The Defining Transportation Challenges of the 21st Century

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IEA EGRD Meeting

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What is Beyond Traffic?

Description

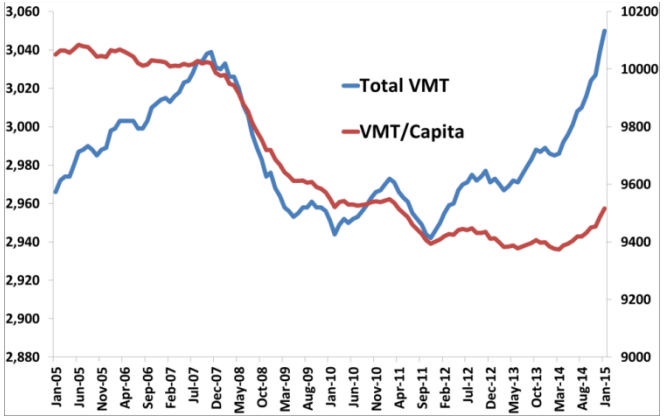
- Draft document released by U.S. DOT on February 2, 2015
  - Describes trends shaping our transportation system
  - Implications of these trends for each mode
  - Future scenario if we fail to address challenges
  - Policy options for addressing challenges

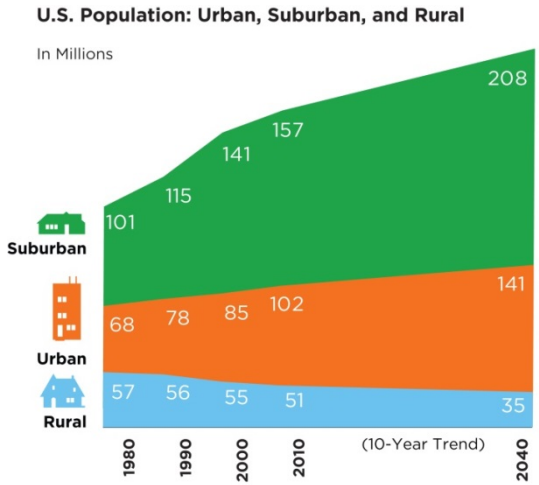
Purpose

- A framework highlighting big decisions, not a prescriptive plan
- Framing of key opportunities for research

How We Move

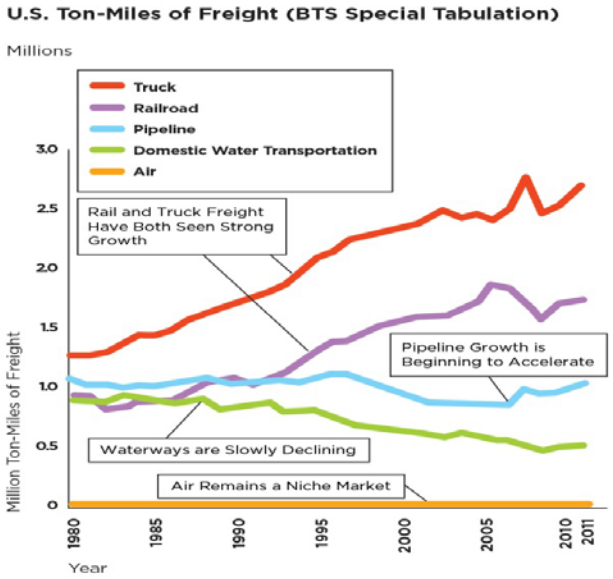
- Our population is growing and aging
- About 3 Trillion Vehicle Miles Traveled
- Large suburban population despite growing urbanization

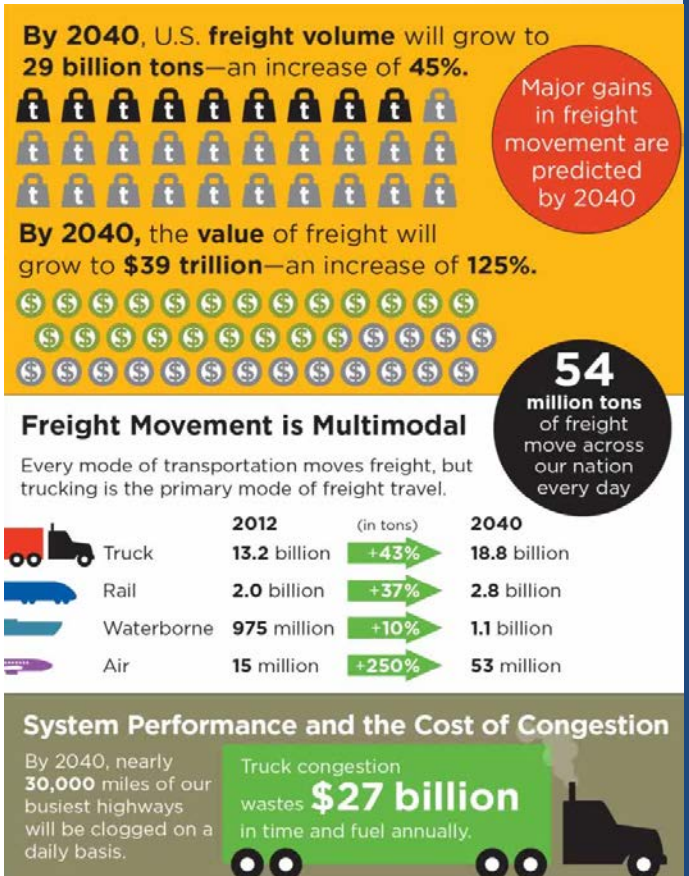




How We Move Things

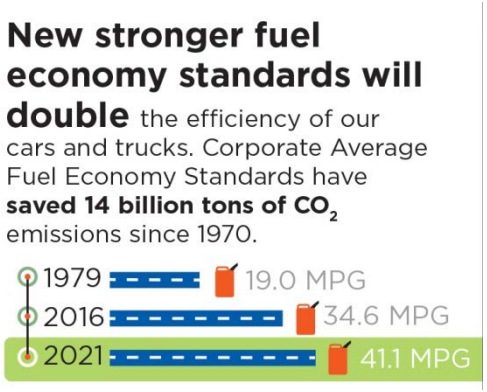
- Freight increasing as economy grows
- Movement highly dependent on trucking
- ‘Last mile’ issues in growing urban areas

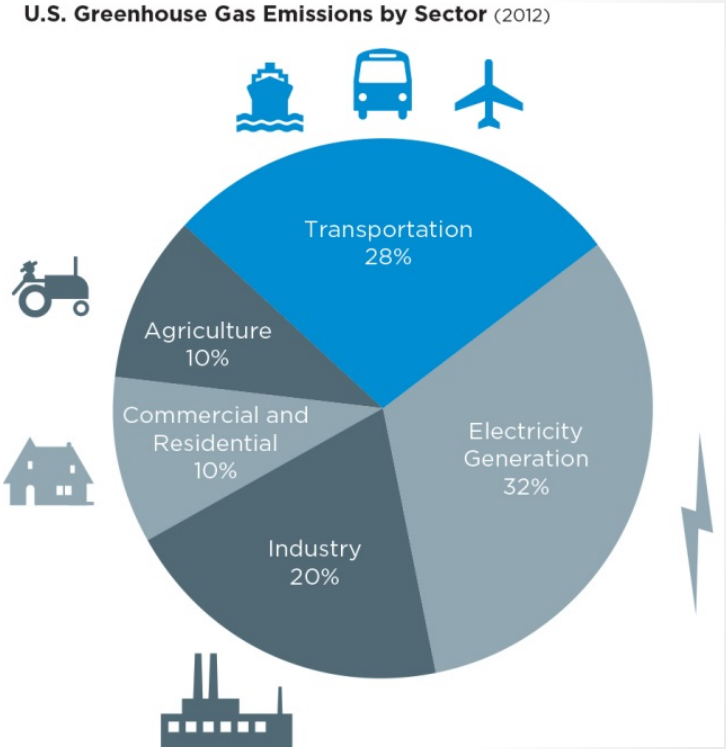




How We Adapt

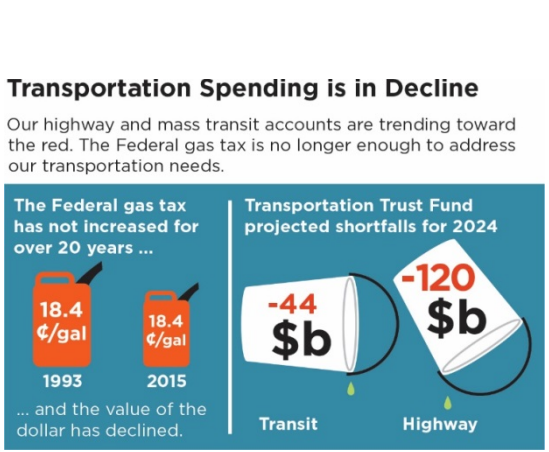
- Transportation responsible for 28% of all GHG emissions in U.S.
- Improving fuel efficiency across all modes is vital
- Focus on less obvious research needs in today's talk

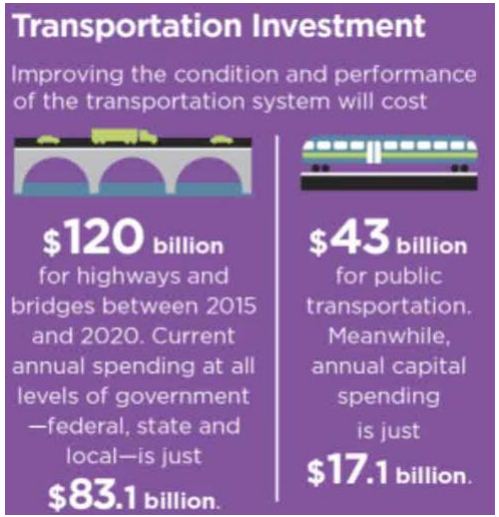


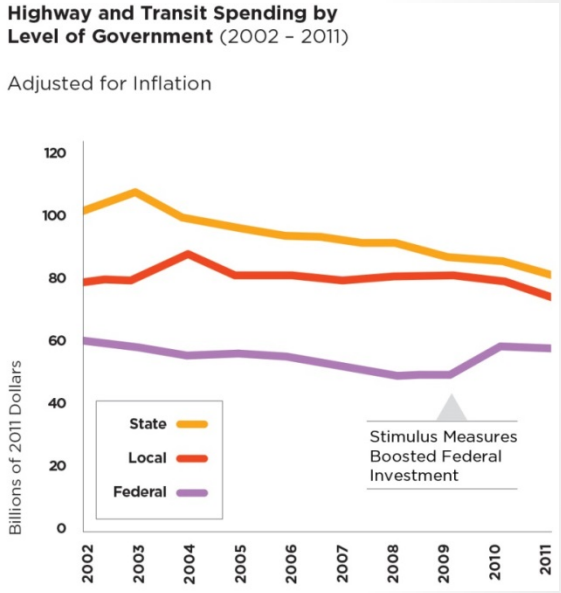


How We Align Decisions and Dollars

- Fragmented institutional environment and decentralized decision making
- Need for infrastructure investment in highways and transit
- Diminishing purchasing power of user fees and fuel taxes







Private Sector Investment

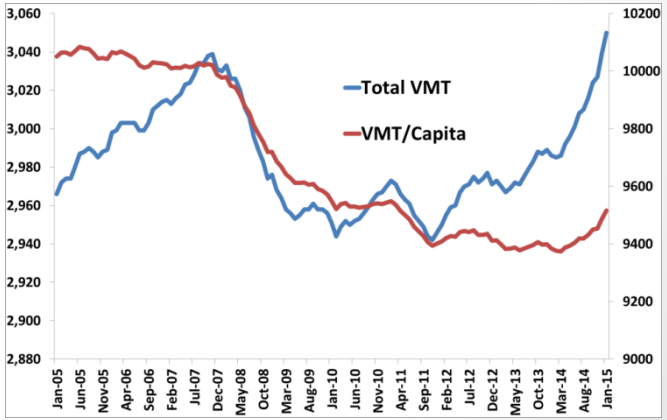
A succinct argument by Adam Jonas of Morgan Stanley:

3 Trillion Vehicle Miles Traveled

At $1 per mile =

$3 Trillion Addressable Market

(and growing)

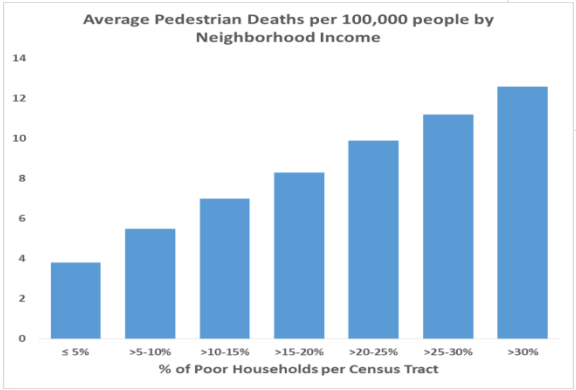


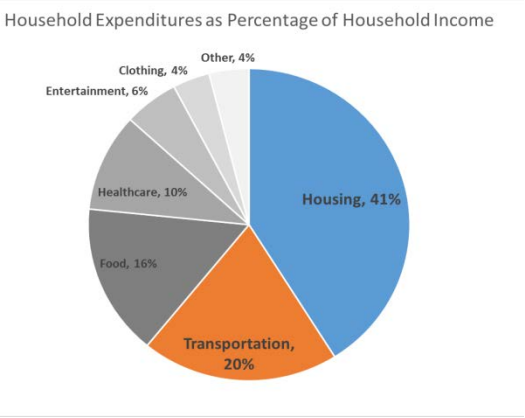
Resulting in considerable investment

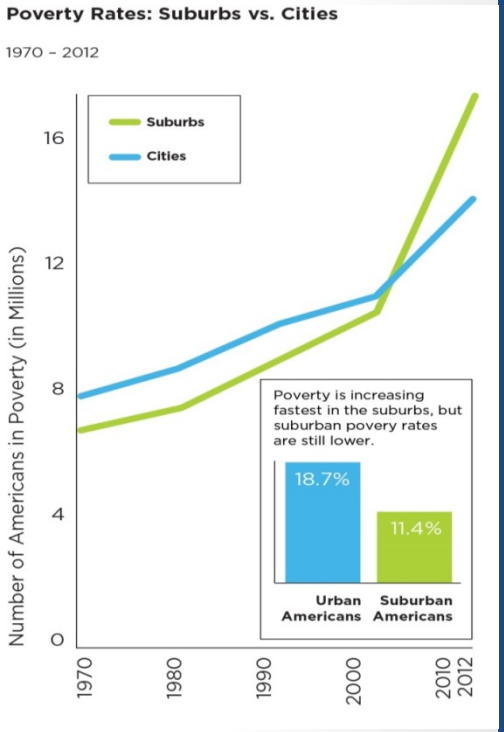
- Automated vehicles and TNCs
- Which miles will be covered?

How We Create Economic Opportunity

- Safety and access depend upon neighborhood
- Increasing challenges with suburban poverty
- First mile / last mile







How We Move Better

Advances we expect to see in coming years:

- Automation of cars, trucks, buses, ships, etc.
- Increased use of unmanned aircraft
- Modernization of our Nation's air traffic control system
- New designs for infrastructure

New approaches to policy in these areas

- Less prescriptive than traditional rulemaking
- Prototyping approaches

Leading to some new research needs for transportation

Automated Vehicles

- Automation will impact all modes of transportation
- Challenges, opportunities and implications of replacing humans

Federal Automated Vehicles Policy

- Traffic fatalities on the rise in 2015 and 2016
- Ensure safe testing and deployment of systems that reverse this

15 Point Safety Assessment

- Data Recording and Sharing
- Privacy
- System Safety
- Vehicle Cybersecurity
- Human Machine Interface
- Crashworthiness
- Consumer Education and Training
- Registration and Certification
- Post-Crash Behavior
- Federal, State and Local Laws
- Ethical Considerations
- Operational Design Domain
- Object and Event Detection and Response
- Fall Back (Minimal Risk Condition)
- Validation Methods

Operational Design Domain

Define for each automation system

- The domain where it operates
- How it ensures it is within the domain
- What fall back systems are in place
- How people are trained

Vehicle Design

- AV designs span (and expand) current modes of transportation

Urban Freight

- Ground drones could come in many shapes and sizes

Speed of Change

- Technology traditionally takes a while to reach the vehicle fleet
  - Roughly 50% penetration after a decade
- New ownership models could upend this
  - Hardware costs of automation already approach costs of a driver
  - Software development costs amortized over many vehicles
  - Few barriers to deployment of some technologies

- Large sudden disruption possible for companies and agencies with large investments in current systems

Unmanned Aircraft Systems

- Significant use within Federal agencies
- Want to open up commercial operations while ensuring safety

Economic Impact

Commercial Drone Operations

$82 Billion

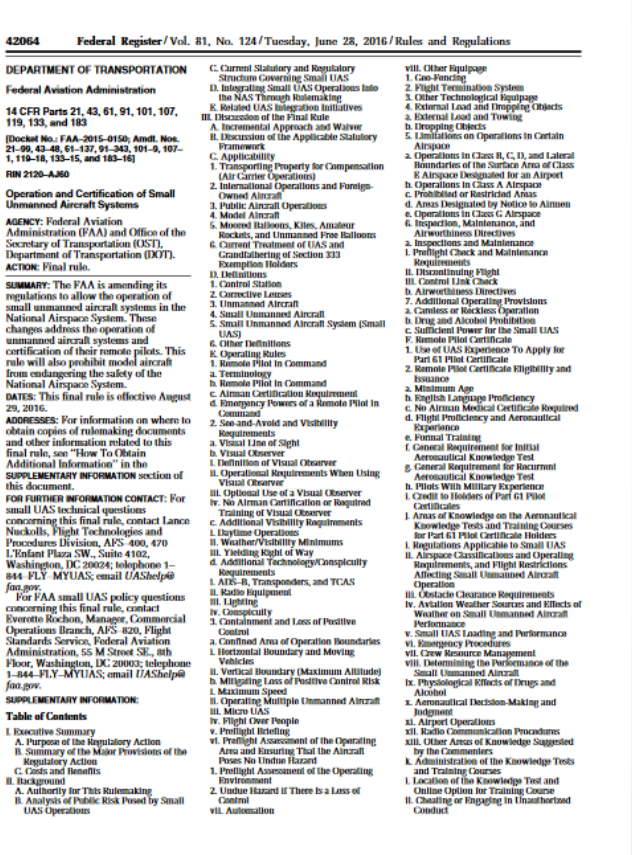
100,000 Jobs

over next 10 years

(Based on 2013 report from AUVSI)

Part 107 (Small UAS) Rule

- Certification for operations:
  - Below 400 feet
  - Within visual line of sight
  - Not over people
  - Less than 55 lb
  - Below 100 mph
- Expand rule to enable operation
  - Over people
  - Beyond visual line of sight



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DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 21, 43, 61, 91, 101, 107, 119, 133, and 183

[Docket No.: FAA–2015–0150; Amdt. Nos. 21–99, 43–48, 61–137, 91–343, 101–9, 107–1, 119–18, 133–15, and 183–16]

RIN 2120–AJ60

Operation and Certification of Small Unmanned Aircraft Systems

AGENCY: Federal Aviation Administration (FAA) and Office of the Secretary of Transportation (OST), Department of Transportation (DOT).

ACTION: Final rule.

SUMMARY: The FAA is amending its regulations to allow the operation of small unmanned aircraft systems in the National Airspace System. These changes address the operation of unmanned aircraft systems and certification of their remote pilots. This rule will also prohibit model aircraft from endangering the safety of the National Airspace System.

DATES: This final rule is effective August 29, 2016.

ADDRESSES: For information on where to obtain copies of rulemaking documents and other information related to this final rule, see "How To Obtain Additional Information" in the SUPPLEMENTARY INFORMATION section of this document.

FOR FURTHER INFORMATION CONTACT: For small UAS technical questions concerning this final rule, contact Lance Nuckolls, Flight Technologies and Procedures Division, AFS–400, 470 L'Enfant Plaza SW., Suite 4102, Washington, DC 20024; telephone 1–844–FLY–MYUAS; email *UAShelp@faa.gov*.

For FAA small UAS policy questions concerning this final rule, contact Everette Rochon, Manager, Commercial Operations Branch, AFS–820, Flight Standards Service, Federal Aviation Administration, 55 M Street SE., 8th Floor, Washington, DC 20003; telephone 1–844–FLY–MYUAS; email *UAShelp@faa.gov*.

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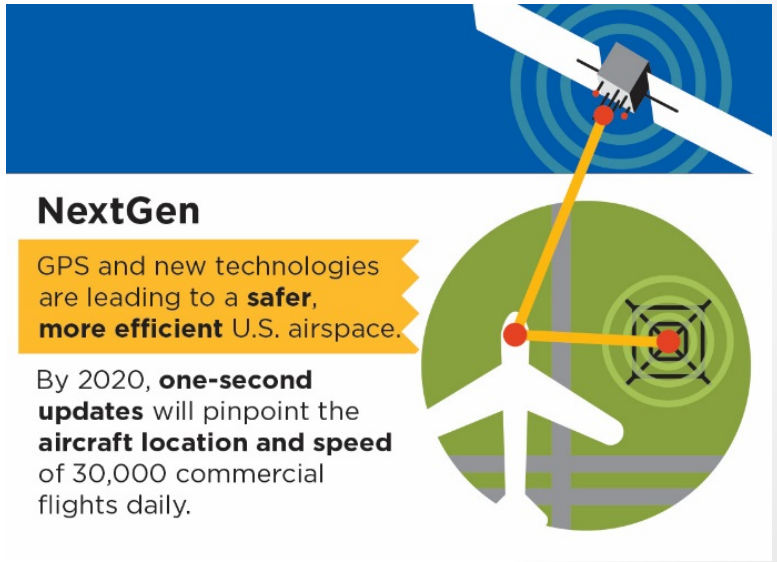
NextGen Air Traffic Control

- Full integration of UAS in the airspace remains a goal
- Many challenges and opportunities with NextGen air traffic
  - Remote tower operations
  - Reduced fuel use and delay
  - Noise
  - Community engagement



Design of Infrastructure

- Infrastructure decisions of the past connected many people while disconnecting others
- As infrastructure is replaced, there is an opportunity to do better
  - Modal shifts may change infrastructure needs

- The Secretary's 3 Principles of Inclusive Design
  - Understand that transportation is essential to opportunity
  - Acknowledge that past wrongs were committed and must not be repeated
  - Make transportation decisions by, with, and for the people impacted by them.

Many Challenges Ahead

- How we move
- How we move things
- How we adapt
- How we create economic opportunity

- Changes are necessary and will come rapidly
  - In many cases, few or no regulatory barriers exist
  - Deployment scenarios considering miles instead of vehicles

- Need to ensure we get very smart about policy, very fast
  - Research ways to shape the future instead of just predicting it
  - Pilot ideas in the real world