Electric Vehicle Outlook 2020

BloombergNEF
BNEF’s Electric Vehicle Outlook

The Electric Vehicle Outlook is BloombergNEF’s annual long-term forecast for road transport. It looks at how electrification, shared mobility, autonomous driving and other trends will impact transport from today to 2040.

Segments:
- Light duty passenger vehicles
- Shared mobility fleets
- Commercial vehicles
- Buses
- Two/three-wheeled vehicles

Impacts:
- Automotive sales and fleet
- Oil markets
- Electricity markets
- Infrastructure
- Battery metals and materials
- Emissions
10 findings from EVO 2020

1. Covid-19: EV sales drop in 2020 but hold up better than combustion vehicles and rebound faster
Covid-19: passenger EV sales holding up better than internal combustion vehicle sales

Year-on-year change in vehicles sales, 1Q 2020

<table>
<thead>
<tr>
<th>Region</th>
<th>Country</th>
<th>Internal combustion passenger car sales</th>
<th>Passenger electric vehicles sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>APAC</td>
<td>China</td>
<td>-45%</td>
<td>-60%</td>
</tr>
<tr>
<td></td>
<td>Japan</td>
<td>-10%</td>
<td>-17%</td>
</tr>
<tr>
<td></td>
<td>S. Korea</td>
<td>-7%</td>
<td>+26%</td>
</tr>
<tr>
<td>AMER</td>
<td>U.S.</td>
<td>-13%</td>
<td>+5%</td>
</tr>
<tr>
<td>EMEA</td>
<td>Germany</td>
<td>-25%</td>
<td>+148%</td>
</tr>
<tr>
<td></td>
<td>U.K.</td>
<td>-34%</td>
<td>+127%</td>
</tr>
<tr>
<td></td>
<td>France</td>
<td>-39%</td>
<td>+123%</td>
</tr>
<tr>
<td></td>
<td>Italy</td>
<td>-36%</td>
<td>+100%</td>
</tr>
<tr>
<td></td>
<td>The Netherlands</td>
<td>-13%</td>
<td>+22%</td>
</tr>
<tr>
<td></td>
<td>Sweden</td>
<td>-25%</td>
<td>+87%</td>
</tr>
<tr>
<td></td>
<td>Norway</td>
<td>-42%</td>
<td>+4%</td>
</tr>
</tbody>
</table>

Source: BloombergNEF
Covid-19: Updated short-term passenger EV sales forecast

Global passenger EV sales forecast by type

<table>
<thead>
<tr>
<th>Year</th>
<th>Plug-in hybrid</th>
<th>Battery electric</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>0.7</td>
<td>1.1</td>
</tr>
<tr>
<td>2017</td>
<td>0.4</td>
<td>1.3</td>
</tr>
<tr>
<td>2018</td>
<td>0.6</td>
<td>1.9</td>
</tr>
<tr>
<td>2019</td>
<td>0.5</td>
<td>2.1</td>
</tr>
<tr>
<td>2020</td>
<td>0.4</td>
<td>1.7</td>
</tr>
<tr>
<td>2021</td>
<td>0.7</td>
<td>2.6</td>
</tr>
<tr>
<td>2022</td>
<td>1.9</td>
<td>4.0</td>
</tr>
<tr>
<td>2023</td>
<td>2.9</td>
<td>5.4</td>
</tr>
</tbody>
</table>

EV share of global sales in 2023: 7%

Source: BloombergNEF. Note: Based on Covid-19 Scenario 2.
Covid-19: Open questions

- **Government stimulus**: Priorities, politics, and trade-offs
- **Consumer attitudes**: To public transit, ride hailing, and private car ownership
- **Automaker strategies**: What to restart when?
- **Covid-19 and urban air quality**: Clean air push?
Electric Vehicle Outlook 2020

Statkraft Nordic Launch

Source: BBC

● Government stimulus: Priorities, politics, and trade-offs

● Consumer attitudes: To public transit, ride hailing, and private car ownership

● Automaker strategies: What to restart first?

● Covid-19 and urban air quality: Clean air push?

Open questions
10 findings from EVO 2020

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2. Two tipping points: EV price parity and infrastructure slowdown
Two tipping points

1: **EV price parity:** By mid-2020s for most segments

2: **Infrastructure slowdown:** In mid-2030s for most countries

*Source: BNEF*
Two tipping points

Global passenger vehicles by drivetrain

EV share of global sales in 2040 58%
EV share of global fleet in 2040 31%

Source: BNEF
The lessons from the Nordics?

EV share of Norwegian passenger vehicle sales

EV share of new sales
70%
60%
50%
40%
30%
20%
10%
0%

5 years to go from 10% to +50%

Many years to get to 10%

Source: BNEF, Marklines
10 findings from EVO 2020

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3. China and Europe pull further ahead of the U.S.
China and Europe pull further ahead of the U.S.

**EV share of new passenger vehicle sales**

- **China**
- **Europe**
- **U.S.**
- **S. Korea**
- **Japan**
- **Global**
- **RoW**
- **India**

**World’s Greenest Coronavirus Recovery Package Arriving in Europe**

Source: BNE

**Emmanuel Macron injects €8bn to fuel French car industry revival**

Subsidies for buyers of electric vehicles and support for makers to develop clean technology

**German auto stimulus to boost VW’s electric push**

Europe and China share of global EV market in 2030: 72%
EU policy is driving EV adoption

Historical and target average vehicle CO2 emissions in Europe

Source: BNEF, European Commission
EU policy is driving EV adoption

EV share of sales needed to hit EU automotive CO2 emissions targets

Source: BNEF, Marklines. Shaded region shows the range of EV market share needed to hit EU CO2 targets in the given year.
……But the U.S. catches up in the 2030s

Cars per U.S. household

- 21.0% No vehicle
- 37.3% 1 vehicle
- 33.0% 2 vehicles
- 8.7% 3 or more vehicles

~120 million U.S. households

Source: BloombergNEF U.S. Census Bureau, 2018.
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Several ‘killer apps’ for electrification are emerging for the 2020s

Current fleet of electric:

- **Commercial vehicles**
  - Million: 0.8
  - 2015: 0.2
  - 2017: 0.4
  - 2019: 0.8

- **Buses**
  - Million: 0.8
  - 2015: 0.2
  - 2017: 0.4
  - 2019: 0.8

- **Two-wheelers**
  - Million: 320
  - 2015: 0
  - 2017: 80
  - 2019: 160

Source: BNEF
Several ‘killer apps’ for electrification are emerging for the 2020s

**Commercial vehicles**  
*[Image of a commercial vehicle]*  
Current EV fleet share: <0.5%

**Buses**  
*[Image of buses]*  
Tipping point: Next 2-3 years  
16%  
Reached

**Two-wheelers**  
*[Image of a two-wheeler]*  
Tipping point: Reached  
20%  
Reached

*Source: BNEF*
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5. Overall passenger vehicle sales peak in 2036. Internal combustion vehicle sales have already peaked
Demand for mobility keeps rising....

Global annual kilometers travelled by the passenger vehicle fleet by region

Source: BloombergNEF
...but vehicle sales peak

Global annual passenger vehicle sales by region

Global annual passenger vehicle sales by type

Source: BloombergNEF
Why do vehicle sales peak?

Growth in population of 16-59 year olds

100 = 2020 levels

- RoW (33%)
- India (19%)
- Global (17%)
- Australia (16%)
- U.S. (4%)
- U.K. (3%)
- S. Korea (0%)
- China (-8%)
- Germany (-12%)
- Japan (-16%)

Growth in urbanization

100 = 2020 levels

- India (+33%)
- China (+24%)
- Global (+15%)
- S. Korea (+12%)
- U.S. (+5%)
- U.K. (+5%)
- Germany (+5%)
- Australia (+4%)
- Japan (+2%)

Total passenger vehicle sales peak in 2036
Combustion vehicles sales have already peaked

Global annual passenger vehicle sales by drivetrain

- Internal combustion
- Fuel cell
- Plug-in hybrid
- Battery electric

Global share of total annual passenger vehicle sales by drivetrain

- Electric
- Internal combustion
- Fuel cell

Source: BloombergNEF
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Light commercial FCV sales

Medium commercial FCV sales

Heavy commercial FCV sales

FCV share of light commercial fleet

FCV share of medium commercial fleet

FCV share of heavy commercial fleet

Rest of World
India
South Korea
Japan
U.S.
Europe
China
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8. Much more charging infrastructure needed, but most is at home/work
Much more charging infrastructure needed, but most is at home/work

Current public charging connectors installed globally

Source: BloombergNEF. Note: Public includes Tesla destination and supercharger network even though this is semi-private.

Public charging:
Today: 1 million connectors
By 2040: 12 million needed

<table>
<thead>
<tr>
<th>Year</th>
<th>RoW</th>
<th>Japan</th>
<th>U.S.</th>
<th>Europe</th>
<th>China</th>
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<tbody>
<tr>
<td>2012</td>
<td>73</td>
<td>96</td>
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<td>141</td>
<td>214</td>
<td>300</td>
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<td>2016</td>
<td></td>
<td></td>
<td></td>
<td>628</td>
<td>202</td>
</tr>
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<td>2017</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>516</td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td></td>
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Thousand 
RoW
Japan
U.S.
Europe
China
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9. Oil demand from passenger vehicles has already peaked
Passenger vehicle oil demand has already peaked. Overall oil demand from road transport peaks in 2031

Source: IEA, BNEF. Note: Includes biofuels. Advancements include fuel efficiency improvements and alternative drivetrains.

Oil demand avoided by privately owned electric and fuel cell passenger vehicles, and shared mobility

Million barrels per day

Trajectory without advancements
Improved efficiency
EV penetration
Shared mobility
EVO 2020 trajectory

Million barrels per day

RoW
Australia
S. Korea
India
Japan
Europe
China
U.S.

Passenger vehicle oil demand forecast

2019 2025 2030 2035 2040

2019 2025 2030 2035 2040

0 10 20 30 40

0 -2 -4 -6 -8 -10 -12 -14
Impact on electricity demand is limited

Source: BNEF. Note: Uses general electricity demand projections from BNEF’s June 24, 2019 “New Energy Outlook 2019” research note. Electric vehicle electricity demand includes demand from passenger EVs, commercial EVs, e-buses (municipal and non-municipal) and electric two-wheelers. Rest of World includes Australia and other rest of world. Percentages refer to the increases in electricity demand caused by EVs in 2030 and 2040.
The EV load profile gets flatter as more segments electrify

Source: BNEF. Note: Light commercial EVs are considered within home and public infrastructure. 11kW hardware is assumed to encompass 7-22kW chargers.
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10. Emissions are still not on track
Emissions are still not on track

Growth in road transport CO2 emissions by country, 2018-2040

Road transport emissions avoided by the penetration of electric and fuel cell vehicles

Source: BNEF. Includes power sector emissions from EVs
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9. Oil demand from passenger vehicles has already peaked
10. Emissions are still not on track
Opportunities in transformation

Where are the opportunities for the market leaders?

- Charging infrastructure business models
- Aggregation, grid integration and forecasting tools
- New mobility business models
- Marine: electric and hydrogen applications
- Other?
Thank you
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