Federal Highway Administration

Future Interstate Study

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Key Topics

- **Current and Future Forecasts**
- **Tools and System Expectations**
- **Technological Advancements**

Scenario

Population Increase

2015: **320 million people**
2045: **390 million people**

In 30 years our population is expected to grow by about

70 million

... that's more than the current populations of

Bumper-to-Bumper

On average, we spend

over 40 hours

stuck in traffic each year

The annual financial cost of congestion is

$121 billion

Older Americans — Redefining Longevity

By 2045, the number of Americans over age 65 will increase by

77%

About **one-third of people over 65** have a disability that limits mobility. Their access to critical services will be more important than ever.

Millennials — Shaped by Technology

There are **73 million Millennials** aged 18 to 34. They are the first to have access to the internet during their formative years and will be an important engine of our future economy.

Millennials are driving less. By the end of the 2000s, they drove over **20% fewer** miles than at the start of the decade.

Income Inequality

10% of the population takes home **one-third** of our national income.

Transportation is the **second-largest** expense for U.S. households.

Megaregions and Shifts in Population Centers

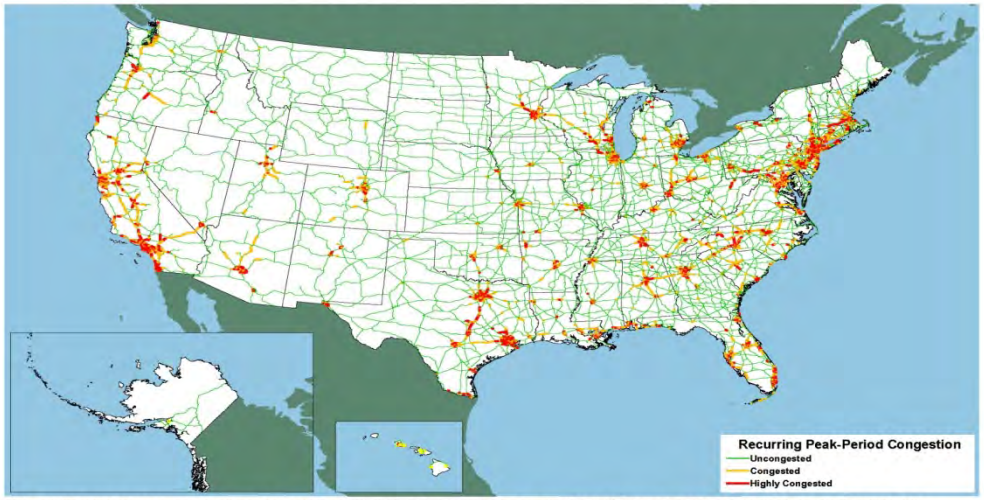
11 megaregions are linked by transportation, economics, and other factors.

They represent over **75%** of our population and employment.

In 2014, **365,000** people moved to the South—up **25%** from 2013—and moves to the West doubled.

Congestion Today and 2040

Peak-Period Congestion on the National Highway System: 2007

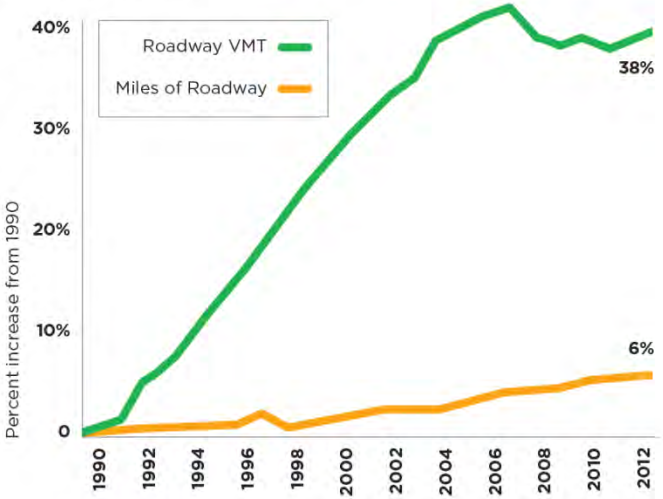


Note: Highly congested segments are stop-and-go conditions with volume/service flow ratios greater than 0.95. Congested segments have reduced traffic speeds with volume/service flow ratios between 0.75 and 0.95.
Source: U. S. Department of Transportation, Federal Highway Administration, Office of Highway Policy Information, Highway Performa
Freight Management and Operations, Freight Analysis Framework, version 3.1, 2010

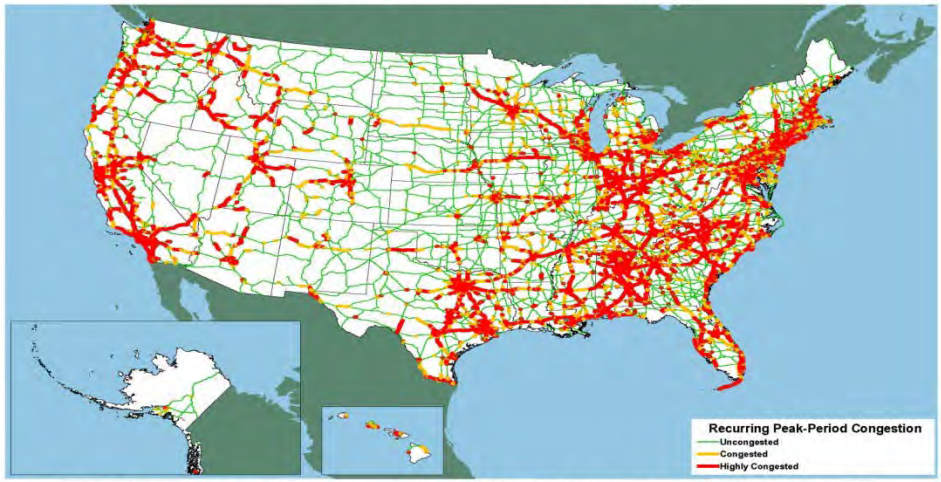
Recurring Peak-Period

- Uncongested
- Congested
- Highly Congested

Increase in Vehicle Miles Traveled (VMT) and Miles of Roadway (1990 – 2012)



Peak-Period Congestion on the National Highway System: 2040



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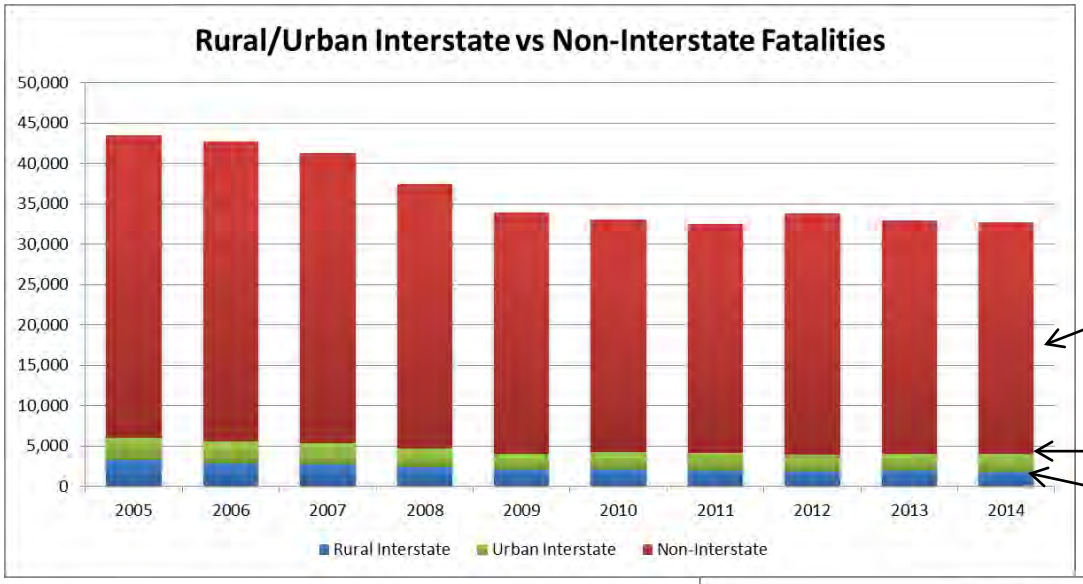
Source: U. S. Department of Transportation, Federal Highway Administration, Office of Freight Management and Operations, Freight Analysis Framework, version 3.1, 2010

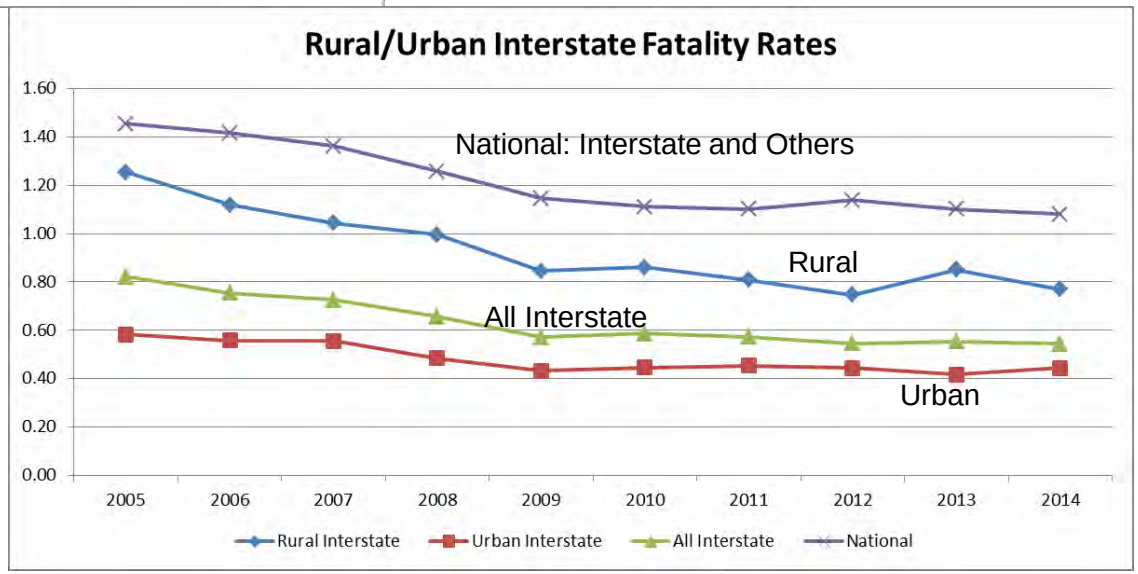
National and Interstate Safety



Non-Interstate

Urban Interstate

Rural Interstate



Current Interstate Condition

Percent of travel (VMT) on Interstate Pavements with Good or Acceptable Ride Quality			
	Calendar Year	2000	2012
Rural Interstate			
	Percent Good Ride Quality	70%	79%
	Percent Acceptable	97%	98%
Urban Interstate			
	Percent Good Ride Quality	44%	63%
	Percent Acceptable	91%	93%

Ride quality is measured in inches of pavement roughness per mile via the International Roughness Index (IRI). IRI < 95 is considered “Good”; IRI <= 170 is considered “Acceptable” (which includes “Good”).

The Environment-Climate Change

Climate change impacts, whether rising sea levels or extreme heat, threaten the considerable Federal investment in transportation infrastructure

Louisiana flooding, August 2016

May 7 & Aug 15, 2016 NASA images of nighttime lighting identify areas of power outages

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NCHRP Project 20-24(79)

- **Focused on estimating costs and benefits of various levels of investment**
- **Reviewed 4 methods; recommended a hybrid method based on existing analytic tools**
- **Recommended using performance management and tiered performance targets**
- **For known technologies, the current gap between best practice and prevailing practice is significant . . . by advancing to state of the art, large gains may be realized**

Transportation Performance Management

TPM Rulemakings

- **Continuing implementation of MAP-21 and FAST Act statutory provisions**
- **Focused on efforts to conduct the rulemaking which will establish a set of national measures**
  - **Includes safety, infrastructure condition, system performance, freight movement, traffic congestion, and on-road mobile source emission**
  - **Targets need to be established; progress needs to be achieved**
  - **States and MPOs will manage the highway system to balance trade-offs across all of these performance areas**
  - **Includes minimum condition requirements for Interstate pavements and NHS bridges that are to be maintained by States**

Investment/Performance Models

- **Highway Economic Requirements System (HERS)**
  - **Investment in highway widening and preservation on Federal-Aid highways**
  - **Including bridge widening as part of highway widening projects**
- **National Bridge Investment Analysis System (NBIAS)**
  - **Investment in bridge rehabilitation on all highway classes**
- **HERS and NBIAS evaluate investment needs using a combination of:**
  - **Technical adequacy (engineering) criteria**
  - **Benefit-cost (economic) criteria**

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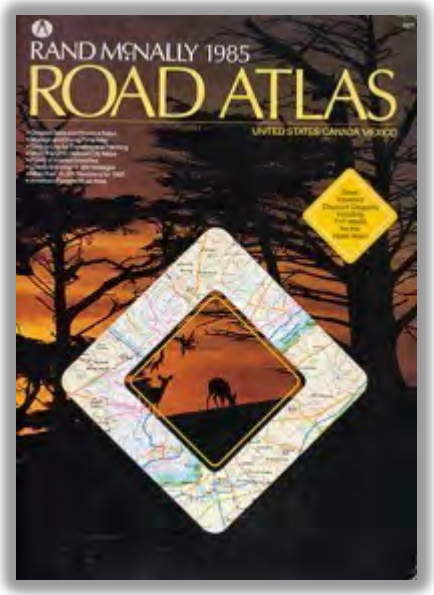
A Look Back …

1985



Near-Term Innovative Enhancements

- **Every Day Counts Technologies & Innovations**
  - **3-D Engineered Models and adding 4D (schedule) & 5D (cost)**
  - **Interchange Geometrics: e.g. Diverging Diamond**
  - **Pavement Preservation**

EDC every day counts

- **Strategic Highway Research Program (SHRP2)**
  - **Traffic Incident Management Responder Training to create safer and more quickly resolved emergency stoppages**
  - **Tools to Organize for Reliability**
  - **Guidelines for Preservation of High-Traffic-volume Roadways**
  - **Innovative Bridge Designs for Rapid Renewal**

SHRP2 SOLUTIONS TOOLS FOR THE ROAD AHEAD

Evolving Technologies

- **Non-traditional mobility providers (Uber, Lyft, etc.)**
- **Automated/connected vehicles**
- **Internet of Things/ Big Data**

- **Drones**
- **Artificial intelligence (AI)**
- **Alternative Powered vehicles**
- **Solar Roadways**
- **Hyperloop and novel transportation system**

Vehicle & Infrastructure Connectivity

- **Technologies available today:**
  - **Adaptive Cruise Control**
  - **Lane-Keeping Assistance**
  - **Braking Assistance**

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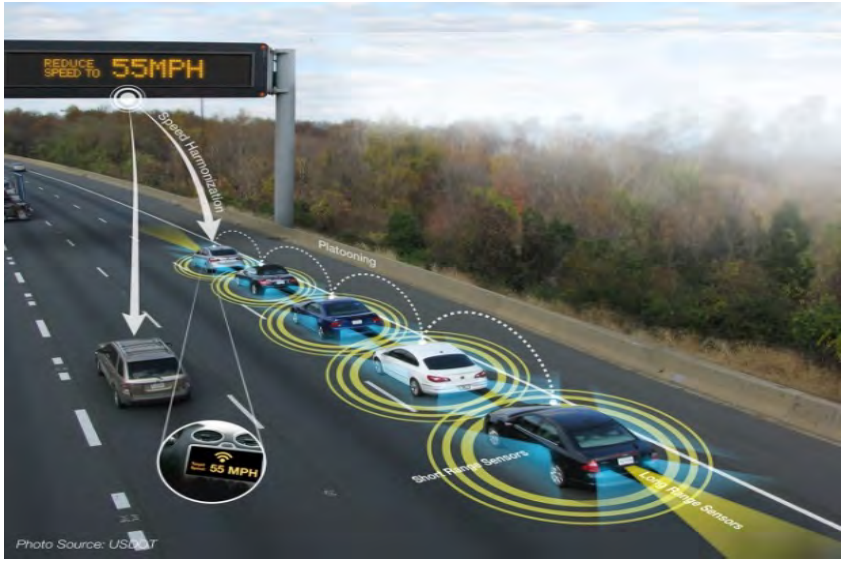
Photo number 7201240 should be purchased for each project in which this image is used.



- **In the near-term:**
  - **Connected Automated Cruise Control (CACC)**
  - **Vehicle Platooning**
  - **Speed Harmonization**
  - **Cooperative Merging**

Connected Vehicle Pilot Deployment Sites

ICF/Wyoming

Reduce the number and severity of adverse weather-related incidents in the I-80 corridor to improve safety and reduce incident-related delays

Focused on the needs of commercial vehicle operators in the State of Wyoming

New York City

Improve safety and mobility of travelers in New York City through connected vehicle technologies

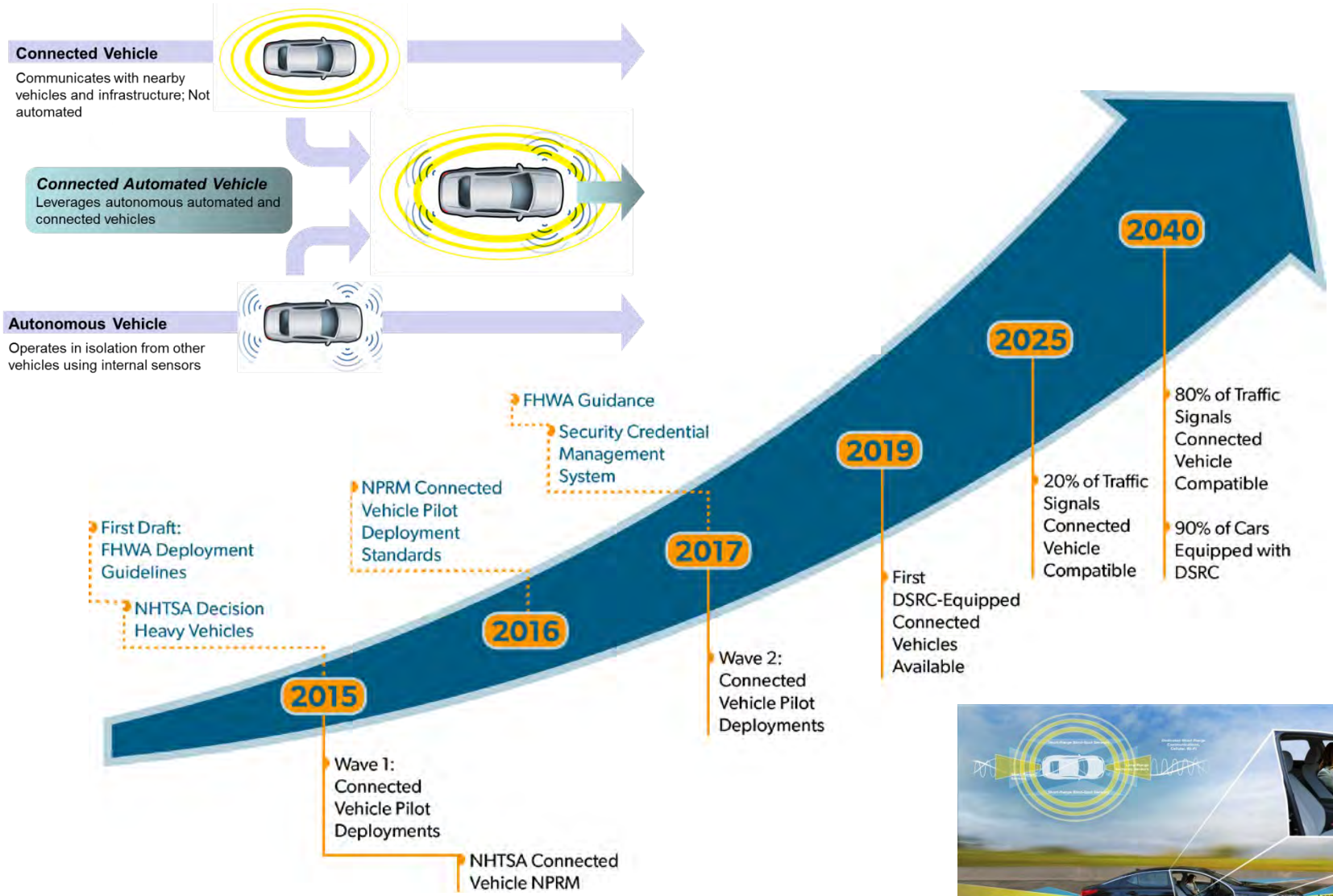
Vehicle-to-vehicle (V2V) technology installed in up to 10,000 vehicles in Midtown Manhattan, and vehicle-to-infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn

Tampa (THEA)

Alleviate congestion and improve safety during morning commuting hours

Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges

Innovation Through Automation



U.S. DOT Smart City

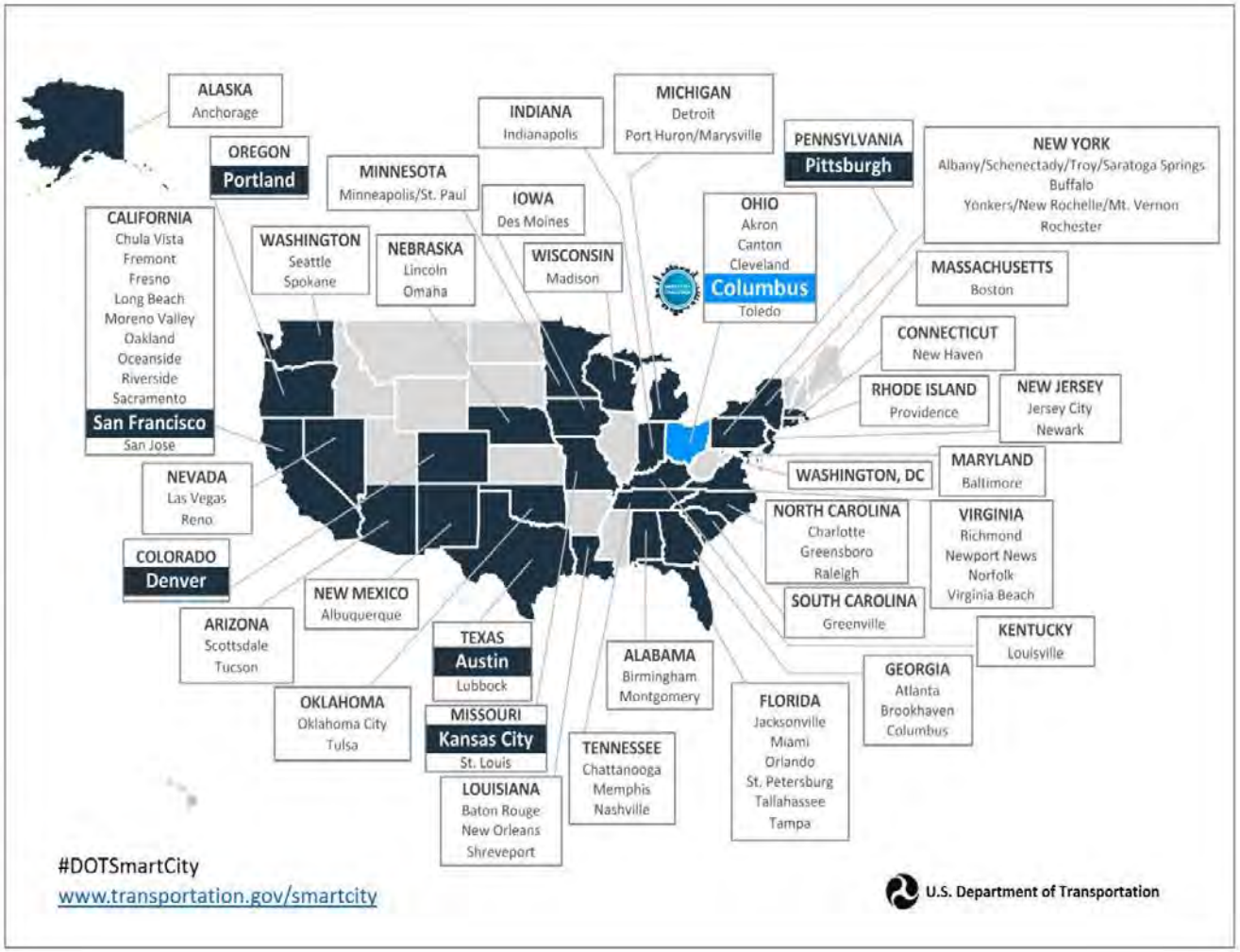
$500 million in partnerships identified in by the seven Smart City Challenge Finalists

150+ partnerships identified by the Smart City Challenge Finalist

78 applications received for the Smart City Challenge

7 Smart City Challenge Finalists announced in March 2016

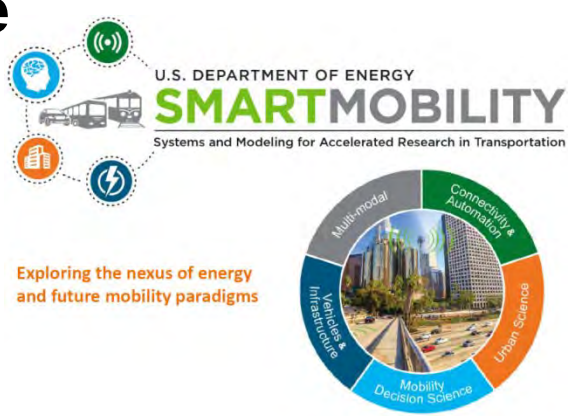
1 Smart City Challenge Winner

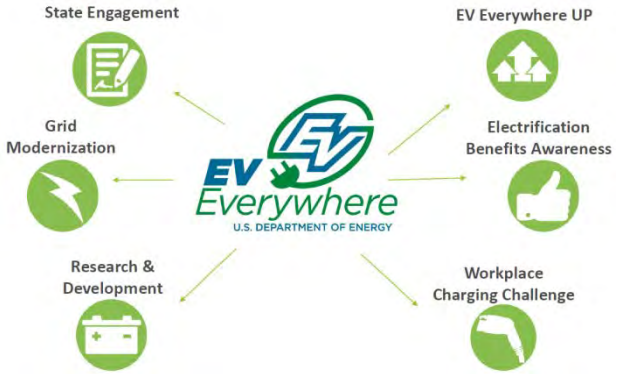


Alternative Fuel Initiatives

FHWA Alternative Fuel Initiatives

- Alternative Fuels Pooled Fund Study
- National Electric Vehicle Charging, Hydrogen, Propane and Natural Gas Fueling Corridors





Hydrogen Fuel

Fuel Cell can have ALL these attributes simultaneously:

- Fast Filled
- Long Range
- Zero Emissions
- Zero Criteria Pollutants
- Fueled by Renewables
- Uses Domestic Sources
- Fewer Vehicle Trade-offs
- Diverse Uses (V2B, SUVs, APUs, range extenders, etc.)

Source: U.S. Department of Energy, Brief entitled "DOE R&D Overview for DOT", August 19th, 2016, Reuben Sarkar, Deputy Assistant Secretary

Questions?

How can we Help?

http://www.fhwa.dot.gov/research/