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

Electric vehicle purchase incentives

- California
- Colorado
- Connecticut
- Delaware
- DC
- Louisiana
- Maryland
- Massachusetts
- Missouri
- New Jersey
- Oregon
- Pennsylvania
- Rhode Island
- Texas
- Utah
- Washington

EV use and ownership incentives

- Connecticut
- Hawaii
- Massachusetts
- Missouri
- Nevada
- New York
- Rhode Island

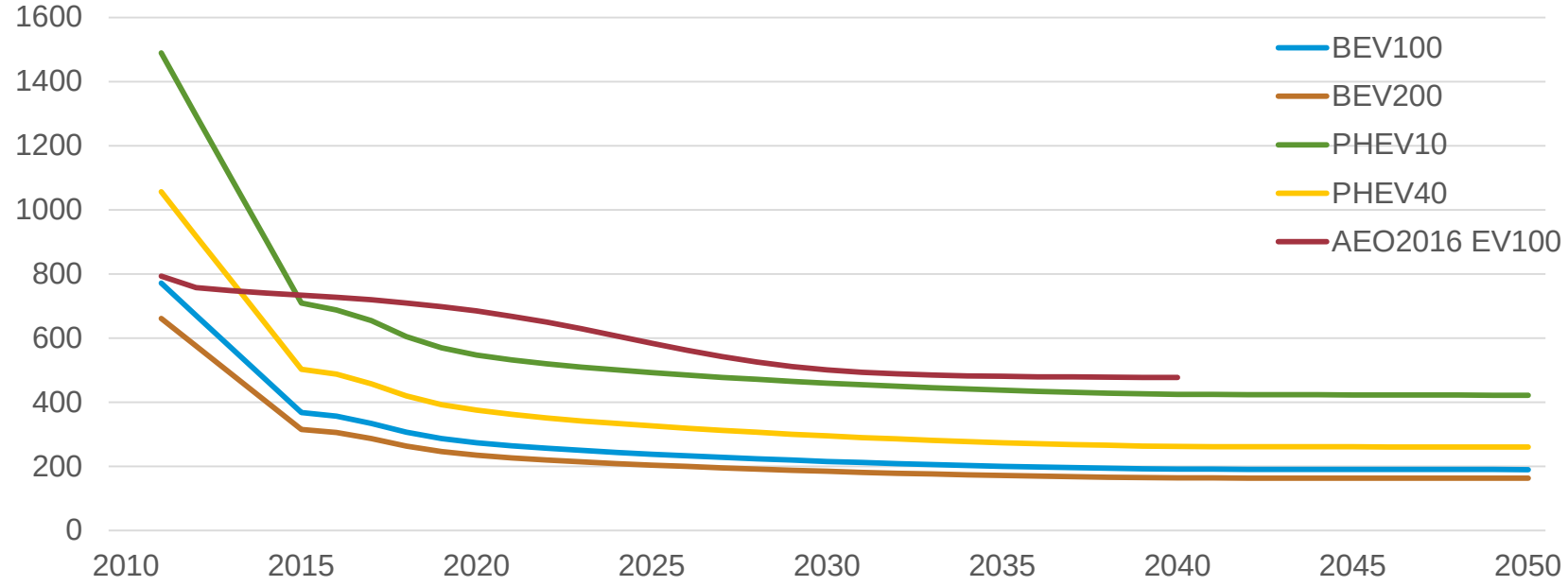
Waivers on access restrictions

- California
- Colorado
- Georgia
- Hawaii
- Maryland
- New York
- Utah

AEO2017 battery cost, projections from 2015

Lithium-ion retail battery costs

2015$ / kW-hr

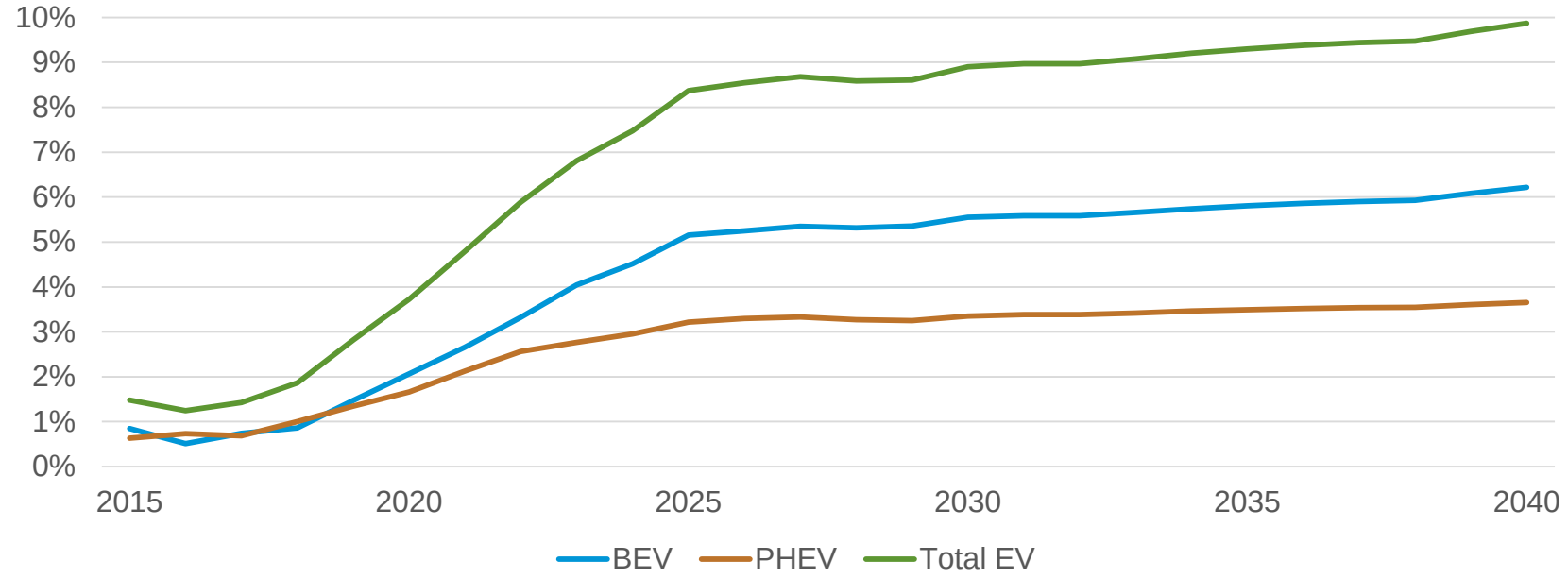


Source: EIA, AEO2017 Reference case

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

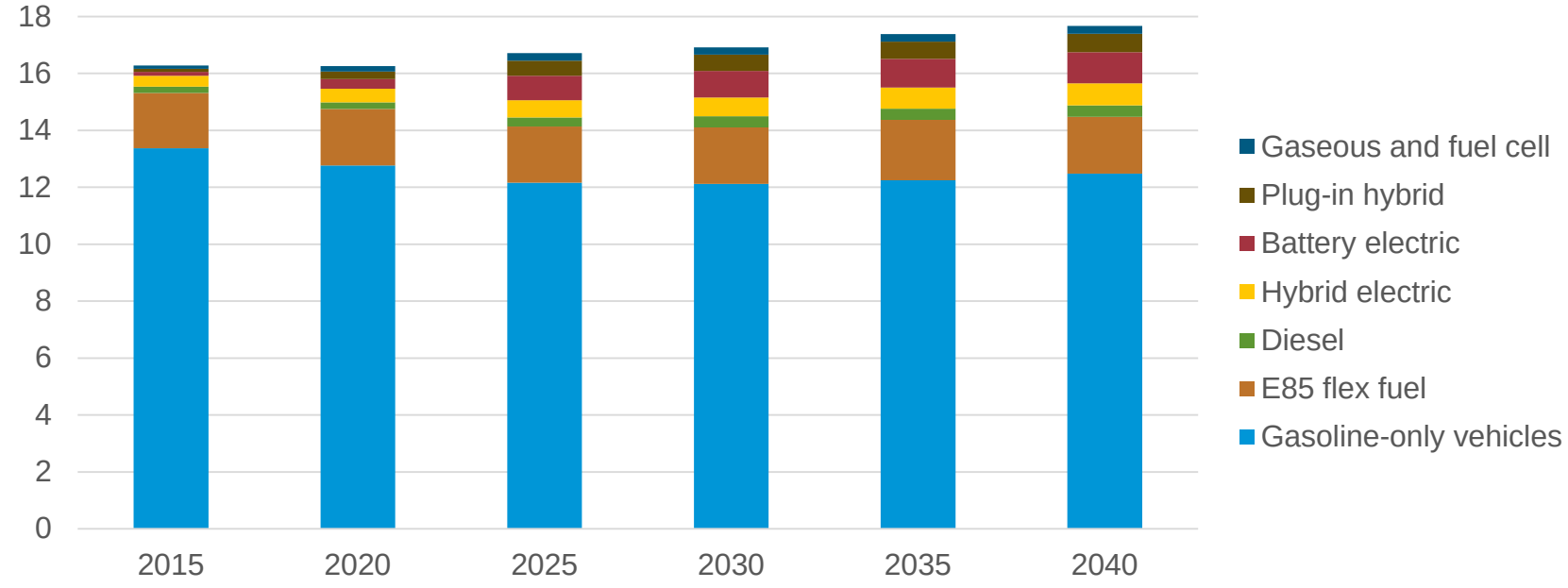


Source: EIA, AEO2017 Reference case

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

millions



Source: EIA, AEO2017 Reference case

World Energy Projection System plus (WEPS+)

International electric vehicle polices

Electric vehicle purchase incentives

- China
- Denmark
- France
- India
- Italy
- Japan
- Norway
- South Korea
- Spain
- Sweden
- United Kingdom

EV use and ownership incentives

- China
- France
- Germany
- Italy
- Japan
- Norway
- South Korea
- Spain
- Sweden
- United Kingdom

Waivers on access restrictions

- Norway
- Spain

Source: IEA Global EV Outlook 2016

Norway policies

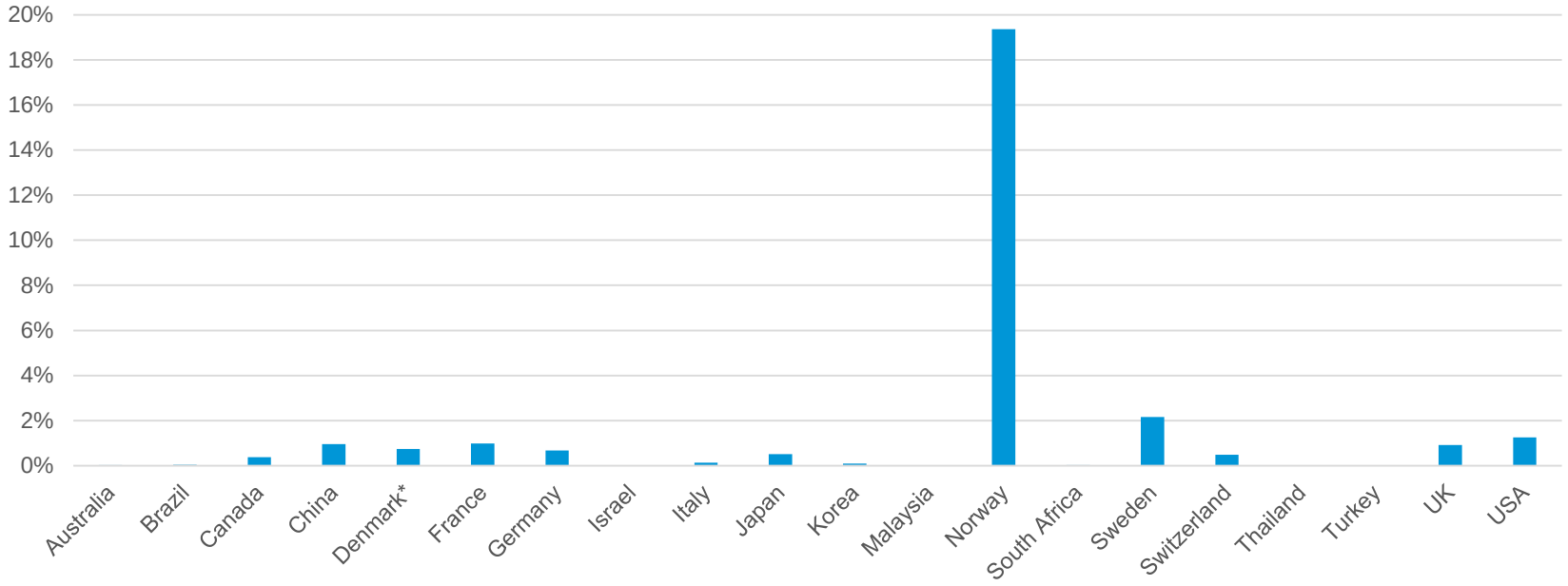
- Purchase incentives for average BEV are $20,000 and PHEV $12,000 based on a $30,000 EV
  - Sales tax exemption ~ $12,000 USD
  - Value-added tax exemption ~ 25% of vehicle price before sales tax (BEVs only)
- Waivers on fees including tolls, parking and ferries
- Access to bus lanes
- Highest publically 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

Plug-in electric vehicle sales

percent



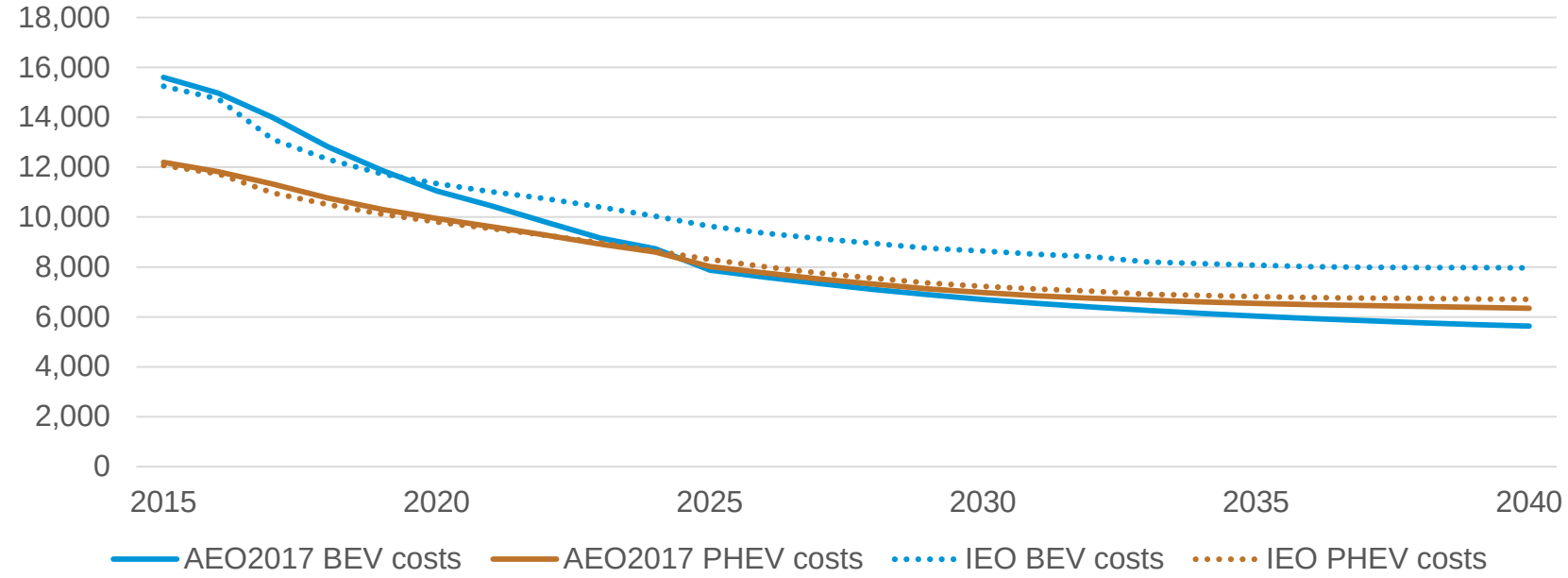
** Data from 2014*

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

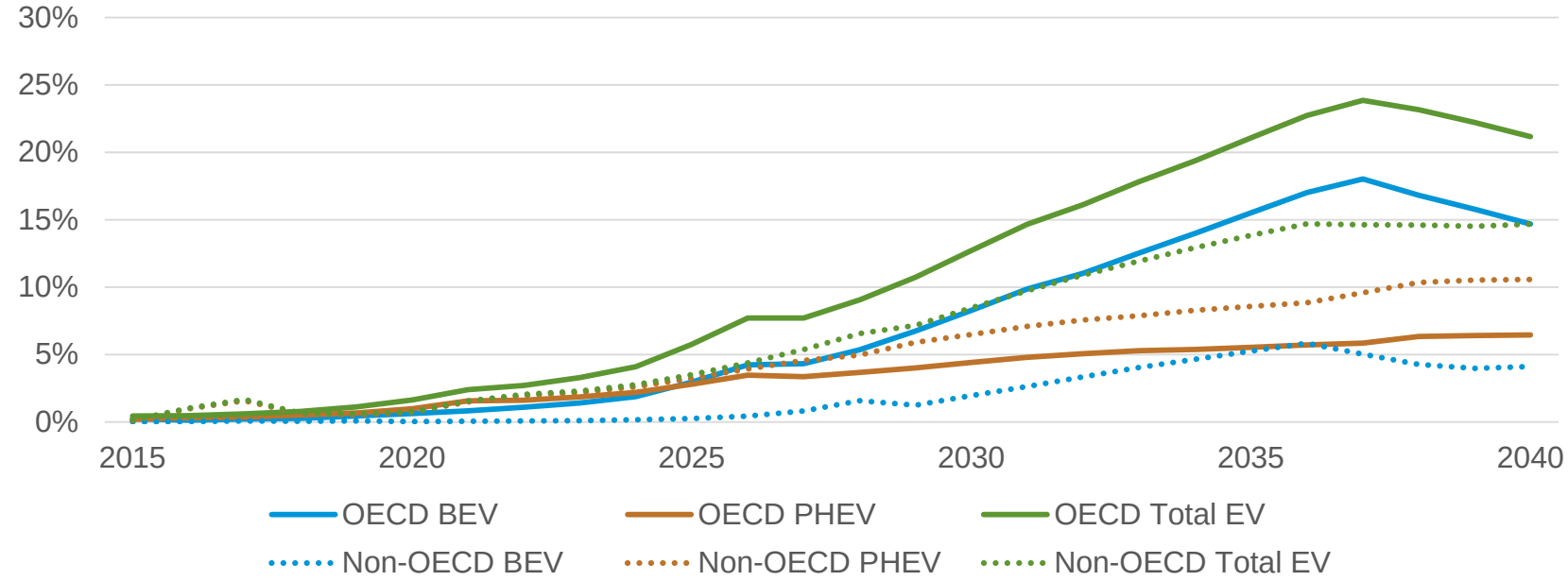


Source: EIA, AEO2017 Reference case and IEO test run

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

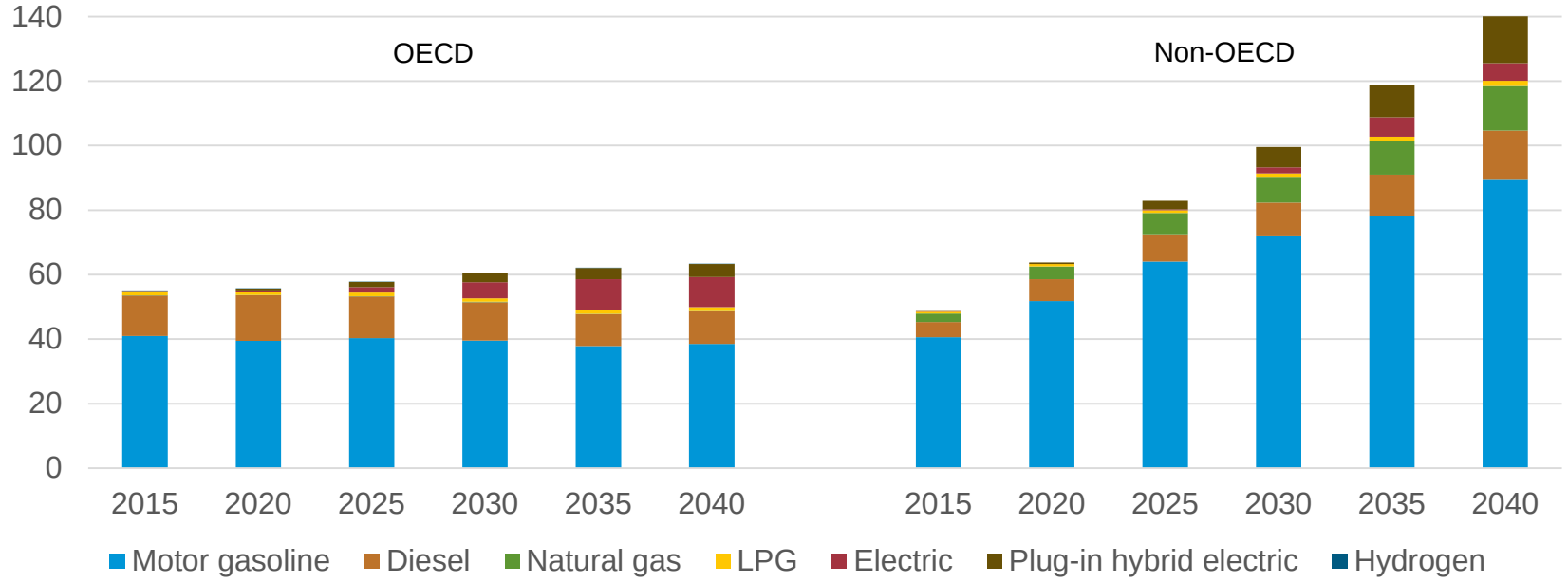


Source: EIA, IEO test run

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

millions



Source: EIA, IEO test run

Uncertainties

- Policies
- Battery technology breakthrough
- Autonomous vehicles

Thank you

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