

# On The Move:

## Navigating the Future of Road Transport

November 2019

**SYSTRA**



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# Foreword

For the world to get onto a sustainable path, the way we travel has to change. A revolution in mobility is already underway: electric vehicles are becoming increasingly popular, improved fuels are helping vehicles to run better and work is underway to lower the carbon footprint of planes and ships.

But as this report highlights, there is no silver bullet for reducing emissions in transport, which currently account for around a quarter of the world's total. That is why BP believes we all have to pursue multiple opportunities to advance the energy transition.

EVs have caught the public's imagination and can help improve air quality, particularly in urban areas. But this report shows how many consumers in Europe still have concerns about making the switch from a conventional engine to an EV. These range from the availability of charging points to anxiety about running out of power mid-journey to the amount of time it takes to charge the vehicle.

In BP's view, the widespread introduction of ultra-fast charging will go a long way to meeting many of those concerns. It would replicate the experience consumers have today, a convenient and efficient forecourt experience. With this in mind, BP Chargemaster is already rolling out ultra-fast chargers to locations across the UK's retail network.

Of course, advancing the energy transition goes beyond cars, vans and scooters. A low carbon transport future also requires changes in air and marine transport. That's why BP is investing in a company that can turn household waste into plane fuels, or 'biojet'. And it's why we are building a new generation of ships to transport liquefied natural gas that are 25 percent more fuel efficient than their predecessors. But the energy transition presents such a complex set of challenges that all of us need to do more.

That will mean different things in different countries, as the pace of development varies across the world. Any transport solutions should suit the local conditions and address consumer concerns.

We commissioned this Europe-focussed report to help contribute to shared learning, challenge preconceptions, and identify the actions needed to turn ideas into reality. I am grateful to the team at SYSTRA for talking to industry experts and consumers, and representing their views in a useful and understandable way. This report shines a light on consumers' desire for change but also highlights issues that need to be overcome.



The way we should all go about tackling this broad and complicated set of issues is by working together. For example, accelerating the uptake of EVs will require vehicle manufacturers, battery companies, fuel providers, grid operators and other stakeholders to work together – all within well-designed regulatory frameworks, drawn up by governments.

It shows that none of us can act in isolation. And that by working together and combining our areas of expertise, we all stand to benefit.



**Tufan Erginbilgic,**  
**Chief Executive Downstream, BP**

# 1

# Research overview

This report explores what customers and experts think a lower carbon future of road transport might look like and outline steps that European consumers, industry and government together can take to get there. Through a robust research programme including 22 expert interviews, a survey of 12,000 people across four European countries and 10 in-depth case studies, it provides a unique insight into some of the barriers, drivers and potential solutions shaping the transport of tomorrow.



## Stakeholder interviews

22 interviews with selected industry experts



## Consumer survey

Representative sample of 12,006 respondents across, UK, Germany, Spain and The Netherlands



## Consumer case studies

10 Case study interviews in UK and Germany

This report reflects findings from an independent research study, conducted by SYSTRA and commissioned by BP. The comments and data presented in this study reflect only the views of the people that took part in the research.

# Vision for a lower carbon future

The transport industry experts from the private sector, government and academia broadly agree that the future of personal and passenger transport will be a blend of autonomous, connected, electric and shared vehicles (ACES).

Opinions vary on the speed and scale of adoption, how these different technologies will interact, and how engaged consumers will be with this vision.

There is also a distinct gap between experts' view on the pace of change and consumer readiness. Both audiences, however, recognise the need to develop a range of greener transport choices, rather than focusing on any one solution. Collaboration between government, industry and individuals is also key to delivering a lower carbon transport future, with legislative changes required to facilitate innovation.

## Spotlight summary

56%

think their country should reach net zero emissions by 2030

62%

consumers believe reduced car ownership will lower carbon emissions but...

38%

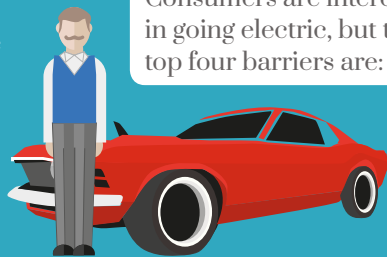
think we will still own cars in 2050

1 in 4

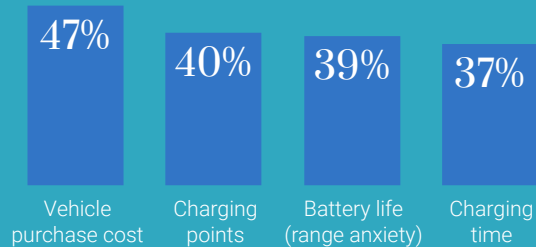
do not think any ACES technological changes will happen by 2030

## Challenges

Concern over climate change is high. Consumers struggle to imagine change without directly experiencing the technology

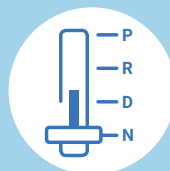


Consumers are interested in going electric, but the top four barriers are:



### Double-parked

Pessimistic about the future and unconcerned



### Stuck in neutral

Happy with the status quo and not motivated to change



### Back seat passenger

Not environmentally motivated but still travel sustainably



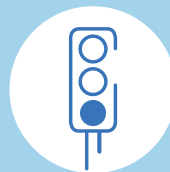
### Lane changer

Up for switching travel habits to help environment



### Revved up

Keen to keep the car but make it greener



### Green light

Welcome a different future, but concerned about cost

## Attitudes & behaviours

There is a risk we overlook tailoring transport solutions to different types of people. Six traveller types have been identified

## Responsibility

Everyone is responsible for moving towards lower carbon transport. Consumers felt the following were most responsible:



# Lowering carbon emissions from transport is a shared priority

Experts and consumers surveyed recognise the importance of tackling climate change.

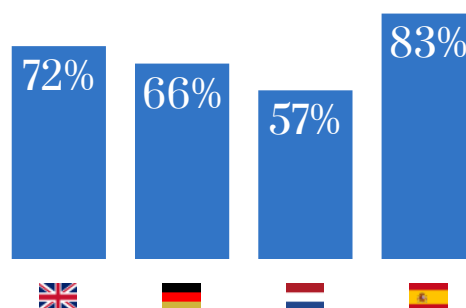
Addressing the impact of global warming is a pressing concern. Most European consumers (70%) are worried about climate change, peaking in Spain (83%) – perhaps as the result of recent extreme weather events – with lowest concern in the Netherlands (57%).

Over half of consumers (56%) think we should achieve net zero carbon emissions by 2030 and, in total, three quarters (72%) think we should achieve it by 2050. Fewer than one in 10 (7%) do not think we should be aiming for net zero at all.

With transport accounting for around a quarter of Europe's greenhouse gas emissions<sup>1</sup>, experts and consumers both accept the need to move to lower carbon transport. Most consumers (62%) are also concerned about the impact of car emissions on air quality.

Two thirds of European consumers (68%) say reducing the carbon footprint of their journeys is important to them. Over half (53%) say they would try greener transport choices, many (43%) even if they cost more. Whilst promising, this contrasts with the more ambitious vision for the future of transport envisaged by experts interviewed as part of this research.

Concern about impact of climate change

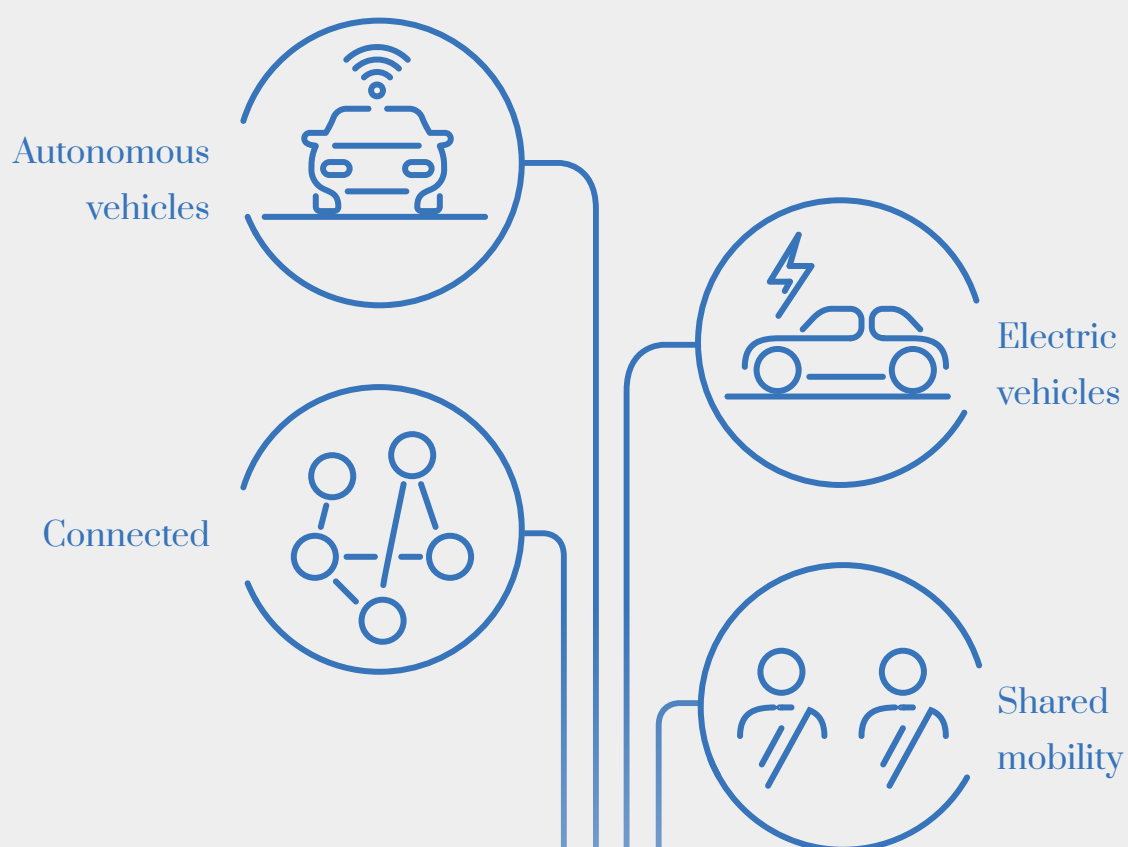


<sup>1</sup> [https://ec.europa.eu/clima/policies/transport\\_en](https://ec.europa.eu/clima/policies/transport_en)



# Gap between expert vision and consumer reality

Experts interviewed point to a blended service of ACES technologies as the future of transport – but questions remain over the speed and scale of uptake.



# Autonomous vehicles



## What the experts say:

- Potential benefits include a more efficient road network, putting parking spaces to other uses, greater accessibility for those less mobile as people will not be required to drive, and opportunities for first and last mile connections to public transport.
- With the complexity of European city road networks, big changes to the physical environment may be needed, potentially leading to public spaces built more for machines than people.
- Autonomous vehicles (AVs) may be more suited to mass transit, longer journeys and freight, where they can operate in dedicated lanes or as part of fleets for last mile deliveries.
- Need to overcome public concern that AVs are unsafe and are capable of making unethical decisions.

“Autonomy will have the greatest impact on the transport industry leading up to 2040 because it can be implemented into several main modes and has the potential to create a very smart system.”

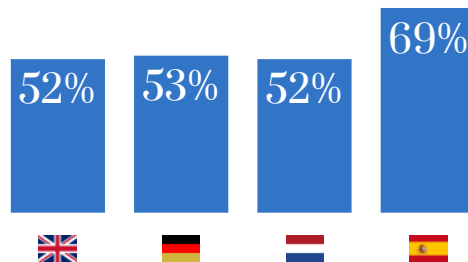
Bosch

“Fully self-driving cars are likely to become a reality for use on motorways first but use in urban areas will not follow for another 5-10 years.”

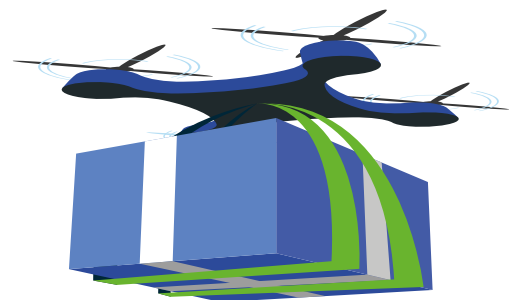
Felyx

## What the consumers say:

Think autonomous taxis will be commonplace by 2050



- 60% believe drone home delivery will be commonplace by 2050; but only 6% would use them.



# Connected



## What the experts say:

- Potential benefits include safer and more efficient journeys.
- Connected vehicles will bring different transport modes and operators together in single mobility platforms (Mobility as a Service or MaaS) - delivering integrated journey planning, provision and payment.
- Concerns include technological constraints (e.g. 5G not yet being widely available), data security and privacy.
- Consumer interests will need to be protected from service providers offering their own transport solutions, above the most convenient options.

“If the vehicles are talking to each other, they make better use of road space we could get a much better flow of traffic.”

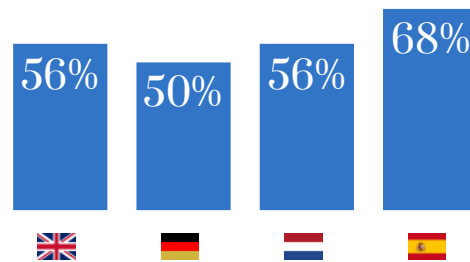
Transport for West Midlands

“Within 5 years all new vehicles will connect to the internet; within 10 years all new vehicles will communicate with each other.”

StoreDot

## What the consumers say:

Door to door journeys will be commonplace by 2050



- This kind of service is welcome especially if it saves time and money.
- But concerns remain over feasibility in rural areas.

# Electric vehicles



## What the experts say:

- Momentum for electrification is growing, battery life is improving and charging times are reducing.
- Seen as key solution for lowering carbon emissions but challenges remain around sustainable battery manufacture and disposal, vehicle and electricity supply, cost, charging infrastructure and range anxiety.

“Electrification is inevitable given pressure to reduce emissions and although it’s relatively expensive at the moment, electric vehicles, including bikes and scooters, will become the norm.”

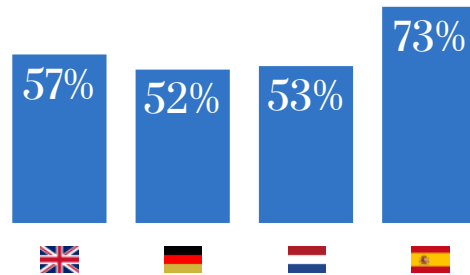
Mayor of Rotterdam’s office

“Electrification will be adopted at a much slower pace, held back by vehicle costs (batteries) to manufacturers and consumers, lack of charging infrastructure and range anxiety.”

Society of Motor Manufacturers and Traders

## What the consumers say:

A fully electrified vehicle network by 2050



Widespread belief that EV-related technologies will be commonplace by 2050:

- Charging hubs where you can eat, shop etc (70%).
- EVs that charge as quickly as filling up with petrol/diesel (63%).
- A fully electrified vehicle network (59%).

# Shared mobility



## What the experts say:

- Access to mobility will be more important than ownership for many, especially in well-connected cities.
- The move to a sharing economy is driven by younger generation.
- It will fill gaps in public transport, but matching demand to supply can be difficult – particularly in rural areas.
- Uncertainty over ability to extend beyond national boundaries, overcome public concern for personal safety, and safeguarding data privacy.

“I see a future where the city centre only offers mobility options that are shared or public, removing personal cars to create a more liveable, accessible and spacious urban environment.”

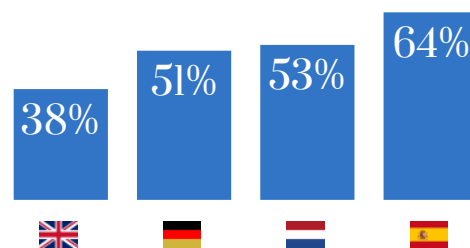
Felyx

“There’s a big trend toward shared mobility and we have started to explore ride share, demand responsive services, and we have a shared bike scheme.”

Transport for West Midlands

## What the consumers say:

Bikes and scooters for shorter journeys as a faster way to travel



- 39% think, by 2050, not owning a car will be commonplace.
- 52% think bikes or scooters will be the norm for shorter journeys.

# Consumers want to adopt greener transport methods, but struggle to imagine how

56%

think their country should reach net zero emissions by 2030

62%

consumers believe reduced car ownership will lower carbon emissions but...

38%

think we will still own cars in 2050

1 in 4

do not think any ACES technological changes will happen by 2030

While industry experts foresee big changes like reduced car ownership, consumers are not as ready and able to embrace such significant behavioural shifts. The intent is there – when asked which behaviours or technologies they would be interested to adopt, one in five consumers stated they are interested in reducing the number of flights they take (21%), taking the bus or train instead of driving or flying (21%) and over half stated they are interested in using a hybrid or EV (55%) to reduce their carbon footprint – but making it happen is the challenge.

While over three quarters (75%) of consumers believe at least one ACES technology will be commonplace by 2030, the remaining quarter are less optimistic. One in four (23%) do not see any of the ACES changes experts predict happening by 2030 and fewer still can see themselves using greener travel technology – whether that’s driving more efficient petrol/diesel cars (11%), using charging hubs that also have leisure facilities (8%), or receiving drone home delivery (6%).

## Car ownership is predicted to decline, but consumers are attached to their vehicles

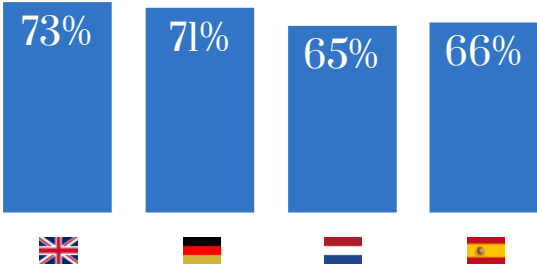
As efforts are made to address congestion and poor air quality, experts predict car ownership will become a burden and new ways to travel conveniently without owning a vehicle will emerge.

Consumers remain wedded to the idea of car ownership. While nearly two thirds (62%) believe that a reduction in car ownership would lower carbon emissions, fewer than half (38%) think people will not own cars in 2050; about as likely as flying taxis (34%).

More people think it is important to own their own car (69%) than are concerned about the impact of car emissions on air quality (62%), but this does vary by market. The British and Germans are most likely to value car ownership (at 73% and 71% respectively), while concerns for air quality are most pronounced in Spain (79%).



Owning a car is important to me



Experts predict the reduction in car ownership will be led by the younger generation, for whom ownership is generally less important, and the consumer survey backs this up. Younger consumers are less likely to think that owning a car is important to them, and more likely to think car ownership will decline in the future.

### Consumer spotlight: Connections to the private car

**Manfred, 68, from Germany**

I am an enthusiastic driver and use the car for many of my journeys. The car is the epitome of personal freedom for me. It’s about independence, convenience and spontaneity – sometimes I drive a whole day just for fun.

## Environmental benefits of shared journeys

Transport experts see potential in social media to personalise transport and help people connect to share journeys, whilst overcoming the barrier of sharing with strangers. Shared car journeys may also become a cost-effective way to travel or reduce the costs of car ownership.

Services which help employees share their commute are already emerging, but the popularity and acceptance of sharing varies by market. Roughly a third of consumers in the UK, Germany and the Netherlands can see shared travel becoming commonplace, but this rises to half (51%) for Spanish consumers.

To help encourage more shared journeys experts suggest:

- Allowing drivers to turn a small tax-free profit when car-pooling to certain destinations.
- Large employers offering premium car parking options or availability for those car-pooling.
- Introducing car sharing lanes.

“It’s a bit like an extension of your real estate, your car, when you use it a lot for long distance.”

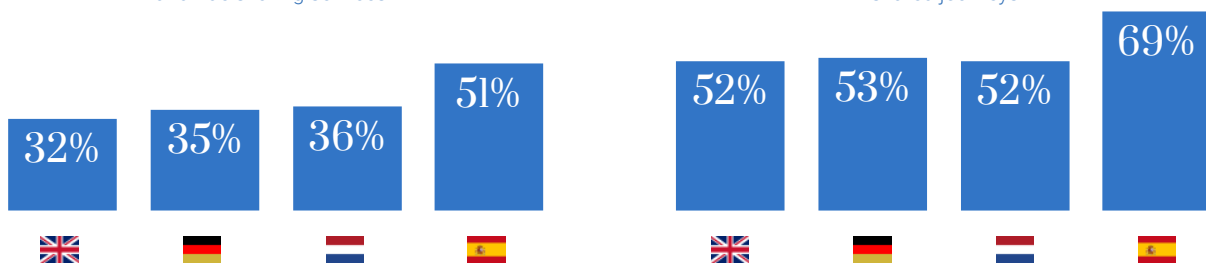
BlaBla Car



People will use a mixture of car clubs and ride sharing services



Autonomous taxis for lone or shared journeys



### Consumer spotlight: Car pooling

Ros, 56, from UK

I take part in a running club. The group has a Facebook page where car-pooling is encouraged due to limited availability of parking at race locations. I regularly car-pool, using the page to arrange the journey. I would only be comfortable car-pooling with people I know from the club, and would not want to car-pool with strangers.

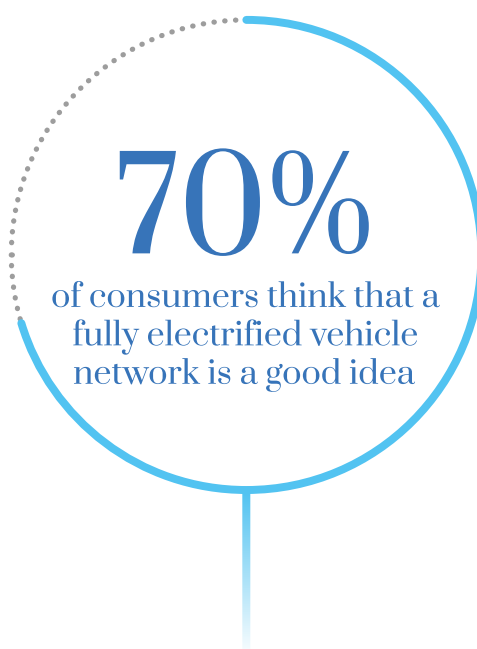


# No single solution

## Electrification alone is not the answer

Electrification is widely recognised as key to lowering emissions and pollution, and most consumers (70%) think that a fully electrified vehicle network is a good idea. Additionally, consumers see a role for alternative fuels, with nearly two thirds predicting a future where cars run on biofuels (63%) and hydrogen (58%) and that the use of these is a good solution to lowering emissions (71% and 72% respectively).

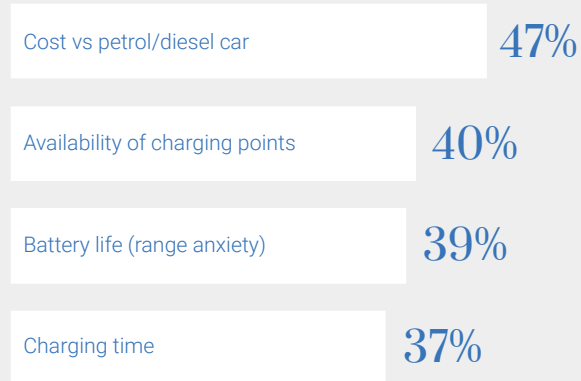
Experts suggested planning for the unintended consequences of electrification. As well as raising affordability and practicality concerns, some noted that a move to electric could disadvantage lower income consumers who are more likely to have older vehicles and least able to upgrade or change their travel habits. Concerns were also raised about sourcing electricity from 'unclean' sources, disposing of battery materials sustainably and the grid's ability to meet increased demand.



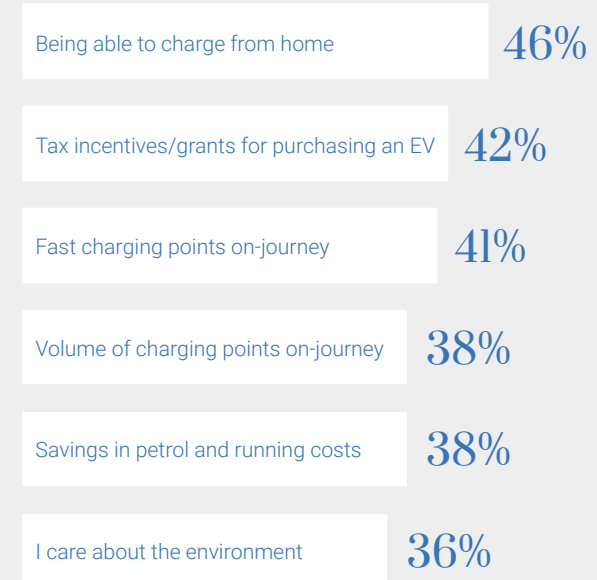


For consumers, whilst there are motivators to EV purchase, various barriers are inhibiting uptake:

### Top barriers to EV purchase



### Top motivators to EV purchase



The role for electrification in freight and aviation is also uncertain. While many experts feel light freight and short-haul planes may be able to be powered by electricity, bigger vehicles will still need fossil fuels or alternatives like hydrogen and biofuels.

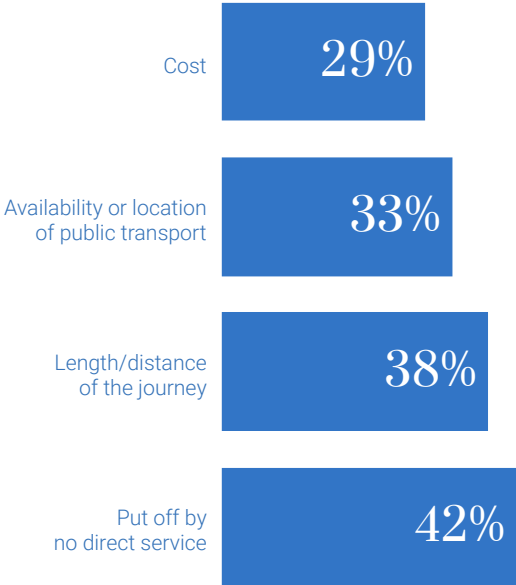


# Innovation may have unintended consequences – pulling people away from public transport

New mobility technology may not automatically lower carbon emissions – in fact it may, inadvertently, lead to more car journeys and less public transport use.

- **Autonomous:** Driverless travel can be more productive and be favoured over public transport.
- **Connected:** Road space efficiency and efficient traffic flow management will be created by vehicle-to-vehicle communication, potentially increasing demand for car journeys.
- **Electric:** Cheaper running costs means that EV owners may choose to drive on more journeys.
- **Shared:** Shared journeys, including car-clubs, car-pooling and micro-mobility solutions, may also become more attractive than public transport and shared on-demand services could create congestion.

Lack of convenient public transport is the biggest barrier to lower carbon travel for consumers, who are put off by:



“Making driving easier through increasing levels of autonomy and increasingly accurate mapping, and journey planning that makes the car more attractive, poses big challenges for areas that want to have more active travel and public transport use.”

CoMoUK



## Rural, older and lower income communities could be left behind

Understandably, rural consumers are more reliant on personal cars and feel it is important to own one (76% vs 67% for urban counterparts). Anticipated policy developments, however, are largely centred on urban areas – cycle paths, pedestrianisation, low emissions zones – and the rural context is missing from the debate.

But making the shift to lower carbon travel is more difficult outside cities where there is less and less frequent public transport. Not having good public transport nearby is a much bigger barrier for rural (48%) rather than urban consumers (27%) as is not having a direct public transport service (51% vs 38% respectively).



76%

Rural consumers are more reliant on personal cars and feel it is important to own one

Mobility start-ups and entrepreneurs, told us in interview that they face challenges in investing in rural areas where uptake is lower and the services they provide need to be more widely dispersed.



67%

Experts also note that other groups risk exclusion through transport developments – older people may be less comfortable adopting lower carbon travel options reliant on digital technology, and it is unlikely everyone will be able to afford a private, driverless car – so it will be important new transport technologies are accessible to all.

### Consumer spotlight: Mobility and transport use

**Anja, 50, from Germany**

I live in town with my husband and daughter and tend to use my car because I have problems with my back and knees that mean walking and taking public transport is difficult.

42%

think lack of convenient public transport is the biggest barrier to lower carbon travel for consumers

# Tailored transport solutions are needed for different types of people

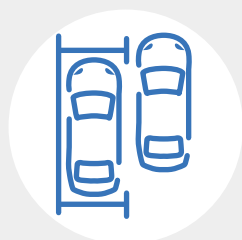
On top of where you live and the journeys you need to make, there are a number of attitudinal factors that affect how individuals will – or will not – embrace new ways of getting around. Interestingly, these factors are not always obvious. Younger and more urban consumers do tend to be more visionary, but concern over climate change and carbon footprint does not automatically translate into enthusiasm to adopt greener technology.

Our study has revealed six broad types of consumer who will need to be accommodated when delivering a lower carbon future.

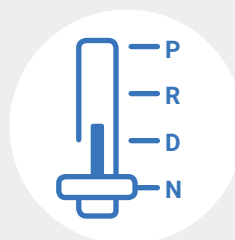
These typologies make it clear that no single solution is going to appeal to all. Some are willing to be led by the market and new innovation, others may need strong incentives or legislative changes. And some will need both depending on the journey or mode of travel.



## Double parked



## Stuck in neutral



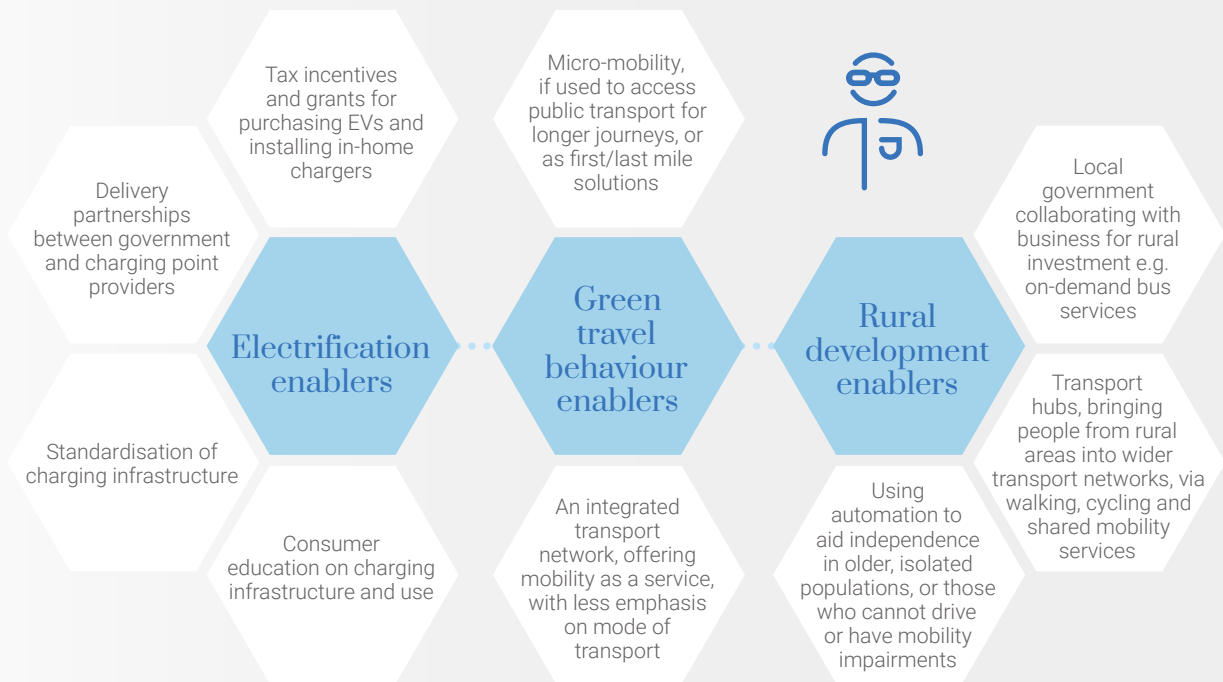
## Back seat passenger



The future is:	No greener than now	No different for me	A bit more efficient but similar
Summary view	Pessimistic about the future and not environmentally concerned	Happy with the status quo and no motivation to change	Not environmentally motivated but still travel sustainably
Demographic	Slightly more prevalent in the UK, Netherlands and Germany; no urban/rural bias	Parents, own a car, rural/village based, more prevalent in the UK, older than other groups.	Slightly more prevalent in Germany and The Netherlands, urban, single person household, young
Description	<p>Not concerned about climate change or reducing carbon footprint</p> <p>Lack of current 'green' behaviours e.g. recycling</p> <p>No motivation to switch to greener transport</p> <p>Do not think any ACES technologies are good solutions to lowering carbon emissions</p>	<p>Somewhat concerned about climate change, but neutral towards reducing own carbon emissions</p> <p>Regular car users who think it's possible to switch in some instances but are unlikely to</p> <p>Would not feel safe using bikes/scooters and would not book journeys via an app</p> <p>Believe there will always be private cars and only expect to use more efficient petrol and diesel engines rather than switch to electric</p>	<p>Least likely to believe that owning a car is important</p> <p>Generally low car usage</p> <p>Moderately concerned about climate change and reducing their carbon footprint</p> <p>See little change in next 10 years, but do see role for biofuels, hydrogen and EVs in next 30 years</p> <p>Do not predict uptake of any new technology.</p>

# Expert view: Making multiple solutions work

The view of industry experts we interviewed is that making a lower carbon transport future a reality will take several enablers.



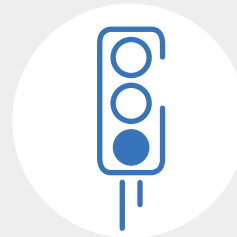
## Lane changer



## Revved up



## Green light



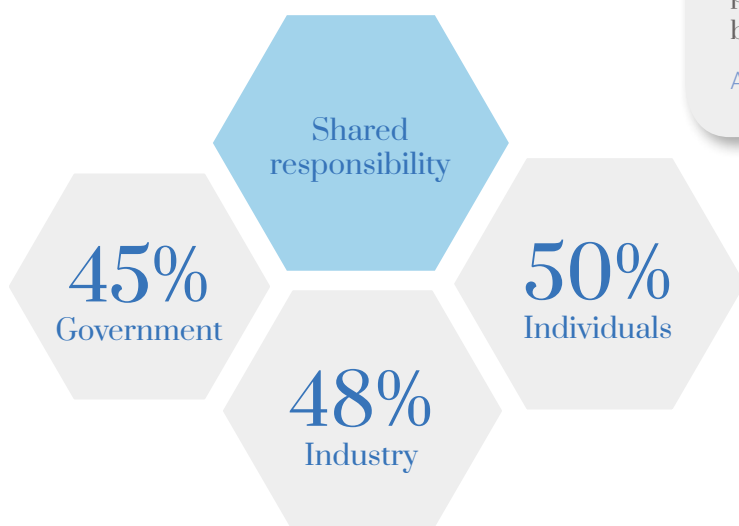
Using existing green tech and adopting new tech in the long term	A much greener version of the way we get around now	Multifaceted and much greener in the short term	The future is:
Motivated to switch travel habits to help environment	Keen to keep travelling by car with technology that makes it greener	Predict a very different future, but concerned about cost	Summary view
Multi-person household, possibly with children, own a car, travel between rural and urban areas.	Multi-person household with no children, younger, car owners, city dwellers, more prevalent in Spain.	Urban parents, have a car, more prevalent in Spain	Demographic
<p>Cannot imagine not owning a car but willing to switch for some journey types</p> <p>High concern over car emissions and want to reduce their carbon footprint</p> <p>Expect a lot of change in the next 10 years, but can't see EVs and AVs at scale for 30 years</p> <p>They particularly anticipate use of efficient ICE cars, multi-purpose charging hubs, fast-charging and delivery-drones</p>	<p>Care about the environment</p> <p>Tech savvy and strong social conscience</p> <p>Risk takers who like high-adrenaline activities</p> <p>Attached to their car and use it for all journey types</p> <p>Prepared to pay more for cleaner fuel and 'green' technology</p> <p>See future of transport as car-focussed, anticipating short-term change to: use of biofuels, improved vehicle efficiency, faster charging, charging hubs, autonomous taxis and an EV network</p>	<p>Very concerned about climate change and think it's individuals' responsibility to reduce emissions</p> <p>'Green' behaviours e.g. recycling and reducing single-use plastic</p> <p>Put off 'greener' tech due to cost</p> <p>But expect lots of changes in the near future and most likely to see themselves using future tech like fast-charging EVs, multi-functional charging hubs, delivery drones and biofuels</p>	Description



# Collaboration is key

## A shared responsibility

Experts and consumers both recognise that addressing transport emissions is not solely the responsibility of governments. Many consumers do point to the role of government and legislation (45%) but more still believe this is as much a job for individuals (50%) and industry (48%). Individuals need to be responsible for their behaviour and industry for delivering the right products and innovation.



“[the public] care about getting from A to B, and what impact it has on their life. It’s nice to get a warm fuzzy feeling because they know it’s electric and clean and they’re doing their bit for the environment, but it’s not powerful enough to radically change behaviour.”

Addison Lee

Yet consumers will need more than purely environmental motivation to adopt greener transport; they also need to be encouraged with incentives such as competitive costs and convenience. Only around a quarter of people think it possible and likely that they will use greener transport for some of their journeys in the next 10 years. They are looking to government and industry to make greener alternatives more viable and affordable to help them break the habit of private car use.

## Getting legislation right can unlock innovation

As important as getting the right legislative drivers in place – be it penalties or incentives – is avoiding the pitfalls of misplaced regulation. Experts caution that legislation could in fact inhibit some innovation, particularly in areas like micro-mobility or connected and autonomous vehicles (CAVs). They recommend policy that: provides better planning guidance and regulation for micro-mobility use including parking; allows trials of new CAV technology (including sense and avoid systems in drones); outlines where fully automated AVs will be allowed and the ethical decisions they can make; and provides incentives for drivers when CAVs make beneficial choices like taking a longer route to reduce congestion.

By partnering with industry, local and central governments can better understand latest innovation and better develop legislative frameworks which help it flourish.

“It’s about the spatial design of the city. Which kind of mobilities do we want to give space to more space for pedestrians, cycling more on-demand and less for car.”

Mayor of Rotterdam Office

### Industry spotlight:

#### Transport for West Midlands

As a regional transport authority, Transport for West Midlands (TfWM) has a statutory responsibility for delivering transport in a way that is clean, safe and affordable in support of the region’s ‘Movement for Growth’ transport plan. The West Midlands is the UK’s first Future Mobility Area, receiving £20 million of Government funding, and is creating a connected and autonomous vehicle testbed where they are relaxing legislation and working with operators and providers to trial new modes of transport, services and technologies. In addition to testing the technology, the testbed will allow TfWM to assess whether the developments are in the interest of consumers.

25%

think it possible they will use greener transport for some of their journeys in the next 10 years





# Research highlights

Creating a future of transport where the world can keep moving, whilst dramatically reducing greenhouse gas emissions, is a complex challenge.

While our research suggests that there is broad agreement between transport experts and consumers on the technologies that are likely to get us there and a shared appetite to change, making that vision a reality will be far from straightforward.

Adopting the right balance of innovation and incentive, regulation and responsibility will be vital in ensuring consumers are brought on the journey to a lower carbon transport system. There is no single mobility solution that will enable a lower carbon future.

Different people, places and journeys, demand different needs – suggesting our future transport ecosystem must consider how each of these needs are met, how different technologies interact, and provide a range of solutions to ensure everyone has the chance to make greener choices.

Efforts to get to a lower carbon future quicker need to be mindful of the “blind spots” we have identified through our survey and conversations with experts – inadvertently stifling innovation, increasing energy demand, undermining public transport or leaving certain groups behind.

Getting everyone on board and at the rate industry experts want and expect will take effort and collaboration. There are those who will be at the forefront of the future of transport, and others that will need much more support. Our conversations with industry experts show that innovation is striding forward and ACES technologies present a compelling future, but public buy-in needs to keep pace with that ambition.

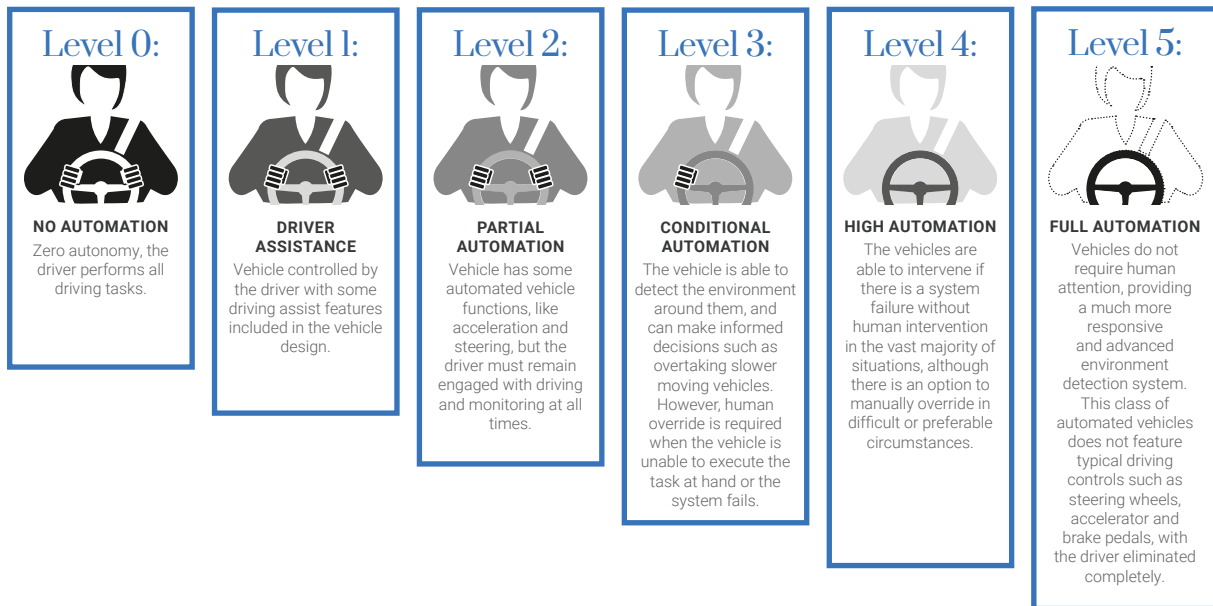
It is, however, a shared ambition. Addressing climate change and ensuring transport plays its part in a lower carbon future is a responsibility to all interviewed parties.



# Key terminology

**ACES:** Acronym of Autonomous Connected Electric Shared technologies.

**Autonomous:** Autonomous Vehicles (AVs) are capable of making decisions without human intervention. There are five levels of autonomous vehicles (see diagram below, adapted from Society of Automotive Engineers), some of which are already on the market.



**Biofuel:** A renewable fuel derived from organic materials, such as plant material or animal waste. This is used as an alternative to non-renewable fossil fuels.

**Connected:** Connected vehicles will be able to communicate with each other and with surrounding infrastructure, making for safer and smarter journeys, more efficient transport networks, and the sharing of real-time feedback to drivers, for example, informing a driver of traffic disruptions in real-time.

**Connected Autonomous Vehicles:** Vehicles that are able to both communicate with surrounding infrastructure and other vehicles and make decisions without human intervention. See definitions of Autonomous and Connected above.

**Electric vehicles / EVs:** Vehicles powered by electricity usually through a battery. EVs include, but are not limited to, cars, buses, bikes and freight vehicles.

**Lower carbon:** Lowering the overall emissions of CO<sub>2</sub>

**Micro-mobility:** On-demand public service shared bikes or e-scooters, which operate via self-service on-street docked or dockless stations e.g. Donkey Republic and Felyx.

**Shared:** This can refer to shared car journeys or ride-sharing, e.g. BlaBla Car; ride-hailing e.g. Uber, Lyft; car-clubs e.g. CoMoUK; carpooling e.g. Faxy; and micro-mobility.

# Acknowledgements

This report reflects findings from an independent research study, conducted by SYSTRA and commissioned by BP. The comments and data presented in this study reflect the views of the people that took part in the research, and these may not necessarily reflect the opinion or views of BP p.l.c. or any member of the BP Group. Consumer spotlights are taken from the consumer survey and case studies and, unless otherwise stated, our reporting of consumer survey findings relates to all four European markets combined.

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