Via electronic mail

October 31, 2011

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

Subject: Northeast/Mid Atlantic Low-carbon Fuel Standard

Dear Mr. Marin:

NPRA, the National Petrochemical & Refiners Association, appreciates the opportunity to comment on the August 2011 NESCAUM report titled "Economic Analysis of a Program to Promote Clean Transportation Fuels in the Northeast/Mid-Atlantic Region". NPRA members produce virtually all the refined petroleum products and petrochemicals manufactured in the United States, serving the American people responsibly and effectively. These manufacturers provide jobs directly and indirectly for 2 million Americans, economic and national security, and thousands of products vital to families and businesses throughout the United States.

The design and implementation of fuels regulations are vitally important for our members and for the economy, since energy plays such an important role in everyday life. These comments are intended as a constructive contribution to the ongoing dialogue that NESCAUM is holding with stakeholders. We hope that this open and transparent comment process will inform policymakers and help them manage the economic risks of implementing new fuels regulations and avoid unintended consequences.

NPRA would also like to reiterate that the low-carbon fuel standard, if implemented, should be evaluated periodically to make adjustments based on new technology, fuel supply issues, and economic or environmental concerns. Should such reviews yield significant modifications to the program, then impacted parties must be provided adequate time to comply.

Because of our association's expertise in transportation fuel markets and manufacturing, NPRA feels that it can make a valuable contribution, and, as always, NPRA welcomes the opportunity to further discuss these issues with states and NESCAUM.

Sincerely,

Charles T. Drevna

President, NPRA

NPRA appreciates the opportunity to comment on the NESCAUM report titled "Economic Analysis of a Program to Promote Clean Transportation Fuels in the Northeast/Mid-Atlantic Region" published in August 2011.

These comments follow up from earlier NPRA comments submitted to NESCAUM in August 2010 regarding the evaluation of a Low-carbon Fuel Standard (LCFS) for the Northeast/Mid-Atlantic region, where NPRA strongly urged NESCAUM to "…undertake a comprehensive incremental economic and benefit analysis …. using a specific set of realistic low-carbon fuel development and implementation assumptions, before moving forward with its current work."

NPRA has reviewed the NESCAUM LCFS economic analysis released in August 2011 and is concerned by the significant deficiencies in that report. NESCAUM did not use a set of realistic LCFS assumptions as the basis for its modeling and, furthermore, did not articulate the economic risk to the region if the assumed overly optimistic scenarios do not materialize.

Specifically, the NESCAUM assumptions regarding supply availability and costs for second generation biofuels and alternative vehicles (electric, PHEV, natural gas) as well as infrastructure are unrealistic over the 2013-2022 timeframe and contradict credible sources such as the National Academy of Sciences and the U.S. Department of Energy's Energy Information Administration (EIA). As a result, the validity of NESCAUM's economic analysis is questionable, the calculated benefits unattainable, and the proposed scenarios cannot be used as a credible basis for sound policy decisions. Furthermore, the report fails to articulate these serious concerns in a transparent way and fails to clarify the apparent risks to policy makers and Governors who need the information as they review the NESCAUM study.

NPRA supports the analysis of the recently published IHS report titled "Assessment of the NESCAUM Economic Analysis of a Clean Transportation Fuels Program for the Northeast/Mid-Atlantic Region" released on October 14, 2011 (http://www.secureourfuels.org/wp-content/uploads/2009/06/Assessment-of-the-NESCAUM-Economic-Analysis-of-a-Clean-Transportation-Fuels-Program-for-the-Northeast-Mid-Atlantic-Region.pdf). To avoid duplication, findings from that report will not be repeated in these comments.

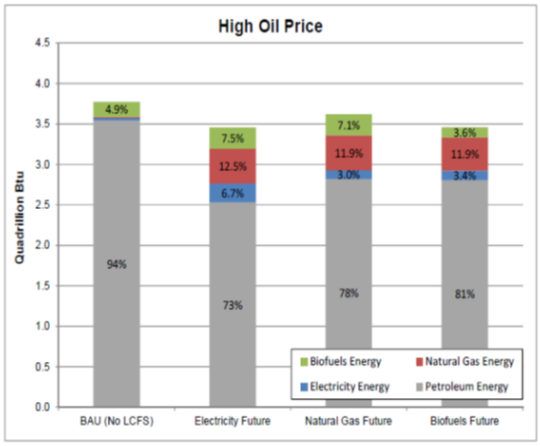
In the comments that follow, NPRA will describe key concerns and flaws in the NESCAUM assumptions and will assert that the NESCAUM LCFS scenario proposals will be infeasible over the next decade. Governors should realize that the NESCAUM proposed LCFS program has no reasonable pathway for achieving compliance by 2022. It is also clear that adoption of the proposal will severely impact the prosperity and economic viability of the Northeast/Mid-Atlantic states. Alternative compliance mechanisms are not substitutes for infeasible policies. According to comments by State DEPs at the stakeholder meetings in Boston and Baltimore on September 20 and 22, 2011, the goal of the LCFS program is to "reduce the GHGs and lower the carbon intensity and there is no interest in alternative compliance mechanisms".

1. *NESCAUM's analysis does not meet the region's energy demand*

The energy balances in the NESCAUM scenarios do not meet the region's transportation demand per the "business as usual" (BAU) baseline (see NESCAUM Figure ES-2 below). For example, in the electricity scenario, the combined reduced volume of gasoline and diesel in 2022 is 8.7 billion gallons or a loss of 1.1 Quadrillion Btu of energy demand which is not replaced by the alternative energy sources.

Energy demand is directly correlated with population growth and GDP. Assuming low energy demand for 2022 is a major flaw in the NESCAUM analysis and will have severe implications for the region's economic viability.

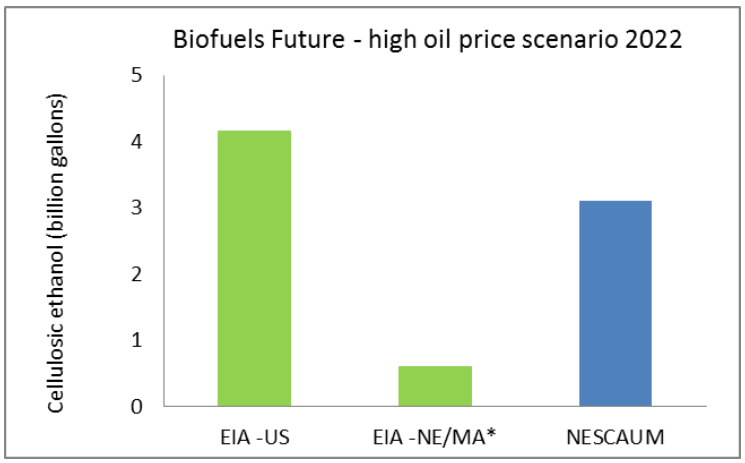
Figure ES-2. Impact on Regional Transportation Fuel Diversity (Year 10)



2. *NESCAUM assumptions regarding availability and cost of low-carbon intensity fuels are unrealistic and contradict credible sources.*

   a) *Cellulosic Biofuel Availability*

   NESCAUM assumes that all ethanol in the Northeast/Mid-Atlantic region (NE/MA) is cellulosic. A comparison of the projected NESCAUM volumes with data from the EIA 2011 Annual Energy Outlook show that the NESCAUM assertions are out of line with EIA projections (see graph below)



*calculated based on EIA cellulosic ethanol projection for the US scaled to the region's gasoline demand as % of US demand

Furthermore, the National Academy of Sciences (NAS) in its recent report "Renewable Fuel Standard: Potential Economic and Environmental Effects of US Biofuel Policy" released in October 2011, finds that "…the capacity for producing cellulosic biofuels to meet the RFS2 consumption mandate will not be available unless innovative technologies are developed that unexpectedly improve the cellulosic biofuels production process and technologies are scaled up and undergo several commercial-scale demonstrations in the next few years to optimize capital and operating costs".

According to NAS, there is not enough crop residue or municipal solid waste to meet RFS2 and "dedicated crops will have to be grown": for 16 billion gallons of cellulosic biofuels, 30-60 million acres of land will be needed for cellulosic biomass feedstock production. Scaling the NAS land estimates to the volume of 3 billion gallons of cellulosic ethanol required by the NESCAUM proposal means that the entire state of New Jersey (at a minimum) or Massachusetts, Connecticut, and Rhode Island combined would need to be converted to energy crop production!

NAS also finds that forest wood residue quantities are insufficient and the plants and processes would be too costly for cellulosic biofuel production.

b) Cellulosic Biofuel Costs are unrealistically low

NESCAUM high oil price 2022	$/gallon
Gasoline (retail)	5.49
Diesel (retail)	5.91
Cellulosic ethanol	0.65 - 2.95
Soy biodiesel	3.15
F-T diesel	3.92

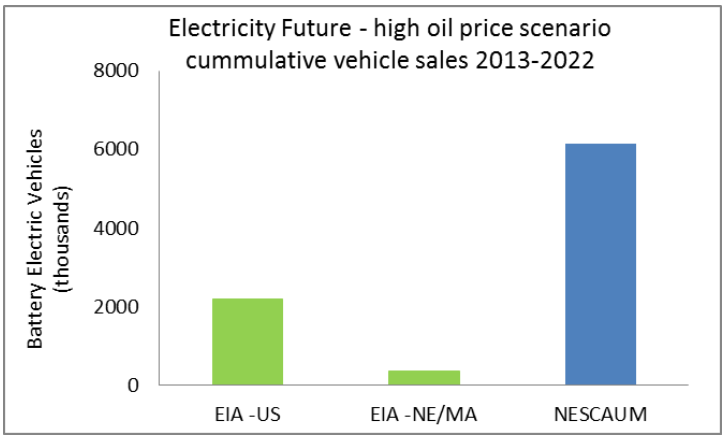
NESCAUM assumes that advanced biofuels such as cellulosic ethanol and renewable diesel will succeed in reducing their total operating costs below those of conventional gasoline and diesel fuels (see table above). Given that cellulosic biofuel technologies have yet to be commercialized, it is unrealistic to project that their costs will be below those of petroleum products within the timeframe under consideration. In fact, the National Academy of Sciences has concluded that "Only in an economic environment characterized by high oil prices, technological breakthroughs, and a high implicit or actual carbon price would biofuels be cost-competitive with petroleum-based fuels." ("Renewable Fuel Standard: Potential Economic and Environmental Effects of U.S. Biofuel Policy", National Academy of Sciences, October, 2011, p. 2). NAS estimates that biofuels may become economic if crude oil reaches $191/barrel which corresponds to an approximate gasoline price of $5.23/gallon according to EIA.

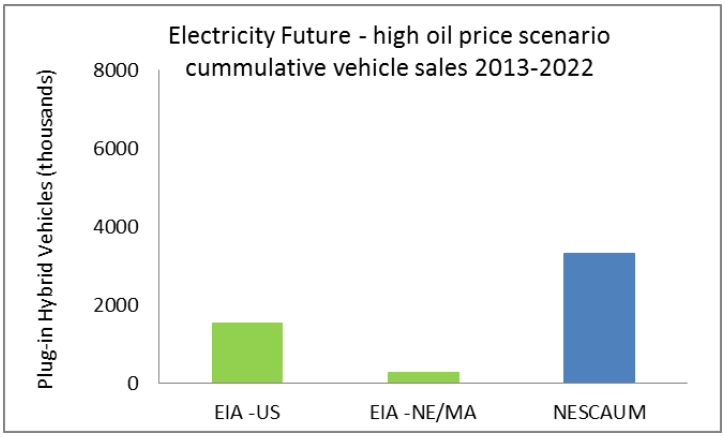
The National Academy of Sciences estimates that the cost for the pioneer cellulosic plant to be $650-850 million and the cost for the n^{th} plant to be $350-500 million. In order to produce 16 billion gallons of cellulosic ethanol for RFS2, NAS projects that $116 billion of capital will be required. Therefore, for 3 billion gallons of cellulosic biofuels in the NESCAUM scenario, the capital cost will be $22 billion vs. the NESCAUM estimate of no more than $2 billion dollars for biofuels infrastructure (that includes terminals and blending facilities)!

c) *Electric Vehicles*

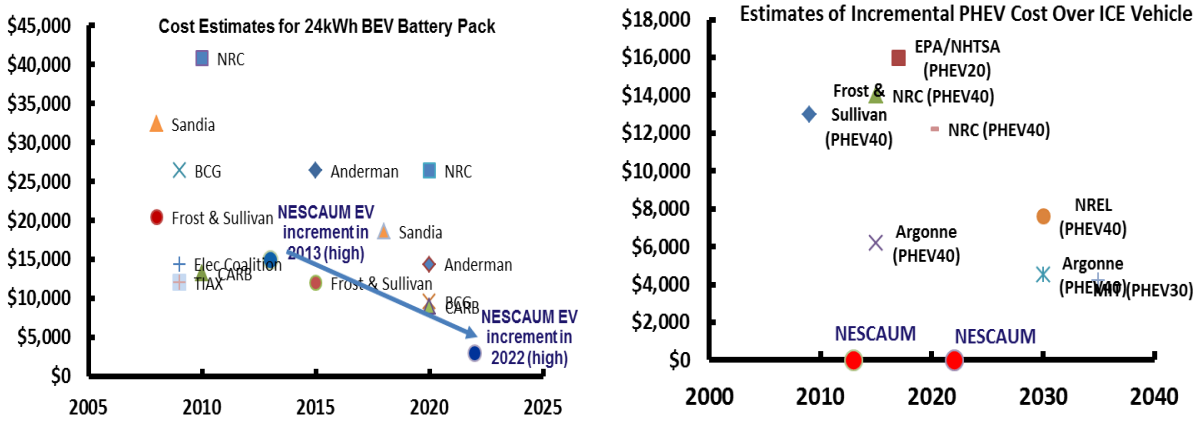
NESCAUM projects unrealistically high volumes of BEV and PHEV vehicle sales and assumes very low price differentials with conventional vehicles.

The figures below compare NESCAUM assumed cumulative vehicle sales between 2013 and 2022 vs. EIA projections in the same timeframe for the whole US and also for the Northeast/Mid-Atlantic region. The NESCAUM numbers are three times the volume of BEV sales projected by EIA for the whole US!





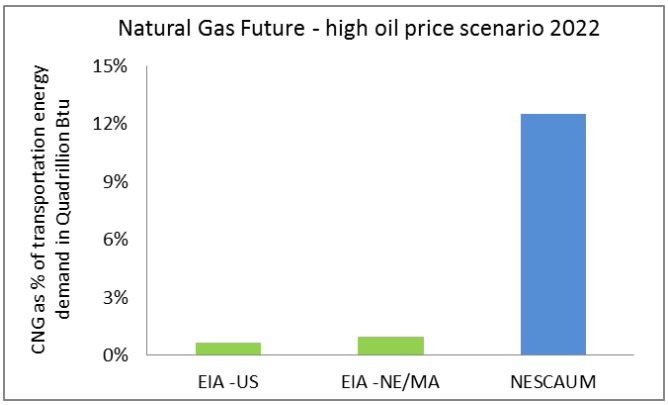
Furthermore, NESCAUM assumes extremely low costs for the alternative vehicles that are not supported by public sources.



Source: IHS report "Assessment of the NESCAUM Economic Analysis of a Clean Transportation Fuels Program for the Northeast/Mid-Atlantic Region" released on October 14, 2011.

d) Natural Gas Vehicles

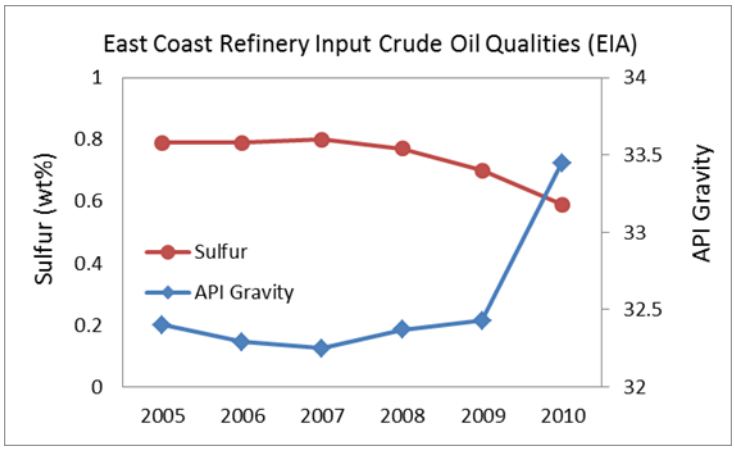
EIA expects limited use of natural gas and compressed natural gas (CNG) in the transportation sector. Specifically, EIA estimates that less than 1% of the transportation energy in the US and Northeast will come from CNG. This contrasts with a 12% projection by NESCAUM! The attached figure illustrates the stark contrast and unrealistic NESCAUM assumptions. There is no infrastructure to support such growth and NESCAUM's assumed cost of $3 billion or less is minuscule.

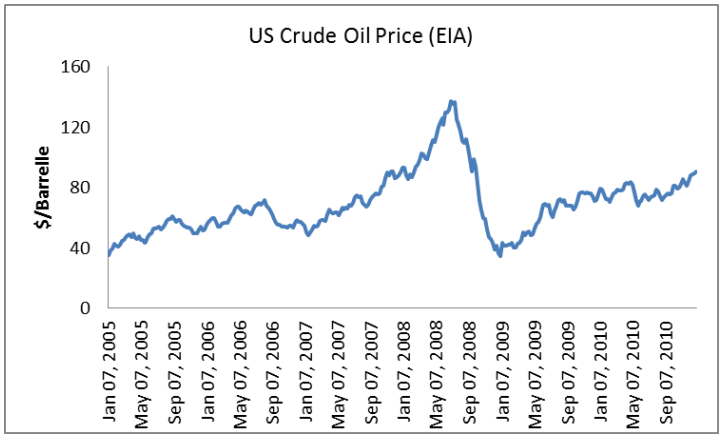


3. Unsubstantiated increase in baseline carbon intensity

NESCAUM assumed an increase of 0.5 gCO2e/MJ/year for the gasoline and diesel CI values in their high oil price scenario which results in a 5% increase in the baseline BAU CI between 2013 and 2022 (gasoline CI increases from 96 to 101 gCO2e/MJ).

NESCAUM anticipates that high oil prices will result in increased production of high carbon-intensity crude oils (HCICOs) and that some of these HCICOs will supply East Coast refineries. However, most of the East Coast refineries are locked in to running light (high API gravity), low sulfur crudes because they do not have the conversion capacity required to run heavy crudes (low API gravity). The graphs below indicate that the average API gravity of the aggregate East Coast crude oil slate is light (i.e. API gravity greater than 32°) and that it does not vary much as crude oil price changes. This is because the refineries have fixed conversion capacity constraints which prevent them from increasing their heavy crude volumes. Because of these conversion capacity constraints the carbon intensity of the region's supply is expected to remain level. NESCAUM should not have assumed that crude oil carbon intensity will increase even for the high crude oil price scenario.





Source: Energy Information Administration http://www.eia.gov/petroleum/data.cfm

4. NESCAUM Pessimistic Scenarios

The NESCAUM economic analysis does contain two somewhat pessimistic sensitivity cases, but these are glossed over in the analysis and do not appear to have been addressed in the conclusions. The analysis should have been expanded to explore these pessimistic cases further so that policymakers can manage the risks that they represent.

NESCAUM did consider a somewhat pessimistic case in which the CI values for each of the technologies were taken from the high end of the range and transportation fuel carbon intensity was reduced by only 5% over the 10-year time horizon. The analysis indicates that even this case would have significant benefits for consumers (Table 3-10, p. 57), but this is because the pessimism with regards to CI values is overwhelmed by the embedded optimistic assumptions. These are:

- Advanced biofuels will cost less than conventional petroleum-based fuels.
- The advanced biofuels volumes of the 5% case are even higher than in the "biofuels future" case. The "biofuels future" scenario assumes 70 MM gallons of cellulosic ethanol in 2013, but the "pessimistic" case assumes that there will be 135 MM gallons of cellulosic ethanol available in 2013. This volume would be nearly ten times the

maximum capacity that EPA thinks will exist *nationwide* in 2012, which is even less credible than the "biofuels future" scenario.

The assumed year-on-year increases for cellulosic ethanol production are very high in the early years (approx. 75%), which is very optimistic given the historical evidence that production volumes for new technologies ramp up slowly due to implementation issues and producers' caution. The net effect of mixing the pessimistic high CI-value assumption with the optimistic assumptions about volume and prices is the self-contradictory conclusion that a less successful (higher CI value) fuel will be used in higher volumes and produce greater savings for consumers.

NESCAUM also considered a sensitivity case for the "biofuels future" scenario that contemplated that advanced biofuels would be produced outside the NE/MA region (Table ES-6, p. ES-11). It is reasonable to consider this case since:

- Most ethanol capacity is presently located close to feedstock sources in the Midwest, and this is likely to be the case in the future.
- The amount of land required to grow biomass sufficient for the 3 billion gallons/year of cellulosic ethanol is approximately equal to the area of New Jersey (low end of land use estimate).

Table ES-6 indicates that this change has a significant impact on the macroeconomic impacts of the LCFS as disposable personal income actually turns negative in the low oil price case (2010 AEO reference case). However, this potential negative is not discussed in the economic analysis and is ignored in the conclusions.

These "pessimistic" scenarios illustrate again that NESCAUM's approach is to assume success and ignore contrary results that might prompt a consideration of the downside risks of implementing new technologies on a large scale.