

# BP and the Energy Transition: Financial and Strategic Analysis Towards Net Zero

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## Introduction

The transition towards a low-carbon economy is one of the most significant transformations of modern times. Achieving global net-zero emissions by 2050 requires not only a drastic reduction in fossil fuel dependence, but also a rapid adoption of renewable energy technologies and major changes in corporate strategies. Within this context, oil and gas companies are facing growing pressure from policymakers, investors, and society to transform their business models and align their operations with sustainable development objectives: the energy sector stands at the heart of an unparalleled structural change.

This thesis focuses on British Petroleum plc, one of the world's largest integrated energy companies, and it examines its financial and strategic response to the energy transition. It seeks to determine whether BP's evolving corporate strategies are effectively positioning the company to lead in a decarbonized economy.

The analysis begins by highlighting the global challenges of decarbonization, examining the regulatory, technological, and financial barriers that must be overcome to reach net-zero emissions. It proceeds with an overview of different international policies which set the framework within which energy companies must now operate.

The thesis then provides a detailed financial analysis of BP, assessing key metrics like profit margins, debt sustainability, and investment strategies. Special attention is placed to BP's capital expenditures, particularly the balance between traditional oil and gas projects and investments in renewable energy.

Following the financial review, the thesis explores BP's environmental, social, and governance commitments, as it analyzes its efforts to reduce Scope 1, 2, and 3 emissions, expand its renewable energy portfolio, invest in sustainable mobility, and issue sustainable financing instruments. In order to verify the effectiveness of its net-zero roadmap, BP's partnerships, acquisitions, and performance in sectors such as electric vehicle charging, bioenergy, and carbon capture technologies are also examined.

To provide context, BP's approach is compared with that of major competitors Shell, TotalEnergies, and ExxonMobil. This comparative analysis outlines divergent strategic approaches, with some companies remaining focused on low-carbon investments, while others facing serious difficulties.

Finally, the thesis discusses the financial risks and opportunities associated with BP's energy transition. It addresses issues such as market volatility, investment risks, inflationary pressures, and the growing economic potential of renewables. Based on these findings, a set of strategic recommendations is proposed to guide BP toward a more sustainable future.

By providing a comprehensive strategic assessment, this thesis aims at contributing to a deeper understanding of how traditional oil and gas companies can successfully navigate the energy transition. It highlights the importance of strategic consistency, disciplined capital deployment, technological innovation, and transparent stakeholder engagement to maintain long-term competitiveness in a carbon-constrained global economy.

# 1. The Energy Transition and Net Zero

## 1.1 Global challenges of decarbonization

Currently, the Earth is already about 1.2°C warmer than it was in the late 1800s, and emissions continue to rise. To keep global warming to no more than 1.5°C – as called for in the Paris Agreement – emissions need to be reduced by 45% by 2030 and reach net zero by 2050. While global commitments and actions are growing, they still fall well short of what is necessary to limit global temperature rise and prevent the most severe consequences of climate change.

In fact, to meet the targets set, the industry sector must generate 20% energy efficiency gains between 2010 and 2030, per ton produced. Three main levers must be activated to achieve decarbonization: energy efficiency – optimizing energy sources; the energy mix – integrating renewable energy; production efficiency and recycling – using less materials or more recycled ones.

Research from the International Monetary Fund estimates that achieving global decarbonisation could generate a net value of \$85 trillion. Carbon emissions impose a substantial burden not only on the environment, but also on the global economy, and the data strongly supports the vast benefits of reducing them. However, despite the environmental and economic benefits of cutting carbon emissions, global efforts toward decarbonization remain drastically insufficient.

The delayed effect of the oil price shocks of the 1970's led to the strongest decline in carbon intensity of energy supply throughout the 1980s and 1990s. However, since the early 2000s, this downward trend has slowed significantly, mainly because of mass consumerism. The rapid expansion of the transport sector contributed to increasing carbon emissions, and industrialization of countries such as China and India has been closely tied to fossil fuel-based electricity generation, with coal playing a dominant role.

Despite improvements in carbon and energy efficiency over recent decades, these gains have failed to counterbalance the combined impact of economic growth and population increases, leading to a continued rise in GHG emissions. Even unprecedented circumstances – such as the COVID-19 pandemic, which led to a drop in CO<sub>2</sub> emissions of 6% in 2020 – resulted only in a temporary decline, with levels rebounding quickly to pre-pandemic norms.

One of the biggest challenges to decarbonization is the misalignment between the stakeholders who benefit from it and those who bear the costs. In addition, the regions historically responsible for the highest emissions, such as the United States and Europe, are not necessarily the largest emitters today. In fact, China is now the world's biggest polluter, even though when population size is factored in, China's per capita emissions remain significantly lower than those of the US and Europe.

However, focusing solely on territorial emissions can be misleading, while assessing emissions based on consumption rather than production provides a more accurate, albeit complex, picture of global carbon footprints. This because many developed economies outsource a significant portion of their emissions by importing goods produced elsewhere – namely in India and China. These misalignments create uncertainty about who should be held responsible for the costs of emissions.

In order to limit global warming, carbon emissions per unit of GDP have to decline by approximately 95% by 2050, translating to an annual reduction of 9% per year from 2019 onwards. To put this into perspective, between 1990 and 2016, the world achieved an average of just 1.8% per year; this means that emission cuts will need to accelerate to nearly five times that rate over the next three decades, and this undoubtedly represents an important challenge.

Achieving such transformation will require a radical shift in the energy sector, replacing fossil fuels with renewable energy and significantly enhancing energy efficiency. A McKinsey report estimates that fully transitioning from coal to renewables would require five times more wind turbines and eight times more solar panels than are currently being installed per year. Encouragingly, since 2010, the costs of solar power, wind energy, and battery storage have fallen by up to 85%, making clean energy increasingly competitive. However, the lack of renewable energy storage solutions remains a major issue.

In addition, a recent McKinsey report found that more than 85% of the changes required to reach net-zero emissions by 2050 could be implemented using existing technologies. Although more than half of these solutions have already been deployed in real-world settings, adopting them at scale requires a series of investment in the tech itself and in the infrastructure needed to use it. For instance, making the most of energy sources like solar and wind necessitates advancements in energy storage to ensure reliable power supply when demand is high, and electric vehicles will have a significant impact on emissions only if accompanied by a robust network of charging stations.

It is important that governments intervene in order to overcome these challenges, by for example offering loans and financial incentives to drive private-sector innovation in clean energy, or by providing offices and lab spaces to green companies.

Another major challenge to decarbonization is the massive investment required for a more efficient use of materials, greater reuse and recycling, and shift toward low- and zero-emission electricity; these investments are necessary in order to exploit existing green technologies and develop new innovations. However, most emission reduction scenarios rely on the use of technologies that are not yet available, underscoring the enormity of the challenge.

According to a study considering 49 developing economies worldwide, from 2023 to 2030 an estimated \$5.8 trillion annually – equivalent to 19% of their collective GDP – will be required to fund the shift to sustainable energy sources; on a per capita basis, this translates to an annual cost of \$1,271. Despite

the pressing need for investment, current government spending patterns leave an annual shortfall of \$286 billion for these economies. Closing this gap would necessitate a 5.2% increase in yearly public spending.

Transitioning to clean energy is fraught with challenges, including infrastructural constraints, financial limitations, regulatory hurdles, and shortages of key natural resources. Among the most pressing technical barriers are the need for efficient energy storage and the enhancement of grid reliability. As renewable energy sources become more prevalent, advanced storage solutions are essential to maintain a consistent power supply.

Additionally, geopolitical factors have added urgency to discussion on energy security and affordability. The Russia-Ukraine war has disrupted global energy supplies, emphasizing the need for more resilient and diversified energy system.

A transition of this magnitude and speed cannot be achieved without sustained support from citizens, as the shift to a net-zero future will impact many aspects of daily lives, from transportation and heating to employment and consumption.

Behavioral changes, particularly in advanced economies – such as replacing car trips with walking, cycling or public transport – are both critical to decarbonization and a challenge to implement. Shifting human behavior is often difficult due to social, economic, and psychological barriers, as the free-rider problem makes people choose the preferred and more convenient solution rather than the most positive one for the environment.

Other major concerns are the risk of greenwashing, where companies promote sustainability efforts while continuing to expand fossil fuel production, as well as keeping the balance between profitability and decarbonization. In fact, oil and gas companies operate in a high-risk, capital-intensive industry where shareholder expectations for returns remain high, thus firms must navigate the tension between delivering shareholder value and meeting global climate targets.

Since the difficulties to reach net zero emissions by 2050 are many, a detailed pathway is needed to overcome them and achieve the ambitious goal.

Over the next decade, the world must massively expand the use of existing clean energy technologies. For solar power alone, this equates to installing a solar park the size of the world's largest roughly every day. To meet climate targets, annual installations must reach 630 GW of solar photovoltaics and 390 GW of wind by 2030 – a dramatic increase from current levels. By 2050, nearly 90% of global electricity will come from renewables, with solar and wind energy contributing almost 70%.

By 2030, the global economy is projected to be 40% larger than today while consuming 7% less energy. A worldwide push for energy efficiency is crucial to achieving this, requiring an annual energy intensity improvement of 4% – nearly three times the average rate of the past two decades.

Annual global clean energy investment must more than triple, reaching \$4 trillion per year by 2030. This transition will create millions of new jobs and significantly boost economic growth worldwide by the end of the decade.

Achieving net zero requires a sharp reduction in coal, oil and gas use. This requires steps such as ending sales of new internal combustion engine cars by 2035, and phasing out all unabated coal and oil power plants by 2040.

By 2040, the global electricity sector must reach net zero emissions, supplying almost half of the world's total energy consumption. To ensure reliable supplies, major investments are needed in battery storage, hydrogen-based fuels, hydropower and demand response technologies to enhance grid flexibility.

By 2045, next-generation clean energy technologies will be widespread: the majority of cars will be powered by electricity or hydrogen fuel cells, planes will rely on advanced biofuels and synthetic fuels, and hundreds of industrial plants will utilize carbon capture or hydrogen around the world. By 2030, electric vehicles are expected to rise from 5% to over 60% of global car sales; the number of public EV charging points will need to grow from 1 million today to 40 million, and annual battery production needs to surge from 160 GWh today to 6,600 GWh in 2030. This all requires annual investments of nearly \$90 billion for EV infrastructure.

By 2050, the global energy sector will be primarily powered by renewables, with solar energy emerging as the dominant source. Achieving this cleaner future requires greater international cooperation, in order to ensure that developing nations have the funding and technology necessary to meet net-zero goals on time.

Government R&D spending must be increased and strategically redirected to support clean energy innovation. Critical areas like electrification, hydrogen, bioenergy and carbon capture, utilization and storage currently receive only one-third of the funding allocated to more established low-carbon technologies. Globally, at least \$90 billion in public funding is needed before 2030 to advance a full portfolio of clean energy demonstration projects – yet current budgets allocate only around \$25 billion.

## 1.2 International policies and regulations

A series of regulations have been enacted in order to meet the net zero target by 2050 and achieve decarbonization.

One piece of regulation is the *Net-Zero Industry Act* (NZIA), which introduces the Net-Zero Europe Platform to oversee and facilitate its implementation. This platform, led by the European Commission and including representatives from EU member states, plays a key role in tracking progress toward NZIA's objectives.

The goal of the NZIA is to boost Europe's manufacturing capacity for net-zero technologies and their essential components, by tackling obstacles that hinder large-scale production. The regulation aims at strengthening the competitiveness of the clean tech sector, attract investments, and enhance market accessibility, ultimately advancing the clean energy transition and improving EU's energy security.

By 2030, the Act targets at least 40% of the EU's annual net-zero technology deployment to come from European manufacturing, providing long-term market certainty for investors and businesses. Additionally, the Act sets a Union-wide goal for CO<sub>2</sub> storage services, mandating at least 50 million tonnes of annual CO<sub>2</sub> storage capacity. To achieve this, oil and gas license holders in the EU must invest in carbon capture technologies, leveraging their expertise to make CO<sub>2</sub> capture a viable large-scale solution.

A key aspect of the NZIA is the designation of net-zero strategic projects, which are given priority treatment at the national level, expedited permitting, financing guidance, and preferential judicial processes. These projects are essential for strengthening the EU's economic resilience, strategic autonomy, and industrial competitiveness. The Net-Zero Europe Platform also advises on funding mechanisms and supports international clean energy partnerships.

Another important policy initiative is the *European Green Deal*. It lays out three fundamental principles to drive the clean energy transition, reduce greenhouse gas emissions, and enhance the quality of life across the EU: the first principle consists in ensuring energy security and affordability for all EU citizens; the second seeks developing a fully integrated, interconnected and digitalized EU energy market; the final one consists in prioritizing energy efficiency, improving the energy performance of buildings and expanding renewable energy sources.

To meet these goals, the European Commission focuses on some key objectives. They include the expansion of interconnected energy systems and integration of power grids for renewable energy, as well as the decarbonization of the gas sector and promotion of cross-sector energy integration; the Commission also wants to promote clean energy technologies and modern infrastructure, improve energy efficiency and eco-friendly product designs, and maximize the potential of offshore wind energy.

In addition, one of the most important international treaties is the *Paris Agreement*. It was adopted in 2015 at COP21, and its central objective is to keep global temperature rise well below 2°C above pre-industrial levels while striving to limit it to 1.5°C above those levels.

However, recent scientific reports from the UN's Intergovernmental Panel on Climate Change have reinforced the urgency of staying within the 1.5°C limit. Surpassing this threshold could lead to severe consequences, including more frequent and intense heatwaves, droughts, and rainfall, as well as rising sea levels and biodiversity loss. To achieve the 1.5°C target, greenhouse gas emissions must peak before 2025 and decrease by 43% by 2030. Under the Paris Agreement, nations have to submit nationally determined contributions (NDCs), each reflecting a progressively higher level of climate ambition.



It is also important to mention the EU *Emission Trading Scheme* (ETS). It is the world's first and largest carbon market, introduced in 2005 to curb greenhouse gas emissions by requiring polluters to pay for their emissions. By 2023, it has reduced emissions from European power and industry plants by approximately 47%.

The EU ETS covers emissions from power generation, industrial manufacturing and aviation – sectors responsible for about 40% of the EU's total emissions. In 2024 it was expanded to cover maritime transport as well; it operates in all EU countries plus Iceland, Liechtenstein and Norway, and is linked to Switzerland's ETS.

The “cap and trade” principle at the core of the EU ETS works by setting a maximum cap on emissions, which gradually decreases over time. Emission allowances – each representing one tonne of CO<sub>2</sub> equivalent – are auctioned and traded on the carbon market. As the supply of allowances shrinks, carbon costs rise, incentivizing companies to cut emissions.

Since 2013, the EU ETS has generated over €175 billion in revenue, which EU member states must allocate to renewable energy projects, energy efficiency improvements and low-carbon technology development.

Furthermore, in order to find solutions to the climate crisis, every year the *Conference of the Parties* (COP) takes place. The COP is the decision-making body of the United Nations Framework Convention on Climate Change (UNFCCC); agreed in 1992, UNFCCC is the main international treaty on fighting climate change. In addition to the Parties of the Convention, representatives of business, international organizations, and interest groups can join the COP as observers.

COP30 will take place in Brazil, in November 2025; the EU will strive to keep the goal of limiting global warming to 1.5°C, and support efforts to adapt to climate change.

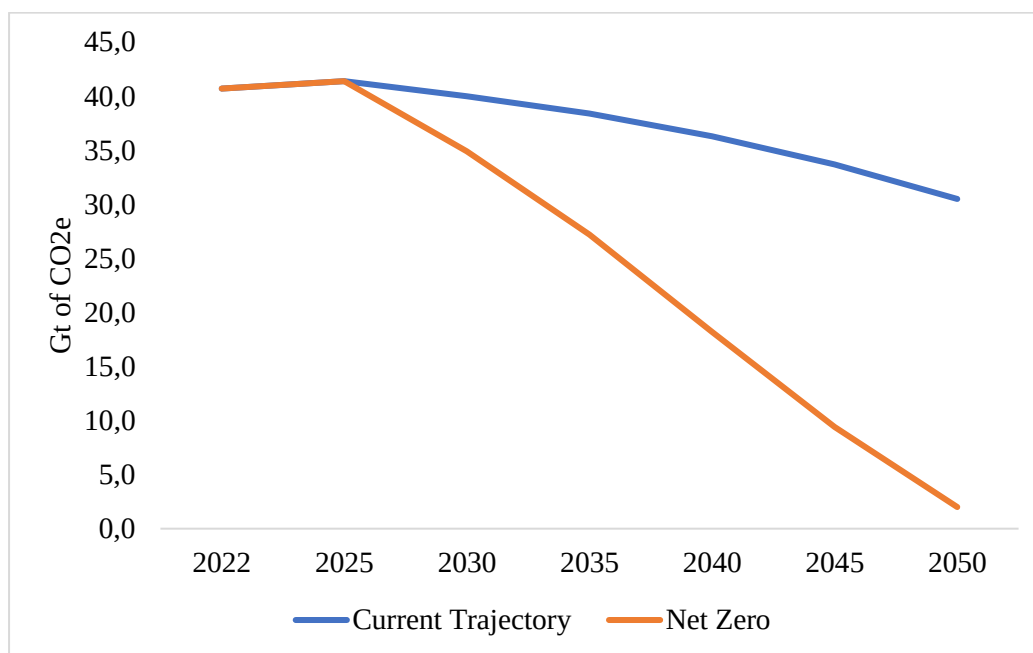
### 1.3 The role of oil & gas companies in the transition

For decades, oil and gas companies have been the backbone of the global energy system, supplying the world's energy needs through fossil fuel extraction and refining. As the primary driver of global emissions, the energy sector plays a decisive role in addressing the climate crisis. Despite decades of government-led initiatives to combat global warming, CO<sub>2</sub> emissions from energy have surged by 60% since the signing of the United Nations Framework Convention on Climate Change in 1992. Today, energy production and consumption are responsible for roughly three-quarters of global greenhouse gas emissions, making energy system transformation critical in mitigating climate change.

To limit global warming to 1.5°C, the world must achieve net-zero CO<sub>2</sub> emissions by 2050. This goal demands a complete overhaul of energy production, distribution, and consumption. Within the European Union, the energy sector contributes over 75% of total greenhouse gas emissions, making its decarbonization

fundamental to meeting the EU's 2030 climate targets and the broader ambition of carbon neutrality by 2050.

Two scenarios have been constructed by BP analysts to explore the speed and shape of the energy transition out to 2050: the *Net Zero* scenario is in line with “Paris consistent” scenarios, while the *Current Trajectory* one suggests that, at this pace, in 2050 the world will be far away from the zero-emissions goal.



Growing environmental concerns, shifting investor priorities, and evolving regulations are putting fossil fuel companies under unprecedented pressure. Many political and environmental leaders are now advocating for the complete phase-out of fossil fuels, calling into question the long-term role of oil and gas in a decarbonized world.

As the global energy transition accelerates, oil and gas companies face increased scrutiny from governments, investors, and the public. They must balance the need to support decarbonization efforts while continuing to meet global energy demand. The sector is now encountering challenges on multiple fronts, such as public opposition driven by concerns over fossil fuels' environmental impact, investor skepticism, and regulatory uncertainty, as governments implement policies to reduce emissions and incentivize clean energy alternatives.

Since 2015, the energy sector of the S&P 500 has plummeted by 48%, making it the worst-performing sector in the index. Although declining oil and gas prices since 2014 have contributed to this downturn, the broader uncertainty about the industry's long-term viability – driven by decarbonization policies – has also played a significant role. Many investors now question whether hydrocarbon demand will continue to grow, particularly as clean energy solutions gain traction.

However, this shift does not necessarily spell the end of oil and gas. While global energy demand continues to rise, the expansion of alternative energy sources may struggle to keep place, creating a dual

challenge for fossil fuel companies: managing the transition to a low-carbon future and continuing to meet the world's energy needs.

Growing climate concerns and regulatory pressures are pushing oil and gas companies to reassess their business models and invest in new technologies to remain competitive in a low-carbon economy. Many firms are undergoing a transformation, repositioning themselves not just as fossil fuel providers but as diversified energy companies; this transition is not just about mitigating risks associated with climate policies but also about seizing opportunities in the growing clean energy sector. Strategies include:

- Diversification into clean energy and electrification, by shifting focus towards downstream energy services that align with electrification, and supporting coal-to-gas transitions while reducing the carbon intensity of oil and gas operations
- Advancing deep decarbonization technologies, by investing in carbon capture, utilization, and storage (CCUS), enhancing methane efficiency, exploring zero-emissions production, and scaling up hydrogen technology as an alternative energy source
- Strategic geographic and geopolitical reassessment, which consists in reducing exposure to high-risk, long-cycle oil projects that may become stranded assets, and in prioritizing investments in regions with sustained long-term oil and gas demand.
- Strengthening ESG commitments and market messaging, by integrating climate-conscious ESG principles into corporate strategies, communicating the role of oil and gas in the transition to clean energy, and highlighting the industry's potential to drive next-generation energy technologies

To thrive in the energy transition, oil and gas companies must also focus on developing clear, low-carbon strategies that ensure profitability while minimizing emissions, as well as improving transparency through robust ESG metrics to maintain investor confidence. Moreover, they should expand international carbon markets through Article 6 of the Paris Agreement, facilitating cross-border emissions reduction projects, and revamp workforce strategies to attract young professionals concerned with ESG performance and the industry's long-term viability.

Oil and gas companies are increasingly focusing on decarbonizing their own operations. Scope 1 and Scope 2 emissions – those directly from operations and purchased electricity – are being addressed through initiatives such as electrification of upstream processes, adoption of low-carbon fuels, and investments in CCUS. Technologies such as direct air capture and methane leak detection systems are also helping to reduce emissions at extraction sites. On the other hand, oil and gas firms have been addressing Scope 3 emissions – which come from the use of their products – through investments in alternative energy sources such as hydrogen, biofuels, and synthetic fuels

Beyond financial and regulatory hurdles, the oil and gas industry faces a worsening public image as climate change concerns dominate global discourse. Renewable energy sources are increasingly positioned as the preferred alternative to fossil fuels, placing additional pressure on traditional energy companies to demonstrate their commitment to sustainability.

In an era where climate action is a key political and societal priority, oil and gas firms must prove their relevance in the energy transition – not just as fossil fuel providers, but as active contributors to a cleaner future. How they navigate this shift will shape their standing among investors, governments, and the public in the decades to come.

Oil and gas companies are therefore at the center of this transformation. While fossil fuels continue to play a role in the global energy mix, the shift toward low-carbon alternatives, emissions reduction technologies, and new business models is essential for long-term sustainability. The energy sector must navigate complex challenges – balancing investors expectations, regulatory pressures, and technological innovation – while ensuring that the transition is both economically viable and socially responsible. How oil and gas companies choose to adapt in the coming decades will determine their relevance in a net-zero world and their ability to contribute meaningfully to the fight against climate change.

#### 1.4 Financial opportunities and risks associated with the transition

While shifting toward a low-carbon economy is expected to yield significant financial benefits in the long term, the early stages of the transition present considerable risks that investors cannot overlook.

One of the main risks associated with the transition is the substantial upfront investment required for green infrastructure and clean energy development. Governments worldwide – both in advanced and emerging economies – will need to secure significant funding to ensure a just transition, particularly to protect vulnerable populations from disproportionate financial burdens.

This large-scale investment will likely necessitate higher levels of borrowing, with debt accumulation concentrated in the initial phase of the transition. This “front-loaded” borrowing comes at a cost, as it may strain already stretched public finances, particularly in nations still recovering from the economic impact of the Covid-19 pandemic. As a result, rising debt burdens could lead to credit downgrades for some countries, increasing borrowing costs and potentially slowing global economic growth.

Although modern economic research suggests that energy prices have a smaller effect on inflation than in the past, carbon reduction policies – such as carbon taxes, emission trading schemes, and the EU’s carbon border adjustment mechanism – will inevitably drive up energy costs for businesses and households. Supply chain constraints for critical raw materials essential to renewable energy technologies, such as lithium, cobalt, and rare earth elements, may further contribute to inflationary pressures.

In addition to inflation, the transition could lead to reduced consumer purchasing power and temporary job losses, particularly in industries reliant on fossil fuels. While new employment opportunities will emerge in the renewable energy sector, these shifts will not be uniform across all regions and economic sectors. Countries that depend heavily on fossil fuel exports may experience economic slowdowns before reaping the benefits of diversification.

Another important concern is the potential for capital misallocation. Large-scale capital projects, particularly those driven by government policies of public-private partnerships, are historically viewed by private investors as prone to poor management, especially in regions with weak institutional frameworks. This situation creates a dilemma for investors seeking to reduce carbon intensity. They may find themselves compelled to allocate funds to unproven clean technologies or back companies with a limited track record in carbon reduction, increasing the likelihood of asset bubbles or mispriced investments.

Such market inefficiencies could lead to heightened financial volatility, with certain assets becoming overvalued while others remain underappreciated. While this dynamic may create tactical investment opportunities, it also underscores the importance of strategic, well-planned capital deployment to avoid economic disruptions.

Despite these short-term risks, accelerating the transition to a net-zero economy presents vast economic opportunities.

One of the key financial benefits is the economic growth and increased profitability in companies. In fact, a well-managed energy transition is expected to drive higher GDP growth in major economies, and according to projections, an accelerated transition scenario could result in GDP levels that surpass the business-as-usual trajectory. For the G7 economies, GDP is expected to be 1.8%, 1.3% and 0.8% higher in 2025, 2030 and 2035 respectively. Notably, net energy-importing nations stand to gain the most, as reduced reliance on imported fossil fuels will lower trade deficits and increase economic resilience. Also, The World Energy Transitions Outlook, published by the International Renewable Energy Agency in March 2022, estimates that aligning policies with the 1.5 degree target could boost global GDP growth by 2.3 % by 2030.

Additionally, the shift toward a clean energy economy will generate millions of new jobs. The World Energy Transitions Outlook, estimates that aligning policies with the 1.5 degree target could create around 85 million new jobs in energy transition sectors. These employment gains will likely offset job losses in fossil fuel industries, provided that workforce retraining and reskilling programs are effectively implemented.

The transition also unlocks new revenue streams for companies across various sectors. These include not only small and medium-sized enterprises engaged in energy efficiency, renewables, and green

technology development, but also oil and gas firms diversifying into carbon capture, utilization and storage, hydrogen production, and advanced biofuels, as well as investments in offshore wind, battery storage, and electric vehicle infrastructure.

Another major opportunity of the transition is given by the lower energy costs and enhanced competitiveness. Over time, widespread deployment of renewable energy and efficiency improvements will drive down industrial costs and household energy bills. The transition will also reduce reliance on volatile fossil fuel markets, leading to greater energy price stability, and improve national energy security by reducing dependence on imported oil and gas. Industrial efficiency will be boosted, making economies more competitive in the global market.

A successful transition will also help economies avoid the most severe consequences of climate change, and this will lead to lower public spending on disaster recovery and healthcare costs, and to reduced insurance premiums for climate-related risks, generating an actual financial benefit.

In conclusion, the global energy transition presents both risks and opportunities for investors, businesses, and governments. While the short-term financial and economic challenges require careful management, the long-term benefits of a clean energy economy far outweigh these risks. Increased GDP growth, job creation, reduced energy costs, and improved resilience against climate change all highlight the economic case for accelerating the transition.

## 2 BP Company Profile

### 2.1 History and corporate structure of BP

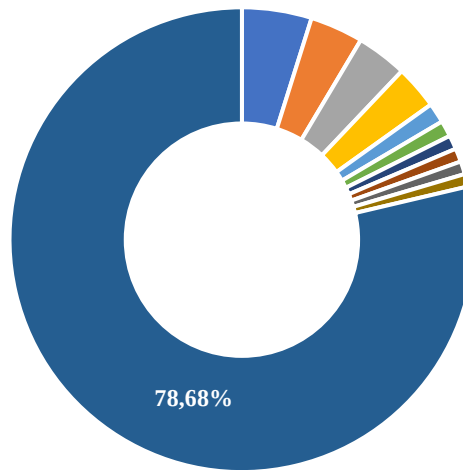
British Petroleum p.l.c. is a United Kingdom-based integrated energy company. Established in 1908, it is one of the world's leading international oil and gas companies, operating in more than 80 countries and with 87,800 employees worldwide.

The company operates under a corporate structure that is designed to support its global energy operations. BP is structured into three primary businesses: production & operations, gas & low carbon energy, and customers & products – enabled by trading & shipping.

BP operates globally through regional subsidiaries and joint ventures. These include BP America, BP Europe, Middle East & Africa, BP Asia Pacific, and BP Trading & Shipping. BP's activities in low-carbon energy are managed through their Alternative Energy business.

The company's global business operations are supported by five corporate functions: finance – which manages investments, budgeting, and capital allocation; technology; strategy, sustainability & ventures – which develops the company's strategies and environmental, social, and governance policies; people & culture – which focuses on culture, workforce strategy and leadership training; and legal – which ensures adherence to regulations and governance.

BP is primarily owned by institutional investors. The pie chart and the table below illustrate the top holders, which together hold 21.32% of BP's shares.



- The Vanguard Group, Inc.
- BlackRock Investment Management (UK) Ltd.
- Norges Bank Investment Management
- BlackRock Fund Advisors
- SSgA Funds Management, Inc.
- Legal & General Investment Management Ltd.
- State Street Global Advisors Ltd.
- Geode Capital Management LLC
- Causeway Capital Management LLC
- UBS Asset Management Switzerland AG
- Other

| Holder                                | Shares  | % Held |
|---------------------------------------|---------|--------|
| The Vanguard Group                    | 777.28m | 4.85%  |
| BlackRock Investment Management UK    | 593.33m | 3.70%  |
| Norges Bank Investment Management     | 565.82m | 3.53%  |
| BlackRock Fund Advisors               | 487.17m | 3.04%  |
| SSgA Funds Management                 | 223.00m | 1.39%  |
| Legal & General Investment Management | 179.57m | 1.12%  |
| State Street Global Advisors          | 155.40m | 0.97%  |
| Geode Capital Management              | 150.06m | 0.94%  |
| Causeway Capital Management           | 143.87m | 0.90%  |



|                                     |         |       |
|-------------------------------------|---------|-------|
| UBS Asset<br>Management Switzerland | 141.53m | 0.88% |
|-------------------------------------|---------|-------|

## 2.2 Analysis of BP's main business lines

BP operates through several main business lines, reflecting its traditional oil and gas operations as well as its transition toward renewable energy and low-carbon solutions.

The Company's segments include gas & low carbon energy, oil production & operations, customers & products, and other businesses & corporate.

The oil production & operations segment comprises regions with upstream activities that predominantly produce crude oil. This business focuses on the exploration, development and production of oil and natural gas resources worldwide. BP oversees offshore and onshore production, including deepwater drilling, and is a major supplier of liquefied natural gas, supporting global energy demand and lower-carbon fuel alternatives. It also invests in carbon capture, utilization, and storage (CCUS) projects to reduce carbon emissions from upstream activities.

The customers & products segment comprises its customer-focused businesses, which include convenience and retail fuels, electric vehicle charging, aviation and business to business and midstream. In particular, BP operates service stations under BP, Aral, and Castrol brands, offering fuels and EV charging infrastructure, and produces motor oils and industrial lubricants under the Castrol brand. This segment also includes its products businesses, refining and oil trading, as well as its bioenergy businesses. Since 2019, BP has raised the number of EV charging points by 150%, and by 2030 plans to introduce an additional 100,000 charge points worldwide.

Its gas & low carbon energy business focuses on natural gas production and BP's energy transition strategy. It includes regions with upstream activities that produce natural gas, integrated gas and power, and gas trading. It also involves investments in solar, offshore and onshore wind, hydrogen and carbon capture and storage (CCUS). This division aims at building BP's renewable portfolio, as the 2030 target is to have developed 50GW of renewable generating capacity to FID, with a starting point of 46.8GW, as of the 3<sup>rd</sup> quarter of 2024.

BP also has global trading and logistics divisions, managing energy markets and commodity trading. In fact, it is one of the world's largest traders of crude oil, refined products, and liquified natural gas, and operates a fleet of tankers and vessels transporting crude oil, liquified natural gas, and refined products.

In addition, an innovation & engineering division focuses on new technologies, safety, and efficiency in BP's operations, by utilizing data analytics and AI to optimize energy production and efficiency.

Other businesses & corporate segment comprises BP ventures, Launchpad and others.

Regarding BP's hydrogen business, the company is investing in several projects on both electrolytic (green) and CCS-enabled (blue) hydrogen, in order to achieve the target of 0.7 million tonnes of production of low carbon hydrogen per year by 2030.

BP's plan is to focus on sustainable aviation fuel, and wants to expand biofuels' production volumes from the three refineries the company is currently operating to over 100,000 barrels per day by 2030. By the same year, BP intends to increase biogas supply volumes by six times, to 70,000 barrels of oil equivalent per day.

BP is investing in bioenergy as, since it comes from sources such as gas captured from landfill sites, used cooking oil, and sugarcane, it is renewable, and the demand for it is significantly growing.

Concerning the convenience market, BP aims to more than double the number of its convenience locations worldwide, increasing from 1,600 sites in 2019 to 3,500 by 2030. In fact, this market is expected to grow by 4% per annum until 2030, while the food service sector by 8% per annum, driven by the increasing demand for quality food (Euromonitor). Furthermore, BP is investing \$15 billion over the next seven years to enhance its convenience and EV charging infrastructure.

In summary, BP balances traditional oil and gas operations with its expanding renewable energy portfolio, and its business segments are in line with BP's intention to achieve Net Zero by 2050 while maintaining profitability high.

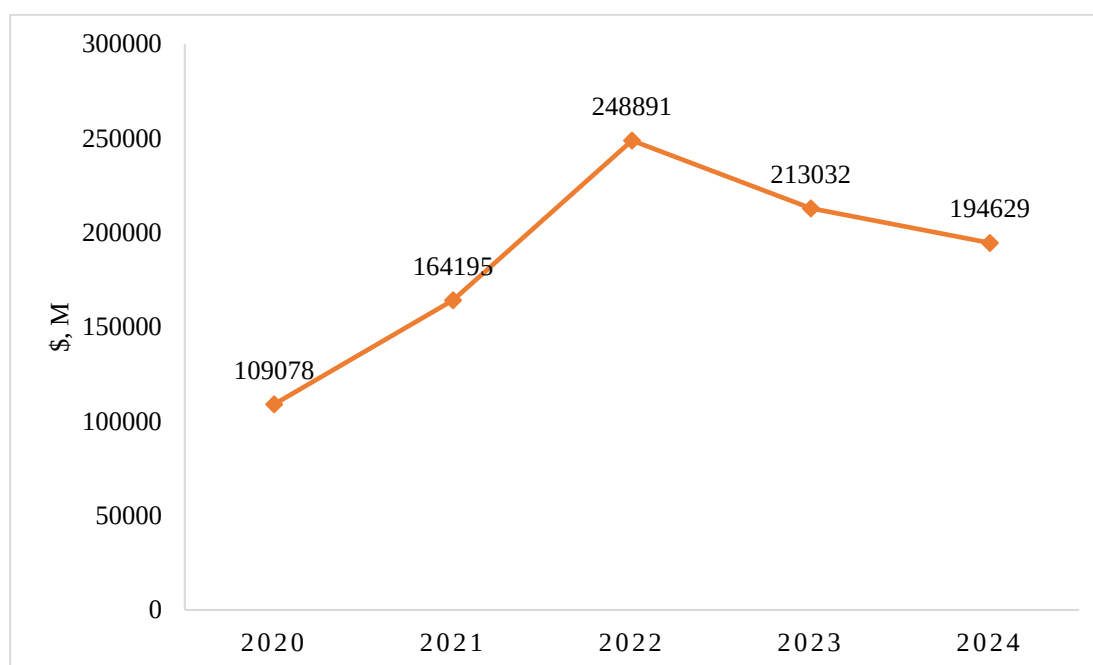
### 3 Financial Analysis of BP

#### 3.1 Revenue, profits, and equity

Below is reported the key financial information of BP (2024):

- Total revenues: \$194.6bn
  - 8.6% decrease from 2023 (when revenues were \$213bn).
- Profits: \$1.2bn
  - 92.5% decrease from 2023 (when profits were \$15.9bn).
- Bp shareholders' equity: \$59.3bn
- Capex: \$16.2bn

BP revenue trend from 2020 to 2024:



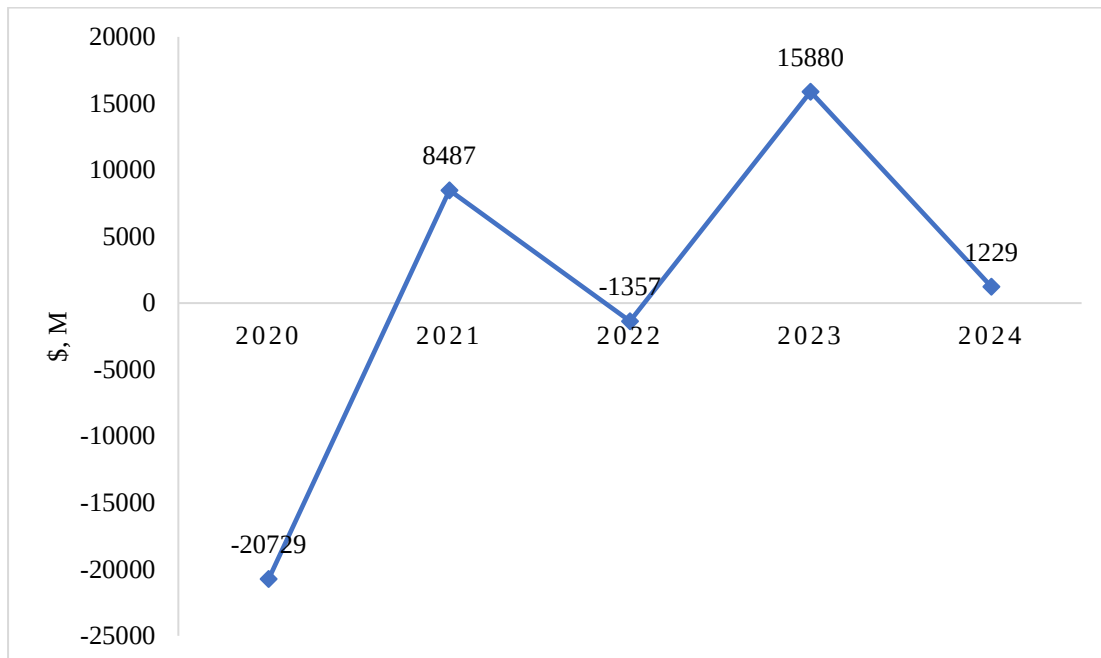
The graph displays a clear upward trend in revenues followed by a moderate decline.

2020 shows the lowest revenue at \$109.1 billion, reflecting the pandemic-induced slowdown in global energy demand.

Subsequently, revenues increased sharply, peaking at \$248.9 billion in 2022, likely due to rising oil and gas prices amid geopolitical tensions, the Russia-Ukraine war, and post-pandemic recovery.

After 2022, revenues began to gradually decline, falling to \$194.6 billion in 2024, possibly indicating market normalization and lower energy prices.

BP profit trend from 2020 to 2024:



The graph highlights significant volatility in BP's profits over the 5-year period considered.

In 2020, the company reported a substantial loss of \$20.7 billion, reflecting the impact of the Covid-19 pandemic on global oil demand and prices.

Profits rebounded strongly in 2021 to \$8.5 billion. The peak came in 2023, with profits reaching \$15.9 billion, followed by a significant drop the subsequent year.

### 3.2 Key financial performance indicators

- Gross profit margin =  $(\text{revenue} - \text{cost of sales}) / \text{revenue} * 100$   
 $= (189,185 - (113,941 + 26,584 + 974)) / 189,185 (\$, m) = \mathbf{25.21\%}$

This value shows that, after subtracting the cost of goods sold, BP has left 25.21% of its revenue. The ratio is quite high, indicating that the company is very profitable.

- Net profit margin =  $\text{net profit} / \text{revenue} * 100$   
 $= 1,229 / 189,185 (\$, m) = \mathbf{0.65\%}$

A net profit margin of 0.65% indicates that the company retains \$0.65 of profit for every \$100 of revenue generated. It is quite low, in particular compared to the other companies in the energy sector, whose margin is often below 5%.

- Working capital =  $\text{current assets} - \text{current liabilities}$   
 $= 102,834 - 82,241 (\$, m) = \mathbf{\$20,593}$

Its value is positive, meaning that BP has enough liquid assets remaining to pay off short-term obligations and to internally finance the growth of its business.

- Current ratio = current assets/current liabilities  
= 102,834/82,241 (\$, m) = **1.25**

A current ratio of 1.25 indicates that the company has enough assets to meet its liabilities while using its capital effectively, but there is room for improvement.

- Quick ratio = (current assets – inventory)/current liabilities  
= (102,834 – 23,232)/82,241 (\$, m) = **0.97**

For every \$1 of its current liabilities, BP has \$0.97 available of liquid assets. Since the ratio is lower than 1, BP may not be able to fully pay off its obligations in the short term.

- Debt-to-equity ratio = total debt/total equity  
= (58,411 + 4,474 + 9,409 + 55,073)/78,318 (\$, m) = **1.63**

A ratio of 1.63 indicates a moderate amount of financial leverage, where BP is using a balanced mix of equity and debt to finance its assets.

- Total asset turnover = revenue/[(beginning total assets + ending total assets)/2]  
= 189,185/[(280,294 + 282,228)/2] (\$, m) = **0.67**

A total asset turnover of 0.67 means that BP is generating \$0.67 in revenue for every \$1 of assets. This signals that the company is using its assets inefficiently to generate sales, as the ratio is lower than 1.

- Return on equity = net profit/[(beginning equity + ending equity)/2]  
= 1,229/[(85,493 + 78,318)/2] (\$, m) = **0.015**

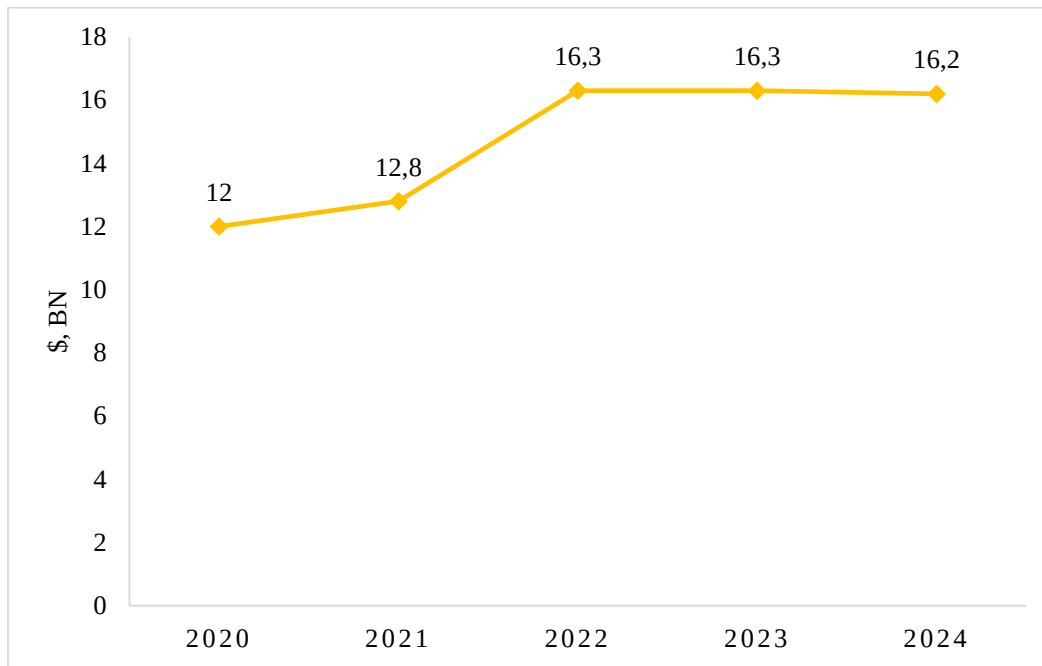
A ROE of 1.5% suggests that the company is delivering very low returns to its shareholders, as for every \$1 of shareholders' equity, the company is generating \$0.015 in profit. In the energy sector, ROEs typically range between 8% and 15% for well-performing company.

- Return on assets = net profit/[(beginning total assets + ending total assets)/2]  
= 1,229/[(280,294 + 282,228)/2] (\$, m) = **0.004**

A ROA of 0.4% indicates that the company is barely earning a return on the assets it owns or controls, while healthy ROAs are usually in the 3%-8% range. The company is not efficiently using its asset to generate profit: this ROA value may signal overinvestment in underperforming assets, or weak profitability.

### 3.3 CapEx analysis: traditional vs renewable projects

BP capex trend from 2020 to 2024:



The graph shows a trend of steady investment growth followed by stabilization.

A notable jump occurred in 2022, with capex reaching \$16.3 billion. In the following years, capex remained relatively stable around \$16.3 billion.

On February 26, 2025, BP announced a fundamental reset of its strategy, consisting in the reallocation of capital toward its highest-returning businesses – oil and gas production. The company will increase upstream spending to 75% of total capex – with an average split of 70% oil and 30% gas – while significantly reducing investment in its energy transition businesses.

According to this new strategy, BP is reducing annual capex to \$13-\$15 billion through 2027; of that, \$10 billion per year are allocated to oil and gas, aiming to increase production to 2.3-2.5 million barrels of oil equivalent per day by 2030 and start 10 new major projects by end 2027. In this way, the company is lowering its renewable energy spending by over \$5 billion per year, reducing its energy transition investments by \$1.5-2 billion annually. This disciplined investment approach in the transition dictates investing only in high grading projects, leveraging existing infrastructure and focusing on fewer key markets, as well as establishing partnerships to focus on renewables in a capital-light way.

In addition, BP is targeting \$20 billion in divestments by 2027, with potential profits from a partnership restructuring in Lightsource BP and from the strategic review of Castrol.

This radical change in strategy was contrary to the investor pressure for capital discipline, and as a result a group of investors holding nearly £5 trillion in assets has urged BP to provide a shareholder vote on the company's energy transition strategy at the next annual general meeting. The principal concern behind this investor pressure was the fact that BP's upstream capex has been six times greater than its low carbon capex over the past five years.

This upstream capex is the main reason of the investor letter published in the Financial Times on February 19, 2025, and signed by 48 funds. The letter calls the Chair's attention to a 2018 shareholder resolution filed on behalf of Climate Action 100+, which was supported by BP's management and over 99% of investors at its 2019 annual general meeting. This resolution required BP to develop a strategy consistent with the Paris Agreement, and verify that all capex investments are in line with the Paris Goals.

This letter aimed at limiting greenhouse gas emissions while promoting capital discipline, to make oil and gas companies focus not only on Scope 3 intensity targets, but also on channeling capex exclusively into cost-competitive projects.

In response, BP developed a new strategy focused on cutting oil and gas production by 40% from 2019 to 2030 and committing to annual transparency on how its capex was in line with the Paris Goals. At the 2022 annual general meeting, shareholders supported this strategy by performing BP's first and only Say on Climate vote.

However, less than a year later, BP walked back its commitment, revising the production cut target to just 20-30%. Many expect that BP will abandon this target entirely this year, and this means that the company will produce around 80% more oil and gas in 2030 than it originally planned in 2020.

Therefore, BP's new strategy – established without consulting shareholders – is a source of concern for investors as, even though the short-term benefits are material, in the medium-term shareholders' risk of exposure to value-destructive assets is radically increased.

BP's capital allocation framework now represents the key mechanism for ensuring that the 2018's investor resolution is respected, thus that the company's strategy aligns with the Paris Agreement. However, investors have criticized the company's evaluation methodology, which according to their judgment would allow expenditure that far exceeds a Paris-consistent framework. They argue that BP purposefully decided to build its model on oil and gas prices rather than oil and gas production, and this resulted in a much weaker correlation with temperature outcomes. In addition, BP's framework does not assess a significant portion of greenfield oil and gas capex, as it excludes projects with capex under \$250 million and FIDs through joint ventures and equity-accounted entities. Finally, BP's model wrongly assumes its commodity prices are in line with the Paris Agreement's temperature targets; however, if the oil and gas sector adopted a similar methodology, the 1.5°C carbon budget would be exceeded by a factor of five.

To conclude, the company's renewed focus on oil and gas constitutes a decisive break from its earlier climate commitments. Stakeholders are carefully assessing whether this energy transition slowdown will provide long-term benefits or expose them to an increased market risk and regulatory uncertainty.

### 3.4 Corporate debt sustainability during the transition

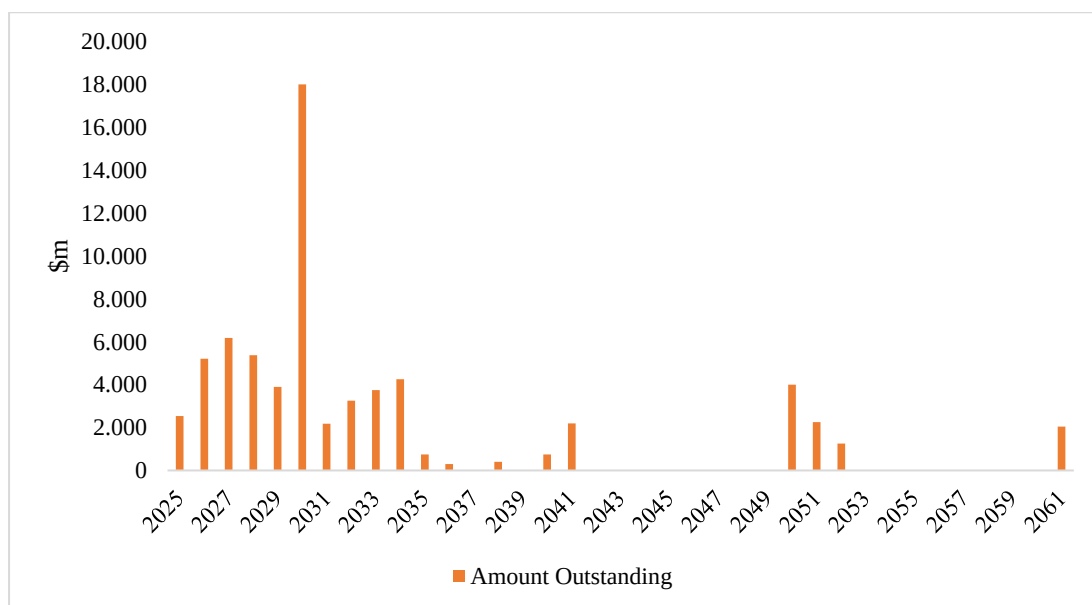
BP is committed to a consistent and disciplined financial framework: it ensures a resilient dividend distribution, setting a guidance of 30–40% of operating cash flow to shareholders, and a reduction in net debt targeted \$14–18 billion by the end of 2027. Between 2019 and 2023 the company already achieved a net debt reduction of nearly \$25 billion – from \$45 billion in 2019 to around \$20 billion in 2023, making debt 50% lower over a four year horizon.

The company’s primary aim is to maintain a strong investment grade credit rating throughout all the transition. Its current credit ratings, all classified as “stable”, are A+ by Fitch, A1 by Moody’s, and A- by S&P.

Moreover, BP plans to execute at least \$14 billion in share buybacks through 2025, in order to follow its commitment to returning a minimum of 80% of surplus cash flows to shareholders.

In recent years, the company is also increasing the proportion of fixed-rate debt, shifting from slightly less than 40% of gross debt in 2019 to around 65% of gross debt in 2023.

As part of its financing strategy, BP issues both short-term and long-term bonds, usually considered investment-grade because of its strong credit profile, and denominated in various currencies including USD, EUR, and GBP. The graph shows a summary of the outstanding bonds issued by BP Capital Markets P.l.c., BP Capital Markets B.V., and BP Capital Markets America Inc., as at 31 December 2024.





## 4 BP's Transition Strategies Towards Net Zero

### 4.1 Strategic plans and ESG objectives

Four years into its 2020 strategy, BP is continuing transitioning from an international oil company to an integrated energy company. Over this time, BP has established the groundwork for sustained decarbonization; notable advancements include Cherry Point and Whiting refineries securing low carbon power purchase agreements, the Tangguh LNG plant incorporating a steam heat recovery system, and bpx energy cutting emissions through increased electrification and automation.

BP's ESG strategy includes three main areas of activity: resilient hydrocarbon – focusing on bioenergy; convenience and mobility – strengthening retail fuels, Castrol, aviation services, and EV charging; low carbon energy – accelerating progress in hydrogen and renewables.

#### **Net zero operations**

By the end of 2023, BP achieved a 41% decrease in Scope 1 and 2 absolute emissions compared to 2019, bringing the company's total to 32.1MtCO<sub>2</sub>e. This reduction surpasses its 2025 goal of a 20% decrease. While new projects may temporarily impact emissions, the company's 2030 aim remains a 45-50% reduction.

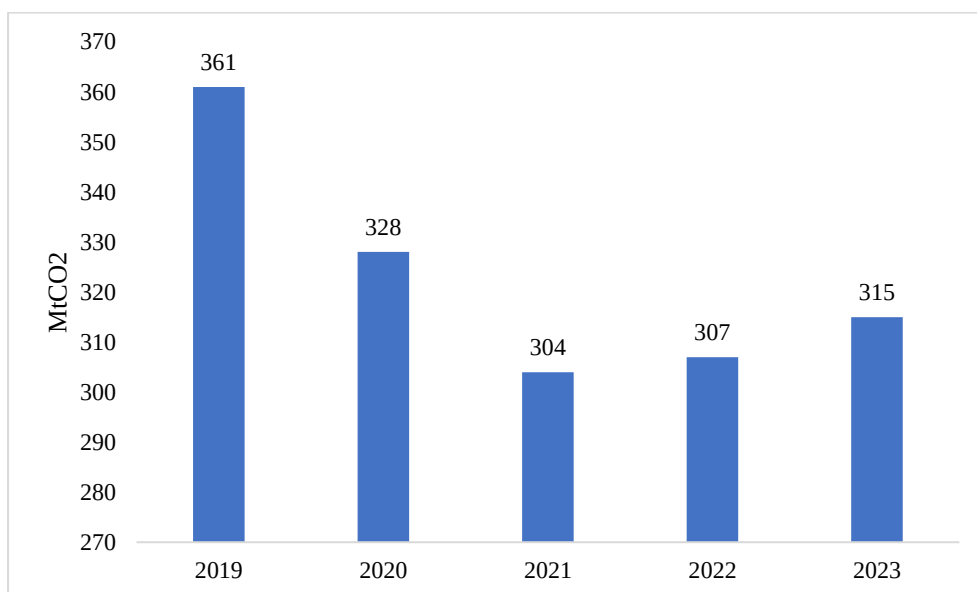
In order to reach net zero operations, BP is working on its operational efficiency by improving energy efficiency, electrifying centralized facilities, minimizing flaring and venting, and manage methane emissions. Process optimizations, steam heat recovery, and powering assets with lower-carbon electricity are fundamental activities contributing to these efforts.

To curb emissions, the company is also increasing its carbon capture and storage (CCS) activities; for example, at the Tangguh LNG facility in Indonesia BP is working on a project to reinject CO<sub>2</sub> into reservoirs. Additionally, BP's refineries are shifting toward greater use of blue and green hydrogen to lower natural gas and grey hydrogen emissions.

#### **Net zero production**

BP's goal is to reach net zero carbon emissions from its upstream oil and gas production (Scope 3) by 2050 or sooner. BP's target is a 10-15% reduction by 2025, followed by a 20-30% cut by 2030. Achieving this will involve a sharp reduction in oil and gas production, targeting a 25% decline by 2030, compared to 2019.

Estimated emissions from carbon in BP's upstream oil and gas production:



### **Net zero sales**

Part of BP's ESG strategy is a reduction of the carbon intensity of the energy products sold to net zero by 2050. This carbon intensity is estimated on a full value chain basis, from the use, production, and distribution of sold energy products per unit of energy delivered.

As of 2023, BP has achieved a 3% reduction in average carbon intensity from its 2019 baseline, progressing toward the 5% reduction goal for 2025. This improvement is driven by changes in the product mix, portfolio changes, and refinements in the methodology.

In order to reach the target, the company is expanding its bioenergy business, and by the end of this year it expects to grow biofuels production to 50kb/d and biogas supply to 40mboe/d. It is also scaling its EV charging network, working on fast and ultra-fast charging solutions, as well as its low-carbon energy operations, aiming for a substantial increase in its electricity trading volumes. However, most of the benefits from these projects will materialize over the longer term – for example, many offshore wind projects of these years will become operating after 2030, and the utilization rates for EV charge points will raise in the future years as EV uptake grows.

### **Reducing methane emissions**

By 2023, BP installed methane measurement across all major oil and gas sites, and maintained methane intensity at 0.05%. While methane emissions from upstream operations increased by around 10% due to flaring changes in the Azerbaijan-Georgia-Türkiye region and Tangguh operations, reductions were overall achieved through sustainability initiatives such as utilizing nitrogen for purge gas in the North Sea and electrifying bpx energy's operations in the US Permian Basin. The company remains committed to eliminating routine flaring by 2030 in line with the World Bank's Zero Routine Flaring.

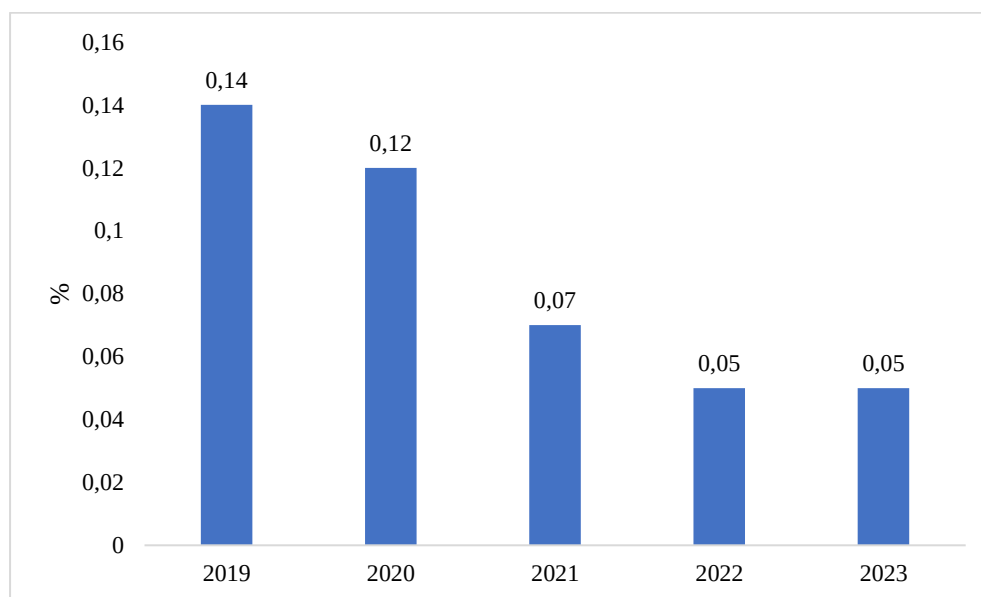
BP is also actively encouraging its joint ventures to set their own methane intensity targets of 0.2%.

The rapid advancement of technologies for detecting, measuring and reducing methane is helping drive improvements in emission management. In 2023, BP retained gold status for its methane measurement plans under the OGMP 2.0 reporting framework.

Together with other 50 companies, BP signed the Oil & Gas Decarbonization Charter, launched at COP28 in December 2023. The document commits to achieving zero routine flaring and near-zero methane emissions by 2030, and acknowledges the role of industry leaders in assisting companies at early stages of their methane reduction efforts.

Finally, BP plans to donate \$25 million to the Global Flaring and Methane Reduction trust fund, initiative aimed at enhancing financing mechanisms and technical solutions to curb methane emissions.

Methane intensity:



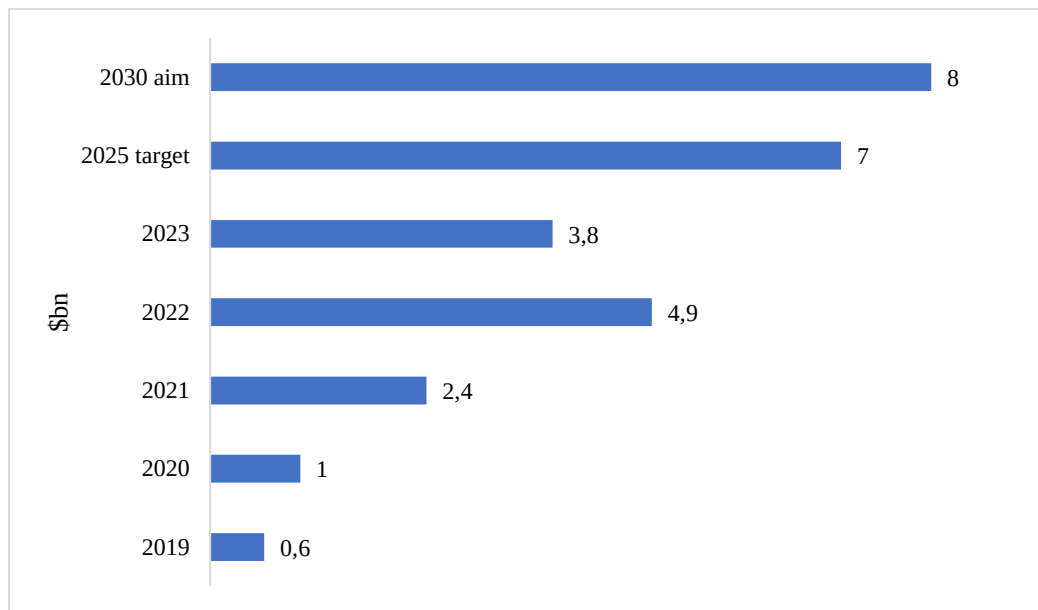
### Higher investment into the transition

BP's ESG strategy plans to increase investments in low- and zero-carbon projects while reducing capital allocation to oil and gas. In 2023, the company invested \$3.8 billion in transition growth areas – it constitutes 23% of total capex for the year – adding 35% more EV charge points, and increasing by 80% the biogas supply volumes.

Important 2023 milestones include:

- Entering the offshore wind market in Europe with two German North Sea projects, totaling a generating capacity of 4GW.
- Investing in hydrogen to meet growing customer demand, including a \$12.5 million commitment to Advanced Ionics to reduce green hydrogen production costs.
- Launching the HyVal hydrogen cluster in Spain and expanding biofuel production at the Castellón refinery.
- Supplying sustainable aviation fuel (SAF) to LATAM Cargo and contributing to the first 100% SAF transatlantic flight with Virgin Atlantic.

## Annual \$ investment in transition growth engines – progress and targets:



### Advancing policies that support net zero

In 2023, BP supported various initiatives that drive progress toward net zero, including:

- Endorsing the Global Renewables Alliance’s call at COP28 to triple global renewable energy capacity and backing the COP presidency’s push to accelerate the energy sector decarbonization.
- Participating in the European Commission consultation on the EU Climate Target for 2040, supporting climate neutrality, an economy-wide carbon price, and emphasized the role of renewable energy, hydrogen, CCUS and sustainable biofuels and biogas in achieving net zero.
  - Engaging with European institutions on electricity markets reforms.
  - Supporting the US Environmental Protection Agency’s (EPA) methane regulations
  - Advocating for the US Inflation Reduction Act, particularly its provisions for sustainable aviation fuel.
- Endorsing legislation in Washington state that incentivizes the production and use of SAF.
- Supporting the UK Energy Act 2023, which lays the groundwork for CCUS and hydrogen development in the UK.
  - Advocating for transport decarbonization policies, such as the Zero Emissions Vehicle Mandate in the UK and the consideration of advanced biofuels in the European Renewable Energy Directive.
- Backing reforms to Australia’s Safeguard Mechanism, which establishes emissions baselines and the purchase of carbon credits for major emitters.

BP engages in a series of initiatives to make sure the company’s workforce plays an active role in achieving sustainability goals. Important to mention is the employee-led initiative of BP’s Global

Sustainability Network, which fosters learning and engagement across the company. Additionally, since 2019 the annual bonus for all eligible employees has been tied to sustainability performance.

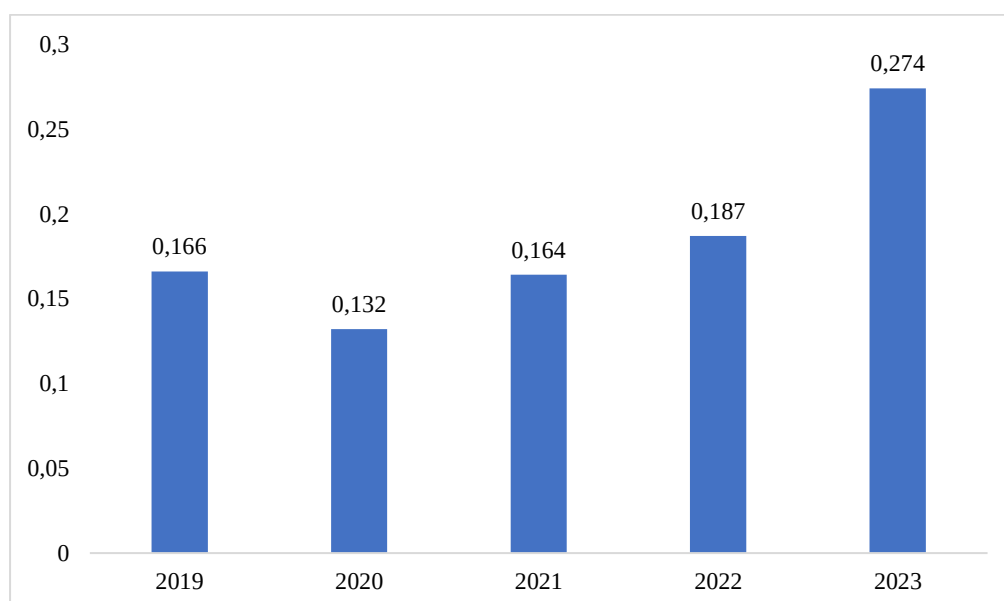
Furthermore, the company is committed to enhancing water efficiency and working towards becoming water positive by reducing its consumption and replenishing freshwater sources in stressed regions. In 2023, BP experienced a 29% reduction in freshwater withdrawals and a 15% decrease in freshwater consumption compared to the 2020 baseline; this was partly due to the divestment of the Toledo Refinery and operational changes at Kwinana and Castellón. In the same year, BP increased the use of produced and brackish water in US operations, saving an additional 476,000m<sup>3</sup> of freshwater, and implemented a water recycling project at the Lingen refinery, saving an additional 500,000m<sup>3</sup> of freshwater annually. Finally, the company conducted water assessments at four refineries (Rotterdam, Lingen, Cherry Point, and Whiting), covering 51% of our total water consumption.

In 2023, BP advanced waste reduction and circularity initiatives. The company achieved a recycling and recovery rate of 51%, by recycling or recovering 250kt of waste, marking a 4% increase from the previous year.

Safety remains a top priority, and while BP experienced improvements in process safety events and spill reduction, it also identified areas requiring further action. In fact, process safety events (PSEs) decreased by 22%, with 39 PSEs reported in 2023, following a downward trend which continues from 2012 (except for 2019); the company's goal is the elimination of tier 1 PSEs.

Recordable injury frequency (RIF) rose by 47%, driven in part by the integration of new retail operations such as Thorntons; interventions are underway to improve workplace safety.

Recordable injury frequency – workforce per 200,000 hours worked:



Overall, BP's energy transition has been slower than expected, despite the well-planned ESG strategy, partly due to volatile energy markets, the Covid-19 emergency, the war in Ukraine, and changing preferences towards renewables in some areas.

## 4.2 Analysis of acquisitions and partnerships in the renewable sector

Strategic acquisitions and long-term partnerships are part of BP's strategy to become an integrated energy company.

In fact, BP has strengthened its global footprint with several major acquisitions. On June 20, 2024, BP completed the acquisition of *Bunge Bioenergia SA*, bolstering its bioenergy portfolio; earlier in the year, on January 17, 2024, it acquired *GETEC ENERGIE GmbH*, enhancing its presence in the European energy market.

Additionally, BP acquired the remaining shares in *Lightsource BP*, a leading solar and battery storage developer, and now seeks a 50% partner for its solar business, with a sale process expected within the year. Lightsource BP has been developing different solar projects in the US, such as the Arche solar project in Ohio, supported by a power-purchase agreement with Meta, and the 187MW DC Peacock solar project in Texas, which will supply power to the Gulf Coast Growth Ventures petrochemical complex.

Moreover, BP is making significant progress in offshore wind energy. Following an agreement with *Equinor* to restructure their US offshore wind investments, BP announced on April 4, 2024, that it had received all necessary regulatory approvals and now fully owns the Beacon US offshore wind projects, while Equinor has taken over the Empire projects.

In the UK, BP's joint ventures *Net Zero Teesside Power* (BP 75%, Equinor 25%) and the *Northern Endurance Partnership* (BP 45%, Equinor 45%, Total Energies 10%) have selected contractors for major engineering and construction projects worth approximately \$5 billion.

In South Korea, the company acquired a 55% stake in *Deep Wind Offshore's* offshore wind portfolio, which consists in four projects with a total potential generating capacity of 6GW.

In Scotland, BP is backing the Morven offshore wind project, by supporting the X-Academy training program.

BP also collaborates with *G+*, a global organization that focuses on health and safety in the offshore wind industry.

Finally, in December 2024, BP created in Japan a £4.5 billion joint venture with *JERA* in order to combine both companies' offshore wind asset and generate up to 13 GW of power.

As part of its strategy to expand into mobility and convenience, in May 2023 BP acquired *TravelCenters of America*. This investment positioned BP in almost every major US highway, increasing its

convenience network through an additional 290 locations. Starting with 2,850 convenience sites at the end of 2023, the final target is to reach 3,500 sites by 2030.

In Poland, the company expanded its collaboration with *Auchan*, planning to introduce over 100 EasyAuchan stores by 2025. Meanwhile, in Germany, BP confirmed its partnership with *Lekkerland*, continuing the delivery of REWE To Go stores at Aral retail sites.

BP actively collaborates with its Non-Operated Joint Ventures (NOJV) to improve methane emissions measurement and reduction, inviting them to operate following the guidelines of organizations such as the Methane Guiding Principles and the Oil and Gas Methane Partnership.

In Azerbaijan, BP promoted the Advancing Global Methane Reductions (AGMR) project in November 2023, with the aim to establish a strong framework for methane emissions management. One month later, the company established a partnership with the State Oil Company of the Azerbaijani Republic (SOCAR), in order to enhance methane reduction initiatives.

Strategic partnerships are also a way for BP to focus on water sustainability.

In Azerbaijan, for example, BP launched a series of initiatives to support irrigation, safe drinking water, and community-led water systems.

In Mauritania, BP is financing the expansion of the N'Diogo water supply project, which will provide solar-powered water distribution systems to an additional 455 households.

In Zambia, the company collaborated with *BioCarbon Partners* to support the Kafue-Zambezi Community REDD+ (Reducing Emissions from Deforestation and forest Degradation) project, aiming at preserving a wildlife corridor while benefiting over 400,000 people.

BP has been rapidly growing its bioenergy business, as in 2023 it increased the biofuels production by 18% and biogas supply volumes by 80%. This has been possible after the 2022 acquisition of *Archaea Energy*, which is scaling up its renewable natural gas (RNG) production by launching a modular RNG plant in Indiana. The acquired company has a pipeline of 80 development projects and aims to launch 15-20 new plants annually through 2025.

BP is also expanding its EV charging network.

In fact, in the UK it launched the nation's largest EV charging hub, the *Gigahub* at the NEC Campus in Birmingham.

In the US, BP Pulse agreed to purchase \$100 million worth of ultra-fast chargers from Tesla.

Finally, BP formed a joint venture with *Iberdrola* to accelerate EV charging infrastructure development in Spain and Portugal, with a €1 billion investment targeting 5,000 fast charge points by 2025 and 11,700 by 2030.

BP is also engaged in several trade associations and industry initiatives globally:

- *Ipieca* organizes working groups focused on GHG emissions, biodiversity, water management, circularity, labor rights and modern slavery.
- Together with other major multinational corporations belonging to different industries, BP is a member of the *Global Business Initiative for Human Rights*.
- The *Oil and Gas Climate Initiative* (OGCI) supports efforts to reduce carbon emissions and promote decarbonization.
- BP played a fundamental role in the creation of *ChargeUK*, a trade association which works to improve EV charging infrastructure in the UK.
- *H2Accelerate* is an organization supporting hydrogen adoption in heavy-duty transport.
- *RenewableUK* is advocating for renewable energy development.

Additionally, BP plays a role in promoting a just transition by funding initiatives such as the *ACCEL program*, which supports entrepreneurs who belong to a minority and whose companies focus on clean energy.

Through the *Tent Partnership for Refugees*, BP has committed to hire and train more than 250 refugees in Europe.

The company is also a founding partner of the *BITC Community Climate Fund* in the UK, to which BP contributed £5 million in order to foster a just transition.

BP's key partners are also major universities and academic institutions, in order to drive innovation.

In China, BP celebrated 20 years of partnership with *Tsinghua Clean Energy Research and Education Center* and the *DICP Energy Innovation Laboratory*, which are dedicated to low carbon research.

The *International Centre for Advanced Materials* (ICAM) is a partnership between BP, Imperial University London, Manchester University and Cambridge University, through which BP fosters energy transition research.

In 2023, BP collaborated with Georgetown University to support wellbeing and mental health.

In summary, in addition to investing in renewables, biofuels, EV infrastructure, and methane reduction, BP is also focusing on strategic acquisitions and collaborations to step towards a more sustainable future. Its partnerships and innovation-driven approach will shape the company's path forward in the energy transition.

#### 4.3 Green bond issuance and sustainable financing instruments

So far, BP has not issued green bonds.



However, the company has been using a variety of other sustainable financing instruments, including:

- Joint ventures in renewable energy, many of which were mentioned in paragraph 4.2.
- Sustainability-linked loans, which tie borrowing costs to BP's environmental performance metrics.
- 10 power purchase agreements secured by Lightsource BP, specifically focusing on solar energy, with giants such as Google, H&M, and Microsoft, and totaling 1.3 GW across Europe, the Americas, and the Asia Pacific region.

#### 4.4 Performance of renewable projects: ROI and NPV

BP recently announced that the returns it expects to earn from the portfolio of renewables are comparable to those achieved by oil and gas, reflecting a very positive outlook.

Due to limited publicly available data on specific projects, a precise calculation of the ROI and NPV is not feasible.

However, we can make some estimates on the performance of BP's solar energy subsidiary, Lightsource BP, which has reported constructing over 2 GW of solar projects in 2024.

In order to calculate the ROI, we need an estimate of the investment costs. Figures on specific projects' financing packages are necessary, and even though not data on all projects is published, we can still use the disclosed one: in particular, Lightsource BP closed on a \$348 million financing package for two solar projects in Texas, totaling 288 MW.

Based on the data reported above, we can now estimate the investment cost per Megawatt, and use it to estimate the total investment cost for Lightsource BP:

- Based on the Texas project, as the total investment was \$348 million and the total capacity was 288 MW, the *investment per Megawatt* is:  $\$348\text{m} / 288\text{MW} = \$1.21 \text{ million per MW}$ .
- If we assume that the 1.3 GW (1,300 MW) of projects secured through power purchase agreements by Lightsource BP in 2024 had a similar investment per MW, then we can estimate the *total investment cost*:  $1,300\text{MW} \times \$1.21\text{m/MW} = \mathbf{\$1.573 \text{ billion}}$ .

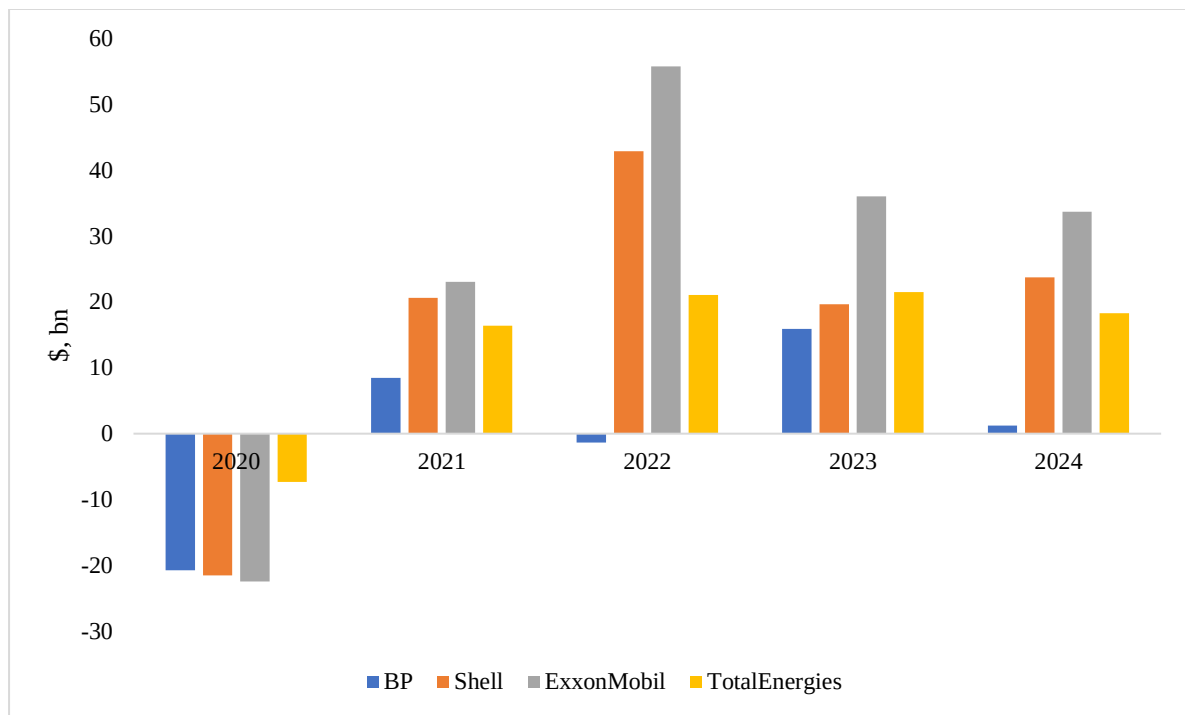
Lightsource BP reported that these projects delivered “double-digit equity returns”; we can assume a conservative estimate of 10%. The annual earning will therefore be  $\$1.573\text{bn} \times (1 + 10\%) = \$1.73 \text{ billion}$ . The net profit is obtained by subtracting the investment cost from the earnings:  $\$1.73\text{bn} - \$1.573\text{bn} = \$157 \text{ million}$

We can now calculate the ROI = (net profit / investment cost)  $\times 100\% = (\$157\text{m} / \$1.573\text{bn}) \times 100\% = \mathbf{9.98\%}$ .

Therefore, assuming a 10% annual return, the ROI would be approximately 9.98%.

In conclusion, despite the impossibility of calculation of specific ROI and NPV for BP's renewable projects, Lightsource BP's performance is positive. However, as BP recently announced a strategic reallocation of capital towards fossil fuels and a consequent reduction of its planned annual investment in renewables by around \$5bn, the future ROI and NPV of renewable projects may be negatively impacted.

## 5 Comparison with Other Oil & Gas Companies



As we observe from the graph above, BP's annual earnings are significantly lower than competitors.

### 5.1 Shell: step back in the energy transition

Despite remaining among the most powerful companies worldwide, oil majors like BP and Shell are being pushed toward the energy transition – a significant shift from their traditional business models. However, both companies have recently scaled back their renewable energy ambitions, prioritizing fossil fuels due to economic and geopolitical factors.

Falling energy prices affected both companies' stock performance. Over the last six months of 2024, Shell's share price declined by 10%, while BP's fell by 23%.

As of September 30, 2024, Shell's book value stood at £149.5 billion, with a stock market valuation of £156.3bn and a corresponding price-to-book ratio of 1.05. On the other hand, BP's book value was £63 billion, with a stock market valuation of £61 billion and a price-to-book ratio of 0.97.

Since both ratios are close to one, if either company stopped trading today, sold all assets, and paid off liabilities, shareholders would receive nearly the current market price for each share held.

When considering price-to-earnings ratios, Shell's performance appears more stable. In fact, based on earnings per share over the four quarters ending September 30, 2024, Shell's price-to-earnings ratio is 13.3, while BP's one is 30.7, indicating BP's weaker earnings in the 2<sup>nd</sup> and 3<sup>rd</sup> quarters of 2024.

Dividend yields also highlight a difference, as Shell yields 4.3% while BP yields 5.5%; BP's higher yield reflects its more volatile earnings, as investors require a larger return for holding its stock. However, both returns are higher than the FTSE 100 average of 3.8%.

Concerning the energy transition, both Shell and BP have significantly slowed their renewable energy investments. Similarly to BP, Shell has reversed course on key climate commitments, focusing instead on improving financial performance and closing the valuation gap with US rivals ExxonMobil and Chevron.

Two main factors are fomenting this shift: the first is the geopolitical and market pressure – as the energy crisis caused by Putin's war in Ukraine reinforced the role of fossil fuels in global energy security; the second is the low profitability of renewable projects, mainly caused by increasing costs and supply chain disruptions.

Shell has cut back on several green activities, and revised its 2030 carbon reduction goals from a 20% reduction in net carbon intensity to 15-20%. BP has followed a similar path, reducing its 2030 emissions target from 25–40% to 20–30%.

In 2023, Shell invested 4.7 times more in oil and gas than in renewables, with spending on green energy dropping from \$3.5 billion in 2022 to \$2.7 billion in 2023 – this constitutes only 11.7% of its total capex, down from 15.3% in 2022.

As a further argument evidencing Shell's drawback from renewables, Shell is negotiating to sell Select Carbon, company specialized in carbon offset projects.

Overall, despite the growing global push for sustainability, it appears that financial imperatives are leading both companies to put profits before the planet.

## 5.2 TotalEnergies: stronger focus on renewables

BP and TotalEnergies have taken contrasting approaches to the energy transition. While BP has recently abandoned its oil & gas production reduction target and scaled back investments in renewables, TotalEnergies remains committed to deliver a consistent green strategy.

Unlike BP, the French oil major is prioritizing expanding its sustainable portfolio without cutting its dividend. To mention, in 2023 TotalEnergies invested \$300m in a joint venture with Adani Green Energy, aiming to develop 1,050 MW of portfolio capacity of solar and wind projects in India.

The company is also focusing on strategic partnerships, such as the one with Airbus established in February 2024 in order to meet emission-reduction goals through sustainable aviation fuels. As part of this agreement, TotalEnergies supplies more than 50% of Airbus' European fuel needs.

Additionally, in November 2024, the company declared its intention to equip all its upstream assets with real-time methane leak detection equipment by 2025, targeting net-zero methane emissions by 2030.

Financially, in 2024 TotalEnergies has significantly outperformed BP. BP reported a profit of \$1.3 billion, making a significant decline from the previous year. Meanwhile, TotalEnergies observed \$18.3 billion in profits, reflecting better financial performance.

In summary, although both BP and TotalEnergies have faced challenges in refining profitability, they have adopted contrasting strategies in response to the energy transition. BP is recalibrating its focus towards oil and gas investments, reducing its emphasis on certain renewable projects. In contrast, TotalEnergies continues to invest in low-carbon energy initiatives, reflecting a sustained commitment to energy transition and maintaining a balanced approach between traditional energy sources and low-carbon alternatives.

### 5.3 ExxonMobil: low-carbon initiatives

While BP focuses on short-term shareholder returns, ExxonMobil appears more financially resilient and strategically positioned for a low-carbon future.

ExxonMobil boasts a remarkable free cash flow margin of 18.35%, providing strong liquidity for dividends and buybacks. It also maintains low leverage, with a debt-to-equity ratio of 15.6%, reflecting a stable balance sheet.

In contrast, BP's lower 8.3% free cash flow margin suggests a reduced capacity to return capital. More concerning is BP's high debt, with a debt-to-equity ratio of nearly 80%, significantly riskier than ExxonMobil's.

In addition, BP currently offers the highest dividend yield among major oil companies at 5.5%, with 42.2% payout. Over the past year, it has repurchased \$6.9 billion in shares, resulting in an 8% buyback yield – materially higher than ExxonMobil, whose buyback yield is at 3.16%, based on its \$17.4 billion in share repurchases and \$551 billion market capitalization.

ExxonMobil also has a lower dividend yield, of 3.2%, with a 41% payout ratio.

Regarding the investment strategy, ExxonMobil maintains a CAPEX/Sales ratio of 6.5%, signaling a balanced investment in assets while ensuring strong financial stability.

On the other hand, BP prioritizes growth and shareholder returns over debt payment, relying on elevated oil prices to sustain its strategy.

In terms of profitability, ExxonMobil reported 2024 net income of \$33.7 billion, slightly lower than \$36 billion in 2023 but still vastly outperforming BP's profit of \$1.3 billion.

BP and ExxonMobil experienced substantial differences not only financially, but also in terms of the global energy transition.

In fact, as we already know, BP is now focusing on high-returning businesses and cost efficiency after the underperformance in its shares compared to peers due to the shift towards renewables of these past years.

On the other hand, in 2022 ExxonMobil established its Low Carbon Solutions division in order to focus on lowering emissions in hard-to-decarbonize sectors such as power generation and heavy industry.

ExxonMobil is also investing in technologies like biofuels, hydrogen, and carbon capture and storage, by deploying over \$15 billion in order to reach its carbon neutrality target by 2050. The company is developing a large-scale low-carbon hydrogen plant in Baytown, Texas, planned to be the world's largest

Moreover, ExxonMobil performed various strategic acquisitions in order to enhance its low-carbon efforts, such as the one of Denbury Resources for \$4.9 billion, and has entered into agreements for carbon dioxide emissions transportation and storage.

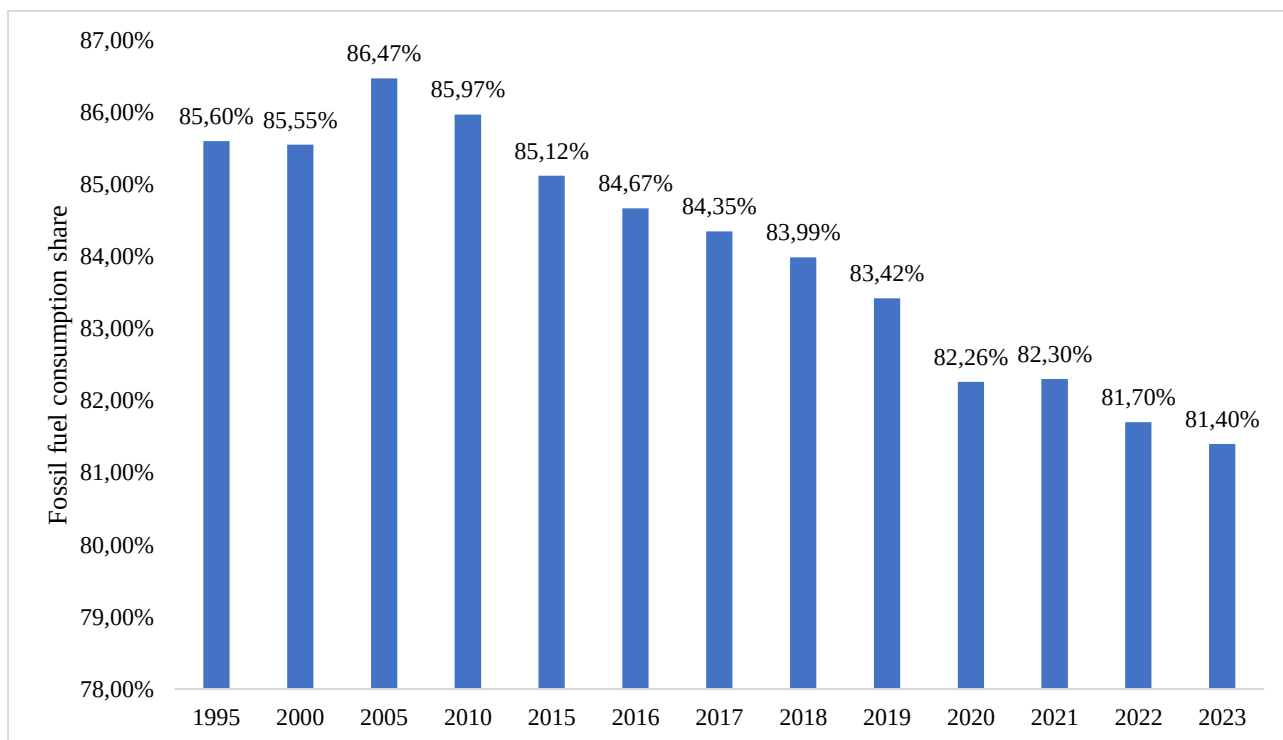
In end, while BP stands out for its high dividend and buyback yields, its high debt levels and weaker cash flow margins pose important risks, in particular in a volatile oil market. On the other hand, ExxonMobil offers stronger financial stability, better cash flow generation, and lower debt, as well as a commitment to low-carbon technologies, differently from BP.

## 6 Challenges and Future Prospects

### 6.1 Dependence on fossil fuels and the burden of transition

Fossil fuels continue to be the primary energy sources worldwide, accounting for more than 80% of global primary energy consumption. While their share declined with the increased adoption of renewables, fossil fuels remain critical, particularly for industries requiring high heat and vast energy inputs.

Many sectors still depend heavily on coal and natural gas due to their high energy density and reliability, while crude oil remains dominant in transportation. Resource-rich nations tend to have the largest per capita fossil fuel consumption.



Global energy demand has been rising, averaging about 1% per year from 2019 to 2023, though slower than the previous decade's 2% growth.

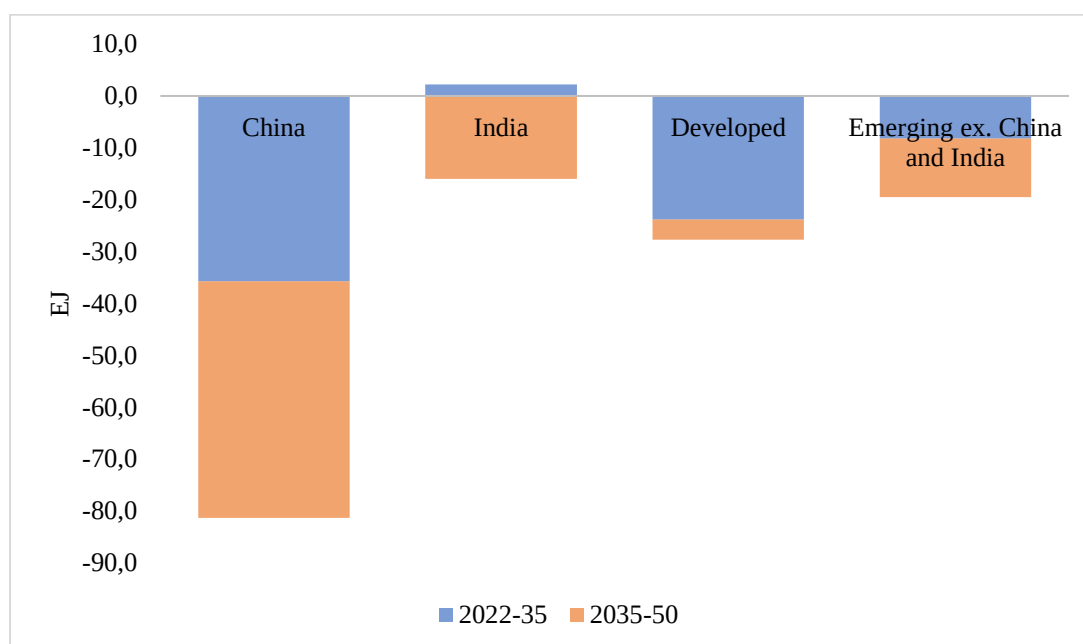
Despite growing investment in renewables, fossil fuel consumption hit a new high in 2023, driven mainly by rising oil demand. Emerging economies have led this growth, particularly in petrochemical feedstock needs and increasing natural gas consumption.

Coal remains a widely used energy source, particularly in nations with growing electricity demand due to its low cost. In 2023, coal accounted for 35% of global power generation. However, the world is steadily moving away from coal, as its consumption is expected to peak in the mid-2020s and then gradually decrease. In a Net Zero scenario, coal consumption is expected to plummet by approximately 85% by 2050, reducing coal's share in primary energy from 28% in 2022 to about 5%.

China plays a pivotal role in this transition, as its economic growth slows and its energy mix increasingly incorporates lower-carbon alternatives. Chinese coal consumption is forecasted to reach its highest point before 2030 and then steadily decline, accounting for roughly 60% of the global reduction in coal use under Net Zero targets.

The power sector experiences the most significant decline in coal consumption, as wind and solar energy are rapidly expanding, replacing coal-fired generation. Additionally, industrial coal usage is diminishing, as industries are shifting towards electrification and alternative energy sources like low-carbon hydrogen. By 2050, nearly 75% of the coal still in use is expected to be paired with carbon capture, utilization and storage (CCUS), predominantly within industrial applications and power generation.

Change in coal demand by region:



Global oil demand is expected to stabilize for the remainder of this decade before entering a steady decline. Despite this shift, oil will remain a key component of the global energy landscape through the first half of the forecast period, with Net Zero projections estimating consumption at 80 million barrels per day (Mb/d) in 2035. By 2050, demand is projected to fall between 25-30 Mb/d – approximately 70% lower than in 2022.

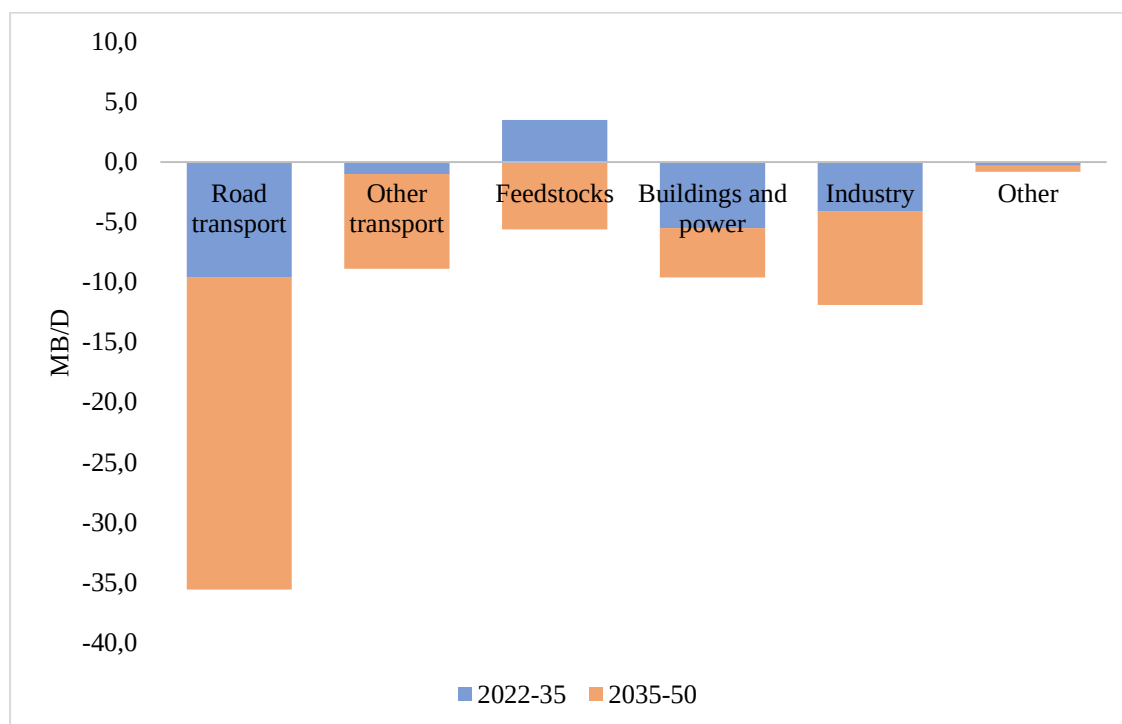
The most significant factor behind this decline is the decreasing reliance on oil for road transport, driven by improved vehicle efficiency and the widespread adoption of alternative fuels, particularly electric vehicles.

Industrial oil demand is also set to decrease by 2050, reflecting a shift away from diesel generators and increased adoption of alternative fuels in off-road industrial applications. The most significant reductions in oil consumption are expected in developed economies, continuing a downward trend that began in early 2000s. By 2050, oil demand in these regions is projected to drop from 45 Mb/d in 2022 to 7 Mb/d.

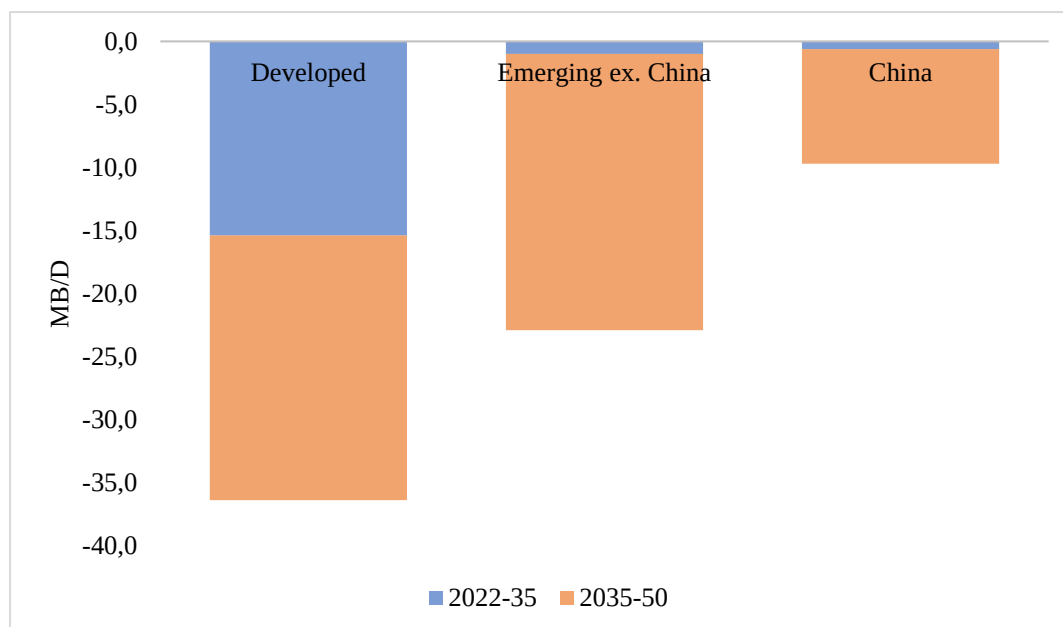


In China, oil consumption is anticipated to rise slightly in the short term before beginning a post-2030 decline, largely due to the rapid electrification of road transport. In other emerging economies, although growing prosperity and improved living standards will initially sustain oil demand, increasing electrification in transport will drive significant reduction in oil use towards the half of the century.

Change in oil demand by sector:



Change in oil demand by region:



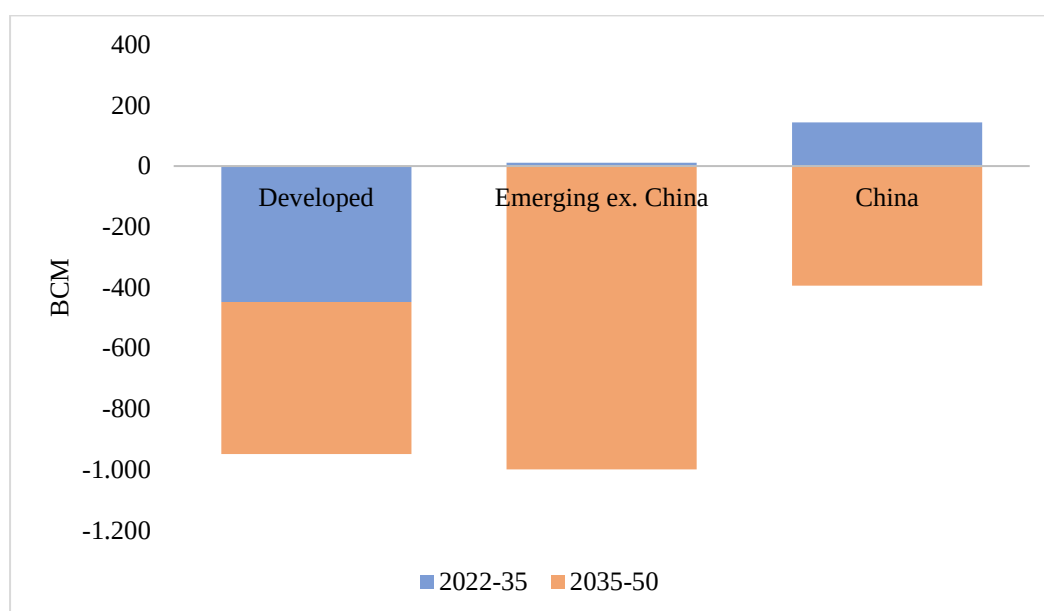
The future demand for natural gas hinges on the pace of the energy transition. Two opposing dynamics influence its trajectory: rising consumption in emerging economies due to industrial growth, countered by a global shift towards electrification and lower-carbon alternatives as decarbonization efforts intensify. The balance between these forces will ultimately dictate the long-term demand for natural gas.

In a Net Zero scenario, natural gas demand reaches its peak around the early 2020s before steadily declining, falling to roughly half of its 2022 levels by 2050. This transition unfolds more rapidly in developed economies, where demand peaks in the 2020s and then drops by more than 55% by mid-century. The decline is fueled by advancements in energy efficiency, increased electrification of residential and industrial sectors (driven by the adoption of heat pumps), and the expansion of alternative low-carbon energy sources in heavy industry.

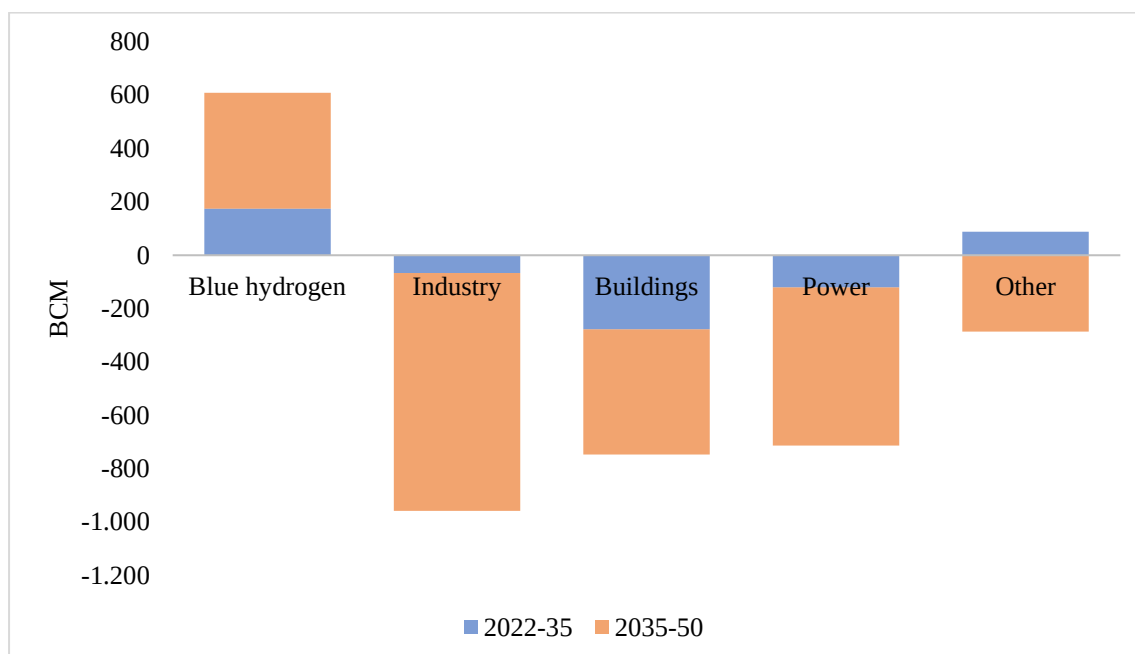
In contrast, natural gas consumption in emerging economies is expected to continue increasing in the near term. However, as electrification efforts accelerate and reliance on alternative fuels grows, consumption in these regions is projected to be more than 50% lower by 2050 than 2022 levels.

By 2050, approximately 80% of the remaining natural gas usage would be mitigated through carbon capture, utilization and storage (CCUS), particularly within the industrial and power sectors, as well as for the production of blue hydrogen.

Change in natural gas demand by region:



Change in natural gas demand by sector:



The decline in oil and natural gas production will have profound economic and geopolitical implications, particularly for countries and corporations reliant on these resources. With no new oil and gas fields expected to be developed, production will become increasingly concentrated among a few low-cost producers. The Organization of the Petroleum Exporting Countries (OPEC) is poised to see its market share rise from around 37% in recent years to 52% by 2050 – higher than at any previous point in the history of oil markets.

Despite this consolidation, oil and gas revenues are expected to fall dramatically. Per capita income from these industries in producer economies is projected to decline by approximately 75%, from an average of \$1,800 in recent years to just \$450 by the 2030s. This could trigger substantial economic and social disruptions, necessitating structural reforms and alternative revenue streams.

While traditional fossil fuel extraction diminishes, expertise from the oil and gas industry can be leveraged in emerging clean energy technologies. Innovations in hydrogen production, carbon capture and storage, and offshore wind energy will play crucial roles in mitigating emissions, particularly in hard-to-decarbonize sectors.

In short, the global energy system is undergoing a historical transformation, with renewables set to overtake fossil fuels in the coming decades. However, while necessary for climate goals, the decline in fossil fuel consumption will also reshape global energy markets, reducing revenues for producer economies and increasing reliance on a few dominant supplies.

## 6.2 Market outlook for renewable energy

The global push toward clean energy is accelerating, fueled by a surge in investment and rising demand across both public and private sectors. As environmental urgency grows and technologies mature, renewable energy continues to evolve from a niche alternative to a mainstream energy source. Developments in artificial intelligence, cleantech manufacturing, and carbon management are expected to play a key role in shaping the clean energy landscape in the future years.

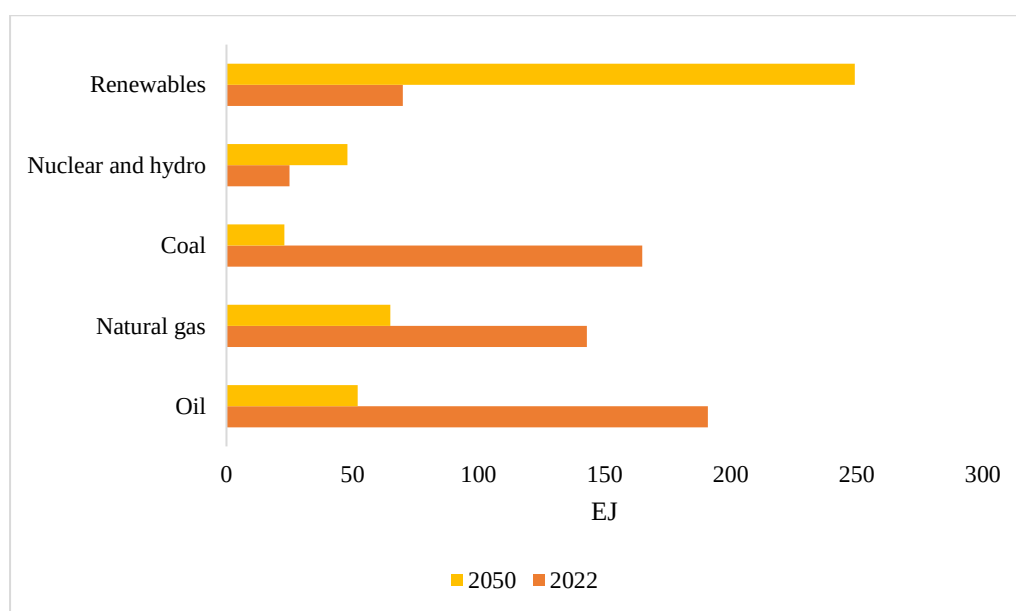
Global energy consumption is set to rise in the short term before stabilizing or declining, driven by an accelerating shift toward cleaner energy sources.

Under a Net Zero scenario, energy demand is expected to peak by the mid-2020s and then steadily decline as aggressive decarbonization efforts lead to substantial improvements in energy efficiency. By 2050, total primary energy consumption is projected to be over 25% lower than in 2022.

Renewable energy – including wind, solar, bioenergy, and geothermal (excluding hydropower) – is the fastest-growing energy source. Its share of global primary energy supply is set to surge from just over 10% in 2022 to more than 50% by mid-century.

As renewables take center stage, fossil fuels are being phased out. Their share of primary energy supply is expected to shrink dramatically, dropping from approximately 85% in 2022 to just one-third in a Net Zero scenario.

Primary energy by energy type:



The rapid expansion of wind and solar power is driven by increasing cost competitiveness and the successful scaling of critical enablers that facilitate a surge in new capacity installations. In a Net Zero scenario, global wind and solar capacity is projected to grow 14-fold.

Concerning the geographical trends, during the first half of the transition, new wind and solar installations are primarily concentrated in China and developed economies, each contributing approximately 30-45% of the total growth. From 2035 onward, emerging economies excluding China take on a greater role, benefiting from improved access to financing, expanded transmission and distribution networks, and

stronger regulatory frameworks. By mid-century, these economies are expected to account for over 60% of new capacity in Net Zero, with China still playing a significant role at around 25%.

In addition, the continued growth of wind and solar power is supported by declining costs, driven by advancements in technology and economies of scale. Solar energy sees cost reductions from higher module efficiency, improved load factors, and larger-scale projects, while wind power benefits from larger, more efficient turbines and lower operational expenses. While the most significant cost reductions occur in the first 10-15 years, further declines slow over time due to the rising expense of integrating variable energy sources into the grid.

The scale-up of wind and solar requires significant investment, coupled with infrastructure enhancements, streamlined permitting processes, and increased grid flexibility. Expanding transmission and distribution networks, fostering social acceptance, and improving both supply- and demand-side adaptability are crucial to maintaining deployment momentum.

The global power sector is undergoing a dramatic transformation, with soaring electricity demand being met largely by the explosive growth of renewable energy – particularly wind and solar. In a Net Zero scenario, total electricity generation increases by nearly 40,000 terawatt-hours (TWh) by 2050. A substantial share – around 30%, or 11,500 TWh – is allocated to producing green hydrogen, marking a major shift toward electrification of hard-to-abate sectors. To meet this surge in demand, wind and solar generation scales up massively, increasing by approximately 45,000 TWh – representing a 14-fold increase compared to 2022 levels. This unprecedented growth in renewables drives a sweeping decarbonization of the global power mix.

In parallel with renewables, other clean energy sources also expand. Nuclear power will more than double, driven almost entirely by new construction in emerging economies, especially China, while advanced economies will focus more on extending the lifespan of existing reactors. Hydropower grows by roughly 75%, reinforcing its role as a backbone of low-carbon baseload power. In a Net Zero scenario, together nuclear and hydro will account for nearly 20% of global electricity generation by 2050.

Moreover, also the role of modern bioenergy is set to expand dramatically, particularly in sectors that are difficult to electrify. In a Net Zero pathway, the use of modern bioenergy – including advanced solid biomass, biomethane, and liquid biofuels – more than doubles, reaching just over 70 exajoules (EJ) by 2050.

This substantial growth occurs without increasing land use, as most of the supply is derived locally from agricultural residues, organic waste, and forestry by-products. This makes bioenergy a scalable and sustainable component of the clean energy mix.

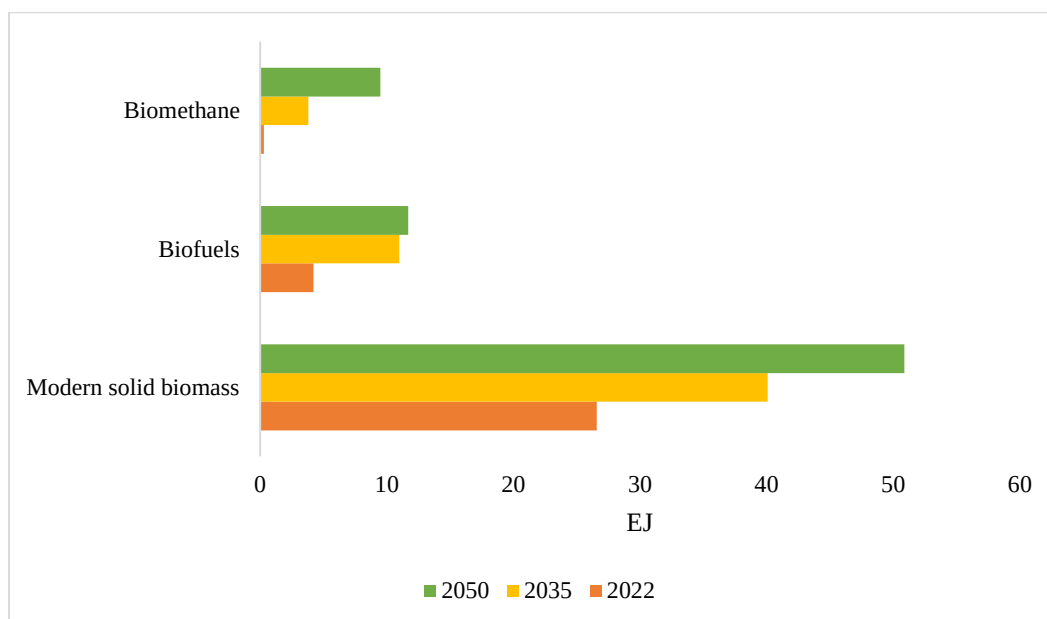
At the same time, traditional biomass – often used for basic heating and cooking in parts of Asia and Africa – is phased out almost entirely by 2050 in the Net Zero scenario. Its replacement with cleaner modern alternatives marks a significant step forward in both decarbonization and public health.

In electricity generation, biomass serves as a renewable substitute for coal and gas in thermal power plants. In many emerging economies, new cogeneration facilities are designed to produce both heat and power from biomass, and co-firing with coal remains common during the transition. When paired with carbon capture and storage (CCS), this application – known as BECCS (Bioenergy with Carbon Capture and Storage) – can deliver negative emissions, supporting climate targets even further.

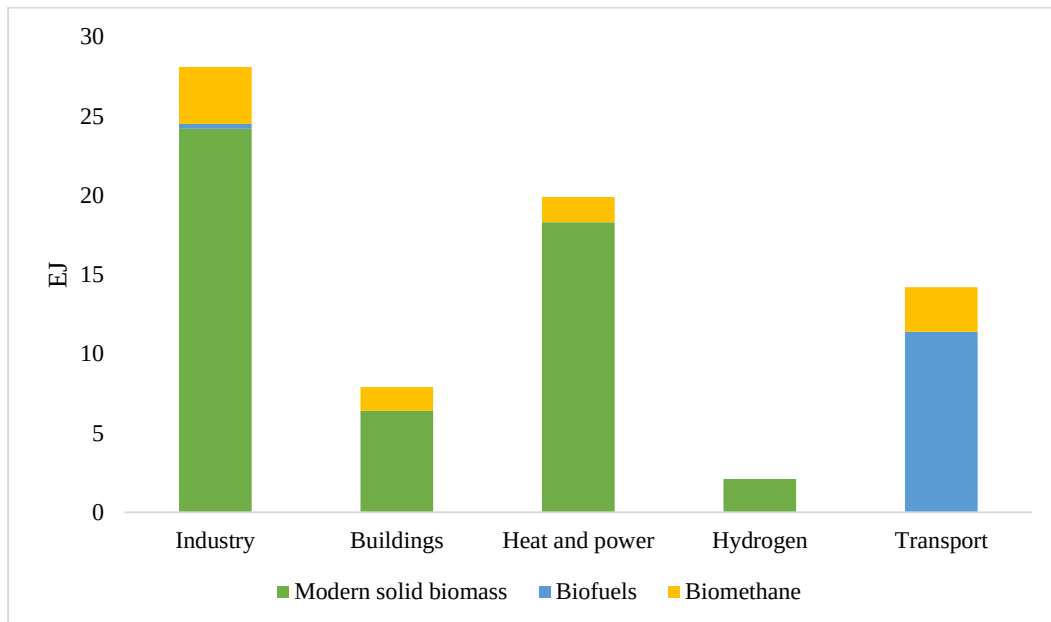
The demand for liquid biofuels sees a near tripling in the period from 2022 to 2035, driven by growing adoption in transportation sectors across China, emerging economies, the EU and the US. This expansion is largely policy-driven, as governments encourage the shift toward renewable fuels. However, as road transport becomes increasingly electrified in the latter half of the timeline, growth in biofuel consumption begins to slow. Still, demand remains strong in hard-to-electrify segments like aviation and shipping, which are expected to be major consumers of biofuels by mid-century.

Biomethane emerges as a fast-growing substitute for conventional natural gas. It is either blended into existing gas networks or directly supplied to industrial facilities. By 2050, biomethane is expected to comprise about 15% of total gas consumption – up from under 1% in 2022. This surge is underpinned by ambitious blending mandates, with regions like the US and EU averaging over 25% biomethane integration in their gas supply.

Modern bioenergy by type:



Modern bioenergy demand in 2050:

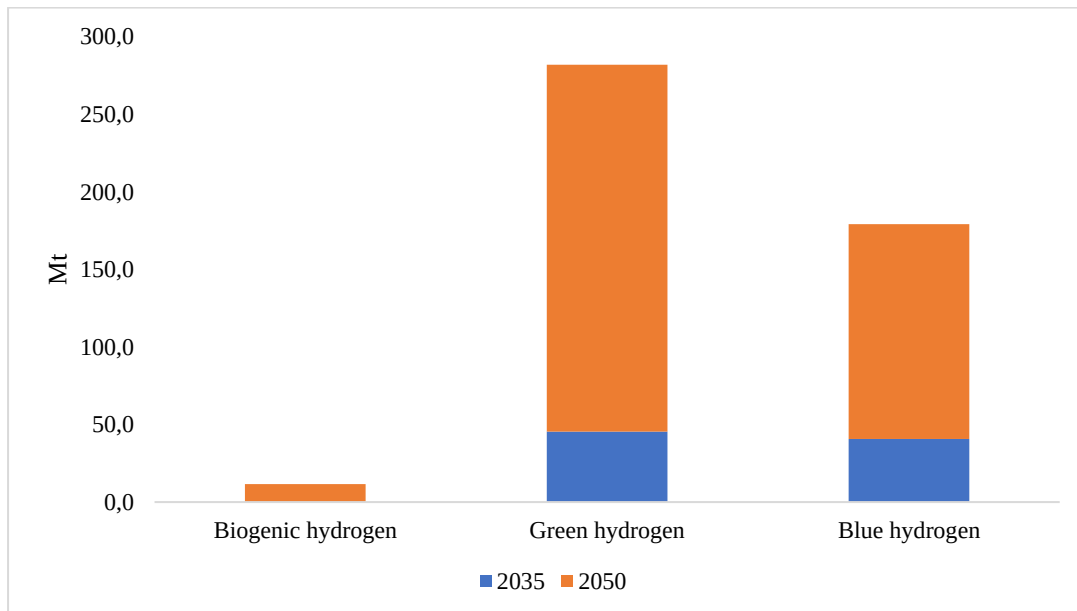


Another important point to focus on is low-carbon hydrogen, which is emerging as a crucial pillar of the global decarbonization effort. It is primarily produced through two methods: green hydrogen, generated by electrolyzing water with renewable electricity, and blue hydrogen, produced from fossil fuels like natural gas or coal, with emissions mitigated via carbon capture and storage (CCS).

Nowadays, blue hydrogen enjoys a cost advantage over its green counterpart in many parts of the world due to the lower cost of fossil fuels and the established infrastructure for extraction and processing. However, this economic edge will gradually narrow over time as renewable energy becomes more affordable and electrolyzer technologies improve. The relative economics of hydrogen production are highly region-dependent, shaped by access to cheap natural gas and viable CO<sub>2</sub> storage sites for blue hydrogen, or abundant and low-cost renewable power for green hydrogen.

By 2050, green hydrogen is expected to account for approximately 60% of all low-carbon hydrogen production in a Net Zero scenario. China and India emerge as major hubs for green hydrogen due to their large-scale renewable deployment and favorable policy environments. Conversely, regions like the Middle East and the US maintain a strong presence in blue hydrogen production, capitalizing on ample natural gas reserves and established carbon storage capacity.

Low carbon hydrogen supply:



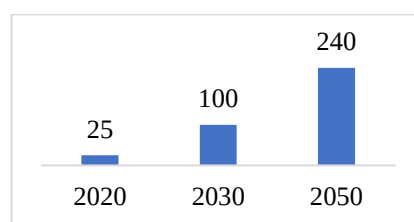
Furthermore, several breakthrough clean energy technologies are attracting attention.

One of these is green hydrogen, promoted as a 24/7 clean energy solution. It received \$7 billion in US government funding to develop hydrogen hubs, yet uncertainty around tax incentives and regulatory clarity continues to cloud the sector's short-term trajectory.

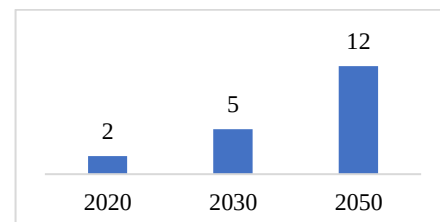
Another important technology is the Long-Duration Energy Storage (LDES), now seen as essential to stabilizing variable renewable output. Projects funded in 2024 include hydrogen storage systems using reclaimed wastewater and iron-air batteries designed to support offshore wind – one of which may become the world's largest battery.

Below are presented some summary statistics about the evolution of the role of renewable sources of energy in the upcoming years:

Households with rooftop solar PV (million):

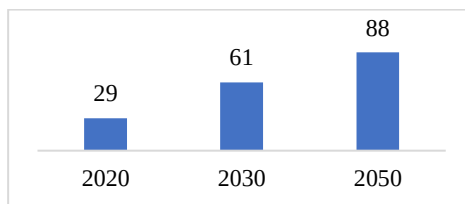


Solar thermal and geothermal in buildings (%):

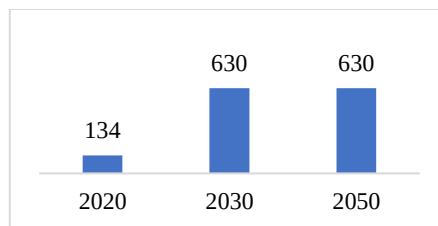




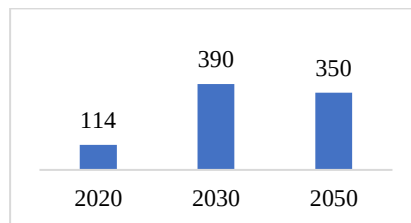
Renewables share in generation (%):



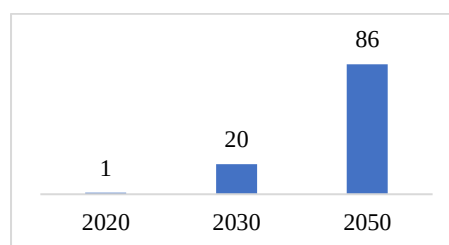
Annual capacity additions – Solar PV (GW):



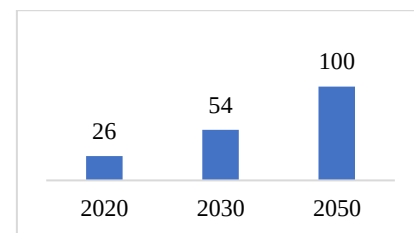
Annual capacity additions – Wind (GW):



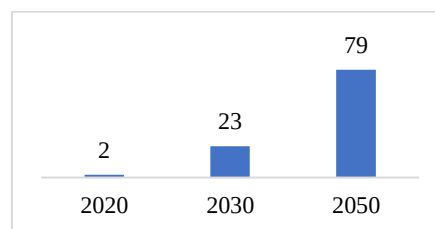
Electric vehicles share in stock: cars (% of stock):



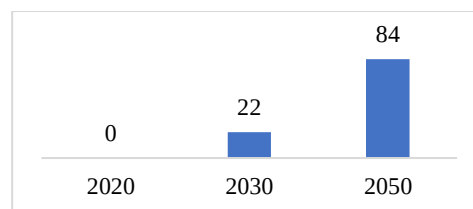
Electric vehicles share in stock: two-three wheelers (% of stock):



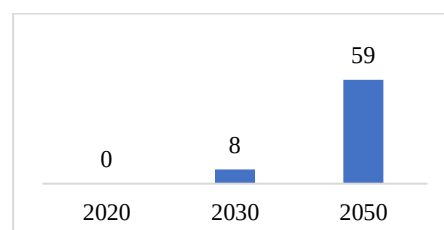
Electric vehicles share in stock: bus (% of stock):



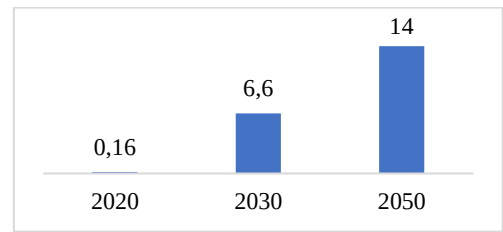
Electric vehicles share in stock: vans (% of stock):



Electric vehicles share in stock: heavy trucks (% of stock):



Annual battery demand for electric vehicles (TWh):



## 7 Conclusions

This thesis highlights the challenges BP is facing while navigating the energy transition. The main controversy is between BP's environmental commitments on one hand, and its profitability on the other.

In fact, although BP has committed to reach net zero emissions by 2050 and has made material efforts toward this goal, they are inconsistently executed and compromised by a short-term focus on financial performance. The company's future role in the energy market will depend on its ability to resolve this tension between margins and decarbonization, as without a proper integration, BP risks losing its leadership position.

### 7.1 Summary of the analysis results

A mixed picture is derived from the analysis of BP's energy transition path, as it experienced both successes and critical challenges.

From a financial standpoint, BP's 2024 profits decreased significantly to \$1.2 billion. This constituted a 92.5% fall from the \$15.9 billion profit of 2023, and indicates strong earnings volatility during the transition phase. Despite maintaining a relatively healthy current ratio of 1.25, which signals sufficient liquidity to meet short-term liabilities, the quick ratio of 0.97 suggests that BP may face liquidity challenges in this fast-changing market. In addition, its relatively high debt-to-equity ratio of 1.63 indicates that the company remains materially leveraged in comparison to competitors.

Considering its investment strategy, BP has departed from its previous attention to low-carbon energy growth, as demonstrated by its decision to reallocate 75% of future capex toward upstream oil and gas activities, together with its reduction of annual renewable investments by over \$5 billion. Despite the short-term profits this strategy may generate, it represented a concerning shift from the interests of shareholders representing around £5 trillion in assets, as they favor a Paris Agreement-aligned approach. BP's efforts towards a net-zero scenario are further weakened by the company's adjustment of its oil and gas production reduction target, which was originally set at 40% by 2030 but has been recently reduced to 20-30%.

In spite of these strategic reversals, the company has reached significant milestones in decarbonization. In fact, BP has exceeded its initial intermediate emissions reduction target, as it achieved a 41% reduction in Scope 1 and Scope 2 emissions by the end of 2023 compared to 2019. In addition, the ROI of around 10% of BP's green energy projects, and specifically Lightsource BP, proved that renewable energy ventures have the potential to deliver returns comparable to those from traditional oil and gas initiatives. However, BP is experiencing a much slower energy transition compared to competitors such as TotalEnergies, which is succeeding in maintaining both high profits and a strong commitment to clean energy; this may raise the concern that BP is not keeping up with other industry leaders in the race toward a sustainable energy model.

Overall, the analysis suggests that on one hand, BP has made significant progress in certain aspects of the energy transition, in particular operational emissions reductions and selective renewable investments; on the other, its competitiveness may be hampered by its strategic inconsistency and strong reliance on upstream fossil fuel projects.

## 7.2 Recommendations for future corporate strategies

At the conclusion of this thesis, the final suggestion for BP is to recalibrate its corporate strategy to achieve a more credible path toward a low-carbon future.

BP should first start by reestablishing a commitment to its original net-zero targets, reversing the recent strategic shift towards oil and gas projects. In fact, given the estimated ROI of 10% on the projects of Lightsource BP, renewable businesses should provide a return comparable to traditional hydrocarbon returns, and focusing on these transition growth engines will enable BP to exploit emerging market opportunities and mitigate future reputational and regulatory risks associated with carbon-intensive operations.

Financially, in particular considering the high debt-to-equity ratio of 1.63, the company should strengthen its balance sheet in order to reduce risk exposure. Ways to achieve this could be a prioritization of free cash flows for repaying debt, or the maintenance of a well-structured dividend and share buy-back program which does not interfere with BP's investment capacity in the long-run.

Furthermore, BP should better align its strategy with shareholders' preferences, as the company's insufficient focus on climate issues has been increasingly criticized. In this regard, it is recommended to BP to annually publish an independently verified report on how the company's investments align with a 1.5 degrees carbon budget, as well as to set internal thresholds for carbon intensity and profitability when projects have to be approved, in order to allocate capital to assets which not only have a stable financial position, but are also climate-resilient. Through constant communication and verifiable progress updates, BP can rebuild trust with stakeholders and prove its re-established ESG priorities.

It is also important that the company continues investing in climate change awareness programs to sensitize its employees and build the human capital needed to lead the transition.

Finally, while BP has done well creating strong connections through partnerships and acquisitions in the green sectors of the economy, it should continue seeking new collaborations but following a capital-light approach, in order to lower balance sheet pressure.

Over the next decade, leadership in the energy transition will no longer be a competitive advantage, but a necessary condition to remain in the market. This is the reason why BP's long-term role and competitiveness in the energy sector will crucially depend on its ability to integrate sustainability goals with its financial strategy.

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#### 1.1 Global challenges of decarbonization

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