

# Your Community Committed to Clean Energy – How to Electrify Your Fleet

June 18, 2020  
2:00 -- 3:00 PM



# Webinar Instructions

- Q & A at end
- Submit questions to “Panelists”
- Scheduled for an hour
- Can go beyond, if interest remains
- Slide handout
- Recording



# Webinar Outline

- Vehicle Fleet Electrification Survey Questions & Results
- Discussion of Obstacles in Survey & Overcoming Them
- Assisting One Another as Peers
- Resources and Best Practices
- Possible Convening on Ongoing Basis



# Organizational Partnership

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- **NC Clean Energy Technology Center** /Rick Sapienza
- **Sierra Club of North Carolina** /Diane Cherry/Cassie Gavin
- **Sustainability Directors Network** /Vanessa King/Meg Jamison



# Local Fleet Survey

- Survey sent to more than 30 local fleet managers and sustainability directors across North Carolina
- Each jurisdiction has a 100 percent renewable energy solution for some future date
- Response rate 30 percent



# Questions Asked

- Is vehicle electrification part of your gov't clean energy plan? Is there a written plan for its implementation?
- What are the top obstacles to electrifying the fleet?
- Is the total cost of ownership part of vehicle purchasing decisions? If vehicle savings are realized, can they be reinvested?
- Is a cross functional team part of guidance and buy in?

# Survey Results

- Vehicle electrification part of your gov't clean energy plan?

Yes – 90 percent

No - 10 percent

- No jurisdiction has a written plan for how to electrify their auto fleet.



# Top Obstacles to Electrification

- Cost Budget
- Lack of Charging Infrastructure
- No Vehicle Model Available
- Concern About Limited Range
- Opposition from Vehicle Fleet Drivers



# Vehicle Purchasing Decisions

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- Total Vehicle Cost of Ownership Considered?

Yes – 100 percent

- Realize Fuel Savings, is Reinvestment Possible?

Yes – 20 percent

No – 80 percent



# Change Management Decisions

- Cross Functional Management Team to Identify, Communicate, and Provide Guidance on Sustainability?

Yes – 40 percent

No – 60 percent



# Overcoming Obstacles

- VW Settlement Funding
- CARES Funding
- Best Practices/Lessons Learned
- NC Clean Tech Center Resources



# Sierra Club's Ready for 100 Campaign



- Ready for 100 is a Sierra Club campaign focused on helping local governments transition to 100% renewable energy starting with a local resolution.
- The vision of 100% clean energy across the U.S. is growing fast: in 2019 alone, 51 cities and towns, 4, plus Puerto Rico and D.C. committed to 100% clean, renewable energy.
- In North Carolina, 26 local governments made the commitment so far and more are working on it.
- After a resolution is passed - planning and funding are key.



# Volkswagen Settlement \$ 92M

- **States may invest 15% in EV infrastructure: acquisition, installation, operations & maintenance of light duty EV equipment including level 1 and 2 DC fast chargers in public spaces, workplaces and multi-unit dwellings.**
- NC Department of Environmental Quality - managing funds.
- NC plan structured in **3 phases**.
- **Phase 1:** 33% of funds (\$30.68M) for public projects. Application deadline passed.
- **\$61.36M still be allocated.**
- **Phase 2 Planning:** It pays to engage in the stakeholder process to determine the application process, how funds will be allocated, and to who.
- States are spending the funds but not NC because of a dispute between the legislature and Governor.
- **Phase 2 stakeholder process delayed** until DEQ begins funding Phase 1 projects, dependent on an appropriation from the legislature.



# Federal Coronavirus Aid, Relief, and Economic Security Act (CARES) Act Funding

- CARES includes \$25B for public transit to prevent, prepare & respond to COVID-19.
- NC transit agencies to receive \$314M.
- Funds are primarily for measures to protect the public and transit workers but if there are leftover funds there may be a possibility to use some for EV transit buses.



# Fleet Pressure to Electrify

- Federal Expenditures—DOE R&D, DOT/FHWA Infrastructure
- Hot Topic for Legislators & Public
- State Level ZEV Plans: 16 states are developing or updating ZEV plans
- Planning activities can be created or required by:
  - Executive Order
  - Legislative Request / Bill / Directive
  - Public Utility Study
  - Multi-State Initiative or MOU

Source: Allison Carr, NCCETC, NC EO80 Presentation March 2019



# State Examples

- NC Executive Order 80 December 2018:  
Goal of 80,000 PEVs by 2025 (from 7,000)
- MD Climate Action Plan January 2019:  
Goal 300,000 PEVs by 2025 (from 10,000)





# Best Practices for ZEV Adoption

1. Statewide ZEV goals
2. Mandates for state fleets
3. Planning for corridors
4. Consumer education & outreach
5. Dealership education
6. Regulation to support infrastructure
7. State financial incentives for vehicles & infrastructure
8. ZEV Taskforce state

Source: Allison Carr & Heather Brutz, NCCETC, White Paper: State Actions & Best Practices in State ZEV Plans, April 2019.



# Automotive Industry Investment/Commitment

- Global cumulative over \$200B (Jan 2019)
- VW \$40B w/ 50 full electric models making up 20-25% of sales by 2025
- Ford \$11B w/ 40 electrified (EV, PHEV and Hybrid) models by 2025
- GM 20 different EV models by 2023
- Hyundai \$17B to electrify most new models by 2025



**William Clay Ford Jr.,  
Executive Chairman of  
Ford Motor Company,**

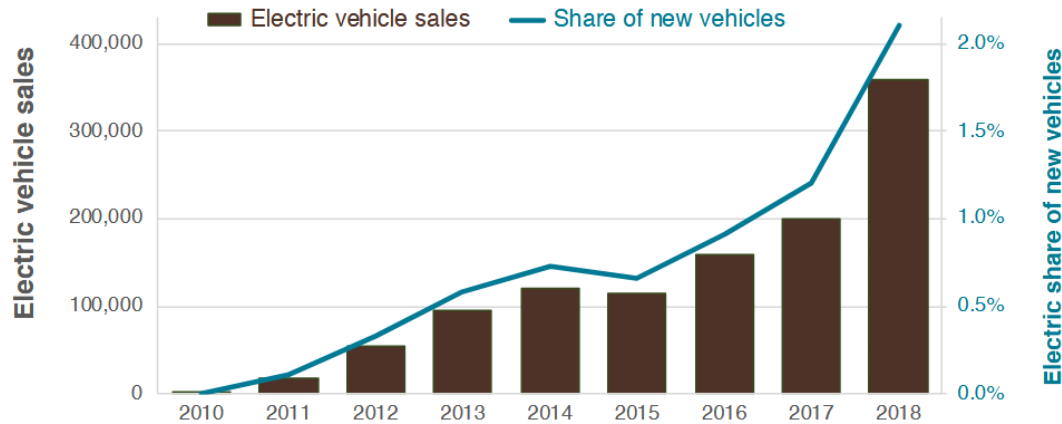
*“We’re all in. The only question is, will the customers be there with us?”*

Source: <https://www.reuters.com/article/us-autoshow-detroit-electric/global-carmakers-to-invest-at-least-90-billion-in-electric-vehicles-idUSKBN1F42NW>

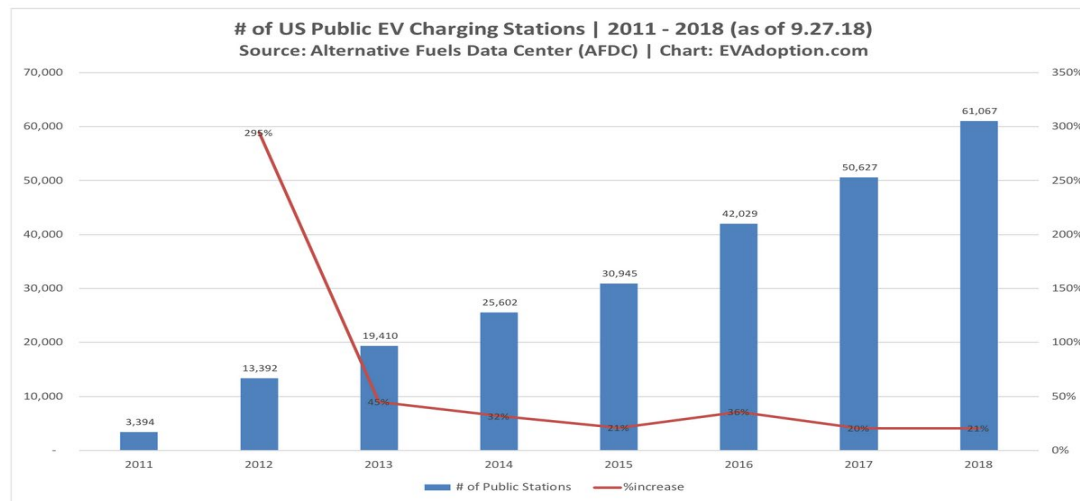
# Electric Vehicle Benefits

- Performance and reliability
- Efficiency (EV 90% vs. ICE 25%)
- Lower maintenance (brakes, fluids, no exhaust system, no starter, no transmission, no spark plugs, no catalytic converter . . .)
- Low operating costs (2.5-3.0 cents/mile)
- Zero tail pipe emissions
- Energy independence
- Fuel diversity

# Growth in EV Adoption and Infrastructure



Number of Public Charging Stations (Outlets) in the US – 2011-2018



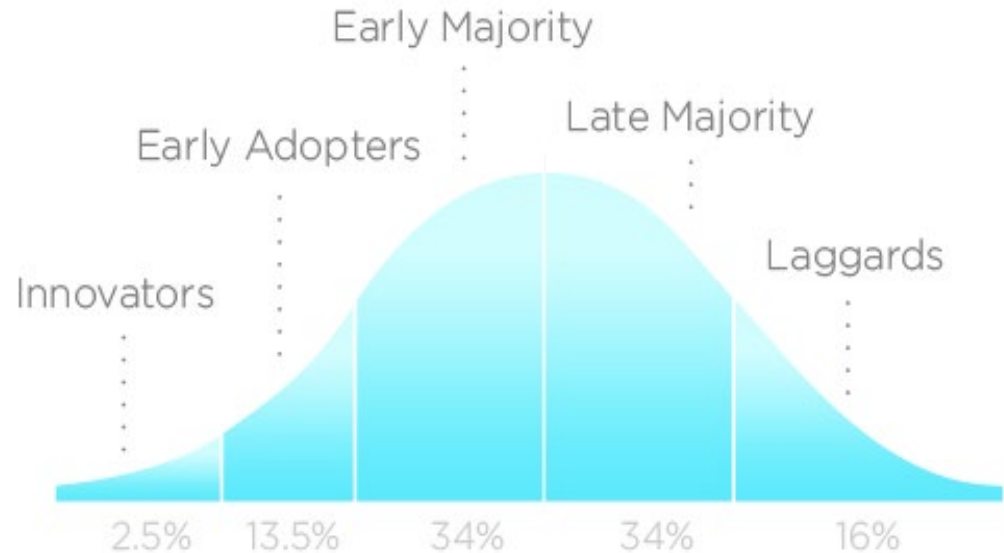
# Technology Adoption Curve

## Microwave Oven:

- 1<sup>st</sup> commercial microwave 1947
- 9 of 10 kitchens in US 1997

## HEV/EV History:

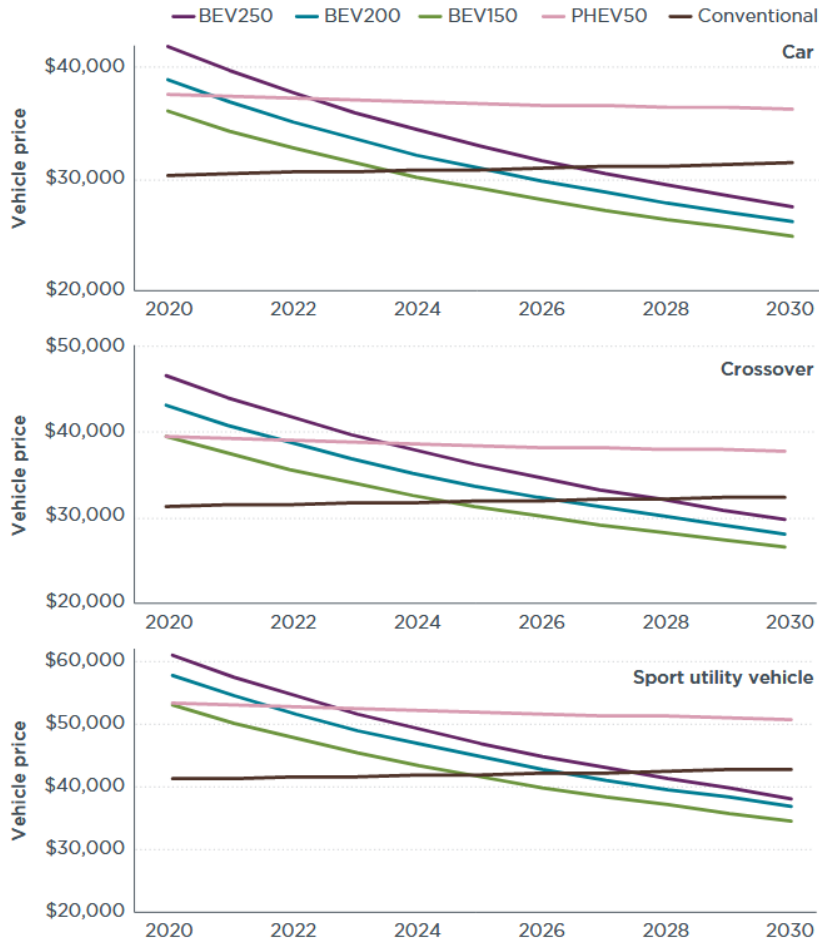
- GM EV1 1996
- Nissan Altra EV 1998
- Prius HEV 1997, US 2000



INNOVATION ADOPTION LIFECYCLE

Source: <http://www.historyofmicrowave.com/microwave-history/microwave-oven-history/>  
and [https://en.wikipedia.org/wiki/Early\\_adopter](https://en.wikipedia.org/wiki/Early_adopter)

# Initial Purchase Price: Conventional vs EVs



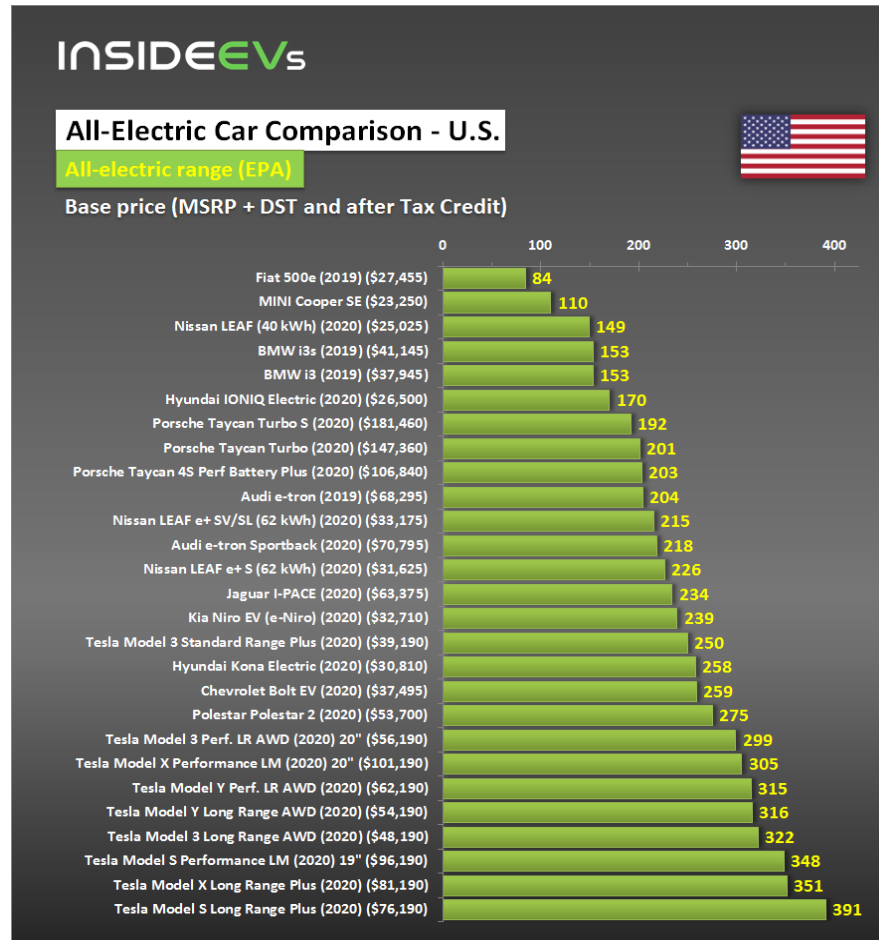
- Price parity 2024-2029
  - Economies of scale
  - Technology advances

Source: [https://theicct.org/sites/default/files/publications/EV\\_cost\\_2020\\_2030\\_20190401.pdf](https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf)





# EV Ranges Increasing/Battery Cost Decreasing



Source: <https://insideevs.com/compare-plug-ins/>

# Electric Pickups Coming Soon



Source: <https://www.motortrend.com/news/electric-rodeo-we-round-up-the-upcoming-ev-pickup-trucks/>

# Electric Low Speed Applications/Options



# MD/HD Electric Options Growing



# Electric Vehicles Here and More Coming



# Question w/ Adopting An Alternative Fuel

- Is there fuel access? Can I/how do I get fuel when I need it?



# US Charger/Connector Types

	120V cordset with SAE J1772 standard connector comes with all electric vehicles except Tesla. The J1772 connector plugs into the car; the other end plugs into a three-prong outlet.	Level 1	1.4kW
	SAE J1772 standard connector used with charging station.	Level 1 Level 2	3.3kW – 19.2kW
	SAE Combo connector used with American and European cars that are fast-charging capable.	DC Fast Charge	30kW – 100kW
	CHAdeMO connector used with Asian cars that are fast-charging capable.	DC Fast Charge	30kW – 50kW
	Tesla connector used only with Tesla Model S and Model X.	Level 2	10kW – 20kW
		Supercharger	Up to 145kW

# Miles per Charging Time

Charging Types Summary		
	Charging Rates	
<b>Level 1</b>	4 to 5	miles per hour
<b>Level 2</b>	11 to 60	miles per hour
<b>DC Fast</b>		
<b>25kW</b>	22.5	miles per 15 minutes
<b>50kW</b>	45	miles per 15 minutes
<b>120kW</b>	108	miles per 15 minutes
<b>150kW</b>	135	miles per 15 minutes
<b>350kW</b>	315	miles per 15 minutes
<b>400kW</b>	360	miles per 15 minutes

Sources: <https://www.fleetcarma.com/electric-vehicle-charging-guide/>  
<https://evobsession.com/electric-car-charging-101-types-of-charging-apps-more/>  
<https://insideevs.com/what-are-the-power-limits-of-available-dc-quick-charging-standards/>  
<https://www.caranddriver.com/news/1800-miles-per-hour-ultrafast-charging-tech-moving-far-faster-than-anticipated>  
<https://plugincars.com/first-150-kw-fast-charging-station-opens-tesla%e2%80%99s-backyard-132652.html>  
<https://www.firstenergycorp.com/content/dam/customer/get-help/files/PEV/guide-to-ev-charging.pdf>





# EVSE Fleet Considerations

- Future proof:
  - Ability to easily expand
  - Next generation higher power (L2 50-60 amp)
  - Site preparation for future
- Asset utilization:
  - Share with other departments/towns
  - Make available to public
  - Platooning
- Smart (networked) vs. Dumb Chargers
- De-rate chargers to avoid expensive panel and power upgrades
- Power needs, upgrade requirements and timing
- Use level 1 (add 120V outlets)
- Chargers reach/service multiple spaces
- Utility rates and smart charging to minimize costs

# Organizational Change

Requires:

- Goal/Vision
- Planning and action
- Communication and understanding
- Involvement and buy-in across organization
- Training and support
- Celebration and incentives—moral/momentum

Examples of Errors:

- LA PD 228 vehicles (160 all electric)
- City of Indianapolis 425 Chevy Volts
- Charlotte Airport Electric Transit Buses



# “SMART CHARGERS”

EVSE ELECTRIC VEHICLE SERVICE EQUIPMENT



## NETWORKED

WIFI or cellular connection required.

## PAYMENT

Capable of accepting credit card or RFID card payment. (when used for public access)

## DATA COLLECTION

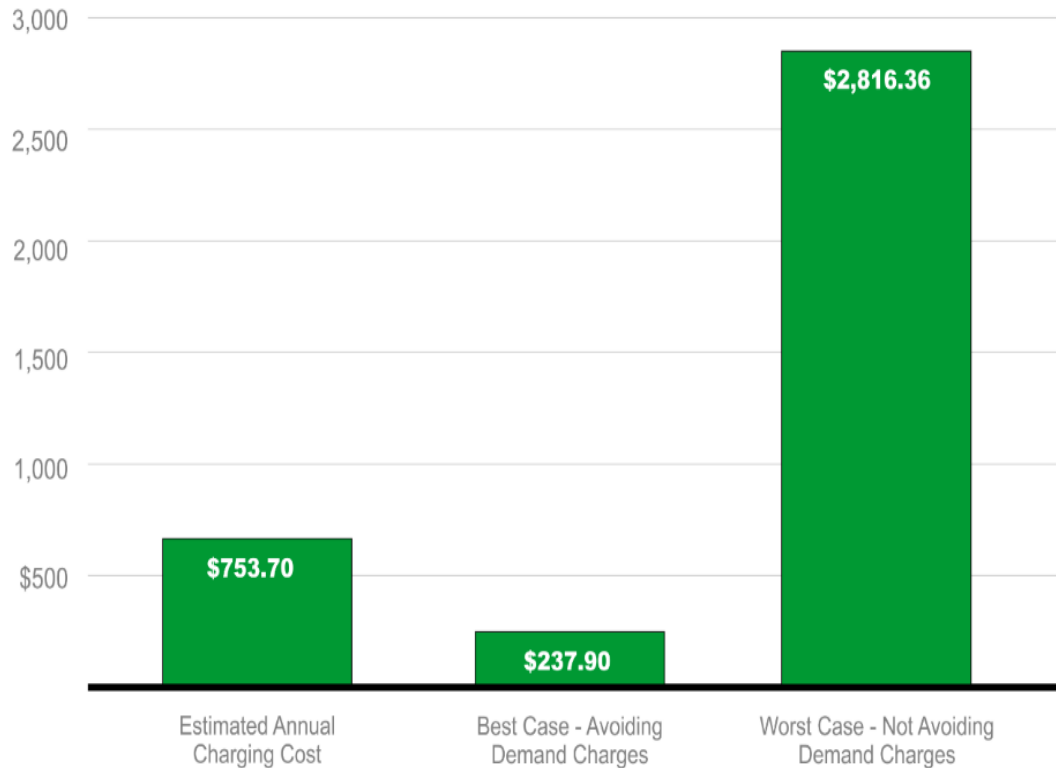
Track information on usage, meter, driver, etc.

## CONSIDER YOUR GOALS

When choosing between Smart vs. Non-Networked charging – what information do you need to be successful?

# EV Charging and Demand Charges

### EV Annual Charging Cost Scenarios



Avg. /yr.  
**\$753.70**

Avoiding Demand  
Charges **\$237.00**

Not Avoiding  
Demand Charges  
**\$2,816.36**

Source: "Managing EVs (and Energy) in Fleets," Phillip Kobernick, Alameda County, CA Green Summit, April 2017



## Electric Vehicle Charging

## Cost Savings

As just noted, the EVMC can reduce cost of power facilities by **up to 50% or more**.

**The "more" is a function several factors:**

What type of vehicles are being charged? How far is it from the panel to the charging stations? Is trenching needed? If so, under concrete? Is there room in the existing panel for more connections?

The EVMC also **reduces the "peak" charges** assessed by electrical utilities.

**Peak Charge Savings:**

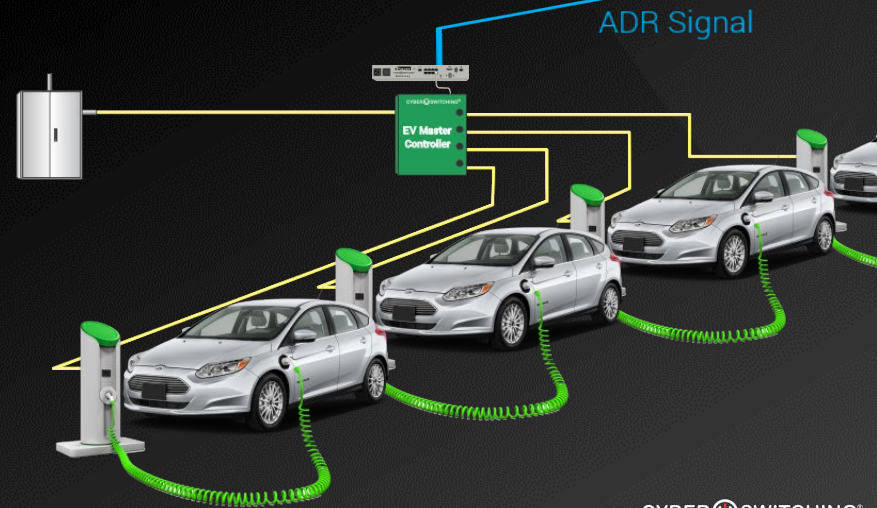
The actual savings varies, but a standard peak charge billing structure for commercial buildings take a normal charge **from 22 cents to over 15 dollars a kilowatt hour**.

The EVMC is designed to respond to **Auto Demand Response**, and will cut power automatically.

Customers utilizing ADR capable systems can be paid utility incentives (or avoid costly penalties).

**PG&E ADR Incentives:**

Technology Category	Incentive Rate (\$ per kW of load shed)
Automated Demand Response	\$200
Advanced Technology HVAC/R	\$350
Advanced Technology Lighting	\$400





## SOLAR EV CHARGING



# How to Fund/Accomplish Electrification

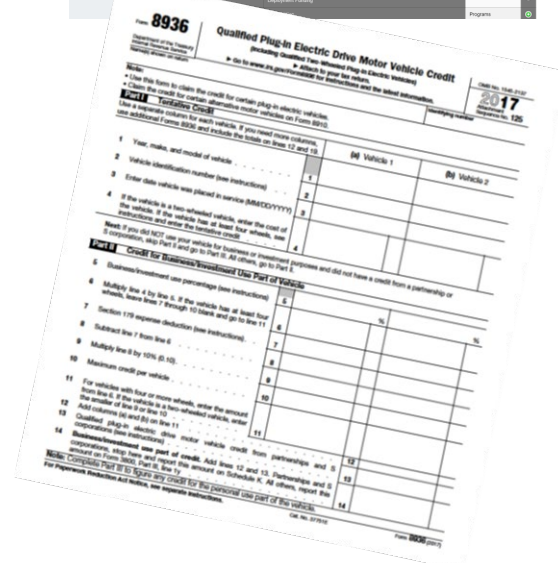
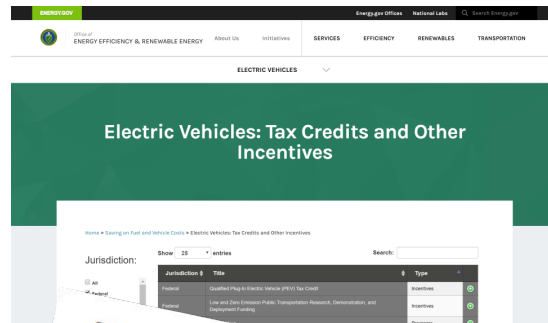
- Private companies: ChargePoint, ABB, Clipper Creek, Electrify America, . . .
- VW Settlement Mitigation Fund
- CMAQ funding/NC CFAT (infrastructure)
- State funding and tax credits (currently 31 states)
- Public private partnerships—Northeast EV Network, the West Coast Electric Highway, Washington State EV Action Plan, . . .
- Cooperatives—Sourcewell, National Cooperative Buying Alliance, Fleets for the Future
- Leasing strategies—cash flow, Federal rebate
- Purchase strategies—lease, buy, used/resale market

# Federal Tax Credits of up to \$7,500/vehicle Are Available

For the purchase of electric vehicles.

Unfortunately, these credits only have value to taxable entities.

Most Leasing and Fleet Management Companies (FMC's) do not offer a mechanism to allow non-taxable clients to realize the benefit of these credits.





# Take Advantage of Federal EV Tax Credits

Offers a lease structure that provides municipal and other tax-exempt client/partners the ability to monetize a significant portion of these tax benefits while still complying with their existing contracting and sourcing restrictions.

By sharing available tax credits with a leasing company, municipalities, school districts, private foundations, non-profits, and other tax-exempt entities can fulfill green goals and initiatives at the lowest possible cost.



# General Comments

- PEVs are real and a viable transportation option
- EVSE network is critical for wide scale adoption
- “Perceived range anxiety” is an obstacle
- Rate and time of growth is uncertain
- Going to take a combination of awareness and motivation generation through education, policy, incentives and collaboration
- Moving target with rapid technology changes
- Largest obstacle to overcome is human nature to resist change
- Level 1 charging has its place

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