Projecting light-duty electric vehicle sales in the National Energy Modeling System (NEMS) and World Energy Projection System plus (WEPS+)

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By
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Outline

• Conditions affecting electric vehicle sales

• National Energy Modeling System (NEMS)
  – National and state level policies
  – Battery costs
  – Projected market penetration in the U.S.

• World Energy Projection System plus (WEPS+)
  – Country level policies
  – Projected market penetration in OECD and non-OECD countries

• Uncertainties
Conditions affecting electric vehicle sales

• Policy

• Reduction in incremental electric vehicle costs

• Consumer sentiment
  – Range anxiety and recharging availability/time
  – Model availability

• Competition from improving incumbent technologies and other alternative propulsion technology

• Autonomous vehicles?
National Energy Modeling System (NEMS)
Policies promoting battery electric vehicle sales

- California Zero-Emission Vehicle Mandate
  - Adopted by nine other states

- California AB-32 for GHG Reduction
  - Further increases electric vehicle share
  - Decreases VMT

- Tax credits
  - Up to a maximum of $7,500
  - Limited to 200,000 vehicles per manufacturer then begins to phase out

- CO2 credits provided under the EPA/NHTSA GHG/CAFE standards
### State policies promoting battery electric vehicle sales

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<th>Electric vehicle purchase incentives</th>
<th>EV use and ownership incentives</th>
<th>Waivers on access restrictions</th>
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AEO2017 battery cost, projections from 2015

Lithium-ion retail battery costs

2015$ / kW-hr

Source: EIA, AEO2017 Reference case
Total plug-in electric vehicle sales approach 10% of new sales in light-duty vehicles by 2040

U.S. light-duty electric vehicle passenger car and truck sales percent

Source: EIA, AEO2017 Reference case
Light-duty vehicle sales remain primarily gasoline-only with modest increase of other vehicle fuel types

U.S. light-duty passenger car and truck sales

Source: EIA, AEO2017 Reference case
World Energy Projection System plus (WEPS+)
### International electric vehicle policies

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Source: IEA Global EV Outlook 2016
Norway policies

• Purchase incentives for average BEV are $20,000 and PHEV $12,000 based on a $30,000 EV
  – Sales tax exemption ~ $12,000 USD
  – Value-added tax exemption ~ 25% of vehicle price before sales tax (BEVs only)

• Waivers on fees including tolls, parking and ferries

• Access to bus lanes

• Highest publically accessible EVSE stock per capita

Source: IEA Global EV Outlook 2016
Norway leads in electric vehicle sales as a percentage of total light-duty vehicle sales in 2015

* Data from 2014

Source: International data from IEA, U.S. data from AEO2017 Reference case
Incremental electric vehicle component costs similar between NEMS and WEPS+

Incremental costs of BEVs and PHEVs

$2015

Source: EIA, AEO2017 Reference case and IEO test run

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Electric vehicles grow more quickly in OECD countries while plug-in hybrids grow more quickly in non-OECD countries

OECD and non-OECD electric vehicle passenger car and truck sales percent

Source: EIA, IEO test run

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Growth in light-duty vehicle sales occurs mainly in non-OECD countries and gasoline remains the primary fuel

OECD and non-OECD light-duty passenger car and truck sales

Source: EIA, IEO test run

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Uncertainties

• Policies

• Battery technology breakthrough

• Autonomous vehicles
Thank you

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