August 31, 2010

Arthur Marin
Executive Director
NESCAUM
89 South Street, Suite 602
Boston, MA 02111

Dear Mr. Marin:

I am writing to share a number of suggestions that members of the National Biodiesel Board (NBB) believe would enhance the Northeast States Center for a Clean Air Future (NESCAF) report, "Economic Analysis of the Northeast/Mid-Atlantic Low Carbon Fuel Standard: Draft Data and Assumptions, Part I and II."

These comments complement the suggestions previously submitted to the agency on May 12, 2010. Included in this document are credible sources of data for quantifying the lifecycle and the economic benefits of biodiesel as a low carbon fuel. We encourage you to use the best data available in order to make the economic analysis as meaningful as possible.

If you should have any questions about our comments, please feel free to contact me by telephone at 573.635.3893 or by email at sneal@biodiesel.org. Thank you, in advance, for your consideration of our recommendations.

Sincerely,

Shelby Neal
Director of State Governmental Affairs

Inclusion of Feedstocks for Advanced Biofuel

The current economic analysis does not include oilseeds such as soybeans and canola, which are important biodiesel feedstocks in the Northeast and Mid-Atlantic regions. It is our understanding that this data has been omitted from the analysis as a result of a policy decision made by NESCAUM staff designed to discourage additional use of so-called "first generation" feedstocks.

If the purpose of the analysis is to determine the availability of low carbon feedstocks and fuels, all low carbon feedstocks and fuels should be included. Arbitrarily defining certain low carbon feedstocks as undesirable based on staff opinions that are unsupported in the documentation, is not, in our view, an appropriate way for the agency to proceed. This is especially true in the case of soy-based biodiesel, which has been defined as an "Advanced Biofuel" by the U.S. Environmental Protection Agency (U.S. EPA)[1], meaning it has a greenhouse gas benefit of greater than 50 percent relative to petroleum-based diesel fuel. In fact, biodiesel is the only advanced biofuel produced in the United States in commercial quantities. Failing to include soybean oil, the only renewable source of advanced biofuel in the U.S., is a policy decision that should be revisited by NESCAUM staff so that the results of the analysis are credible.

Regarding the larger point of NESCAUM staff's desire to not encourage additional use of so-called first generation feedstocks, it is important to understand that biodiesel is made from a wide array of oils and fats and that sustainable utilization of existing feedstocks is driving the development of new feedstocks as well as the continual evolution of the biodiesel industry. A healthy biodiesel industry that can convert new feedstocks into clean, renewable fuel provides a ready market for innovators who explore new options. While feedstocks on the horizon, such as algae, provide potential for future growth and further displacement of fossil fuels, existing feedstocks will long be a cornerstone of the industry and should not be discriminated against. Flexibility for renewable fuel producers to use a multitude of feedstocks will help them weather market fluctuations and ultimately provides more sustainable options than continued reliance on unsustainable fossil fuels or "next generation" fuels that may or may not arrive.

Finally, as you may know, the U.S. EPA has determined through its rulemaking for the federal Renewable Fuels Standard that biodiesel qualifies as an advanced biofuel when produced from soybean oil, inedible corn oil, animal fats, recycled grease, waste grease, and algae. Additionally, a proposed rule that is currently pending indicates that U.S. EPA is likely to include canola in the list of feedstocks that can be used to produce advanced biofuel. NBB, therefore, urges NESCAUM staff to embrace all of these feedstocks for production of advanced, low carbon biofuel and to include them in the economic analysis. And, more generally, we encourage NESCAUM staff to embrace all of these advanced, low carbon feedstocks when making policy decisions.

[1] 40 CRF 80.1401

Proposed Carbon Intensity Values

NESCAUM staff's approach to estimating the carbon intensity of soy-based biodiesel is flawed in so far as the "high-end" carbon intensity value is represented by results presented by the California Air Resources Board (CARB). With all due respect to CARB staff, that agency's analysis was so seriously flawed that it should not be used for any serious purpose. NBB's comments to CARB on the agency's report were previously submitted to NESCAUM for review.

For the reasons identified in those comments, as well as the fact that the U.S. EPA's analysis was substantially more thorough, the U.S. EPA results should be relied upon exclusively for regulatory purposes. As you may know, the U.S. EPA indicated that soy-based biodiesel reduces GHG emissions by 57 percent relevant to petroleum-based diesel fuel, making biodiesel the nation's first and only commercial-scale advanced biofuel.

If NESCAUM desires to use a range of figures in its analysis, we recommend staff use that which was published by U.S. EPA. In terms of GHG emissions, the U.S. EPA analysis indicates that soy-based biodiesel could be as much as 85 percent better than petroleum and is at least 24 percent better than petroleum. However, if this approach is used we recommend noting that: 1) U.S. EPA is utilizing the 57 percent figure for regulatory purposes, thus viewing it as the most valid and accurate estimate; 2) all uncertainly in the analysis derives from the inclusion of indirect emissions from speculative international land use changes; and 3) soy biodiesel's direct emissions are 85 percent better than petroleum with zero uncertainty, according to U.S. EPA.

Finally, the most recent and accurate soy lifecycle inventory available was published in February of this year by the United Soybean Board (USB). It includes updated data that was not included in the GREET, CARB, or U.S. EPA lifecycle analyses. Since submitting a copy of this report to NESCAUM in May, this lifecycle data has been submitted and accepted to the U.S. Lifecycle Inventory database maintained by the U.S. Department of Energy's National Renewable Energy Laboratory. This data has also been submitted to the U.S. Department of Energy's Argonne National Laboratory (Argonne) for updating the data used in the GREET model.

The significance of using the most accurate data from existing biodiesel production should not be underestimated when using lifecycle data to predict future scenarios. The USB lifecycle inventory follows the protocols of the International Standards Organization (ISO) and the United Nations Intergovernmental Panel on Climate Change (IPCC). It also utilizes official USDA and industry data, which show significant improvements in the biodiesel lifecycle since previous studies. These include an 85 percent reduction in N2O emissions, 20 percent less direct energy used in soybean farming, and a 45 percent reduction in energy used at soybean oil and biodiesel processing facilities.

Economic Benefits

NESCAUM staff should be careful not to underestimate the economic benefits of the policy, including local jobs that would be created within the region as a result of additional demand for biodiesel. This is particularly true in states such as New York which has as much as two million acres of fallow agricultural land that could be used for production of oilseed crops like soybeans and canola. A healthy local biodiesel industry makes farming in this region more economically sustainable. These crops provide valuable protein meal as well as oils that can be used for a multitude of uses. Using these existing agricultural lands for their suited purpose is more sustainable than allowing them to default to suburban development while cropland is created elsewhere in the world to meet demand for protein meal.

While biodiesel creates direct employment opportunities in both the feedstock and fuel production sectors, it should also be noted that the mere existence of the industry encourages research, investment, and development of new feedstocks such as algae. For example, in 1996, the U.S. Department of Energy cancelled its funding for research to turn algae into bioenergy. Algae has potential to produce massive quantities of oil, but there was no mechanism to commercialize the production of renewable fuel from algae in a marketplace dominated by cheap petroleum fuels. It was not until the biodiesel industry built independent plants all around the country that interest and investment in algae production returned. Because these operating businesses can produce biodiesel meeting an ASTM specification from any natural oil, they provide a market path for new sustainable oils. They provide incentive for researchers and investors to develop methods of harvesting algal oils that can be turned into biodiesel and other products.

Infrastructure

Slides from the August 12 presentation list 65 biodiesel fueling stations that currently offer biodiesel blends. Since biodiesel meeting the requirements of an ASTM International specification (e.g. D975, D7467) is a “drop-in” fuel, biodiesel blends can be offered at virtually every diesel fueling station in the region. A better measure of current infrastructure capacity and future needs is the number of terminals that offer biodiesel blending. According to an NBB survey, 72 terminals nationwide and 21 terminals in Northeast states currently offer biodiesel blends for delivery to retail fueling stations.

Heating Oil

The NBB requests that NESCAUM staff reconsider their interim decision to not include heating oil in the low carbon fuel standard (LCFS). Fuels like biodiesel, which exist in today’s commercial marketplace, can provide substantial carbon emission reductions in space heating applications. In addition to GHG reductions, Bioheat reduces every category of criteria emissions, which has significant public health benefits, particularly in cities with high populations that rely extensively on heating oil such as Boston and New York.

Air Quality Impacts

NESCAUM staff note in the report that upstream emission data is being accessed from the GREET model, the National Renewable Energy Laboratory (NREL), and CARB. The previously referenced (and attached) lifecycle inventory published by the United Soybean Board (USB) is more current and accurate. This USB data is currently being uploaded into the databases at both NREL and Argonne National Laboratory. We recommend using this information.

LCFS Policy Scenarios

The three policy scenarios presented by NESCAUM staff fail to include all the likely mixes of fuel options that could be used to reduce the region's carbon emissions. For example, including both biodiesel and ethanol in a "Biofuels Future" suggests a linkage between the fuels that simply does not exist. Biodiesel and ethanol have distinctly different processes, feedstocks, greenhouse gas emission profiles, and uses. While biodiesel can have beneficial uses in passenger cars (e.g. Europe, where diesel vehicles command more than 50 percent of the market), it is primarily used in the U.S. as a replacement fuel in heavy duty applications and space heating. Therefore, we recommend adding a policy scenario whereby electric vehicles realize increased penetration in light duty applications and biodiesel is relied upon to reduce carbon emissions in heavy duty applications and home heating oil. We view this as a likely scenario that should be evaluated.

Vegetable Oil Supplies

U.S. vegetable oil supplies continue to expand. In 2009, soybean production totaled 3.36 billion bushels. The average yield per acre was estimated at a record high 44.0 bushels (4.3 bushels above the 2008 yield). The U.S. Department of Agriculture (USDA), in its most recent crop report, forecasted U.S. soybean production in 2010 at a record high 3.43 billion bushels. Soybean yields are expected to average 44 bushels per acre, unchanged from last year. The National Agriculture Statistics Service estimated 2010 soybean acreage to be 78 million acres. If realized, this would be the largest U.S. soybean acreage harvested on record. U.S. canola acreage was estimated at 1.52 million acres (also a new record), up from 827,000 acres last year.

New technology will continue to add significantly to these supplies. Based upon historical yield trends, domestic production of soybeans will continue to increase. However, a major research focus of companies such as Pioneer and Monsanto has been to create "virtual acres" through stepwise enhancements in yield technology and/or oil content. Monsanto plans to introduce new technology that can increase soybean yields 9 to 11 percent. Pioneer, a DuPont Company, is commercializing soybean varieties that increase yields by as much as 12 percent. After years of research investments by the life science companies, these technologies have reached commercialization and are set to have a meaningful impact on soybean yields in 2010. More than 90 percent of U.S. farmers currently utilize herbicide resistant soybean varieties, demonstrating farmers' willingness and desire to adopt technology that can enable improved profits through increased yields or decreased costs. If this same 90 percent of U.S. soybean acres adopted the new yield technology, farmers would see a

10 percent increase in current yields on 70 million acres. This equates to approximately 280 million additional bushels of soybeans (the equivalent of 420 million gallons of biodiesel) without increasing acreage in the U.S. Although technology will enable increased production per acre, realization of additional vegetable oil supplies will be dependent upon an expansion of oilseed processing capacity. Stated a different way, protein demand will need to increase to create an economic incentive to expand processing capacity to process additional bushels.

Increased feedstock supply can also be achieved by increasing soybean oil content. Current industry genetic programs suggest 10 percent oil increases are achievable within the next few years, and increasing soybean oil content by that percentage would generate approximately 120 million gallons of additional oil if adopted on 50 percent of soybean acreage. New approaches for achieving even higher oil levels in plants are being actively researched. Previous efforts focused on increasing the flow of carbon into the oil biosynthesis pathway. However, downstream bottlenecks appear to reduce the value of this approach. The National Biodiesel Board (NBB) has partnered with The Donald Danforth Plant Science Center to identify novel approaches to enhance oil production in soybeans and other oilseeds. This work centers on the hypothesis that the ability to utilize available carbon limits oil production. Therefore, the Danforth Center's work will focus on engineering carbon sinks that will pull metabolites through the oil production process in plants. This is a three-year program that was initiated in 2008.

Winter canola is a crop with increasing demand in the United States and world markets. The USDA National Agricultural Statistics Service recently reported that the 2010 crop of canola was the largest on record with 1,523,700 acres. Canola is the primary crop grown for biodiesel production in Europe. According to Dr. Bill Cox of Cornell University (personal communication), winter canola is well adapted to growing conditions in parts of the Northeast based on past testing of the crop within the state.

Winter canola is fall-planted in September and establishes a thick leafy cover that protects soil from erosion in the fall and early winter months. The leaves die off during the winter but then regrowth occurs in early spring from the crown tissue (root-stem interface). Canola grows vigorously in the spring, producing profuse yellow flowers in mid-spring and ultimately reaching four to five feet in height. In June, the green stems and pods turn tan and the crop is ready for harvest by late June.

Overall production practices with canola are very similar to growing winter wheat, which is familiar to most row-crop farmers in the Northeast. The same equipment used for planting and harvesting wheat is used for canola, and fertility management is much the same. New hybrid types of winter canola have significantly boosted yields in other states and offer promise to provide strong economic returns. Roundup Ready varieties of winter canola are also now available.

As a rotation crop, canola offers several advantages. As mentioned above, it is a good crop to help with reducing soil erosion. It can be double cropped with soybeans in warmer areas, and can help reduce cyst nematode problems that can trouble soybean farms. Using canola to diversify a corn-soybean rotation can also help reduce other insect and disease problems. Canola can also be grown with a forage, such as overseeding clover into canola and allowing the clover to grow after the canola is harvested. Alternatively, the early harvest of canola compared to corn and soybeans can allow an August planting of alfalfa, giving that crop a better start for establishment in the early fall. For existing alfalfa fields that are declining in productivity, canola can be planted in September after two or three hay cuttings of alfalfa have been done and the alfalfa is killed by tillage or herbicides. For farmers who take corn off as silage, they can plant canola in the fall and then follow canola with either wheat or soybeans.

Spring canola can also be grown successfully in states such as New York (similar to growing spring oats), but in the majority of the states, higher yields can be expected from winter canola. Winter canola is not quite as winter hardy as winter wheat, but if planted on time in well-drained soils and given adequate fertility it can be expected to survive most winters.

A new entry into the bioenergy scene is camelina, a crop native to Europe being evaluated in many areas of the U.S. Initial commercial acreage of this crop has been in Montana, where as much as 20,000 acres have been grown for the biodiesel market. Camelina is a cool season spring crop that is grown much like spring oats or spring wheat. In fact, it is grown with the same equipment used for growing wheat or oats.

Camelina has been of significant interest for two primary reasons, with one being that it is currently a non-edible crop with the oil used only for bioenergy purposes. However, like any oilseed, the portion of the seed remaining after the oil is removed (the meal) is fed to livestock. The second reason is that camelina requires little rainfall and few inputs, including only low amounts of fertilizer. This makes it particularly well-suited for more marginal row crop areas such as the northern Plains.

While camelina can be grown and harvested in the Northeast, the question of its profitability has not been evaluated in the state. Recent trials with camelina in Pennsylvania should soon provide some baseline yield data that can be used to help evaluate profitability. Camelina is a relatively low yielding crop, so it may not be as appropriate for biodiesel production in this region compared to canola, which is much higher yielding. Still, camelina offers opportunity for diversification and may have a niche in certain regions of the Northeast.

Animal Fats & Brown and Yellow Grease

Each month the United States Census collects industry fats and oils consumption information through its m311K survey. Based upon survey information there are several biodiesel feedstocks sources beyond vegetable oils that are currently being utilized by industry and should be considered by NESCAUM. These include at least the following: yellow grease; inedible tallows; pork lard; and inedible corn oil from dry grind ethanol operations. Although these feedstock supplies do not have a supply response, their production can be significant for the region.

Animal fats are derived from the rendering process using animal tissues as the raw material. The raw material is a byproduct of the processing of meat animals and poultry. The amount of fat produced is directly related to the species of animal processed and the degree of further processing that is associated with the marketing/distribution of the meat product. Derived from U.S. Census Bureau statistics for 2007, approximately 964 million gallons of biodiesel could be produced from animal fats generated by the rendering industry. Industry analysts anticipate that roughly 25 percent of the rendered animal fat supplies could be diverted to biodiesel production without disrupting current uses. Thus, approximately 240 million gallons of biodiesel could be produced nationally from rendered animal fats. The National Rendering Association forecasts rendered fat supplies to grow approximately 6 percent, thus an estimated 483 million gallons of biodiesel could be produced from rendered fats in 2020.

As reported in, *Statewide Feasibility Study for a Potential New York State Biodiesel Industry, May 5 2004,* recycled cooking and restaurant greases are collected and processed primarily by the independent rendering sector since it is generally not a practice for packer or processing facilities to process yellow grease. Although the supply and availability of waste grease is difficult to quantify, approximately 300 million gallons of biodiesel could be produced from yellow grease generated in the United States[2].

It is estimated that a very high percentage of used cooking/restaurant grease is capable of being collected from restaurant and food operations. According to the U.S. Census, 1,484,711,376 pounds of yellow grease (estimated 185.6 million gallons) were generated in 2007. Accordingly, 62 percent of the potential recycled cooking oils in the U.S. were collected and processed into yellow grease. Realistically, all waste oils will not be collected. However, the population centers in the Northeast offer a viable feedstock source for biodiesel production. Effort can continue to be expanded to collect these feedstock supplies for biodiesel production versus other disposal options (e.g. landfill).

[2] Based upon the assumption that 9.4 lbs of recycled oils are generated per capita, 85% conversion rate to yellow grease, and a U.S. population of 300 million.

Also reported in, *Statewide Feasibility Study for a Potential New York State Biodiesel Industry, May 5 2004*, brown grease is collected from grease traps installed in commercial, industrial, or municipal sewage facilities to separate grease and oil from wastewater. This 2004 study utilized estimates by Wiltsee that annual production of trap grease averages an estimated 13.37 pounds per person. In the Wiltsee study, he indicates, "Data collected on grease trap wastes are subject to inherent inaccuracies because this material can include a significant amount of water and other materials mixed with the grease…. In all cases, a best effort has been made in this report to adjust grease trap resource data to include only the grease, and to exclude water and other materials that may be present." Assuming that 95 percent of the material collected was lipid, significant biodiesel production could be realized from brown grease generated in the Northeast.

Corn Oil

Corn oil supplies should also be incorporated into the report. The changing biofuels landscape creates the opportunity to benefit from increased ethanol usage. Historically, corn oil has not been a viable biodiesel feedstock due to its relative high cost and high value as an edible oil. In current dry grind processes, the corn oil essentially passes through the process and remains in the resulting distillers grains with solubles (DGS). Ethanol firms are investigating fractionation technology to remove corn germ (the portion of the corn kernel that contains oil) prior to the ethanol process. Furthermore, some ethanol plants have either began construction or announced their intent to employ technology to remove a portion of the remaining vegetable oil from distillers grains, a co-product of the ethanol process. In addition to the various extraction technologies, the quantity of corn oil could also be increased in the long term by producing more high oil corn varieties. The adoption of higher oil corn varieties by agricultural producers will be a function of vegetable oil value and agronomic performance. All of these technologies could add to the biodiesel raw material supply in a meaningful way. Multiple ethanol plants have invested in de-oiling technology, and the U.S. Census Bureau initiated coverage of corn oil in their m311k surveys in June, 2008. As of December 2009, approximately 50 million gallons of extraction capacity had been installed at ethanol plants. Expansion of this technology can occur very rapidly.