Global Passenger Transport Futures

Subjects: Others

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Global passenger transport consists of all passenger travel by private and public road vehicles, rail passenger travel, air travel, and non-motorized travel. The vehicular travel component expanded an estimated 14-fold between 1950 and 2018, so that now it is not only a major energy user and CO2 emitter, but also the cause of a variety of other negative effects, especially in urban areas. Global transport in future will be increasingly subject to two contradictory forces. On the one hand, the vast present inequality in vehicular mobility between nations should produce steady growth as low-mobility countries raise material living standards. On the other hand, any such vast expansion of the already large global transport task will magnify the negative effects of such travel. The result is a highly uncertain global transport future.

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Possible global passenger transport futures are important to consider, both because of the economic and social importance of this sector, and because of the environmental/social costs generated, many of which presently go unpaid. Before the 2020 pandemic, most forecasts were upbeat about the continued growth of global passenger transport. Pre-pandemic, the Organization of the Petroleum Exporting Countries (OPEC) forecast passenger car numbers growing from 1133 million in 2018 to 1969 million in 2040. In their late 2020 report, the OPEC forecast for 2040 had dropped slightly to 1936 million, but the 2045 forecast was for 2119 million passenger vehicles, with strongest growth in countries outside the Organization for Economic Cooperation and Development (OECD) [1]. For air travel, Airbus in 2019 forecast an average 4.7% annual growth globally out to 2038 [2].

Given the great inequalities in ownership of vehicles and plane travel throughout the world, it might be argued global passenger transport will continue to rise strongly as predicted by OPEC and Airbus, as presently low-mobility countries catch up with the OECD. These countries are keen to enjoy the many benefits they perceive from car ownership and air travel, as well as the economic benefits from a national car manufacturing industry. However, even present high levels of travel come at a high cost, not all of which is covered by users. Fossil fuels overall receive an estimated global subsidy of US$ 5.3 trillion in 2015 [3]. Much of this subsidy was for CO2 emissions, including those from passenger transport.

However, passenger transport incurs a number of other costs, a key one being the result of the global toll of road fatalities and injuries; according to the World Health Organization [4], in 2018 1.35 million died on the world’s roads, with millions more injured. The WHO further pointed out that: “The burden is disproportionately borne by pedestrians, cyclists and motorcyclists, in particular those living in developing countries.” Nevertheless, other external costs include oil supply security fears; air and noise pollution, especially in urban areas; the heavy uptake of urban land for transport infrastructure; and even the health implications from the lack of exercise caused by the replacement of walking and cycling by motorized modes.

A US study evaluated the external costs for all modes of transport in the year 2006 for the US [5]. The study included estimated costs for a variety of items, with the costliest being for accidents, traffic delays, air pollution, and climate change. For car travel, total external costs (in 2006 values) were calculated to lie in the range 1.6–23.5 US cents/p-k. (p-k = passenger-km: one p-k is generated when one passenger travels one km.) The large range reflects the uncertainty in estimates of this type. Presumably, figures in 2020 dollar values would be higher.

Climate researchers sometimes speak of a “carbon pie”—the maximum allowable global CO2 emissions to avoid serious climate change [6]. Many papers have discussed the equitable division of this “pie” between the world’s nations or even individuals. Similarly, Campbell [7] discussed the “Rimini Protocol” which was formulated for what was seen as the need to better match global oil demand to falling supply. An important provision was that “Each importing country shall reduce its imports to match the current World Depletion Rate, deducting any indigenous production.” Additionally, along the same lines, Kitzes et al. [8] proposed a general “shrink and share” approach for achieving both global environmental sustainability and equity. In this proposal, high-income countries would greatly reduce their greenhouse gas emissions (GHGs) while low-income countries could increase theirs.

This idea of limits has prompted Swiss advocacy of a “2 kW society”, in which Swiss average power use per capita is reduced to 2 kW by year 2050 [9]. Given passenger transport’s many costs—particularly CO2 emissions—it might be time for high-mobility countries to analogously consider a “4000 p-k society”, with average vehicular travel levels per capita of 4000 passenger-km (p-k). Average vehicular travel per capita in 2018 was about 6300 p-k [6] but varied from over 30,000 p-k in the US to a few hundred p-k in some low-mobility countries [10]. No limit is proposed for the various forms of non-motorized travel, given their positive health benefits.

The remainder of the paper examines in Section 2 past and present international travel: the amount of travel and its distribution between countries, its distribution between modes, and travel energy consumption and emissions. Section 3 explains why improvements in energy efficiency, even if significant, would not solve the ecological challenges facing transport. In Section 4, several approaches to future patterns of travel are explored, including fully automated vehicles. Section 4 offers some conclusions about preferred futures for global travel.

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