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How to structure the public debate on the low-carbon future of passenger transport?

Lessons from the DDP-Transport Project

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Detailed long-term mitigation pathways are key instruments to inform short-term planning and decisions and to avoid lock-in situations (e.g. do they lead to long-lived assets or machinery that cannot be retrofitted?). Different communities of stakeholders have strong opinions about the long-term evolution of the transport sector and argue for specific visions of the loww-carbon transition consistent with their own situations and priorities (e.g. emphasizing autonomous electric vehicles in contrast to mode switching to cycling and walking in a denser urban form).

A key challenge for organizing debates around these alternative visions is that they are very difficult to contrast and compare in the light of common public questions and to assess against their consistency with all national objectives. Pathways designed by stakeholders may also provide partial descriptions of the transformations, reflecting their core domain of expertise, and the lack of sufficient detail inhibits understanding of the underlying linked drivers and action levers.

Building consistent long-term pathways for the low-carbon future of the passenger transport sector and making them comparable in a transparent manner are key challenges for structuring productive public debates.

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KEY MESSAGES

Most existing visions, proposed by different communities of stakeholders, provide partial but complementary visions of the future of the passenger transport sector. These visions need to be confronted with each other in a consistent manner to support a meaningful policy debate.

Building a consistent dialogue between these visions requires revealing underlying physical and socioeconomic transformations, corresponding actions in a given time period, and interacting effects on other national priorities.

To operationalize an open and consistent dialogue for all stakeholders and their visions, a structured comparison framework informing all the main transformations and public questions is needed, as well as a tool to structure and ensure a fair and transparent debate. The Deep Decarbonization Pathways Building and Comparison tool developed by members of the DDP network offers a methodology and framework for such an approach in the passenger transport sector.

A sectoral transition involves a multitude of stakeholders from various industries, from politics, and from research and society. They all have critical stakes in the transition, and to protect their own interests will trumpet in the public debate decarbonization visions and pathways reflecting their own priorities.

In the transports sector, some of them focus on the improvement of connectivity, promoting the reduction of time spent in transport for all mobility purposes, whether daily activities or leisure activities, short or long distance travel. They highlight the benefits of increasing connections with the development of rapid transport modes or the development of infrastructure to reduce congestion. However, they are less likely to consider the induced urban sprawl and related transformation of land patterns with possible competition with other uses (e.g. for agriculture, preservation of biodiversity, or as emissions sinks). Others, like the community of digital industries and service providers highlight the future benefits of autonomous vehicles and new forms of collaborative mobility. Road user associations may highlight the urgent need to manage the transition costs for car drivers. Unions may focus on estimated effects on jobs. The gas industry may highlight the potential for hydrogen and renewable gas to fuel a large portion of the fleet. Some transport experts may even describe the end of individual mobility and the reinforcement of collective transport, and so on.

All these visions cover specific parts of the debate with more or less detail on the underlying drivers of transformations, the timing of required actions and resulting transformations, and the effects of these transformations on other national objectives. But, in the absence of a simultaneous consideration of all short- and long-term transformations and objectives, there are serious risks of some objectives clashing, e.g. the fight against global warming and the fight against poverty and inequalities.

To build a consistent dialogue between these visions, we need to:

— develop a better understanding and articulation of all physical and socioeconomic transformations underlying the different visions;
— provide an approachable framework to compare the visions that gives a full picture of the passenger transport transition and informs the main national priorities.

1. BUILDING CONSISTENT LONG-TERM PATHWAYS

Effective deep decarbonization of the transport sector requires a consistent articulation of four synergistic pillars: mobility demand management, shifting to low-carbon energy carriers, energy efficiency, and the decarbonization of electricity and fuels.

Decarbonization pathways in current debates often fall short of explaining how these four pillars are implemented and how they interact with each other. The reduction of distances between human activities can come through urban reorganization and land development strategies, lifestyle changes or the transformation of economic organizations. The use of low-carbon fuels can come from a technological shift (e.g. from petrol to electric cars) or a structural modal shift (e.g. from petrol cars to electric public transport). The reduction of energy consumption related to mobility can come from making all vehicles more energy efficient, using transport modes that are fundamentally more fuel efficient (e.g. public transport *vs.* cars) or from increasing the occupancy rate of travelling vehicles. The reduction of the carbon content of electricity and fuels can come from the use of non-fossil fuels for the generation of electricity, liquid and gaseous fuels.

Beyond the deployment of these four main pillars, there is a broad and complex set of widely differing drivers that have cross-over effects on several of these pillars. For example, explaining for which geographical situations, at which speed and time, at which costs and revenues, for which kind of trips and family situations, for which distances, people could shift from private car to public transport is a key description to discuss the conditions, the action levers, the uncertainties and the potential deployment over a certain time period. The description of the long-term pathway will be concrete and useful for decision-makers when it highlights and articulates the evolution of these underlying drivers, because these drivers can be connected with potential action levers and associated policies.

In addition, not all decarbonization pathways or strategies currently available explicitly connect the analysis with other main national and sector-specific objectives. Providing a refined analysis of the transformation of these underlying drivers, however, is key to assessing the effects of the physical and socioeconomic transformations on other objectives.

For example, just considering a technological shift replacing all petrol and diesel vehicles with electric vehicles (EVs) combined with low-carbon electricity will certainly decarbonize the sector. However, beyond technological challenges based on the use of electric vehicles and the decarbonization of electricity, other challenges like the future of land and infrastructure development, the problem of congestion, the lack of space in urbanized areas and other objectives are not addressed. Moreover, what are the car uses for daily mobility or leisure mobility in metropolitan or non-metropolitan areas? How are they acquired by households? How and where are charging infrastructures implemented? How are the other pillars activated, like modal shift and demand management? A lack of complementary analysis could risk hindering the massive necessary adoption of EVs demonstrated in many international exercises.

Reducing distances travelled is another example. It is certainly a driver of decarbonization but it must be envisaged in relation with the development of connections between people and services, evolution of demographic structure, trip purposes, lifestyles, tele-activities, land development, etc. This is indeed vital to ensure that the reduction of kilometers travelled in some countries is consistent with an improvement in the quality of life, not inhibiting development and access to activities.

A literature review has allowed us to identify eight main categories of drivers influencing the transformations of the

passenger transport sector: (1) demography and economics; (2) human settlement, land development and spatial organization; (3) sociocultural practices and lifestyles; (4) technology development of vehicles; (5) fuel generation and carbon content; (6) penetration of alternative motorizations in the car stock; (7) income, modal distribution and costs; (8) modal speeds, infrastructure development and time dedicated to transport. This framework can be used to provide a systematic analysis of the future of these drivers in order to provide a consistent story of their transformation while avoiding unwanted effects on other national and sectoral priorities (See Box).

2. DEFINING A POLICY RELEVANT COMPARISON FRAMEWORK

A quantitative framework is the simplest option to allow everyone to report data in a common and synthetic way. However, current pathways provide good examples of the variety of quantitative representations and different backgrounds of authors. For example, some:

- have different emission accounting perimeters (e.g. excluding vehicles with foreign flags, integrating air international emissions…);
- have different timeframes (e.g. every ten years, only two points in 2035 and 2050…), start the analysis at different years (2010, 2015…);
- use different quantitative indicators to inform some community-specific questions (e.g. square meters occupied by car parking places to inform the sharing of public spaces among modes for the urban communities);
- use different quantitative indicators to describe the same transformations (e.g. fuel shift is represented by aggregates of the different family of fuels, split among modes or with more details distinguishing the shift in metropolitan and non-metropolitan areas or for constrained and non-constrained activities).

This is an expected result when different stakeholders with different knowledge bases and understanding of challenges and issues build long-term pathways. However, these differences in the representation of interacting elements affect the capacity to compare the visions. Harmonization is therefore required to support a fair and transparent debate.

After aligning accounting measures and timeframes, understanding the main public questions asked by the different communities and their priorities related to the transformation of the passenger transport sector is a key step to defining a comparison framework integrating all visions. An analysis of national debates on the low-carbon future of the passenger transport has allowed us to identify some of the main questions asked for this sector. What would be the average individual level of mobility by 2050? What would be the dominant mode in non-metropolitan areas by 2050? How will the daily commuting time for work and other constrained activities change by 2050? What would be the future of car mobility, motor technologies, the size of car stock and annual sales? How will an average household manage the transition costs?

Given this list of questions, the next step is to identify the most relevant quantitative indicators able to inform these questions. The necessary indicators can go beyond the usual aggregates used to describe the sector. For example, mobility demand may have to be represented beyond the total aggregated (Gpkm) and individual mobility (pkm/cap) demand and consider a split between geographical situations, revenue situations, ages, modes, etc.

The Deep Decarbonization Pathways for Transport has developed such an analysis for the passenger transport sector. It has identified about 20 main questions and selected related quantitative indicators to inform them. For example, "emission drivers" (population, individual mobility, mobility energy consumption, carbon content of fuels expressed as a % of the 2010 value) and "modal shares for non-metropolitan and constrained mobility" (in pkm/capita/year) help characterize the future of human settlements, land development and the built environment, and the development of services in non-metropolitan areas in the overall decarbonization strategy. The "disposable income dedicated to transport for constrained and non-constrained activities" (in % of disposable income) helps understand how households financially perceive the transition.

This summarized quantitative description is another way to present the vision and the evolution of drivers following the eight categories of the storyline described before (See Box).

3. CONCLUSION

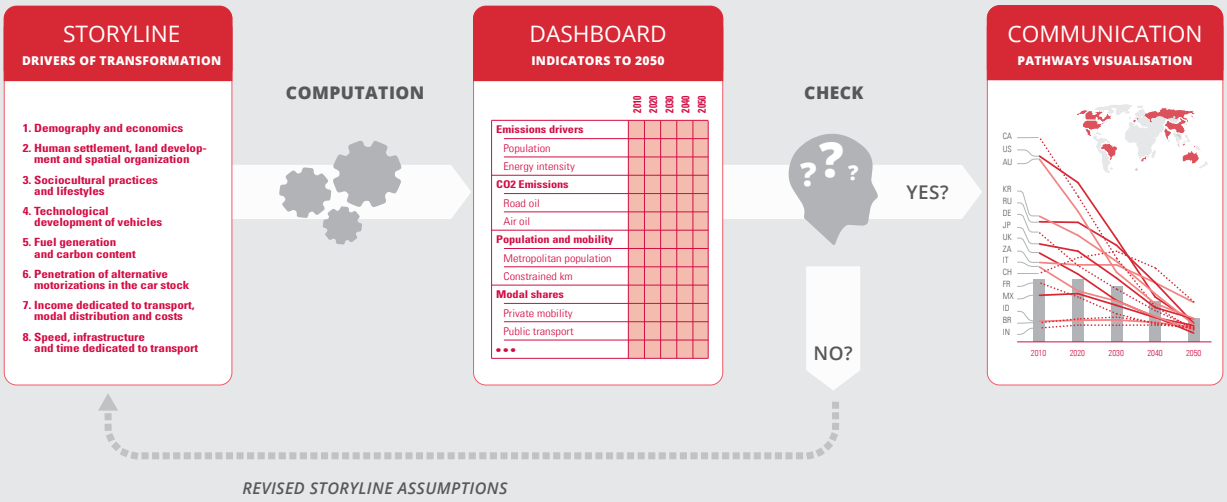
Deep decarbonization pathways for the passenger transport sector should meet all of a given society's socio-economic and sectoral objectives for transport, such as ensuring access to activities for all, managing unsustainable transition costs, minimizing the daily time dedicated to transport for all trip types, and reducing air pollutants and congestion. The required transformations to reduce emissions cannot be considered in isolation from the other objectives because they are interdependent, and all objectives must be satisfied if the transformation is to be socially attractive and politically secure.

The DDP tool offers a framework to enable a constructive dialogue about decarbonizing transport by structuring the public debate around differing decarbonization visions of stakeholders. Such a framework can help reveal uncertainties and underlying enabling conditions related to pathways, help align or differentiate the proposed visions, and help prioritize the different country-specific objectives. This could support the analysis of long-term low emission pathways, contribute to the revision of Nationally Determined Contributions (NDCs) by 2020, and finally, inform politically durable policies to implement the transformation.

BOX. DDP APPROACH AND TOOL

The DDP approach proposes to reconcile qualitative and quantitative visions, bottom-up and top-down approaches, in an iterative and backcasting method. The final purpose is to provide relevant pathways for the policy-making processes.

The DDP tool for the passenger transport sector provides an analytical framework based on the principles of this approach for the passenger transport sector for helping stakeholders create their own scenario and compare pathways.



Source : IDDRI

Storyline – broad qualitative and semi-quantitative description of the scenario according to the main drivers influencing the transformations of the transport sector.

Computation – detailed and refined quantitative representation of the scenario, to translate the storyline assumptions, calculate their effects and compute dashboard indicators. This quantitative assessment is flexible to integrate model outputs, expert-based knowledge or other benchmarks.

Dashboard – summarized quantitative representation of the scenario, easily usable to structure a public debate around stakeholders' scenarios, which reveals a clear picture of the physical and socioeconomic transformations and how they align with national and sectoral objectives.

Check – Verification of the consistency of the pathway with national and sectoral objectives, based on the indicators across its interrelated assumptions. In case of inconsistencies, the design should return to step 1.

Communication – Visualisation of the pathway and its key elements with graphs.

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