ELECTRIC VEHICLES 101

Bronwyn Cooke, Department of Housing and Community Development
Dave Roberts, Drive Electric Vermont

Municipal Day Workshop
October 28th, 2022

Session Overview

Why Electric Vehicles?

Electric Vehicles 101

Electric Vehicle Charging 101

Municipal Roles

Overview of Planning & Installation Resources & Incentives

- more details on this in the afternoon session 2:45-3:45

Why Go Electric?

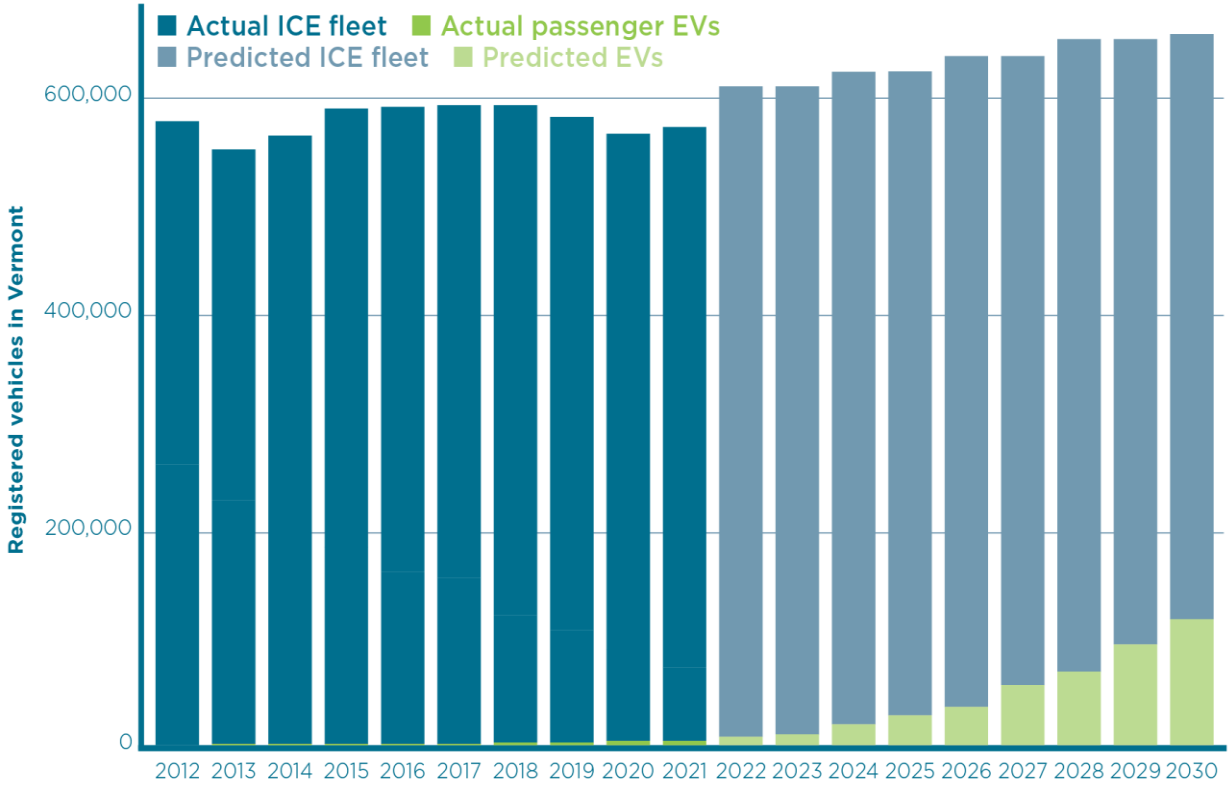
- Reduce emissions
- Driving experience
- Convenient charging at home
- Savings

State Goals – EV

Global Warming Solutions Act EV Adoption Scenarios

- 27,000 PEVs registered by 2025
- 126,000 PEVs registered by 2030

EV registrations: Historical trends and Pathways Analysis projections



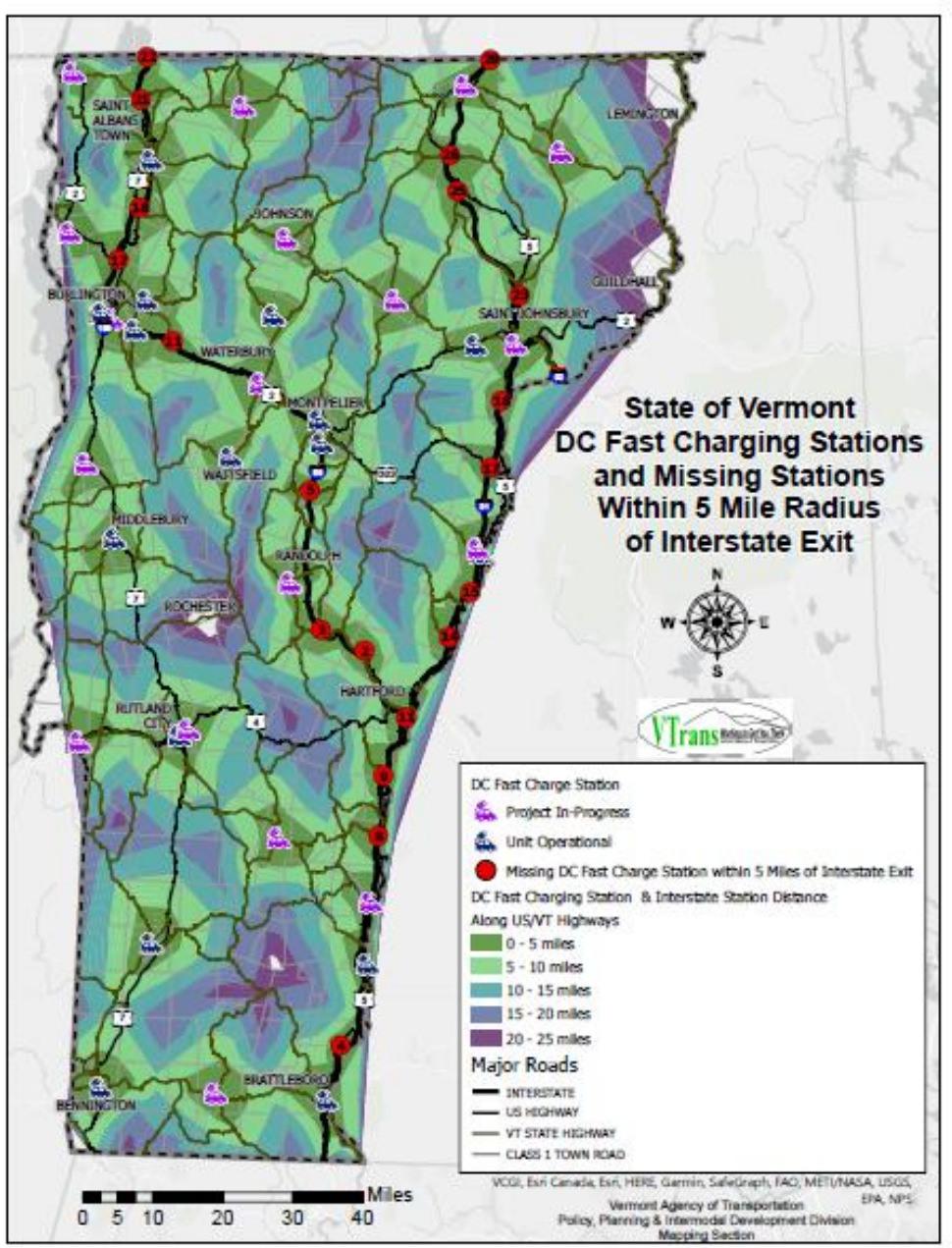
Source: Historic Data: VEIC, VT Agency of Natural Resources, Drive Electric VT; Cadmus/EFG, Vermont Pathways Analysis Report, 2022

ENERGY ACTION NETWORK

State Goals – EVSE

DC Fast Charging (DCFC) along State Highway Network

- DCFC within 1 mile of every interstate exit
- No more than 25 miles to the next DCFC



About Drive Electric Vermont

- Drive Electric Vermont is a public-private partnership established in 2012 by VEIC and the State of Vermont

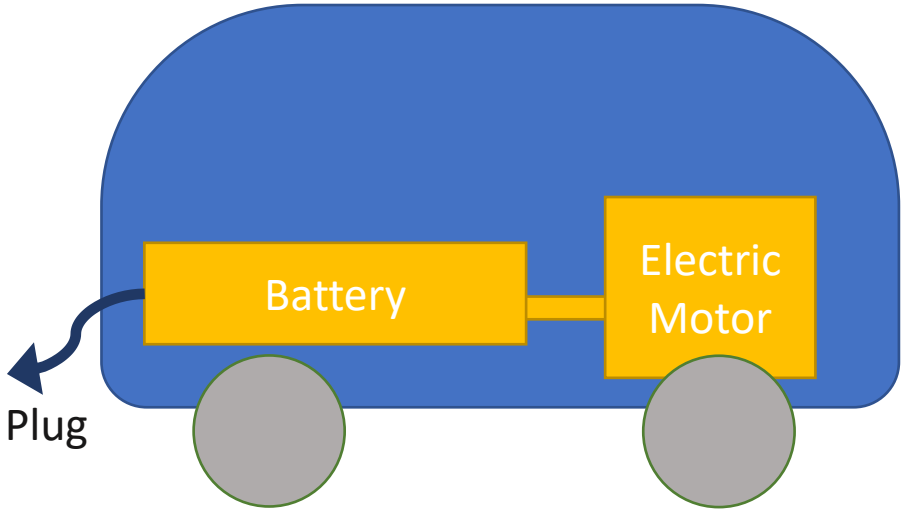
- Working to advance transportation electrification through:
  - Stakeholder coordination
  - Policy engagement
  - Consumer education & outreach
  - Infrastructure development

Drive Electric Vermont

https://www.driveelectricvt.com/

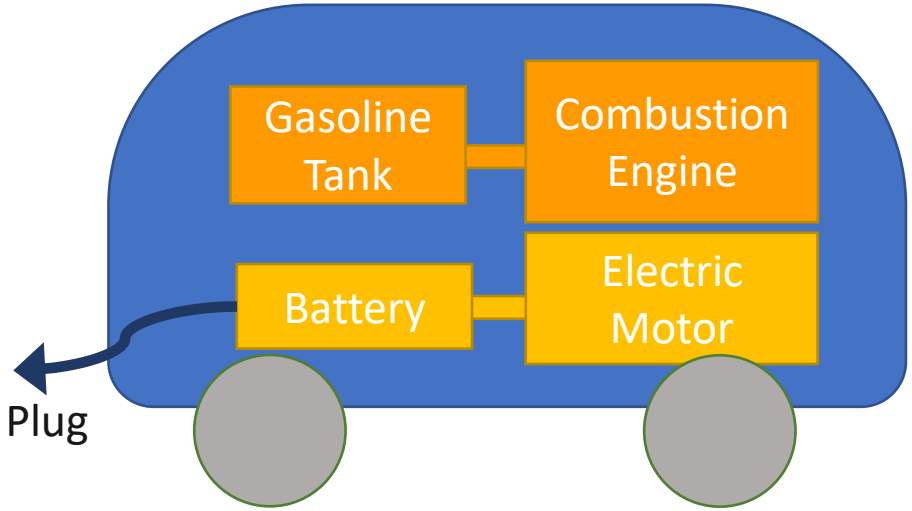
Types of Plug-in Vehicles

All-Electric



70 – 300+ Mile Range on Battery

Plug-in Hybrid



15 – 80 Mile Range on Battery

+

300 or More Miles on Gasoline

Popular EV Models

All-Electric Vehicles

Chevrolet Bolt
260 Miles
$27k+

Tesla Model 3
250-322 Miles
$47k+

Nissan LEAF
150-225 Miles
$27-32k+

Plug-in Hybrid Vehicles

Toyota Prius Prime
25 Miles
$28k+

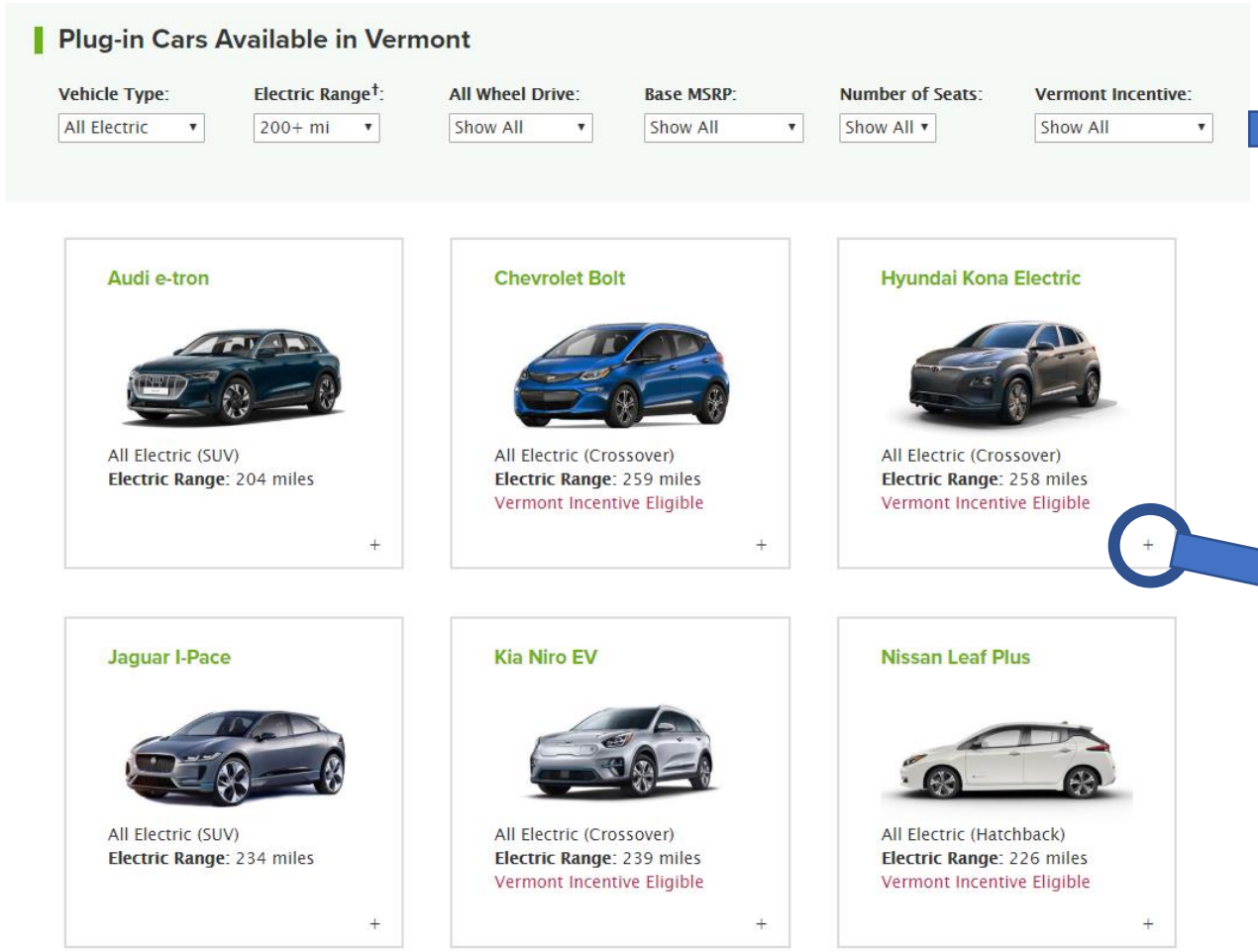
Subaru Crosstrek Hybrid
17 Miles
$36k+

Toyota RAV4 Prime
42 Miles
$40k+

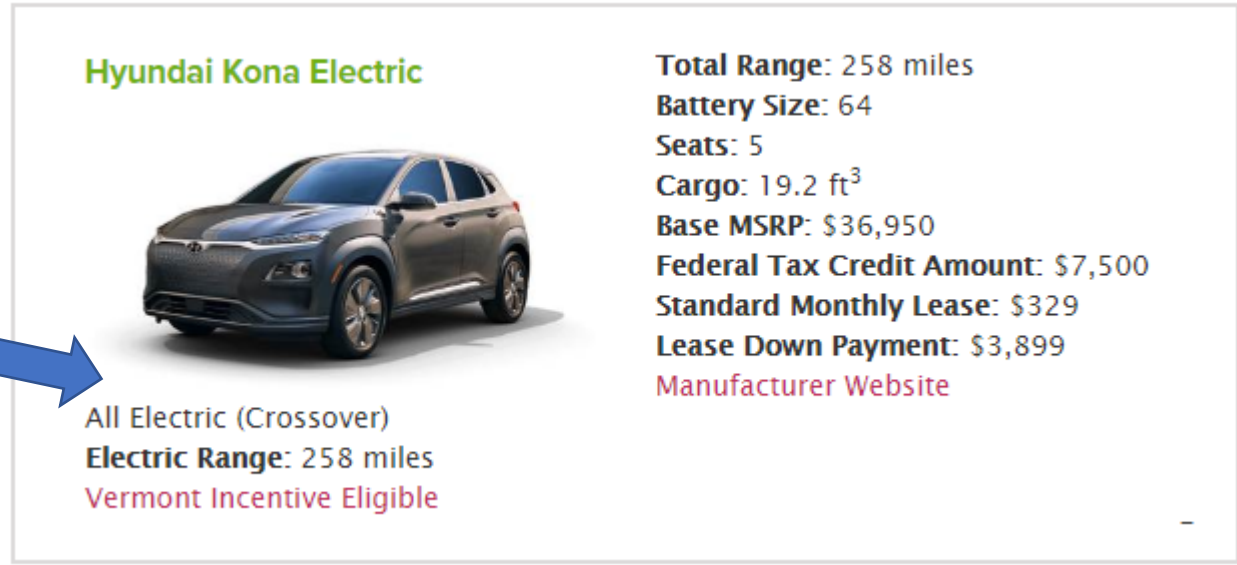
Recent Arrivals and Coming Soon

VW ID.4
250 miles, $41k

Website EV Model Explorer

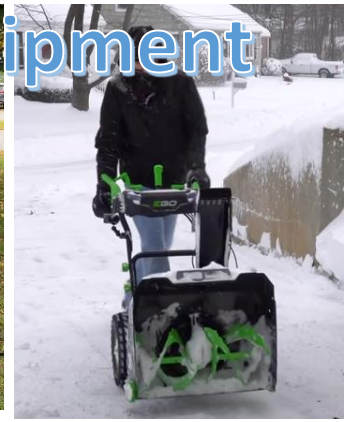


Filters for vehicle characteristics



www.DriveElectricVT.com

Other Electric Options



EVs in Vermont Conditions

- Cold weather reduces electric range 20-50%

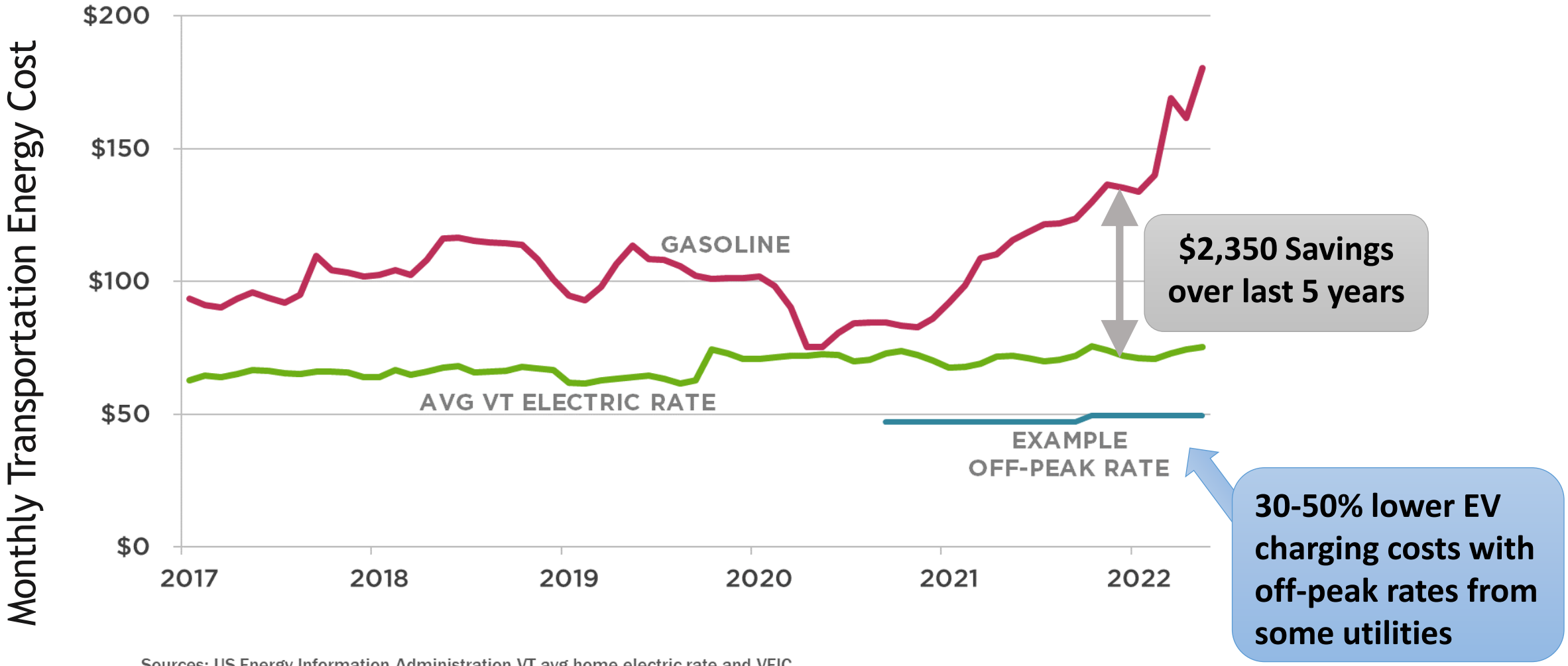
Range Saving Tips

- Cold weather option packages are encouraged (when available)
- Heated seats / steering wheels
- Heat pumps on some EVs
- Preheating
- Drive slower

Other Considerations

- Slower fast charging
- Battery technology advancements

Monthly Energy Cost Comparison



Sources: US Energy Information Administration VT avg home electric rate and VEIC
Assumptions: 25 mpg gasoline vehicle; 3 mile per kWh EV; 1,000 miles per month

https://www.driveelectricvt.com/about-evs/cost-of-ownership

US EIA / VEIC

Total Cost of Ownership Savings

CR Consumer Reports

EVs Offer Big Savings Over Traditional Gas-Powered Cars

- A CR study shows that total ownership cost savings can more than make up for an electric vehicle's typically higher purchase price
- EV Total Cost of Ownership Savings = Fuel Savings + Maintenance Savings - Depreciation
- "Typical total ownership savings over the life of most EVs ranges from $6,000 to $10,000"

AND EV purchase incentives available to Vermonters can boost these savings

https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/

Combined Purchase Incentive Example

	***New* 2022 Nissan LEAF Plus** **226 Mile Range**	
	Standard Incentive	< $50k Income Incentive
Starting Price	$32,400	$32,400
Federal Tax Credit	-$7,500	-$7,500
State EV Incentive	-$2,500	-$4,000
State Replace Your Ride		-$3,000
Utility Incentive (varies)	-$1,500	-$2,500
Price after Incentives	$20,900	$15,400

Charging Basics | Charging Equipment

Level 1 Charging
120V
5 miles range / hr

Level 2 Charging
240V
10-20 miles / hr

DC Fast Charging
480V
150-1,000 miles / hr

EV Charging – Locations and Types

Location	Charge Time	Price	Level	Driver
Long Distance Travel	**Travel 20 min**	$$$$	Fast Charging	Parked
Entertainment/ Shopping/ Recreation	**Public 0.5 – 3 hours**	$$$	L2/DCFC	Parked
Work/Transit Parking/Airport	**Workplace 4 – 8 hours**	$$	L1/L2	Parked
At Home	**Residential 8 – 10 hours**	$	L1/L2	Sleeping Parked

http://opr.ca.gov/docs/ZEV_Guidebook.pdf

Charging Basics | Smart Charging Overview

Networked or Smart Charging

- Equipment is connected to a network service provider (wi-fi, cellular or ethernet)
- Data on use of EVSE is collected, and often available via user-friendly online dashboards
- Supports electronic payment
- Many other features (reservations, and pricing groups)

Non-Networked Charging

- Not connected to network service
- Does not collect data
- Options for charging a fee for use are very limited, don't support a $/kWh fee
  - Donation Box
  - PayPal/Venmo
  - Parking meters / apps
- Lower cost for equipment

Charging Basics | Smart Charging Examples

Plugzio Level 1 Outlet

$600-1,200

No fees first 2 years;
up to $120 thereafter

EV Match Wallbox L2

$650 per unit

+$200/yr per port

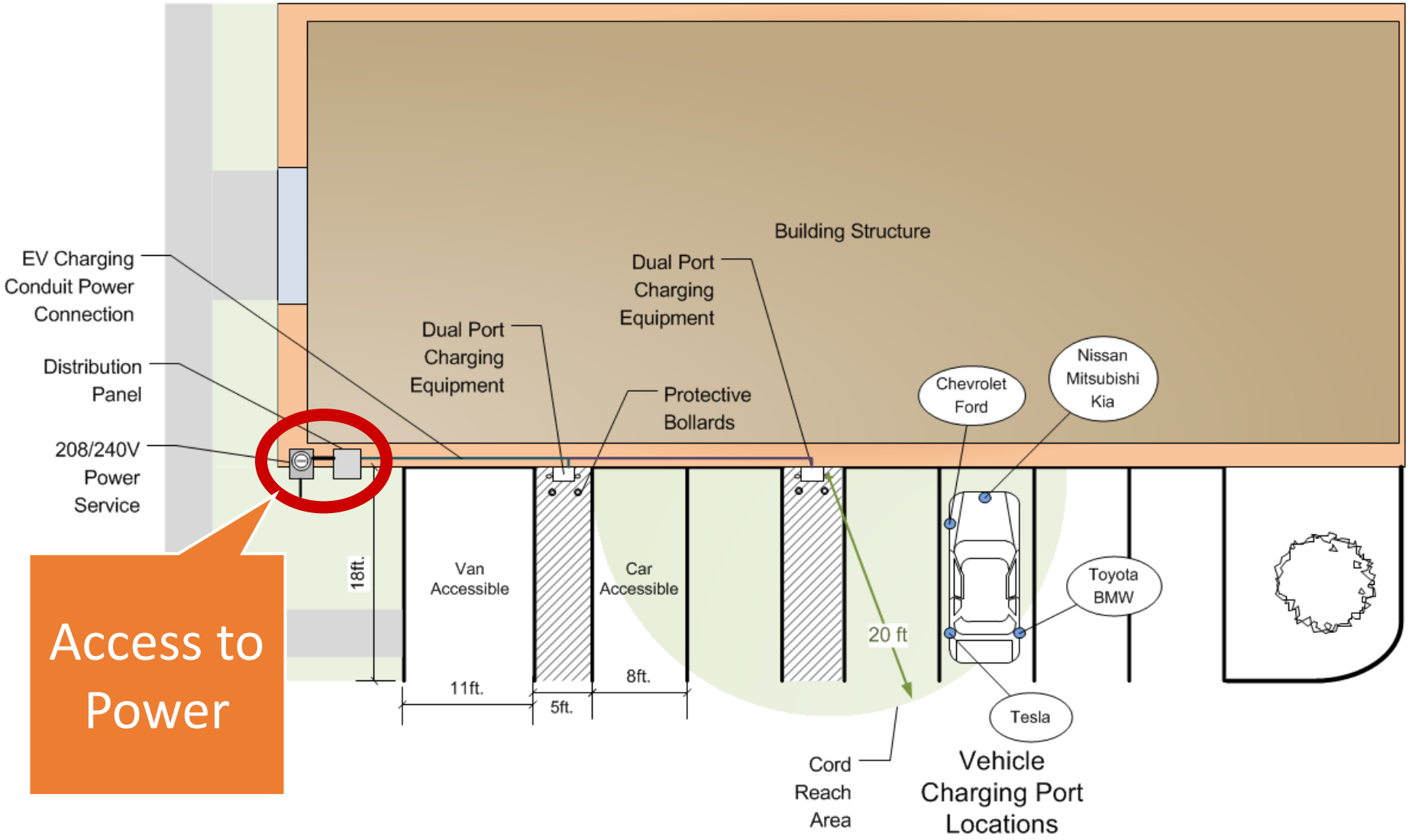
Cord management to keep cables off the ground

Flo Core L2

$3,500 per unit

+$150/yr per port

Charging Basics | Siting



Considerations

- Power
- Futureproofing
- ADA access
- Walkways
- Cell service
- Snow removal

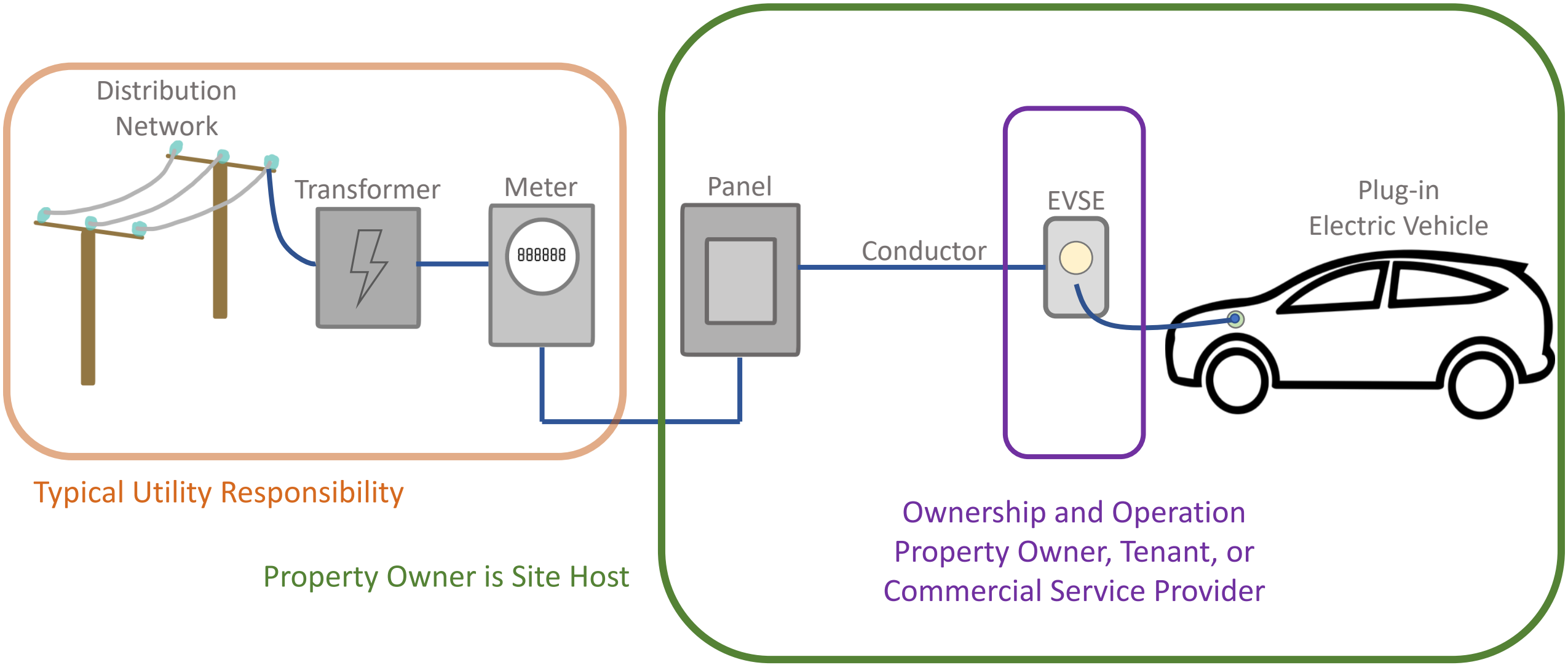
Charging Basics | Capital Costs per Port

	Level 1	Level 2	DC Fast Charging
Equipment Price	$30 - 900	$600 - 9,000	$15,000 - 150,000+
Installation	$200 - 450+	$2,000 - 12,000+	$10,000 - 100,000+
Total Capital Cost	**$230 - 1,350+**	**$2,600 - 21,000+**	**$25,000 - 250,000+**

Charging Basics | Operating Costs per Port

	Level 1	Level 2	DC Fast Charging
Energy	$200 – 800+	$200 – 2,500	$500 - 15,000+
Networking (optional)	$150 - 300	$200 – 400	$200 - 500+
Maintenance	$200 – 400+	$400 - 800	$400 – 10,000+
Total Annual Cost	**$550 - 1,500+**	**$800 – 3,700+**	**$1,100 - 25,500+**

Charging Basics | Utility Role



Municipal Roles | Lead by Example

Municipal Fleets

- Consider EV models when replacing fleet vehicles
- ZEV or “EV First” Fleet Policy
- Fleet Improvement Plan

Municipal Parking

- Make parking spaces in municipal lots available for charging
  - Lease spaces to 3rd party service providers
  - Install and own charging stations

Employee Support

- Provide access to charging infrastructure at work

Procurement/Purchasing

- Preferred purchasing policy

Municipal Roles | Enable EV Charging

ACCD Guidance and model bylaw language (link)

DEFINE IT

- **Define** common terms related to **EV charging** in your bylaws
- *e.g. Electric vehicle supply equipment, electric vehicles, AC charge levels, DC charge levels*

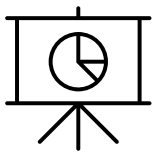
ALLOW IT

- Allow charging stations as an **accessory use** in **all parking**
- Principal use may be appropriate in some cases, as in fueling or service stations

REDUCE SOFT COSTS

- **Allow permit exemptions** or ZA review/don't require planning commission or zoning board review
- Waive local permit fees

Municipal Roles | Planning



Existing and Future Conditions
What types and how many EVs are registered now? Where is there already charging? Who is it serving? Whose charging needs are not met by charging?

Identify key stakeholders….
Parking owners
Large employers
Residents
Utility
Energy Committee

…and talk with them about
Use Cases - match parking dwell times to charging type
Business Models - who can own and operate now, and in the future?
Equity - where charging is needed to meet the needs of those with the least access

Resources

- DEV EV Charging Installation Guide
  - https://www.driveelectricvt.com/charging-installation-guide
- DEV Business and Fleet Incentives
  - https://www.driveelectricvt.com/for-businesses
- DEV Federal EV Tax Credits
  - https://www.driveelectricvt.com/incentives/federal-incentives

- Transportation Services and Tools
  - https://www.efficiencyvermont.com/products-technologies/transportation-efficiency

- Vermont Clean Cities Coalition Fleet Resources
  - https://vtccc.w3.uvm.edu/

Questions and Discussion

Bronwyn Cooke
Community Planning and Policy Manager
Vermont Department of Housing and Community Development
Bronwyn.cooke@vermont.gov

Dave Roberts
Managing Consultant and Drive Electric Vermont Coordinator
Vermont Energy Investment Corporation
droberts@veic.org