

Too Much Riding on Climate Change?

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Abstract

Over the last decade and a half, climate change and its impacts have become increasingly important to local, regional, national and international public policy debates. Since settlement patterns, built form, and transportation contribute significantly to climate-changing greenhouse gas (GHG) emissions, urban planners are taking a lead in promoting compact, transit, and walk friendly urban development to lower carbon dioxide and other GHG emissions. This paper argues that focusing on climate change as the catalyst for a Kuhnian paradigm shift in how we think about transportation, rather than as a complex and elusive public policy problem, has a number of risks. Specifically, an overemphasis on reducing the carbon impacts of transportation projects may lead to weak coalitions for transportation projects, bad decision-making processes, and even some poor planning decisions. Although transportation planning and policy will likely continue to play an important role in efforts to stem the effects of climate change, an excessive focus on GHG emissions may lead to mistakes along the way.

Keywords: Transportation policy; climate change; global warming; paradigm shift, carbon reduction

“The transition from a paradigm in crisis to a new one from which a new tradition of normal science can emerge is far from a cumulative process, one achieved by an articulation or extension of the old paradigm. Rather it is a reconstruction of the field from new fundamentals, a reconstruction that changes some of the field’s most elementary theoretical generalizations as well as many of its paradigm methods and applications.”

-Thomas Kuhn (1970)

“The kinds of problems that planners deal with—societal problems—are inherently different from the problems that scientists and perhaps some classes of engineers deal with. Planning problems are inherently wicked. As distinguished from problems in the natural sciences, which are definable and separable and may have solutions that are findable, the problems of governmental planning—and especially those of social or policy planning—are ill-defined; and they rely upon elusive political judgment for resolution.”

-Rittel and Webber (1973)

Over the last decade and a half, climate change and its impacts have become increasingly important to local, regional, national and international public policy debates. Since settlement patterns, built form, and transportation contribute significantly to climate-changing greenhouse gas (GHG) emissions, urban planners are taking a lead in promoting compact, transit and pedestrian-friendly urban development to lower carbon dioxide and other GHG emissions. The transportation sector, in particular, contributes significantly to GHG emissions and will likely account for more than half of all emissions by 2030 (Price et al. 2006). The need to consider transportation planning in terms of climate change is apparent. As articulated by Kuhn (1970), crisis has led to a paradigm shift, a fundamental change in our understanding of the world and a new framework for making planning decisions. Yet climate change is also a “wicked problem” as described by Rittel and Webber (1973). There is no definitive formulation of the problem or of the solution. There are no absolute solutions but rather a set of good or bad resolutions, which help to address the problem, however it has been defined. Treating climate change as the impetus for a planning paradigm shift with technical solutions to well-defined scientific problems may lead to weak coalitions for transportation projects, bad decision-making processes and poor planning decisions. As with any wicked problem, dogged questions persist about both problem formulation and problem resolution.

Responding to Climate Change

Apart from a few climate change skeptics, there appears to be a general consensus that climate change is bad, that carbon dioxide emissions contribute to climate change, that the transportation sector, particularly in the United States, emits a lot of carbon dioxide, and that it generally makes sense to lower transportation-related carbon emissions. Schipper et al. suggest a framework for the transportation sector, the ASIF framework, within which planners can work to lower emissions by changing (A)ctivity patterns, mode (S)hare, fuel (I)ntensity and (F)uel choice (Schipper et al 2000). While some focus on a specific area, such as promoting bicycling or creating new fuel technologies, changes in all four areas will be required to reduce carbon emissions significantly. The problem is that emissions reduction targets are objectives rather than goals. No one wants to reduce carbon emissions for the sake of reducing carbon emissions, but rather for the purpose of preventing climate-related catastrophe or attaining some other goal. There is no real, solid consensus on the actual problem of climate change or its appropriate solutions. Yet, in transportation planning, we are operating in a framework of *known ends and known means* where technocratic planning methods are considered most appropriate (Christensen 1985). Indeed, studies on transportation planning and climate change tend toward the

technical: City, County or Metropolitan Area A's transportation sector emits X tons of carbon, policy Y will reduce these emissions by Z , which represents Q percent of the city's overall carbon reduction targets, at a cost of P . For example, the California Global Warming Solutions Act of 2006 makes a commitment to lower GHG emissions to 1990 levels by 2020 and 80% of 1990 levels by 2050. The act enumerates a set of targets for different industries to meet the legislation. Transportation strategies include specific, quantified reductions in vehicle-miles traveled (VMT), improvements in fuel efficiency, and shifts in fuel types away from carbon-intensive ones (California Air Resources Board 2008). If climate change legislation makes its way through the U.S. Congress, it will contain similar language though arguably with even less emphasis on VMT reductions.

These technical solutions—however necessary for reducing carbon emissions—do not directly address the wicked problem of climate change. They are a set of policy targets related to climate change that politicians and voters can choose to support or oppose. For all its purported scientific certainty, the policy decision bears closer resemblance to Lindblom's (1959) description of the science of "muddling through." There is no real definitive formulation of the overall goals of climate change reduction. Uncertainty and disagreement cloud not just climate science but also the determination of when and how to respond as well as the trade-offs of different responses. Some environmentalists may see the appropriate goal as being simply to minimize anthropogenic carbon emissions, period. This, however, would lead to policy recommendations to minimize population and general human activities: an unappealing prospect for most humans. Some economists prefer to measure the costs of climate change and formulate policy proposals to maximize economic growth subject to insuring against potential environmental catastrophe. This method leads to a focus on reducing carbon emissions or climate change impacts in the least costly way and stopping when the estimated cost of removing a ton of carbon is equal to the estimated damage that a ton of carbon creates. Some businesspeople may formulate the problem in terms of minimizing the impacts that climate change legislation has on business or to maximize profits given new legislation.

Although there is no consensus, perhaps the closest formulation to an acceptable resolution would be to maximize economic productivity subject to reducing carbon emissions to a sustainable level by 2050, as determined by the Intergovernmental Panel on Climate Change. While this would not necessarily appease all economists, environmentalists or businessmen given political leadership and compromises over the equitable distribution of costs and benefits, it may lead to a majority consensus. It is the likely scenario under which most planners will operate in the coming years.

Transportation Planning and Climate Change

For many planners, climate change reinforces and validates positions that they have long held and advocated. Cities need to do more with less. Sprawl is expensive and wasteful and we need to encourage compact, smart urban development. For transportation planners, climate change is another example of one of the many high social costs attributed to the transportation dominance of the private automobile. Even Wilson (1997), in his defense of the benefits of automobiles and critique of anti-car rhetoric, acknowledges that the social costs of our transportation system are so high that very few would accept building it from scratch. Given its existence, transportation planners, economists and engineers advocate ways to offset these costs, such as charging for congestion and environmental damage, mandating safety and emissions standards or encouraging the use of other modes. Although the focus on climate change has led more politicians and voters to support many of the policies that transportation planners have been advocating, there are risks in putting too much emphasis on the carbon impacts of transportation projects.

Weak Coalitions

If transportation projects oversell themselves based on carbon reductions, they risk developing shaky coalitions of support. First, belief in and support for carbon reduction are fickle. A recent Pew Research Center poll found that the number of American respondents who believed that global temperatures are rising dropped from 71% in 2008 to 57% in 2009. Furthermore, those who believed that human activities were causing temperature increases dropped from 47% to 36% (The Economist 2009). The history of regional air quality regulations provides some insight into how politicians and voters' views of climate change may evolve. As Wachs and Dill (2002) observed, support for smog-reducing programs in the 1990s depended more on political acceptance, which varies based on economic conditions and general sentiments, than on the observed connections between human activities and smog or success of the programs.

Second, if carbon emissions take precedence over other considerations, solutions may tend toward technological fixes that reduce emissions but have little impact on congestion, collision-related injuries and deaths, accessibility improvements, land use regulations or local environmental impacts. In California, decreases in VMT contribute less than 2% to legislated GHG reduction targets (Cervero and Murakami 2010). Jones (2008) sees most of the negative externalities of auto use stemming from the combustion engine and therefore advocates hydrogen fuel cell powered automobiles as the future of mass transportation. In the

short-term, he suggests a modest increase in gasoline taxes, offset by decreases in other taxes, and a subsidy for fuel cell distribution systems in the medium term. Given that traffic collisions are the leading killer of Americans under 35 (National Center for Injury Prevention and Control 2008) and approximately 40,000 Americans die every year in road collisions, claiming that emissions are the sole externality caused by automobiles is a gross oversimplification. Hydrogen fuel cells will also do little to prepare for the aging and retirement of the baby boom generation, many of whom will find it difficult to continue to meet their mobility needs by driving.

Third, focusing on carbon emissions leaves transportation plans vulnerable to changing approaches in how we address climate change. Some scientists, engineers and economists believe that the simplest, most cost-effective and only politically feasible approaches to attaining sustainable levels of carbon revolve around geo-engineering. Planting forests in the Sahara desert, capturing and storing carbon in algae, and shooting sulfur dioxide into the upper atmosphere have all been advanced as possible techniques for reducing carbon's impacts. Although geo-engineering has been criticized, its potential to alleviate climate change impacts may be enough to shift consensus away from projects that reduce carbon by reducing VMT or improving fuel efficiency. In short, projects that are sold in terms of their ability to reduce carbon may lose momentum or be scrapped altogether.

Muddled Messages

Despite these potential risks, carbon reduction rightly continues to be an important driver of transportation decisions, or at least discussions about transportation decisions. At times, the emphasis on carbon reduction may obscure the actual transportation decision-making process. Many road capacity expansion advocates have begun, for example, to tout the carbon-reducing attributes of alleviating congestion. While this may be a near-term solution, Cervero (2003) shows that in the long term, this new capacity shifts development into the newly accessible areas, often into greenfield sites well outside the urban core, which then induces longer vehicle trips that potentially emit much more GHG than if the capacity were left as is. Hansen (1995) found that 60% of highway expansions in California filled with traffic within two years and 90% within four years.

In Portland, Oregon, for example, forecasters looking at the impacts of a new 12-lane bridge were specifically told not to account for impacts on demand or settlement (Rivera 2008). While the bridge may make sense in terms of economic or fiscal considerations, it will do nothing to improve the environment and little to reduce congestion. Yet, the decision-making

criteria does not include all the necessary information for a sufficiently informed decision-making process.

A high-speed rail network proposed in California is another interesting example. It can be argued that it has been both *oversold*, while simultaneously *over-criticized* in terms of its ability to address GHG and climate change. While the train system, running at projected occupancies, will have lower carbon impacts than cars or airplanes, a \$40 billion infrastructure-intensive project is going to create a lot of carbon and other environmental impacts. If the project diverts trips from airplanes and automobiles, then it may pay back this “carbon investment,” but by increasing supply it will also lead to more trips. The project’s carbon benefits accrue when compared to a counter-factual of expanding road and airline capacity. Weighed on its environmental benefits alone, high-speed rail should not be built. GHG emissions, however, should not dominate the conversation. High-speed rail’s potential impacts on regional connectivity, land use, and economic growth are far more critical.

Poor Planning Decisions

Worse than confusion, focusing only on GHG emissions may also lead to bad decisions and unintended consequences. One such example is the former and current practice of allowing hybrid vehicles to use some high occupancy vehicle lanes regardless of occupancy. This lowers incentives for carpooling and appears quite inequitable because hybrid vehicles are expensive and tend to appeal to a specific higher income market. It also has dubious environmental impacts since many hybrids actually get relatively poor gas mileage (e.g. Hybrid SUVs). The modest effects of this policy, however, pale in comparison to the more devastating potential impacts of other government policies, such as the decision to subsidize corn-based ethanol. This type of fuel proved less environmentally friendly than gasoline, and even worse, contributed to the 2007 spikes in food prices that led to riots in over 20 countries. While Congress was subsidizing corn for fuel, the price of tortillas in Mexico rose 400%. Nevertheless, the Environmental Protection Agency’s (EPA) latest proposed revisions to renewable-fuels requirements would mandate a tripling of ethanol use by 2022.

The experience with biofuels should lead more policy makers and academics to question the impacts of switching from conventional cars to electric and hydrogen fuel cell vehicles. The national electricity grid is already overstretched and many metropolitan areas already experience black and brown outs. With nearly 30% of American energy consumption going to the transportation system, the impacts of adding this energy demand onto the electricity grid and electricity supply markets will

be significant to say the least. Electricity prices will likely increase dramatically, reducing economic productivity, particularly in an already weakened manufacturing industry. This shift also raises serious equity questions about how one household's desire to drive long distances may impact another's ability to have a more basic need fulfilled, such as having sufficient light or heat. Nevertheless, debate has focused on how much electrification of motor vehicle transportation might reduce GHG emissions depending on what sources of electricity are used. Whether coal, nuclear, wind or solar, electric sources are going to have a difficult time matching the low cost energy provided by gasoline and distribution networks already in place, they are nowhere near ready to handle the influx of demand. As with biofuels, subsidizing alternative fuel technologies will increase costs for other users: in this case, homes and businesses. Yet the emphasis on reducing GHG has contributed to a brushing aside of these real concerns.

Conclusion

"Stubborn policy controversies tend to be enduring, relatively immune to resolution to reference by evidence, and seldom finally resolved" —Schön and Rein 1993.

This pronouncement does not bode well for transportation investments based on a policy of reducing GHG emissions. This is not to suggest that reducing GHG emissions is not an important objective. It cannot, however, be the primary one for transportation planning or any other policy area. As a wicked problem, climate change does not have an easily defined problem statement or set of solutions. Although there has been a recent paradigm shift in terms of recognizing the importance of reducing the negative impacts of climate change, this does not mean that resolution is simple or clear-cut. Both geo-engineering and technological innovations are bound to provoke unintended consequences. Slowing economic growth, charging drivers for pollution, or taking measures to reduce VMT, however, may provoke a backlash against efforts to curb GHG emissions, since they target behavior change. Transportation planning and policy will likely continue to play an important role in efforts to stem the effects of climate change, but excessive focus on GHG emissions without analysis of the other associated trade-offs and consequences will lead to many mistakes along the way.

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