bp Energy Outlook 2023
CCUS and CDR

16 March 2023

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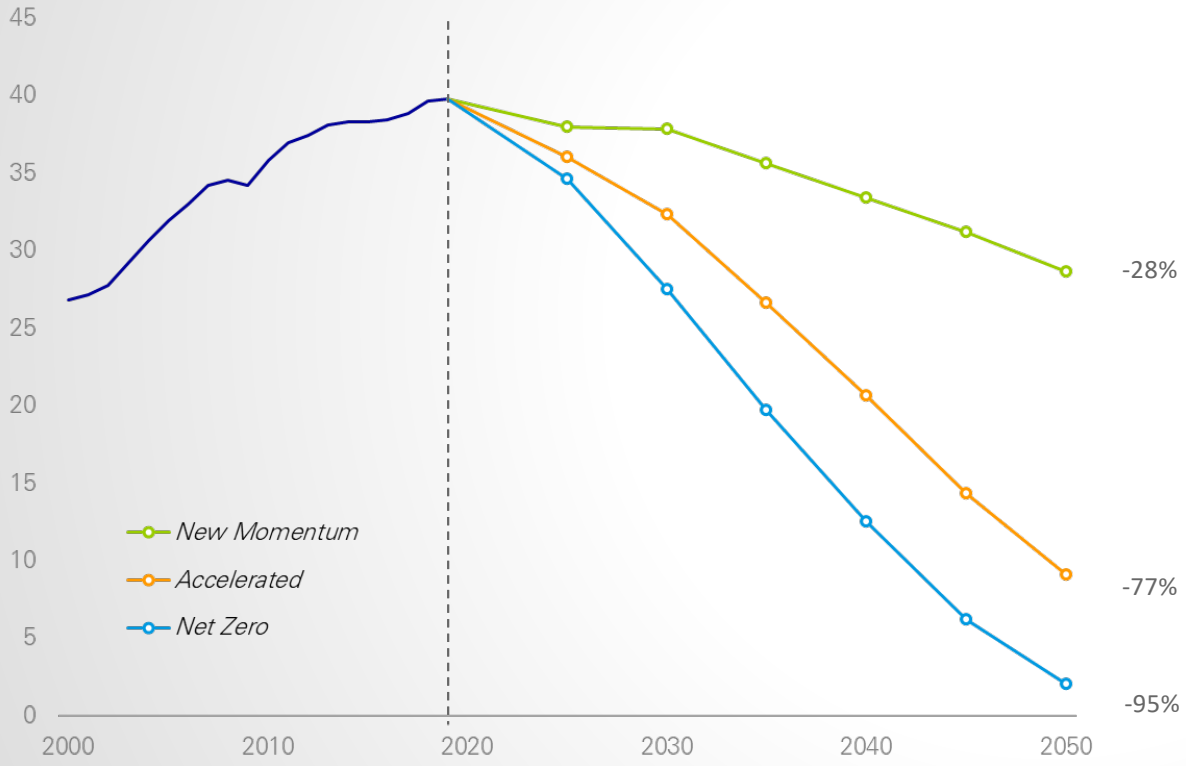
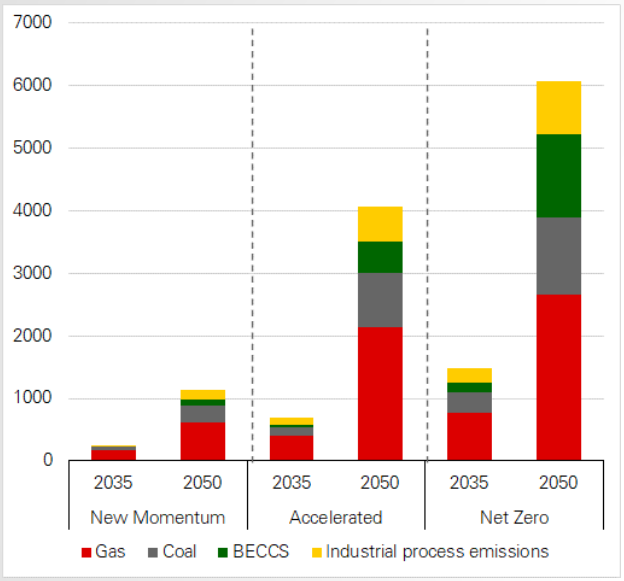
Executive Summary – Energy Outlook 2023



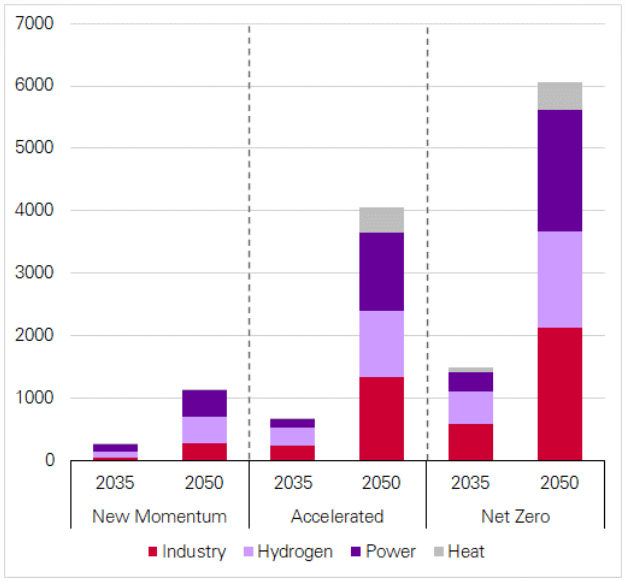
- bp Energy Outlook 2023 (EO23) uses three scenarios (Accelerated, Net Zero and New Momentum) to consider a range of possible outcomes
- Two key updates have been made to last year's analysis:
  - *Russia-Ukraine war*
  - *Passing of the Inflation Reduction Act in the US*
- *Accelerated (ACC)* and *Net Zero (NZ)* explore how the energy system may change in order to significantly reduce carbon emissions (CO_2e)
  - *Scenarios are broadly in line with "Paris consistent" IPCC scenarios*
- *New Momentum (NM)* is designed to capture the trajectory along which the global energy system is currently travelling, with decarbonization focus increasing but at a slower rate

CCUS reaches 1-6 Gtpa by 2050 across the scenarios

Mt (by source)



Mt (by sector)



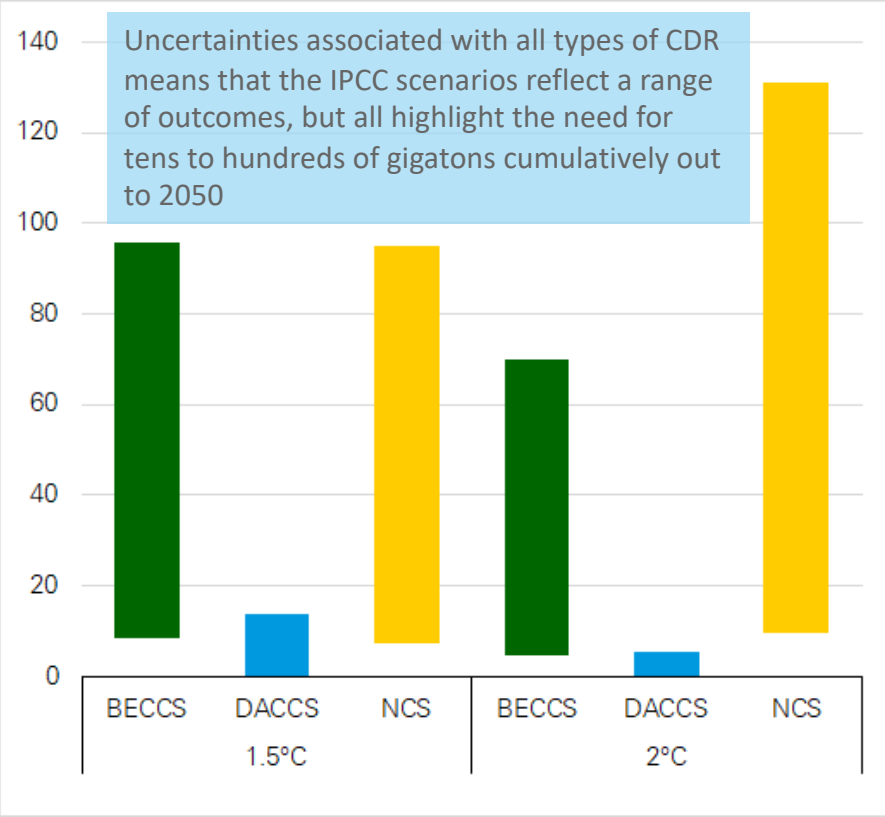
CCUS deployment is split broadly equally across industry, hydrogen and power with a smaller amount on heat

- Around 15% of total deployment in 2050 is used to store cement process emissions (limited decarbonization alternatives)
- BECCS accounts for around 10% of deployment in *New Momentum* and *Accelerated* and around 20% in *Net Zero* in 2050
- In *Accelerated* and *Net Zero* CCUS on gas split fairly evenly across blue hydrogen, power and industry
- The US, Middle East, Russia, and China account for 2/3 of all gas with CCUS applications in *Accelerated* and *Net Zero*
- Vast majority of CCUS with coal in regions with relatively new coal-based assets in power and steel, largely in emerging Asia, led by China

SS&V

Carbon dioxide removal is necessary to achieve the Paris climate goals

Cumulative carbon dioxide removal in IPCC scenarios: 2015-2050
Gt CO_2



Annual carbon dioxide removal in median IPCC 1.5°C scenario
Gt CO_2