

Mobility

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During 2008 we:

- Cosponsored a major forum on mobility
- Concluded pilot mobility projects in South Africa and India

Our goal is to make mobility affordable in every sense of the word – economically, environmentally and socially. Today, there are 6.7 billion people in the world. By 2050, there will be 9 billion people, 75 percent of whom will live in urban areas. Forty of the world's 50 largest cities will be in countries outside of North America, Europe or Japan. These mega-cities – urban areas of 5–10 million people or more – will be increasingly affluent and increasingly crowded (see "[Mega-Cities: The Icon of Personal Mobility Challenges](#)").

Residents of these cities will want – and deserve – the same freedom of mobility that many in developed nations enjoy today. But, because of energy costs, climate change concerns, infrastructure constraints and resource limits, business as usual will not work.

Many cities are already imposing regulations to restrict the use of private transportation. For example, London, Vienna and Bucharest have established anti-congestion policies in the form of a tax on personal vehicle usage into the city. Legislation is pending in Berlin, Paris and Tokyo to enforce zero emission public transportation. Adding more and more privately owned cars to a mega-city may not be possible, and certainly isn't practical. A car stuck in traffic wastes time and energy, a car sitting in a parking garage all day while its owner works wastes a valuable asset.

We need to explore sustainable alternatives. We believe that creative collaboration and innovative technologies and services can yield new solutions, and that these solutions can harness the benefits of mobility while reducing its environmental and social impacts. Information technology shows promise for overcoming barriers to integrated urban mobility systems that rely on multiple modes of transportation seamlessly tied together. Ford has been a leader in exploring the potential for these models to contribute to solutions, especially in urban areas (see "[What Is New Mobility?](#)").

During 2008, we intensified our focus on the challenges of urban areas in both developed and developing countries. Ford cosponsored a major forum on mobility at the University of Michigan that brought together leading thinkers from around the world to share knowledge and insights, and plan collaborative projects. We concluded our involvement in pilot mobility projects in Cape Town, South Africa, and Bangalore and Chennai, India, gaining important insights that will aid us in the future. And we refocused our mobility efforts on products like electric vehicles, bringing together fleet managers, utilities and city leaders to encourage use of these technologies in alignment with the priorities of the new U.S. administration.

This section describes the actions Ford is taking to deepen our understanding of the future of mobility and to develop and test sustainable mobility solutions for all of our global customers.





PERSPECTIVES ON SUSTAINABILITY

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Mobility Challenges and Opportunities

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Mobility is a basic human need. Developed and emerging economies alike require transportation systems to get goods to market and people to the places where they work, shop, dine, gather and have fun.

Automobiles have provided personal mobility for more than 100 years. There are currently 900 million vehicles in the world, and that number is increasing rapidly as individuals in developing markets reach new levels of prosperity; it could reach 2 billion by the middle of this century.

This sounds like good news for an automotive company, and to some extent, it is. Our most rapid sales growth is taking place in emerging markets. But a business model built on private ownership of automobiles comes with inherent challenges, which are related directly to the following current and emerging mega-trends:

Urbanization

By 2015, it is projected that at least 35 mega-cities will have a population of more than 10 million. The migration of rural populations to urban areas often outpaces infrastructure development, leading to overcrowded, substandard living conditions and inconvenient, congested transportation systems.

Congestion

Each year, traffic congestion is estimated to cost the United States \$67.6 billion, and the average metropolitan driver endures 27 hours of traffic delays. In many places, especially developing countries, traffic delays are considerably worse, and are increasing at an alarming pace. As more vehicles crowd limited road networks, congestion increases. This, in turn, creates pollution, reduces fuel efficiency and wastes travelers' time.

Climate Change

The transportation of people and goods accounts for about a third of global human-caused greenhouse gas emissions. Stabilizing greenhouse gas emissions in the atmosphere will require a concerted effort on the part of the private and public sectors to achieve significant cuts in transport-related emissions, at a time when rapid growth in the transportation sector is anticipated.

Shifting Demographics

Different regions of the world are experiencing opposing population trends. Among the more developed countries, only the U.S. is growing in population; Europe, Russia and Japan are all shrinking. Regions of Africa and Asia are growing in population and will have large numbers of young people. But by the middle of this century, most of the world will be much older on average. With most people living in urban areas, more and different forms of mobility will be needed to support independent living for seniors, the disabled and young people.

Social Inequality

The growing gap between rich and poor creates enormous needs for innovative, affordable mobility solutions that meet human needs and help people build a better way of life. Unequal access to transportation often limits the opportunities available to those most in need. Better mobility is part of the solution to unemployment and income disparities.

Taken together, these trends point to increasingly diverse and fragmented markets for traditional automobile sales. They also point to significant opportunities for companies that are able to respond to mobility needs creatively.

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Ford's Approach to Urban Mobility: Catalyst for Learning, Collaboration and Action

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As mobility models change, so do the needs of our customers and potential customers. For several years, Ford has worked with a wide range of academic and public and private sector partners to explore sustainable mobility issues, advance thinking and catalyze on-the-ground projects to test different approaches to urban mobility. The insights we gain from this work help us to understand the forces that are shaping our markets, our role in addressing mobility challenges and the opportunities these trends present for us.

Pilot Urban Mobility Projects

During 2008, we worked on pilot projects including the following:

- Cape Town, South Africa is the capital of the Western Cape Province. It is a popular tourist destination and will be a host of the World Cup in 2010. To prepare for the tournament, local officials are seeking to upgrade the city's transportation systems, from its aging taxi fleet to its bus and rail systems. The city also wants to build on the legacy created by the World Cup to provide solutions to persistent problems of congestion and access to mobility for the poor, and develop a whole new industry around business opportunities in connecting the transportation dots. The project has an economic, systems and accessibility approach by focusing on how people meet their needs, rather than how to move people from point A to point B.

Ford and the University of Michigan's [Sustainable Mobility and Accessibility Research and Transformation \(SMART\)](#) program have been working since early 2007 to engage private-sector leaders, local thought leaders and government and transportation officials, as well as taxi, minibus and bike entrepreneurs, in planning for a new mobility project. Planning is under way for a network of mobility hubs. A hub is a transfer point where multiple mobility options and services come together. In turn, one hub connects with an integrated system of hubs to provide seamless, convenient, sustainable, safe and affordable door-to-door trips for everyone – rich and poor.

In Cape Town, the hubs will link multiple mobility services, including buses and metro trains, minibuses, taxis, car-share vehicles and bike-share vehicles. They will also include restaurants and shops. Travellers will eventually be able to use a software device, connected through a cell phone or information kiosk, to access integrated, multi-modal, real-time travel information. A leading NGO, IDASA, is coordinating meetings of larger forums and smaller working groups and facilitating deeper democratic engagement around the project.

- In Chennai, India, inadequate infrastructure and congestion are creating air quality and safety problems in the urban center. Ford has helped catalyze a pilot project to provide mobility hubs and feeder services along the IT business corridor for bus and light rail customers. This pilot will help integrate various modes of transportation and greatly improve travellers' opportunities to transfer seamlessly from one mode to another, especially from MRTS and other vehicles to buses that ply the corridor. Working together in an integrated manner, these services will become a model system that can be replicated across the city, promoting the use of public transportation and helping create a world-class public transport system for Chennai.
- In Atlanta, Georgia, Ford has worked with the [Sustainable Design and Manufacturing Program at Georgia Tech](#) to develop and test mobility solutions for one of the United States' most mobility-challenged cities. These efforts have included identifying technical options for improved urban mobility in Atlanta area; assessing their potential impact in terms of financial, environmental and social benefits and costs; and creating an engineering design framework to invent and test solutions.

One pilot project placed a solar-powered information kiosk on the Georgia Tech campus. Travellers could use the kiosk to plan a route to their destination using various transportation options. The kiosk provided information about route alternatives, schedules, costs and real-time tracking of buses, shuttles and other conveyances. Researchers gathered feedback from users to refine the system. They also tested a similar, cell-phone-based information technology application.

The insights from these pilot projects are contributing to a better understanding of sustainable mobility challenges and solutions. The researchers are viewing urban mobility as a complex system and are

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looking at how best to integrate:

- Vehicles
- Powertrain Technologies
- Fuels
- Fleets
- Information Technology
- Systems Design
- Revenue and Marketing
- Sustainability Attributes

Collaboration to Support Electrification

Through work on these pilot projects, we have gained insight into the mobility needs of urban residents, the institutions that must work together to forge solutions and the range of technical solutions and their strengths and weaknesses. These insights come together in our urban mobility methodology that can be applied to a variety of settings and challenges. This equips us as a company to respond to rapidly changing needs for mobility by offering new products and services.

For example, we are using what we've learned in diverse global locations to support the effort to build markets for electric vehicles in the United States. These vehicles will play an important role in reducing CO₂ emissions from the transportation sector. They can be deployed in various ways as part of urban mobility solutions. But, like the creation of integrated mobility systems, the manufacturing, distribution and sales of electric vehicles will require new business models. Multiple technologies and industries will need to converge to marry vehicles and infrastructure, utility services and information technology. Transportation and utilities will become interdependent. City leaders will need to take a system-wide approach to develop clean, green, "cool" and sustainable cities.

Several Ford functions – including the sustainable business strategies group, fleet sales and sustainable mobility technologies – are working together with a range of partners to deploy fleets of electric vehicles over the next two to five years.

With rising concern over carbon emissions from private vehicles and renewed emphasis on green transportation and infrastructure, urban leaders are looking for creative solutions to enhance transit use and reduce car use by linking bicycles, electric bikes and scooters, car sharing, car rental and ridesharing. With help from economic stimulus funds, they are poised to increase investment in electric and plug-in hybrid-electric vehicles including cars, trucks, conventional buses, trolley buses, express buses, and all forms of rail including streetcars, light rail and heavy rail.

We are working in several cities to put together coalitions of city and state agencies, utilities, transportation providers and others to pursue stimulus funding for electric vehicle fleets. This will help build the critical mass of electric vehicle sales that will be needed to help overcome a range of challenges to widespread electric vehicle use including infrastructure, affordability, battery technology and public policy (see "[Electrification: A Closer Look](#)" for more discussion of challenges and solutions).

Continuing Learning and Engagement

We are also continuing urban mobility research in the Brazil, Africa and India. In addition, we have learned from our involvement in the Center for Sustainable Transport Turkey (SUM-Türkiye), has the goal of delivering sustainable transport solutions to Turkish cities. Its efforts have centered on improving air quality and reducing travel times by promoting mass transit. SUM Turkey has completed Istanbul's first emissions inventory and has provided technical advice to the city on its new Bus Rapid Transit system, Metrobus, which has now added an additional line. More information is available at the [EMBARQ Istanbul Web site](#).

Partnerships and Collaboration

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Mobility issues are complex and rapidly changing. Developing solutions to mobility challenges requires innovative, systems thinking. That's why we've developed sustained relationships with organizations including the following that give us access to the latest research, insights and integrative ability.

Sustainable Mobility and Accessibility Research and Transformation (SMART)

Ford has been working with the University of Michigan on the SMART project since April 2005. SMART takes a collaborative, systems approach to developing innovative, sustainable and connected mobility and accessibility solutions in urban regions around the globe. Building on the seminal work of Moving the Economy in Toronto, SMART has pioneered new thinking, new partnerships and pilot projects related to emerging New Mobility markets and industry development.

SMART has provided the empirical research and inspiration for Ford's mega-city mobility projects. The insights of the SMART leadership team have served as a foundation for our innovative approach to business opportunities related to New Mobility and for our work with other key sectors, including manufacturing, IT, logistics, tourism, real estate, design and more. In addition to developing New Mobility business opportunities and markets, SMART and Ford are seeking to improve quality of life, employment and other community benefits in cities all over the world over the long term. We are convinced that our partnership with SMART will produce a new systems approach for addressing the increasingly complex challenges to achieving sustainable mobility and accessibility globally, while at the same time transforming the transportation industry into a more sustainable and equitable New Mobility industry.



Georgia Tech Joint Research Projects

Ford and Georgia Tech have a strong cooperative relationship, focused particularly on sustainability. Our present joint research projects are funded under a multi-year agreement to partner in design, manufacturing and logistics, and in mega-city mobility research. Our collaborative approach has been effective in developing talent among students, faculty and Ford professionals, as knowledge is transferred between the university and company settings. For instance, the students develop enthusiasm for the contributions of engineering in the realms of manufacturing and sustainability, and they gain valuable work experience during summer internships. At present, Georgia Tech is assisting Ford by:

- Developing the business case for mega-city mobility, especially pertaining to finance, information technology and vehicles (including fuels, design, carbon and powertrains)
- Building on the results of Ford's prototype projects, particularly with regard to software device connections

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Mega-Cities: The Icon of Personal Mobility Challenges

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Mega-cities are urban areas with more than 10 million residents. At least 25 mega-cities already exist worldwide. Twenty are located in the developing world, as are seven of the nine most populous. By 2015, there are projected to be at least 35 mega-cities, with virtually all the growth in developing countries. Mega-cities experience a wide range of social and environmental problems, many of them related to mobility.

All of the mega-trends we have identified, as well as other challenges to sustainable mobility, are at their worst in mega-cities, and engender paralyzing traffic congestion, air pollution, vehicle-related injuries and fatalities, and health problems. Furthermore, social inequality and the dislocation of families and communities are increasing as people move from rural areas to mega-cities seeking economic opportunities. To develop mega-city mobility strategies will require addressing the mobility needs of rural as well as urban residents, as many mega-city problems could be improved by developing new approaches to the transportation of people and goods between rural and urban areas, and by reducing the need for rural-urban migration.

Mega-cities face a wide range of mobility challenges, including paralyzing traffic congestion, air pollution, vehicle-related injuries and fatalities, and health problems.

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As we reach the limits of conventional models of mobility, "new mobility" offers a practical route forward. New mobility approaches transportation needs and options from a systems perspective. It relies on collaborative partnerships and information technology to bring existing services, products, technologies, infrastructure and design together into something that is greater than the sum of its parts – smarter, more sustainable, more convenient, more equitable and better connected.

Examples of new mobility systems already exist, notably Hong Kong's "Octopus" system, which uses a "smart card" to provide travelers with access to multiple transit services as well as ferries, parking and retail outlets. Other examples exist in Bremen, Germany; Bogotá, Colombia; Paris, France; Curitiba, Brazil; Portland, Oregon; and more. Key features of new mobility systems include the innovative use of technology to link diverse transportation systems such as rail, bus and subway with car sharing, bike sharing and other options, to provide flexible, seamless, door-to-door trips. Technologies can also enable distance working, learning, medicine and shopping, thereby reducing the need for some trips altogether. And still other information technologies support the sustainable and efficient movement of goods in urban regions, a growing area of concern and opportunity for innovation.

New mobility also depends on something more old-fashioned: collaboration and partnership. Technology can "connect the dots," but only humans can get the varied institutions and interests involved in urban mobility to work toward a common end. Thus, new mobility projects like those described in this section require extensive stakeholder engagement and establishment of trust between the many partners with a role to play.



MOBILITY OPTIONS

"Connecting the dots" for urban commuters through the use of information technology, scheduling, navigation, congestion identification and avoidance, and fare payment would be available on PDAs or cell phones.

BENEFITS

High quality, safe, clean transportation widely accessible in crowded urban areas reduce congestion, fuel consumption, pollution and carbon emissions.

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