

Clean Energy Technology Trends

Testimony before the House Appropriations
Subcommittee on Energy & Water

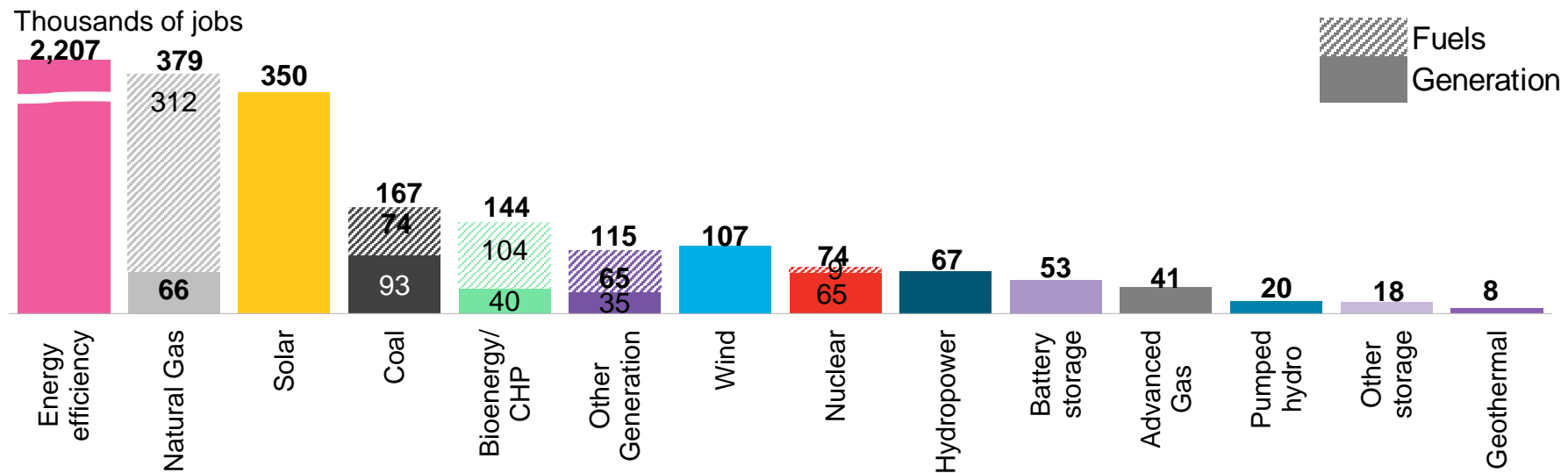
Ethan Zindler

February 07, 2019

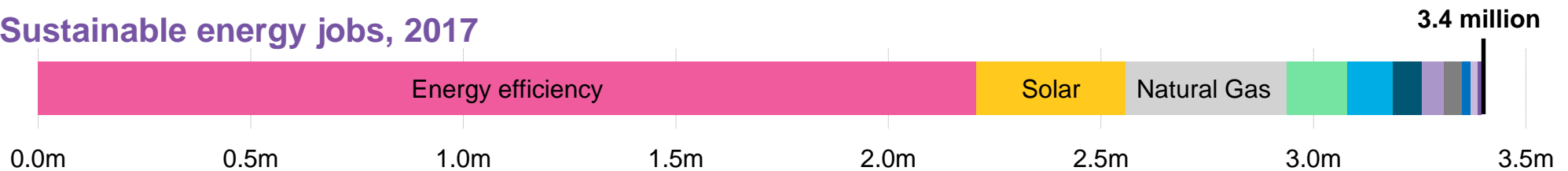
BloombergNEF

Jobs in select segments of U.S. energy

Jobs in select energy segments, 2017

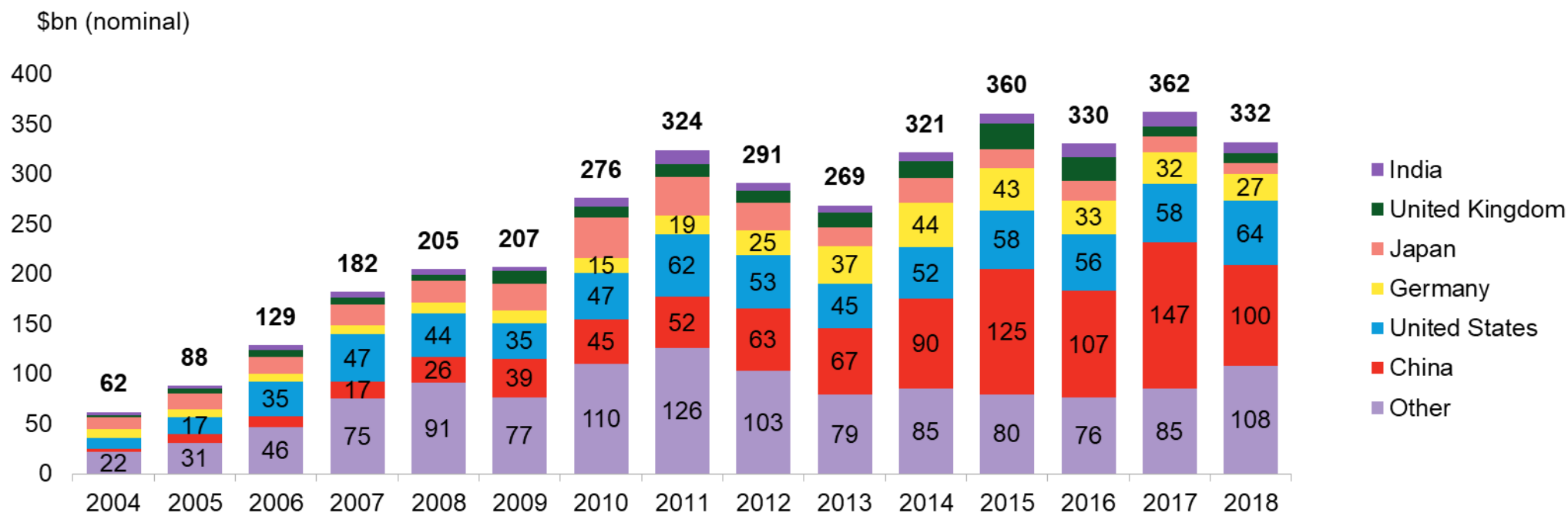


Sustainable energy jobs, 2017



Source: The U.S. Energy Employment Report, NASEO and EFI. Notes: The data provided relies on thousands of data points provided via survey. Transmission, distribution, and oil/petroleum jobs not included as available data does not break out the portion of those jobs relevant to the electricity sector. See footnote on next slide for details on the definition for "Advanced Gas." Chart to appear in 2019 Sustainable Energy in America Factbook

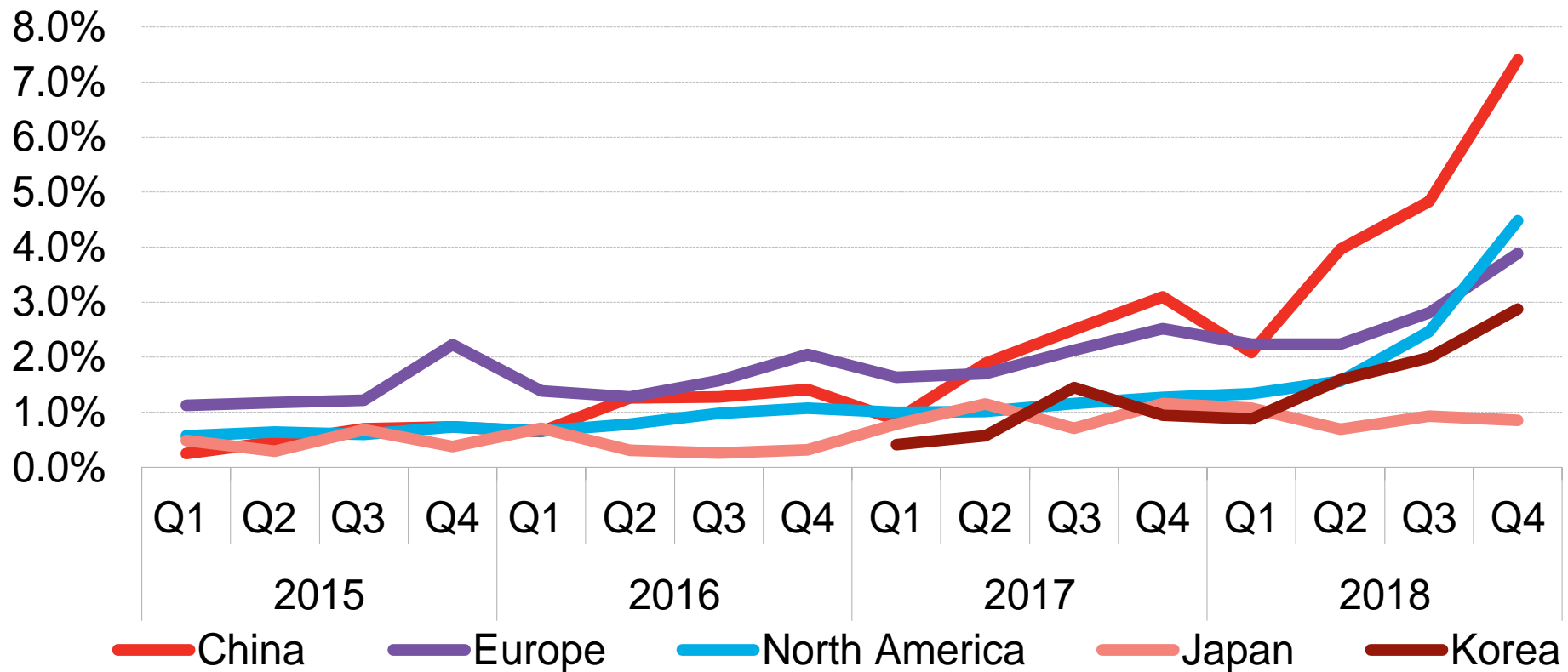
New investment in clean energy: >\$3 trillion to date



Source: BloombergNEF Notes: Includes new investment in wind, solar, biofuels, biomass, waste, energy smart technologies (such as electric vehicles and lithium-ion batteries), and other renewables/low carbon services.

Electric vehicle sales: accelerating

EV share of overall passenger vehicle sales

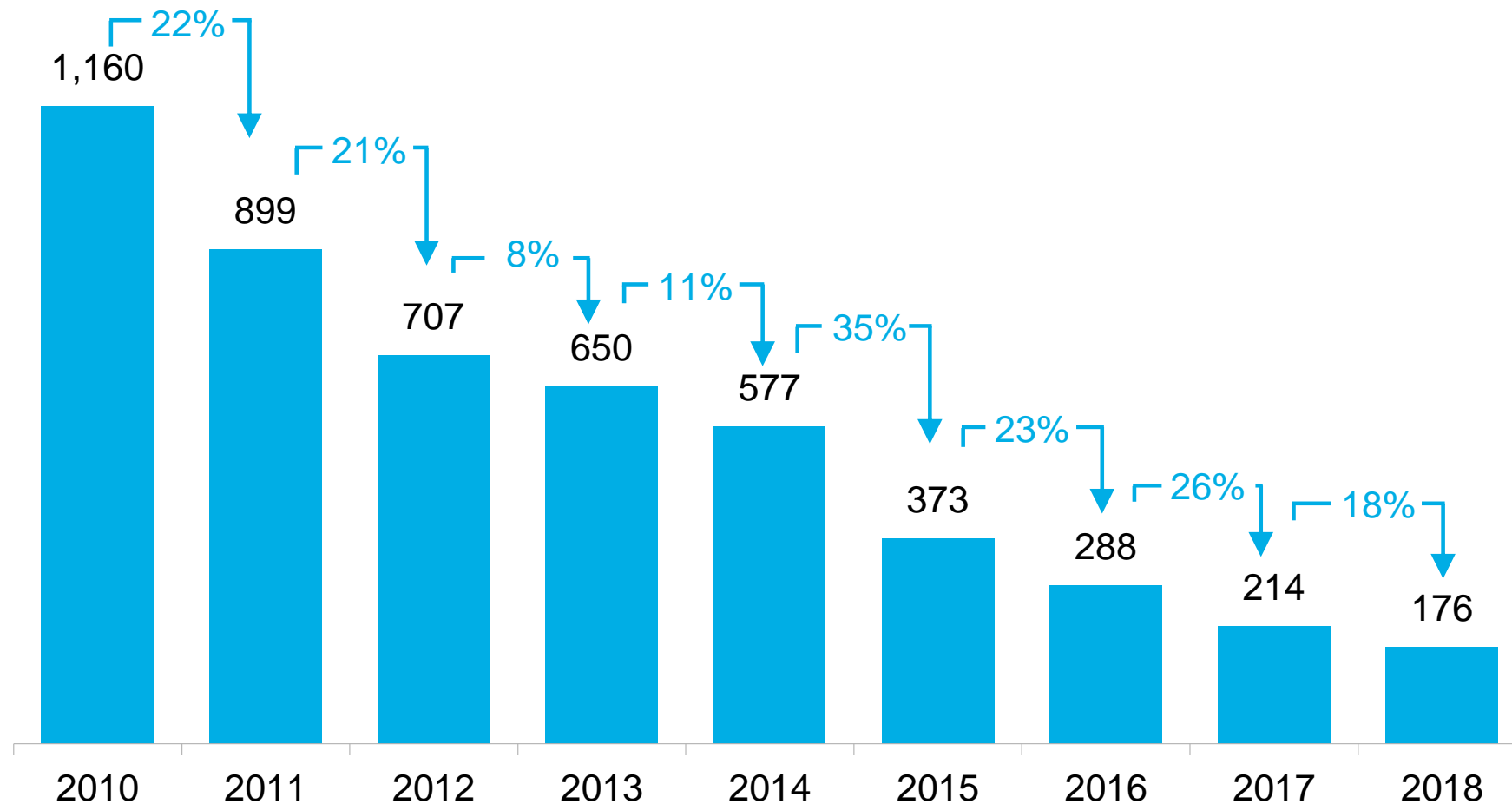


Source: China Association of Automotive Manufactures, BloombergNEF.

Lithium-ion battery prices: down another 18% in 2018

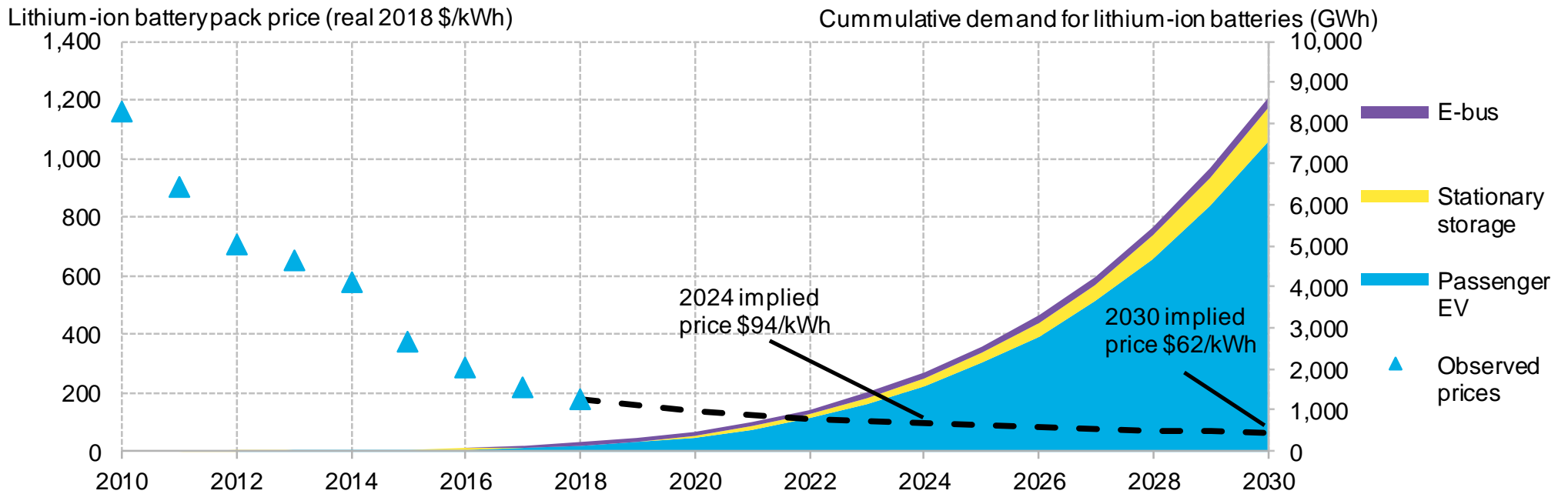


Battery pack price (real 2018 \$/kWh)



Source: BloombergNEF. Based on confidential survey of buyers/sells of li-ion batteries conducted annually by BNEF.

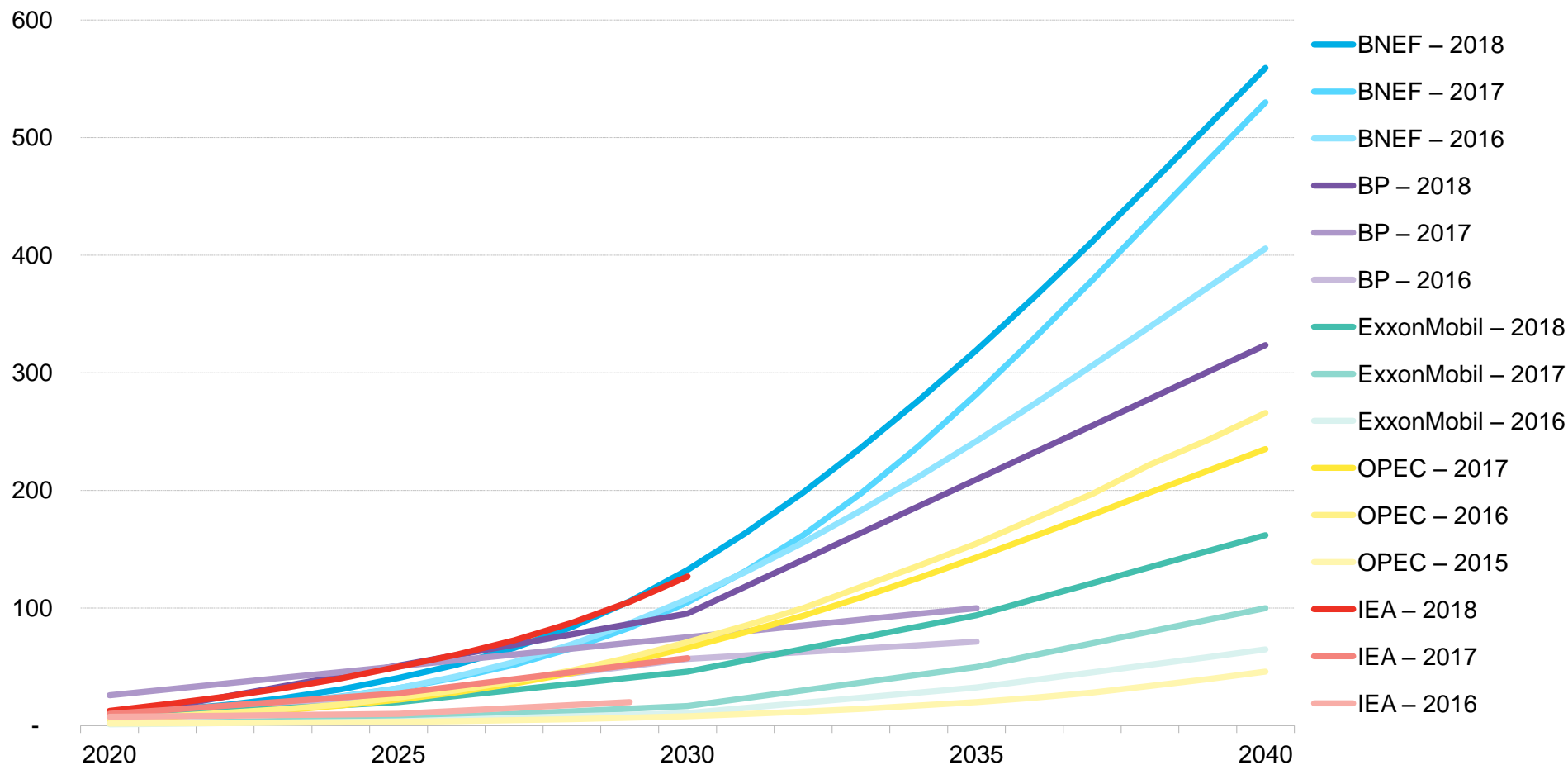
As battery prices fall, EV sales will rise



Source: BloombergNEF. Note: Prices have been changed to real 2018 dollars

Electric vehicle forecasts: trending upward

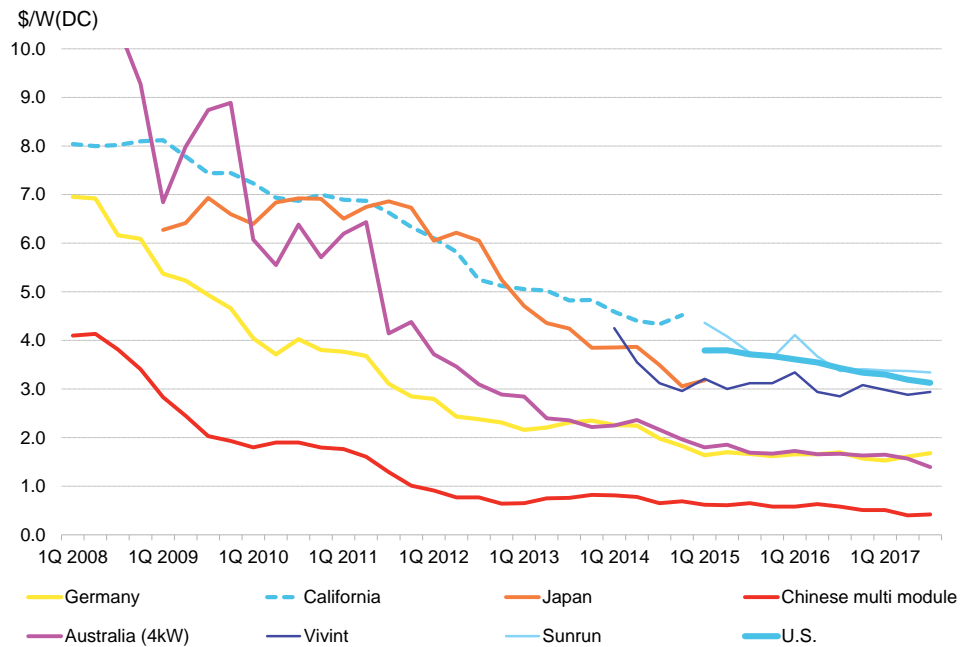
EV fleet size (millions)



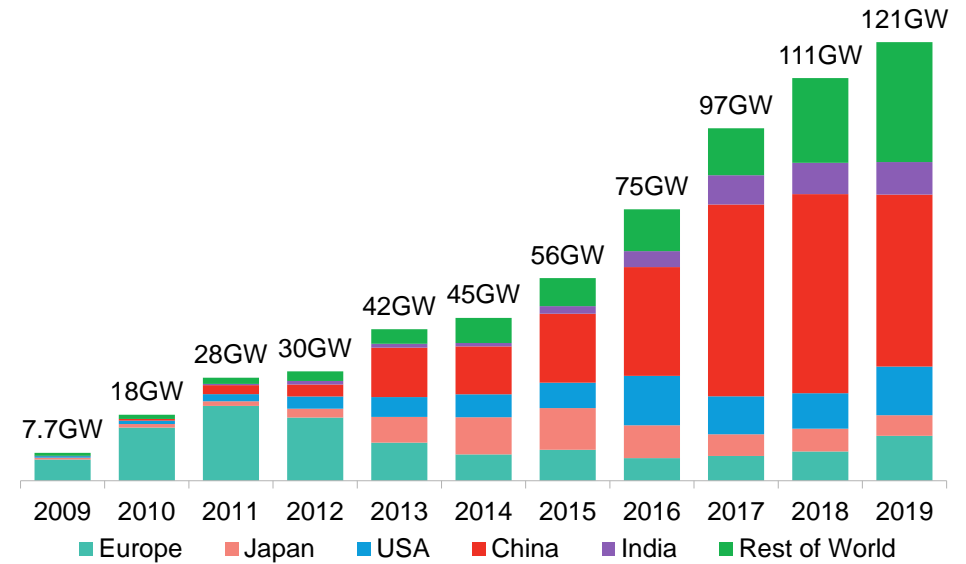
Source: BloombergNEF, organization websites. Notes: BNEF-2016, BNEF-2017, and BNEF-2018 represent our revised annual forecasts. Some data points for BP, ExxonMobil and the IEA are estimated based on organization charts, reports and data (estimates assume linear growth between known data points). Outlook assumptions and methodologies vary. BP only forecasted through 2035 in its 2016 and 2017 outlooks. The IEA only forecasts through 2030. The IEA forecasts multiple scenarios (base case values are shown here). ExxonMobil and IEA forecasts prior to 2018 included BEVs, PHEVs and FCVs; all other forecasts include just BEVs and PHEVs. See organization websites for authoritative viewpoints.

Solar: costs keep dropping, build keeps surging

Residential solar costs

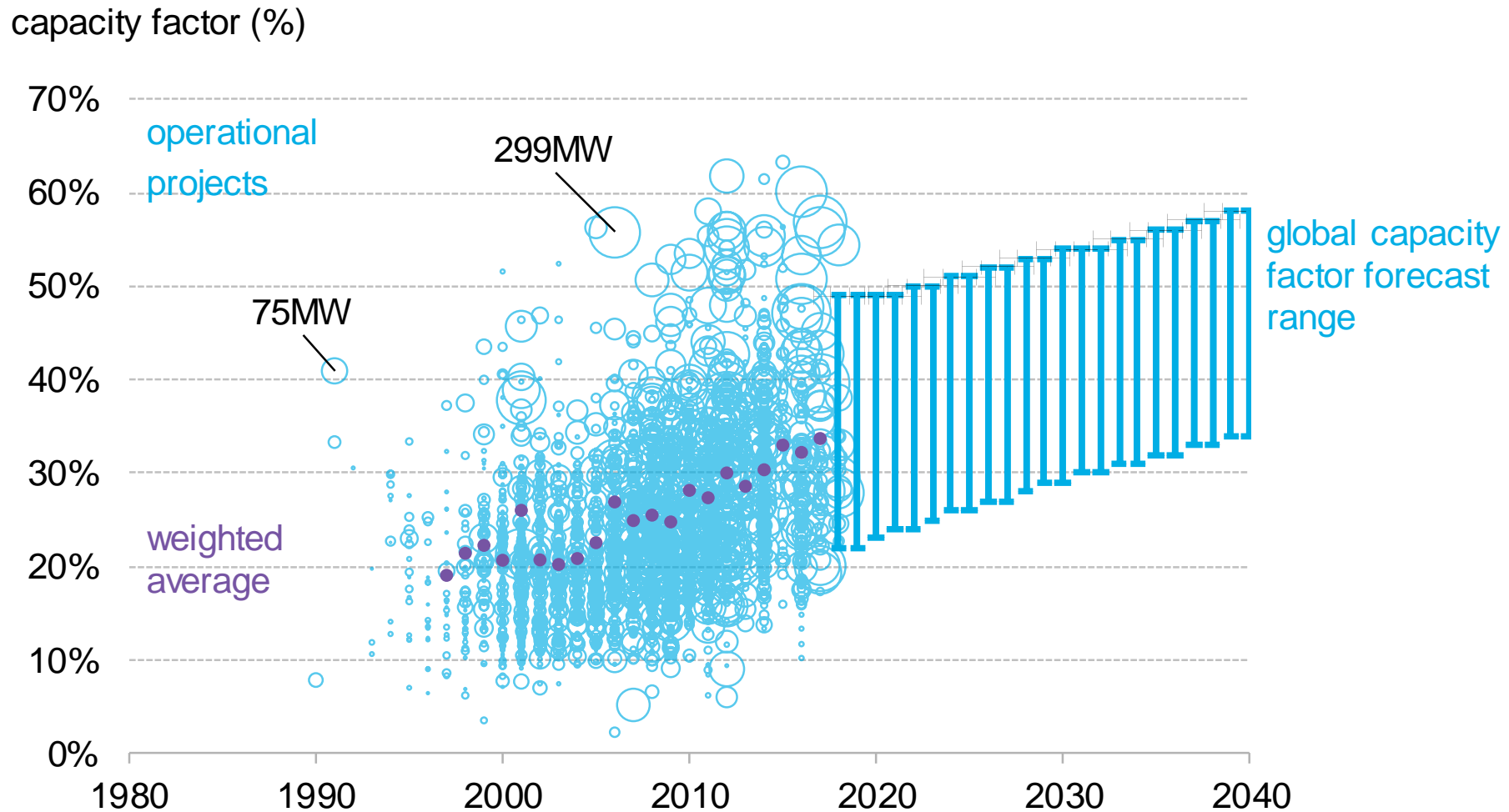


Total photovoltaic build



Source: BNEF. Data portrayed for residential solar on a \$ per installed Watt basis. Build figures are given in gigawatts.

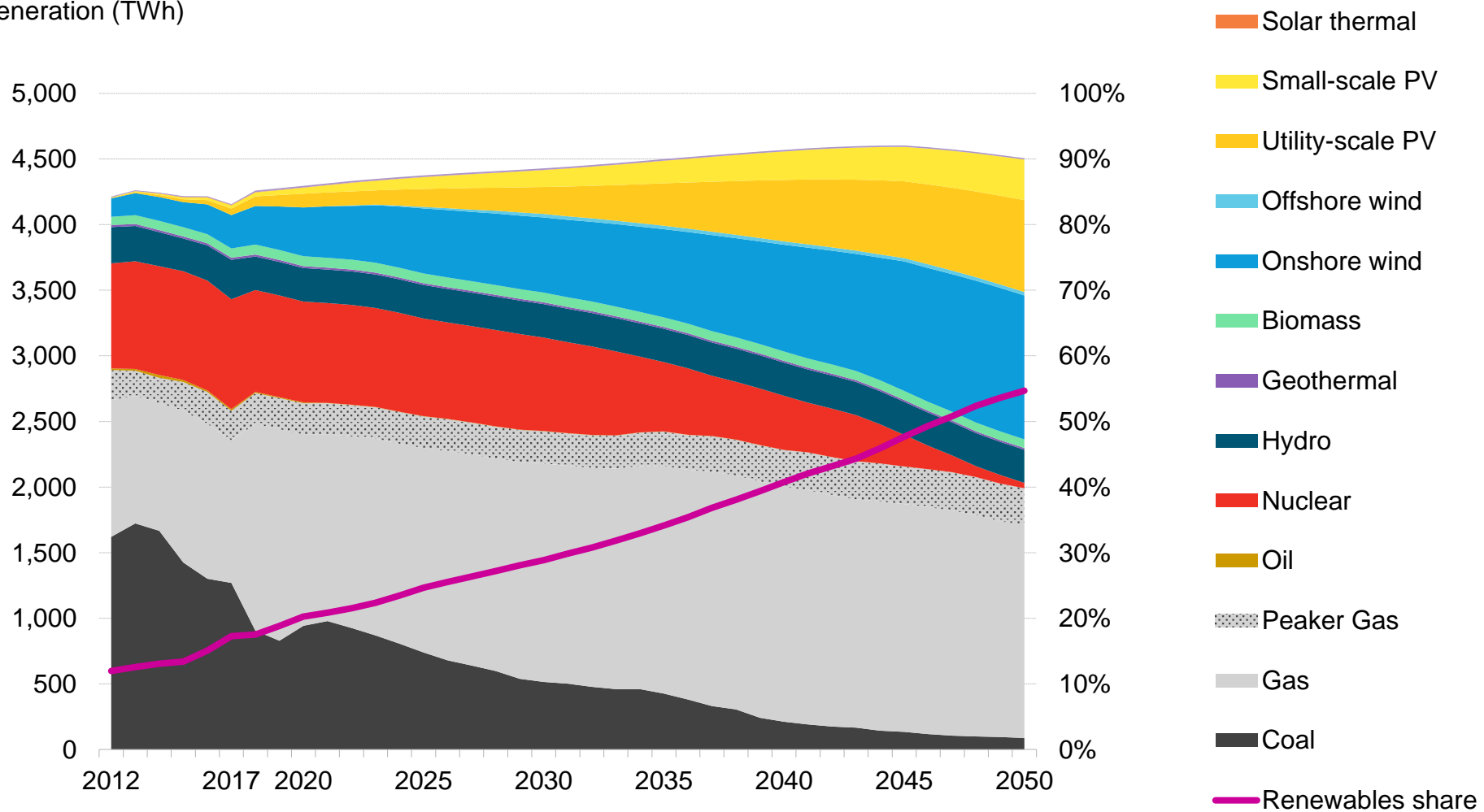
Bigger wind turbines are making more productive use of wind



Source: BloombergNEF Note: onshore wind capacity factors

Natural gas and renewables will dominate U.S. power generation

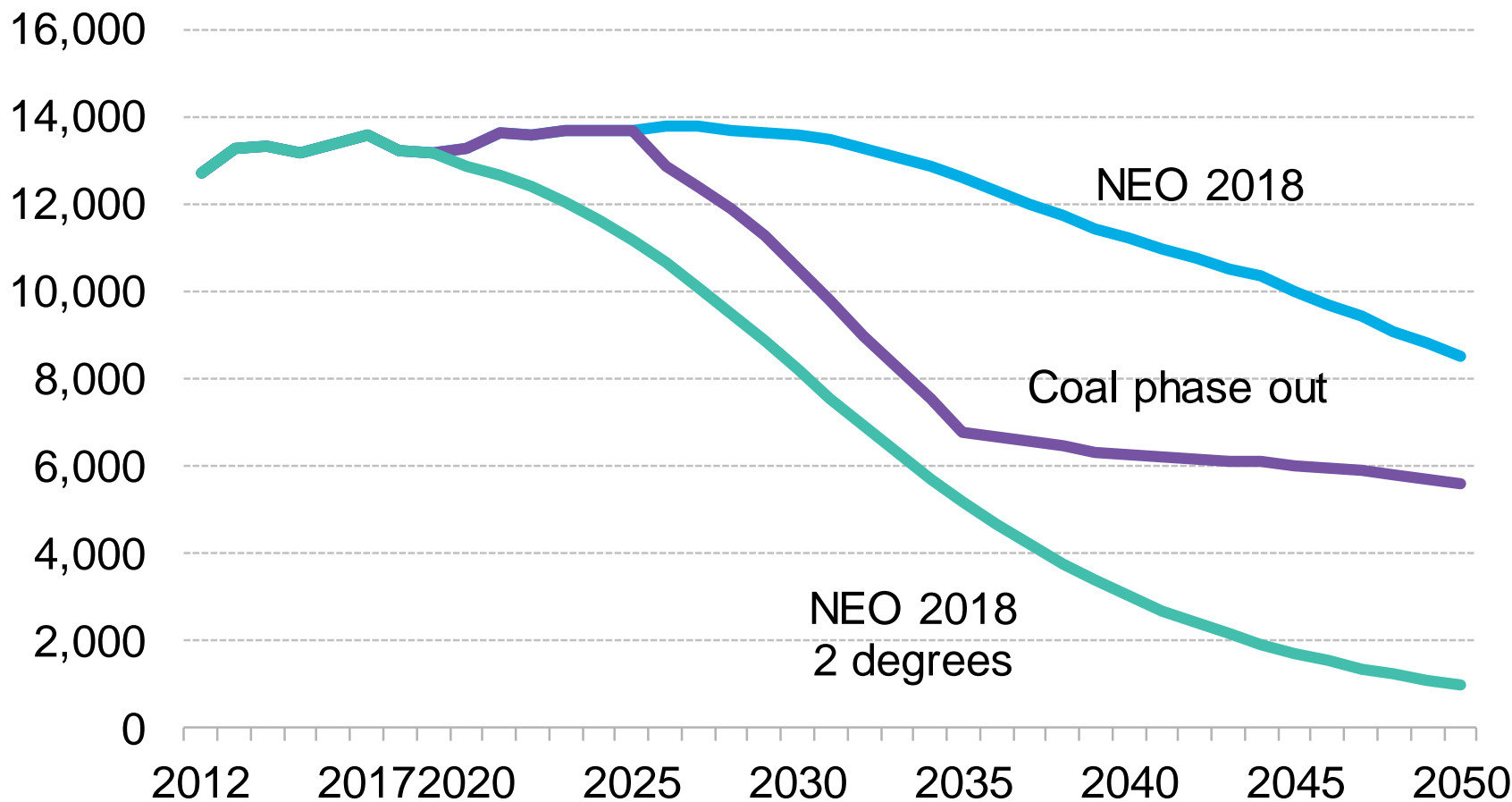
Generation (TWh)



Source: BloombergNEF New Energy Outlook projection to 2050.

Technology alone won't save the day

Global power sector CO2 emissions (MtCO2)



Source: BloombergNEF 2018 New Energy Outlook (NEO). Blue line represents BNEF central scenario for global CO2 emissions. "Coal phase out" scenario depicts emissions if all coal-fired power plants are brought off line in 10 years. "NEO 2018 2 degrees" shows the level of CO2 emissions reduction required of the power sector to keep global temperature rises within 2 degrees C.

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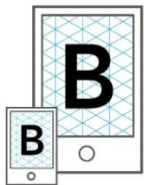
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