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## Key uncertainties

- A faster mobility revolution
- Alternative pathways to a lower carbon world
- Risks to gas demand

## Beyond 2035

- When will global oil demand peak?
- What role will Africa play in driving energy demand?
- Will power dominate global energy demand growth?
Reference case
Global energy demand

Energy consumption by region

Growth in GDP and primary energy

Billion toe

- Other
- Africa
- Other non-OECD Asia
- India
- China
- OECD

% per annum

- Energy intensity
- GDP
- Primary energy

Primary energy consumption by fuel

Share of primary energy

*Burnables includes wind, solar, geothermal, biomass, and biofuels

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Carbon emissions

Contributions to slower growth of carbon emissions

% per annum
2.5%
2.0%
1.5%
1.0%
0.5%
0.0%

1995-2015
2015-2035

Energy intensity
Fuel mix
GDP

Carbon emissions

Billion tonnes CO₂
40
30
20
10
0


IEA 450
Base case

2017 Energy Outlook
© BP p.l.c. 2017
Key issues
Growth of electric cars

The global car fleet: 2015-2035

- Billions of vehicles
- Electric cars
- Conventional cars
- Non-OECD
- OECD

*For a Battery Electric Vehicle with a 60 kWh pack. Cost projections depend heavily on the degree of EV uptake, which is uncertain, so ranges should be treated as illustrative only. Current estimates of battery costs also vary widely, but this uncertainty is not shown.

Illustrative path for battery pack costs

Range of estimates of cost parity between electric and oil-powered cars

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Impact of LNG Trade

Net LNG exports and imports in 2035 (Bcf/d)

- North America: 22
- Europe: 17
- Middle East: 9
- Other Asia: 44
- Russia: 5
- S & C America: 2
- Africa: 7
- Australia: 17

Exports
Imports
Key uncertainties
Mobility revolution scenarios

Digital revolution:
Impact on oil demand in cars in 2035

Electric revolution:
Impact on oil demand in cars in 2035
Comparison with other low carbon scenarios...

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<tr>
<th></th>
<th>Faster transition</th>
<th>Even faster transition</th>
<th>IEA 450</th>
<th>MIT 2° Base</th>
<th>IHS Markit ‘Solar Efficiency’</th>
<th>Greenpeace ‘Revolution’</th>
</tr>
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<tr>
<td>CAGR (%)(^*)  2015-2035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbon emissions</td>
<td>-0.7%</td>
<td>-2.0%</td>
<td>-2.0%</td>
<td>-2.0%</td>
<td>-2.8%</td>
<td>-3.2%</td>
</tr>
<tr>
<td>Total energy</td>
<td>0.9%</td>
<td>0.8%</td>
<td>0.4%</td>
<td>0.5%</td>
<td>-0.7%</td>
<td>-0.1%</td>
</tr>
<tr>
<td>Energy intensity</td>
<td>-2.4%</td>
<td>-2.5%</td>
<td>-3.0%</td>
<td>-2.9%</td>
<td>-4.0%</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Carbon intensity</td>
<td>-1.5%</td>
<td>-2.7%</td>
<td>-2.3%</td>
<td>-2.5%</td>
<td>-2.1%</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Share of total energy, 2035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; gas</td>
<td>51%</td>
<td>48%</td>
<td>48%</td>
<td>46%</td>
<td>51%</td>
<td>39%</td>
</tr>
<tr>
<td>Renewables(^\d)</td>
<td>16%</td>
<td>23%</td>
<td>17%</td>
<td>29%</td>
<td>19%</td>
<td>38%</td>
</tr>
<tr>
<td>Share of abatement vs. 2015</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power sector</td>
<td>&gt;100%</td>
<td>89%</td>
<td>77%</td>
<td>74%</td>
<td>58%</td>
<td>35%</td>
</tr>
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\(^*\) Compound annual growth rate \(^\d\) includes biofuels
See page 101 for a technical note on comparison methodology and page 102 for details of sources
Digital revolution mobility scenario: assumptions

Assumptions are illustrative only and can be scaled up or down to consider alternative calibrations.

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<thead>
<tr>
<th>Assumptions in 2035</th>
<th>Impact on oil demand (Mb/d)</th>
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<tr>
<td>Electric vehicles (EVs): No additional EVs relative to the base case.</td>
<td>0</td>
</tr>
<tr>
<td>Autonomous vehicles (AVs): 200 million AVs. Each AV is 25% more fuel efficient than a conventional car.</td>
<td>-0.7</td>
</tr>
<tr>
<td>Car sharing: Occurs via AVs. On average each AV is driven twice as many miles per year as a conventional car - doubling the disruptive impact of AVs.</td>
<td>-0.7</td>
</tr>
<tr>
<td>Ride pooling: 40% of urban car journeys are pooled and 25% of all car miles are urban, so 10% of all miles are affected by pooling. Each pooled ride has twice as many occupants per vehicle, which reduces total mileage by 5%. Pooling occurs via all car types (EVs and ICEs) so the effects are distributed proportionately.</td>
<td>-1.1</td>
</tr>
</tbody>
</table>

Demand for car travel: The range reflects uncertainty about the magnitude of the cost reduction, the sensitivity of demand to any fall in costs, and any additional impact of new technology on demand. The upper bound assumes the cost of digital car travel falls by up to 33% and a price elasticity of demand for travel of up to -1. This boosts miles travelled by digital cars by up to 33%, which translates to an increase in total miles travelled of up to 7.5%. In addition, digital technologies create new sources of demand from new user groups (the old, young, and empty cars driven autonomously), which boost miles travelled by up to a further 7.5%. | 0 to +2.8 |