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SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS

An Institute of Transportation Studies Program

The Challenge of Meeting Deep Reductions in GHG Emissions from the Transportation Sector by 2050

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Putting Reduction Goals in Context

- Decomposition analysis for each subsector
  - LDVs, HDVs, Aviation, Marine, Rail, Ag and Offroad

$$CO_{2,Transport} \equiv (Population)\left(\frac{Transport}{Person}\right)\left(\frac{Energy}{Transport}\right)\left(\frac{Carbon}{Energy}\right)$$

$$P \cdot T \cdot E \cdot C$$

Population | **Transport intensity** (e.g., VMT/capita) | **Energy Intensity** (e.g., MJ/mile) | **Carbon Intensity** (e.g. gCO_2-eq/MJ)

  - Population and travel demand growth are major challenges
- ***80in50* scenarios**
  - get a feel for size and scope of challenge required

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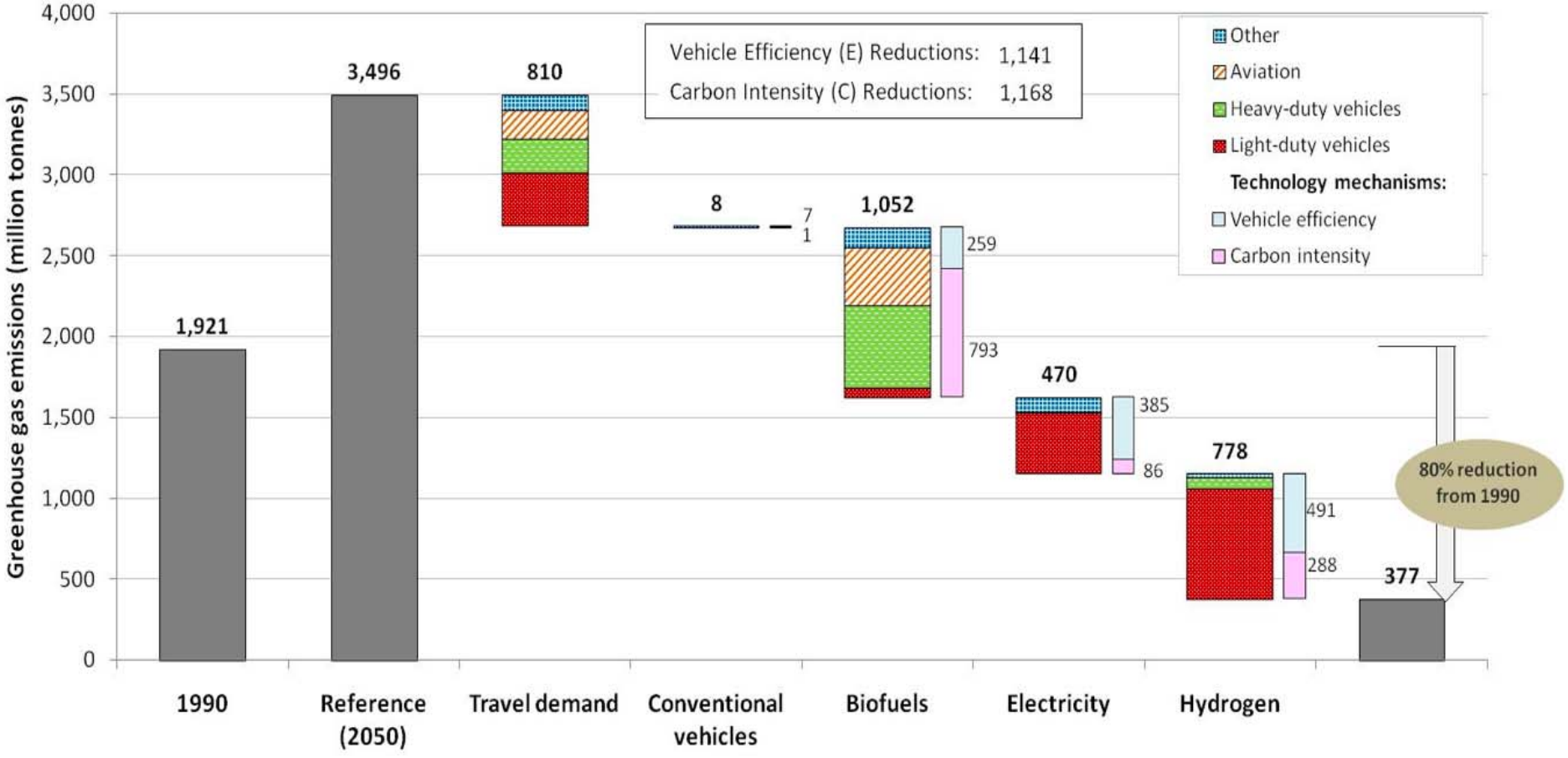
80in50 Scenario Inputs

- Travel demand
  - 20% reduction from BAU LDV growth in VMT
  - 25% reduction from BAU Aviation passenger miles
- Vehicle efficiency
  - 85 mpg LDV (on-road) 4x improvement
  - ~2-3x improvement in most other subsector fleet efficiency

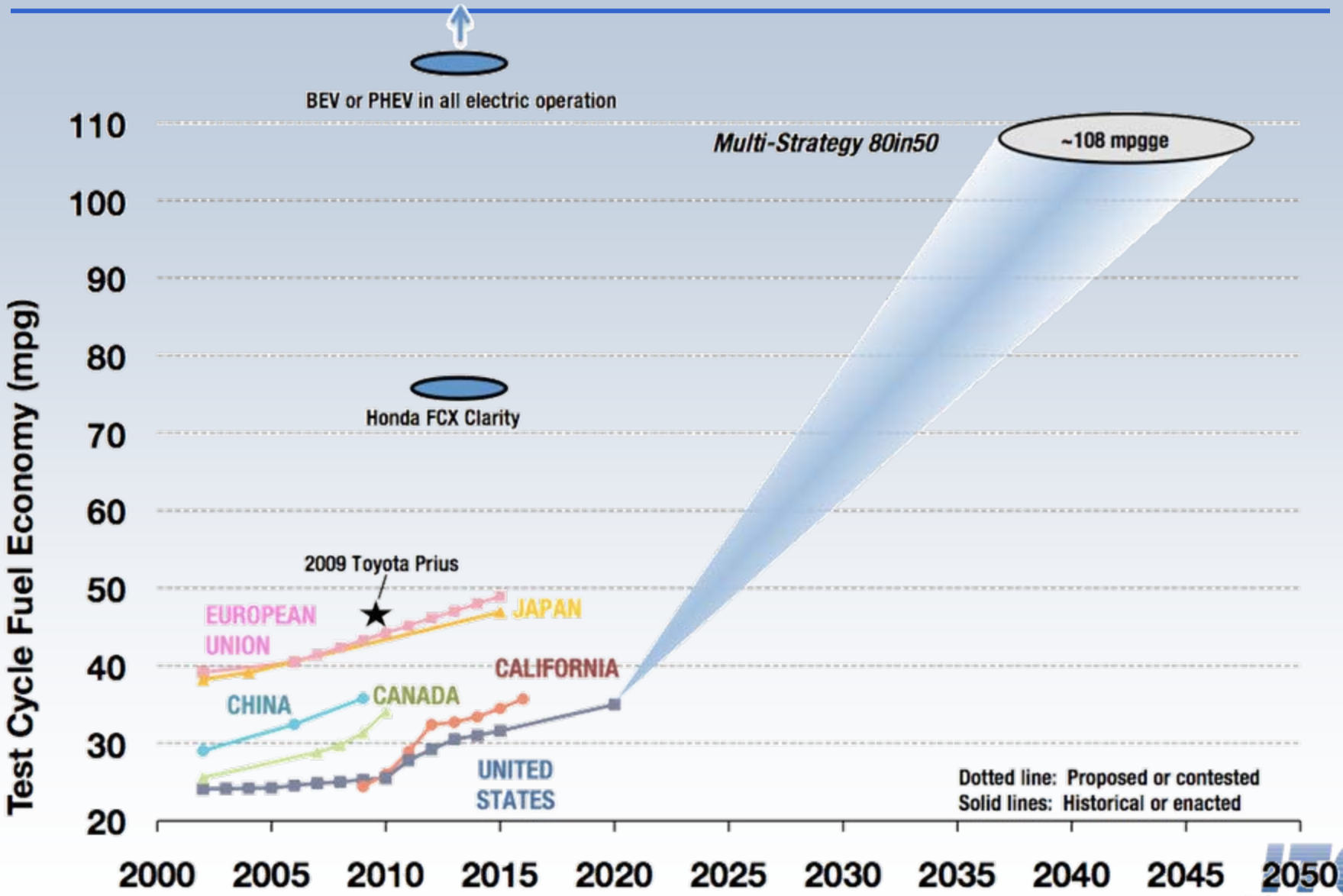
		% of Miles by Fuel Type				Energy Intensity (1990= 100%)	Carbon Intensity (1990= 100%)
		Petroleum	Biofuels	Hydrogen	Electricity		
Multi-Strategy 80in50	LDV	0%	10%	**60%**	**30%**	22%	30%
	HDV	0%	**63%**	28%	9%	58%	19%
	Aviation	0%	**100%**	0%	0%	37%	14%
	Rail	0%	0%	0%	**100%**	38%	43%
	Marine/Ag/ Off-road	2%	**79%**	20%	0%	40%	28%
	Total	0%	36%	40%	24%	31%	24%
Fuel Demand [Billion GGE] (Carbon intensity [gCO2e/MJ])		2.0 (90-92)	**82 (12.3)**	**39 (24.3)**	**19 (43.6)**		

80in50 for US Transportation Emissions

- Multi-strategy



LDV Fuel Economy



* All country level data comes from the International Council on Clean Transportation, *Passenger Vehicle Greenhouse Gas and Fuel Economy Standards: A Global Update*, December 2008
* Timing of required new vehicle fuel economies for scenarios is approximate since it depends on fleet turnover. On-road fuel economies are assumed to be ~80% of test cycle values.
* Fuel economy of Chevy Volt is based on its classification as an EV and includes electrical energy and gasoline. An exclusive EPA testing cycle for PHEVs has not yet been developed.