GLOBAL CLIMATE CHANGE, OIL RESOURCES, AND THE ROAD TO SUSTAINABLE TRANSPORTATION

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by

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ABSTRACT

There is little dispute that motor vehicles have brought enormous benefits worldwide, socially and economically. They allow flexibility in where we live and work. In the developed countries, they provide access to goods and services for almost everyone. They are truly magic carpets.

Unfortunately, on at least three grounds, our present patterns of transportation use – based almost exclusively on oil-powered motor vehicles – are not sustainable.

- First, **traffic congestion** is leading to gridlock in most urban areas of the world. This is the result of rapidly growing demand for motor vehicle travel which cannot be met with existing road construction programs. The growth in demand is the result of several factors including per-capita economic growth; the availability of reliable, cheap used vehicles; smaller families; more women in the work force; and no viable option to travel by car. The response to these trends involves new forms of urban land use planning and new forms of public transit that reduce the need to travel so much by the automobile.

- Second, **global oil resources** are by no means infinite and global production of conventional crude oil is likely to start declining in the next 10 to 20 years. This time frame is very short for the introduction of new energy sources, which typically take 60 years. There are, of course, uncertainties in how much conventional oil there is to be recovered but the year of peaking is remarkably insensitive to the ultimate quantity. The examples of oil production in the lower 48 states and Prudhoe Bay show this. This does not mean that the world is short of fossil fuels. There are huge amounts of coal, oil sands,

shales, and bitumen that could be converted into petroleum products. But only at a penalty of increasing greenhouse gas emissions.

Global warming is perhaps the most serious issue in achieving sustainable transportation. The world relies on oil to meet almost all its transportation needs. But, clearly, this cannot continue if we take climate change seriously. And if we do, we must start the transition away from not only oil but from fossil fuels more generally. A review of candidate alternatively fueled vehicles shows that GHG emissions vary widely with the technologies. Those long-term options with the lowest GHG emissions are battery powered with the electricity produced from renewable resources and hydrogen fuel cell powered vehicles with the hydrogen produced sustainably. Both of these technologies present major problems of cost and lack of infrastructure, but they offer the promise of pollution free, climate friendly transport based on renewable fuels, fuels which should not run out for the next few billion years.