The Future of Mobility

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TRANSPORTATION IS FUNDAMENTAL TO OUR WAY OF LIFE

The U.S. population is growing and aging

Population density is increasing—75% of the population lives in urban mega-regions

Technologies and fuel choices are expanding

Transportation costs are high—second only to housing expenses

3 Trillion Vehicle Miles

11 Billion Freight Tons

11 Billion Freight Tons

3 Trillion Vehicle Miles
**Population**

Population expected to grow by **70 million** in next **30 years**

- **75%** of population concentrated in **11 Megaregions**

**Demographics**

**Americans are Living Longer**

By 2045, the number of Americans over age 65 will increase by **77%**.

About **one-third** have a disability that limits mobility.

**Millennials are Connected & Influential**

- There are **73 million** Americans aged 18 to 34.
- They drove **20%** fewer miles in 2010 than at the start of the decade.

**Technology**

- **Integration of Connected & Automated Technologies**
- **Introduction of Shared Service Platforms**
- **Advancements in Energy Storage Technology**
- **Deeper Application of Big Data**
- **Faster Processing Speeds at Decreasing Cost**
A BRIDGE TO THE FUTURE...

MATERIALS

ADVANCED COMBUSTION & FUELS

CO-OPTIMIZATION
ELECTRIFICATION
### Cost Trends for Lithium-based EV Batteries

- **Graphite/High Voltage NMC**
  - 4V, NMC: $219/kWh

- **Silicon/High Voltage NMC**
  - 4.2V, 10% Si: $256/kWh

- **Lithium-Metal or Lithium/Sulfur**
  - 4.7 Volt, 30% Si: ~$80/kWh
  - 5x excess Li, 10% S: $320/kWh

Li-Metal Battery projection assumes cycle life, cell scale-up, and catastrophic failure issues have been resolved.
NEW TECHNOLOGIES & BUSINESS MODELS ARE DRIVING DISRUPTION

- Shared Mobility
- Mobility On Demand
- Goods On Demand
- Connected & Automated Vehicles
- Emerging Fuels & Powertrains
- New Modes of Transport
PIONEERING RESEARCH

EXPLORES POTENTIAL ENERGY IMPACTS

Shared Mobility  
Mobility On Demand  
Goods On Demand  
Connected & Automated Vehicles  
Emerging Fuels & Powertrains  
New Modes of Transport
NEW CHALLENGES BRING NEW OPPORTUNITIES IN THE ENERGY EFFICIENT MOBILITY SYSTEMS PROGRAM
ACHIEVING GOALS

THROUGH FIVE EEMS ACTIVITY AREAS

- Advanced R&D Projects
- Core Evaluation & Simulation Tools
- Living Labs
- Smart Mobility Lab Consortium
- HPC4Mobility & Big Transportation Data Analytics
SMART MOBILITY LAB

CONSORTIUM

7 labs, 30+ projects, 65 researchers, $34M* over 3 years.

* Based on anticipated funding
ADVANCED RESEARCH & DEVELOPMENT

4 University Projects, $6.4M
11 arpa-e NEXTCAR Projects

Vehicle & Traffic Control Algorithms
CAV Vehicle & Transportation Simulation
Data Collection from CAV Deployments
Transportation System Optimization
CAV Vehicle-in-the-Loop Testing
$20 million in New Living Lab Projects Just Announced – Covering 6 Key Research Areas
NEW OPPORTUNITIES FOR

HPC4MOBILITY & BIG DATA ANALYTICS

Up to $5.5M in FY2018

* Based on anticipated funding
TOOLS CORE TO ASSESSING TECHNOLOGIES IMPACT ON ENERGY

**SINGLE VEHICLE**
- Component Targets
- Powertrain Electrification Benefits
- Predictive Control

**SMALL AREA NETWORK**
- Multi-vehicle simulation in environment
- V2V, V2I, I2V
- Eco-Control

**CITY / REGION**
- Agent-Based Transportation Simulation
- Traveler Demand
- ITS and Network Operations
MathWorks core to energy impact estimation from individual vehicles to entire metropolitan areas leveraging HPC.
OUR VISION

VEHICLE TECHNOLOGIES OFFICE

MOBILITY ENERGY PRODUCTIVITY

achieving

more choices

when & where it is needed

more affordable
$65 MILLION IN COOPERATIVE RESEARCH FUNDING

Breakthrough research including:
- Next Generation Batteries
- New Engines & Fuels
- CyberSecurity of EV Charging
- Truck Platooning
- HPC & AI to optimize Transit hubs
- Mobility Data / Analytics for Cities

$19 MILLION – PROJECTS SELECTED:
BATTERIES & ELECTRIFICATION RESEARCH TO ENABLE EXTREME FAST CHARGING

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Thank You

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