

Professional Delphi on Automated Vehicles #2

Questions and answers

January 2020

The round one data showed consensus amongst the panel that automation to passenger and freight vehicles would lead to reduced carbon emissions and decreased air pollution, and this benefit was thought to be relatively likely to occur. Following on from this, and given our interest in energy demand reductions, we will now ask a series of questions about transport-related emissions.

While bringing major economic and social benefits, using a car or van contributes to road traffic congestion (excess delays), accidents, physical inactivity, climate change and local noise and air pollution. The UK transport system is emitting a range of harmful air pollutants (e.g. CO₂, NO_x, PM), either directly from vehicle operation (e.g. tailpipe emissions, non-tailpipe emissions from brake and tyre wear) or indirectly (emissions from fuel/energy production, vehicle manufacturing, maintenance and disposal/recycling). Please read and respond to the following questions using the free text spaces below the questions.

- 1. Do you think that PASSENGER vehicle automation will respond (positively and/or negatively) to these challenges? and if so, how?**
- 2. Do you think that FREIGHT vehicle automation will respond (positively and/or negatively) to these challenges? and if so, how?**
- 3. What other changes (e.g. technologies, regulation, behaviours) do you think will respond (positively and/or negatively) to these challenges? Please provide examples of technologies, regulations, behaviours and any other innovations you can think of.**

The panel agreed that alternative fuels would be the most likely change to result in energy demand reductions for the freight sector, and the second most likely for passenger vehicles.

A number of different propulsion systems have been posited for future vehicles, using a variety of fuels. Below we ask you to consider the distribution of these propulsion systems for all new vehicles across two time frames; 2025 and 2040.

- 4. What proportion of all new PASSENGER vehicles in 2025 (five years from now) will have the propulsion systems/fuels listed below? Adding up to a total of 100%, please indicate the proportion of new vehicles you think will have each of these propulsion system/fuel.**
 - Diesel internal combustion engine (ICE)
 - Petrol (ICE)
 - Full electric (BEV)
 - Diesel or petrol hybrid electric (HEV)
 - Diesel or petrol plug-in hybrid electric (PHEV)
 - Hydrogen fuel cell (H2 FCEV)
 - Natural/ bio gas (ICE)
 - Biofuel ICE (3rd generation, non-food crop biofuels)
 - Other
- 5. What proportion of all new PASSENGER vehicles in 2040 (twenty years from now) will have the propulsion systems/fuels listed below? Adding up to a total of 100%, please indicate the proportion of new vehicles you think will have each of these propulsion system/fuel.**
 - Diesel internal combustion engine (ICE)
 - Petrol (ICE)
 - Full electric (BEV)
 - Diesel or petrol hybrid electric (HEV)
 - Diesel or petrol plug-in hybrid electric (PHEV)

- Hydrogen fuel cell (H2 FCEV)
 - Natural/ bio gas (ICE)
 - Biofuel ICE (3rd generation, non-food crop biofuels)
 - Other
- 6. What proportion of all new FREIGHT vehicles in 2025 (five years from now) will have the propulsion systems/fuels listed below? Adding up to a total of 100%, please indicate the proportion of new vehicles you think will have each of these propulsion system/fuel.**
- Diesel internal combustion engine (ICE)
 - Petrol (ICE)
 - Full electric (BEV)
 - Diesel or petrol hybrid electric (HEV)
 - Diesel or petrol plug-in hybrid electric (PHEV)
 - Hydrogen fuel cell (H2 FCEV)
 - Natural/ bio gas (ICE)
 - Biofuel ICE (3rd generation, non-food crop biofuels)
 - Other
- 7. What proportion of all new FREIGHT vehicles in 2040 (twenty years from now) will have the propulsion systems/fuels listed below? Adding up to a total of 100%, please indicate the proportion of new vehicles you think will have each of these propulsion system/fuels.**
- Diesel internal combustion engine (ICE)
 - Petrol (ICE)
 - Full electric (BEV)
 - Diesel or petrol hybrid electric (HEV)
 - Diesel or petrol plug-in hybrid electric (PHEV)
 - Hydrogen fuel cell (H2 FCEV)
 - Natural/ bio gas (ICE)
 - Biofuel ICE (3rd generation, non-food crop biofuels)
 - Other

Along with alternative fuels, new ownership models were agreed by the panel to be likely to result in energy demand reductions for passenger (most likely) and freight (second most likely).

Changes to ownership models, mobility-as-a-service (MaaS) and sharing practices have emerged as important parts of visions of future transport systems. This is one aspect of what has been called the 'three transport revolutions' (automation, electrification and sharing), with some arguing that the largest potential for disruption lies in the possibility of shared, autonomous, electric vehicles.

- 8. Which of the models of sharing identified below do you think is most likely to prevail in 2025 (five years from now), and which will be the most effective in dealing with current transport challenges?**
- Shared access to vehicles (e.g. shared cars, car clubs) at different times to other users
 - Shared use of a commercially owned vehicle (e.g. UberPool) used at the same time as other users
 - Shared access to a privately owned vehicle used at the same time as friends/ acquaintances (e.g. car pooling)
 - Shared access to a privately owned vehicle used at the same time as an unknown person (e.g. via App or web interface)
- 9. How common do you think the following ownership models (automated road transport vehicles for passengers) will be?**
- Private ownership
 - Long-term leasing
 - Shared (community model)
 - Shared (car club model)

- Shared (taxi model)

9a. Is there another potentially common ownership model that we have not include here?

10. Do you think the vehicle ownership model will alter for FREIGHT vehicles in the next five years, and if so, what will it look like?

11. To what extent will SHARED transport (in the configuration you think is most likely) have the following effects on PASSENGER transport?

- Reductions in transport energy demand
- Decreased emissions
- Increased accessibility
- Decreased cost of transport

12. To what extent will shared AND ELECTRIC transport have the following effects on PASSENGER transport?

- Reductions in transport energy demand
- Decreased emissions
- Increased accessibility
- Decreased cost of transport

13. To what extent will shared, electric AND AUTOMATED transport have the following effects on PASSENGER transport?

- Reductions in transport energy demand
- Decreased emissions
- Increased accessibility
- Decreased cost of transport

14. Read the scenarios below, and indicate the likelihood of you using an SAE level 5 automated passenger vehicle in this context.

- Put an intoxicated friend in a private vehicle (sole occupancy) alone to transport them home at 1am.
- Put an intoxicated friend in a shared vehicle to transport them home at 1am.
- Put your two primary school age children in a vehicle to transport them to school.
- Put your teenage child in to drive them to swim practice at 5am.
- Order a vehicle to transport your elderly grandparent to your house for Christmas dinner.
- Travel in a vehicle with your partner and new born child.
- Put your teenage child and their friends in a vehicle to take them to the cinema for their birthday treat.