



Fuels Regulation for Climate Change in the US

Al Jessel
Senior Fuels Policy Advisor
Chevron Global Downstream

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Four Approaches

Indirect

- Carbon Tax
- Economy-Wide Cap and Trade

Direct

- **Low-Carbon Fuel Standard (LCFS)**
 - Carbon intensity
 - California (presumably no longer EPA) and Lieberman-Warner amendment
- **Renewable Fuel Standard (RFS)**
 - Often called a “gallon standard”
 - EPACT05
- **Energy Independence and Security Act of 2007** is arguably both an LCFS and an RFS

These are not mutually exclusive; more than one conceivably could be enacted.

California Low Carbon Fuel Standard

Stated Goals

- Force the market to supply low-GHG fuels
- Stimulate new technology
- Prevent “recarbonization”

Important known design elements

- An intensity standard (gCO₂e/BTU)
 - 10% reduction by 2020 and more thereafter
- Lifecycle determination of carbon intensity
- Credit trading among transportation fuels

Some Early Insights

LCFS

- Intended to be performance-based and fuel neutral— does not mandate use of any specific fuel but will credit specific fuels and/or origin of those fuels with different GHG reduction capabilities
- For liquid fuels, favors use of biofuels including ethanol - especially from cellulose or waste
- Seeks to drive advances in technology and innovation. It is generally recognized that the commercial technology needed does not yet exist.

Federal Renewable Fuel Standard

Stated Goals

- Increase renewable fuel use
- Reduce GHG's

Important known design elements

- Covers liquid fuels only
- Schedules an increasing number of gallons of renewable fuels in four categories
 - Four categories defined by carbon intensity and feedstock
- Credit trading

Some Early Insights

RFS

- Three categories appear to require expansion of existing technologies (corn and sugar-based ethanol and biomass-based diesel). One category, “cellulosic biofuels”, is technology-forcing.
- Requires a hefty increase in renewable fuel use over the next few years that may challenge the fuel production and delivery infrastructure

Some Areas to Watch

- Life-cycle adjusted carbon intensity scales
- “Leakage”, “shuffling” and “rationalization”
- Overlapping and/or conflicting requirements
- Commercial availability
- Enforcement

“A Little Bit of A Lot” - Description

- The goals of the LCFS are not now technologically achievable. The best way to realize the promise of advanced fuel technology is to encourage innovation and investment certainty with a milestone-based approach
- This approach is designed to force the development of advanced fuel technology by requiring fuel providers to blend small amounts of next-generation, low-carbon fuel (like cellulosic ethanol) into gasoline early in the LCFS implementation
- To qualify, these fuels would have to provide significant reductions in carbon intensity compared to current generation technology; so “a little bit” of fuel can provide “a lot” of carbon intensity reduction and demonstrate that it *can* be done without requiring immediate full scale production
- For example, the first milestone could be a requirement for 200 million gallons a year of truly breakthrough low-carbon California transportation fuel by 2012.

“A Little Bit of A Lot” – Overall Benefits

- **Allows Progress Tracking** – Milestones provide an easy method to track fuel technology progress
- **Offers Investment Certainty** – Firm volume requirements at milestones will provide the certainty of a market for advanced fuels, thereby encouraging investors to fund the development and production of these new fuels.
- **Aligns with Normal R&D Cycles** – Starting small aligns with a well-established R&D cycle where smaller pilot plants are used to test/demonstrate new production processes
- **Reduces or Eliminates the Counterproductive “Shuffle”** – If California phases in the LCFS requirements without the right incentives to drive the development of new fuel technology, it will lead naturally to simple exchanges of current “high carbon” fuels for current “low carbon” fuels (for example, ethanol). In that case, the LCFS will provide no benefits to the environment and, on the contrary, the logistical switch will cause more transportation energy to be expended which will *increase* GHG emissions.
- **Focuses Investment on New Technology** – avoids early overinvestment in conventional technologies