

BACKGROUND ON MASSACHUSETTS BIOFUELS INITIATIVE: Q&A

What is the rationale for this initiative?

Oil is at \$95/barrel; we get all of our transportation fuel from the Middle East or out of state; emissions from transportation and heating buildings with oil contribute more than 50% of our greenhouse gas emissions as well as pollutants like sulfur dioxide, nitrous oxides and particulates; and we have universities and technology companies poised to lead the world in biofuels development.

This initiative will launch the Commonwealth as a leader in the nation in biofuels R&D and commercialization; ensure cost-effective biofuels make it to the consumer; has the potential to grow the biofuels sector of our clean energy industry by adding 3,000 jobs and \$320 million in the state economy; and ensure that economic benefits of fuel production stay close to home.

What does the legislation do?

This legislation:

1. Requires a minimum percentage of biodiesel as component of diesel fuel sold in the Commonwealth. This starts at 2% in 2010 and ramps up to 5% by 2013.
2. Requires a minimum percentage of bioheat as component of heating oil sold in the Commonwealth. This starts at 2% in 2010 and ramps up to 5% by 2013.
3. Exempts cellulosic ethanol used in transportation fuel from state gasoline excise tax.

Why does this initiative have incentives for cellulosic but not corn ethanol?

Today, gasoline distributed in Mass. is blended with 10 percent ethanol made from corn. Massachusetts is a center for national R&D on the next generation of ethanol – cellulosic ethanol derived from feedstocks such as forest products, organic waste and agricultural crops like switchgrass. Cellulosic ethanol holds tremendous promise for Massachusetts, and New England as a whole. It can be produced here with homegrown inputs – forest products, which are abundant in this state, switchgrass, agricultural wastes, and even organic waste like yard waste. Universities here are researching cellulosic ethanol, and Massachusetts has several companies that are pursuing cellulosic ethanol, and numerous others are looking to locate here. Many in the fuel industry see cellulosic ethanol as one of the fuels of the future and Massachusetts is poised to be the first to commercialize. With this initiative, Massachusetts will become the first state in the nation to provide a tax-based incentive for cellulosic ethanol.

How much of these fuels will get to market because of this legislation?

To fulfill the requirements for 5% biodiesel and bioheat in 2013, about 64 million gallons of pure biodiesel fuel will be needed per year (39 million for bioheat, 25 million for biodiesel motor fuel). If cellulosic ethanol achieves a 25% share of the ethanol market in 2014, about 72 million gallons will be needed to meet the Massachusetts market.

Where do biodiesel and bioheat come from?

Biodiesel fuel, which can be used in both motor vehicles and heating fuel, can be made from a variety of oil-seed crops and also from waste oil. Most of the biodiesel currently

used in the U.S. comes from soybeans, produced either in the Midwest or from imported sources. But a portion of Massachusetts feedstock is likely to be available from restaurants and other waste oil.

One large-scale biodiesel refining plant is being built in Massachusetts and others are under consideration. Both small and national diesel oil distributors have shown interest in expanding retail distribution points.

Cellulosic ethanol is not yet commercially available, so what good is this tax exemption?

By signaling that cellulosic ethanol will not be taxed, we are sending a message to emerging R&D and production companies that Massachusetts will be a ready market for clean fuels. When it does get produced, the gas-tax exemption will provide an incentive for distributors and eventually consumers to use cellulosic ethanol.

Given the need for transportation finance, can we afford a gas-tax exemption for cellulosic ethanol?

Cellulosic ethanol is not yet on the market, so there will be no revenue loss in the near future. A sunset clause that kicks in after 10 years ensures that once cellulosic ethanol has become a large part of the market, and does not need an incentive any more, the tax exemption will expire.

What will the biofuels initiative, with its exemption of cellulosic ethanol from the gasoline tax, cost us?

The bill has three provisions. None of them would raise additional revenue, so no tax increase is involved. Eliminating the state gasoline excise tax on the cellulosic ethanol portion of gasoline would reduce revenue from the gas tax. Cellulosic ethanol is not yet commercially available, but intensive research to develop it is taking place in Massachusetts and elsewhere. The incentive should help push R&D forward. If cellulosic ethanol enters the market in 2012 and replaces 5% of ethanol fuel now used as an additive in Massachusetts gasoline (10 percent currently), then roughly 14 million gallons of cellulosic ethanol will be sold; at a tax rate of 21 cents a gallon, and \$3 million of revenue will be foregone, out of approximately \$600 million that the gas tax currently brings in from gasoline-fueled vehicles. If cellulosic attains 25% of the ethanol market by 2016, the tax loss will be about \$15 million a year.

Will this increase costs to consumers?

No – consumers may well save money. Crude oil is priced at more than \$90/barrel and subject to huge fluctuation. Moving toward homegrown fuels will reduce volatility and costs at the pump. Currently, 2-percent biodiesel is priced at \$3.02/gallon, compared with \$3.19/gallon for straight petroleum diesel – 17 cents a gallon less. As prices of crude oil rise, we expect biodiesel to become even more price competitive.

Currently, bioheat blends (2-5%) are roughly 2.5 cents more per gallon than regular home heating oil. But over the past two years, as crude oil has risen from \$60/gallon to over \$90/gallon, the differential between bioheat and regular oil has been shrinking. With 3 years before implementation, bioheat may become cheaper than regular heating oil – a major boon to homeowners struggling with high heating bills. This will happen

because of greater bioheat supply and greater use of waste oil as a feedstock for bioheat production, which is cheaper than agricultural feedstocks.

What will this biofuels initiative do for economic development?

Assuming that cellulosic ethanol meets 25% of ethanol demand, that R&D facilities concentrate in Massachusetts, and that local consumption is served by in-state feedstock and fuel production, we estimate total economic gains to the state of 3,000 jobs and \$320 million in new economic activity by 2016.

Part of that job growth and economic impact would come in R&D to develop commercially priced cellulosic ethanol – an estimated 430 jobs and \$55 million of direct economic activity in the high-tech sectors by 2014. These would be engineering, science and support jobs. Multiply that effect by a factor of two for indirect jobs and spending, and we forecast a total of 860 jobs and \$110 million in economic growth due to cellulosic ethanol research and development.

When cellulosic ethanol enters the marketplace, the economic benefits rise further. If cellulosic ethanol becomes an increasing fraction of ethanol supplies from 2012 to 2016, and the cellulosic ethanol needed for Massachusetts come from in-state feedstocks (like forest products or agricultural switchgrass) and are produced in-state, this will yield 2,150 additional jobs and a \$215 million increase in Gross State Product by 2016. These jobs would include growing, harvesting, and re-planting feedstock, as well as operating production plants and fuel distribution systems. These employment gains include the indirect economic benefit of cellulosic ethanol producers and distributors purchasing goods and services from other companies in the state and their employees spending their incomes. In essence, these are gains that come from producing and buying homegrown fuel rather than spending our money on imported fuels and sending those monies out of state and out of the country.

What are the environmental benefits of the biofuels legislation?

This legislation will provide significant benefits in addressing both climate change and local air pollution.

- CO₂ reductions: Overall reduction of 2.7% in CO₂ emissions from three sectors (gasoline, diesel motor fuel, heating oil) that produce more than half of all greenhouse gas emissions in the state, a total reduction of 1.1 million tons of CO₂ emissions annually by 2014.
- Other pollutants: 1% to 3% decrease in SO₂, carbon monoxide, particulates and hydrocarbons from the diesel and heating fuel sectors combined. The bioheat requirement will yield a substantial 5% cut in particulates from heating fuel -- a major contributor to asthma, lung cancer and other respiratory diseases.