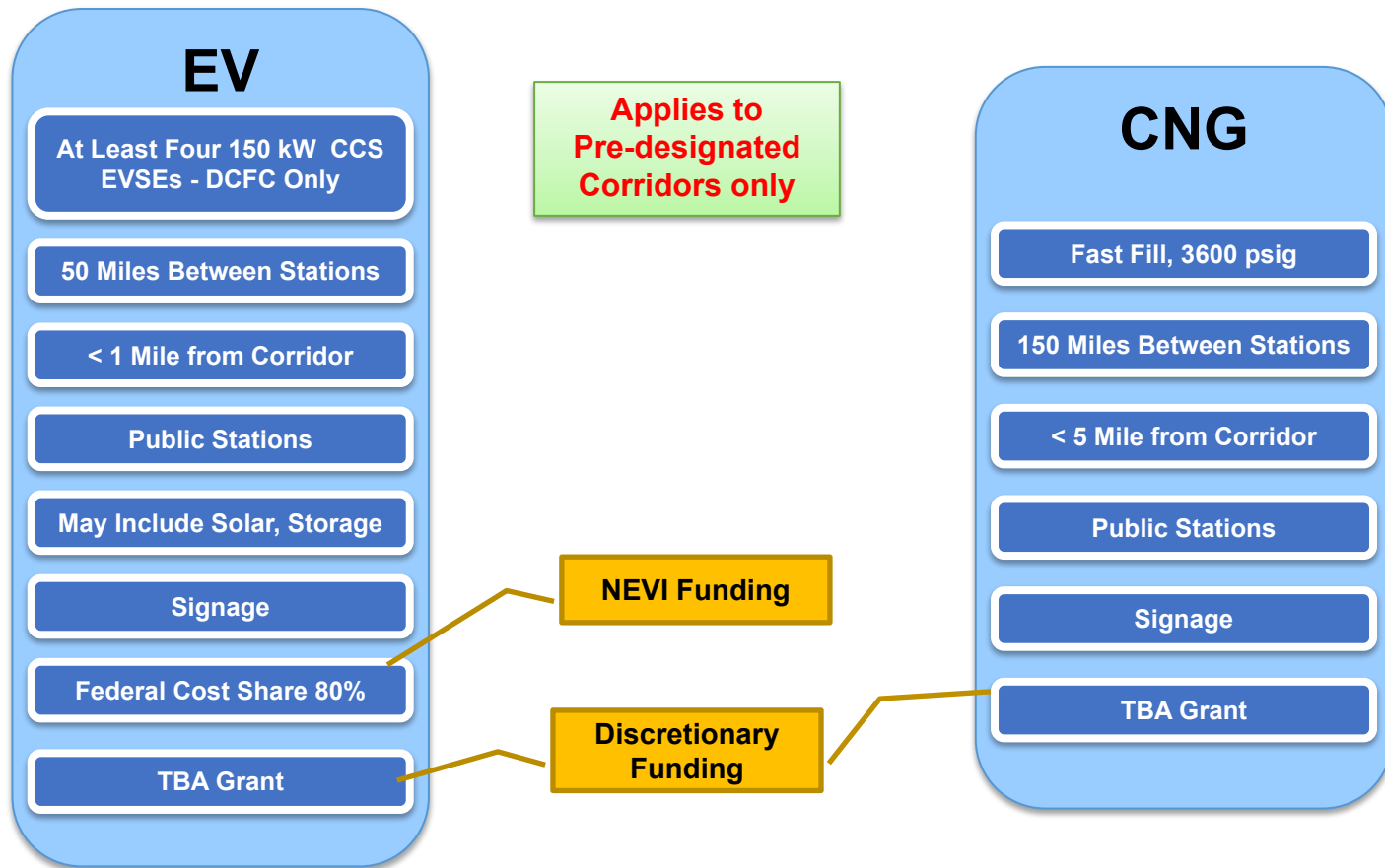


Tim Milburn

Chicago Area Clean Cities Project Consultant  
Green Ways 2Go, Partner



# FHWA Alternative Fuels Corridor Readiness Criteria and Funding Sources



# Siting Factors for EV Charging and CNG Refueling

## SUPPLY FACTORS

Natural gas pipelines (on site and virtual) with sufficient supply pressure, quality.

Access and egress

Locational distance from selected sites to/from nearby access roadways

## DEMAND FACTORS

Populations: people, industry, vehicles

Average Annual Daily Traffic (AADT)

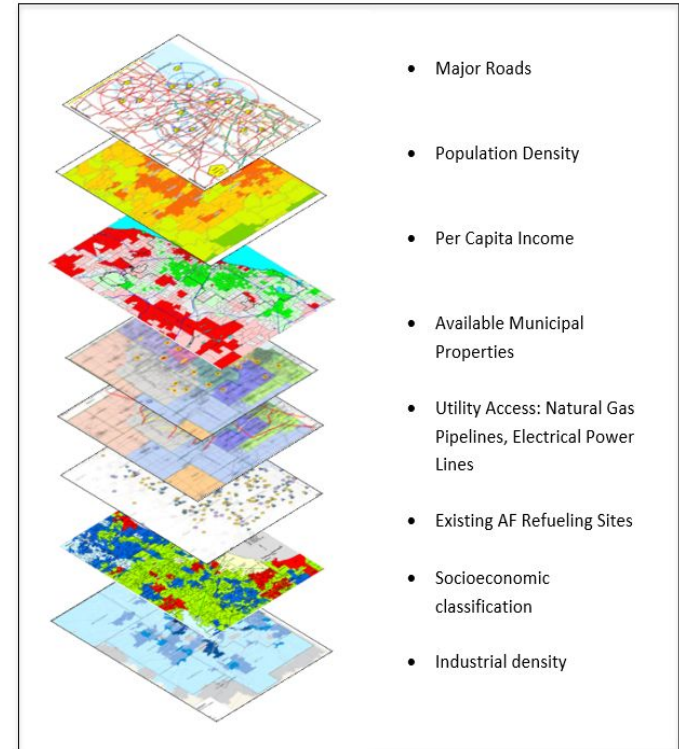
Existing and planned Alternative Fuel infrastructure sites

Interested public entities (municipalities, county, state) and available public properties

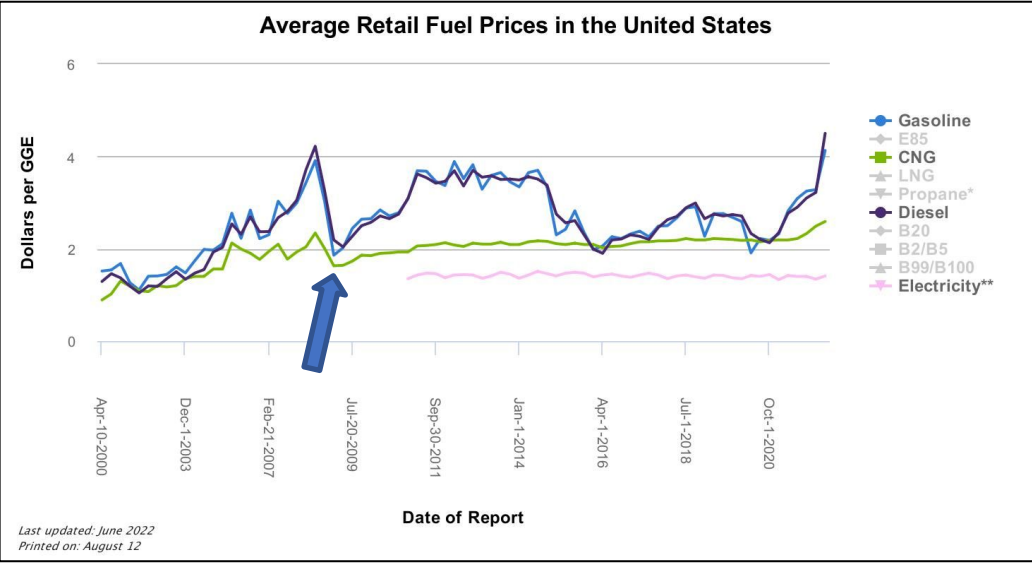
Economic /social justice/socioeconomic factors

Driver needs - amenities, parking

Proximity to attractions (e.g. retail, parks)



# Comparing Fuel Costs per AFDC: What fleets consider



- Normalized pricing for retail transportation fuel
- Diesel/& Gasoline tied to global prices – volatility
- Natural gas prices decoupled from world prices in 2008 □ natural gas prices are steady.
- NG prices have averaged around \$2.10/GGE for 20 years, while gasoline and diesel have varied between \$2 and \$5/GGE
- Electricity prices lower and stable – largely due to public utility commission control of utility prices

AFDC Site Fuel Prices  
<https://afdc.energy.gov/fuels/prices.html>

# Investment Factors for Alternative Fuel Stations

<b>Up Front Investment Considerations</b>
<b>Property ownership and physical space requirements</b>
Formation of <b>strategic partnerships</b>
Equipment and site <b>investments</b>
<b>Capital Incentives:</b> Type (grants, rebates, financing), availability, timing and amount
<b>Operational Incentives:</b> utility rate structures, demand charge programs
Investor's <b>cost to upgrade utility service</b>
Ability to gain <b>fueling contracts</b> from third party fleets
<b>Price of alternatives</b> (\$ gal diesel, gasoline, \$/vehicle mi)
Reasonable expectation of <b>demand meeting supply needs</b>
<b>Future Proofing</b> investments
<b>Sustainability goals</b> and monetization of emissions
<b>Integration of renewable energy / energy storage</b>

<b>Ongoing Costs</b>
Operation and Maintenance
<b>Operational Incentives:</b> utility rate structures, demand charge programs
Taxes, insurance, other overhead
<b>Total Life Cycle Cost of Ownership Evaluation</b>
<b>Total Life Cycle</b> investment analysis
<b>Go/no-go criteria</b>



# What are the Make Ready Costs Involved in EV Charging and CNG?

## EV and CNG

### *Utility Side of the Electric Meter*

- Power step-down transformers
- Switchgear
- Service lines (above or below ground)
- Interconnecting conduit and wiring
- Mechanical / Civil work

### *Customer Side of the Electric Meter*

- Connecting conduits and wiring
- Branch Runs
- Power panels and circuit breakers
- Switchgear/ disconnects
- Transformers
- Electrical / Mechanical / Civil work

## CNG Only

### *Utility Side of the Gas Meter*

- Gas pressure regulators
- Service lines (above and/or below ground)
- Interconnecting piping
- Mechanical / Civil work

### *Customer Side of the Gas Meter*

- Gas dryer
- Compressors
- Storage
- Dispensing
- Controls
- Mechanical / Civil work

***Utility Side : Who pays? varies by region / utility / project***

***Electrical Supply and Gas Supply upgrades range from \$0 to \$1 MM!***

**Contact your utility early**



# Use Case: Corridor **Refueling** or **Recharging**

## Requirements:

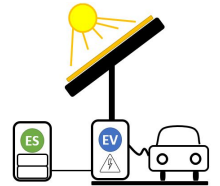
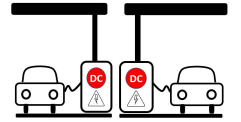
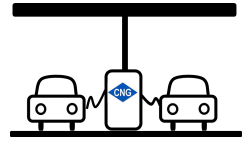
- Total Cost of Ownership – must meet business goals
- Total Installed Cost and fuel Incentives are key
- Engagement with regulators and utilities essential
- Interstate locations with full exchanges and crossroads with good traffic flow
- Supporting regional demographics and population
- Access to utility supplies at peak demand levels
- Multiple ports (redundancy)
- Predictable demand
  - **CNG**: Long term volume contracts
  - **EVs**: Predicted EV Growth

## Key Success Criteria:

- Easy to see from interstate. Signage helps.
- Driver amenities / parking
- Positive aesthetics and safety
- Things to do while charging
- Utility as collaborator
- Equity considerations

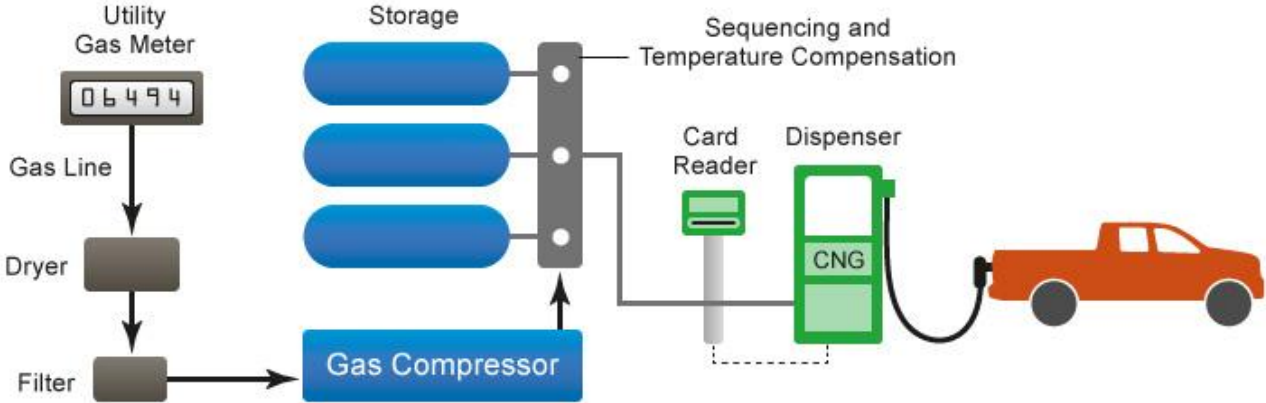
## Future considerations:

- Property, gas supply and power to grow
- Anticipate expansion - install higher utility capacity at onset
- Renewable energy and energy storage may help offset grid capacity costs, demand charges
- Monetization of vehicle emissions



# CNG Refueling Capital Investments

Natural Gas supply connections/ upgrades



Electrical utility service and /or facility upgrade

# CNG Retail Experience

- Trillium designed and installed alternative fuels at over 200 locations.
- CNG stations built to provide up time, meaning redundancy is essential
- Some of the stations were supported by local and federal incentives.
- Gaining fleet fueling contacts key to success



Thanks to



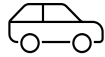
The Love's Family of Companies

# Evolution of EVs & Charging

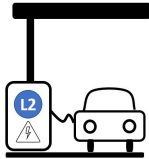


## Siting Evolution

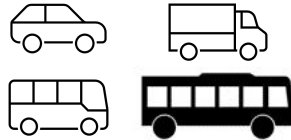
2020



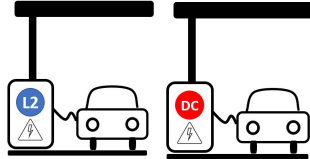
Residential  
Public  
Workplace



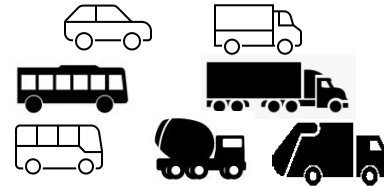
2025



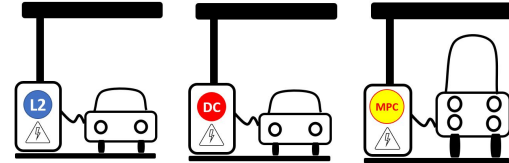
+ Medium Duty Fleets  
School / Transit Buses  
Charging as Business



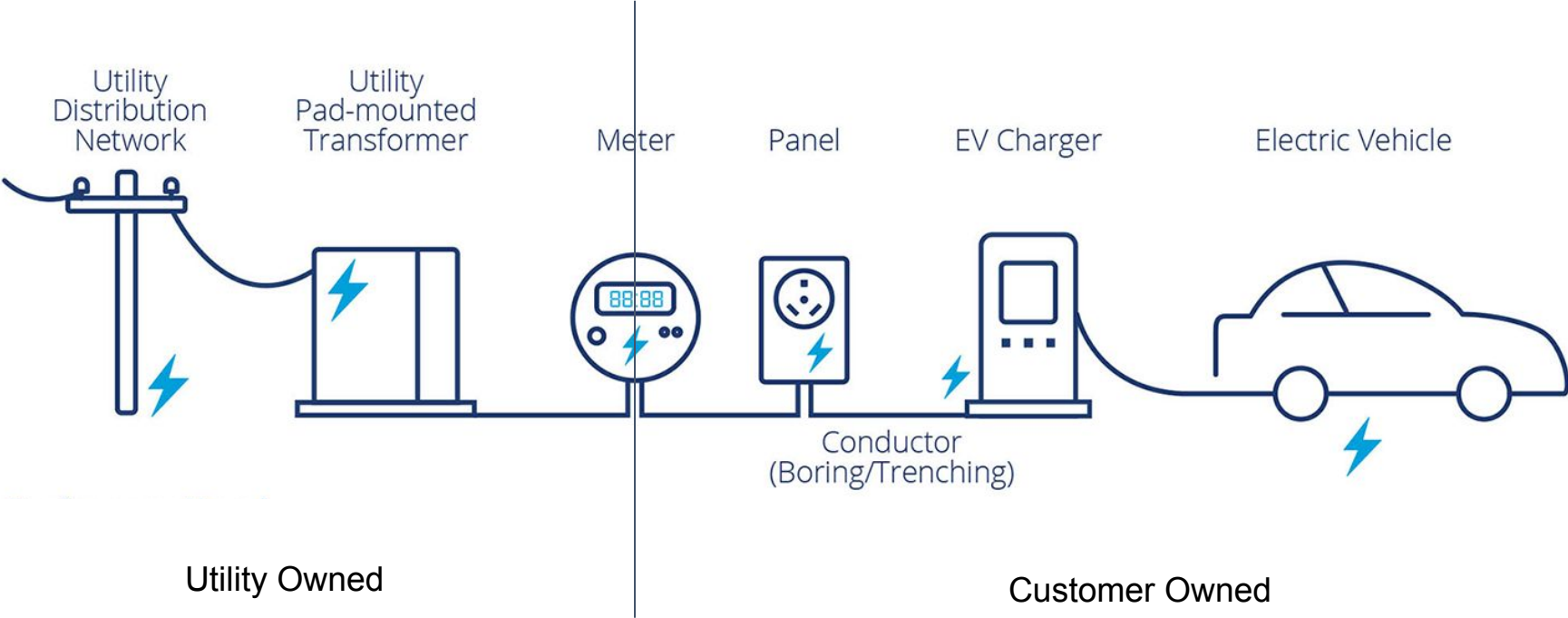
2030



+ Heavy Duty Fleets  
Megawatt Charging



# EV Charging Capital Investments



# EV Charging Retail Experience

- Trillium designed and installed several EV charging stations at several locations.
- Most of the chargers are fast chargers.
- Many of the chargers were supported by local and federal incentives.
- This was key to investment evaluations



Thanks to



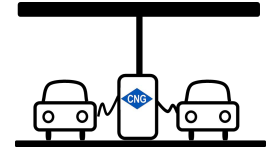
The Love's Family of Companies

# Targets: Corridor **Refueling** or **Recharging**



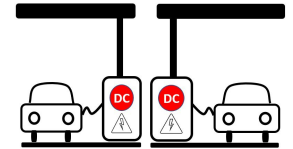
## CNG Targets:

- **CNG Refueling Stations** – 500 to 1,000 SCFM, 2 to 4 dispensers
- **Users:** Interstate drivers, local drivers
- **NGVs:** commercial and municipal fleets  
Anchor fleets to secure investment
- **Investment:** \$2 to \$3 million investments (pre-incentive)



## EV Targets:

- **EV Charging Stations:** DCFC (Four @150 kW, CCS connectors)
- **Users:** Interstate drivers, local drivers  
Large fleets likely will use home-based charging until fleet EV population and use cases grow
- **EVs:** Passenger BEVs, increasing number and type of larger EVs over time
- **Investment:** \$700,000 to \$1.1 million investments (pre-incentive)



# Net Present Value Cash Flow Analysis Retail CNG Station\*



## Key Assumptions:

- 24/7 operation
- CNG Cost \$2.00 /DGE
- 30% margin on fuel

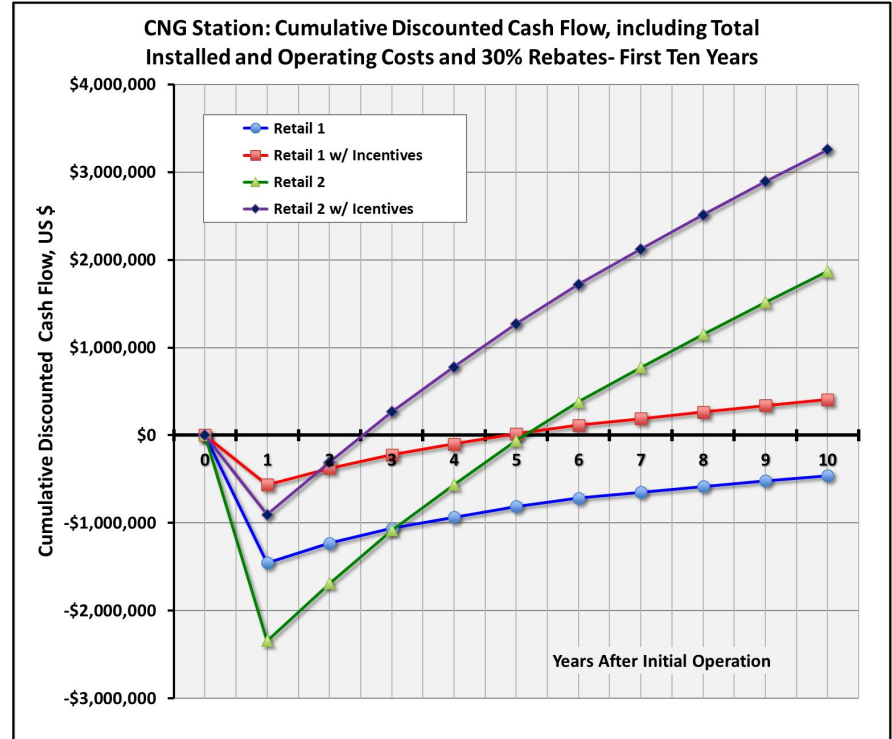
## Cases:

- **Retail 1- small retail station**
- **Retail 2- larger retail station**

## Key Driver of Success: Utilization

- Amount of fuel pumped/day
- Amount of energy transferred per event

CASE	Retail 1	Retail 2
Total Installed Cost – no incentives	\$1.6 MM	\$2.7 MM
Total Installed Cost – with 30% incentives	\$1.1 MM	\$1.9 MM
Annual DGE	1.9 MM	3.7 MM



\*Values are for illustrative purposes only



# Net Present Value Cash Flow Analysis Retail EV Charging Station\*



## Key Assumptions

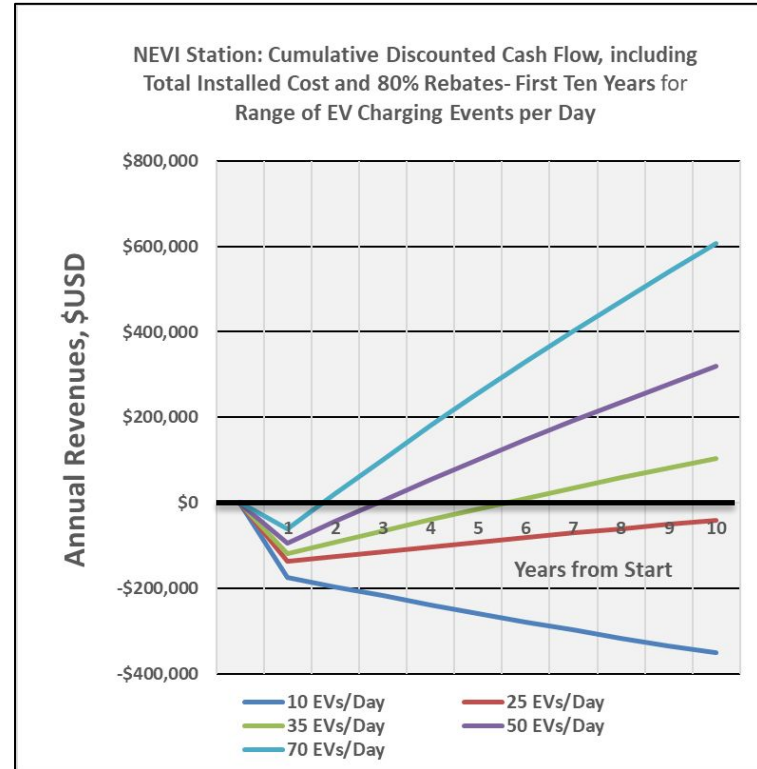
- 24/7 operation
- Four 150 kW EVSEs available
- Average recharge: 200 miles 30-minute session
- Electricity \$0.13 /kWh, demand charges
- Total installed Cost (TIC) \$1,038,000
- 80% Grant for TIC
- 30% margin on fuel

## Cases:

- Vary the average number of EVs per day  
(Note at 70 EVs per day – at about 50% of maximum capacity)

## Key Driver of Success: Utilization

- Number of EV charging events per day
- Amount of energy transferred per event
- Growth in EV market acceptance



\*Values are for illustrative purposes only

# Electric and CNG Vehicles and Station Locator

Abbie Christophersen  
Iowa Clean Cities Coordinator  
Iowa Economic Development Authority



# AFDC Vehicle Search

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.

- [afdc.energy.gov/vehicles/search](http://afdc.energy.gov/vehicles/search)

## Alternative Fuels Data Center

Search the AFDC  [SEARCH](#)

[FUELS & VEHICLES](#) [CONSERVE FUEL](#) [LOCATE STATIONS](#) [LAWS & INCENTIVES](#) [Maps & Data](#) [Case Studies](#) [Publications](#) **[Tools](#)** [About](#) [Home](#)












EERE » AFDC » [Tools](#) » Vehicle Search [Printable Version](#)

### Alternative Fuel and Advanced Vehicle Search

Find and compare alternative fuel vehicles (AFVs), engines, and hybrid/conversion systems. Some of the light-duty AFVs may count toward vehicle-acquisition requirements for [federal fleets](#) and [state and alternative fuel provider fleets](#) regulated by the Energy Policy Act (EPAAct). To download lists of light-duty vehicles for past model years, see the [publications search](#).

Download a complete list:  
[Light-Duty Vehicles](#)   
[All Vehicles](#) 

#### Vehicles by Type

 <a href="#">Sedan/Wagon</a>	 <a href="#">Pickup</a>	 <a href="#">SUV</a>	 <a href="#">Van</a>
 <a href="#">Step Van</a>	 <a href="#">Vocational/Cab Chassis</a>	 <a href="#">Street Sweeper</a>	 <a href="#">Refuse</a>
 <a href="#">Tractor</a>	 <a href="#">Passenger Van/Shuttle Bus</a>	 <a href="#">Transit Bus</a>	 <a href="#">School Bus</a>

#### Vehicles by Manufacturer

Light-Duty  [SEARCH](#)

Medium- and Heavy-Duty  [SEARCH](#)

#### Engines and Hybrid/Conversion Systems

For medium- and heavy-duty vehicles:

[ENGINE & POWER SOURCES](#) [CONVERSION & HYBRID SYSTEMS](#)

[ABOUT THE DATA](#)

# NGV America Vehicle Availability

Compare manufacture conversion systems that have been certified and approved by the U.S. Environmental Protection Agency and/or the California Air Resources Board.

- [ngvamerica.org/vehicles/availability](https://ngvamerica.org/vehicles/availability)

The screenshot displays the NGV America website's 'Manufacturers & Modifiers' page. The page features a navigation bar with links for 'WHY NGV?', 'ENVIRONMENT', 'VEHICLES', 'FUEL', 'POLICY', 'PODCAST', and 'OPPORTUNITIES'. Below the navigation is a search bar and three filter buttons: 'Sort By Category', 'Order By Title', and 'Type To Search'. The main content is a grid of 12 items, each representing a manufacturer or modifier. Each item includes a category label, the company name, and its website URL.

Category	Manufacturer/Modifier	Website
LIGHT-DUTY/MEDIUM-DUTY RETROFITS	<b>AGA Systems</b>	<a href="https://agasystemsinc.com">agasystemsinc.com</a>
HEAVY-DUTY VOCATIONAL OEMS	<b>ALF Condor</b>	<a href="https://flic.kr/p/2h1uH5">flic.kr/p/2h1uH5</a>
LIGHT-DUTY/MEDIUM-DUTY RETROFITS	<b>Altech-Eco</b>	<a href="https://transecoenergy.com">transecoenergy.com</a>
HEAVY-DUTY VOCATIONAL OEMS	<b>Autocar Truck</b>	<a href="https://autocartruck.com">autocartruck.com</a>
HEAVY-DUTY BUS OEMS	<b>Blue Bird Bus</b>	<a href="https://blue-bird.com">blue-bird.com</a>
HEAVY-DUTY VOCATIONAL OEMS	<b>Capacity</b>	<a href="https://capacitytrucks.com">capacitytrucks.com</a>
HEAVY-DUTY RETROFIT/REPOWERS	<b>Clean Air Power</b>	<a href="https://cleanairpower.com">cleanairpower.com</a>
HEAVY-DUTY VOCATIONAL OEMS	<b>Crane Carrier</b>	<a href="https://cranecarrier.com">cranecarrier.com</a>
LIGHT-DUTY/MEDIUM-DUTY RETROFITS		
HEAVY-DUTY RETROFIT/REPOWERS		
HEAVY-DUTY BUS OEMS		
HEAVY-DUTY VOCATIONAL OEMS		



# Vehicle Cost Calculator

Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.

- [afdc.energy.gov/calc](https://afdc.energy.gov/calc)



## Vehicle Cost Calculator

This tool uses basic information about your driving habits to calculate total cost of ownership and emissions for makes and models of most vehicles, including alternative fuel and advanced technology vehicles. Also see the cost [calculator widgets](#).

ASSUMPTIONS

### Choose vehicles to compare

Select up to eight vehicles to compare from the makes and models below or [create your own custom vehicle](#).

[Create Custom Vehicle](#)

### Tell us how you use your car

Because vehicle efficiencies vary depending on how you use your car, this information allows the tool to more accurately calculate fuel usage.

## Results

- ✓ Total cost of ownership
- ✓ Annual fuel use and operating costs
- ✓ Cost per mile
- ✓ Annual emissions



# Vehicle Cost Calculator

Vehicle	Price	Fuel Economy (City/Hwy)	Fuel Type
2022 Volkswagen ID.4 AWD Pro Automatic (A1) EV	\$ 44,440 <a href="#">Tax credit?</a>	32/35 kWh/100mi	Electric
2022 Nissan Leaf (40 kW-hr battery pack) Automatic (A1) EV	\$ 27,400 <a href="#">Tax credit?</a>	27/34 kWh/100mi	Electric
2022 Chevrolet Bolt EV Automatic (variable gear ratios) EV	\$ 31,000 <a href="#">Tax credit?</a>	26/31 kWh/100mi	Electric
2022 Honda Accord 4cyl 1.5L Automatic (variable gear ratios) Gasoline	\$ 26,520	30/38 mpg	Gasoline
2022 Hyundai Santa Fe AWD 4cyl 2.5L Automatic (S8) Gasoline	\$ 29,400	22/25 mpg	Gasoline
2022 Kia Seltos AWD 4cyl 1.6L Automatic (AM-S7) Gasoline	\$ 22,590	25/30 mpg	Gasoline

[Clear all](#)

## Fuel Prices

Gasoline  
\$ 4.13 /gal

## Tell us how you use your car

EDIT

### Normal Daily Use

Average daily driving distance  miles  
Days per week   
Weeks per year   
Percent highway

### Other Trips

Annual mileage  miles  
Percent highway

### Electricity Use

Select a state so we can find the electricity price and calculate the emissions from generating electricity in your area.

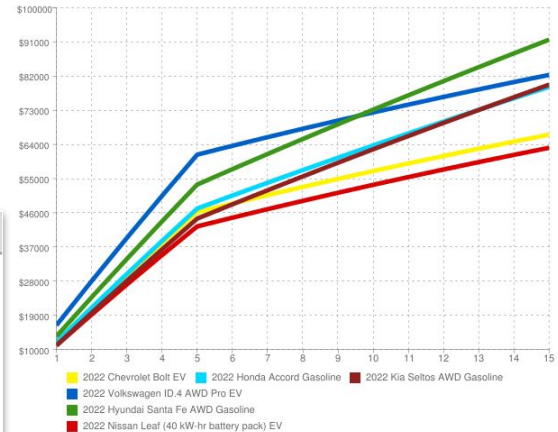
Annual Driving Distance **11926 miles**  
City Distance **5301 miles**  
Highway Distance **6625 miles**

## Results

Vehicle	Annual Fuel Use	Annual Electricity Use	Annual Fuel/Elec Cost	Annual Operating Cost	Cost Per Mile	Annual Emissions (lbs CO2)
2022 Volkswagen ID.4 AWD Pro EV	0 gal	4,019 kWh	\$512	\$2,617	\$0.22	3,943
2022 Nissan Leaf (40 kW-hr battery pack) EV	0 gal	3,713 kWh	\$473	\$2,578	\$0.22	3,642
2022 Chevrolet Bolt EV	0 gal	3,417 kWh	\$436	\$2,541	\$0.21	3,352
2022 Honda Accord Gasoline	351 gal	0 kWh	\$1,450	\$3,707	\$0.31	8,425
2022 Hyundai Santa Fe AWD Gasoline	506 gal	0 kWh	\$2,090	\$4,347	\$0.36	12,143
2022 Kia Seltos AWD Gasoline	433 gal	0 kWh	\$1,788	\$4,045	\$0.34	10,389

[Graph](#) [Graph](#) [Graph](#) [Graph](#) [Graph](#) [Graph](#)

Cumulative Cost of Ownership by Year (Dollars)





# Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions.

- [afdc.energy.gov/stations](https://afdc.energy.gov/stations)

## Alternative Fueling Station Locator

Find alternative fueling stations in the United States and Canada. For U.S. stations, see [data by state](#). For Canadian stations in French, see [Natural Resources Canada](#).

Public Stations   Advanced Filters   Corridor Measurement   40,091 results in U.S. and Canada

Enter location   All Fuels   Map a Route

Legend

- Biodiesel
- CNG
- Electric
- Ethanol
- Hydrogen
- LNG
- Propane

© MapTiler © OpenStreetMap contributors

# Alternative Fueling Stations



Public Stations | Advanced Filters | Fuel Corridors

**7,292** station locations  
**25,105** EVSE ports

Filters chosen:

- United States
- Compressed Natural Gas (CNG)
- Electric  
Types: DC Fast
- Access: Public

Legend  
● CNG  
● Electric

Download Results

Public Stations | Advanced Filters | Fuel Corridors | United States

Des Moines, IA | Electric | Charger Types: DC Fast | Connectors: All | Find Stations

Chicago, IL

Show stations within 1 miles of the route

32 stations along the route

See Route Directions

Download list of stations on route

- 300mlk  
300 W Martin Luther King Jr Pkwy  
Des Moines, IA 50309  
DC Fast  
0.5 mi from route
- Altoona Fast and Fresh  
3590 Prairie Fire NW  
Altoona, IA 50009  
DC Fast  
0.6 mi from route



# U.S. Department of Energy Clean Cities Coalitions



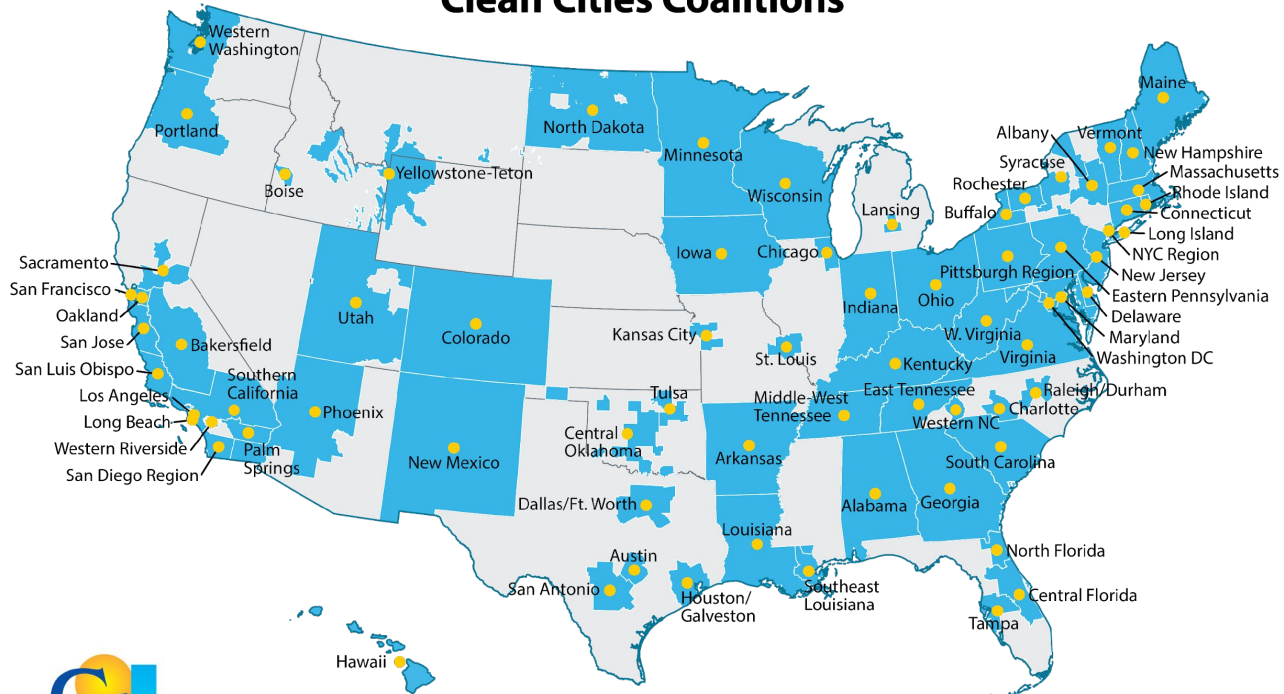
Abbie Christophersen  
Iowa Clean Cities Coordinator  
Iowa Economic Development Authority

# National Network of Clean Cities Coalitions

More than 75 active coalitions covering nearly every state with thousands of stakeholders

[cleancities.energy.gov](http://cleancities.energy.gov)

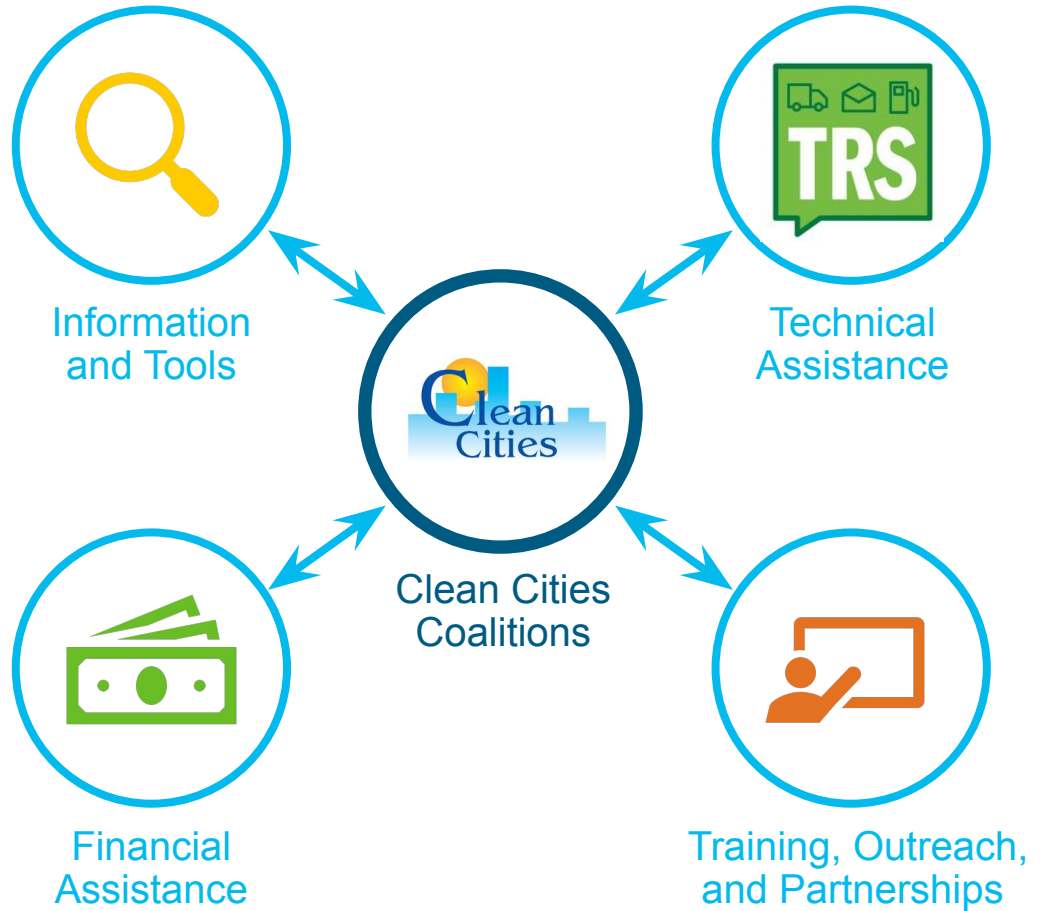
## Clean Cities Coalitions



Map Date: 2/3/22

# Technology Integration Program

Provides objective/unbiased data and real-world lessons learned that inform future research needs and support local decision-making



# FuelEconomy.gov : Advanced Cars & Fuels

fueleconomy.gov

www.fueleconomy.gov

Mobile Español

the official U.S. government source for fuel economy information

Find a Car

Save Money & Fuel

Benefits

My MPG

Advanced Cars & Fuels

About EPA Ratings

More



## About Hybrid and Electric Cars



A quick guide to the different kinds of hybrids and electric vehicles.

## All-Electric Vehicles

Compare Side by Side

About Electrics

New & Upcoming

Tax Incentives

GHG Emissions Calculator

Electric Vehicle Links

## Hybrids

Compare Side by Side

How Hybrids Work

Can a Hybrid Save Me Money?

Hybrid Links

## Plug-In Hybrids

Compare Side by Side

About Plug-in Hybrids

How Plug-in Hybrids Save Money

My Plug-in Hybrid Calculator

New & Upcoming

Tax Incentives

GHG Emissions Calculator

Plug-in Hybrid Links

## Diesels

Compare Side by Side

About Diesels

New & Upcoming

Ultra-Low Sulfur Diesel

Biodiesel

Diesel Links

## Flex-Fuel Vehicles

Flex-Fuel Vehicles

Flex-Fuel Links

## Alternative Fuels

Ethanol

Electricity

Biodiesel

Natural Gas

Hydrogen

Propane

## Fuel Cell Vehicles

Compare Side by Side

How They Work

Benefits and Challenges

Videos

Fuel Cell Links

# Alternative Fuels Data Center: Tools

[afdc.energy.gov/tools](http://afdc.energy.gov/tools)

The screenshot shows the 'Alternative Fuels Data Center' website. At the top, there is a search bar with the text 'Search the AFDC' and a 'SEARCH' button. Below the search bar is a navigation menu with links for 'FUELS & VEHICLES', 'CONSERVE FUEL', 'LOCATE STATIONS', 'LAWS & INCENTIVES', 'Maps & Data', 'Case Studies', 'Publications', 'Tools' (which is highlighted), 'About', and 'Home'. Below the navigation menu, there is a breadcrumb trail: 'EERE > AFDC > Tools'. On the right side, there is a 'Printable Version' link. The main heading is 'Tools'. Below this heading is a paragraph: 'The Alternative Fuels Data Center offers a large collection of helpful tools. These calculators, interactive maps, and data searches can assist fleets, fuel providers, and other transportation decision makers in their efforts to advance alternative fuels and energy-efficient vehicle technologies.' The tools are organized into three columns. Each tool entry includes an icon, a title, and a brief description. The tools listed are: Calculators: EVI-Pro Lite, AFLEET Tool, Vehicle Cost Calculator, VICE Model, JOBS Model, Heavy-Duty Vehicle Emissions, and EVolution: E-Drive Vehicle Education. Interactive Maps: Alternative Fueling Station Locator, Alternative Fuel Corridors, TransAtlas, Coalition Locations, and Energy Zones Mapping Tool. Data Searches: Vehicle Search, Laws and Incentives Search, Battery Policies and Incentives, Fuel Properties Comparison, Find a Car, and State Information.

## Alternative Fuels Data Center

Search the AFDC  [SEARCH](#)

[FUELS & VEHICLES](#) [CONSERVE FUEL](#) [LOCATE STATIONS](#) [LAWS & INCENTIVES](#) [Maps & Data](#) [Case Studies](#) [Publications](#) [Tools](#) [About](#) [Home](#)

[EERE](#) > [AFDC](#) > Tools [Printable Version](#)

### Tools

The Alternative Fuels Data Center offers a large collection of helpful tools. These calculators, interactive maps, and data searches can assist fleets, fuel providers, and other transportation decision makers in their efforts to advance alternative fuels and energy-efficient vehicle technologies.

#### Calculators

- EVI-Pro Lite**  
Estimate a city or state's need for vehicle charging and the effect on electric load.
- AFLEET Tool**  
Calculate a fleet's petroleum use, cost of ownership, and emissions.
- Vehicle Cost Calculator**  
Compare cost of ownership and emissions for most vehicle models. [mobile](#)
- VICE Model**  
Evaluate the financial case for natural gas vehicles and battery electric buses.
- JOBS Model**  
Estimate economic impacts of deploying alternative fuel and charging infrastructure.
- Heavy-Duty Vehicle Emissions**  
Calculate the emissions of alternative fuel medium- and heavy-duty vehicles.
- EVolution: E-Drive Vehicle Education**  
Understand the costs and benefits of electric vehicles based on location.

#### Interactive Maps

- Alternative Fueling Station Locator**  
Locate alternative fueling stations and get maps and driving directions. [mobile](#)
- Alternative Fuel Corridors**  
Find maps and station data to help with nominating alternative fuel corridors.
- TransAtlas**  
Explore light-duty vehicle registration counts over time by state and fuel type.
- Coalition Locations**  
Find Clean Cities coalitions and contact information for coordinators.
- Energy Zones Mapping Tool**  
Identify potential energy resource areas and energy corridors in the United States.
- ATRAVEL Tool**  
Estimate costs, travel time, and emissions for private vehicles and other travel modes.

#### Data Searches

- Vehicle Search**  
Compare all classes of alternative fuel vehicles, electric vehicles, and hybrids.
- Laws and Incentives Search**  
Search for laws and incentives related to alternative fuels and advanced vehicles.
- Battery Policies and Incentives**  
Find policies and incentives for batteries developed for EVs and energy storage.
- Fuel Properties Comparison**  
Compare alternative fuel properties and characteristics.
- Find a Car**  
Compare fuel efficiency, costs, carbon footprints, and emissions. [mobile](#)
- State Information**  
Find state information about alternative fuels and advanced vehicles.

# Information & Education: Publications

**Clean Cities Coalitions: Advancing Affordable, Domestic Transportation Fuels and Technologies Across the Country**

A coordinated group of nearly 100 coalitions serve as the foundation of Clean Cities, working in communities across the country to help local decision makers and fleets understand and implement alternative and renewable fuels, life-cycle reduction measures, fuel economy improvements, new mobility choices, and emerging transportation technologies. The U.S. Department of Energy's (DOE) Mobile Technologies Office (MTO) within the Office of Energy Efficiency and Renewable Energy facilitates national coordination of the coalitions through its Technology Integration Program. Together, Clean Cities coalitions and MTO focus on advancing affordable, domestic transportation fuels, energy-efficient, low-carbon, and other fuel-saving technologies and practices.

At the national level, MTO's Technology Integration Program offers technical assistance, information resources, online training, and an array of data and analysis tools. At the local level, coalitions leverage their resources to create networks of community stakeholders and provide hands-on technical assistance to fleets.

MTO designated the first Clean Cities coalition in 1993 in response to the Energy Policy Act of 1992, and coalitions across the country have evolved and expanded ever since. After a quarter century, coalitions have garnered the respect and trust of fleets and industry alike by providing objective data and real-world lessons learned to smooth the transition to alternative fuels and advanced vehicle technologies. Coalitions accomplish this in communities large and small, one project, one local decision, and one

**Compressed Natural Gas Vehicle Maintenance Facility Modification Handbook**

At a time that creates a compelling impact nationwide that advances U.S. energy independence and reduces vehicle emissions while supporting regional economic development and job growth, the Office of Energy Efficiency and Renewable Energy facilitates national coordination of the coalitions through its Technology Integration Program. Together, Clean Cities coalitions and MTO focus on advancing affordable, domestic transportation fuels, energy-efficient, low-carbon, and other fuel-saving technologies and practices.

- Evaluate transportation needs and energy choices to determine the most impactful and cost-effective vehicle options, fuels, technologies, and best practices that make sense for specific, at-station applications.
- Shift to domestic energy sources through the use of alternative and renewable fuels such as natural gas, propane, by-product, ethanol, and biodiesel.
- Improve fuel efficiency through state-of-the-art technologies and strategies.
- Reduce harmful emissions through life-cycle reduction and other fuel-saving technologies and practices.

Coalition activities, project results, and estimated energy impact are summarized in an annual report. This gives coordinators the ability to track, accept, implement, and inform stakeholders of their

**Electric Vehicles for Fleets**

Electric vehicles (EVs) can fulfill many daily driving needs, making them a great solution for fleets. They offer several benefits and can fill roles in light-duty, medium-heavy-duty (MDHD), and even off-road applications.

The unique fleet environment presents considerations beyond those that consumers must address before going electric. For example, fleet managers must understand the impacts of charging multiple vehicles while maintaining fleet operation. Larger MDHD vehicles bring additional factors to consider.

**Why Consider an EV?**

**Lower Costs.** In addition to available incentives, EVs offer high fuel economy, which translates to lower operating costs. Operation and maintenance averages about 3 cents per mile for light-duty EVs. They reduce their base fuel economy during stop-and-go driving conditions typical of many fleet applications. Electricity prices have also been low relative than those of gasoline/diesel, making it easier to estimate future fuel costs (see Figure 2). Finally, lower off-peak electric rates may be available for charging, which further reduces EV fleet costs.

**Performance Features.** EVs are much quieter than conventional vehicles. They produce maximum torque and smooth acceleration from a full stop, which can be especially useful when hauling heavy loads.

**Medium- and Heavy-Duty Considerations**

**Vehicles:**

- Several MD/HD EV models are available for applications such as school and transit buses, shuttle vans/buses, delivery trucks, and vocational trucks.
- Many off-road EVs are available, including forklifts, mowers, agricultural tractors, and airport ground support equipment.
- Initial vehicle production quantities can be limited, resulting in longer delivery times for some MD/HD EVs, so plan early.
- MD/HD vehicles can be more impacted by factors that can reduce range, such as heating/cooling loads, high driving speeds, significant cargo loads, and auxiliary power use in power tools, auxiliary power units, etc.

**Charging:**

- Level 2 charging equipment with low utilization or long dwell times may be more cost-effective than Level 1.
- MD/HD vehicle charging equipment is different than those of light-duty vehicles.
- Industrial and off-road conditions can be an option, particularly for transit buses. With these conditions, automaticity begins charging.

**CLEAN CITIES Alternative Fuel Price Report**

Figure 1: Fleets can choose from a wide variety of medium- and heavy-duty applications, from to delivery trucks to school buses.

Figure 2: The average retail fuel prices in the United States are not only lower but much more stable than gasoline.

Figure 3: Some can serve as a significant energy source for off-board equipment such as power tools or lights, providing several kilowatts of electricity through multiple electrical outlets.

Figure 4: Flexible charging, EVs can charge at fleet facilities or public stations. Facility charging enables EVs to charge overnight and during idle times. Public "fast charge" stations are increasingly available along major routes.

Figure 5: Methanol, ethanol, and biodiesel are increasingly available along major routes.

[afdc.energy.gov/publications](https://afdc.energy.gov/publications)



# Federal and State Laws and Incentives Database

Find federal and state laws and incentives for alternative fuels and vehicles, air quality, fuel efficiency, and other transportation-related topics.

- [afdc.energy.gov/laws](http://afdc.energy.gov/laws)

## Alternative Fuels Data Center

Search the AFDC

SEARCH

FUELS & VEHICLES

CONSERVE FUEL

LOCATE STATIONS

**LAWS & INCENTIVES**

Maps & Data

Case Studies

Publications

Tools

About

Home

EERE » AFDC » Laws & Incentives

Printable Version

### Federal and State Laws and Incentives


Find federal and state laws and incentives for alternative fuels and vehicles, air quality, fuel efficiency, and other transportation-related topics.

**Federal**

[Recent Federal Actions](#)  
[Key Federal Legislation](#)

**State**

[Recent State Updates](#)  
[Local Examples](#)  
[Utility Examples](#)

**Search**  
by category or keyword

**See All**  
in summary tables

For questions or to submit an incentive, email the [Technical Response Service](#). For additional incentives, search the [Database of State Incentives for Renewables & Efficiency](#).

*This information provides an overview of laws and incentives and should not be your only source of information for making decisions about vehicle purchases, taxes, or other binding agreements. Please refer to the federal and state contacts included to verify these laws and incentives are still applicable, and consult your tax advisor.*

ABOUT THE DATA

[Download Data](#)

[Data Fields](#)

[Developer API](#)

#### – Technology Bulletins

 [Connecting Dots and Bridging Gaps: Alternative Fueling Corridors](#)

[All Technology Bulletins](#)

+ [Maps & Data](#)

+ [Case Studies](#)

+ [Publications](#)

+ [Tools](#)



## Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) Tool

Calculate a fleet's petroleum use, cost of ownership, and emissions.

- [greet.es.anl.gov/afleet](http://greet.es.anl.gov/afleet)



### AFLEET Tool (xls)

The AFLEET spreadsheet provides detailed energy, emission, and cost data for light-duty, heavy-duty, and off-road AFVs. It has the following 5 calculators depending on the user's goals:

- Simple Payback
- Total Cost of Ownership
- Fleet Footprint
- Idle Reduction
- Electric Vehicle Charging



### AFLEET Online

AFLEET Online replicates the spreadsheet's Simple Payback Calculator with a user-friendly interface and analyzes the following metrics:

- Petroleum use
- Greenhouse gas emissions
- Air pollutant emissions
- Simple payback



### HDVEC

The Heavy Duty Vehicle Emissions Calculator (HDVEC) is an AFLEET-based online tool that compares NOx, PM, GHGs and funding cost-effectiveness of environmental mitigation projects for the following fuel types:

- Diesel
- Electric
- Natural Gas
- Propane



### ATRAVEL

The ATRAVEL Tool was developed to estimate costs, travel time, and emissions of private vehicle ownership and other travel modes based on your location and travel patterns, while also providing related travel metrics at both local and regional levels. The travel modes currently included are:

- Private vehicle
- Transit
- Ridehail



# Questions



**Tim Milburn**



**Abbie  
Christophersen**

# Local Success Stories



Photo by Dennis Schroeder / NREL



# METROLINK

---

ROCK ISLAND COUNTY METROPOLITAN  
MASS TRANSIT DISTRICT, MOLINE, IL

I-80 CLEAN FUELS  
AUGUST 2022

# METROLINK - AGENCY OVERVIEW

- Serving the Illinois Quad Cities communities of Moline, Rock Island, East Moline, Silvis, Hampton, Carbon Cliff, Colona, and Milan
- Approximately 160 employees in a service area population of approximately 148,000
- State-of-the-art Operations and Maintenance Center completed in 2014, which includes a solar thermal hot water system and a rooftop solar array
  - 13 fixed-routes
  - 1 Microtransit van
  - Paratransit service
  - Special Transportation Services division
  - Seasonal ferryboat service on Mississippi River

## Fleet (As of 01/2022)

- 17 battery electric (40')
- 45 CNG (30', 35', 40')
- 16 paratransit vehicles
- 3 ferryboats (49-passenger)

## Service Data (Pre-COVID)

- Annual UPT – 3.3 Million



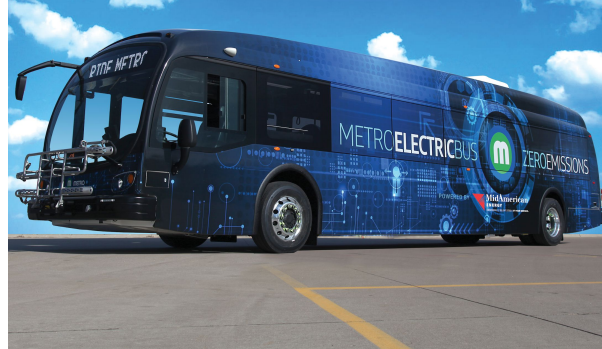
# ALTERNATIVE FUELS JOURNEY



## COMPRESSED NATURAL GAS

Over 20 years ago Metro made the decision to be a sustainable leader in our community through a commitment to alternative fuels.

In 2002 Metro converted 40% of our fixed route fleet to Compressed Natural Gas (CNG) buses powered by John Deere Engines. Today 70% of the fleet runs on Compressed Natural Gas.



## BATTERY ELECTRIC

We've continued to seek the latest alternative fuel technologies to reduce vehicle emissions, and welcomed three (3) all electric fixed-route buses into our fleet in 2018. In 2019, we brought five (5) more all electric buses to the Quad Cities. Nine (9) additional buses deployed in May of 2022.

**With this deployment, Metro will have a fleet of nearly 30% electric and will be able to decommission its last remaining diesel buses from the fleet.**

# ALTERNATIVE FUELS JOURNEY



## CHARGING INFRASTRUCTURE

First utilization of a Proterra depot pedestal dispenser with a ceiling-mounted installation

Key-operated hoist raises and lowers dispenser cable for charging

No loss in vehicle storage space from a traditional floor mount unit

2019 Metro Magazine “Innovation Solution Award” for creative design



## SOLAR INFRASTRUCTURE

Operations & Maintenance Facility  
(Completed in 2014)

Rooftop photovoltaic array with  
bidirectional meter

1,344 panels

Average annual output –  
350,000–380,000 kWh

# ALTERNATIVE FUELS JOURNEY



## FUTURE ELECTRIFICATION PROJECT - CHARGING

Metro has received nearly \$8,000,000 in state and federal funds to build out overhead pantograph chargers at major Metro terminals in East Moline, Centre Station, and District Station as well as the QC International Airport. During each stop at the terminal, buses will utilize charge rails and an automated pantograph to “top off” charge in 5-7 minutes to allow greater vehicle utilization and operating range. In addition, the charging system at our Operations and Maintenance Center will be upgraded to a high speed charging system.

PANTOGRAPH



## FUTURE ELECTRIFICATION PROJECT – COMMUNITY DEVELOPMENT

In tandem with infrastructure improvements in downtown facilities, Metro plans to partner with local governments and stakeholders on the purchase and installation of on-street EV automobile chargers to prepare for the industry demand in coming years.

# METROLINK-ELECTRIFYING OUR COMMUNITY

## MetroLINK Transit Automobile EV Charging Scope

- Install a total of 50 Level 3 automobile EV chargers in the downtown areas of East Moline, Moline, and Rock Island, IL
- Focus on short-term parking intervals with charges that offer 250-500 miles of range with a charge time of 1-2 hours
- Purchase to include enterprise program for power management, software updates, customer service, data collection, end-user mobile app, and payment systems.
- Opportunities for audible alerts or additional charge fees if a vehicle continues to use the parking space after charging is complete
- Purchase to include vendor commissioning following install, as well as options for extended warranty or maintenance services.
- Est. cost \$40-60k per dispenser (excluding installation or any applicable electrical service upgrades)





# EMISSIONS REDUCTION GOALS

Purchase only low or no emission heavy duty buses beginning in FY2022, with a focus on zero emission where feasible.

Apply green principles to the design of all new facilities and renovation of existing facilities (where feasible).

Coordinate with education institutions on workforce development relative to emerging technologies, such as EV buses and sustainable facilities

Introduce alternative fuels to support vehicles and/or paratransit vehicles

Consider renewable energy sources to reduce environmental impact of non-facility and non-vehicle emissions, such as additional solar-powered passenger shelters

Expand resiliency efforts to anticipate, prepare for, and respond to events, trends, or disturbances related to climate change.



# ROCK ISLAND COUNTY METROPOLITAN MASS TRANSIT DISTRICT - METROLINK



**JENNIFER HIRSCH, MANAGER OF ADMINISTRATION**  
**309-235-9945**  
**[JHIRSCH@QCMETROLINK.COM](mailto:JHIRSCH@QCMETROLINK.COM)**



*Moline* Illinois

**City of Moline  
Fleet Diversity and Use of  
Alternative Fuels**

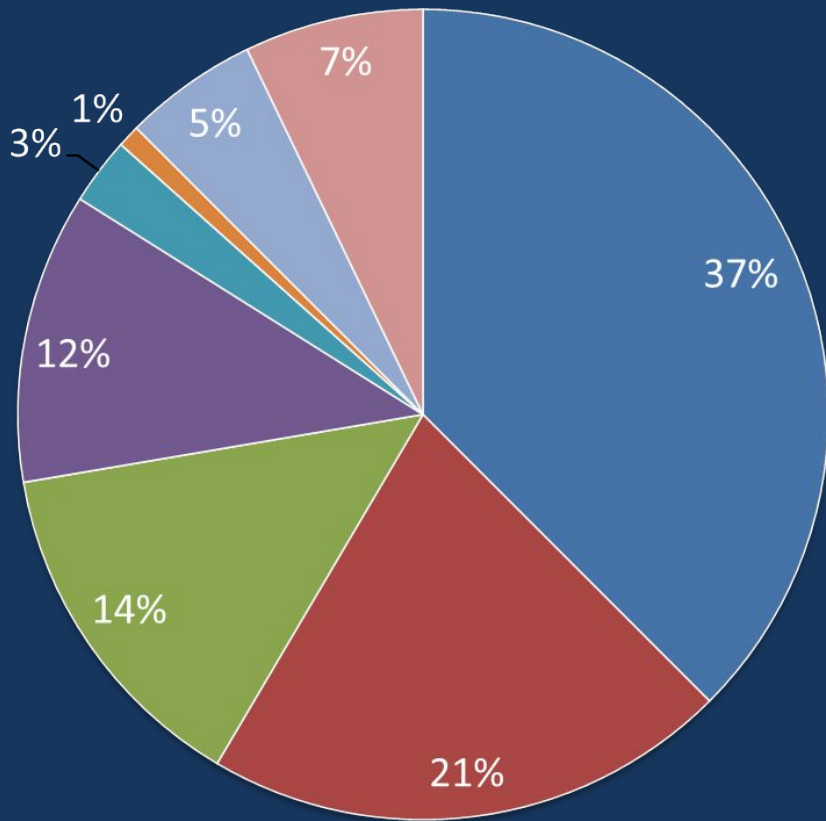
Mike Doi, P.E.  
Director of Public Works

The mission of the Moline City  
Government is to act in a  
financially responsible manner  
while providing quality and efficient  
City services and creating a  
sustainable City.

100%

of the City of Moline's  
fleet operates on some type of  
alternative fuel!

# City of Moline Alternative Fuel Vehicles



## City of Moline Fleet 232 Fueled Pieces of Equipment

B20 Biodiesel	(92)
E85	(47)
Gasohol	(31)
Hybrid Electric	(26)
All Electric	(6)
Propane	(2)
Bifuel (UNL + CNG)	(12)
CNG	(16)

# Why Alternative Fuels?

B20 Biodiesel	Ethanol	CNG
57% Reduction in Greenhouse Gas Emissions	Almost 40% reduction of greenhouse gases	Lower Exhaust Emissions
15% Less Carbon Dioxide	Cleaner Burning and Renewable	Currently More Cost Effective
10% Reduction in Particulate Matter	Absorbs Moisture - Helps Prevent Freezing	Domestically Produced
Safer to Handle - Less Combustible	Corn and Sorghum - 99% of Feedstock	Reduced Range, Longer PM Intervals
Non Toxic - Biodegradable	Iowa Leads Nation in Ethanol Production	
Less Dependence on Foreign Oil	Ethanol requires less water to produce 3:1	



The City of Moline is an inaugural member of the B20 Club, a partnership between the Illinois Soybean Association Checkoff Program and the American Lung Association.

The B20 Club recognizes a select group of Illinois-based organizations with strong commitments to run fleets on biodiesel blends of 20% or greater.





CITY OF  
MOLINE  
ILLINOIS

PUBLIC WORKS

STERLING

Powered By:  
**BIO DIESEL**  
CLEANER BURNING & RENEWABLE  
[www.biodiesel.org](http://www.biodiesel.org)

# Regional Fueling

In addition to the City's fleet, our fueling site is a regional facility selling fuels to another 157 vehicles or pieces of equipment belonging to Black Hawk College, the Moline Housing Authority, the Moline-Coal Valley School District, the TaxSlayer Center, and our neighbors in the City of East Moline.

Selling fuel to our neighbors is not only a good way to foster a strong sense of community cooperation, but also extends the positive benefits of alternative fuel use beyond Moline!

The City of Moline has an  
Intergovernmental Agreement with  
MetroLINK for the CNG fueling station  
at Moline's Public Works facility



*Moline* Illinois



# Gallons by the Year

	<b>B20 BIODIESEL</b>	<b>E85</b>	<b>GASOHOL</b>	<b>CNG*</b>	<b>PROPANE*</b>
2013	127,006.77	78,874.22	22,117.93	-	-
2014	131,779.66	74,980.25	22,330.03	1,291.39	-
2015	158,772.82	74,670.03	89,104.14	3,105.93	2,060.70
2016	138,425.72	74,730.83	89,487.63	10,376.10	759.50
2017	116,632.33	68,617.42	83,935.29	17,579.01	375.00
2018	123,902.55	69,195.24	88,336.83	15,943.35	720.50
2019	119,798.91	74,896.59	86,673.29	48,313.24	850.00
2020	78,585.27	53,383.56	86,387.94	58,184.48	748.00
2021	84,946.94	27,507.78	98,772.90	66,560.06	714.00

\*CNG and Propane are measured in GGE (gas gallon equivalents), not gallons

# Future Fleet Goals

- Add to our EV/CNG fleet
- Implement a higher blend of biodiesel
- Expand the use of bio-based fluids and supplies in the garage

A green rectangular sign with rounded corners and a white border, mounted on two wooden posts. The sign features the words "Thank You" in a large, white, sans-serif font. The background is a bright blue sky with scattered, soft white and light-colored clouds, suggesting a clear, sunny day.

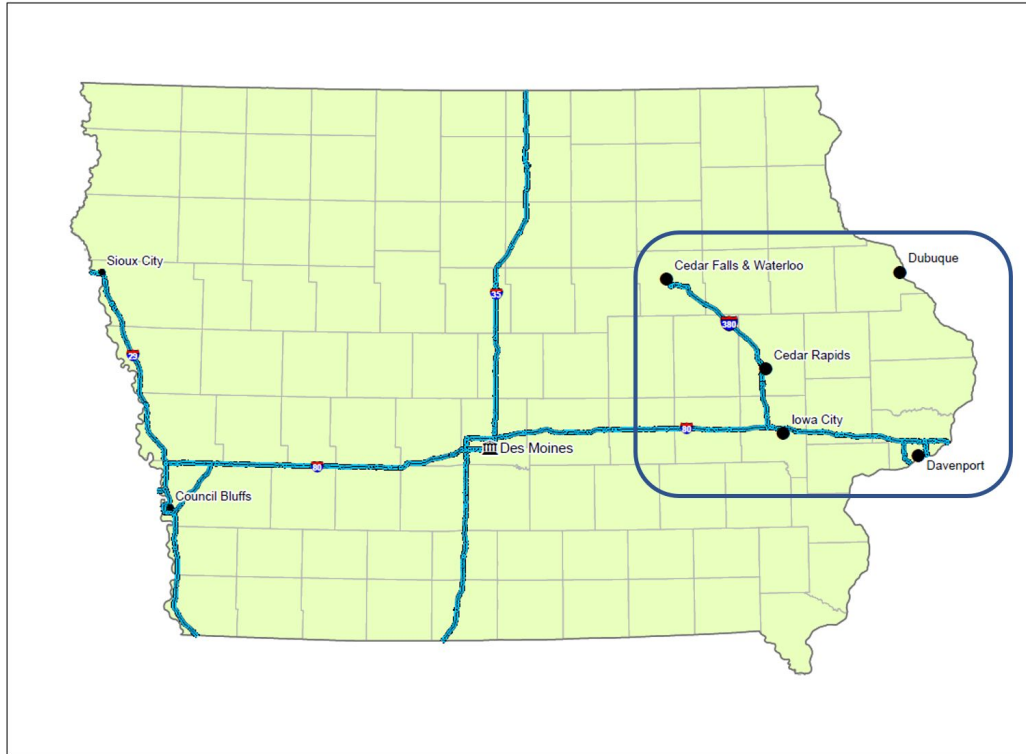
**Thank You**

# Eastern Iowa Electric Vehicle Readiness Plan





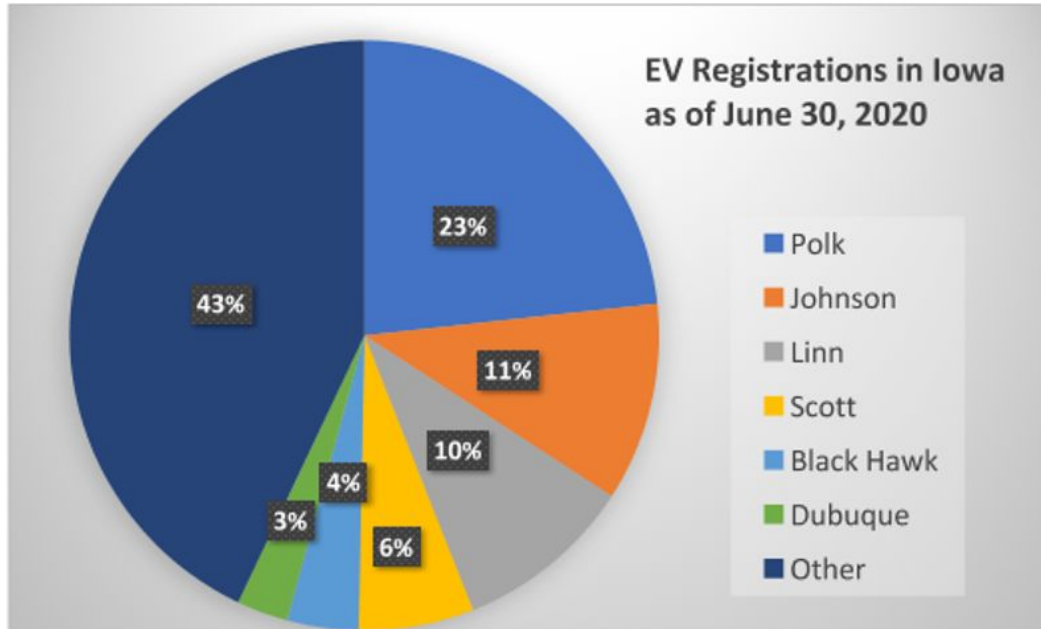
# Study Area & Goals



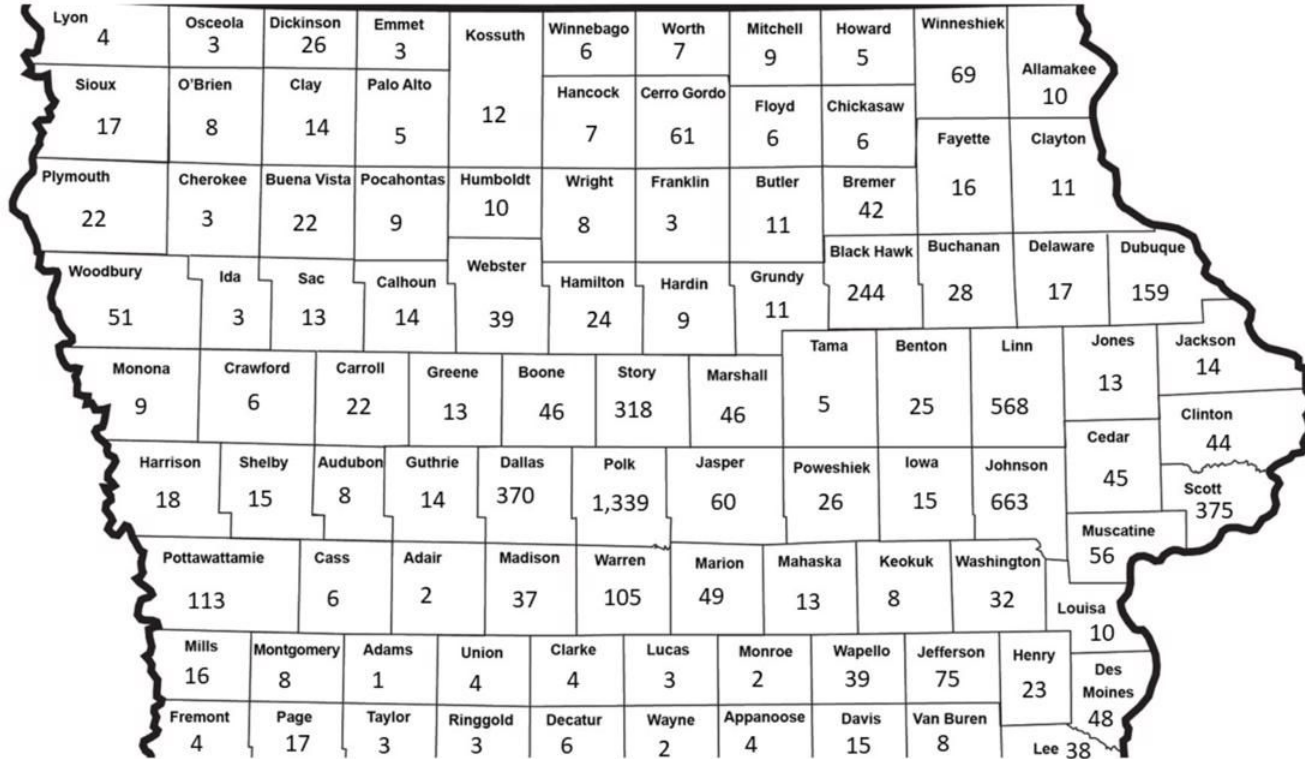
- Increase EV use
- Increase EV charger availability
- Increase equitable access to EVs and charging
- Reduce emissions
- Improve air quality
- Generate economic benefits
- Establish regional collaboration to leverage resources and share learnings

# EV adoption trends in Iowa

- EV ownership has become more widespread throughout the state
- Increase from < 1,000 vehicles to > 8,300 between 2016-2021
- Shifting from PHEVs to BEVs, following national trends



# EV registrations by county



Source: WOI-TV, 2021

# Rapidly increasing EV adoption

- EVs represent 4.4% of the 2021 passenger vehicle, more than doubling sales from 2020
- During this same time, the sales of internal combustion engine (ICE) vehicles declined 1.1%, and total number of vehicle sales declined overall



<sup>1</sup> See, the "[Get Connected: Electric Vehicle Report](#)" for the third quarter.

<sup>2</sup> For the full year 2020, EVs comprised just two percent, or roughly 320,000 of the nation's 14.5 million new light-duty vehicle sales.

# Charging infrastructure in eastern Iowa

City	Population (2019)	Public EV charge points	Charge Points Per Million Population
Cedar Rapids	133,562	26	195
Davenport	101,590	11	108
Iowa City	75,130	29	386
Waterloo	67,328	6	89
Dubuque	57,882	13	225
Cedar Falls	40,536	10	247
Bettendorf	36,543	2	55

- Optimal number of publicly available charge points is 400-450 ports/million people to spur EV adoption



- 25 charge points in QC/383,781 MPA population =
- 65 charge points/million

# Stakeholder input

## Cost

- Action should fit within relevant fiscal parameters and be categorized into high, medium, and low-cost.

## Political & Policy Feasibility

- Action should be evaluated in the context of current administrative and legislative landscapes.

## Equity

- Action should be evaluated based on their impact on low-income and disadvantaged communities.

## Impact on EV Adoption

- Action should reasonably advance transportation electrification and its associated benefits in the region (e.g., economic development, air quality improvements).

## Policy Durability

- Action should be assessed based on its effectiveness on a short, medium, and long-term basis.

## Scalability

- Action should be assessed based on its applicability at the regional level.

## Technical Feasibility

- Action should be evaluated in the context of its practical implementation.

## Timing

- Action should be evaluated based on when the jurisdiction can start implementation (near-, medium-, or long-term).

# Strategies and implementation

## Key Readiness Strategy

**Invest in EV Charging Infrastructure**

**Expand Access to EV Charging Infrastructure**

**Adoption of and Access to EVs**

**Increase Education and Awareness of EVs and EV Charging**

**Coordinate Regionally to Implement Actions and Strategies**

**Lead by Example**

Each strategy includes:

- Lead stakeholders
- Strategies for implementation
- Best practices
- Key performance indicators



# Strategy: Invest in EV infrastructure

## Actions:

### High Priority

- Quantify the need for new publicly available charging equipment to fill gaps at both local and regional level, including DC fast chargers to enable long-distance travel along corridors.

### Medium Priority

- Identify and pursue opportunities to fund city-owned and operated charging infrastructure (available for employee and public use) in high-traffic locations such as parking lots nearby major roadways, retail, and recreational areas.
- Collaborate with external entities (e.g., other government agencies, chambers of commerce, workplaces, businesses) to track and pursue grants for public and workplace charging infrastructure.
- Promote existing utility programs offering rebates for EV charging.





# Strategy: Coordinate regionally

## Actions:

### High Priority

- Integrate EV readiness into regional planning efforts, including regional transportation plans and sustainable communities' strategies.

### Medium Priority

- Engage in state, regional, and national advocacy efforts to support laws, incentives and policies that further EV adoption (e.g., zero-emission vehicle or ZEV mandates, low-income rebates, point of sale vouchers), aligning with other leading cities and complementary regional initiatives.
- Create a regional working group or steering committee to share lessons learned, monitor emerging EV applications and track progress toward EV readiness at the regional level.
- Develop common metrics to track progress on EV readiness at the local and regional level. Monitor and report progress toward EV readiness at the municipal/county level.



Source: <https://iowa80truckstop.com/services-amenities/amenities/ev-chargers/>

# What comes next?

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## **Continued coordination**

- Continued steering committee meetings (quarterly)
- Share funding opportunities, regional coordination, best practices, track progress
- Coordinate events:
  - National Drive Electric Week
  - Fleet manager field trips





## QUESTIONS?

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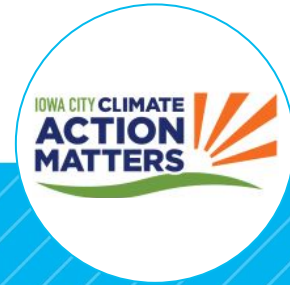
# Questions



Jennifer Hirsch



Mike Doi



Sarah Gardner

# Next Steps & Survey





# Survey

Will be provided to participants



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# Contact Information

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# Networking



Photo by Dennis Schroeder / NREL