

Testimony of
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Public Transportation: A Core Climate Solution
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Good morning Chairman Menendez, Ranking Member Vitter and members of the committee. Thank you for inviting me to testify today. My name is Clinton Andrews and I am a professor at Rutgers, The State University of New Jersey. For the past six years, I have been privileged to direct the University's urban planning program, which is part of the Edward J. Bloustein School of Planning and Public Policy.

My testimony discusses the role that transit can play in reducing greenhouse gas emissions and addressing climate change. I want to make three points here, as follows.

- The problem of global warming is large enough that it requires sustained efforts on multiple fronts, and transit is definitely one of those fronts.
- To be cost-effective, transit projects should be tailored to local conditions, settlement patterns, and unmet demands.
- There are many additional reasons to enhance the viability of the transit option in the nation's transportation system beyond its greenhouse gas reduction benefits.

In what follows I elaborate upon each of these points.

Transit as part of a portfolio of global warming solutions

The U.S. economy produces 21% of the world's greenhouse gas emissions, with 28% of U.S. emissions due to the transportation sector.ⁱ We know with confidence that: (1) global warming is already underway; (2) human activities are a key driver of this climate change; (3) the effects of other air pollutants are actually

masking the extent of the global warming to date; (4) the trajectory of future greenhouse gas emissions indicates that some fairly dire scenarios are plausible; and (5) the impacts on human health, food and fiber production, coastal areas, water availability, and ecosystem health will scale upwards with the trajectory of emissions.ⁱⁱ

This scientific consensus has spurred policy action in many U.S. states: to date 22 states have established greenhouse gas emissions targets, 36 states have completed or are working on climate change action plans, and 48 states have completed greenhouse gas inventories.ⁱⁱⁱ The federal government is also beginning to respond to the problem of climate change by complementing its longstanding support of research with specific, practical policies of the sort that passed the House last month and are being discussed here today.

There are three main types of greenhouse gas emission-reduction options: using energy much more efficiently or more frugally, switching to low-carbon and no-carbon energy sources, and sequestering carbon in natural sinks such as trees and soil or by means of geo-engineering techniques. In transportation, we can achieve energy efficiency by increasing vehicular miles per gallon, or reducing vehicle miles traveled by (1) changing settlement patterns, (2) altering the structure of travel demand such as with telecommuting, or (3) shifting to other modes including transit, walking, biking. None of these options can do the whole job, and hence there is a need for a multi-pronged approach to the problem.^{iv}

The United States should be, and is, pursuing energy efficiency and renewable energy and next-generation nuclear power and re-growing its forests.

The appropriate analogy is to a portfolio of investments, in which the nation balances risks and returns overall, by choosing a diverse mix of solutions with complementary strengths and weaknesses.

For the transportation sector, this boils down to pursuing higher miles per gallon and lower carbon emissions per gallon, biofuels and electric vehicles, private vehicles and public transit, smarter long-distance networks and more walkable neighborhoods. While it is tempting to demand a marginal analysis that asks “what single choice is most cost-effective?,” there is no universal answer to that question that applies nationwide and for all time. So it is appropriate to delegate some—but not all—of these decisions to the states and MPOs, and to the marketplace.

There remains a clear role for the federal government to collect data that measures the performance of the transportation sector, fund research to expand our range of low-carbon mobility options, aggressively drive vehicle fuel efficiency standards in the right direction, continue to support state and local transportation infrastructure investments on a matching basis, help coordinate and fund interstate transportation initiatives, and encourage utilities and private actors to establish the necessary infrastructures (such as the smart grid) that are preconditions for fruitful competition among gasoline, biofuels, electricity, and even hydrogen as alternative transportation fuels.^v

Roles for regional transportation planning agencies

States and MPOs can play key roles in decarbonizing the U.S. transportation sector by developing locally appropriate portfolios of solutions. It is only in the context of specific time frames, settlement patterns, transportation networks, and

natural resource endowments that one can identify which solutions are most cost-effective.

To illustrate the variation in baseline emissions, and therefore, suitable solutions, I will share results of a study we recently performed in New Jersey. Moving along a gradient from rural to urban, we see decreasing per-capita transportation-related greenhouse gas emissions, with towns served by commuter rail systems having lower emissions than towns having similar population densities but lacking that option.^{vi} Table 1 shows the numbers for a few illustrative towns. Access to rail service coincides with a 10-15% reduction in per-capita greenhouse gas emissions for a given settlement pattern, and a change in settlement patterns from exurb to suburb to city ties to even larger emissions reductions from the transportation sector.

Table 1: Illustrative GHG Emissions per Capita along the Rural-to-Urban Gradient (Source: Andrews 2008)

New Jersey Municipality	Per-capita transportation-related greenhouse gas emissions (metric tons CO ₂ -equivalent per year)	Population density (persons per square mile)	Is there a railway station in town?
<i>Exurb</i>			
Woolwich	3.74	145	No
<i>Post-war suburb</i>			
East Brunswick	3.21	2,130	No
Cherry Hill	2.81	2,885	Yes
<i>Inner-ring suburb</i>			
Highland Park	2.81	7,614	No
Montclair	2.44	6,184	Yes
<i>City</i>			
Hoboken	1.23	30,239	Yes

These cross-sectional results suggest correlation but do not confirm causation, so they are by no means definitive. However, there are many other studies with similar findings that allow us to be confident that transit already plays a role in reducing greenhouse gas emissions.^{vii}

In the short run, local and regional transportation planners must work with the settlement patterns they have. Empty buses and trains are not greenhouse gas-efficient or cost-effective. Regional public policy can help build demand in marginal locations by providing targeted incentives such as transit passes for students, but there are limits.

The policy prescription for the area near exurban Woolwich is not to build a light rail system because it lacks the population density to make such a system viable. It can make more progress by getting kids to bike to school, and getting adults to car-pool or commute by bus. The policy prescription for the region near a post-war suburb like East Brunswick would be similar, although it might also be able to support a bus rapid transit system along its commercial strip. An inner-ring suburb like Highland Park has the density to support a shuttle bus or bus rapid transit stops linking to nearby train stations and employment centers. A city like Hoboken can—and does—support rail transit. This implies that MPOs and other regional planning organizations must engage with the land-use planners and urban designers in selecting which transportation—and which transit—investments are appropriate for each context.

In the longer run, problems of low ridership often disappear and transit investments can actually catalyze growth, based on the experience to date with

transit-oriented developments.^{viii} However, a hard-nosed public policy would more often build transit in response to demand rather than ahead of it. This suggests that the marginal transit investment dollar should target existing and obvious capacity constraints such as the needed additional rail tunnel under the Hudson River connecting New Jersey and New York.

Adaptation of transit systems to climate change is another key responsibility for regional transportation planning agencies. Much transit infrastructure is vulnerable to sea level rise, coastal or riverine flooding, and equipment failure due to high temperatures. Existing facilities need hardening, and more precise elevation data are needed to help plan new facilities.

In sum, transit serves as a core climate change solution. However, the specific type of transit and appropriate level of investment varies by locality, implying that more decision-making authority over the allocation of funds among modes should devolve to the regional planning agencies. Each such agency should be expected to create and follow a greenhouse gas action plan that guides investment priorities in a way that reflects national greenhouse gas emission reduction targets, regional network needs, local land use patterns, and adaptation requirements.

Other reasons to encourage transit

There are many other good reasons for encouraging transit. This is well-trodden ground, so I will not be lengthy. Transit reduces road congestion, delays, accidents, and pollution. Transit stabilizes and increases property values. Transit provides mobility options for children, the elderly, and others who cannot drive or afford a car. Transit helps people live more actively, thereby reducing obesity and

related health problems.^{ix} Transit offers scale economies that are unavailable in other transportation modes. Transit improves energy security because its rolling stock can be readily converted to non-petroleum fuels. A recent, and very rigorous, economic analysis of the net internal and external benefits of transit has concluded that current subsidies to transit in U.S. cities are far below their optimal levels.^x In other words, transit is under-supported in the United States.

Conclusions

As the Senate prepares to address the problem of global warming and as it considers how to finance the nation's future transportation infrastructure needs, I urge you to keep transit in mind. Transit brings multiple benefits and deserves greater support than it currently receives. Transit can cost-effectively help reduce greenhouse gas emissions, provided the projects are tailored to local conditions and land uses. The federal government should direct regional transportation planning agencies to do greenhouse gas action planning for transportation—and within that, transit—that pursues both mitigation and adaptation objectives. Finally, I believe the funding should follow the planning. Thank you for the opportunity to testify today.

References

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- ⁱⁱ Intergovernmental Panel on Climate. 2007. *Climate Change 2007: Synthesis Report*, Summary for Policymakers. Downloaded July 3, 2009 from www.ipcc.ch.
- ⁱⁱⁱ Pew Center on Global Climate Change. 2009. *State Action Maps*. Downloaded on July 3 from www.pewclimate.org.

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- iv Stephen Pacala and Robert Socolow. 2004. Stabilization wedges: Solving the climate problem for the next 50 years with current technologies. *Science* (13 August) 305 (5686): 968 – 972.
- v Clinton Andrews. 2006. Formulating and implementing public policy for new energy carriers. *Proceedings of the IEEE* (October) 94(10): 1852-1863.
- vi Clinton Andrews. 2008. Greenhouse gas emissions along the rural to urban gradient. *Journal of Environmental Planning and Management* (November) 51(6): 1–20.
- vii For a good survey of this literature see Reid Ewing, Keith Bartholomew, Steve Winkelman, Jerry Walters, and Don Chen with Barbara McCann and David Goldberg. 2008. *Growing Cooler: The Evidence on Urban Development and Climate Change*. Washington, DC: Urban Land Institute. See also Jared VandeWeghe and Christopher Kennedy. 2007. A spatial analysis of residential greenhouse gas emissions in the Toronto Census Metropolitan Area. *Journal of Industrial Ecology* 11(2): 133-144. Also see Jonathan Norman, Heather MacLean and Christopher Kennedy. 2006. Comparing high and low residential density: Life-cycle analysis of energy use and greenhouse gas emissions. *Journal of Urban Planning and Development* (March) 132(1): 10-21.
- viii Key references include: Cervero, R., Murphy, S., Ferrell, C., Goguts, N., Tsai, Y-H., Arrington, G. B., et al. 2004. *Transit-oriented development in the United States: Experiences, challenges, and prospects* (TCRP Report No. 102). C. Gorewitz et al. 2006. *Communicating the benefits of TOD: The city of Evanston's transit-oriented redevelopment and the Hudson Bergen light rail transit system*. Retrieved July 19, 2007 from http://www.policy.rutgers.edu/vtc/tod/Communicating_Benefits_TOD.pdf. Nelson-Nygard Associates. 2006. *MTC's Resolution 3434 Transit-Oriented Development Policy interim evaluation* (Report prepared for the Metropolitan Transportation Commission). Retrieved October 28, 2007, from http://www.mtc.ca.gov/planning/smart_growth/tod/TOD_Policy_Evaluation.pdf.
- ix Cross-national comparisons show a clear inverse relationship between the prevalence of obesity and the percent of trips taken by non-automobile modes (transit, walking and biking). See David Bassett, Jr., John Pucher, Ralph Buehler, Dixie Thompson, and Scott Crouter. 2008. Walking, Cycling, and Obesity Rates in Europe, North America, and Australia. *Journal of Physical Activity and Health* 5, 795-814.
- x Ian Parry and Kenneth Small. 2009. Should urban transit subsidies be reduced? *American Economic Review* 99(3): 700-724. They find that the external benefits of transit are not internalized until fares are set substantially below 50% of operating costs.