Hīkina te Kohupara - Kia mauri ora ai te iwi Green Paper for Consultation

bp submission

June 2021

Contents

Executive summary

In line with bp's aims[1] to get to net zero by 2050 or sooner we strongly support the legislated goal of net zero emissions by 2050. We welcome the opportunity to participate in this ***Hīkina te Kohupara - Kia mauri ora ai te iwi Green Paper for Consultation*** and are committed to working in collaboration with the New Zealand Government to support the development of proposed policies. The pace and forms of decarbonisation of road transport is regionally varied but with the output being the same, to reduce emissions to net zero by 2050. The decarbonisation of the sector must be progressed as quickly and as practically feasibly as is appropriate for New Zealand. Environmental justice, job creating in low carbon transport industries and access to sustainable, affordable mobility are equally important goals to achieve.

The challenge in transport is to significantly reduce emissions while meeting the growing global need for mobility. bp supports the rapid decarbonisation of road transport and believes sophisticated policy is needed to tackle this complex challenge at a system level.

The way people live, and the way people move are intrinsically linked. Urban planning, regional development and the infrastructure that connects economic centres across a landscape or ocean are essentially linked to the type of transport required to enable that economic activity. As we look to the future, the fuels that power those modes of mobility become increasingly diverse, driven by the need to reduce emissions. The transition of the transport sector from crude based (fossil fuel) to other low carbon fuels – whatever they may be – comes with some difficult challenges. These challenges can be physical such as the ability to haul load (Trucks) or provide long-distance range (Electric Vehicles) or they are economic, expensive alternatives that will erode margin or add cost to the consumer. This means we have to think of the transport sector transition in a whole new way.

At bp, we think about the sector's evolution as a journey from hydrocarbons to electrons. In fuels and the mobility technologies that will begin to take over from the Internal Combustion Engine (ICE), both fuels and vehicle technology will work together to provide a product of parity to the consumer but with lower emissions. The functionality of specific transport/mobility applications such as aeroplanes, or heavy-hauling trucks (off road and on road) must remain constant as we transition to low carbon alternatives, because the impact on broader economic activity must be to enhance that activity as the global economy recovers from the Pandemic and as demand for energy especially in mobility grows out to 2050.

The pathway is likely to begin with drop-in solutions, such as sustainable biofuels and renewable diesel – a liquid fuel sourced from biomass or waste products respectively, refined into the fuels that can be blended with fossil fuels to reduce the overall carbon intensity of that fuel. The blends can be as high as required, and in some applications pure renewable diesel may be technically possible but commercially constrained. In sectors such as aviation and heavy hauling which are hard-to-abate sectors, these solutions will provide absolute emission reductions while the mode and functionality of the transport does not need to be altered. This is of particular benefit to long-leased vehicles. As we progress to 2050, the technological changes that are likely to progress will see electrification and or hydrogen displace liquid mediums of fuel.

[1] See 5.Appendix – bp's purpose and aims and https://www.bp.com/en/global/corporate/news-and-insights/press-releases/bernard-looney-announces-new-ambition-for-bp.html

Road transportation accounts for about a quarter of global CO2 emissions from energy, of which around two thirds come from passenger vehicles and the rest from haulage. Decarbonising this sector specifically will support efforts to achieve net zero by 2050. At bp, we will aim to reduce emissions from road transport by offering a range of lower carbon solutions. However, many of these fuels will need policy support to make them more attractive both to investors and customers if we hope for rapid uptake.

bp supports the electrification of cars and light duty vehicles. We believe electrification of passenger cars and light duty vehicles, supported by a fully renewable powered electricity grid, is the best option for lowering emissions from road transport. Until electrification is adopted at scale the most significant reductions in emissions can be achieved by increasing the efficiency of ICE vehicles and decarbonising the fuels they use. Therefore, we support vehicle regulations as an important component in the policy mix to provide regulatory certainty to automakers while seeking to incentivise reductions from all technologies. Biofuels will play an important role in reducing carbon intensity of fuels for ICE vehicles. Their role in the short to medium term, will be vital in reducing GHG life cycle emissions over the coming decades, as we transition to broader vehicle electrification. However, the sources of these biofuels must be environmentally and socially sound, so a net positive sustainability outcome is gained. Sustainable liquid biofuels will play a significant role in providing low and zero carbon solutions for transport especially in those hard-to-abate sectors. Our submission in response to the Ministry's ***Sustainable Biofuels Mandate*** consultation paper will provide further specifics on the role and contribution bp can make in this area.

For heavy duty vehicles, alternative fuel types such as advanced biofuels and biomethane, natural gas and hydrogen potentially have an important role to play, as electrification in the medium term may not be commercially or technically be feasible. Natural gas in a compressed form (CNG) and liquid form (LNG) is an economic alternative to diesel that can lower the carbon emissions and reduce pollution from long-distance road haulage now, and can be progressively decarbonised by the addition of biofuels and hydrogen.

We believe natural gas will continue to play a significant role in the energy transition, increasingly decarbonised and in combination with Carbon Capture and Storage (CCS) technology to produce blue hydrogen as a lower carbon alternative to petroleum fuels in the hard-to-abate long distance road and marine transport sectors.

This will require a number of actions and policies:

i. We support the phasing out of sales of new petrol and diesel cars as one of the ways to help decarbonise road transport.

ii. The phasing out of these cars needs to be coupled with a system transformation and the development of alternative low carbon technologies, fuels, markets and infrastructure. This includes progress in improved battery and fuel cell technology, ultra-fast charging technology, hydrogen associated infrastructure and modal shift.

iii. bp supports policy measures that can be used today to support more biogenic fuel blends, so the economy can begin to abate emissions today, such as appropriate blending targets or mandates with supporting sustainability criteria to ensure a net positive outcome is achieved.

iv. bp supports policies that promote behaviour change and reduce consumption such as ride sharing, promoting public transport, and designing cities with walk-only ways and cycling lanes. The fastest and cheapest way to reduce emissions from road transport is to use it more efficiently and use it less. Behaviour changes that reduce consumption of transport fuels and create efficiency in the transport system, enabled by technology and the provision of convenient, affordable, and accessible public transport option go hand in hand with vehicle and fuel technological advancements to achieve net zero.

Aviation accounts for ~2% of global CO2 emissions and an approximate 12% of transport emissions. The sector itself has made commitments to reduce net emissions to 50% of 2005 levels by 2050. However, the decarbonisation in aviation is very difficult and very expensive. Efficiency gains will need to play a big role in reducing emissions. The biggest lever to reducing emissions from the current aviation fleet, is through fuel switching. The provision of aviation fuel needs to be safe, compliant, and compatible with high altitude conditions. The energy itself needs to have good energy density both in a volumetric and mass basis. The best option for reducing emissions in the aviation sector today is to blend fossil jet fuels with Sustainable Aviation Fuels (SAF). This is a drop-in solution not requiring any aircraft technology adjustment or airport infrastructure modifications. Hydrogen and battery technology do offer solutions to abatement in this sector, but this is many years away from scalable utilisation. Hydrogen is high density on a mass basis but low on a volumetric basis – unless one is able to operate in cryogenic condition, which creates safety risks. There are significant technical challenges with using hydrogen in aviation and will require new generation air-travel technology and supporting airport infrastructure. Electric battery is proven in small scale.

bp is of the opinion that the private sector is a key player in developing resilient strategies, infrastructure and processes, as well as bringing forward innovative technology solutions necessary to meet New Zealand and the world's carbon neutral targets. Only through collaboration can the community achieve the change required to transition the economy. We understand the value of collaborating and have achieved mutual benefit over many years by working with external organisations. This approach is integral to our sustainability frame and we are looking for allies who can help drive progress. We are thinking beyond conventional collaborations with others in our industry and forging relationships beyond our sector with a growing number of businesses, including Qantas, Microsoft and Uber. bp is a founding partner of HRH the Prince of Wales's Sustainable Markets Initiative, and is working with others in the private sector to accelerate the global transition to a sustainable future.

As we transform the economy, and support global transformation to net zero, we must ensure this transition is just. The just transition is about mitigating the potential adverse impacts of a low carbon transition on workers and communities while promoting sustainable and resilient opportunities that low carbon industries can bring to workers and communities. These include decent jobs, support for livelihoods and access to sustainable energy. The workforce will need to adjust to support these new forms of energy and technology. For bp working with the workforce to ensure social inclusion, skills transfer and retraining goes side by side with reducing emissions.

1. Introduction

We believe the world is on an unsustainable path – the carbon budget is running out – and needs to reach net zero greenhouse gas emissions. And we believe that there are a range of global pathways to achieve the Paris goals, with differing implications for regions, industries and sectors, so business strategies need to be flexible.

Ambitious climate policies will be essential to enable the world to meet the Paris climate goals, including achieving global net zero greenhouse gas (GHG) emissions. In our aim 6[2] we have publicly stated our aim to more actively advocate for well-designed policies that will support net zero. We co-operate and engage with Governments, regulators and legislators in the development of proposed policies relevant to our business – ranging from those in support of net zero, through to policy related to tax, employment, safety and other issues. Our activities may include direct lobbying on specific policy proposals by bp employees, through broader advocacy via research work or supporting think tanks, to communications activities and advertising. We're also working in cross-industry initiatives and partnerships to promote policies that support net zero, such as the NCS Alliance, the Carbon Pricing Leadership Coalition, and the Taskforce on Scaling Voluntary Markets.

Our purpose is reimagining energy for people and the planet. We are part of a society and we value the contribution of the communities in which we operate. We want to improve people's lives, ensuring the transition to a low carbon economy does not leave anyone behind or disadvantage particular groups. We referenced this strongly in our submission to the Climate Change Commission's Draft Advice[3] that an equitable, inclusive, and well-planned climate transition is imperative and should be linked to the Government's Economic plan. We want to work with the Government and other relevant stakeholders on developing a robust vision and strategy for the future workforce of New Zealand, as part of this strategy.

Our new regions, cities and solutions integrator (RC&S) will identify and deliver integrated energy and mobility solutions to help customers decarbonise by bringing together bp's capabilities, products and services and with our partners, creating value greater than the sum of its parts. Cities are critical to the progress of the energy transition. They are home to about half the world's population but generate 70% of CO2 emissions – with population and emissions both expected to grow over time.[4] Research suggests that cities have the potential to achieve 40% of the carbon mitigation goals outlined in the Paris Agreement.[5]

bp Energy Outlook 2020[6] explores three main scenarios – **Rapid**, **Net Zero** and **Business-as-usual** – which span a wide range of possible outcomes for the global energy system to 2050. The scenarios are not predictions of what is likely to happen or what bp would like to happen. Rather, the scenarios help to illustrate the range of outcomes possible over the next thirty years. We have included this as an Appendix for context.

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[2] bp's aims https://www.bp.com/en/global/corporate/who-we-are/our-ambition/our-aims.html and included in 5. Appendix – bp's purpose and aims

[3] bp submission to the Climate Change Commission's Draft Advice to Government

[4] Source: c40.org; bp Sustainability Report 2020 p.48 https://www.bp.com/en/global/corporate/sustainability.html

[5] Source: CDP, City-Business Climate Alliances; bp Sustainability Report 2020 p.48 https://www.bp.com/en/global/corporate/sustainability.html

[6] https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html

2. Consultation questions

Our submission addresses the consultation questions where we have a position to share:

Consultation question 1
Do you support the principles in Hīkina te Kohupara? Are there any other considerations that should be reflected in the principles?

bp supports the seven principles used in Hīkina te Kohupara to shape the advice to the Government on transitioning to a net zero carbon transport system. bp supports the rapid decarbonisation of road transport and believes sophisticated policy is needed to tackle this complex challenge at a system level. We support a system-level approach to coordinate action as the energy sector becomes more interconnected and transport and energy markets become dependent.

Consultation question 2
Is the government's role in reducing transport emissions clear? Are there other levers the government could use to reduce transport emissions?

bp believes the role of Government should be to create an enabling policy landscape that supports a level playing field and degree of certainty to encourage the scale of investment required to achieve a successful and sustainable just transition - so all low carbon transport fuels and technologies can compete and succeed. We agree with the Business Energy Council (BEC) submission that an outcome-based regulatory environment will enable private sector innovation and forge a market-led path to 2050.

The task of decarbonisation is large and difficult, no one sector can do it alone. It is imperative that Governments, the private sector and civil society work together with a common objective and clear rules of play. We believe a market-led approach will deliver diverse technologies both known and yet to be known, in an economically efficient way.

Consultation question 3
What more should Government do to encourage and support transport innovation that supports emissions reductions?

It is important that the policy landscape developed to support innovation in emissions reduction is technologically neutral, inclusive of all decarbonisation options rather than prescriptive. Given technology advancements will change quickly in coming years, it is important to regularly review this consultation question to ensure New Zealand is able to lead and adapt to new emissions reductions innovations as they arise.

The Government should attend to changing patterns of consumption by encouraging behaviour change that results in lower emissions. bp is particularly supportive of flexible working arrangements as home-based work forces particularly support reduced emissions from the transport sector.

The interdependence of transport with electricity is explored in detail in this paper, equal in interdependence is the role of digital in creating efficiencies in the transport sector. bp recommends a deeper understanding of the role of digital in supporting behaviours that reduce emissions, particularly in the transport sector and believes this should be included in the policy development process.

Consultation question 4
Do you think we have listed the most important actions the government could take to better integrate transport, land use and urban development to reduce transport emissions? Which of these possible actions do you think should be prioritised?

bp is of the opinion that different countries and cities have different circumstances. There's no one size fits all approach here. We want to work with countries, regions, cities and industries that share our ambition to be net zero. The mobility revolution will have the deepest impact in cities, where half of the world's population lives. bp agrees with the BEC submission that the Ministry should commission relevant research to ensure measures designed to shift demand or modal choices are effective in the context of broader planning priorities.

Consultation question 7
Improving our fleet and moving towards electric vehicles and the use of sustainable alternative fuels will be important for our transition. **Are there other possible actions that could help Aotearoa transition its light and heavy fleets more quickly, and which actions should be prioritised?**

The phasing out of petrol and diesel cars will be a hard push towards electrification. In the near term, policies are needed that ensure alternative low carbon transport fuels, technologies and vehicles are readily available at the scale needed to make this phase-out possible. bp suggests the Ministry explores plug-in hybridisation support, to provide bridging technology to build consumer confidence and manage possible limitations on the supply of batteries. These may also help reduce emissions in the energy-intensive transport modes.

bp supports EV mandates and subsidies provided they are proportionate to the need to drive innovation and early deployment, and take account of environmental externalities in a broad sense (not just GHG). This includes manufacturing and disposal costs and emissions, including residual emissions from green power.

We also support proportional incentives for EV charging and hydrogen refuelling infrastructure. This support should facilitate national or common infrastructure that enables a market to work and is not readily exposed to consumer demand or market forces e.g. Below ground electricity distribution infrastructure. We do not support incentives for other parts of required infrastructure such as public charging points as we believe market incentives are sufficient to drive investment.

The improvement of vehicle efficiency must be part of any measure to reduce emissions and this is possible through vehicle emission standards, and increased uptake of hybridisation. bp suggests considering encouraging demand for light-weighting and downsizing of cars and vans where materials and technology allow this to be done safely.

The introduction of biofuels as progressive blending targets and incentives in order to maximise emission reductions from the existing fleet can be used in ICE vehicles as the fleet turns over to more electric. However, these biofuels must be developed in an environmentally and socially sustainable way.

Consultation question 9
Do you support the possible actions to reduce domestic aviation emissions? Do you think there are other actions we should consider?

bp supports the possible actions to reduce domestic aviation emissions in the context of the points outlined earlier regarding the aviation sector.

Consultation question 13
Given the four potential pathways identified in Hīkina te Kohupara, each of which require many levers and policies to be achieved, which pathway to you think Aotearoa should follow to reduce transport emissions?

bp supports an effective and efficient decarbonisation of the New Zealand economy and commends New Zealand on its Emissions Trading Scheme (ETS). The first step for all decarbonisation must be an explicit price on carbon. The ETS as the primary legislative framework to reduce emissions should lead the decarbonisation efforts of the country. Coupled with complementary policies that address sectors of the economy that may need to transform at pace and at scale. In hard-to abate areas within the Transport sector such as in aviation – additional measures will be needed. We understand that Pathway 4 is the most closely aligned with the Climate Change Commission's final recommendations to Government and bp intends to work with and support this approach, where opportunities allow.

3. bp contact

Gordon Gillan
Communications Advisor
BP Oil New Zealand Limited
Watercare House, 73 Remuera Road, Newmarket
Auckland 1050
E: gordon.gillan@bp.com
P: 0800 800 027

4. Appendix - bp Energy Outlook 2020

bp Energy Outlook 2020[7] explores three main scenarios – **Rapid**, **Net Zero** and **Business-as-usual** – which span a wide range of possible outcomes for the global energy system to 2050. The scenarios are not predictions of what is likely to happen or what bp would like to happen. Rather, the scenarios help to illustrate the range of outcomes possible over the next thirty years.

Three scenarios to explore the energy transition

Rapid

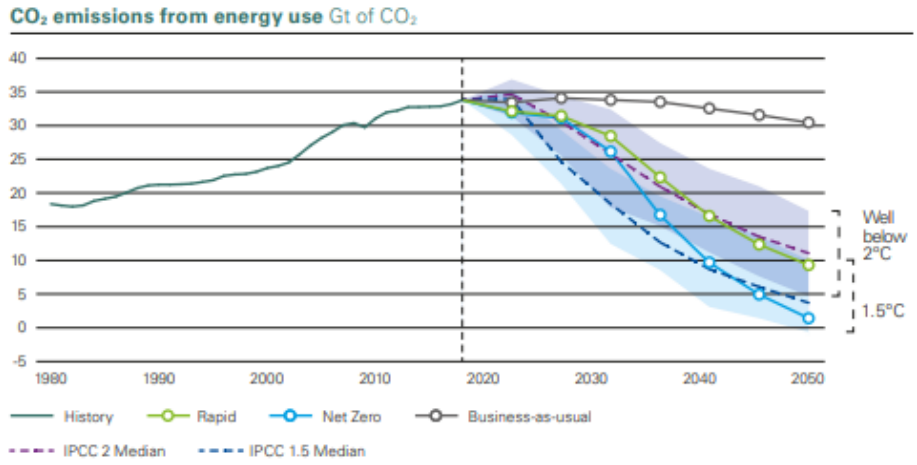
One of many possible scenarios that can be considered 'consistent with Paris', in line with a 'well below 2 degrees' pathway[a]. In this scenario emissions from energy use fall by around 70%, with a fall of approximately 80% in the developed world and 65% in the emerging world.

Net Zero

In which global energy systems emissions fall by 95% by 2050 versus 2018, in line with a '1.5 degrees' pathway[a]. Changes in societal actions and behaviours are a key driver in this scenario.

Business-as-usual

A continuation of recent trends without major change in the pace or direction of policy tightening; this scenario is not 'consistent with Paris' and results in a reduction in global energy greenhouse gas emissions of only 10% by 2050 versus 2018.



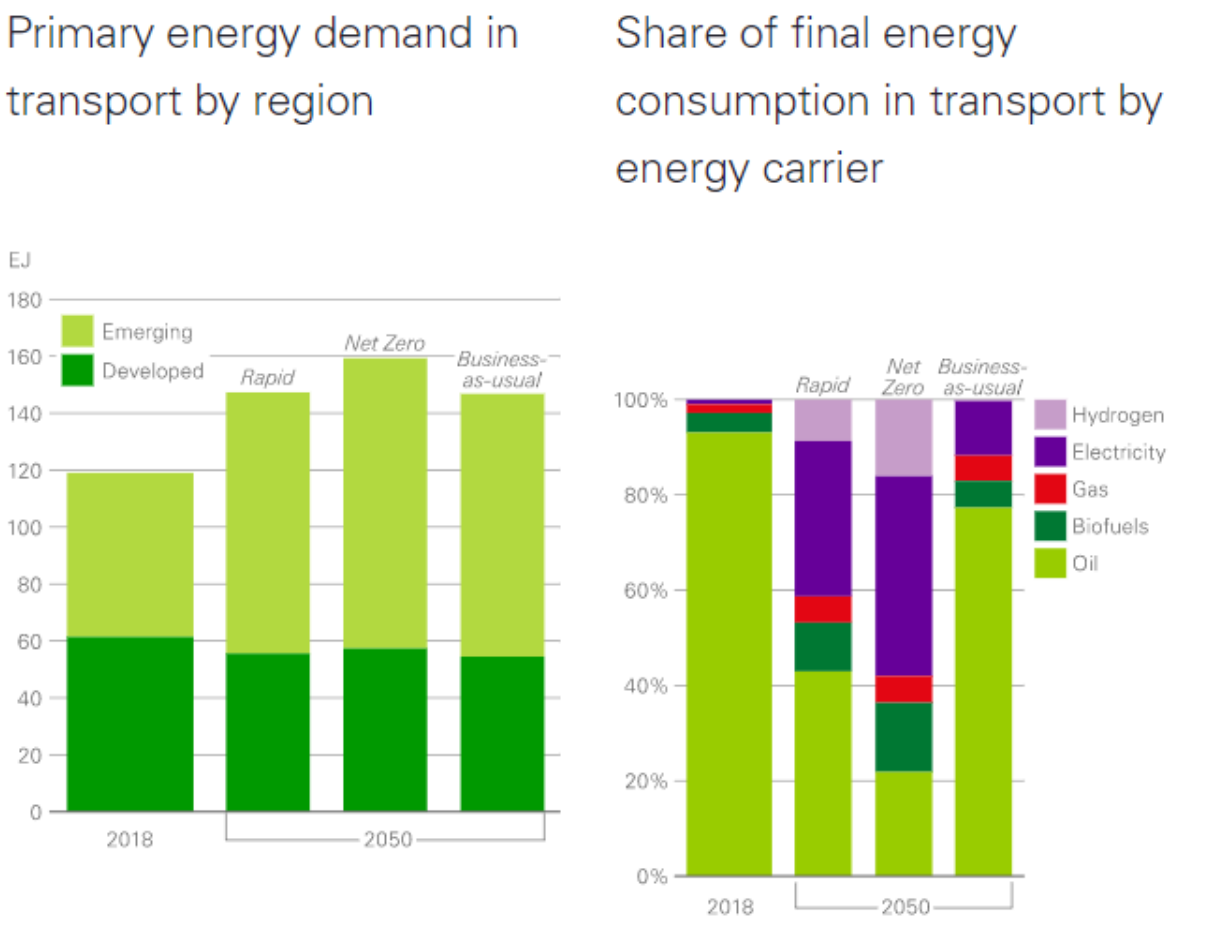
This chart compares the three main scenarios from the *bp Energy Outlook 2020*: Rapid, Net Zero and Business-as-usual, with the range of scenarios included in the Intergovernmental Panel on Climate Change[b], which were judged to be consistent with meeting the Paris climate goals[c].

Scenarios for strategic decision making

We have been using scenarios at bp to inform strategy, manage risk and improve decision making for many years. The scenarios we used to inform our new ambition and strategy were based on a collaborative approach between our economists, strategists and our senior management team.

[7] https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html

The growth of energy used in transportation slows, with oil peaking in mid-to late-2020s.



[8]

The demand for passenger and commercial transportation increases strongly over the Outlook, with road and air travel doubling in all three scenarios. The growth in final energy required to fuel this increased travel is offset by significant gains in vehicle efficiency, especially in passenger cars, trucks and aviation.

The gains in energy efficiency are partially disguised by a shift away from oil towards the increasing use of electricity and hydrogen in transport. In particular, the conversion process used to produce these energy carriers boosts the total amount of primary energy absorbed by the transport sector. The shift towards electricity and hydrogen is most pronounced in **Rapid** and **Net Zero**, where overall primary energy increases by around 25% and 35% respectively by 2050. Primary energy in transport increases by almost 25% in **BAU**, with slower gains in energy efficiency offset by a smaller shift away from oil.

[8] bp Energy Outlook 2020 https://www.bp.com/en/global/corporate/energy-economics/energy-outlook.html

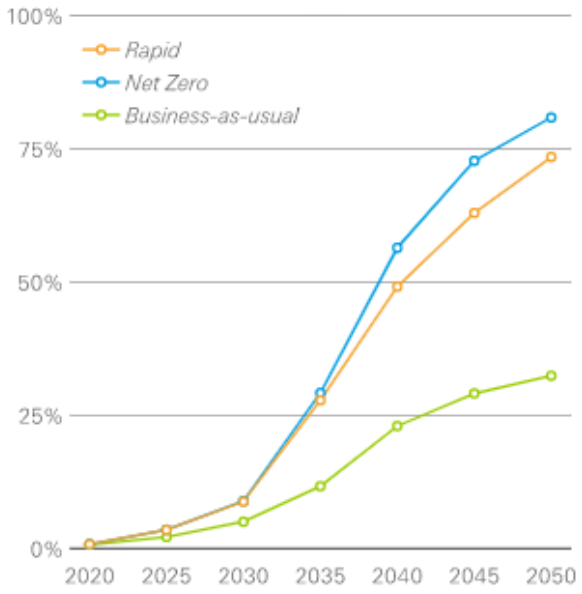
The growth in primary energy used in transport in all three scenarios stems entirely from the developing world, as increasing prosperity in developing Asia, Africa and Latin America supports greater demand for passenger and freight transportation. Energy use in transport in the developed world is broadly flat.

The use of oil in transport peaks in the mid-to-late 2020s in all three scenarios: the demand for oil for road transport in emerging markets continues to increase until the early 2030s in **Rapid** and **Net Zero**, and the late 2030s in **BAU**, but this is increasingly offset by falls in the developed world.

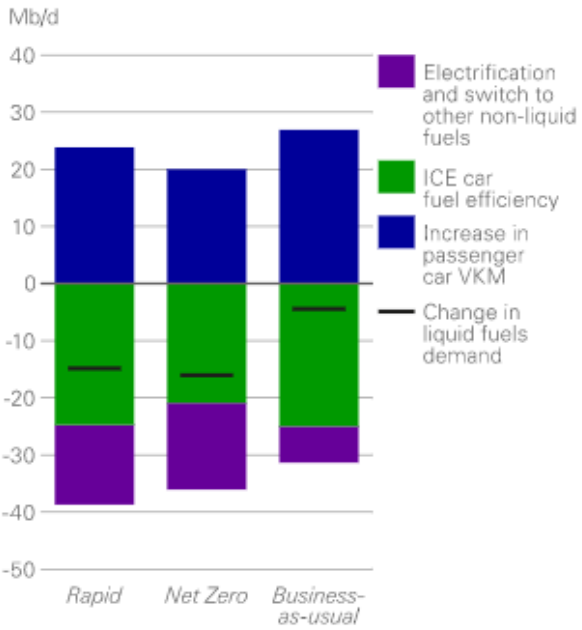
The share of oil in total final consumption falls from over 90% of transport demand in 2018 to around 80% by 2050 in **BAU**, 40% in **Rapid** and just 20% in **Net Zero**. The main counterpart is the increasing use of electricity, especially in passenger cars and light and medium-duty trucks, along with hydrogen, biofuels and gas. The share of electricity in end energy use in transport increases to between 30% and 40% by 2050 in **Rapid** and **Net Zero**.

Energy use in road transport is dominated by electrification and vehicle efficiency

Share of car and truck vehicle kilometres electrified*



Factors impacting passenger car liquid fuels demand over the outlook



*includes buses

The outlook for energy use in road transport is dominated by two major trends: increasing electrification and improving vehicle efficiency.

The electrification of the vehicle parc is most pronounced in **Rapid** and **Net Zero**, concentrated in two and three wheelers, passenger cars and light and medium-duty trucks. Electric vehicles in **Rapid** and **Net Zero** account for around 30% of four-wheeled vehicle kilometres (VKM) travelled on roads in 2035 and between 70-80% in 2050, compared with less than 1% in 2018. The corresponding shares in **BAU** are a little over 10% in 2035 and around 30% in 2050.

By 2050, electric vehicles account for between 80-85% of the stock of passenger cars in **Rapid** and **Net Zero** and 35% in **BAU**. The corresponding numbers for light and medium-duty trucks are 70-80% and 20%.

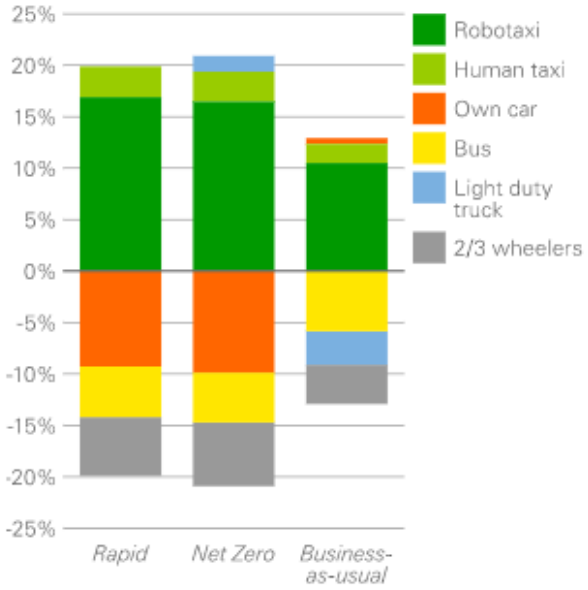
The other dominant trend affecting the use of energy in road transport is the increasing levels of vehicle efficiency, especially passenger cars, driven by tightening vehicle emission standards and rising carbon prices which are largely borne by consumers in the form of higher gasoline and diesel prices. In **Rapid**, the efficiency of a typical new internal combustion engine (ICE) passenger car increases by around 45% over the next 15 years.

Despite the accelerated electrification of passenger cars, the continuing importance of ICE passenger cars for much of the Outlook means that improvements in their efficiency is the main factor limiting the growth of oil used in passenger cars out to 2050.

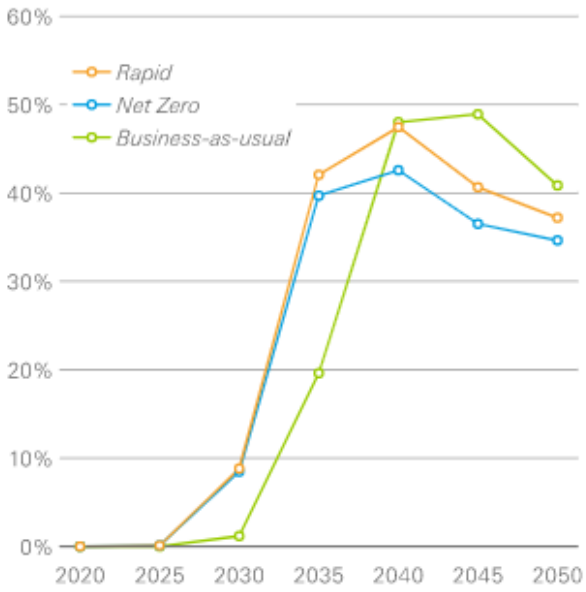
Vehicle efficiency improvements in **Rapid** reduce oil use in passenger cars (and hence carbon emissions) by roughly twice as much as electrification out to 2050.

The pattern of road transportation changes led by increasing prosperity and growth of robotaxis

Change in share of road passenger VKM, 2020-2050



Robotaxi share of passenger car VKM powered by electricity



The composition of road transportation across different modes of transport, e.g. private cars, taxis, buses etc, is affected by two significant trends over the Outlook: increasing levels of prosperity and the falling cost of shared-mobility transport services. Both trends have important implications for the pace and extent to which the transport sector is decarbonized.

The increasing levels of prosperity and living standards in emerging economies leads to a shift away from high-occupancy forms of transport (e.g. buses) into passenger cars. This leads to a reduction in average load factors (i.e. average number of passengers per vehicle), putting upward pressure on carbon emissions.

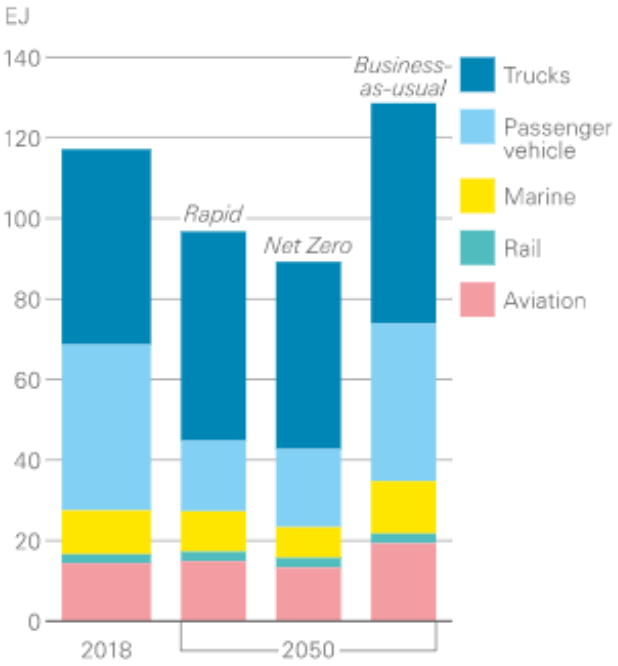
The relative cost of shared-mobility services falls as a result of a range of factors, including continuing advances in digital technologies such as improving connectivity and geospatial technologies. In addition, digital advances enable automated driving systems and the emergence of fully autonomous vehicles (AVs) from the early 2030s in **Rapid** and **Net Zero**, significantly reducing the cost of shared-mobility services, especially in developed economies where average income levels are higher. The falling relative cost of autonomous shared-mobility services (robotaxis) leads to a shift away from private-owned vehicles as well as buses.

The vast majority of robotaxis are electric in all three scenarios. This reflects the local air quality benefits and lower running costs of electric cars relative to traditional (internal combustion engine). Electric robotaxis provide a significant cost advantage given the intensity of use – up to 9-times greater than private cars by 2050. The growing penetration of robotaxis, combined with their intensity of use, means that by 2035 they account for around 40% of passenger VKM powered by electricity in **Rapid** and **Net Zero** and around 20% in **BAU**. This share declines in the final 10-years or so of the Outlook in **Rapid** and **Net Zero** as the share of private ownership of electric cars increases.

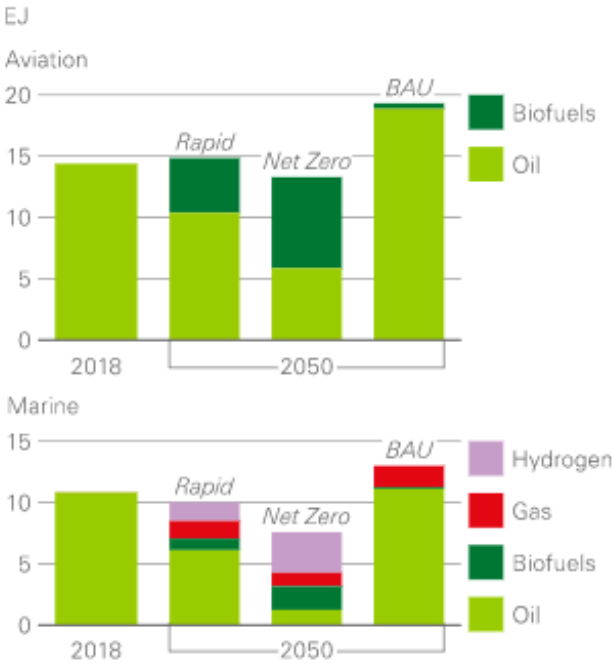
The potential for robotaxis to help decarbonize road transportation by increasing the share of passenger car VKM powered by electricity means they are supported by government policies, such as higher road pricing and congestion charges for private vehicles, particularly in **Rapid** and **Net Zero**. The importance of robotaxis is also supported in **Net Zero** by a shift in societal attitudes towards a sharing economy.

Biofuels and hydrogen play a key role in decarbonizing aviation and marine

Total final energy demand in transport by mode



Aviation and marine demand by source



Aviation and marine transport accounted for around 7 Mb/d and 5 Mb/d of oil consumption in 2018 respectively. Demand for these services increases over the Outlook in both **Rapid** and **BAU**: growth in shipping is driven by increased levels of trade; whilst expansion in air-travel is underpinned by growing prosperity, especially in emerging economies. In **Net Zero**, the growth in air travel by 2050 is around 10% lower than in **BAU**, reflecting in part a shift in societal preferences to use high-speed rail as an alternative to air travel in China and much of the OECD. Similarly, increasing preference for the consumption of locally-produced goods and reduction in oil trade in **Net Zero** contributes to reduced shipping demand by around a third by 2050 relative to **BAU**.

In **Rapid**, liquids demand from aviation remains relatively stable at around 7 Mb/d over the course of the Outlook, as efficiency improves by around 35%, largely offsetting additional demand for air travel. In **Net Zero**, these efficiency savings plus reduced appetite for flying in some markets means liquids demand from aviation peaks in the early 2030s and declines to a little below 2018 levels by 2050. In contrast, liquids demand continues to grow throughout the Outlook in **BAU**, reaching 10 Mb/d by 2050.

Biofuels play a critical role in decarbonizing the aviation sector, since neither batteries nor hydrogen are able to deliver the necessary energy density required for aviation. The share of biofuels in jet-fuel increases from less than 1% in 2018 to around 30% by 2050 in **Rapid** and to nearly 60% in **Net Zero**. In contrast, there is minimal growth in the share of biofuels in **BAU**.

Unlike aviation, the fuel mix in the shipping sector is able to diversify into hydrogen (either as ammonia or in liquid form) and LNG, as well as biofuels. In **Rapid** and **Net Zero**, non-fossil fuels account for 40% and 85% of marine transport fuel by 2050 respectively, with more than half of that coming from hydrogen. Conversely, under **BAU**, marine demand for oil increases slightly by 2050, with natural gas increasing its share of the sector fuel mix to just under 15% and non-fossil fuels accounting for just 1%.

5. Appendix - bp's purpose and aims

On 12 February 2020 bp adopted a new purpose – 'reimagining energy for people and our planet' to make this purpose a reality we have adopted the ambition to become a net zero company by 2050 or sooner, and to help the world get to net zero.

We have developed ten aims to supporting bp's ambition; five to become a net zero company and five to help the world meet net zero:

1. Net zero across bp's operations on an absolute basis by 2050 or sooner.
2. Net zero on carbon in bp's oil and gas production on an absolute basis by 2050 or sooner.
3. 50% cut in the carbon intensity of products bp sells by 2050 or sooner.
4. Install methane measurement at all bp's major oil and gas processing sites by 2023 and reduce methane intensity of operations by 50%.
5. Increase the proportion of investment into non-oil and gas businesses over time.
6. More active advocacy for policies that support net zero, including carbon pricing.
7. Further incentivise bp's workforce to deliver aims and mobilise them to advocate for net zero.
8. Set new expectations for relationships with trade associations.
9. Aim to be recognised as a leader for transparency of reporting, including supporting the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).
10. Launch a new team to help countries, cities and large companies decarbonise.