Effectiveness of Incentives on the Adoption of Electric Vehicles in the United States

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Plug-in Electric Vehicles (PEVs)

Plug-in Hybrid Electric Vehicles (PHEVs)
Contains both a battery and engine

Battery Electric Vehicles (BEVs)
Contains only a battery

- Toyota Prius Prime
- Chevrolet Volt
- Tesla Model 3
- Nissan Leaf
Current state of PEV incentives
Federal incentive for Plug-in Electric Vehicles (PEVs)

Plug-In Electric Drive Vehicle Credit (IRC 30D)
• Provides up to $7500 depending on the size of the battery for purchase of a PEV.
• Expiring for Tesla and GM soon.
State-level purchase incentives

California CVRP provides a rebate check after purchase, $1500 for PHEVs, $2500 for BEVs.

Washington incentive is “off the hood” by exempting sales tax.

Connecticut rebate is based on the battery size of the vehicle.
Other purchase incentives

Many local level purchase incentives are offered by non-government entities (including electric utilities).
Many states offer high-occupancy vehicle (carpool) lane access for PEV owners
Some utilities across the country offer special electricity rates that vary over the time of day for electric vehicle owners.
Some incentives that were not included: emissions exemptions and charging infrastructure incentives.
1. Incentives are effective

- Incentive efficacy is one of the most studied topics regarding PEV adoption
- Studies have both elicited these values directly from PEV owners or measured them by looking at past sales of PEVs
- Most findings generally attribute around 25%-35% of sales due to existing/past purchase incentives
2. Removal of incentives has led to crashes in the PEV market

- There have been several examples of incentives being removed—all of which have led to a plummet in sales of corresponding PEVs.
- This effect is stronger than what we attribute to incentives on PEV adoption: the negative perception of losing the incentive could be strong.
3. Other countries have been successful

Norweigian sales driven by fee exemptions for PEVs which can double the price of conventional gasoline vehicles.

Major cities in China have placed restrictions on registering gasoline vehicles— but electric vehicles are exempt from these restrictions.
4. Knowledge and awareness is low

- Consistent findings across different studies
- Even in states with strong PEV markets, such as CA, there have been no improvements in knowledge over the last 5 years

![Bar chart showing percentage of respondents who have heard of various electric vehicles and their familiarity levels from 2014 to 2018.]

- 2013:
  - Toyota Prius**: 78%
  - Chevrolet Volt***: 96%
  - Nissan Leaf***: 87%
  - Tesla Model S: 81%

- 2017:
  - Toyota Prius**: 64%
  - Chevrolet Volt***: 37%
  - Nissan Leaf***: 37%
  - Tesla Model S: 24%

- 2014:
  - Have heard of this:
    - Toyota Prius**: 64%
    - Chevrolet Volt***: 20%
    - Nissan Leaf***: 22%
    - Tesla Model S: 17%

- 2018:
  - Have heard of this:
    - Toyota Prius**: 20%
    - Chevrolet Volt***: 20%
    - Nissan Leaf***: 20%
    - Tesla Model S: 20%

- Moderately or very familiar:
  - Toyota Prius**: 31%
  - Chevrolet Volt***: 28%
  - Nissan Leaf***: 27%
  - Tesla Model S: 25%
  - Hybrid***: 20%
  - PHEV***: 24%
  - BEV***: 20%

- Toyota Prius***: 87%
- Chevrolet Volt***: 87%
- Nissan Leaf***: 87%
- Tesla Model S: 81%

- 2018:
  - Toyota Prius**: 96%
  - Chevrolet Volt***: 64%
  - Nissan Leaf***: 37%
  - Tesla Model S: 24%

- By 2018, the percentage of respondents who have heard of the Toyota Prius*** increased to 96% and for the Chevrolet Volt*** to 64%, while for the Nissan Leaf*** it was 37% and for the Tesla Model S, it was 24%.
5. Incentives are becoming more important

- As PEVs begin to become more of a mainstream purchasing decision, our analysis finds that the incentives are increasingly becoming a tipping point for purchase decisions.
- Phase out of incentives will become increasingly difficult without adversely affecting sales.

How would consumers change their purchase decision if the federal incentive were removed?

- Change in purchase decision:
  - No change
  - A non plug-in vehicle
  - Another plug-in vehicle
  - Not to buy/lease a vehicle at all
  - Don’t know
6. New car buyers push the market

- Just 25% of all households are responsible for all new vehicle purchases
- Targeting this group can increase efficacy of incentives
- Used car markets can help to spread technology across the population—but this is an area that is currently not well studied
7. Feebates: a sustainable funding idea

• A feebate is the combination of a “fee” and a “rebate”, it charges a fee to the dirtiest and least efficient vehicles and provides a rebate for the cleanest and most efficient vehicles

• Efficient solution that can indefinitely provide sustainable funding for an incentive program

• Aligns the market with regulatory goals for automakers such as CAFE and ZEV
References by subject

Purchase Incentive Studies


Incentives Over Time


International Incentive Studies


Knowledge and Awareness
