T4<2° | Transport For Under Two Degrees

T4<2° – Transport For Under Two Degrees Questionnaire Delphi Survey Round 1

The global **transformation of the transport sector** is a key challenge for climate protection and sustainable development. Therefore, the **foresight project T4<2°** aims at delivering necessary policy solutions for a successful transport transformation by mid-century.

The core of T4<2° is a two-round **Delphi survey among distinguished international experts** from the transport sector and other relevant thematic areas.

Given your renowned expertise, we would kindly invite you to answer the following questionnaire and contribute your personal opinion on the future of transport.
It will approximately take a **maximum of 25 minutes** to answer the questions.

The **most disputed issues** will be dealt with in a second survey round which will begin in January 2020. We would highly appreciate your participation in this second round as well!

In order to contact you for the second survey-round and to provide you with exclusive preliminary results we would kindly ask you to state your consent and **confirm your e-mail-address at the end of the questionnaire**.

T4<2° is jointly realized by the World Economic Forum, Agora Verkehrswende, and GIZ on behalf of the German Federal Foreign Office. For any questions or comments, do not hesitate to contact us on *t42@giz.de*.

Thank you very much!

Commissioned by: Federal Foreign Office

Implemented by: giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, World Economic Forum, Agora Verkehrswende

NOTES FOR FILLING IN THE QUESTIONNAIRE:

To go to the next page, please click on "next page". If you would like to answer questions that have already been answered, please use the "previous page" button. The percentage in the banner of the questionnaire gives you information about the current progress of the survey.

During the survey, you will notice some words in **green**. You can hover on it with the cursor, to receive a more detailed description of the word.

Please note that this is an "open" survey. It is not possible to interrupt and save the progress of the survey. If you end the survey, it will be restarted the next time you call it up.

PRIVACY DECLARATION:

This survey is administred by the Institute for Innovation and Technology (iit) at the VDI/VDE Innovation + Technik GmbH on behalf of Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

The Institute for Innovation and Technology commits to maintaining the confidentiality in the handling of the data. All analysed data will be processed only in an anonymous and aggregated manner for the project's prupose. All data will be processed in relation to lawfulness, purpose limitation, data minimisation, accuracy, storage limitation, integrity and confidentiality in accordance with art. 5 GDPR. For more information please see the Data protection information.

- ○ I declare my consent with the Privacy declaration above.

Actors and Challenges of the Transport Transformation

The following questions will explore your opinion on key international actors and main challenges that will shape the development of the global transport sector in the next 30 years.

By when will the global transport sector be decarbonised*?

- well before mid-century,
- by mid-century,
- only after mid-century,
- never,
- I don't know

* *Decarbonisation is understood as the reduction of carbon dioxide emissions in all areas of the respective sector with the aim to become net-emission free. It includes emissions created over the lifecycle of appliances and facilities as well as reductions achieved through balancing mechanisms such as emissions trading*

Please rank the following six challenges for decarbonising transport by mid-century, starting with the most significant challenge.

vested interests of incumbent industries	1st rank	
lack of suitable technologies	2nd rank	
lack of regulatory action	3rd rank	
lack of public acceptance	4th rank	
lack of international co-ordination and co-operation	5th rank	
slowing economic growth	6th rank	

- I don't know
- Other (please specify): .....

Which three countries will be most influential for the success of the global transport transformation?

- Rank 1: .....
- Rank 2: .....
- Rank 3: .....

Which three countries will be most influential in slowing down the global transport transformation?

- Rank 1: .....
- Rank 2: .....
- Rank 3: .....

Which three countries will experience the most adverse consequences from the global transport transformation?

- Rank 1: .....
- Rank 2: .....
- Rank 3: .....

Cities and coalitions of cities (as opposed to national governments) will be the main political actors shaping the future of transport worldwide.

○ strongly agree	○ agree	○ disagree	○ strongly disagree	○ I don't know

With the shift of demand towards new commodities such as minerals and rare earths the risk of geopolitical conflicts will ...

- decrease
- increase
- stay the same
- I don't know

Please select and rank the three fields of international governance that require the most action in order to enable a transport transformation.

energy	1st rank	
transport	2nd rank	
trade	3rd rank	
development co-operation		
international standardisation		
security		
regulation of transnational communication (i. e. standards for telecommunication and postal service)		

- I don't know
- Other (please specify): .....

Which three international organisations will be most influential for the success of the global transport transformation*?

- Rank 1: .....
- Rank 2: .....
- Rank 3: .....

- Other (please specify): .....

* *The transport transformation will ensure that the transport sector is carbon neutral by 2050. Lowering energy usage and covering the remaining demand with carbon-neutral energy will be essential for this large-scale transformation. Hence, the transport transformation necessarily rests on two pillars: the mobility transition and the energy transition in transport. While the mobility transition will reduce energy consumption without limiting mobility by changing how people get around, the energy transition in transport is primarily a technological challenge that will cover remaining demand with carbon-neutral energy.*

Policy Instruments for a successful Transport Transformation

The following questions specify which kind of policy solutions will be needed in order to accomplish the decarbonisation of the transport sector by mid-century.

In order to achieve the transport transformation by mid-century, ...

... policy should make use of:	not at all				With high emphasis
Regulations	○	○	○	○	○
Incentives	○	○	○	○	○

... policy should mainly influence:	not at all				With high emphasis
behaviour	○	○	○	○	○
technology	○	○	○	○	○

In your opinion, which five policy instruments would be most effective for decarbonising the transport sector in your country by mid-century?

.....

.....

.....

Which five of these policy instruments do you see as most likely to be implemented?

	most effective for decarbonising	most likely to be implemented
Regulation:		
carbon tax / fuel-pricing	O	O
fuel economy standards	O	O
phase-out of vehicles with combustion engines	O	O
minimum quotas for zero-emission vehicles	O	O
road pricing	O	O
parking management	O	O
zero-emission vehicle zones	O	O
Incentives:		
investment in public transport	O	O
investment in active transport modes*	O	O
tax reliefs for low-emission transport modes coupled with higher taxes for high-emission modes	O	O
free public transport	O	O
financial support for electric vehicles	O	O
public procurement focusing on low-emission solutions	O	O
support to civil society organisations	O	O
mix-used zoning** in urban planning	O	O
improvements in cycling infrastructure	O	O
Improvements in walking infrastructure	O	O

Information:		
education in schools	O	O
information campaigns	O	O

O Other (please specify): .....

* *e.g. walking, cycling*

** *Mixed-used zoning is a type of urban development or urban planning that blends residential, commercial, cultural, institutional, or entertainment uses into one space, where those functions are to some degree physically and functionally integrated, and that provides pedestrian connections.*

Do you think a politically forced phase-out of incumbent and fossil fuel-driven technologies* is needed in order to decarbonise the transport sector by mid-century?

- O yes, immediately
- O yes, in 10 years
- O yes, in 20 years
- O yes, in 30 years
- O not at all
- O I don't know

* *These include for example privately owned, internal combustion vehicles.*

Digital Impact

Digitalisation will be a key factor in transforming the transport sector. This trend comprises for example the connection of vehicles to mobile phones and other devices, the spread of mobility platform services or autonomous driving. The following questions explore a wide range of possible consequences of this development.

I expect that digitalisation in the transport sector will...

	not at all				very much	I don't know
increase demand for inter-national governance	○	○	○	○	○	○
contribute to a decrease of greenhouse gas (GHG) emissions	○	○	○	○	○	○
increase social equity	○	○	○	○	○	○
close the urban-rural divide	○	○	○	○	○	○
give rise to significant energy consumption in data processing and transmission	○	○	○	○	○	○
cause problems related to data privacy concerns	○	○	○	○	○	○

By mid-century I expect autonomous vehicles (AVs) to...

	not at all				very much	I don't know
dominate the vehicle market	○	○	○	○	○	○
play a significant role in road passenger transport	○	○	○	○	○	○
have increased urban sprawl	○	○	○	○	○	○
be all shared and pooled	○	○	○	○	○	○
have increased transport volumes	○	○	○	○	○	○
have narrowed the urban-rural divide	○	○	○	○	○	○
have increased social participation of children, older people and disabled persons	○	○	○	○	○	○
have increased social participation of economically disadvantaged persons	○	○	○	○	○	○
have reduced road injuries and deaths	○	○	○	○	○	○
be provided by the state rather than by private entities	○	○	○	○	○	○

Societal Effects of the Transport Transformation

The change of the transport sector will have a variety of effects on society. At the same time technological innovations and trends are affecting the development of the transport sector. The following questions focus on these interrelations.

The transport transformation...

	strongly agree	agree	disagree	strongly disagree	I don't know
will create more new jobs than it eliminates.	○	○	○	○	○
will decrease the social divides.	○	○	○	○	○
will decrease global development gaps.	○	○	○	○	○
will decrease gender divides.	○	○	○	○	○
will decrease racial divides.	○	○	○	○	○
will increase social participation of until now deprived groups such as children, older people and disabled persons.	○	○	○	○	○

The spread of the following solutions and trends can potentially lead to a significant decrease in transport emissions. Please rank the trends and applications according to their net emissions reduction effect.

3D printing	1st rank	
advanced telecommunication	2nd rank	
virtual reality applications	3rd rank	
flexibility schemes for employees	4th rank	
e-commerce	5th rank	
home entertainment solutions	6th rank	
sustainability lifestyles	7th rank	
decentralised city-planning	8th rank	

Capital and Markets

The following questions focus on economic implications and the capital needed to achieve the transport transformation.

Which sources of capital will be available in due time in order to finance the global transport transformation?

- sufficient private capital will be available but not sufficient public funds.
- sufficient public funds will be available but not sufficient private capital.
- both public and private capital will be available in sufficient quantities.
- neither public nor private capital will be available in sufficient quantities.
- I don't know

Economic growth and growth in transport demand...

- are strongly linked and cannot be separated.
- will only be decoupling in developing economies
- will be decoupling in developing and developed economies
- will only be decoupling in developed economies
- I don't know.

Fuelling the Transport Transformation

Getting the fuel mix right for vehicles, airplanes and ships will be decisive for achieving the transport transformation. The following questions will focus on the specific fuel mixes for land-based and maritime transport as well as aviation.

Please select and rank: Which three types of fuel do you expect to have the biggest share in land-based passenger transport by mid-century:

direct use of renewable electricity	1st rank	
hydrogen from renewable sources	2nd rank	
synthetic fuels from renewable sources	3rd rank	
biofuels from agricultural and forestry products		
biofuels from waste and residues		
oil-based liquid fuels		
natural gas		

- I don't know
- Other (please specify): .....

Please select and rank: Which three types of fuel do you expect to have the biggest share in land-based freight transport by mid-century:

direct use of renewable electricity	1st rank	
hydrogen from renewable sources	2nd rank	
synthetic fuels from renewable sources	3rd rank	
biofuels from agricultural and forestry products		
biofuels from waste and residues		
oil-based liquid fuels		
natural gas		

- I don't know
- Other (please specify): .....

Please select and rank: Which three types of fuel do you expect to have the biggest share in aviation by mid-century:

direct use of renewable electricity	1st rank	
hydrogen from renewable sources	2nd rank	
synthetic fuels from renewable sources	3rd rank	
biofuels from agricultural and forestry products		
biofuels from waste and residues		
oil-based liquid fuels		
natural gas		

- I don't know
- Other (please specify): .....

Please select and rank: Which three types of fuel do you expect to have the biggest share in maritime transport by mid-century:

wind power	1st rank	
direct use of renewable electricity	2nd rank	
hydrogen from renewable sources	3rd rank	
synthetic fuels from renewable sources		
biofuels from agricultural and forestry products		
biofuels from waste and residues		
oil-based liquid fuels		
natural gas		
other / please specify		

In order to integrate the transformation of the energy and transport sectors...

- the extension of renewable energy capacities needs to be prioritised over grid flexibility*.
- grid flexibility needs to be expanded first.
- renewable energy capacities and grid flexibility need to be developed hand in hand.
- I don't know.

* *Grid flexibility measures include, inter alia, extension of the existing electricity networks, building up storage capacities, establishing market designs that incentivise flexibility (e.g. storage, shift of consumption to low-demand times), solutions for more efficient grid management.*

Modes of Transport

It can be expected that modes of transport in urban and rural areas will have changed significantly by mid-century due to new technologies, service offers and reformed spatial planning.

Which modes will dominate *urban* transport by mid-century?

Cascaded selection *(second and third selections will open once prior selection is made)*

First level:

- cars
- two- and three wheelers
- taxis and mini busses
- public transport (busses, metros, trams etc.)
- bicycles
- walking
- passenger drones
- cargo drones

Second level:
Which ownership model will be dominant for the selected modes?
(except for mass transport, walking)

- individually owned
- shared
- pooled

Third level:
How will the selected modes be powered? *(except for walking)*

- electrically
- with internal combustion engines
- differently (please specify): .....

Which modes will dominate *rural* transport by mid-century?

Cascaded selection *(second and third selections will open once prior selection is made)*

First level:

- cars
- two- and three wheelers
- taxis and mini busses
- public transport (busses, metros, trams etc.)
- bicycles
- walking
- passenger drones
- cargo drones

Second level:

Which ownership model will be dominant for the selected modes?
(except for mass transport, walking)

- individually owned
- shared
- pooled

Third level:

How will the selected modes be powered? *(except for walking)*

- electrically
- with internal combustion engines
- differently (please specify): .....

Additional Remarks

Are there any technologies that are still not market-ready but that could play a significant role in transport by mid-century?

- Yes, please specify: .....
- No
- I don't know

Do you have any topics or remarks that have not yet been mentioned in the questionnaire and that you would like to share with us?

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.....
.....
.....
.....
.....
.....
.....

General Data

Please select your country:

.....

Please choose your gender:

- male
- female
- other
- no answer

Please select the sector in which you are predominantly active:

- Politics/public administration
- academia/research
- private sector
- civil society/NGO

Which thematic field are you primarily working in?

- transport
- energy
- foreign policy
- development cooperation
- digitisation
- other (please specify): .....

How many years of professional experience in relevant thematic areas do you have?

- up to 3 years
- 3 to 5 years
- 5 to 10 years
- more than 10 years

Thank you very much for participating in our project "T4<2° – Transport for under two degrees"!

Please let us know/confirm your e-mail address for contacting you for the second survey-round in January 2020:.....

We would highly appreciate your participation the second survey-round as well! Only by sharing your e-mail address with us we will be able to exclusively inform you about all preliminary and final results.

- I do not want to participate in the second survey round of the Delphi survey.

Your e-mail address will only be used to contact you for this Delphi survey and will not be stored in any other database. Your answers to the survey will not be linked to your personal and contact data in any way.