# 21. Les perspectives énergétiques

## *21.3 – BP Energy Outlook*

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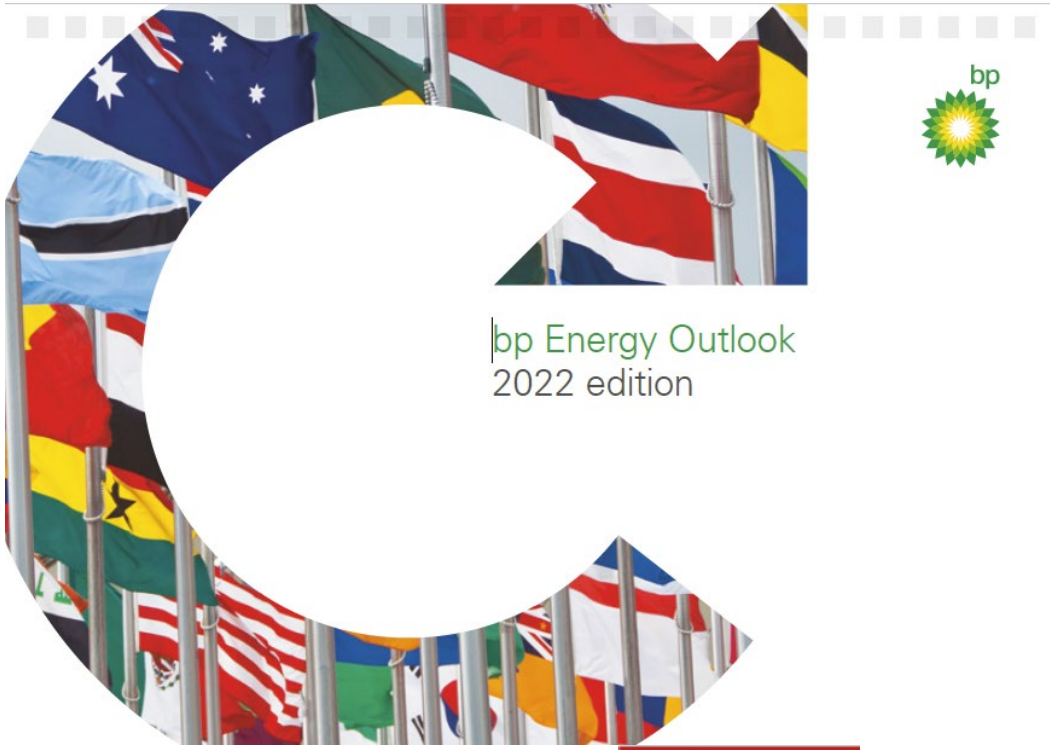

# Plan de la présentation

- Introduction et objectifs de la capsule
- Key themes
- Overview et Core Beliefs
- Impacts of Covid-19
- Key figures
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# Introduction et objectifs

- Le document original de BP est assez long. Trop pour ce cours;
- Il faut considérer la portion Key thèmes (pages 7) mais lisez aussi le début qui explique comment on construit les scénarios;
- Il faut ensuite se limiter à l'Overview et au Core Beliefs  (pages 10 à 16 et 28 à 35);
- Cette année, Le rapport a sorti une section dédiée au changement depuis 2020 et notamment l'impact de la crise du covid (pages 20 à 21);
- Le reste est à votre discrétion.

# Introduction et objectifs

- Objectifs de cette présentation
  - Présenter les Key Themes des perspectives de BP ;
  - Présenter la section Overview et Core Beliefs des perspectives de BP ;
  - Présenter la section des changements depuis 2020 ;
  - Présenter l'Annexe Key Figures (page 135 et suivante).

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# Key themes

The Outlook can be used to identify aspects of the energy transition which are common across the main scenarios and so may provide a guide as to how the energy system may evolve over the next 30 years.

- The carbon budget is running out: $CO_2$ emissions have increased in every year since the Paris COP in 2015, except in 2020. Delaying decisive action to reduce emissions sustainably could lead to significant economic and social costs.
- Government ambitions globally have grown markedly in the past few years pointing to new, increased momentum in tackling climate change. But there is significant uncertainty as to how successful countries and regions will be in achieving those aims and pledges.
- The structure of energy demand changes, with the importance of fossil fuels gradually declining, replaced by a growing share of renewable energy and increasing electrification. The transition to a low-carbon world requires a range of other energy sources and technologies, including low-carbon hydrogen, modern bioenergy, and carbon capture, use and storage (CCUS).
- The movement to a lower carbon energy system leads to a fundamental restructuring of global energy markets, with a more diversified energy mix, increased levels of competition, shifting economic rents, and a greater role for customer choice.
- Oil demand increases to above its pre-COVID-19 level before falling further out. Declines in oil demand are driven by the increasing efficiency and electrification of road transportation. Natural declines in existing hydrocarbon production imply continuing investment in new upstream oil and gas is required over the next 30 years.

# Key themes

- The use of natural gas is supported, at least for a period, by increasing demand in fast-growing emerging economies as they continue to industrialize and reduce their reliance on coal. Growth in liquefied natural gas plays a central role in increasing emerging markets' access to natural gas.
- Wind and solar power expand rapidly, accounting for all or most of the increase in global power generation, underpinned by continuing falls in their costs and an increasing ability of power systems to integrate high concentrations of variable power sources. The growth in wind and solar power requires a substantial increase in the pace of investment in both new capacity and enabling technologies and infrastructure.
- The use of modern bioenergy increases substantially, providing a low-carbon alternative to fossil fuels in hard-to-abate sectors.
- The use of low-carbon hydrogen increases as the energy system progressively decarbonizes, carrying energy to activities and processes which are difficult to electrify, especially in industry and transport. The production of low-carbon hydrogen is dominated by green and blue hydrogen, with green hydrogen growing in importance over time.
- CCUS plays a central role in supporting a low-carbon energy system: capturing emissions from industrial processes, providing a source of carbon dioxide removals, and abating emissions from fossil fuels.
- A range of carbon dioxide removals – including bioenergy combined with carbon capture and storage, natural climate solutions, and direct air capture with storage – may be needed for the world to achieve a deep and rapid decarbonization.

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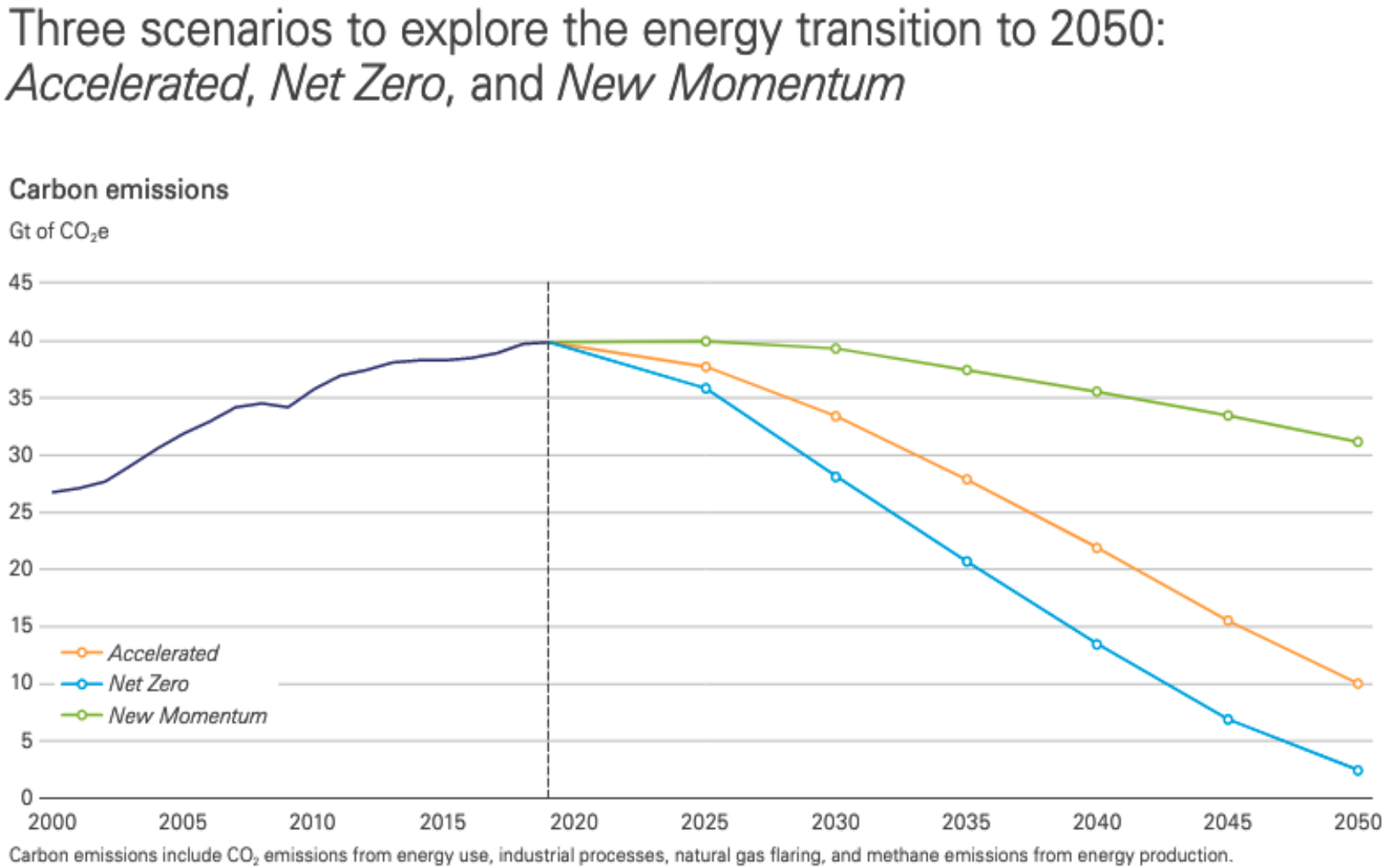
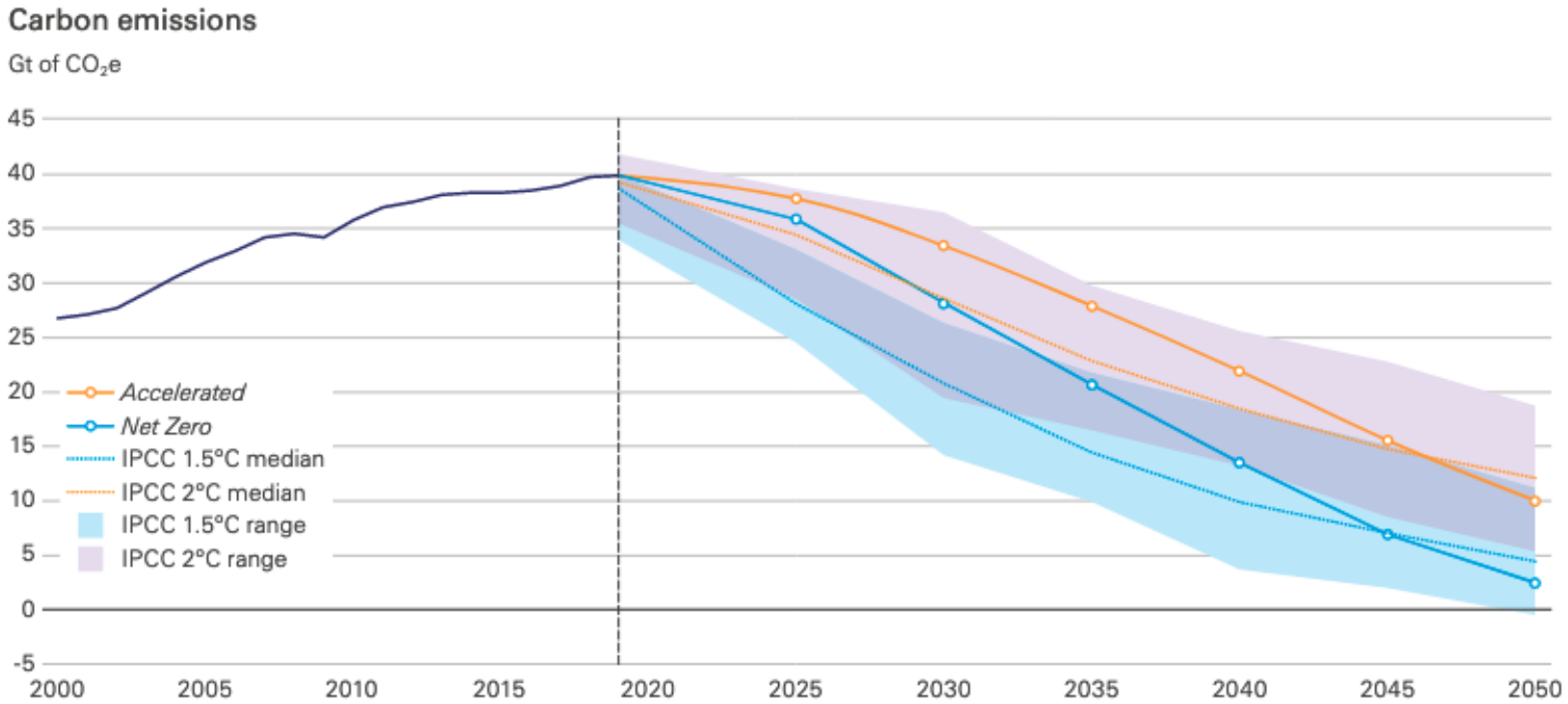
# Overview et Core Beliefs




- Les scénarios permettent d'explorer l'éventail des possibilités au cours des 30 prochaines années
- Les scénarios ont été préparés avant le conflit militaire en Ukraine
- Le scénario net zéro accéléré prend l'hypothèse de décisions politiques fortes en faveur du climat
- Le scénario net comprend des changements de comportements
- Le new momentum suit les évolutions actuelles

# Overview et Core Beliefs

*Accelerated* and *Net Zero* are broadly in line with 'Paris consistent' IPCC scenarios

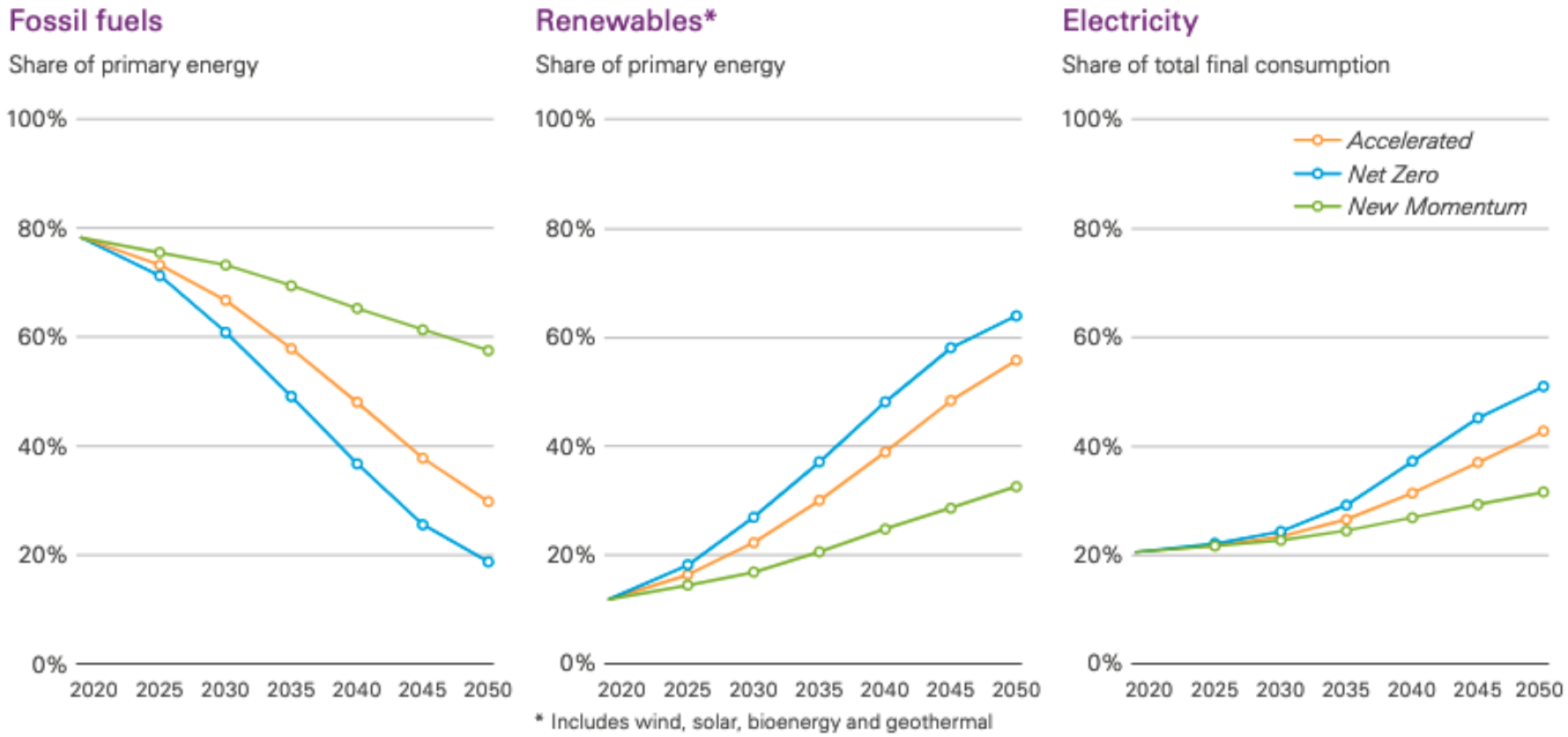



Carbon emissions include $CO_2$ emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production.
Ranges show 10th and 90th percentiles of the IPCC scenarios.

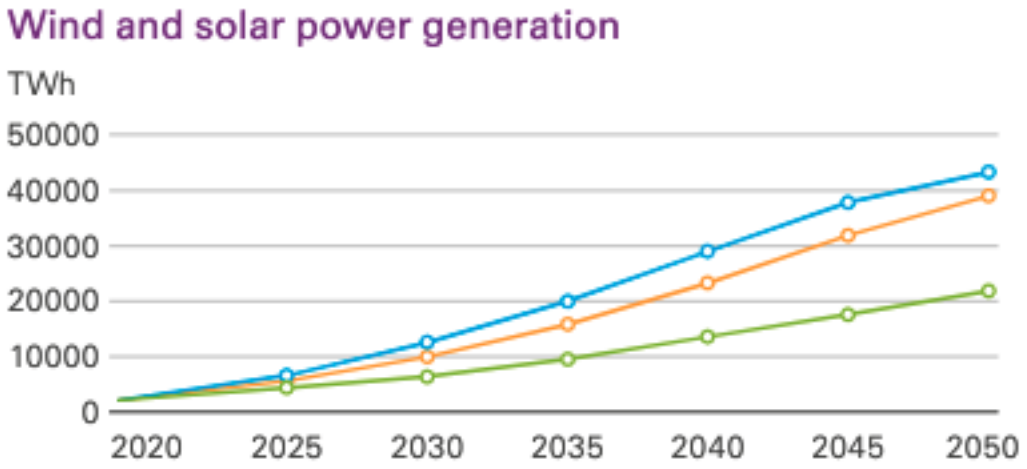
- Les scénarios Net zero et Accelerated sont compatibles avec les mesures du GIEC pour rester en dessous des 1,5°C.

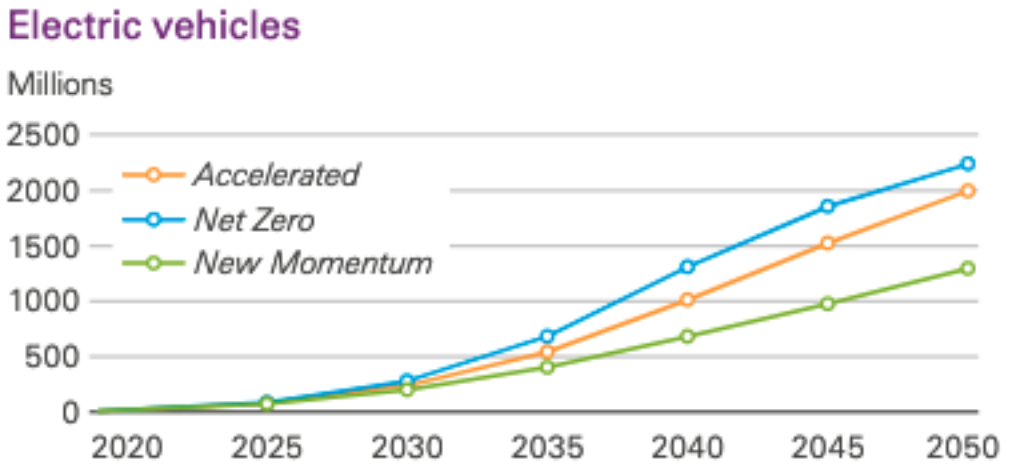
# Overview et Core Beliefs

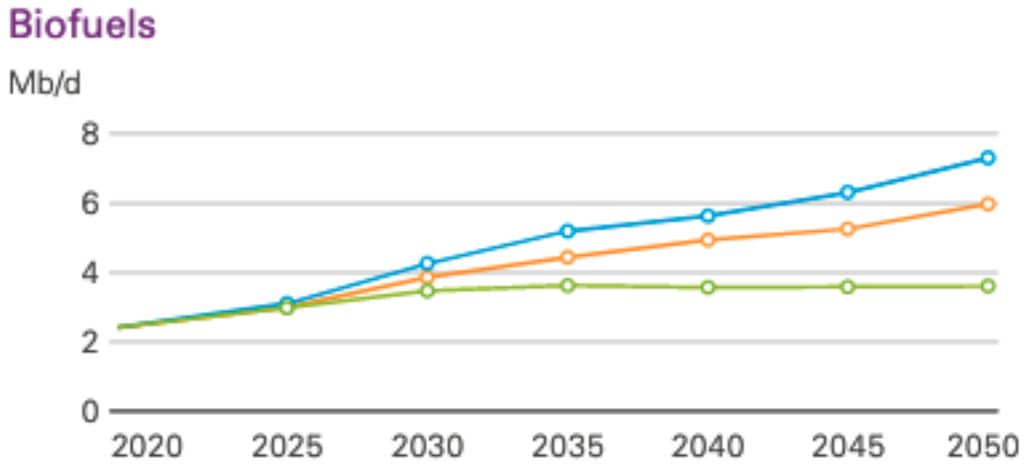
## Gradual shift in energy demand: declining role for hydrocarbons, rapid expansion in renewables and electrification



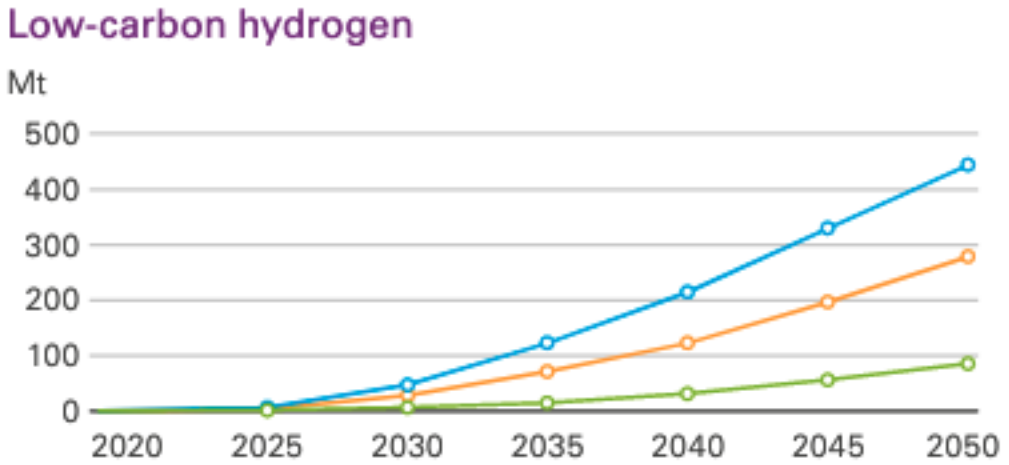
# Overview et Core Beliefs



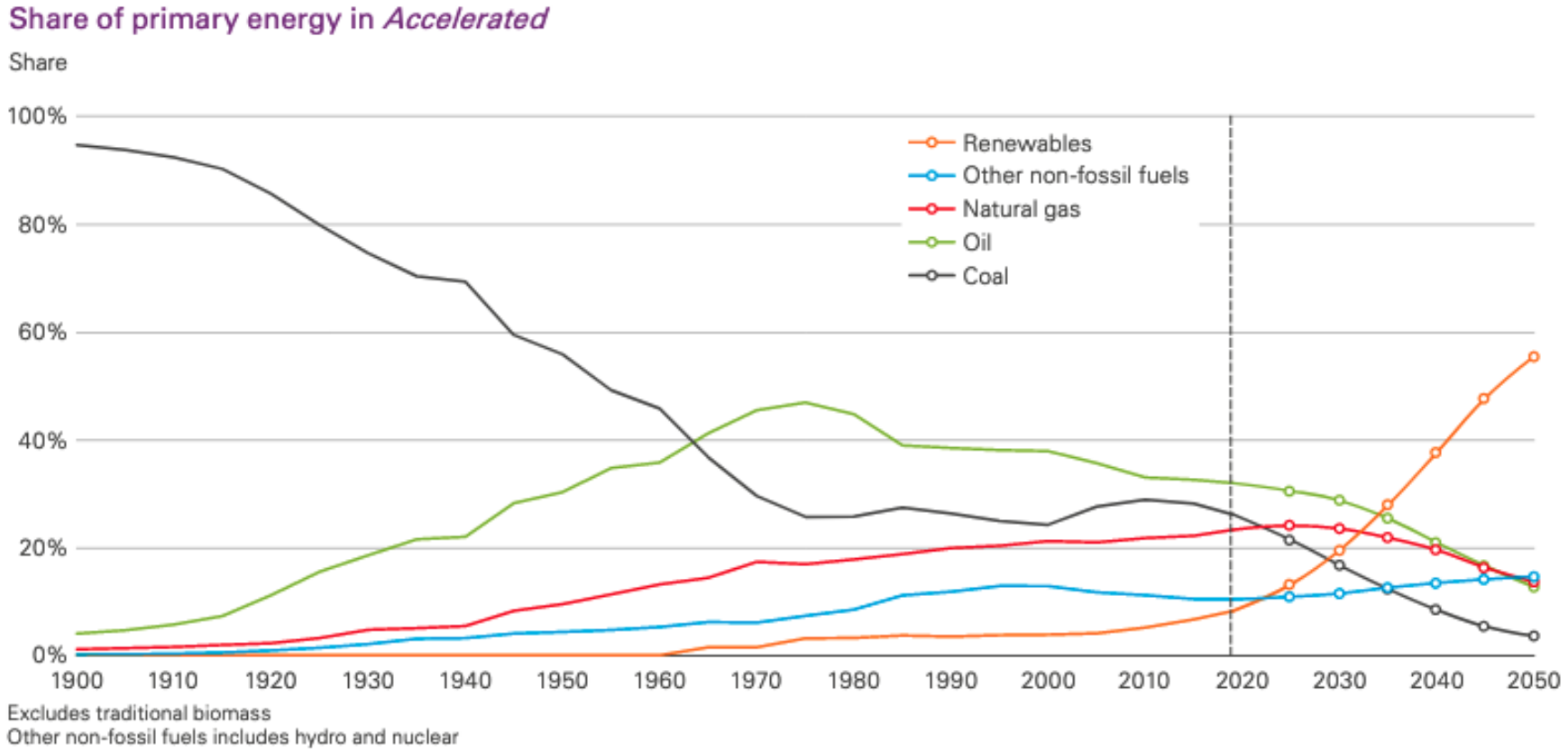




Biofuels includes liquids biofuels and gaseous biofuels (biomethane, expressed in biodiesel equivalent terms)



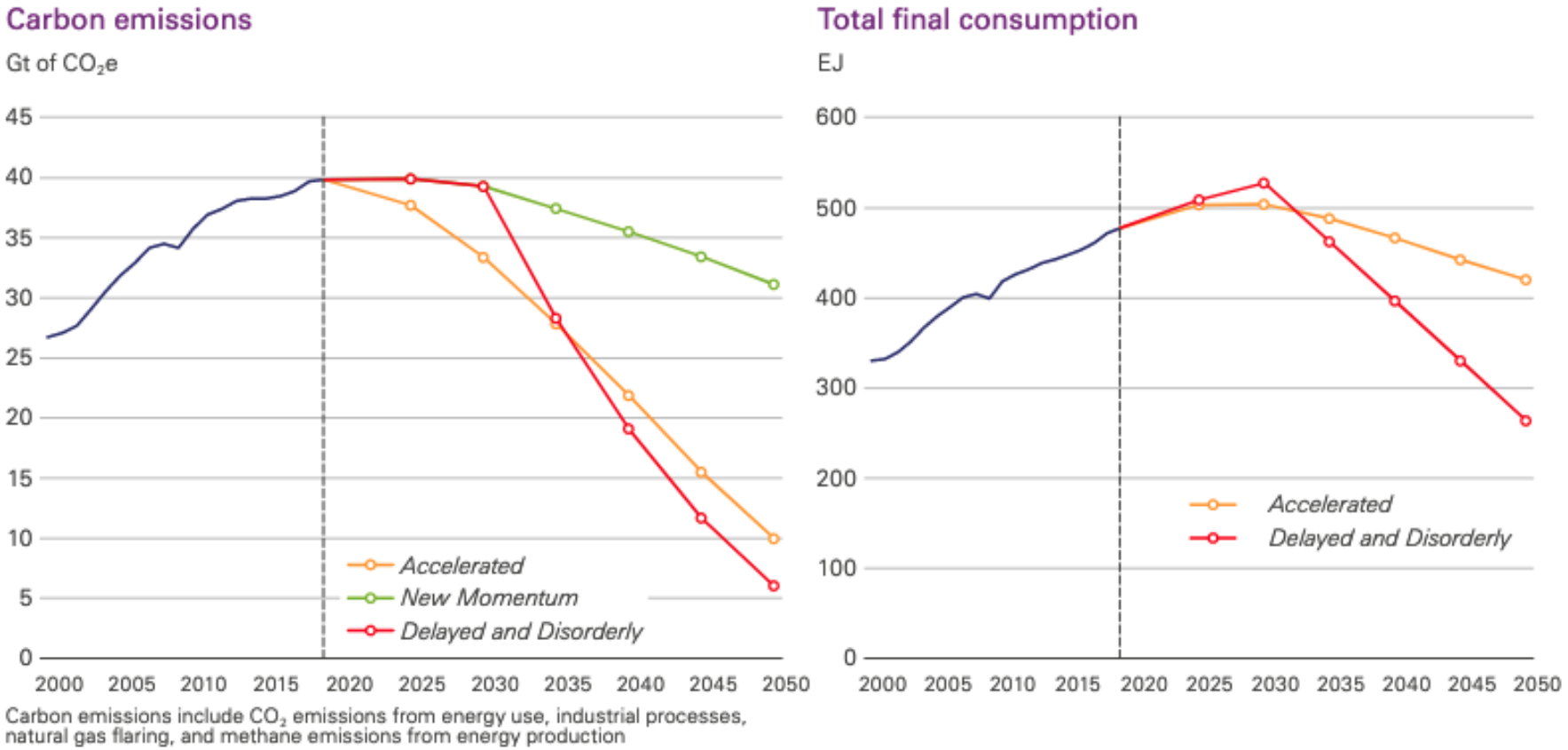
# Overview et Core Beliefs

## Changing nature of global energy markets: more diverse energy mix, increased competition and greater customer choice



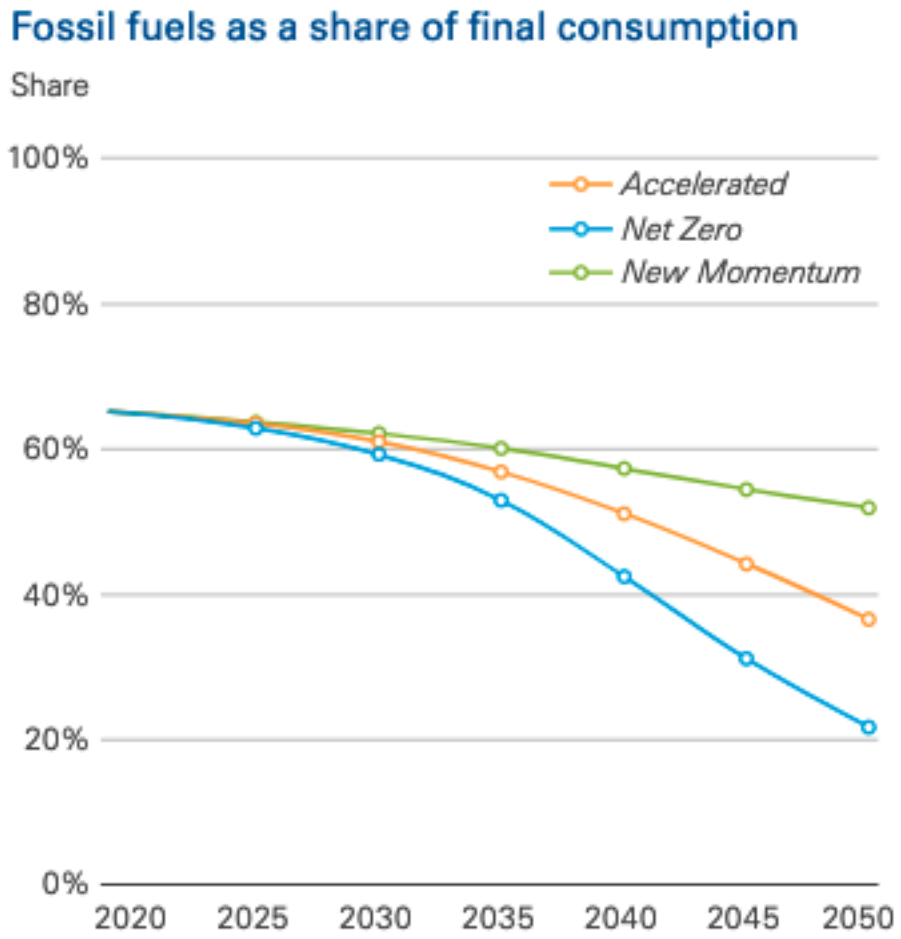
# Overview et Core Beliefs

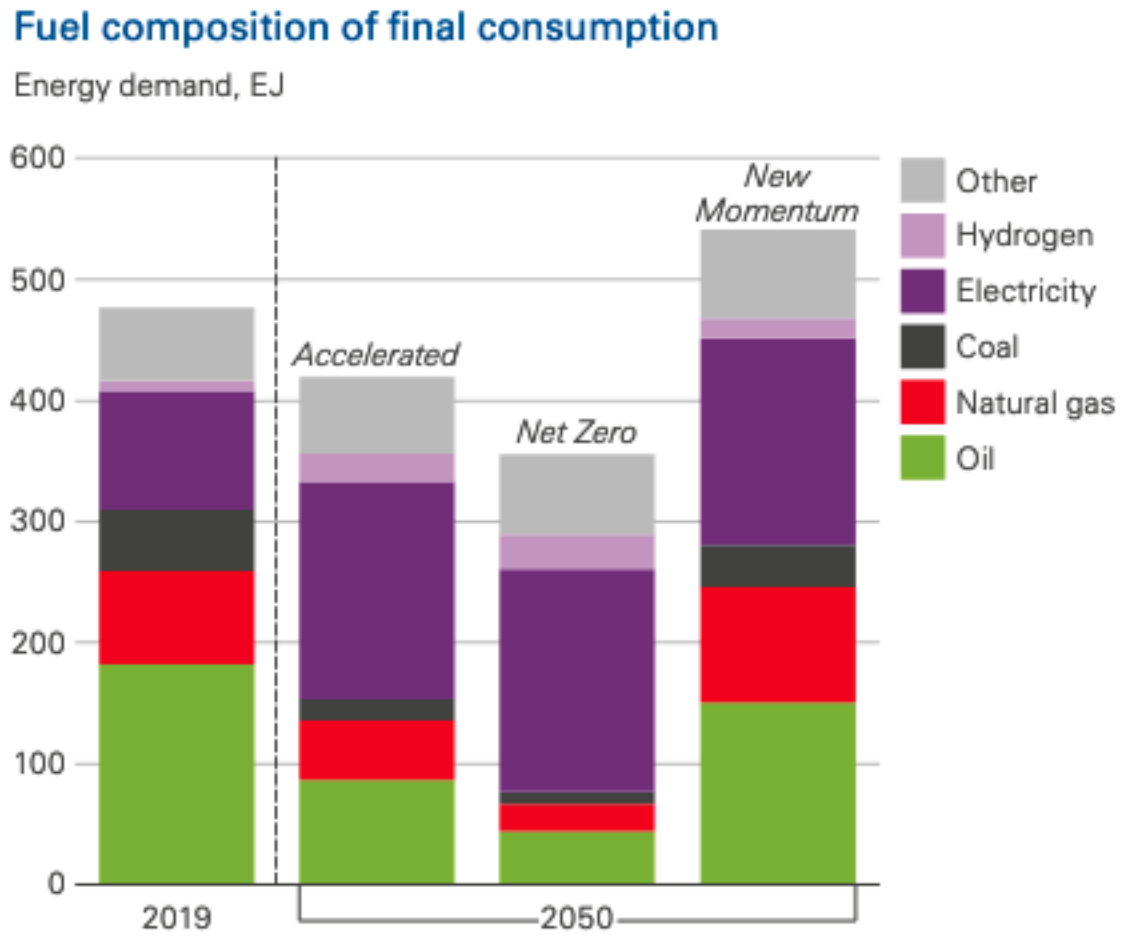
*Delaying action increases the risk of a costly and disorderly transition*




Carbon emissions include $CO_2$ emissions from energy use, industrial processes, natural gas flaring, and methane emissions from energy production

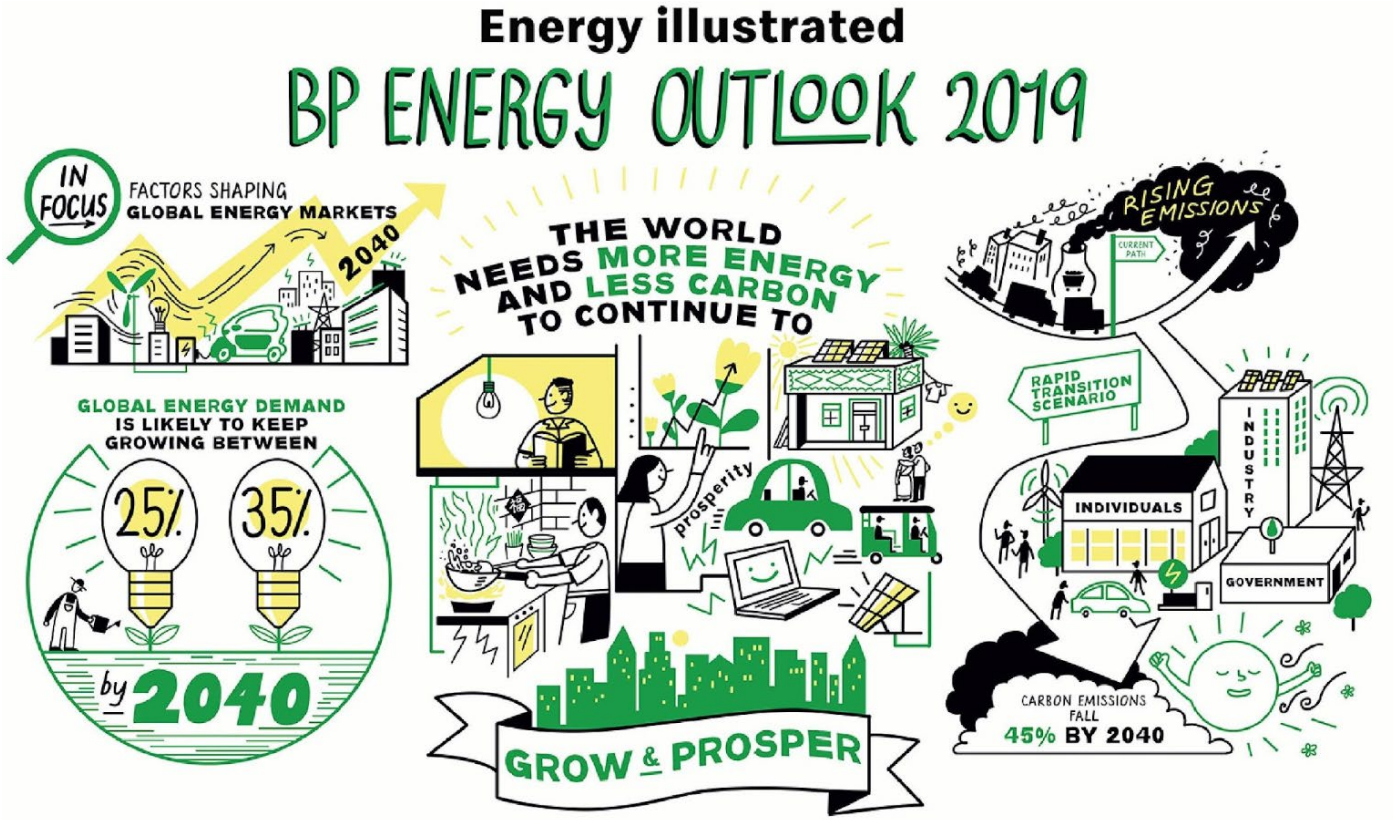
# Overview et Core Beliefs



# Overview

- Résumé en vidéo :
  - BP Energy Illustrated : [Episode 1. The outlook for energy](#).



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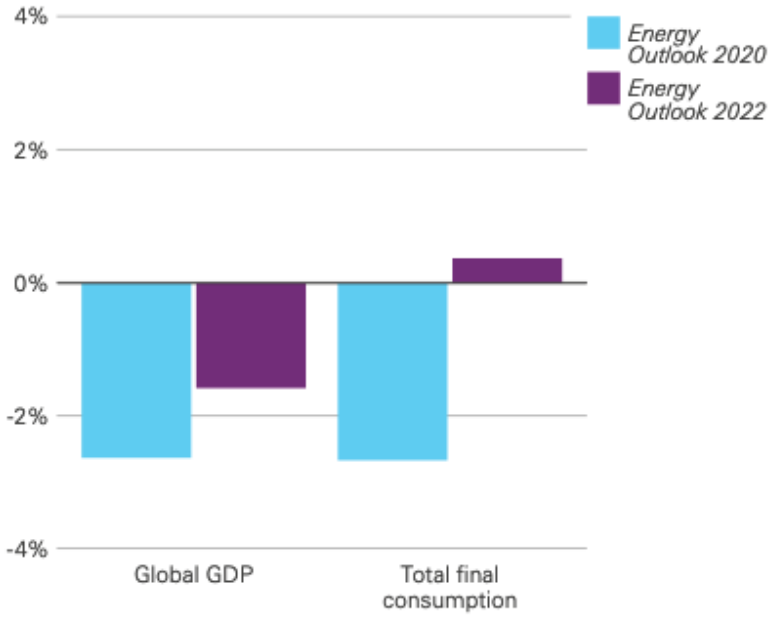
# Impacts of COVID-19

## Economic impact of COVID-19 in near-term less than previously feared

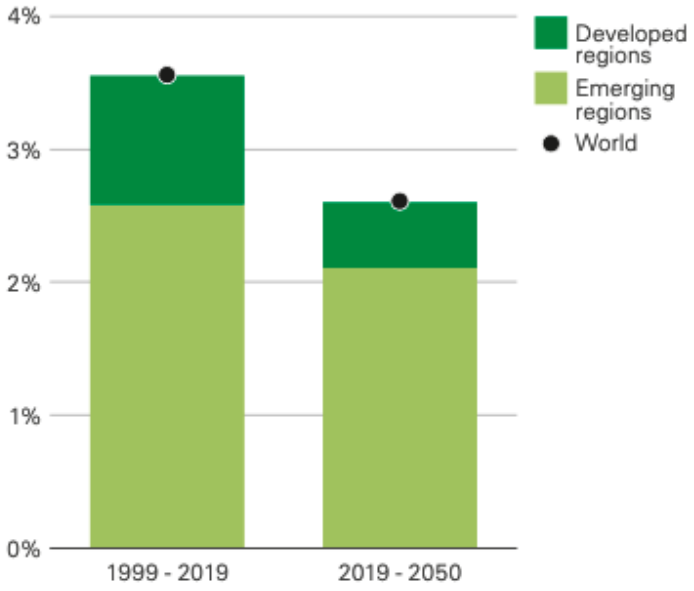
**Impact of COVID-19 on global GDP and total final consumption of energy**

2019 - 2025 Change




**Global GDP growth**

Contributions to annual average growth rate




- Les perspectives étaient en grande partie préparé avant l'armée l'action de la Russie en Ukraine et ne n'inclut aucune analyse des possibilités implications de ces développements sur la croissance économique ou l'énergie mondiale marchés.

- Le déploiement généralisé de vaccins efficaces associés à énorme soutien fiscal et monétaire signifie l'économie à court terme l'impact du COVID-19 est susceptible d'être moindre dommageable qu'on ne le craignait auparavant dans les pays développés. En conséquence, le niveau du PIB mondial en 2025 dans ce Energy Outlook est environ 1 % de plus que dans Outlook 2020.

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# Key figures

| | | Level in 2050* | | | Change 2019-2050 (p.a.) | | | Share of primary energy in 2050 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | *Accelerated* | *Net Zero* | *New Momentum* | *Accelerated* | *Net Zero* | *New Momentum* | *Accelerated* | *Net Zero* | *New Momentum* |
| **Primary energy by fuel** | | | | | | | | | | |
| Total | 627 | 692 | 653 | 760 | 0.3% | 0.1% | 0.6% | 100% | 100% | 100% |
| Oil | 193 | 87 | 44 | 154 | -2.5% | -4.6% | -0.7% | 13% | 7% | 20% |
| Natural gas | 140 | 94 | 61 | 181 | -1.3% | -2.7% | 0.8% | 14% | 9% | 24% |
| Coal | 158 | 25 | 17 | 103 | -5.8% | -6.9% | -1.4% | 4% | 3% | 13% |
| Nuclear | 25 | 40 | 49 | 27 | 1.6% | 2.2% | 0.3% | 6% | 7% | 4% |
| Hydro | 38 | 61 | 65 | 48 | 1.6% | 1.8% | 0.8% | 9% | 10% | 6% |
| Renewables (incl. bioenergy) | 74 | 384 | 418 | 247 | 5.5% | 5.7% | 4.0% | 56% | 64% | 33% |
| **Primary energy by fuel (native units)** | | | | | | | | | | |
| Oil (Mb/d) | 98 | 47 | 24 | 81 | -2.4% | -4.4% | -0.6% | | | |
| Natural gas (Bcm) | 3900 | 2614 | 1681 | 5020 | -1.3% | -2.7% | 0.8% | | | |
| **Primary energy by region** | | | | | | | | | | |
| Developed | 234 | 172 | 167 | 196 | -1.0% | -1.1% | -0.6% | 25% | 26% | 26% |
| United States | 97 | 73 | 71 | 83 | -0.9% | -1.0% | -0.5% | 10% | 11% | 11% |
| European Union | 65 | 48 | 47 | 52 | -1.0% | -1.1% | -0.7% | 7% | 7% | 7% |
| Emerging | 393 | 519 | 486 | 565 | 0.9% | 0.7% | 1.2% | 75% | 74% | 74% |
| China | 147 | 156 | 144 | 166 | 0.2% | -0.1% | 0.4% | 22% | 22% | 22% |
| India | 42 | 91 | 88 | 96 | 2.5% | 2.5% | 2.7% | 13% | 14% | 13% |
| Middle East | 37 | 48 | 45 | 50 | 0.8% | 0.6% | 0.9% | 7% | 7% | 7% |
| Russia | 30 | 32 | 29 | 34 | 0.1% | -0.1% | 0.4% | 5% | 5% | 4% |
| Brazil | 16 | 17 | 15 | 20 | 0.3% | -0.1% | 0.8% | 2% | 2% | 3% |

# Key figures

| | | Level in 2050* | | | Change 2019-2050 (p.a.) | | | Share of final consumption in 2050 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2019 | *Accelerated* | *Net Zero* | *New Momentum* | *Accelerated* | *Net Zero* | *New Momentum* | *Accelerated* | *Net Zero* | *New Momentum* |
| **Total final consumption by sector** | | | | | | | | | | |
| *Total* | 477 | 420 | 351 | 542 | -0.4% | -1.0% | 0.4% | 100% | 100% | 100% |
| Transport | 119 | 103 | 91 | 120 | -0.5% | -0.8% | 0.0% | 25% | 26% | 22% |
| Industry | 188 | 163 | 136 | 217 | -0.5% | -1.0% | 0.5% | 39% | 39% | 40% |
| Feedstocks | 38 | 39 | 30 | 49 | 0.1% | -0.7% | 0.8% | 9% | 8% | 9% |
| Buildings | 132 | 114 | 94 | 157 | -0.5% | -1.1% | 0.6% | 27% | 27% | 29% |
| **Energy carriers (generation)** | | | | | | | | | | |
| Electricity ('000 TWh) | 27 | 58 | 63 | 50 | 2.5% | 2.8% | 2.0% | 50% | 65% | 33% |
| Hydrogen (Mt) | 66 | 287 | 446 | 146 | 4.8% | 6.3% | 2.6% | 8% | 15% | 3% |
| **Production** | | | | | | | | | | |
| Oil (Mb/d) | 98 | 46 | 24 | 80 | -2.4% | -4.4% | -0.6% | | | |
| Natural gas (Bcm) | 3976 | 2617 | 1681 | 5020 | -1.3% | -2.7% | 0.8% | | | |
| Coal (EJ) | 168 | 25 | 16 | 99 | -6.0% | -7.2% | -1.7% | | | |
| **Emissions** | | | | | | | | | | |
| Carbon emissions (Gt of $CO_2$e) | 39.8 | 9.9 | 2.4 | 31.1 | -4.4% | -8.7% | -0.8% | | | |
| Carbon capture use & storage (Gt) | 0.0 | 4.2 | 6.0 | 0.9 | 56% | 58% | 48% | | | |
| **Macro** | | | | | | | | | | |
| GDP (trillion US$ PPP) | 127 | 283 | 283 | 283 | 2.6% | 2.6% | 2.6% | | | |
| Energy intensity (MJ / US$ of GDP) | 3.7 | 1.5 | 1.2 | 1.9 | -2.9% | -3.5% | -2.1% | | | |

** EJ unless otherwise stated*

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# Conclusions

- Pas de baisse de la production d'énergie primaire prévue d'ici 2050 dans l'ensemble des scénarios;
- Parmi le trios des fossiles, seul le gaz peut connaître une faible croissance d'ici 2050;
- Entre 33% et 56% sera la part des énergies renouvelables dans la consommation d'énergie primaire en 2050.