



bp Energy Outlook – 2022

Insights from the Accelerated, Net Zero and New Momentum scenarios – Global

The world transitions to a lower carbon energy mix as renewables penetrate rapidly displacing fossil fuels, but with significant variation between scenarios

1. Under all three scenarios, primary energy increases as global GDP more than doubles over the next 30 years
2. Renewable energy grows strongly in all scenarios, led by wind and solar
3. The world continues to electrify, leading the power sector to play a central role in the global energy system

>50,000 TWh

electricity demand in 2050 up from 27,000 TWh today

30% to 65%

share of renewables in 2050, up from 10% in 2019

33% to 65%

share of electricity in final consumption in 2050

-20% to -95%

decline in carbon emissions between 2019 and 2050

- ▶ Energy efficiency improves between 2% and 3.5% p.a. depending on the scenario, compared with a 1.5% p.a. average of the recent past.
- ▶ Fossil fuels as share of primary energy declines from just below 80% today to between under 60% in **New Momentum** and 20% in **Net Zero**, of which nearly half is abated with CCUS.
- ▶ Within fossil fuels, natural gas remains the most resilient, increasing by nearly a third in **New Momentum** by 2050. In **Accelerated**, gas increases over the next decade before declining to one-third below 2019 level in 2050. In **Net Zero**, gas demand falls by nearly 60% over the same period.
- ▶ Oil demand peaks in the mid-2020s in **Accelerated** and around 2030 in **New Momentum**. In all scenarios oil demand declines by 2050 to between 25 mb/d and 80 mb/d.
- ▶ Coal declines in all scenarios to between 3% and below 15% of primary energy, compared to 25% today.
- ▶ Electricity generation more than doubles by 2050 in **Accelerated** and **Net Zero** and increases by 85% in **New Momentum**.
- ▶ Wind and solar power contribute between 85% and 115% of generation growth to 2050, reaching between 11,000 and 21,000 GW of installed capacity depending on the scenarios. This compares to 1,200 GW of installed capacity in 2019.
- ▶ Hydrogen demand increases as the energy system progressively decarbonizes to nearly 300 Mt in **Accelerated** by 2050 and 450 Mt in **Net Zero**, of which over 60% is generated by wind and solar. Hydrogen demand in **New Momentum** reaches 50 Mt over the same period, one-third of which is 'green'.
- ▶ The use of modern, sustainable bioenergy increases strongly in all scenarios, with total bioenergy growing by nearly a third by 2050 to around 70 EJ, 10% of primary energy.





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	Level in 2050				2019	Shares in 2050 (%)			Change 2019-2050 (% p.a.)		
	2019	Accelerated	Net Zero	New Momentum		2019	Accelerated	Net Zero	New Momentum	Accelerated	Net Zero
Primary energy consumption (EJ)											
Total	627	692	653	760	100	100	100	100	0.3	0.1	0.6
Oil†	193	87	44	154	31	13	6.8	20	-2.5	-4.6	-0.7
Natural gas	140	94	61	181	22	14	9.3	24	-1.3	-2.7	0.8
Coal	158	25	17	103	25	3.6	2.7	13	-5.8	-6.9	-1.4
Nuclear	25	40	49	27	4.0	5.8	7.5	3.6	1.6	2.2	0.3
Hydro	38	61	65	48	6.0	8.8	9.9	6.3	1.6	1.8	0.8
Renewables (incl. biofuels)	74	384	418	247	12	56	64	33	5.5	5.7	4.0
Primary energy consumption (native units)											
Oil† (Mb/d)	98	47	24	81							
Natural gas (Bcm)	3,900	2,614	1,681	5,020							
Total final consumption by sector (EJ)											
Total	477	420	351	542	100	100	100	100	-0.4	3.5	5.0
Transport	119	103	91	120	25	25	26	22	-0.5	-0.8	0
Feedstocks	38	39	30	49	7.9	9.3	8.5	9.0	0.1	-0.7	0.8
Buildings	132	114	94	157	28	27	27	29	-0.5	-1.1	0.6
Industry	188	163	136	217	39	39	39	40	-0.5	-1.0	0.5
Generation (native units)											
Power (TWh)	27,143	58,150	62,974	50,057					2.5	2.8	2.0
Hydrogen (Mt)	66	287	446	146					4.8	6.3	2.6
Production											
Oil† (Mb/d)	98	46	24	80					-2.4	-4.4	-0.6
Natural gas (Bcm)	3,976	2,617	1,681	5,020					-1.3	-2.7	0.8
Coal (EJ)	168	25	16	99					-6.0	-7.2	-1.7
Emissions											
Carbon emissionst†† (Gt of CO ₂ e)	40	9.9	2.4	31					-4.4	-8.7	-0.8
CCUS (Mt of CO ₂)	0	4,162	6,018	911					56	58	49

EJ = exajoules

† Oil supply includes crude oil, shale oil, oil sands, natural gas liquids, liquid fuels derived from coal and gas, and refinery gains, but excludes biofuels. Oil demand includes consumption of all liquid hydrocarbons but excludes biofuels. †† Carbon emissions include CO₂ emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production.