California's Transportation GHG Policy Model

…as seen by a policy wonk, regulator, and academic

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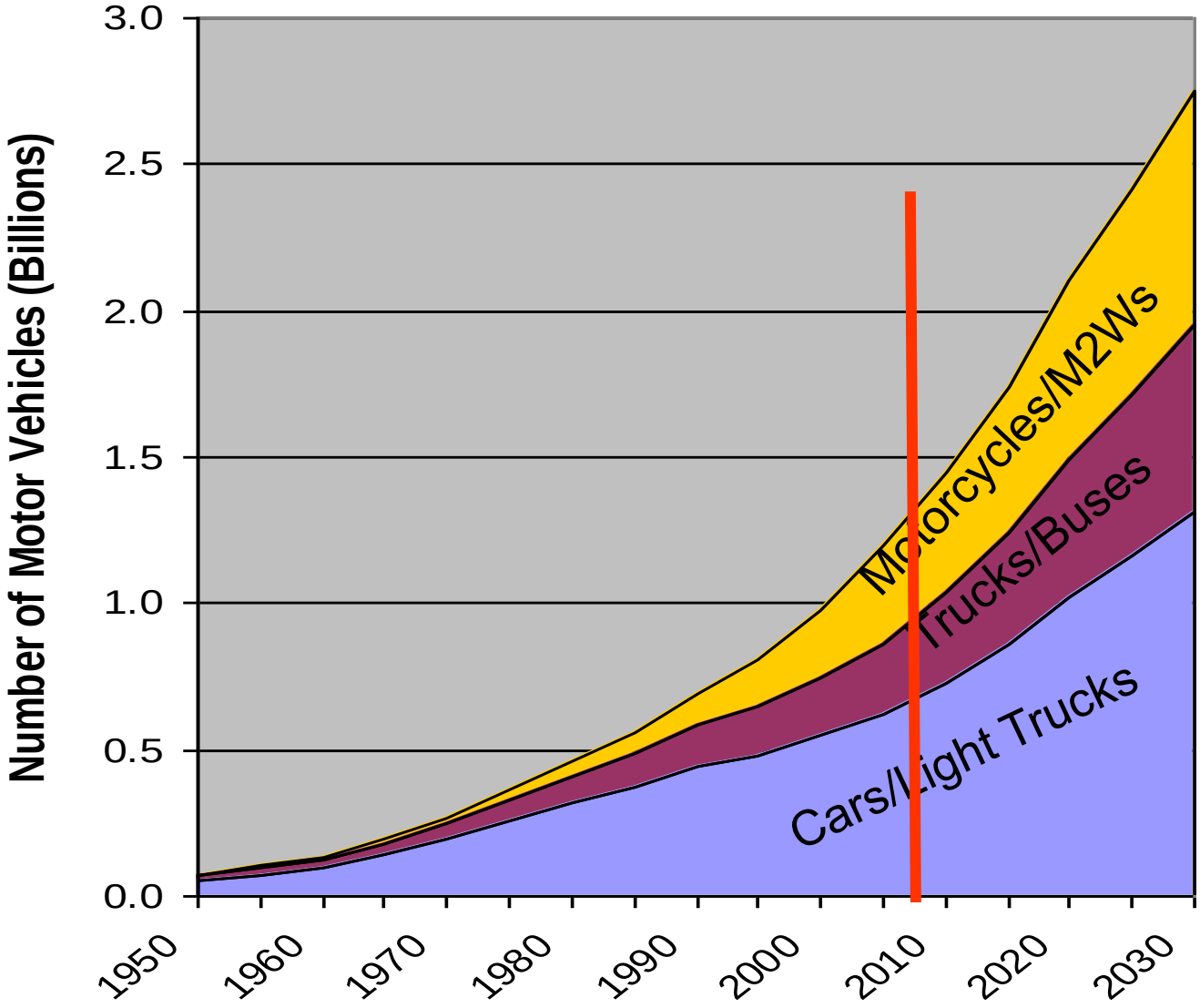
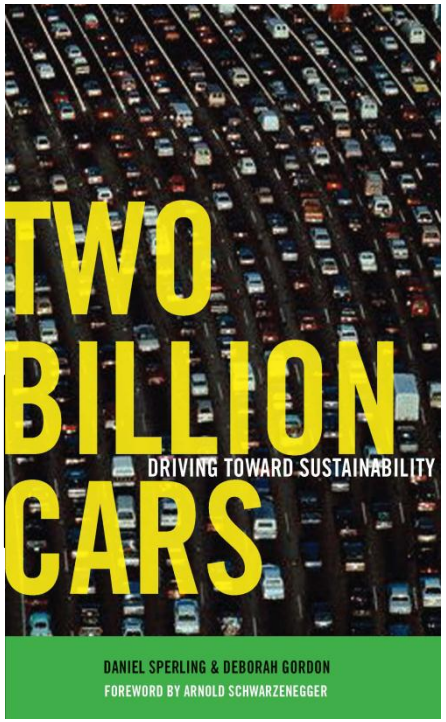
Outline

- The Problem
- Transforming Transportation
  - Vehicles
  - Fuels
  - Mobility
- The California Policy Model

Setting the scene…

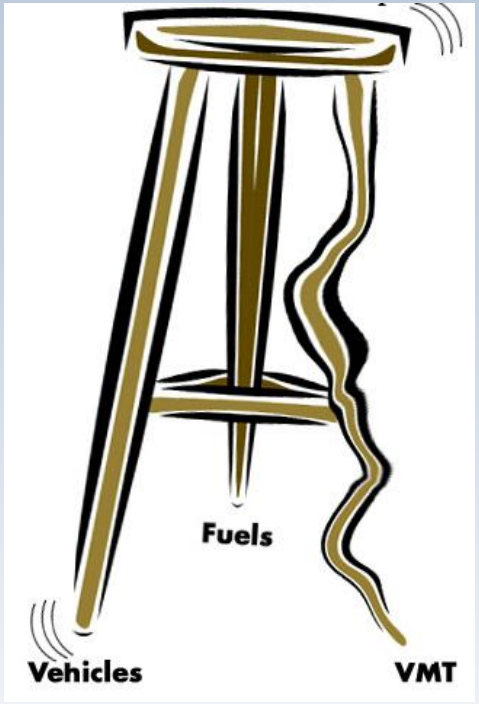
Soaring Global Demand for Vehicles (and Oil)





Sperling and Gordon (2009), based on DOE, JAMA, other

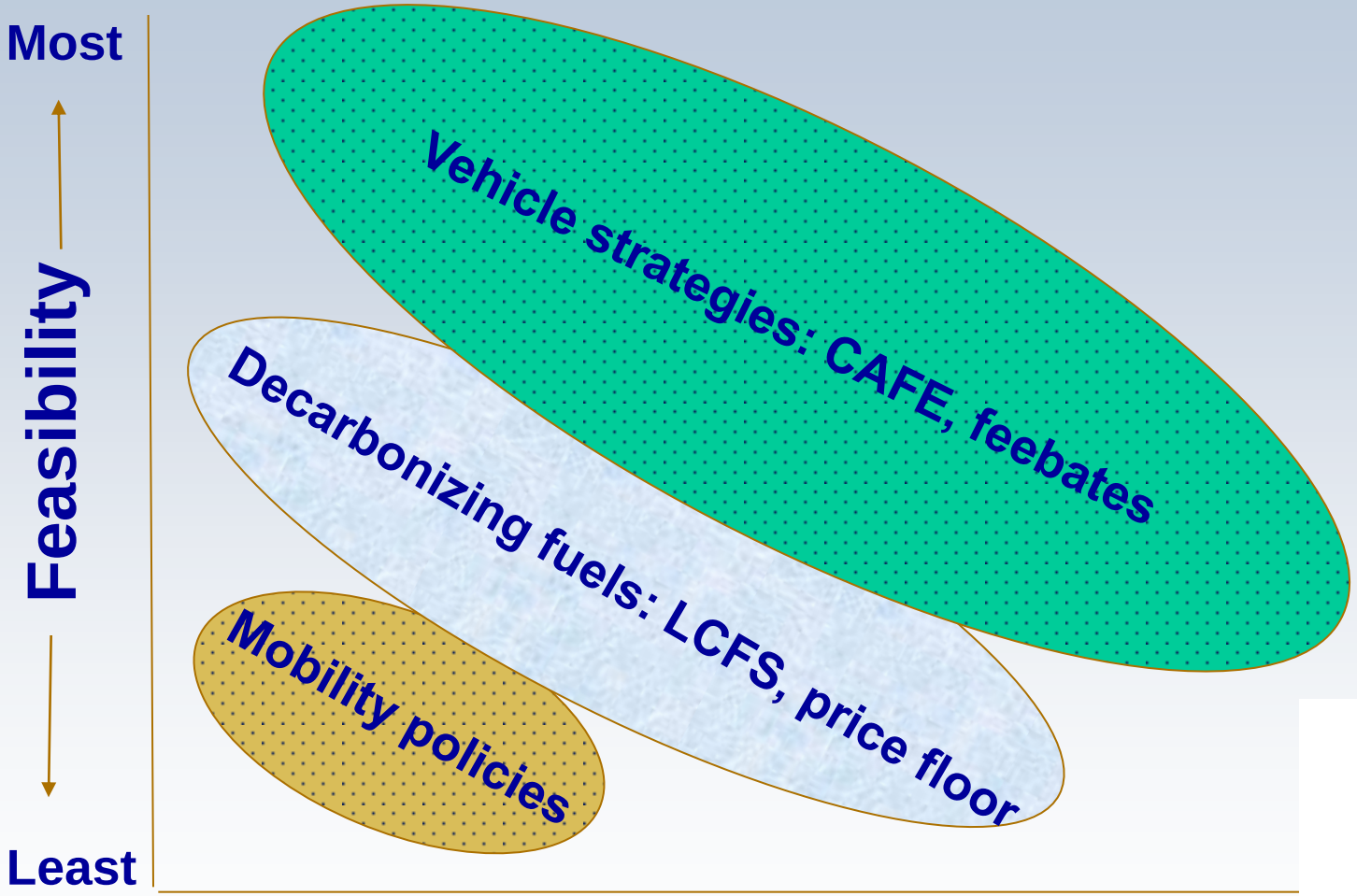
Transforming Transportation

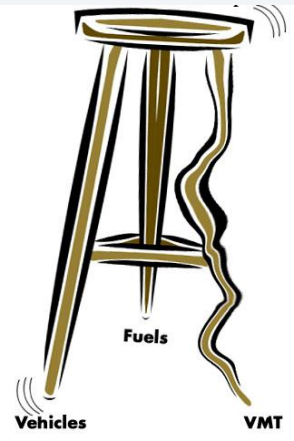


Large reductions in local pollution, oil use, and GHGs, with large benefits for health, livability.

- Transforming vehicles
- Transforming fuels
- Transforming mobility

Vehicle strategies are easier and more effective than others

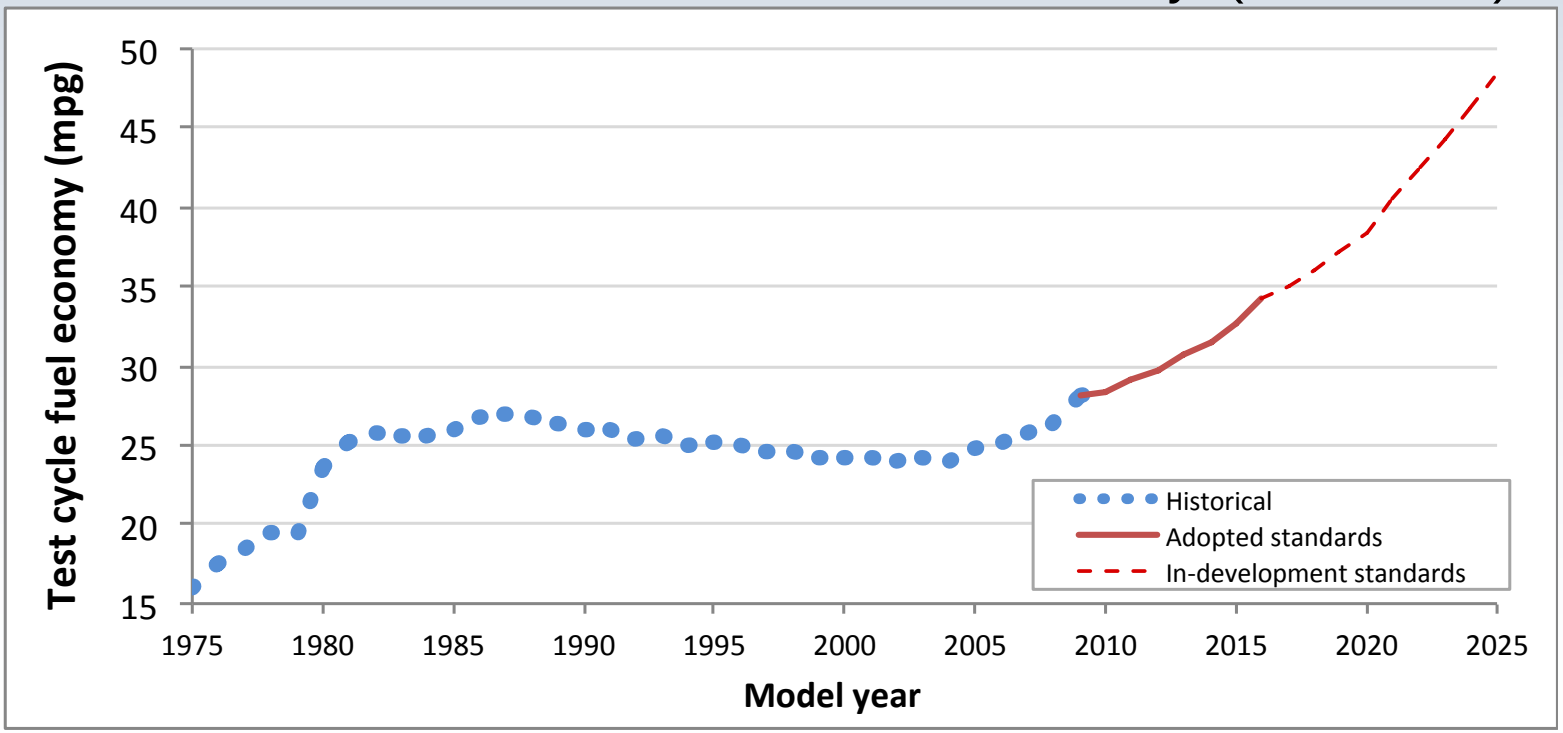




1st Leg
Vehicles

California Leadership

- GHG <u>performance</u> standards
  - Calif 2004 stds adopted as national std (35 mpg by 2016)
  - New stds for 2017-2025: 3.5-5% reduction/yr (Jan 2012?)



Automaker CEOs Support Aggressive 2025 Vehicle GHG Standards

Scott Becker (Nissan)
John Krafcik (Hyundai)
John Mendel (Honda)
L. Jackson (EPA)
Doug Speck (Volvo)
Alan Mulally (Ford)
Bob King (UAW)
Dan Akerson (GM)
R. LaHood (DOT)
Sergio Marchionne (Chrysler-Fiat)
Jim O'Sullivan (Mazda)
Josef Kerscher (BMW)
Andrew Goss (Jag-Land Rover)
Jim Lentz (Toyota)

Mary Nichols (California)

Government-industry agreement (July 29, 2011)

Obama administration, automakers, and California agree to national US standards

Aggressive 2025 Stds Can Be Met with "Conventional" Vehicle Technology

(CARB/US Analysis of Technology Needed for Compliance)

Stringency, % GHG change/yr	Hybrids, %	Plug-EVs, %
4%	18	0
5%	43	1

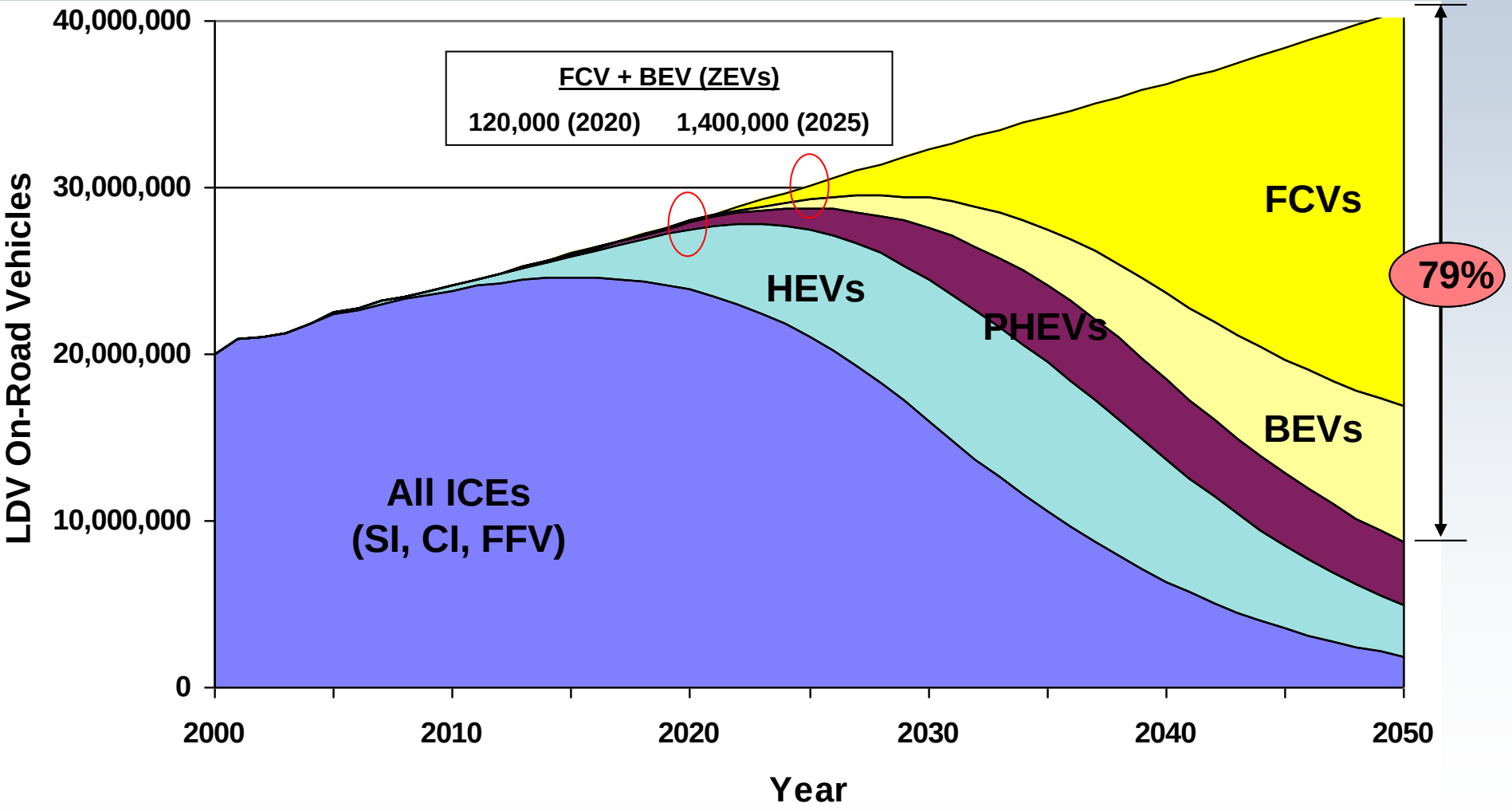
*** Limited to a maximum 20% in this Scenario B**

Vehicles (Part II)

Need to "Kickstart" Advanced (Efficient, Low Carbon) Vehicles

- California ZEV mandate
- Special incentives in GHG/CAFE stds (EVs count as 0 g/mi)
- Rebates for EVs ($2500/veh, plus $7500 from feds) and other low-carbon, low-energy vehicles via AB118 (CARB and CEC)

Beyond 2025, rapid shift to electric and fuel cell vehicles needed to achieve 60-80% reduction by 2050



CARB scenario (2) for light duty vehicles, to justify aggressive ZEV requirements

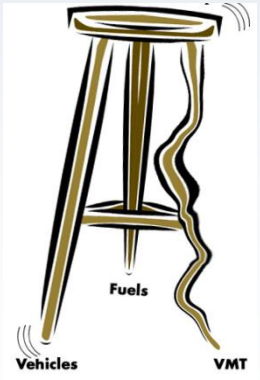
2nd Leg

Fuel Policy

The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil.

Sheikh Zaki Yamani, Saudi Arabian oil minister for 3 decades

BIOFUELS **HYDROGEN** **ELECTRICITY**



Failed Fuel *du jour* Phenomenon

- **30 years ago – Synfuels (oil shale, coal)**
- **25 years ago – Methanol**
- **20 years ago – Electricity (Battery EVs)**
- **10 years ago – Hydrogen (Fuel cells)**
- **5 years ago – Ethanol**
- **Today – Electricity (again)**
- ***What's next?***

Without policy intervention, we would start over with "unconventional oil".

All fuel supply alternatives are difficult and face major barriers

- Biofuels
- Hydrogen and FCVs
- EVs
- CNG

And thus need flexible, performance based technology-forcing policy

California Low Carbon Fuel Standard (LCFS)

(Adopted April 2009, took effect 2011)

Policy Design

- 10% reduction in carbon intensity of transport fuels by 2020
- Oil refiners are point of regulation
- Allows credit trading (harness market forces)

Why Important and Good Policy?

- Doesn't pick winners: includes all fuels (unlike national RFS)
- Harnesses market forces (via tradable credit market)
- Stimulates innovation and investment
- Performance based
- Relies on lifecycle analysis (scientifically sound, important precedent)

Why is LCFS Controversial?

- Fuel suppliers feel unfairly targeted because land use effects (iLUC) are considered for first time in climate policy
- Immature science underlying land use impacts
- Difficulty addressing high carbon crude oil
- Less economically efficient than carbon tax
- Raises question about oil sands (energy security vs climate change)
- ***Threatens powerful interest groups*** (mostly corn ethanol and small refiners)

My view:

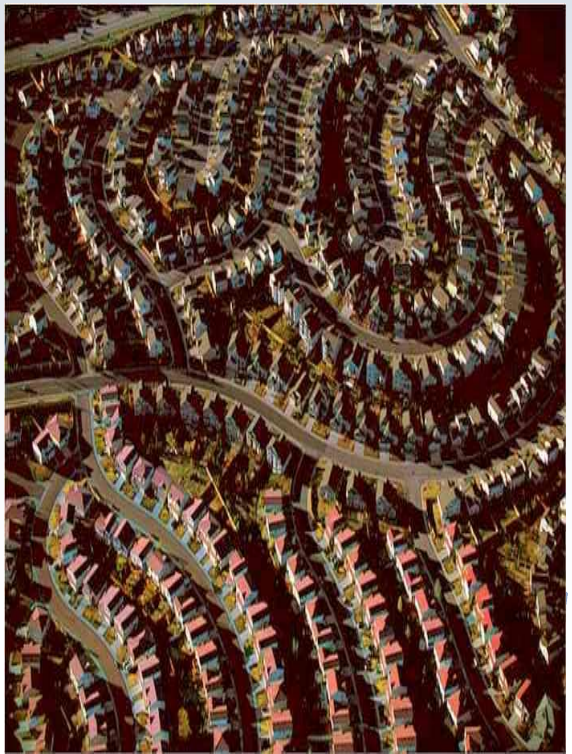
- LCFS is best policy to guide transformation of transport fuels
  - More effective than cap & trade (and carbon taxes)
  - Better than RFS because fuel neutral and harnesses market forces
  - Provides incentive to innovate (oil sands production, alt fuels, etc)
  - Provides durable policy framework
- Important to retain full lifecycle analysis (including iLUC) because:
  - Ignoring iLUC equivalent to saying land use impacts = 0, which is incorrect

3rd Leg

Transforming Mobility (and Land Use)

U.S. passenger transport system is a very expensive transportation monoculture where "sprawl is the law."

Many ways to provide equal accessibility at less cost— ***with less GHG emissions***

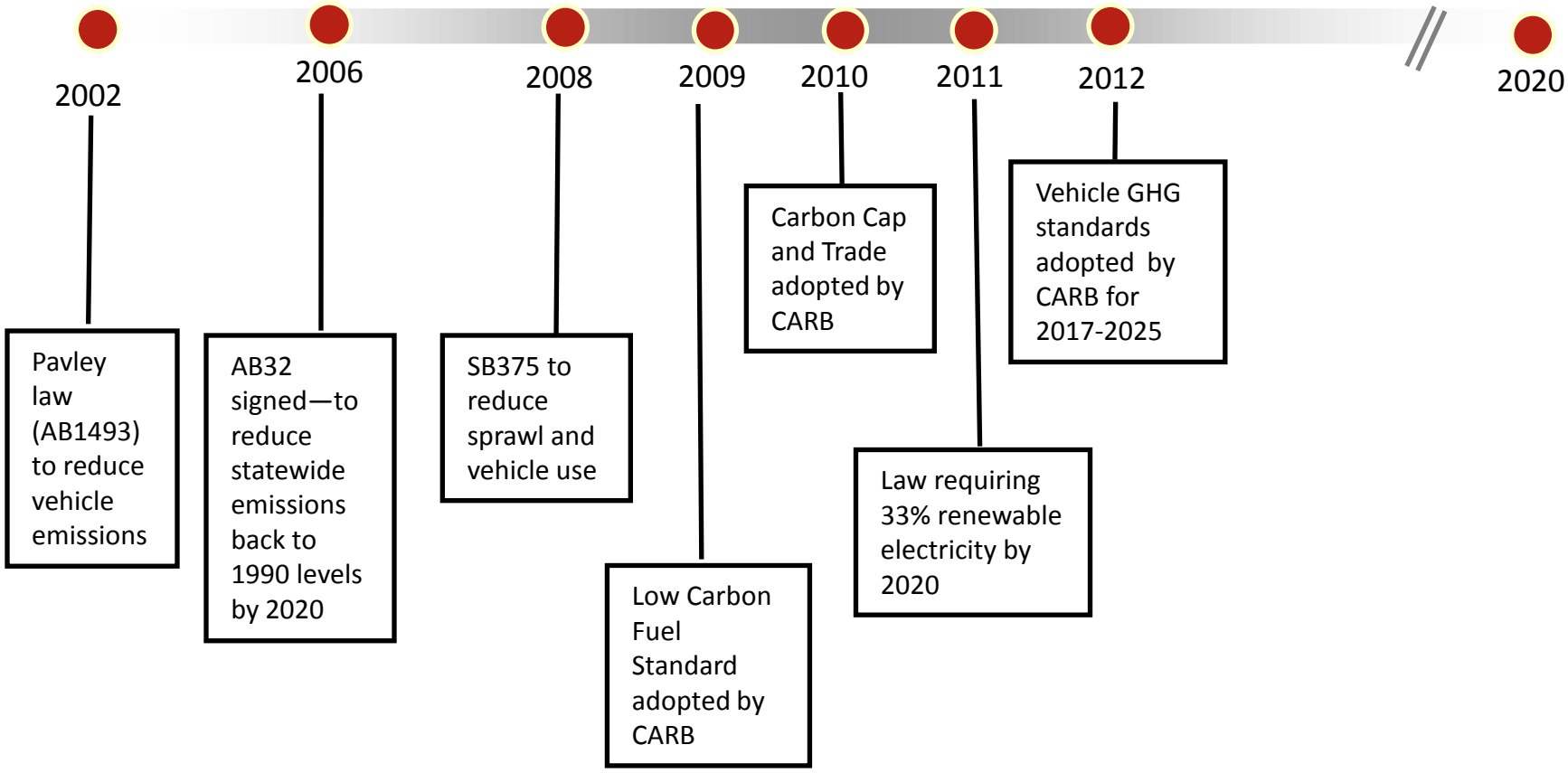


California Leadership in Reducing VMT and Sprawl

- SB375 Sustainable Communities Act of 2008
  - Requires reductions in GHGs associated with passenger vehicle use via changes in land use, transit, and pricing)
  - CARB proposed GHG targets for major cities (to be adopted sept 2010):
    - **2020: 7-8% reduction/capita (mostly VMT)**
    - **2035: 13-16% reduction/capita (mostly VMT)**
- But weak incentives
- Why good policy?
  - Provides performance-based mechanism for funding cities
  - Defers to local governments
  - Empowers local governments to do good planning and investment
    - Policies to reduce VMT and GHGs are aligned with good planning practices (generate large co-benefits (reduced infrastructure costs, healthy communities)

Model for rest of country?

California GHG Policy Timeline



California's Comprehensive Program to Reduce GHG Emissions from Transportation

VEHICLES

- **GHG light duty vehicle stds (soon extended to 2017-2025) (Jan 2012?)**
- GHG requirements for trucks (mostly to improve aerodynamics)
  - Feds in process of adopting CAFE for heavy trucks
- ZEV requirements (to be updated Jan 2012)
- $ for EVs and others (AB118)

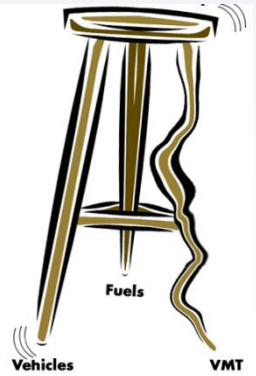
FUELS

- **Low carbon fuel standard req't for oil companies (10% reduction in carbon intensity by 2020, requiring roughly 1/3 alternative fuels)**
- Hydrogen fuel station requirements ("Clean Fuel Outlet") (Jan 2012?)
- 33% renewable electricity stds for utilities

VMT

- **Reduce VMT and sprawl (SB375)**

Plus carbon cap and trade (imposed on refineries and fuels)



Why Gov't Initiative is Needed … and why prices are not enough

A Long List of Market "Failures"

- **Environmental and energy externalities**
- **Principal agent problem** (rental cars, truck trailers, leased vehicles, cars for legislators/execs)
- **Network externality**. Complementary products requiring large *non-recoverable* investments and investments that cannot be made by individual consumers—such as when different vehicles or different infrastructures are required (H2, bike paths for biking, smart paratransit, etc)
- **Technology lock-in**
- **Market power** (cartels, oligopolies, etc)
- **High entry barriers in auto industry**
- **R&D under-investment** due to:
  - industry diffusion (ag industry)
  - R&D spillovers. When R&D findings cannot be fully captured (leading to under-investment in R&D)
  - Learning-by-doing spillovers where mfg savings not fully captured
- **Consumer cognition** (eg, buying cars), resulting in under-investment in efficiency (related to information and loss-aversion)
- **Volatile oil prices** create uncertainty which leads to under-investment in alternatives

Carrots *and* Sticks Needed

+

Only Major Public Vote on Climate Policy in US

By 23% margin, California, voted in favor of climate policies

- Voters rejected a proposition 61% vs 38% to block implementation of AB 32 until California's unemployment rate drops to 5.5% or below for four consecutive quarters
- Unemployment was 12.4% at the time
- Bigger margin than any other proposition and politician (governor, etc)

Is California Unique?

- Yes
  - “Independent” and trusted implementing agency (CARB)
  - No coal industry
  - Strong cleantech industry (venture capital, silicon valley, entrepreneurial universities)
- No
  - Government under duress
  - High unemployment
- Maybe
  - Future support for environmental protection

Is California Showing the Way to Promised Land…. or Going to be Swept Away?

Only time will tell….

Thank You

ITS UCDAVIS