Webinar: Understanding and supporting the used ZEV market

Presenters: Alexander Tankou (International Council on Clean Transportation); Rachel Sakata (Oregon Department of Environmental Quality); Scott Case (Recurrent); and Aseer Khalid (Electric Vehicle Association England)

December 15, 2021
Introduction
- Dale Hall, International Council on Clean Transportation

Understanding the used ZEV market
- Alex Tankou, International Council on Clean Transportation

Lessons from Oregon’s Clean Vehicle Rebate Program
- Rachel Sakata, Oregon Department of Environmental Quality

What we’ve learned from 7,000 EVs on the road
- Scott Case, Recurrent

Driver perceptions on used ZEVs in England
- Aseer Khalid, EV Association England
The International ZEV Alliance
A growing global footprint with 20 members
Fostering deep collaboration among expert staff in national and regional governments, including:

- Collaborate, share info, experiences on policy and market developments
- Support each other on action plans, incentives, utility policy, campaigns, infrastructure
- Monthly meetings, annual Assemblies, and events at COP and other conferences
- 3+ focus areas each year based on member priorities with public reports and webinars

ZEV Alliance events: [http://www.zevalliance.org/all-events/](http://www.zevalliance.org/all-events/)
ZEV Alliance reports: [http://www.zevalliance.org/publications/](http://www.zevalliance.org/publications/)
Webinar: Understanding and supporting the used ZEV market

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December 15, 2021
IZEVA and ICCT just released a report on the used ZEV market

The report, entitled *Understanding and supporting the used ZEV market*, builds on an extensive literature review and on modeling-based analysis to:

- Describe some of the important characteristics of market
- Identify its unique challenges (most of them related to technological reliability, especially regarding the battery)
- Formulate policy recommendation for governments to ensure used ZEV market provides a successful experience to its consumers

Link to the publication: https://theicct.org/publications/used-zero-emission-zeva-dec21
The motivation for this research

- **The opportunity:** Used ZEVs can help in increasing the share of ZEVs on the roads, and therefore to achieve climate and clean air goals. It can also broaden market participation to underserve communities.

- **The challenges/barriers:** Technological reliability is a major concern for consumers (battery degradation or failure, maintenance costs, long term compatibility with fast charging inlets).

- **The policies:** The research was conducted to identify best practices that could support successful experiences within the used ZEV market.
The used ZEV market provides an opportunity for more affordable ZEVs

- Faster technology development in ZEVs lead used ZEVs to depreciate faster than used conventional vehicles
- In the U.S, 200 and 300 miles used EVs will reach price parity with used conventional vehicle around 2025 and 2026, respectively
Used ZEVs could surpass first-owner ZEVs by the early 2040s

From a global used ZEV fleet of about 1 million in 2020 growing to more than 500 millions in the early 2040s, used ZEVs become the largest part of the global ZEV market.
50% of the global fleet could be used ZEVs by 2050, with 20% being combustion engine vehicles.

From a global vehicle stock fleet that increases from approximately 1.4 billion to nearly 2 billion over 2020-2050, 50% could be used ZEVs by 2050, this compares to a share of 20% for combustion engine vehicles and 30% for first-owner ZEVs.
Assurance provision measures could support more confident used ZEV purchases

- To ensure that the growth of used ZEV translate into uptake, governments could consider **assurance provision measures**:
  - Transparency on battery state of health data (SOH)
  - Warranty requirement (e.g., longer warranties)
  - Battery durability requirements
  - Right to repair laws
- Measures that guaranty access to charging and maintain fast charging compatibility with older ZEV models will also be important (e.g., fast charging standardization)
Small-scale programs (pilot projects) are critical to address the many unknowns of the used ZEV market

- Data evidence that proves the effectiveness of current policies proposed to support used ZEV remain scarce
- Through pilot projects, governments can fill these information gaps by collecting data, developing tracking systems and metrics that define success in the used ZEV market.
Understanding and supporting the used ZEV market – Oregon’s Clean Vehicle Rebate Program (OCVRP)

International Council on Clean Transportation
December 15, 2021

Rachel Sakata | Oregon Department of Environmental Quality
In 2017, the Oregon Legislature directed DEQ to implement a zero-emission electric vehicle rebate program.

DEQ receives $12M annually, via a “privilege tax” imposed on car dealers.
Types of rebates

**Standard rebates**
- $750-$2500 rebates
- Anyone can purchase or lease a new electric vehicle or motorcycle

**Charge Ahead rebates**
- $2500 rebate
- Low- and moderate- income households only
- Purchase or lease of new or used electric vehicle
- Can be combined with Standard rebate if purchasing new (up to $5000)
Charge Ahead rebates – recent program changes

Starting January 1, 2022
• Increases rebate amount from $2500 to $5000
• At least 20% of rebate funds must be dedicated to Charge Ahead
• Low-income service providers can apply for Charge Ahead rebates
• DEQ has awarded:
  – Over 16,600 rebates
  – $38.75 million over the lifetime of the program (beginning in 2018)
  – 12% of total rebates were Charge Ahead
  – Used EVs
    • 5% of total rebates
    • Almost $2M for used EV rebates
• Applicants fill out a survey, post-rebate
• Questions about:
  – EV purchase decisions
  – Rebate essentiality
  – EV driving and charging usage
  – Demographic information
  – Awareness of program
Preliminary OCVRP survey results

Influences for buying an EV
- Reducing environmental impacts
- Saving money overall
- Saving money on fuel costs
- In general, this is their first EV purchase

Primarily charge at home

Majority of EV rebate participants are Caucasian, male, college degree or higher

<table>
<thead>
<tr>
<th>Vehicle Model (used)</th>
<th>Qty</th>
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<tbody>
<tr>
<td>NissanLeaf</td>
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<td>Fiat500e</td>
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<td>ToyotaRAV4 EV</td>
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<td>Mini5E Countryman All4 PHEV</td>
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Program Challenges / Lessons Learned

• Increasing rebate accessibility
  • Establishing pre-qualification program for dealer point of sale
  • Ease of applying
Program Challenges / Lessons Learned

- Awareness of the program among underserved communities
- Focused outreach and education to potential Charge Ahead applicants
  - Community Partner Toolkit
  - Program specific materials in alternate languages
Barriers to EV adoption
• Availability of used EVs for purchase/lease
• Concerns about charging availability

Opportunities
• Increased dealer engagement
  – Try before you buy
• Awareness and education
Questions?

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What we’ve learned from 7000 EVs

Scott Case
Co-founder & CEO

December 2021
Buying an EV is totally different

For Used Electric Vehicle Buyers, Battery Health Is Everything. And There's No Way To Know It

The battery is the most important part of an electric vehicle, but there’s currently no way for used car buyers to find the battery’s state of health.
7000 drivers spanning most makes and models
What have we learned?
#1: Odometers don’t matter.

Real-life example #1:
2013 Nissan Leaf
with 19K miles

Real-life example #2:
Every Chevy Bolt ever made
With up to 75K+ miles
What does matter?

- Calendar age of battery
- External temperature over time
- Battery temperature (when charging and storing)
- Charging speed (voltage)
- Total number of charge/discharge cycles
- Depth of discharge (how much of the battery is used before recharging)
- Frequently storing at high or low state of charge
#2: EV dashboards lie about range.
Factors that influence short-term range estimates

- Charge rate and recency
- “Guess-o-meter” for some OEMs
- Glass half full vs. glass half empty OEMs
- Exposure to extreme cold temperatures
- Recent driving efficiency
#3: A LOT of data matters a LOT

Model improvement with additional
vehicles

Model improvement with additional
months of data

Model improvement with additional
data sources
#4: The used car ecosystem isn’t ready for EVs

**Used EV Shoppers:** “How’s the battery in that thing?”

**The rest of the ecosystem: Dealers, Remarketers, Inspection Tech**

- How are the EV batteries in our inventory, auction, fleet?
- How should we value premium or degraded batteries?
- What physical upgrades and diagnostics do we need to handle EVs?
- Where do I get inventory with premium batteries?
#5: Early adopters are patient... Majority buyers aren’t.

2019: “We are here” (GreenFlux)

2021: “We’re in it” (Recurrent)
THANKS!

- Web: www.recurrentauto.com
- Linkedin: /company/recurrent-auto
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EVA England – Used EVs

Aseer Khalid,
December 2021
Mission

A membership and advocacy organisation for EV drivers and prospective EV drivers in England

Inspired by consumer associations in Scotland, the Netherlands, Norway, the US and elsewhere

We aim to help new and existing EV drivers understand the technology and to promote the shift to zero emission vehicles.

Zero emission vehicles support economic recovery and deliver cleaner healthier and quieter streets as well as tackling climate change
Market Size UK Cars

Number of licensed BEVs and PHEVs annually in the UK, (‘000 vehicles)

Source: Department for Transport

Total Licensed Cars

BEVs = 0.6% of cars

Source: DfT
## Example of Used Car Search

**Battery quick charge time**
- Any
- Up to 1 hour (189)
- Up to 2 hours (450)
- Up to 3 hours (810)
- Up to 4 hours (974)
- Up to 5 hours (1,552)
- Up to 6 hours (1,953)
- Up to 8 hours (3,925)
- Up to 10 hours (4,495)
- Up to 15 hours (6,073)

**Battery charge time**
- Any
- Up to 3 hours (33)
- Up to 6 hours (147)
- Up to 9 hours (831)
- Up to 12 hours (1,359)
- Up to 15 hours (1,940)
- Up to 20 hours (2,996)
- Up to 30 hours (4,411)
- Up to 40 hours (5,213)
- 40 hours + (123)

**Mileage**
- Any
- Bi Fuel (155)
- Diesel Hybrid (2,258)
- Electric (6,019)
- Natural Gas (1)
- Petrol Hybrid (15,503)

**Gearbox**
- Any
- Any
- Diesel (165,509)
- Diesel Plug-In Hybrid (254)
- Electric (6,019)
- Hydrogen (4)
- Petrol (23,014)
- Petrol Plug-In Hybrid (6,096)

**Battery range**
- Any

**Battery charge time**
- Any

**Age**
- Select year
- Brand new
- Only show new car deals

Reset filters - 1 selected  
Search 6,019 cars
Pain points when looking for a used EV

Barriers

- Cost of EVs due to young age of vehicle stock on used market and high demand
- Customers do their own research up-front to determine make and model. YouTube and Fully Charged and EV sites / forums often mentioned as a source of information.
- Online platforms and dealer websites used to find specific examples on sale.
- Specification advertised is often incorrect. Websites mention information specific to petrol cars ('engine capacity'). Important features for EVs are optional
- General lack of knowledge amongst non-specialised dealers. Confusion around charger type and rates.
Demand is high & supply is low

Availability of used EVs is low, prices have increased and sourcing them become harder.

Mileage isn’t as much of a consideration as traditional ICE. Good service history still important.

Key questions are state-of-health of battery and charging specs. When state-of-health is not possible, we ask questions about range, charge time etc. to get clue for SOH.

EV dealership observations

- Selling 1-2 per fortnight to selling 4 a week on average.
- Most customers are first-time EV buyers.
- Some companies offer EV-specific warranty
Which details are important?

Key spec

1. Real-world range estimation (summer + winter)
2. Battery State Of Health (SOH)
3. Battery useable size (battery size minus buffers)
4. Warranty
5. Charging cables
6. Charger type and charge speed for AC & DC
7. Model specific features such as Safety, CCS
8. Battery leased or not (currently affects older models)
Further Potential Policy Recommendations

1. Loans for used EVs to support lower incomes
2. Battery Certificates validating health status
3. Tax and VAT changes for second-hand EVs
4. Introducing a scrappage scheme for the oldest and most polluting combustion vehicles
5. A standardised used car electronic label for consumers (ZEMO partnership initiative)
Used Car Labels for Consumers

Development of ZEMO partnership new car environmental label to be adapted for used cars.