Transportation – Current State

- One of fastest growing end-use subsectors:
  - 5.5 GtCO$_2$e in 2009, or 18% of total GHG emissions excluding LULUCF.
  - Increase in personal vehicle mobility drives growth in emissions:
    - Least efficient, most carbon intensive.
Transportation Emissions Share

| Source: CAIT 2009 |
| Emissions are in MtCO$_2$e. |
Transportation - Modal Breakdown

OECD/IEA, ETP 2012

[Bar chart showing modal breakdown of transportation by region, with categories including Air, Rail, Buses, Mini-buses, Passenger light trucks, Passenger cars, 3- and 4-wheelers, and 2-wheelers.]
Transportation – Energy Mix

Figure 2: Final Energy Distribution in the Transport Sector, 2009

Source: OECD/IEA ETP 2012
Transportation – Emissions by Country

UNITED STATES: 1.607
EU 28: 0.915
CHINA: 0.470
RUSSIAN FEDERATION: 0.226
JAPAN: 0.221
CANADA: 0.164
INDIA: 0.149
MEXICO: 0.147

CAIT 2009
Transportation

Current, BAU, and 2DS scenarios

OECD/IEA, ETP 2012
Transportation - BRICS Trends

OECD/IEA, 2012
Projected growth in demand in developing countries for travel will determine magnitude:

- Urban density and urbanization increase.
- Global passenger and freight travel is expected to double from 2010 figures in the next 40 years.
- Non-OECD member countries composing 90% of global travel increase.
Transportation-ASI framework

- Avoid Travel
- Shift Modes
- Improve Technology
Emissions Reduction Needed to get to 2DS, 4DS by 2050
Transportation - Avoid

- Reduce demand for carbon-intensive mobility:
  - Congestion and Distance-Based Pricing.
  - Less Carbon-Intensive Road Construction.
  - Emissions Calculators.
**Transportation - Avoid**

- **Barriers:**
  - Reduced access for low income groups.
  - Funding for Infrastructure Improvements.
  - Governance structure in-country.
Transportation - Avoid

- **Recommendations:**
  - **United States**
    - LEED-type certification for transportation infrastructure.
  - **China**
    - Public transport, urban planning, electric 2-wheeled vehicles.
  - **India**
    - Advocate low-carbon road and rail construction and maintenance, urban planning.
Transportation - Shift

- Shifting demand away from carbon intensive transport
  - Rail
  - BRT
**Transportation - Shift**

- **Barriers:**
  - Lack of investment (US), Market saturation (EU).
  - Shift is only highly effective in high density population areas.
  - Prevalence and increase of car culture.
  - Decentralized decision making (India, US).
Transportation - Shift

- **Recommendations:**
  - **United States**
    - National transport hub system incorporating multi-modal travel.
  - **China**
    - Fiscal incentives (ex. tax breaks) promoting use of EV and alternative fuel technology and plug-in infrastructure.
  - **India**
    - Rail as the dominant form of freight.
Transportation - Improve

- The greatest GHG mitigation potential in the transport sector is achieved by improving transportation technologies, especially LDVs: $2.5 \text{ GtCO}_2\text{e in 2030 and 7 GtCO}_2\text{e in 2050.}$
  - Improve fuel efficiency.
  - Increase use of alternative fuels.
LDV Improvements Reducing Emissions

Source: McKinsey Climate Desk, 2009
Barriers:

- Lack of political will for top-down regulation.
- Uncertainty about operating cost reductions and split incentives (HDVs).
- Lack of authority over international air & sea emissions.
- Alternative fuels require extensive infrastructure investment.
LDV Emissions Reductions

Source: ICCT 2013
Transportation - Improve

**Recommendations:**

- Encourage alternative fuel use by increasing taxes on fossil fuel consumption and subsidizing EV charging infrastructure.

**US:**
- Continue to increase LDV fuel economy standards and pursue aggressive standards for MDVs and HDVs.

**EU:**
- Expand electric vehicle charging infrastructure.

**China and India:**
- Encourage vehicle manufacturing joint-ventures and encourage the adoption of easily integrated alternative fuels.
Transport Summary

- Avoid and manage travel to reduce emissions and congestion:
  - Reduces emissions in dense urban areas.

- Shift to low carbon intensity modes such as BRT and rail:
  - Developing countries must maintain diverse modes.

- Improve transportation technologies to reduce emissions:
  - Energy security is improved as a result.