ZEV Market Growth: California, China, and Clean Car States

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Natural Resources Defense Council
### Important policy drivers for ZEV deployment

#### Vehicles:
- Long-term GHG tailpipe and efficiency standards
- ZEV deployment requirements

#### Consumers:
- Purchase incentives
- Non-monetary incentives (preferential access)

#### Fuel provider/infrastructure:
- Utility investments in transportation electrification
- Low carbon fuel incentive

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**Table 2. Summary of government electric vehicle promotion actions in select countries**

<table>
<thead>
<tr>
<th>Area</th>
<th>Action</th>
<th>China</th>
<th>United States (ex-CA)</th>
<th>California</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global market share</td>
<td>Vehicle sales in 2014 (million vehicles)</td>
<td>22</td>
<td>14</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Vehicle manufacturing in 2014 (million vehicles)</td>
<td>22</td>
<td>11</td>
<td>&lt;0.1</td>
</tr>
<tr>
<td></td>
<td>Percent of 2014 global electric vehicle sales</td>
<td>17%</td>
<td>19%</td>
<td>19%</td>
</tr>
<tr>
<td>Vehicle manufacturer</td>
<td>Research and development support</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Long-term efficiency standards</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Incentive provisions within efficiency regulations</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Cumulative sales goal</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Vehicle deployment requirements</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Vehicle production subsidy</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer purchase</td>
<td>Vehicle purchase subsidy (tax credit)</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Vehicle purchase subsidy (rebate)</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td></td>
<td>Vehicle purchase tax exemption</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Vehicle fee-bate scheme</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Government fleet vehicle purchasing preferences</td>
<td>X</td>
<td>X</td>
<td></td>
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<tr>
<td></td>
<td>High fuel price and greater fuel savings</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer use</td>
<td>Annual vehicle fee exemption</td>
<td>/</td>
<td></td>
<td>/</td>
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<tr>
<td></td>
<td>Discounted/free electric charging</td>
<td>/</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Preferential lane (e.g., bus, HOV lane) access</td>
<td>/</td>
<td>/</td>
<td></td>
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<tr>
<td></td>
<td>Reduced roadway tax or tolls</td>
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<td></td>
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<tr>
<td></td>
<td>Preferential parking access</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td>Fuel provider/infrastructure</td>
<td>Carbon pricing scheme</td>
<td>X</td>
<td>/</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Low carbon fuel incentive for electricity providers</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Public charging network funding</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Home charging equipment tax incentives</td>
<td>X</td>
<td></td>
<td>X</td>
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<tr>
<td></td>
<td>Public outreach activities to educate on consumer benefits</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*Based on IEA, 2015a; Jin et al., 2014; Modl & Yang, 2014; NRC, 2015; OECD, 2015; "X" denotes national program; "/" signifies smaller local or regional program*

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http://www.theicct.org/transition-global-zero-emission-vehicle-fleet-collaborative-agenda-governments
SCALE
LITHIUM-ION EV BATTERY EXPERIENCE CURVE COMPARED WITH SOLAR PV EXPERIENCE CURVE

CA + ZEV States (2015 – 2025)

Source: Bloomberg New Energy Finance, ZEV state and China estimates added for illustration
LITHIUM-ION EV BATTERY EXPERIENCE CURVE COMPARED WITH SOLAR PV EXPERIENCE CURVE

Source: Bloomberg New Energy Finance, ZEV state and China estimates added for illustration
Scale up of EV markets will help drive costs down

Source: Data compiled by Bloomberg New Energy Finance
Most recent forecasts: even faster cost reductions

More recent announcements and reports from GM, AAB, Navigant, and Bloomberg New Energy Finance added
TOTAL COSTS OF OWNERSHIP
Total cost of ownership: Utility EV rates important

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**eGallon: Compare the costs of driving with electricity**

**What is eGallon?**
It is the cost of fueling a vehicle with electricity compared to a similar vehicle that runs on gasoline.

**Did you know?**
On average, it costs about half as much to drive an electric vehicle.

**Find out how much it costs to fuel an electric vehicle in your state**

<table>
<thead>
<tr>
<th>regular gasoline</th>
<th>electric eGallon</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.80</td>
<td>1.61</td>
</tr>
</tbody>
</table>

**Avg CA 17¢/kWh**
Total cost of ownership: Utility EV rates important

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PGE EV-A
Off-peak 10¢/kWh

2.8 Regular gasoline
0.91 Electric eGallon
UTILITY SCALE INVESTMENTS
CEC & PUC: Public Level 2 Charge Points
Existing and Proposed Actions

Low and high range from NREL/CEC #600-2014-003
* As of 5/11/15

Source: Tyson Eckerle, Governor’s Office of Business & Economic Development,
presentation at California Air Resources Board Hearing (October 2015)
FIGURE 1: SDG&E COST OF SERVICE BEFORE AND AFTER WIDESPREAD ELECTRIC VEHICLE ADOPTION

[Adapted from Kintner-Meyer et al., 2007]^{39}

Figure 2: Present Value of EV Adoption in California Through 2030 by Rate Scenario

[Environmental and Energy Economics, California Transportation Electrification Assessment - Phase 2: Grid Impacts]^{10}

Notes: Based on California utility system, assuming charging occurs predominantly when the system is underutilized. Net revenues are positive under “Tiered,” “Flat,” and “TOU” (time-of-use) rate structures and a “Mixed” TOU/Tiered scenario. Under TOU rates, EV owners are rewarded for charging during hours of the day when the cost of energy is at its lowest, resulting in smaller, but still significant, net revenues.

Thank You!

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