GETTING SMARTER ON ENERGY & MOBILITY
Massive wave of changes hitting our transportation system

THE OPPORTUNITY AND PROBLEM....

Megatrends
Shared Mobility
MaaS
GPS/Map Services
E-Retailing

Master the wave or get washed out on GHG emissions
TODAY….ADVANCED VEHICLES IN A SUB-OPTIMAL SYSTEM

Efficient vehicles enter an inefficient system

CAVs technology targeting safety is hitting the market.

Designing for the nexus of safety, energy, and mobility
INTRODUCING TRANSPORTATION-AS-A-SYSTEM

Explore untapped system-level efficiencies at planning and operations timescales

- **Today:**
  - Vehicle-level focus
  - Independent
  - Unconnected
  - Subject to behaviors & decisions

- **Tomorrow:**
  - System-level focus
  - Connected
  - Automated
  - In concert
  - Across modes
  - Managed behaviors & decisions
Vast range of energy implications … more research required
UNLOCKING VALUE MAY UNLEASH CONSUMPTION

Travel More
Travel Faster
Modal Shifting*
Ship More Goods*

* Not included in preliminary projections

2050 Baseline Energy Consumption

Potential Increase in Energy Consumption +200%
Potential Decrease in Energy Consumption -90%

Reduce Congestion
Smooth Traffic Flow
Operate More Efficiently
Adopt More ZEVs

Will new value creation drive unbridled consumption?
INCREASINGLY COMPLEX DECISION ENVIRONMENT

Transforming complexity into clarity for decision makers?
CONNECTED & AUTOMATED VEHICLES (CAVs)

- Quantify the energy impacts
- Identify CAV-enabled opportunities
- Inform policy/research on CAVs
- Address the barriers to CAVs

Improving our ability to predict the energy impact of CAV’s
URBAN MOBILITY SCIENCE

- A new class of data science
- City-scale computational mobility models
- Revealing the previously unknown

Providing scientific support to decision makers
MOBILITY DECISION SCIENCE

- A science of decision making
- Increasingly complex decision environment
- Convergence of ICT, IOT, Shared Economy

Technology and policy that anticipate how decisions are made
WORLD CLASS LABORATORY
RESOURCES

Automation tools
Massive data feeds

Propulsion / powertrain
Modeling systems

HPC architecture and systems

Multi-scale mobility models

Traveler energy consumption model
~1 (individual) agent
LBNL Traveler Energy Consumption Model
LBNL Vehicle Model Library (VML)

Micro/meso simulation
~50,000 agents
Aimsun

Macrosimulation
~500,000 agents
Connected Corridors
Mobile Millennium
TOPL

Agent based model
~ 5,000,000 agents
Socially Aware Incentive
Responsive - Travel Demand
Model (SAIR-TDM)
MATSim

Land use models and regional models
Multi-lab consortia exploring the nexus of energy and future mobility paradigms