



# bp Energy Outlook – 2023

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

Strong growth in renewable electricity and bioenergy leads the decarbonization of Brazil's energy system. Wind and hydropower become the major sources of energy in all scenarios by 2050

1. Primary energy consumption grows to 2050 in **New Momentum** but remains broadly stable at around late 2020's levels in **Net Zero**
2. Renewable energy grows strongly in all the scenarios, providing over half of primary energy in **Accelerated** and **Net Zero**
3. Electricity in final consumption grows by over 50% in all three scenarios

**-2% to 18%**

growth in primary energy in 2019-2050 under all scenarios

**6% to 23%**

share of oil in primary energy in 2050

**45% to 61%**

share of renewables in primary energy in 2050

**-14% to -100%**

net change in CO<sub>2</sub> emissions by 2050 relative to 2019

- ▶ Brazil's economy grows at a rate of 0.9% per year in 2019-2050, down from 1.4% per year over the past 20 years.
- ▶ Primary energy grows in all three scenarios in the short term. By 2050 it falls by 2% in **Net Zero** while it grows by 6% in **Accelerated** and by 18% in **New Momentum**. Average growth per year is in the range of -0.1% to 0.5%.
- ▶ The share of gas in total primary energy has been broadly stable around 2019 levels (8%) over the past 15 years. However, gas' share increases in **New Momentum** but declines slightly in **Accelerated** and **Net Zero**, reaching between 6% and 11% by 2050.
- ▶ The share of oil in total primary energy over the past 30 years has been broadly stable at around 35%. However, oil's share declines in all scenarios, reaching between 6% and 23% by 2050.
- ▶ Renewables (inc. biofuels) are Brazil's largest source of primary energy by 2050. The share of wind in renewable generation reaches ~30% in **New Momentum** and at ~40% it overtakes hydro as the main source of renewable generation in **Accelerated** and **Net Zero**.
- ▶ Electricity generation in 2050 is around two times that in 2019 in all scenarios, with solar and wind power accounting for 80% to 97% of that growth.
- ▶ Brazil's hydrogen demand increases by 16x in **New Momentum** and 110x in **Net Zero**. 60% of the hydrogen growth is from green hydrogen in **New Momentum**, with around 70% of hydrogen growth from green hydrogen in **Accelerated** and **Net Zero**.
- ▶ Carbon emissions fall by 2050 in all scenarios. In **New Momentum**, emissions fall by 14% relative to 2019. In **Accelerated** and **Net Zero**, they start to decline earlier and faster, decreasing by 68% and 100% by 2050.



# bp Energy Outlook – 2023

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

	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
<b>Primary energy consumption by fuel (EJ)</b>											
<b>Total</b>	<b>16</b>	<b>17</b>	<b>15</b>	<b>18</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>0.2</b>	<b>-0.1</b>	<b>0.5</b>
Oil†	5.2	2.3	0.9	4.2	33	14	6.0	23	-2.6	-5.4	-0.6
Natural gas	1.3	0.7	0.6	1.8	8.2	4.1	4.1	9.8	-2.1	-2.3	1.1
Coal	0.6	0.2	0.1	0.4	4.2	1.1	0.8	2.4	-4.1	-5.3	-1.2
Nuclear	0.1	0.4	0.7	0.2	0.9	2.5	4.3	0.9	3.4	5.0	0.5
Hydro	3.5	3.6	3.7	3.5	23	22	24	19	0.1	0.1	0
Renewables (incl. biofuels)	4.8	9.3	9.2	8.2	31	56	61	45	2.2	2.2	1.8
<b>Primary energy consumption (native units)</b>											
Oil† (Mb/d)	2.6	1.2	0.5	2.2							
Natural gas (Bcm)	36	19	17	50							
<b>Total final consumption by sector (EJ)</b>											
<b>Total</b>	<b>12</b>	<b>11</b>	<b>8.4</b>	<b>13</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>-0.4</b>	<b>-1.1</b>	<b>0.4</b>
Transport	4.1	3.3	2.5	3.8	34	32	30	28	-0.7	-1.5	-0.3
Feedstocks	0.6	0.7	0.5	0.9	5.1	6.6	5.8	6.6	0.5	-0.7	1.2
Buildings	2.2	2.1	1.7	2.7	18	20	21	20	-0.2	-0.7	0.7
Industry	5.0	4.4	3.6	6.1	42	42	43	45	-0.4	-1.0	0.6
<b>Generation</b>											
Electricity (TWh)	651	1,217	1,340	1,117					2.0	2.4	1.8
Hydrogen (Mt)	0.1	6.7	11	1.6					15	16	9.3
<b>Production</b>											
Oil† (Mb/d)	2.9	0.4	0.5	4.2					-6.4	-5.4	1.2
Natural gas (Bcm)	26	17	15	35					-1.4	-1.8	1.0
Coal (EJ)	0.1	0	0	0					-9.2	-11	-5.7
<b>Emissions</b>											
Carbon emissions (Gt of CO <sub>2</sub> e) <sup>††</sup>	0.5	0.2	0	0.4					-3.7	-184	-0.5
CCUS (Mt of CO <sub>2</sub> )	0	60	117	8.6							

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.