BNEF coverage

Strategies for a cleaner, more competitive future

Clean power
- Solar
- Wind
- Storage
- Decentralized energy
- Power systems & networks

Advanced transport
- Electrified transport
- Mobility services
- Connected & autonomous vehicles
- Next-gen aviation
- Next-gen shipping

Buildings & industry
- Low-carbon heat & cooling
- 3D printing & green manufacturing
- Circular economy
- Composites & bioplastics
- Energy efficiency

Agriculture / land
- Agri-chemicals & biotechnology
- Land & water management
- Alternative proteins & food demand
- Food waste management
- Agricultural technology & supply chain

Commodities
- Gas & LNG
- Power
- Oil
- Carbon
- Coal
- Metals
- Chemicals
- Agriculture

Cross-cutting technologies
- Industrial digitalization
- Hydrogen
- Bioenergy
- Carbon capture, utilization & storage (CCUS)
New Energy Outlook 2020

PART 1
Economic Transition Scenario

PART 2
NEO Climate Scenario

PART 3
Implications for policy
Energy emissions in the NEO Economic Transition Scenario

Source: BloombergNEF
Fuel combustion emissions

Source: BloombergNEF
Coal demand peaked in 2018

Source: BloombergNEF
Wind and PV grow to 56% of electricity generation worldwide in 2050

Source: BloombergNEF
Power capacity almost triples to 2050

Total installed capacity, 2019

7,367GW

- Coal: 28%
- Gas: 23%
- Oil: 16%
- Nuclear: 9%
- Hydro: 5%
- Wind: 4%
- Solar: 4%
- Other: 2%
- Storage: 2%

Total installed capacity, 2050

20,391GW

- Coal: 15%
- Gas: 7%
- Oil: 7%
- Nuclear: 2%
- Hydro: 20%
- Wind: 38%
- Solar: 9%
- Other: 4%
- Storage: 1%

Source: BloombergNEF
Innovation and scale have driven down the costs of renewable technology...

**PV module price and cumulative installed capacity**

$/W (2019 real) vs GW

- 89% reduction since 2010

**Onshore wind turbine price and cumulative installed capacity**

$m/MW (2019 real) vs GW

- 59% reduction since 2010

**Li-ion battery pack price and demand**

$/kWh (2019 real) vs GWh

- 89% reduction since 2010

Source: BloombergNEF
...and at the same time the technology keeps getting better

**PV module efficiency**

- **Mono**: 14% in 2010, 17.5% in 2012, 19.1% in 2016, 21.1% in 2018
- **Multi**: 16% in 2010, 16.2% in 2012

**Onshore wind capacity factors**

- Decile range
- Quartile range
- Average: 21.1% in 2010, 25% in 2012, 29% in 2016, 33% in 2018
- Median: 19.1% in 2010, 23% in 2012, 27% in 2016, 31% in 2018

**Battery cell energy density**

- Company disclosed
- Wh/kg: 17.5% in 2010, 21.1% in 2012, 33.2% in 2016, 45% in 2018

Sources:
- BloombergNEF
- Company interviews
- BloombergNEF, public announcements, company interviews
Renewables are now the cheapest new electricity in countries making up just under ¾ of world GDP

Source: BloombergNEF
In the next 5 years, wind & PV are on track to be cheaper than running existing coal and gas

China: new wind & PV vs. existing coal & gas

United States: new wind and PV vs. existing coal & gas

Source: BloombergNEF
But limit appears to be 70-80% wind & PV

Penetration of wind and PV in electricity generation, by country

Source: BloombergNEF
Gas use in power peaks in 2019 falls 0.7% year on year from 2030

Gas use in the power sector

Source: BloombergNEF
Gas capacity grows year on year, peakers outpace CCGT from 2029

Cumulative installed power capacity

Source: BloombergNEF
Weekly electricity generation, Germany

Source: BloombergNEF
Gas demand grows 0.5% year on year to 2050

Primary gas demand, by end-use sector
Oil demand peaks in 2035

Primary oil demand, by end-use sector

Source: BloombergNEF
Oil demand is shaped by the transition to electric drivetrains in road transport

**Global passenger vehicle sales, by drivetrain**

- **BEV**
- **PHEV**
- **FCV**
- **ICE**

**Global passenger vehicle fleet, by drivetrain**

- **ICE**
- **FCV**
- **PHEV**
- **BEV**

Source: BloombergNEF
Energy emissions in the NEO Economic Transition Scenario, and climate pathways

Source: BloombergNEF
Total final energy

2019

419 EJ

2050

516 EJ

Source: BloombergNEF
Electrification of transport, buildings and industry saves emissions...

**Emissions from end-use sectors**

**Emissions from power sector**

**Net impact of electrification**

Source: BloombergNEF

Source: BloombergNEF

Source: BloombergNEF
...and doubles the size of the power system

Cumulative installed capacity, ETS

Cumulative installed capacity, NCS-CEHP

Source: BloombergNEF Note: ETS is Economic Transition Scenario

Source: BloombergNEF Note: NCS-CEHP is NEO Climate Scenario: Clean Electricity and Green Hydrogen Pathway
Hydrogen demand, by sector, NCS-CEHP

Source: BloombergNEF  Note: NCS-CEHP is NEW Climate Scenario: Clean Electricity and Green Hydrogen Pathway
A 100,000TWh clean electricity & green hydrogen energy economy in 2050

Source: BloombergNEF Note: ETS is Economic Transition Scenario
Oil demand peaks in 2028, gas in 2023 and emissions on track for 1.75 degrees

Oil and gas demand, ETS vs NCS-CEHP

Energy emissions in the NCS-CEHP and a range of carbon budgets

Source: BloombergNEF
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