US Approach for Reducing Transportation Emissions

- National standards for new vehicles and fuels
- Incentives to leverage private investment in clean technology
- Cross-cutting complementary programs – EPA SmartWay, EPA ports initiative
US EPA’s Emissions Standards for Diesel Trucks

- 1988
- 1991
- 1994
- 1998
- 2004

PM (g/hp-hr)

NOx (g/hp-hr)

- 2007-2010
- 1990
- 1988
- 1991
- 2004
- 1998
- 1994

unregulated
Comparison of Growth Areas and Emissions, 1970-2015

- Growth Areas:
  - Gross Domestic Product: 246%
  - Vehicle Miles Traveled: 184%
  - Population: 57%
  - Energy Consumption: 44%
  - CO₂ Emissions: 28%
  - Aggregate Emissions (Six Common Pollutants): -71%

- Emissions:
  - 70 80 90 95 96 97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
EMISSIONS FROM FREIGHT

$\text{CO}_2$ emissions from freight = 30% of all transport-related $\text{CO}_2$ emissions from fuel combustion

7% of global $\text{CO}_2$ emissions
U.S. LIGHT AND HEAVY-DUTY VEHICLE GHG STANDARDS

* Note that Japan has already exceeded its 2020 statutory target, as of 2013.
OPPORTUNITIES FOR SUPPLY CHAIN REDUCTION:

- De-speeding the Supply Chain (18%)
- Optimized Networks (13%)
- Low Carbon Sourcing & Manufacturing (16%)
- Near Shoring (?%)
- Packaging Reduction (14%)
- Modal Switches (12%)
- Reverse Logistics (9%)
- Energy Efficient Buildings (<5%)
- Clean Vehicle Technologies (18%)
- Reverse Logistics (9%)

Source: Maersk, based on World Economic Forum – Supply Chain Decarbonization – The Role of Logistics and Transport in Reducing Supply Chain Carbon Emissions
SMARTWAY DATA PLATFORM

**Simplicity**
- Standard benchmarking tools and methods

**Accuracy**
- Performance based assessment of CO₂, NOx, PM

**Flexibility**
- Multiple metrics, multimodal, multi-fleet, multi-categories

**Transparency**
- Manageable granularity, protects sensitive information

![Transportation Modes](Barge, Rail, Truck, Air)
Scopes 1-3 from a supply chain perspective
A SmartWay tractor and trailer annually save 2,000 to 4,000 gallons of fuel and reduce CO2 emissions by up to 20% as compared to similar trucks on the road. Learn more at www.epa.gov/smartway
Tens of thousands of individual businesses, each with dozens or hundreds of discrete supply chains, interact with hundreds of thousands of carriers and third party logistics firms (3PL). Each entity (or division thereof) has its own internal systems, metrics and assumptions = market discontinuity, niches, fragmentation

- Procurement
- Manufacturing
- Packaging
- Warehousing
- Logistics
- Retail
- End of life
SMALL FLEETS MAKE UP MOST OF THE TRUCKING INDUSTRY

SMARTWAY VS. NATIONAL FLEET SIZE COMPOSITION

- STP Truck Fleet Composition, 2016 (%)
- National Registration, 2015 (%) fmcza

- 1-2 trucks: 5%, 98%
- 1-10 trucks: 64%, 15%
- 1-20 trucks: 90%, 28%
- 1-50 trucks: 97%, 51%
- 1-100 trucks: 70%
Ushering in the Freight “Data Sphere” – IoT and Digital Twins
ADVANCING AUTOMATION & DIGITALIZATION
DATA WISH LIST:

- Back end: AI and other cognitive data systems to assess data from multiple sources at massive scale
- Front end: User interfaces that make data collection and access easy and convenient for its intended use
Rethinking Urban and Last Mile Delivery
Bicycle-Assisted EV’s… or Robots?
NETWORK OPTIMIZATION
ADVANCING POWERTRAINS, MATERIALS & TECHNOLOGY
WHAT CAN THE WORLD LOOK LIKE IN 2050?