

The Transportation Boom in Asia: Crisis and Opportunity for the United States

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A revolution is under way in Asia, but it involves mobility, not political change. In China and India, home to 2.2 billion people—more than a third of the world’s population—motor vehicle use is soaring. China’s vehicles, numbering less than two million in 1980, increased tenfold by 2002, to almost 18 million; car sales soared 73% in 2003 alone, and by 2030 China is projected to have more motor vehicles than the US. In India, vehicles totaled 10.7 million in 2000, an increase of 245% since 1984, and there are more than 14 million today.

Of course, compared to the US, China’s and India’s vehicle fleets are in their infancy. Since 1900, when the US had just 8,000 vehicles, its vehicle fleet has experienced a century of continuous growth. The number of vehicles rose to 40 million by 1950, to 108 million by 1970, and to over 220 million today. As of 2000, there were 850 vehicles for every 1,000 Americans. As recently as 2000, China did not even have 50 vehicles per 1,000 people—a rate of vehicle ownership equal to that of the US during World War I (see Figure 1).

Were the Chinese, who aspire to the US lifestyle, to have a comparable rate of vehicle ownership, as many as 972 million cars, buses, and trucks would travel their roadways—almost 27% more than the entire vehicle population of the world in 2001.

The astronomical transportation growth in China and India, combined with industrial development, has created an enormous thirst for oil. Largely because of transportation, these two vast countries recently became, respectively, the world’s second and sixth largest oil-consuming nations. Over the next two decades, China and India are expected to see annual growth rates of 4% and 3.9%, respectively, in oil consumption—the fastest rates in the world.

Rising Trends in Vehicle Ownership in the US, 1900–2000, and Relative Vehicle Ownership in Other Countries in 2000

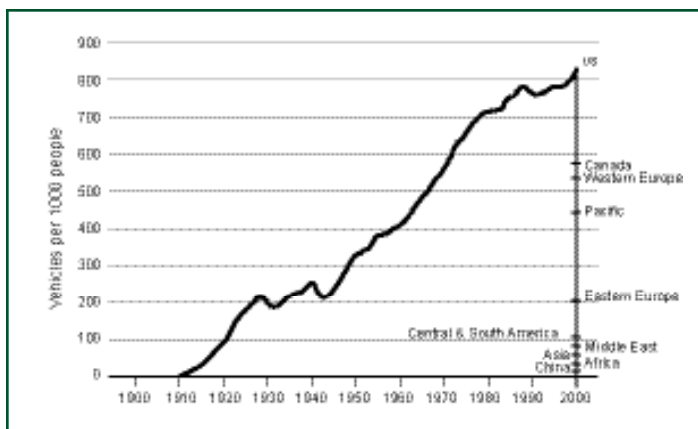


Fig. 1 Source: S. Davis et al., Transportation Energy Data Book, 2003

Vying for Imports

Both China and India are already turning to imports to meet their oil needs. China now imports more than one-third of the oil it consumes, while two-thirds of India’s oil comes from foreign sources, nearly twice the level of just 15 years ago. Yet all this is occurring against a backdrop of dwindling global reserves. Most energy supply experts believe that oil supplies are likely to peak within the next 30 years—some say by 2010. Virtually none project the tripling of production that would be required to fuel oil-based transportation systems in China and India alone.

While rates of oil use in China and India are steadily rising, their total oil consumption (about 7.8 million barrels a day) is nowhere close to that of the US. With 5% of the world’s population, the US represents 25% of world oil consumption—more than 20 million barrels a day out of a world total of 80 million. For a century the US has had a virtually free rein in exploiting global oil supplies. Well over half of its oil today comes from foreign sources—almost a quarter from the precarious Persian Gulf region, putting this country’s national security in great jeopardy.

The US is home to 220 million cars, buses, and trucks—more than any other country in the world—and this huge transportation sector accounts for most of US oil consumption. From 1975 to 2000, oil consumption for all purposes other than transportation fell by 17%, while oil consumption for transportation rose 43%.

The question today is not whether the US faces a dangerous shortfall of oil in the near future, but when and how it will reduce consumption and make the transition to more secure and cleaner alternatives.

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China and India: The Perils of Oil Dependency

Expanding use of gasoline- and diesel-fueled vehicles in China and India is already having unwelcome consequences in addition to creating concerns about future fuel security. The air in China's and India's major cities is grossly polluted, mostly because of vehicle emissions. The World Bank estimates that 178,000 people die prematurely in Chinese cities each year because of this pollution. The economic costs of the transportation revolution in China and India are also escalating. China now pays for its oil imports—almost 48% of which come from the Middle East—with part of its trade surplus with the US. India is more dependent on foreign oil and is harder pressed for funds to pay for its imports.

Embracing Natural Gas Vehicle Technology

China and India, seeking ways to reduce their reliance on oil in transportation, have chosen natural gas as their preferred option. Since the late 1990s, they have become two of the world's top users of natural gas vehicles (NGVs), especially buses and taxicabs. From only a few thousand NGVs five years ago, India has 200,000 NGVs today, the fifth largest NGV fleet in the world, while China has more than 70,000 NGVs and ranks seventh. China and India selected natural gas-based transportation systems for several reasons.

First, NGVs are significantly less polluting than gasoline- and diesel-fueled vehicles. For example, INFORM's research of refuse trucks found that for those fleets that calculated their emissions, trucks converted from diesel to natural gas achieved reductions in particulates of 67% to 94%, in nitrogen oxides of 32% to 73%, and in non-methane hydrocarbons of 69% to 83%.

Second, many types of NGVs are commercially available, and the infrastructure and technologies needed to produce, transport, store, and refuel them are well developed.

Third, long-term supplies of natural gas may be more secure than those of oil, since reserves are distributed in areas that are more stable than today's Middle East. INFORM's research over the past decade has also shown that, because of the synergies between natural gas and hydrogen fuels, widespread use of NGVs can help pave the way to the hydrogen fuel cell vehicles of the future (see Figure 5).

Trends in Total Oil Production and Consumption in China, 1980–2002

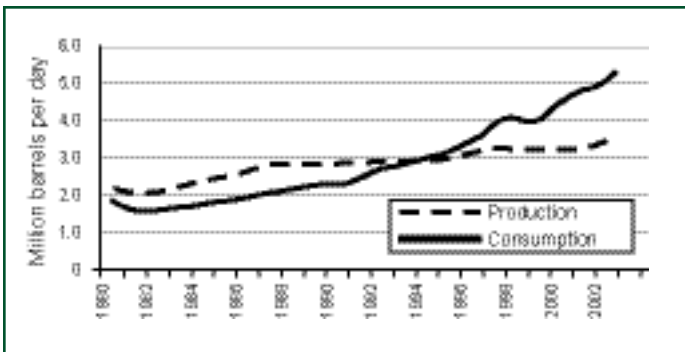


Fig. 2 Source: US Energy Information Administration

The Growing US Challenge

In contrast to the far-sighted efforts of India and China to stem their dependence on foreign oil and protect public health by promoting natural gas vehicles, INFORM's research found US government support for alternative fuel programs—support that made possible development of some of the world's most sophisticated alternative-fuel technologies, including natural gas vehicles—to have eroded since 2000. Despite the current administration's five-year \$1.7 billion hydrogen research

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program, it reduced support for natural gas vehicle research and failed to support broad economic incentives that would give NGVs and other vehicles powered by fuels that are more secure and cleaner than petroleum-based fuels a level playing field to compete in domestic vehicle markets. In so doing, ironically, it has impeded the expanded use of NGV technology that can pave the way to the hydrogen era. NGV use in the US hovers today at around 146,000 vehicles. Yet the US faces near-term air quality and fuel security challenges as severe as those of China and India. Motor vehicle emissions are a major cause of the air pollution that blankets most US cities, and they contribute to the virtual epidemic of asthma that has swept the country. On the economic front, reliance on foreign oil has meant the loss of more than a million jobs in the last 30 years, and the economy has been sapped of millions of dollars in related tax

Trends in Total Oil Production and Consumption in India, 1980–2002

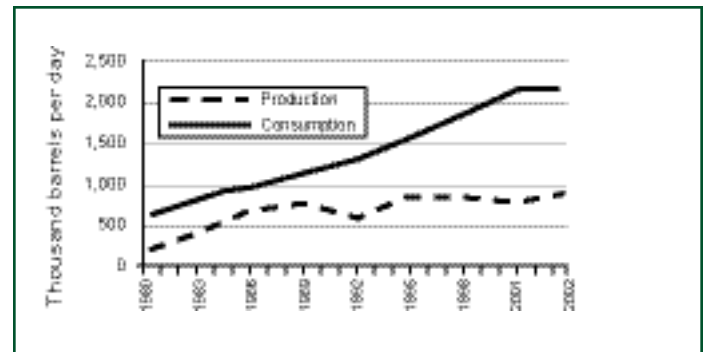


Fig. 3 Source: US Energy Information Administration

A Viable Transition Path to Pollution-Free Hydrogen Cell Vehicles

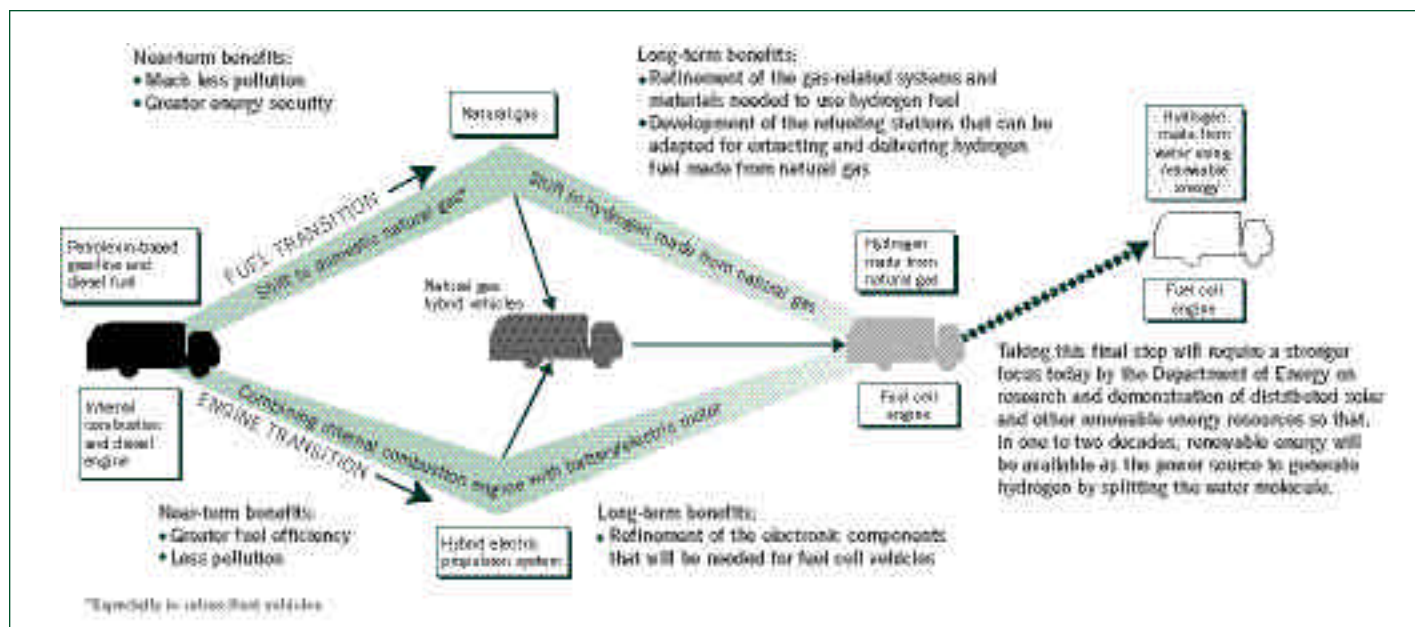


Fig. 4 Source: INFORM

Taking a Fresh Look at US Options

revenues. The oil price spikes and disruptions caused three times since 1970—a result of decisions or supply interruptions involving the OPEC nations—have battered the US economy, sent companies into recession or bankruptcy, and led to soaring inflation. These costs, combined with the military costs of safeguarding US sources of Persian Gulf oil, have drained the US economy of approximately \$300 billion a year. The health costs incurred by the 158 million Americans who live in areas where the air does not meet US public health standards are incalculable, as are the growing costs of global climate change.

INFORM's research for The Transportation Boom in Asia found the US positioned today not only for a crisis but also with an historic opportunity, created by Asia's skyrocketing use of natural gas vehicles. This country could bolster its own alternative fuel vehicle industry by putting NGVs (and renewable fuel sources) to work domestically while contributing to the creation of sustainable transportation systems in industrializing Asia. The question is whether the US will seize this opportunity by taking action today. INFORM makes the following eight recommendations for action by government policy makers:

"An essential ingredient is recognition of the technologies that provide the greatest near-term petroleum displacement and environmental and fuel efficiency gains while creating the most direct and rapid transition path to hydrogen."

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Trends in US Oil Supply and Demand, 1950–2002

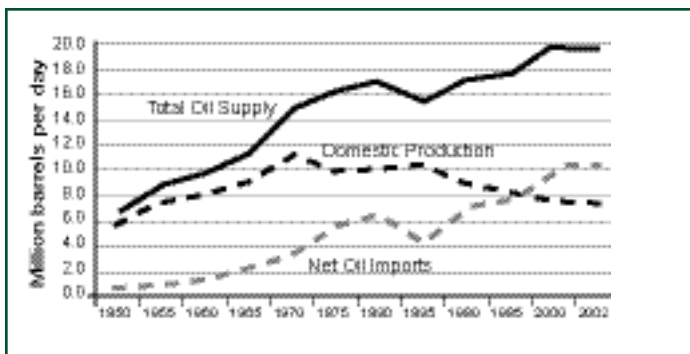


Fig. 5 Source: US Energy Information Administration

INFORM Recommendations for Policy Makers

Recommendation 1

Congress and the president must make Americans aware of the crisis being created by the increasing worldwide demand for oil and the potential implications for the US over just the next 10 to 15 years. It is important that Congress and the president publicly acknowledge the dimensions of this crisis in clear terms.

Recommendation 2

Congress and the president must outline a realistic and achievable national energy plan to address this crisis step-by-step. An essential ingredient is recognition of the technologies that provide the greatest near-term petroleum displacement and environmental and fuel efficiency gains while creating the most direct and rapid transition path to hydrogen. After 20 years of government funding and experimentation with a range of fuel options, it has become evident that the most promising and assured path forward involves exploiting the many synergies between natural gas and hydrogen technologies, as well as promoting hybrid electric (including natural gas hybrid) vehicles for the greater fuel efficiency they offer today and for the key role they can play in refining the electronic componentry that is essential for commercial hydrogen powered fuel cell vehicles. A goal for use of natural gas, biogas, and hybrid natural gas technologies could reasonably be set at 20% by 2020.

Recommendation 3

Congress and the president must give full support to creating a package of economic incentives that would encourage the purchase and use of vehicles powered by cleaner non-petroleum domestic fuels and more efficient engines. Such a package, called CLEAR ACT, which was under consideration by Congress as part of the Foreign Sales Corporation/ExtraTerritorial Income (FSC-ETI) "JOBS" bill in the Senate, was killed in October 2004. This was unfortunate, as it would have been the right approach at the right time, providing incentives for purchasing alternative-fuel vehicles, for using alternative fuels, and for building infrastructure for the delivery of alternative fuels to vehicles.

Recommendation 4

Congress and the president should provide especially visible leadership at the local level—in communities across the country—by supporting the conversion of school buses from diesel to cleaner fuels. The Green School Bus Act, included in both the Senate and House versions of the 2004 energy bill, would have helped to safeguard the hundreds of thousands of children who ride these buses to and from school each day by authorizing \$140 million for alternative-fuel buses. (Cleaner diesel buses and the retrofit of existing diesel buses with current pollution control technologies would get \$60 million and \$100 million, respectively.) New efforts at passing a federal energy bill should continue to support the use and continuing refinement of natural gas school bus technology.

Recommendation 5

Congress and the president must support substantially expanded funding for natural gas and other alternative-fuel vehicle R&D. Today's available alternative-fuel vehicles—especially natural gas vehicles—are fully commercial but they can be made even cleaner and more efficient. The federal government should invest significantly in the R&D required to achieve these goals as a complement to R&D being funded by the private sector, which has identified \$60 million in vital research needs aimed at developing even more vehicle platforms and engines that can operate on alternative fuels in more applications.

Recommendation 6

Congress and the president should expand support for the Department of Energy's Clean Cities domestic and international programs. Its domestic program is the best program to date engaging citizens and local communities in being part of the solution. The primary mission of this program is to engage local government, business, and community leaders in voluntary initiatives that help reduce petroleum consumption in transportation. Clean Cities carries out this mission through a network of more than 80 volunteer coalitions that develop public/private partnerships to promote alternative fuels and vehicles, as well as strategies for greater fuel efficiency. Clean Cities provides funding for local coalitions. In 2003, it reported that its coalitions had more than 173,000 alternative-fuel vehicles in their fleets, displacing 148 million gallons of petroleum. The Clean Cities international program, established in 1995, has sought to foster information exchange on technologies and policies and development around the world of partnerships for alternative-fuel vehicle programs. It is active in countries including India, Bangladesh, the Philippines, Brazil, Mexico, Peru, and Chile.

Recommendation 7

Congress and the president should immediately elevate the importance of sustainable transportation technology exports and make export a high priority in US trade and energy policy. This would enable the US to compete in the rapidly growing markets for natural gas vehicles in Asia (as Canada has been doing successfully for some time). By means of such an export policy, the alternative-fuel and vehicle industries in the US—which over the past 20 years have developed some of the world's most sophisticated natural gas vehicle and refueling technologies at great cost—could grow and flourish while contributing to the creation of modern, environmentally sustainable transportation systems in China, India, and other developing countries.

Recommendation 8

Congress and the president must accelerate funding for the rapid development of renewable energy technologies, such as wind power, photovoltaic, and hydropower, as well as the deployment of these technologies across the country. Since natural gas is ultimately a depletable fossil fuel, hydrogen must eventually be made from water using renewable energy.