California's Transportation Policy Model

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

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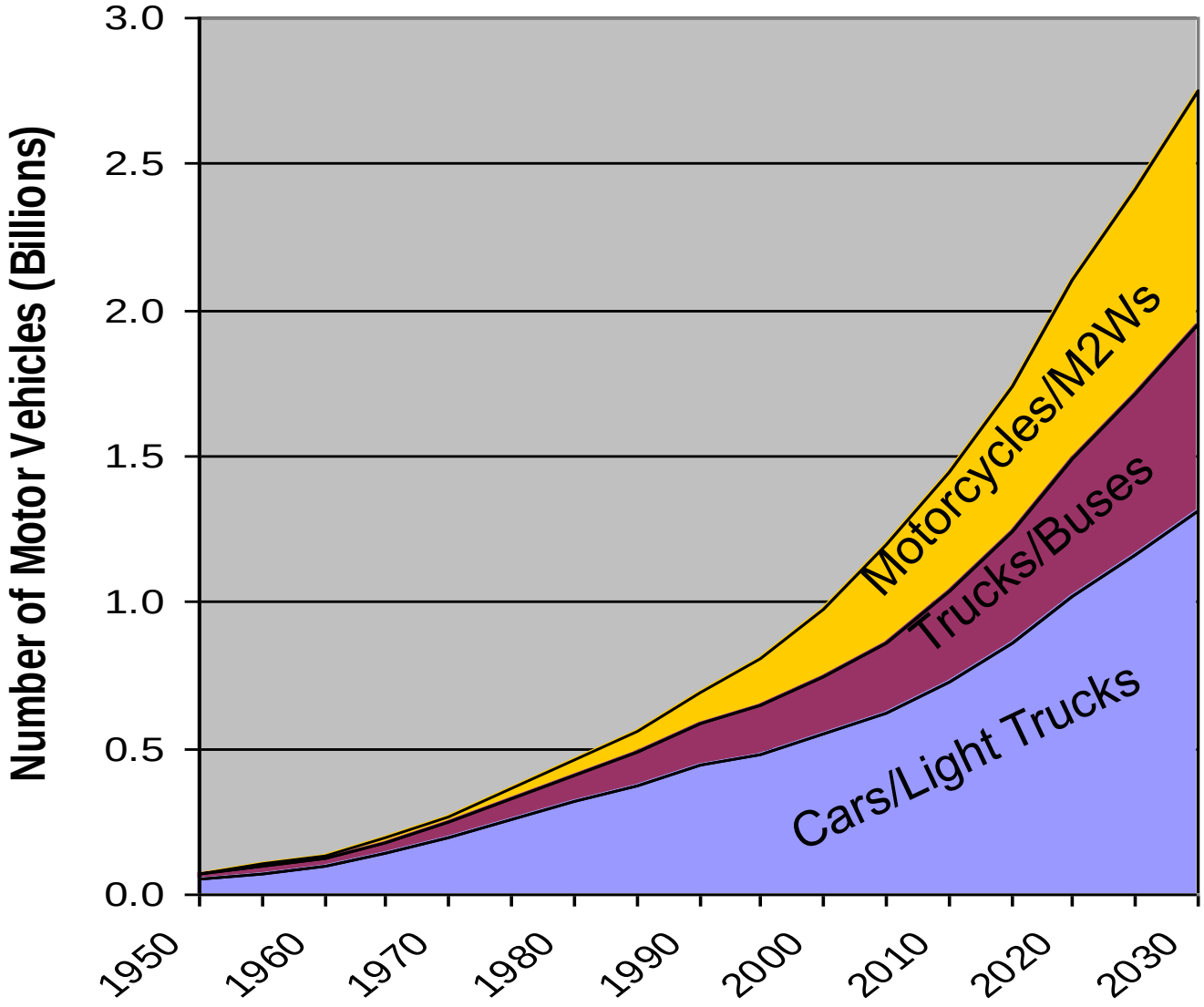
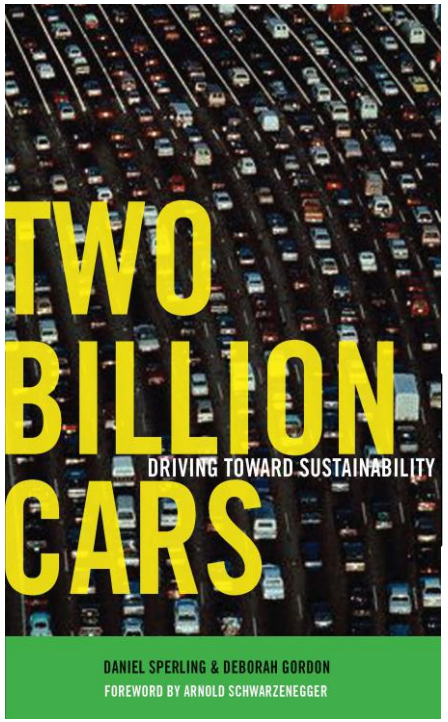
The Problem!?

Good news and bad news

Soaring Global Demand for Vehicles (and Oil)

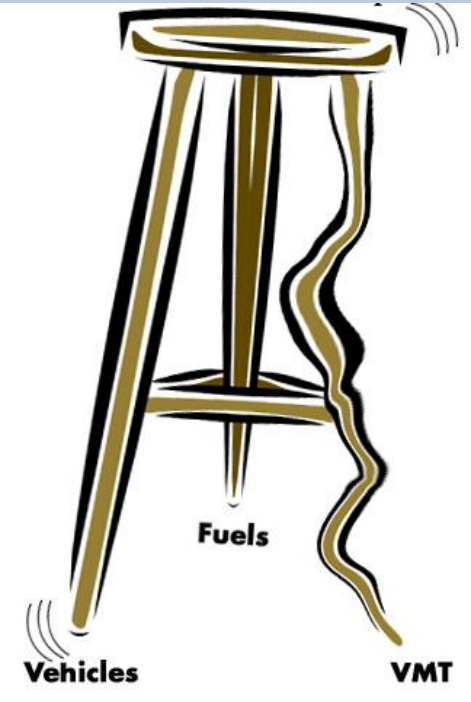




Sperling and Gordon (2009), based on DOE, JAMA, other

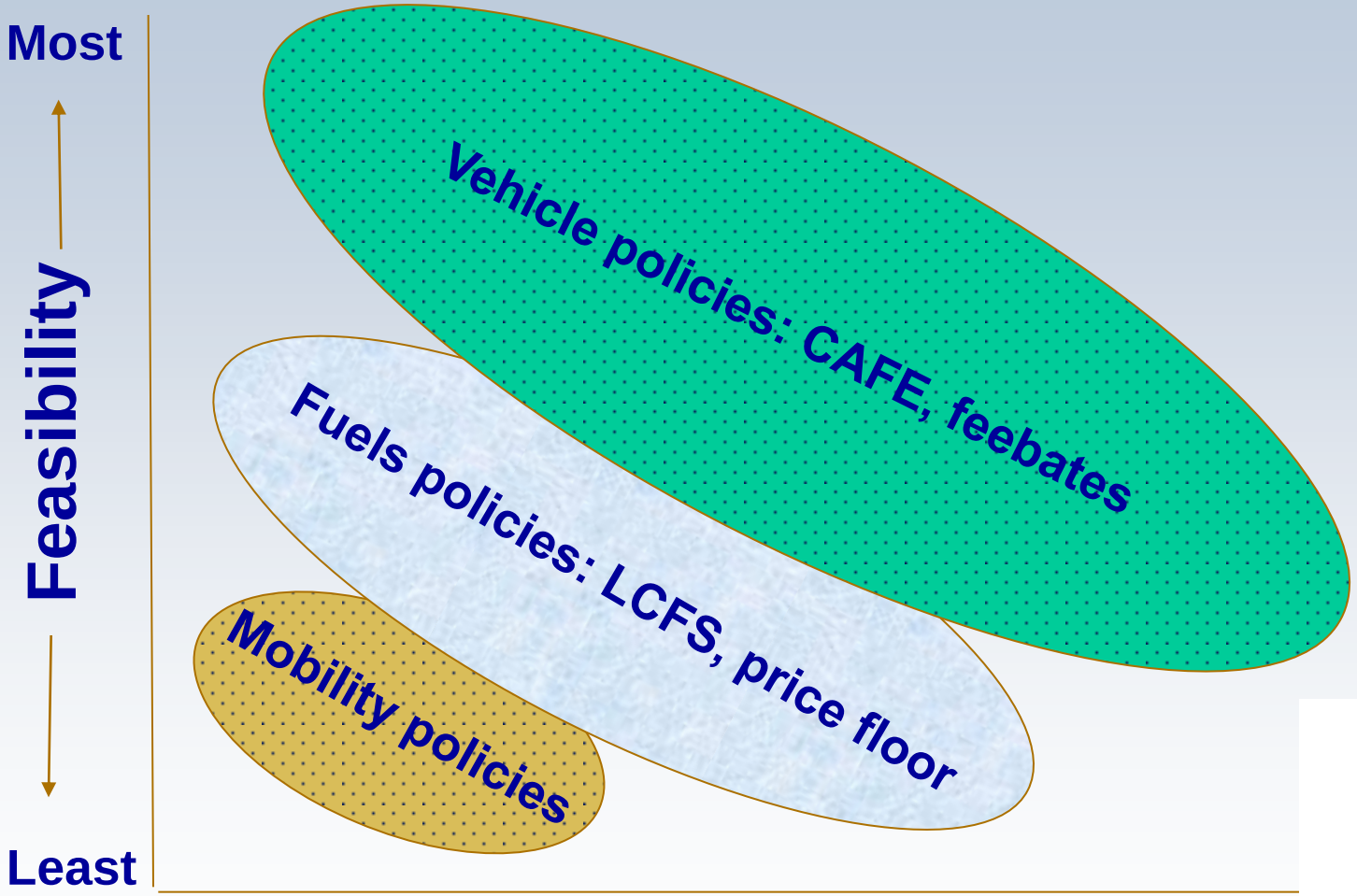
One solution …. a car “exodus”

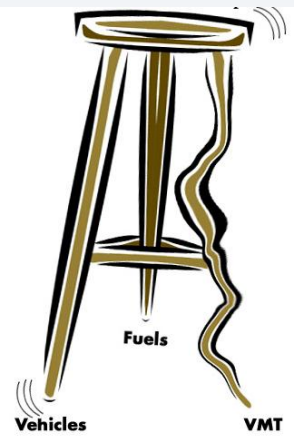
Transforming Transportation



- Transforming vehicles
- Transforming fuels
- Transforming mobility

Vehicle policy solutions are easier and more effective than others





1st Leg
Vehicle Policy

California Leadership (patchwork success!)

- GHG performance standards (for mainstream market)
  - Stds adopted in 2004 adopted by Obama as national atd
  - New stds for 2017-2025 (Jan 2011?)
- "Kickstart" advanced vehicles
  - ZEV mandate
  - Special incentives in GHG/CAFE stds (EVs count as 0 g/mi)
  - Rebates for EVs ($5000/veh) and other low-carbon, low-energy vehicles via AB118 (CARB and CEC)
- Feebates? (mechanism for reconciling regulations and markets)

2nd Leg
Fuel Policy

Failed Fuel *du jour* Phenomenon

- **30 years ago – Synfuels (oil shale, coal)**
- **20 years ago – Methanol**
- **15 years ago – Electricity (Battery EVs)**
- **5 years ago – Hydrogen (Fuel cells)**
- **2 years ago – Ethanol**
- **Today – Electricity (Plug-in hybrid vehicles)**
- ***What's next?***

California Low Carbon Fuel Standard (LCFS)

(Adopted April 2009, took effect Jan 2010)

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
- Less economically efficient than cap & trade/carbon tax
- Raises question about tar sands (energy security vs climate change)
- ***Threatens powerful interest groups*** (mostly corn ethanol and small refiners)

My view:

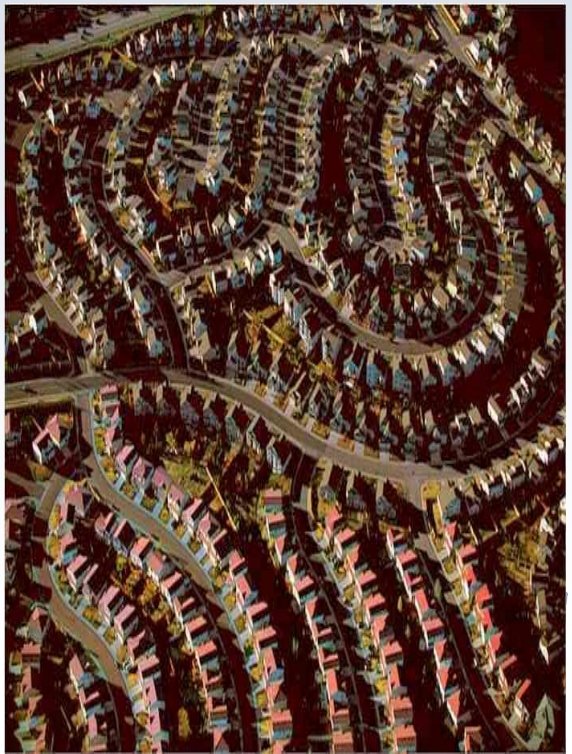
- LCFS is best policy to guide transformation of transport fuels
  - More effective than cap & trade (and carbon taxes)
  - Better than RFS because fuel neutral and harnesses market forces
  - Provides incentive to innovate (tar sand production, alt fuels, etc)
  - provides durable policy framework
- 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***



Not all vehicle trips are “high value”!

California Leadership in Reducing VMT and Sprawl

- SB375 targets reductions in GHGs associated with passenger vehicle use (ie reduced VMT) 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's Comprehensive Program to Reduce GHG Emissions from Transportation

VEHICLES

- **GHG light duty vehicle stds (soon extended to 2017-2025) (Jan 2011?)**
- GHG requirements for trucks (mostly to improve aerodynamics)
- ZEV requirements (to be updated Jan 2011)
- $ for EVs and others (AB118)

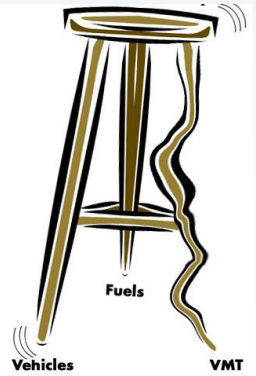
FUELS

- **Low carbon fuel standard**
- Hydrogen fuel station requirements ("Clean Fuel Outlet") (Jan 2011?)
- 33% renewable electricity stds for utilities (Sept 2010?)

VMT

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

Plus carbon cap and trade?



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

- Market instruments such as gas taxes (“carrots”) are relatively ineffective in transport sector
- Mandates (“sticks”) are effective at launching new technologies, but inefficient at creating markets
- Need sticks and carrots working in concert

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Question of Will and Vision, More Than Cost!

- Consider hydrogen and fuel cells, which many think is most expensive and difficult transition …
  - $55 billion extra over 15 years for vehicles and fuels, to get to 10% market penetration (NRC/NAS, 2008)
- Meanwhile, US spends ~$8 billion/year on subsidies for corn ethanol

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