



# bp Energy Outlook – 2023

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

The war in Ukraine has accelerated the decarbonization of the energy system, with carbon emissions in **New Momentum** declining by over 70% while **Net Zero** achieves negative emissions by 2050

1. Renewables are the only source of energy that grows across all scenarios, multiplying by a factor of three in 2019-2050
2. Total final consumption of energy declines between a third and a half due to a significant increase in energy efficiency
3. Green hydrogen production boosts and around 20-30% of total renewable installed capacity is devoted to its production

### Over 20%

decline in primary energy in 2019-2050 in all scenarios

### 59% to 78%

share of renewables in primary energy in 2050

### 41% to 46%

growth in electricity generation in 2019-2050

### -0.1 to 0.8

### GtCO<sub>2</sub>e

level of carbon emissions by 2050

- ▶ Total final consumption declines between 36% and 53% in 2019-2050. Hydrogen is the only energy source that grows strongly, representing between 5% and 10% of total final demand in 2050. Electricity generation also grows but moderately, around 1.2% per year in 2019-2050.
- ▶ In this context, primary energy also decreases in all three scenarios, showing. Average decline per year in 2019-2050 is between 0.8% and 1.4%.
- ▶ Primary energy from renewables grows strongly in all scenarios, boosted by policies designed to reduce emissions and to increase energy security. In 2019-2050 average growth is between 3.2% and 3.6%.
- ▶ Demand of hydrogen threefold in **New Momentum**, sixfold in **Accelerated**, and eightfold in **Net Zero**. This strong growth implies that between 18% to 30% of total renewable installed capacity is devoted to the production of green hydrogen.
- ▶ Fossil fuels demand declines strongly in 2019-2050. Coal, natural gas, and coal fall over 85% in **Accelerated** and **Net Zero**. In **New Momentum** natural gas is more resilient declining by 45%, while oil and coal decrease above 70% in 2019-2050.
- ▶ The EU is deeply decarbonized in all scenarios thanks to a fall in total final consumption, accelerated growth in renewables, mild growth of electricity generation and strong growth of low-carbon hydrogen demand.
- ▶ In the **New Momentum** scenario emissions decline over 70%, achieving a level of 0.8 GtCO<sub>2</sub> in 2050 from 3 GtCO<sub>2</sub> in 2019. In the **Accelerated** scenario, the level of emissions is around 0.1 GtCO<sub>2</sub> and negative in **Net Zero**. All the scenarios have some CCUS (carbon capture, usage and storage) used in hard-to-abate sectors.



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	Level in 2050				2019	Shares in 2050 (%)			Change 2019-2050 (% p.a.)		
	2019	Accelerated	Net Zero	New Momentum		Accelerated	Net Zero	New Momentum	Accelerated	Net Zero	New Momentum
<b>Primary energy consumption by fuel (EJ)</b>											
<b>Total</b>	<b>65</b>	<b>45</b>	<b>42</b>	<b>51</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>-1.2</b>	<b>-1.4</b>	<b>-0.8</b>
Oil†	23	3.1	1.3	6.9	35	6.9	3.1	13	-6.3	-8.9	-3.8
Natural gas	14	1.2	1.2	7.7	21	2.6	2.8	15	-7.7	-7.7	-1.9
Coal	7.3	0.1	0.1	0.7	11	0.3	0.3	1.3	-12	-13	-7.4
Nuclear	6.8	3.2	3.4	2.5	10	7.2	8.2	5.0	-2.4	-2.2	-3.1
Hydro	2.8	3.2	3.2	3.0	4.3	7.0	7.7	5.9	0.4	0.4	0.2
Renewables (incl. biofuels)	11	34	33	30	17	76	78	59	3.6	3.4	3.2
<b>Primary energy consumption (native units)</b>											
Oil† (Mb/d)	11	1.6	0.7	3.3							
Natural gas (Bcm)	389	32	33	215							
<b>Total final consumption by sector (EJ)</b>											
<b>Total</b>	<b>50</b>	<b>26</b>	<b>24</b>	<b>32</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>-2.1</b>	<b>1.3</b>	<b>2.3</b>
Transport	16	11	9.9	11	32	41	42	34	-1.3	-1.5	-1.2
Feedstocks	3.8	1.4	1.1	2.2	7.6	5.5	4.8	6.8	-3.1	-3.9	-1.8
Buildings	16	8.5	7.8	11	32	33	33	33	-2.0	-2.3	-1.3
Industry	14	5.3	4.8	8.4	29	20	20	26	-3.2	-3.5	-1.7
<b>Generation</b>											
Power (TWh)	2,880	4,209	4,047	4,215					1.2	1.1	1.2
Hydrogen (Mt)	5.7	20	24	12					4.1	4.8	2.5
<b>Production</b>											
Oil† (Mb/d)	0.7	0.4	0.2	0.3					-1.9	-3.8	-2.3
Natural gas (Bcm)	61	3.2	3.2	19					-9.1	-9.1	-3.7
Coal (EJ)	4.4	0.1	0	0.3					-12	-14	-8.3
<b>Emissions</b>											
Carbon emissions (Gt of CO <sub>2e</sub> )	3.0	0.1	-0.1	0.8					-9.6	-	-4.0
CCUS (Mt of CO <sub>2</sub> )	0	118	217	62							

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 CO<sub>2</sub> emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production.