



- OVERVIEW
- OUR OPERATIONS
- MATERIAL ISSUES
- GOVERNANCE
- ECONOMY
- ENVIRONMENT
- SOCIETY

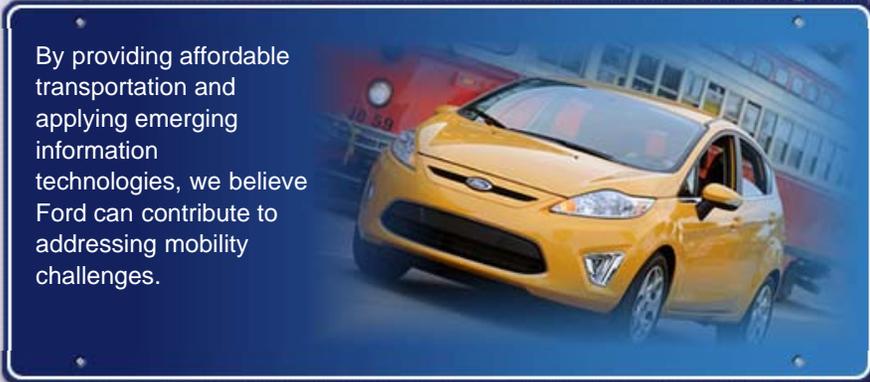
- MATERIAL ISSUES
  - Materiality Analysis
  - Climate Change
  - Mobility
    - Ford's Approach to Urban Mobility: Catalyst for Learning, Collaboration, and Action
    - Mobility Challenges and Opportunities
  - Human Rights
  - Vehicle Safety
  - Sustaining Ford
  - Perspectives on Sustainability

- TOOLBOX
  - Print report
  - Download files

## Mobility

### 2009 HIGHLIGHTS:

- Helped to catalyze urban mobility collaborations in Richmond, Virginia; Seattle, Washington; Portland, Oregon; and Los Angeles, California, while continuing our work in Atlanta



Most automakers define *sustainable mobility* as reducing the environmental impacts of the vehicles they offer by cutting the vehicles' lifecycle greenhouse gases and other emissions. At Ford, we see this as an important piece of the picture – and we're working hard to achieve it.

But there are other important pieces as well. Consider this: today, there are 6.7 billion people in the world. By 2050, there will be 9 billion, 75 percent of whom will live in urban areas. Putting 9 billion people into private automobiles is neither practical nor desirable. The Earth lacks the resources to make and fuel those autos and to provide infrastructure to accommodate them. And with congestion already choking many urban areas, adding more vehicles – however clean – onto already-stressed roads will threaten to overwhelm them (see [Mega-Cities: the Icon of Personal Mobility Challenges](#)).

Yet mobility is a critical enabler of economic growth and human potential. As the Earth's population grows, so does its need for mobility. That mobility must be based on new, more sustainable models. This doesn't mean giving up the freedom afforded by private automobiles. It means including them as one of many options in an integrated system that harnesses the power of information and communication technologies to tie together diverse, appealing modes of travel. It also means building and redeveloping communities with sustainable mobility in mind.

At Ford, our goal is to make mobility affordable in every sense of the word – economically, environmentally and socially. 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. We aim to be a trusted partner with the many institutions that must cooperate to implement new mobility models. Not only will we be ready with low-carbon vehicles, but also with expertise, insight and mobility solutions.

## Electric Vehicles Play a Role

Electric vehicles could play an important role in more sustainable, integrated, urban mobility systems. But a wholesale shift to electric vehicles will also require systemic change. Charging infrastructure needs to be developed, electric vehicles must be integrated with electric utilities, and vehicles and grids must be knit together into an efficient system. The technologies that enable these shifts – universal connectivity, in-vehicle information systems, cloud computing – are becoming widely available. For example, our newest-generation SYNC® system makes automobiles rolling communication and information platforms, which will help them to integrate seamlessly with "smart" electric grids and mobility systems.

### PERSPECTIVES ON SUSTAINABILITY

Steve Marshall



Senior Fellow, Cascadia Center for Regional Development

[Read more](#)

## Progress in 2009

During 2009, Ford continued to catalyze and conduct dialogues with key regional stakeholders, exploring sustainable mobility projects in Atlanta, Georgia; Richmond, Virginia; Seattle, Washington; Portland, Oregon; and Los Angeles, California. These efforts brought together a range of parties – including municipal and state government officials, utilities, transportation planners and nongovernmental organizations – to envision solutions and pursue the funding needed to implement them. Ford's role in these projects built on its experience catalyzing mobility projects in India, South Africa and Brazil.

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.



- OVERVIEW
- OUR OPERATIONS
- MATERIAL ISSUES
- GOVERNANCE
- ECONOMY
- ENVIRONMENT
- SOCIETY

↓ MATERIAL ISSUES

- Materiality Analysis
- Climate Change
- ↓ Mobility
  - ➔ Ford's Approach to Urban Mobility: Catalyst for Learning, Collaboration, and Action
  - Mobility Challenges and Opportunities
- Human Rights
- Vehicle Safety
- Sustaining Ford
- Perspectives on Sustainability

TOOLBOX

- Print report
- Download files

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

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 new approaches to urban mobility (see [What Is New Mobility?](#)). Our first such projects were in Cape Town, South Africa; Chennai, India; and Atlanta, Georgia.

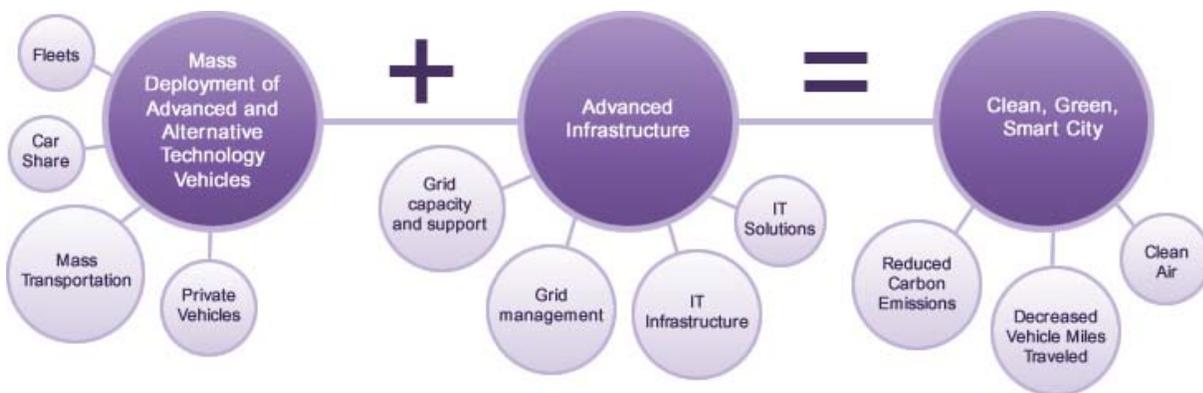
The insights we've gained from this work have helped us to understand the forces that are shaping our markets, our role in addressing mobility challenges and the opportunities these trends present for us (see [Mobility Challenges and Opportunities](#)). In particular, we have gained insight into the 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 lessons are reflected in our urban mobility methodology, which 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.

RELATED LINKS

- This Report:
- [What is New Mobility?](#)
  - [Mobility Challenges and Opportunities](#)
  - [Electrification: A Closer Look](#)
- External Web Sites:
- [Cascadia Center for Regional Development](#)
  - [Georgia Tech](#)

## Collaboration to Support Electrification

We are using what we've learned to support the effort to build markets for electric vehicles in the United States. These vehicles will play an important role in reducing carbon dioxide (CO<sub>2</sub>) 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, "smart" and sustainable cities (see figure below).



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 poised to work with these leaders by providing technology as well as experience catalyzing mobility partnerships. On the technology side, Ford will launch its first 21st century electric vehicle, the electric Transit Connect targeted at commercial markets, in 2010. We are developing this battery electric vehicle (BEV) in partnership with Azure Dynamics Vehicles, a leading electric adapter of commercial vehicles. In 2011, we will introduce a Focus BEV, called the Focus Electric,

developed in collaboration with Magna International. Both of these BEVs will be ideal for customers who routinely travel relatively short distances (e.g., 80–100 miles) between charges. In North America, we are also planning to introduce a plug-in hybrid electric vehicle (PHEV) commercially in 2012, along with our next-generation hybrid electric vehicle (HEV) technology. We already have a test fleet of PHEVs on the road in partnership with more than a dozen utility companies and other collaborators. These vehicles will also be introduced in Europe by 2013.

Ford has also been a leader in deploying vehicle communication and connectivity technologies, beginning with the SYNC® system. These technologies provide a platform for future communication between electric vehicles and "smart" electric grids and mobility information systems. In early 2010, we announced that we are collaborating with Microsoft on new energy-management software that will help customers determine when and how to most efficiently and affordably recharge BEVs and PHEVs, while giving utilities better tools for managing the expected changes in energy demand. Ford is the first automaker to announce the use of this new technology, called Hohm™, which will be used in the Focus Electric starting next year.

Several Ford functions – including the Sustainability and Environmental Policy group, Fleet Sales and Sustainable Mobility Technologies – are working together with a range of partners to deploy fleets of electric vehicles over the next five years. Our aim is not only to provide vehicles but to serve as a trusted partner in developing integrated solutions.

During 2009, we helped to catalyze urban mobility collaborations in Richmond, Virginia; Seattle, Washington; Portland, Oregon; and Los Angeles, California, while continuing our work in Atlanta. These collaborations focused on developing proposals for integrated urban mobility demonstration projects that incorporate electric vehicles as one of multiple transportation options. The organizations involved have included city and state agencies, utilities, transportation providers and others. These efforts will help to 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).

In Seattle, Washington, for example, we were a sponsor of a major conference called "Beyond Oil: The Sustainable Communities Initiative," organized by the Cascadia Center for Regional Development, a Seattle organization focused on regional transportation and sustainable development issues. The forum brought together city leaders, academic institutions, information technology providers and others to focus on solutions for more sustainable mobility in the Seattle region.

We also continue to support research into and development of mobility technologies. In Atlanta, for example, we supported students at Georgia Tech who developed technology that allows users to unlock shared bikes on the Georgia Tech campus using a cell phone. This technology adds flexibility and convenience to the bike-share concept.

In 2010 and beyond, we will continue to collaborate with our key partners (see [Key Partners](#)) as well as organizations in several U.S. cities that are committed to pursuing new mobility solutions.



- OVERVIEW
- OUR OPERATIONS
- MATERIAL ISSUES**
- GOVERNANCE
- ECONOMY
- ENVIRONMENT
- SOCIETY

↓ MATERIAL ISSUES

- Materiality Analysis
- Climate Change
- ↓ Mobility
  - Ford's Approach to Urban Mobility: Catalyst for Learning, Collaboration, and Action
  - ↓ Mobility Challenges and Opportunities
    - Key Partners
    - Mega-Cities: The Icon of Personal Mobility Challenges
    - What Is New Mobility?
- Human Rights
- Vehicle Safety
- Sustaining Ford
- Perspectives on Sustainability

TOOLBOX

- Print report
- Download files

## Mobility Challenges and Opportunities

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 two 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 United States 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.

RELATED LINKS

- This Report:
  - Climate Change



- OVERVIEW
- OUR OPERATIONS
- MATERIAL ISSUES**
- GOVERNANCE
- ECONOMY
- ENVIRONMENT
- SOCIETY

↓ MATERIAL ISSUES

- Materiality Analysis
- Climate Change
- ↓ Mobility
  - Ford's Approach to Urban Mobility: Catalyst for Learning, Collaboration, and Action
  - ↓ Mobility Challenges and Opportunities
    - Key Partners
    - Mega-Cities: The Icon of Personal Mobility Challenges
    - What Is New Mobility?
  - Human Rights
  - Vehicle Safety
  - Sustaining Ford
  - Perspectives on Sustainability

TOOLBOX

- Print report
- Download files

## Key Partners

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. (See [What Is New Mobility?](#))

### 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 urban 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

RELATED LINKS

- External Web Sites:
- SMART
  - Georgia Tech



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OVERVIEW

OUR OPERATIONS

MATERIAL ISSUES

GOVERNANCE

ECONOMY

ENVIRONMENT

SOCIETY

## ↓ MATERIAL ISSUES

Materiality Analysis

Climate Change

## ↓ Mobility

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

## ↓ Mobility Challenges and Opportunities

Key Partners

➤ Mega-Cities: The Icon of Personal Mobility Challenges

What Is New Mobility?

Human Rights

Vehicle Safety

Sustaining Ford

Perspectives on Sustainability

## TOOLBOX

Print report

Download files

# Mega-Cities: The Icon of Personal Mobility Challenges

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.



- OVERVIEW
- OUR OPERATIONS
- MATERIAL ISSUES**
- GOVERNANCE
- ECONOMY
- ENVIRONMENT
- SOCIETY

↓ MATERIAL ISSUES

- Materiality Analysis
- Climate Change

↓ Mobility

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

↓ Mobility Challenges and Opportunities

Key Partners

Mega-Cities: The Icon of Personal Mobility Challenges

➔ What Is New Mobility?

Human Rights

Vehicle Safety

Sustaining Ford

Perspectives on Sustainability

TOOLBOX

- Print report
- Download files

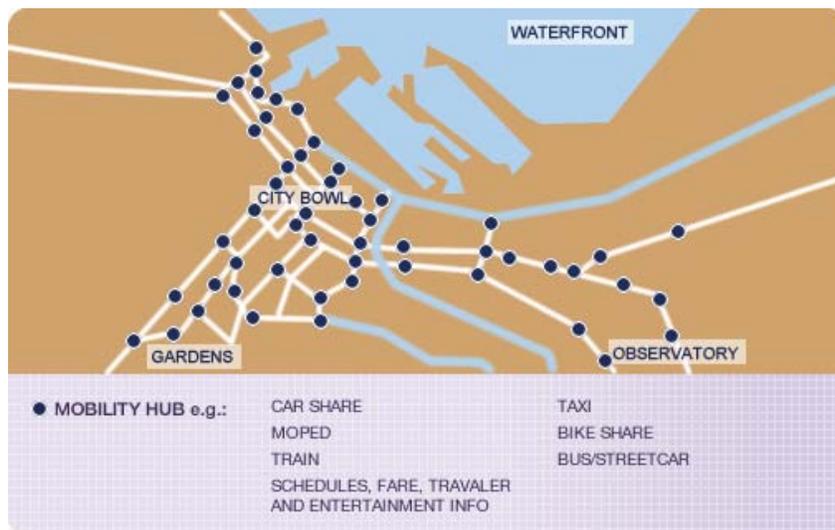
## What Is New Mobility?

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.

### NEW MOBILITY



#### Mobility Options

Urban commuters would be able to "connect the dots" using PDAs or cell phones, on which they could get scheduling, navigation, and congestion identification and avoidance information, as well as pay fares as needed.

#### Benefits

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