

“Carbon in Motion 2050” for North America and Latin America

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Transportation contributed nearly 25 percent of global anthropogenic carbon dioxide (CO₂) emissions in 2007. The level of emissions depends on the distances people and goods travel, the modes with which they use, the fuel consumed per kilometer moved and the CO₂ associated with each fuel. Different developed countries have complied to different levels of emissions reductions targets, while developing countries are not subject to any national agreement to reduce their emissions levels. For the United States, President Obama has pledged to reduce CO₂ emissions between 14 percent and 17 percent by 2020 from 2005 levels and has set a goal to reduce 83 percent of emissions by 2050, implying a 30 percent reduction below 2005 levels in 2025 and a 42 percent reduction below 2005 in 2030 (The White House, 2009). Meeting these targets would help prevent further increases in global temperature and environmental degradation.

As this paper will show, with modest changes to current transportation trends and efficient vehicles powered by alternative fuels that release approximately a third less CO₂ per unit of energy than today, CO₂ emissions in 2050 will be at 2005 levels for Latin America and 50 percent of 2005 levels for North America (ICCT, 2010; Schipper et al., 2009). While this North American level is well below 1990, it is very high globally on a per capita basis.

A more ambitious target analyzed in this study would give both regions half of the global per capita emissions average of 315 kg/capita, consistent with many public calls for very large great cuts in emissions. We find it possible to arrive at this low target for the Americas, but only with relatively large cuts in automobile and air travel in North America and an almost 90 percent decline in the CO₂ emissions per passenger- or tone-km of the main modes of light duty vehicles and trucking, a 75 percent decline for air travel, as well declines in transport activity in these modes. Without a liquid fuel source with extremely low CO₂ emissions used in very efficiency vehicles, these very stringent targets are unlikely to be met.

Recognizing that reducing emissions against a rising trend means taking a long-term view, this study has developed two scenarios, “Globalization” and “Glocalization,” for low carbon transportation development in North America (United States and Canada) and Latin America by 2050. The scenarios illustrate how different policy assumptions and energy intensities could reduce transportation CO₂ emissions in North and Latin America. In Globalization, strong international cooperation to decrease CO₂ emissions leads to innovations in vehicle technologies and stricter standards, while in Glocalization, local concerns for reducing transportation problems lowers distance traveled and shifts travel to less CO₂ intensive modes, through significant changes in land use and other planning policies.

Using data on energy intensities, transport activity by mode, and basic population and GDP projections from ICCT (2010) and IEA/SMP (Fulton and Eads, 2004) respectively, as inputs for our scenarios, we have found that in Glocalization, total transportation CO₂ emissions in 2050 could be approximately 78 percent less than in the

“Business as Usual” (BAU) scenario for North America and only 34 percent of 2005 level. For Latin America, CO₂ emissions in 2050 could be approximately 76 percent less than BAU, but 71 percent of 2005 level. The 2050 Latin American emissions of CO₂ emission would be about half of what North America will emit in 2050. Compared to emissions in 2005, these regions’ absolute levels fall by 70 percent and 50 percent respectively.

The somewhat greater reduction in emissions in the Globalization scenario is due to improvements in fuel efficiency and about a one-third reductions in the carbon content of a unit of fuel, measured over the life cycle of the fuel. However, shifts in transportation mode are limited, and there is only a small reduction in distance traveled for passenger and freight in North America, with some growth in Latin America. Compared to BAU in 2050, Globalization results in 72 percent less total emissions in North America and 54 percent less in Latin America. Compared with 2005, these declines are 75 percent and 51 percent respectively. The larger differences in the BAU and 2005 comparisons for Latin America arise because BAU foresees much stronger growth there than in North America as Latin American continues to motorize in either scenario, albeit much slower than in BAU.

By themselves, the technology improvements in the Globalization scenario reduce emissions by 50 percent in North America compared to 2005, and return emissions in Latin America at the 2005 level. Because the Globalization scenario does not include a strong international effort to reduce CO₂ emissions, that scenario does not see the reduction in the CO₂ emissions of a unit of energy seen in Globalization.

The scenarios indicate that if transportation emissions are to be effectively decreased, it is not enough to simply reduce vehicle emissions per kilometer. It also is not enough to simply apply the auto restraints, mode shifts, and urban development strategies. In order to meet target reductions, aggressive technology improvements will have to be coupled with efforts to redirect growth in transportation activity away from its present domination by cars, air travel, and trucking. This would require the implementation of complementary policies that will encourage changes in land use planning and transportation investment to enable greater demand for low-carbon modes, such as mass transit, rail transport and non-motorized transport, and fiscal policies that will readjust transportation costs across different modes.

Three main policy groups are assumed to trigger modal shifts and trip reductions in our scenarios: Transportation Technologies and Strategies, Land Use Planning and Pricing Instruments Design. The levels of shifts we assume are consistent with findings from the literature, i.e., there is evidence that such shifts are feasible. Nevertheless, this confluence of strong policies from different spheres would call for an unprecedented level of local, regional and national planning, together with infrastructure development, combined with low energy vehicles and lower carbon fuels. Scaling up planning and investment to support this change is a major challenge to planners at every level if changes in land uses and transportation patterns are to contribute and bring the world to a low level of emissions around 2050.

The changes envisaged in these scenarios differ for the very highly motorized North America and the less motorized Latin America. North America must bring about reductions in total distance traveled in cars and by air, while Latin American has room to expand car use and air travel, albeit not enough room to expand at previous rates. Both regions must adopt very low-carbon technologies as well, but this may be easier in Latin America because there is far less capital sunk in a carbon intensive transport system for travel.

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