Existing Policy

Federal Renewable Fuel Standard and Regional Low Carbon Fuel Standard

Policy summary: Title II of the federal Energy Independence and Security Act of 2007 creates a "renewable fuel standard," which requires that the volume of renewable fuels used in the U.S. will rise from 4.7 billion gallons in 2007 to 36 billion gallons in 2022. In a similar fashion, Massachusetts' biofuels law, passed in 2008, instructs the state to pursue development of a "low carbon fuel standard" (LCFS) on a regional basis throughout the Northeast. The LCFS (first developed by California) would require that the average carbon intensity of vehicle fuels fall by a specific percentage compared to petroleum fuels.

Economy-wide GHG emissions reduced in 2020	1.5 million metric tons; 1.6%

Clean energy economy impacts: To the degree that imported petroleum used in Massachusetts can be replaced by feedstocks such as solid waste, forest residues, and other cellulosic material, money that would otherwise go overseas is retained in the regional economy. If advanced fuels (including electricity powering plug-in hybrid and all-electric vehicles) eventually become less expensive than petroleum fuels, consumer costs are expected to fall. There are significant economic development opportunities in growing feedstocks, converting those into fuel, and in research and development. The report of the Massachusetts Advanced Biofuels Task Force forecast that the sector could employ 2,500 people in the state by 2025.

Rationale: The carbon intensity (or GHG emissions per unit of energy used) of fuel is one of the three main ways that emissions from motor vehicles can be reduced. In theory, if crops or other plants are used to produce fuel, the emissions from burning the fuel can be canceled out by the re-growth of plants on the same land absorbing equal amounts of carbon dioxide during its growth. Given the United States' large supply of land and agricultural produce, this is a logical method of reducing the use of petroleum. In addition, if electric vehicles become prominent, they would reduce the carbon intensity of fuels, since electric motors are far more efficient at powering motor vehicles than are gasoline engines.

Policy design and issues: Under the Federal RFS, supplies of "advanced biofuel" (including cellulosic) must rise from 0.6 billion gallons in 2009 to 21 billion gallons in 2022, and cellulosic biofuel by itself must rise to 16 billion gallons in 2022. Advanced biofuel excludes ethanol derived from corn starch, and must yield at least a 50 percent lifecycle reduction in GHG emissions, while cellulosic biofuel must achieve a 60 percent reduction. Renewable fuels that don't qualify as advanced can constitute up to 15 billion out of the 36 billion total gallons of fuel; they must still be produced from renewable biomass, replace other transportation fuel, and achieve at least a 20 percent reduction in GHG emissions on a lifecycle basis for "new facilities." Existing facilities, and expansion of such facilities, such as those producing corn-based ethanol, are exempt from the GHG criterion, leaving some question as to how much of the non-advanced fuel will actually meet the 20 percent criterion.

As required by the Biofuels Act, during the past two years Massachusetts has been leading an effort by the Northeast and Mid-Atlantic states to develop a Low Carbon Fuel Standard in the region. The LCFS concept originated in California, where regulations require a reduction in the

average carbon content of motor fuel of 10 percent by 2020. Targets and timelines for the Northeast/Mid-Atlantic LCFS are being developed. Unlike the RFS, the LCFS is a "technology neutral" standard — rather than requiring specific volumes of different fuels, it allows fuel suppliers to choose any motor fuel in any quantity — including petroleum, biofuels, natural gas, electricity, and other possibilities. First, the average carbon intensity of each fuel is determined. If the intensity of a particular fuel exceeds the annual target, then suppliers of this fuel have a "deficit" and must purchase credits from sellers of fuels that have a carbon intensity below the annual target.

A major issue for the RFS and the LCFS is calculating the carbon intensity of different fuels. This requires examining the entire lifecycle of a fuel, including, for example, how electricity is generated and how crops are grown — calculations that are difficult to do with any degree of precision. Important numerically, and controversial, are the carbon impacts from what is known as "indirect land use change" (ILUC). When large amounts of food crops are used for fuel (corn for ethanol, soybeans or rapeseed for biodiesel), this may cause the need for more food production. Forests may be cut down to expand the amount of land on which crops can be grown, causing reductions in the CO_2 sequestered by trees and soil. The US EPA and the California Air Resources Board (CARB), along with the European Union and specific European countries, are currently calculating ILUC for each fuel, but each source has published different numbers. The Northeast and Mid-Atlantic states are examining which methodologies and figures are best to use, and these choices substantially affect how much "credit" each fuel would receive under the LCFS.

There are a number of other design issues involved in constructing a regional LCFS for the 11 states currently involved, and an interstate group of agency staff, along with an interstate agency — the Northeast States for Coordinated Air Use Management (NESCAUM) — have been addressing design issues for the past two years.

GHG impact: For purposes of this Plan, the LCFS is estimated conservatively to achieve a 5 percent reduction in the average carbon content of vehicle fuel by 2020, with greater reductions in following years. The LCFS is more specifically focused on GHG reductions than the federal RFS. Without the LCFS, the RFS by itself might yield about a 3 percent reduction, depending on what reductions are actually achieved from corn-based ethanol produced throughout the U.S.

Other benefits: Possible reductions in other air pollutants, depending on which fuels are used in place of petroleum.

Costs: NESCAUM is working on a regional economic analysis which will be available in early 2011. This analysis will include estimates of cost and benefits to the region and to each state.

Equity issues: Any price impacts from the RFS and LCFS will be spread across all drivers in proportion to the amount of fuel that they use.

Experience in other states: California has adopted regulations for implementation of its LCFS, which goes into effect in 2011.

Legal authority: Massachusetts' biofuels law gives the state the authority to implement the LCFS. In other participating states, new regulations or legislation will be necessary, or both.

Implementation issues: As with any interstate policy, achieving agreement on how to implement a uniform policy among a number of states presents many complexities. The

interstate effort currently underway, led by Massachusetts and NESCAUM, is addressing these. For example, distribution infrastructure for new fuels and vehicles may be needed. This would require large capital investments (e.g., liquid fuel distribution for biofuels, charging stations for electricity, etc.) and it is unclear whether the incentive system created by the LCFS will be sufficient to draw out that investment. Nor is it clear whether the auto manufacturers will develop the vehicles needed to utilize the fuel, particularly in the case of plug-in hybrid and all-electric vehicles. Complementary policies may be necessary for all parts of the system to be developed in tandem.

Uncertainty: As a technology-neutral policy, the LCFS is not picking between the several possibilities for alternatives to petroleum, and it is uncertain at this time which ones will succeed best in terms of eventual cost, and what that cost will be.