

## Federal Renewable Fuel Standard (RFS) and Regional Clean Fuel Standard (CFS)

**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. 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. In order to address this requirement, Massachusetts and other states have studied the potential implementation of a regional Clean Fuel Standard (CFS) in the Northeastern U.S.

	Savings from full policy implementation	% of 1990 level
Economy-wide GHG reductions in 2020	0.1 MMTCO <sub>2</sub> e	0.1%

**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.

**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. Under certain conditions, if crops or other plants are used to produce fuel, the emissions from burning the fuel can, to some degree, be canceled out as the growth of plants on the same land absorbs carbon dioxide. 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:** The Federal RFS includes a variety of national biofuel blending mandates, the most important of which is a target of 16 billion gallons of low carbon cellulosic ethanol in 2022, or about 10% of the fuel supply. However, the technology required for large-scale production of cellulosic ethanol has not matured as quickly as anticipated, and the cellulosic biofuel target will not be achieved until well after 2022. For the purposes of this CECP Update, achievement of the national goal is assumed to be delayed until at least 2030, with only minimal production by 2020.

Implementation of a regional CFS has also been delayed, so the CFS is unlikely to deliver significant reductions by 2020. A CFS would complement the federal RFS by providing an incentive to reduce the carbon intensity of cellulosic ethanol below the level required by the RFS, ensuring delivery of fuel to Massachusetts, and providing a market signal to support other low carbon fuels such as electricity.

A major issue for the RFS and the CFS 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). Large amounts of food crops being used for fuel (corn for ethanol, soybeans or rapeseed for biodiesel) 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<sub>2</sub> sequestered by trees and soil. The U.S. 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. One reason that this policy focuses on cellulosic ethanol is the expectation that it can be produced using waste materials and crops that do not result in significant ILUC.

A significant obstacle affecting the potential of cellulosic ethanol to displace petroleum in the gasoline supply is often referred to as the “blend wall.” The blend wall refers to the fact that most existing gasoline engines are not certified to accept gasoline that contains more than 10% ethanol—the current composition of gasoline. Therefore, in order to realize reductions from cellulosic ethanol, it will be necessary to make higher ethanol blends (likely 15%, which can be used in new vehicles, and 85%, which can be used in certain “flex-fuel” vehicles) widely available.

**GHG Impact:** With the production of low carbon cellulosic ethanol assumed to be minimal by 2020, the RFS is expected to reduce GHG emissions by 0.1 MMTCO<sub>2</sub>e in 2020.

**Costs:** In 2011, NESCAUM published an economic analysis of a regional CFS that projected small but positive economic impacts. Because of the complexity of fuel markets and the incentives created by the RFS, it was not possible to determine the impact on gasoline prices.

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

**Experience in Other States:** California’s low carbon fuel standard is similar to the CFS, and has operated successfully since 2010.

**Legal Authority:** Massachusetts’ biofuels law gives the Commonwealth the authority to implement the CFS. As noted above, EPA is required by federal law to implement the RFS.

**Implementation Issues:** Regarding a regional CFS, as with any interstate policy, achieving agreement on how to implement a uniform policy among a number of states presents many complexities. For example, distribution infrastructure for new fuels and vehicles may be needed. This would require large capital investments, and it is unclear whether the incentive system created by the CFS will be sufficient to draw out that investment. Complementary policies may be necessary for all parts of the system to be developed in tandem.

One possible approach to implementing a CFS would be to begin with a reporting-only requirement. This approach would provide information and experience to inform development of a CFS that would require emission reductions in later years.

**Uncertainty:** The pace at which technology and infrastructure needed to manufacture and distribute large quantities of cellulosic ethanol can be developed is highly uncertain.

**Policy Websites:** <http://www.epa.gov/OTAQ/fuels/renewablefuels/> and <http://www.nescaum.org/topics/clean-fuels-standard>.