

Climate Change Mitigation

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Instructor's comments needed

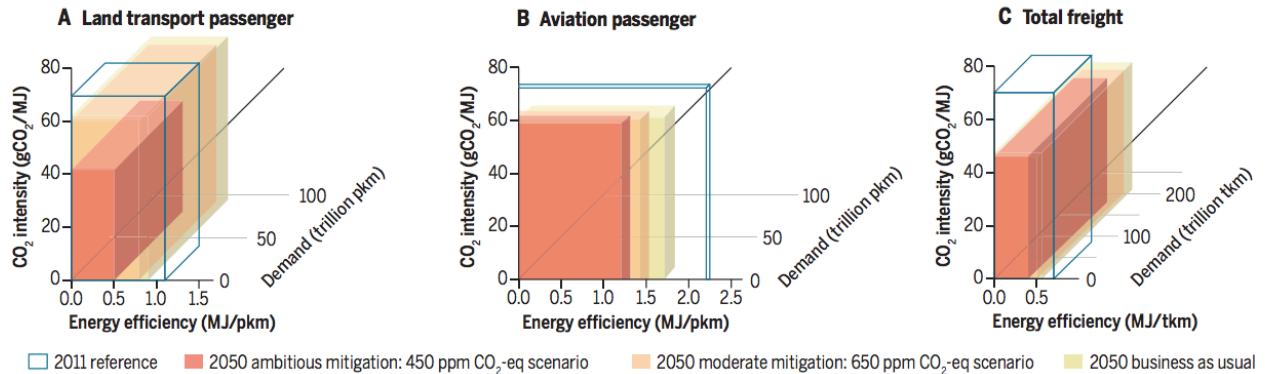


The broad problem is the transportation sector in society acting as a barrier to climate change solutions. The rapid growth of the transportation sector as well as its importance to the everyday lives of many consumers makes it difficult for policymakers to implement significant changes to it while avoiding the wrath of public backlash. Paying more attention to the transportation sector is critically important because transportation affects the entire world: almost everyone has used some form of transportation-related machinery in their lives, such as a car, bus, taxi, train, plane, or boat. Additionally, many jobs are based in or related to the transportation sector, playing a significant role in the global economy and global markets. Because of its sheer influence over the world, immediate action is needed to cut global emissions in the transportation sector. The article I am reviewing, titled “Transport: A roadblock to climate change mitigation?” and published in *Science* in 2015, includes several scenarios about future projections of global emissions. This article notes different ways that emissions from the transportation sector can be reduced and proposes several courses of action to offset increases in transportation emissions. This in turn can help mitigate the effects of global climate change.

The article warns of rapidly increasing emissions from the transportation sector, “with emissions projected to double by 2050” (Creutzig et al., 2015). This is a direct result of the rapid growth of the sector itself. The article notes three different ways that emissions from the transportation sector can be reduced: lowering usage and demand by reducing distance traveled and shifting to alternative sources of fuel, lowering the energy required by increasing fuel efficiency, and lowering the carbon intensity (measured in gCO₂/MJ, or grams of carbon dioxide released per megajoule of energy produced). The central argument in the article is a call to action to reduce overall emissions within the transportation sector. By pointing out the overall effect

that the transportation sector has on the world and listing the evidence, the article articulates why action is needed to reduce emissions in the transportation sector.

The article proposes several courses of action. The first is to improve efficiency standards in road transportation. The second is to transition energy sources of road transportation from nonrenewable sources to renewable ones. The third is the human element: citizen decisions and public policy. These three proposals form the action plan behind the three different ways of reducing global emissions that the article mentions earlier. The article argues in favor of these proposals while providing several ways to do this. In the first point, fuel efficiency standards can be raised either through regulation of the auto industry or “a shift in societal preferences toward smaller cars” (Creutzig et al., 2015). These can both produce long-term effects on lowering emissions. Societal preferences can be initially difficult to sway and are further elaborated upon in the article’s third point, along with behavioral choices of the public. The article uses three separate three-dimensional graphs, which the article collectively calls an integrate assignment model image, to illustrate the effects of carbon intensity (measured in gCO_2/MJ), energy efficiency (measured in MJ/pkm , or megajoules of energy produced per passenger kilometer traveled), and demand (measured in pkm , or passenger kilometers traveled). The three different graphs represent land transportation (including vehicles and trains), air transportation (planes), and total freight:



Modeled transport CO₂ emissions, in 2011 and in 2050, based on data from 2005. (See SM). (A) Land passenger (passenger-kilometer, pkm); (B) aviation; and (C) freight transport (metric ton-kilometer, tkm), as modeled by the IAM IMAGE (I4) (See SM). Emissions, calculated as the product of the three axes (CO₂ intensity, energy efficiency, and demand), can be visualized by the volume of the boxes.

Graph A shows that land transportation has the highest demand, but graph B shows that air transportation requires the highest energy production per passenger kilometer traveled.

In the article's second point, shifting energy sources "from gasoline and diesel to biofuels, electricity, and/or hydrogen" (Creutzig et al., 2015) is made easier with electric or fuel-cell vehicles, or hybrid-electric vehicles. This shows how new innovations in technology can create new opportunities for mitigating climate change. The article does note that the technology for these newer, alternative-energy vehicles is still in its early stages and thus is more expensive to produce than traditional vehicles that run on gasoline. These costs are naturally passed on to the consumer, which decreases initial demand. This represents a social decision based on economic factors, a topic that the article explores further in the third point.

The article's final point on this issue is the most complicated and most interesting of the three. It is complicated because enacting public policy and behavioral decisions by people in society are more abstract and not as quantifiable as the other two points made. The article suggests two things that can help reduce emissions in the transportation sector to this end: public projects with lower carbon intensities and more optimally designed parking management and traffic congestion solutions. This can drastically reduce the amount of time that vehicles needlessly waste energy by sitting idly in parking lots and traffic jams. A roadblock that can

exist in enacting public policy is expensive initial costs. For example, a high-speed rail has a large price tag attached to it. As taxpayers, citizens are reluctant to support such a project and it can be difficult for public officials to persuade members of the public of its benefits. However, long-term benefits, like more efficient transportation and reductions in vehicle emissions, can provide a considerable return on investment. One way that behavioral decisions can be influenced is through public campaigns: local and national governments can promote transportation methods that are more friendly to the environment, like walking, bicycling, and carpooling. These campaigns have already been implemented in many places across the world: wider sidewalks and designated pedestrian-only streets, shared bicycle lanes, and carpool lanes are often used in metropolitan areas. The difficulty in changing behavioral decisions of citizens lies at the beginning of the process in introducing them to new, different forms of transportation that they may not be used to or familiar with. Behavioral decisions naturally tend toward the status quo or routine and are initially opposed to change; the article states that “unlocking their considerable mitigation potential requires policies that explicitly take nonstandard preferences, beliefs, and decision-making processes into account, as well as normative considerations of policy-makers” (Creutzig et al., 2015). However, once public opinion is in favor of these new innovations, they can also provide secondary societal benefits, like reductions in air and noise pollution (Creutzig et al., 2015).

The authors’ use of language is clear. Many good points are laid out in the article, and sentence structures in these arguments are grammatically sound. However, the authors’ style and expression is a bit obscure. Some transitions between paragraphs are not very smooth; this is especially noticeable between paragraphs with contrasting ideas. Even though initialisms found in the article are spelled out when they are first used, many terms and key words used in the

article are not well-defined and it is difficult for a layperson to understand and comprehend the topic in the article without prior background knowledge in the industry.

The argument presented in the article is that action is needed to curtail emissions in the transportation sector. After reading the article and reviewing the evidence presented within it, I agree with the article's main point. The only criticism that I have, while still maintaining my strong approval of the argument displayed, is that many sectors of society have large impacts on global emissions; the food and construction industries, for example. The article maintains two points that are also brought up in other articles. In the article "Scientific research about climate change mitigation in transport," the authors mention the effects of market solutions being pursued by local and national governments: "With the likely expansion of market-based approaches to climate change mitigation at local, national and international levels in the coming decade, the basis of climate change-related transport research in techno-economic thinking is likely to be reinforced" (Schwanen, et al., 2011). The article I am researching uses 2050 as its baseline year for its graphs and most of its examples and discusses the changes needed to adequately reduce emissions in the transportation sector. Another article co-authored by Creutzig, "Climate change mitigation and co-benefits of feasible transport demand policies in Beijing," discusses the wide-ranging effects of congestion: "Congestion and road building not only affect car drivers but also cause delay for bus passengers and create barriers for pedestrians and cyclists" (Creutzig & He, 2009). Both of Creutzig's articles address the disadvantages of vehicle congestion.

I believe that I have gained a considerably greater understanding on transportation emissions from this article. It is important to discuss the sectors of public life that are the most influential on global climate. This article highlights several solutions to the problem of

increasing emissions that is often overlooked. Overall, this article has the potential to educate others on the transportation sector and what steps people can take to reduce their own emissions footprint.

Reference List

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