Connecticut Department of Energy and Environmental Protection
Electrification for Air Quality Challenges

Counties with Ozone Violations in 2017 Ozone Season

- Violating the 2015 Standard (70ppb)
- Violating both the 2015 Standard (70ppb) and the 2008 Standard (75ppb)

Mobile Sources account for **67%** of all NOx emissions in CT (on-road and non-road)

NOx Data: 2014 National Emissions Inventory (NEI)
EV drivers in Connecticut

• Regulatory
  – California LEV, ZEV, and GHG rules
  – Connecticut is a “CAA sec. 177” state

• Regional
  – Multi-State ZEV MOU
  – Eight states; 3.3 Million ZEVs by 2025

• Statutory
  – Connecticut Global Warming Solution Act targets
LEV Program Structure and Goals

- Requires conventional vehicles to meet fleet average emission requirements
- LEV III standards will bring vehicles 73% cleaner than 2004 vehicles by 2025

- Requires manufacturers to bring advanced technology vehicles to market
- Complicated but flexible compliance framework
- Active regulatory schedule with CARB set to revisit post 2025 ZEV targets

- Requires fleet average CO2g/mi requirements to reduce gasoline use and decrease GHG emissions
- Harmonization between California and Federal GHG and NHTSA fuel mileage requirements a result of 2013 negotiations now on hold pending recent EPA/FHWA proposed rules
How ZEV Works

**Goal:** to bring about the commercial viability of advanced technology vehicles

**Requirement:** Deliver for sale a certain percentage of advanced technology vehicles to CT each year as a percentage of their total fleet delivery

- Vehicles can be of two categories:
  - Zero Emission Vehicles (battery electrics, FCEV)
  - Transitional (TZEV), plug-in hybrid vehicles

- Vehicles delivered for sale earn credits based on technology factors (vehicle range, time to fuel/charge, etc.)
What the Requirement Looks Like

<table>
<thead>
<tr>
<th>Model Years</th>
<th>Total ZEV Percent Requirement</th>
<th>Minimum ZEV floor</th>
<th>TZEVs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>4.5%</td>
<td>2.0%</td>
<td>2.5%</td>
</tr>
<tr>
<td>2019</td>
<td>7.0%</td>
<td>4.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>2020</td>
<td>9.5%</td>
<td>6.0%</td>
<td>3.5%</td>
</tr>
<tr>
<td>2021</td>
<td>12.0%</td>
<td>8.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>2022</td>
<td>14.5%</td>
<td>10.0%</td>
<td>4.5%</td>
</tr>
<tr>
<td>2023</td>
<td>17.0%</td>
<td>12.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td>2024</td>
<td>19.5%</td>
<td>14.0%</td>
<td>5.5%</td>
</tr>
<tr>
<td>2025</td>
<td>22.0%</td>
<td>16.0%</td>
<td>6.0%</td>
</tr>
</tbody>
</table>

- The total ZEV % requirement is the % of the delivered fleet of vehicles each year that must be ZEV vehicles.
- Manufacturers get a small number of credits for very clean conventional vehicles; the “Minimum ZEV floor” is the number of vehicles that must be ZEV vehicles (Battery electric), and the TZEVs are those that must be Plug-in Hybrid Electric Vehicles.
Why it Works for Manufacturers

- Utilizes a web-based reporting platform (ZEV CRDTs system courtesy of California)
  - Both manufacturers and state administrators have accounts
- Manufacturers report credits from vehicles delivered for sale to a state
- State administrators review/approve and QA/QC credits
- Manufacturers may then use those credits to meet yearly obligations and bank excess credits for use in later years
## Challenging Electrification Targets

### Electrification of Passenger Vehicles

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>45% below 2001 levels by 2030</td>
<td></td>
<td></td>
</tr>
<tr>
<td># of ZEVs</td>
<td>500,000</td>
<td>2,610,000</td>
</tr>
<tr>
<td>% of Fleet</td>
<td>20%</td>
<td>95%</td>
</tr>
<tr>
<td>% of Sales</td>
<td>56%</td>
<td>100%</td>
</tr>
</tbody>
</table>

### Heavy-duty Vehicle Electrification

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Commercial Trucks and Transit Busses</td>
<td>30%</td>
<td>80%</td>
</tr>
<tr>
<td>School Busses &amp; Refuse Trucks</td>
<td>30%</td>
<td>80%</td>
</tr>
<tr>
<td>Single Unit Short Haul Trucks</td>
<td>35%</td>
<td>80%</td>
</tr>
</tbody>
</table>

### Passenger and Freight Rail Electrification

<table>
<thead>
<tr>
<th></th>
<th>2030</th>
<th>2050</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger</td>
<td>45%</td>
<td>95%</td>
</tr>
<tr>
<td>Freight</td>
<td>45%</td>
<td>95%</td>
</tr>
</tbody>
</table>
ZEV Memorandum Of Understanding

- Signed by CT and 7 other states in 2013
- Established 2025 ZEV sales goals based on GHG reduction targets
- Some states viewing ZEV targets now through lens of better than expected range
Multi-state ZEV Action Plan 2018 update

- New Jersey Joined the 8 other states in 2018
- New 2018-2021 plan presents five priority strategies and actions for states, OEMs, dealers and other key stakeholders
  - Consumer Education and Outreach
  - EV and H₂ Fueling Infrastructure
  - Consumer Purchase Incentives
  - Light Duty Fleets
  - Dealerships
NE Strategy for EV Charging Infrastructure

• Northeast corridor states from DC to Maine released 2018-2021 regional strategy on EV charging infrastructure

• Strategy addresses:
  – Overarching issues such as electricity rates, interoperability, signage, etc.
  – Specific roles and priorities for charging use cases such as charging at home, work, around town, etc.
  – Development of a branding initiative to promote the NE regional charging network and increase EV awareness
Drive Change. Drive Electric.

• Public-private partnership between auto mfrs. and Northeast states to advance consumer awareness, understanding, consideration and adoption of all EVs

• Media campaign showcases the convenience, affordability, technology, sustainability and power performance of EVs

• Encourages the public to test drive EVs through media and ride and drive events
EVConnecticut Charging Station Grants

- Focused on Municipal and Business locations
- Accessible to all Connecticut residents at no cost

2013-2017 Highlights:

- $1.08 Million Allocated
- Over 200 Level 2 Chargers Installed
- 336 Charging Outlets/Plugs

Pie chart showing:
- Municipal: 192 outlets, $674.6K
- Private: 65 outlets, $104.2K
- State: 79 outlets, $304K
CT’s EV Charging Infrastructure

CT is Range Confident!

<table>
<thead>
<tr>
<th>Level</th>
<th>Stations</th>
<th>Plugs</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVEL 1</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>LEVEL 2</td>
<td>613</td>
<td></td>
</tr>
<tr>
<td>DC FAST</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>TESLA</td>
<td>82</td>
<td></td>
</tr>
</tbody>
</table>

CT public EV charging station data from US DOE Alternative Fueling Station Locator, February 5, 2019

With more stations coming online everyday
The Network is Growing!
CHEAPR Leading the Charge!

“Connecticut boasts what we believe is the most comprehensive EV consumer rebate program in the country.”

Gina Coplon-Newfield
Director of Sierra Club’s Electric Vehicles Initiative

“First state in the country to offer rebates on advanced technology vehicles that are applied when the car is purchased.”

Sarah Shelton
hybridcars.com

Connecticut Department of Energy and Environmental Protection
CHEAPR Overview

CHEAPR provides the consumer with “money on the hood” and the dealer receives an incentive for selling an EV.
### CHEAPR Eligible Vehicles

**An Eligible Vehicle under CHEAPR...**

...must be a **new** Battery Electric Vehicle (BEV), Plug-in Hybrid Electric Vehicle (PHEV) or Fuel Cell Electric Vehicle (FCEV)

...must have an MSRP **under $50,000**

...must be **highway capable**

Not Eligible: Aftermarket EVs and conversions, scooters, ATVs, neighborhood vehicles, electric motorcycles

<table>
<thead>
<tr>
<th>Model</th>
<th>MSRP (in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMW i3</td>
<td>36,440</td>
</tr>
<tr>
<td>Chevrolet Spark EV</td>
<td>20,900</td>
</tr>
<tr>
<td>FIAT 500e</td>
<td>23,900</td>
</tr>
<tr>
<td>Ford Focus Electric</td>
<td>20,400</td>
</tr>
<tr>
<td>Kia Soul EV</td>
<td>16,900</td>
</tr>
<tr>
<td>Mercedes Benz B-Class Electric</td>
<td>25,000</td>
</tr>
<tr>
<td>Mitsubishi i-MiEV</td>
<td>24,000</td>
</tr>
<tr>
<td>Nissan LEAF</td>
<td>16,900</td>
</tr>
<tr>
<td>smart ED</td>
<td>17,600</td>
</tr>
<tr>
<td>Volkswagen e-Golf</td>
<td>24,200</td>
</tr>
</tbody>
</table>

Connecticut Department of Energy and Environmental Protection
CHEAPR’s Impact

CHEAPR has issued 4,230 EV rebates since May 2015 and 36% of those have been full battery EVs.

Best Selling BEVs

<table>
<thead>
<tr>
<th>Model</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tesla Model 3</td>
<td>570</td>
</tr>
<tr>
<td>Chevrolet Bolt</td>
<td>456</td>
</tr>
<tr>
<td>Nissan Leaf</td>
<td>311</td>
</tr>
</tbody>
</table>

Best Selling PHEVs

<table>
<thead>
<tr>
<th>Model</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chevrolet Volt</td>
<td>826</td>
</tr>
<tr>
<td>Toyota Prius Prime</td>
<td>687</td>
</tr>
<tr>
<td>Honda Clarity PHEV</td>
<td>372</td>
</tr>
</tbody>
</table>

Data as of January 15, 2019

Connecticut Department of Energy and Environmental Protection
Rapid EV Growth in CT

Monthly EV Market share by Model

Launch of CHEAPR

Chart based on IHS cumulative sales data through August 2018

Connecticut Department of Energy and Environmental Protection
CHEAPR Website

www.EVconnecticut.com

- Detailed interactive CHEAPR program statistics are updated monthly

- Dealer or consumer can check real-time available funding at any time on the CHEAPR website
EV Ride & Drive Events

- Educates consumers about the benefits and cost of EVs
- Plug-in America and DEEP participated in 3 EV Ride & Drive events in 2018

Surveys have shown that more than 85% of ride and drive participants left with a better opinion of EVs!
Northeast Retail H₂ Stations Network

H₂ Stations Covering the Northeast

- Network of 12 Stations
- Start-up over Q4 2017-Q1 2018
- Dedicated H₂ supply chain by
- Project in collaboration with

New York
Bronx
Hempstead
Brooklyn
Site Location TBA

Connecticut
Hartford

Massachusetts
Braintree
Mansfield
Two others TBA

New Jersey
Lodi
Whippany

Rhode Island
Providence

Air Liquide, world leader in gases for industry, health and the environment
Why Hydrogen?

- Conventional range and refueling times
- Zero tailpipe emissions
- Reduced GHGs compared to gas vehicles*
- Cold weather “penalty” on par with gasoline
- Viable for SUVs and AWD favored by CT’s drivers
- Economically viable
- As safe and easy to fuel as gasoline
- Potential for local H₂ and H₂ from renewables

H₂ Fueling Station Program

DEEP continues to pursue the development of a retail hydrogen fueling station in the New Haven Area.

- Located within 8 miles of the I-91/I-95 interchange in New Haven
- Compliance with SAE Standards for: Station Dispensing, Station to Car Communication, Nozzles, Fuel Quality
- 200 kg avg. daily capacity with the ability to handle back to back refills

Connecticut Department of Energy and Environmental Protection
VW ZEV Investment – “Electrify America”

- Appendix C of VW Settlement
- Electrify America is solely responsible for every aspect of selecting the national ZEV investments but is eager for success
- EA must spend $1.2 billion outside CA and at least $300 million every 30 months
VW Electrify America Cycle 1

• Cycle 1 National ZEV Investment Plan
  – 30 Month Cycle (January 2017-June 2019)
  – Multistate Network of **150- to 350-kW** DC Fast Chargers
  – Installing **2,500 chargers** at 450 sites in 38 states

• Connecticut Focus
  – Prioritization of charging on I-95, I-84, I-91

**Now Open!**
Stratford Square, Stratford, CT (8 outlets)
Waterford Commons, Waterford, CT (6 outlets)

**Coming Soon!**
Sam’s Club, Wallingford, CT
VW Electrify America Cycle 2

- **Cycle 2 National ZEV Investment Plan**
  - Released February 4, 2019
  - 30 Month Cycle (July 2019-December 2021)

- **Investments center on two core areas:**
  - ZEV Fueling Infrastructure ($235M)
    - Metro Community Charging, Highways and regional routes, Autonomous Vehicle Charging, and Renewable Generation
  - ZEV education, awareness and marketing ($65M)
VW Electrify America Cycle 3

- **Cycle 3:** Proposals and feedback always accepted regardless of planning cycle – No deadline yet

- **Project Specifications:**
  - Shovel ready opportunities and sites
  - Projects that request large banks of chargers/location
  - Projects that generate large publicity opportunities
  - Unique brand neutral educational programs

Submit Proposals at www.electrifyamerica.com
VW Settlement – “Appendix D”

- Connecticut’s allocation is about $55.7 Million
- Disbursement over 10 year schedule
- Connecticut Mitigation Plan approved in April 2018
- $12.2 Million awarded during first round of diesel emissions reduction grants.
  - Includes funding for 12 fully electric transit buses (CT DOT) and two fully electric shuttle buses (UCONN).
VW Funding Allocations

At least...

- 70%
- On-Road Heavy Duty Vehicles
- Non-Road Equipment
- Commercial Marine Vessels
- Locomotives
- Diesel Emission Reduction Act (DERA) Option

Up to...

- 15%
- Zero Emission Vehicle Supply Equipment
- 15%
- Administrative Expenditures

Connecticut Department of Energy and Environmental Protection
Zero Emission Vehicle Supply Equipment

Eligible Equipment

- Level 1, Level 2 or Fast Charging Equipment for Electric Vehicles
- Hydrogen (H₂) Fuel Cell Vehicle Supply Equipment

Eligibility Criteria

**EVSE:** Must be located publicly, or at a workplace, or at a multi-unit dwelling

**H₂ Fueling Station:** Must be publicly available and dispensing pressure of 70MPa
VW Grants Awarded

- First project solicitation period closed on July 31, 2018.
- DEEP received 56 applications requesting $31.7 Million and awarded $12.2 Million to 10 projects.
  - Awards include funding for 14 fully electric buses - 12 transit buses for CT DOT and two shuttle buses for UCONN
  - Those awards also include funding for the associated charging infrastructure for the buses.
  - Also funded were 52 diesel school buses, 51 diesel commercial trucks, 17 CNG refuse trucks and a ferry repower.
Volkswagen Settlement Information

www.ct.gov/deep/vw

- Sign-Up for our VW Email Distro List to be notified of future funding opportunities
- Also in 2019 look for:
  - Second round of diesel emissions mitigation project solicitations
  - Additional outreach
Thank You!

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Hartford, CT 06106

Email: paul.farrell@ct.gov
Phone: (860) 424-4152
Web: www.ct.gov/deep/air