Hi, I'm Steve Sack from Sack Energy, My Company is one of the largest wholesalers of biodiesel in Southern New England. Sack Energy has been in business for more than 100 years, providing local heating oil retailers with home heating oil and biodiesel, blended together called Bioheat.

I am here today in support of HB 5380, *AN ACT REDEFINNING "CLASS 1 RENEWABLE ENERGY SOURCE ' TO INCLUDE CERTAIN USEFUEL THERMAL ENERGY GENERATED FROM BIODIESEL.*

There are two major befits doing this. Reduction of green house gas emissions and a larger revenue stream to the state with local production that is happening in New Haven.

By including biodiesel in this program, we will be on our way to meet the State's Reduction in Greenhouse gas emissions goals. We look at carbon Intensity known as CI Values to understand the whole lifecycle of fuels and GHG emissions that products emit. The CI value of CNG (Compressed Natural Gas) is 79.46 and the CI value of Biodiesel made from used cooking oil is 19.87. When we add Biodiesel to #2 heating it is called BioHeat, when 7% of Biodiesel is added to Heating Oil the CI value is about the same as Natural Gas. Today we can easily add 20% biodiesel to heating oil and burn cleaner then Natural gas. When used in homes and commercial heating systems there are virtually no changes needed to use Bioheat. Our industry is also looking forward to the future and we have created products that have zero to negative carbon values with the use of biodiesel and other waste feed stocks that are able to be used in conventional home heating systems. The future of the planet is with Biodiesel.

This Bill will also have a positive impact on the state's economy. There will be an increase in continuing revenue streams that the state will benefit from. In New Haven there is the largest Biodiesel production plant in New England. This bill will create more jobs to produce Biodiesel, create temporary jobs to expand the current manufacturing and potentially new production plants, it will create ancillary jobs to support the plants in the transportation, supply and other supporting rolls. This bill also could create more plants locally. There will be new tax revenue to the towns where manufacturing plants will be built or expanded. Today of the top 100 producers of T-recs only 37% are created in Connecticut, with the addition of Biodiesel we can increase this to more than

75% created in state and the sale of them will happen in Connecticut and Connecticut companies will be paying income tax on the revenue generated from the sale of them.

Thank you for your time and support of HB 5380
Also I do not support Bill # 5478, this is not the time for mandates until our industries are ready for it.

LCFS Carbon Intensity Values

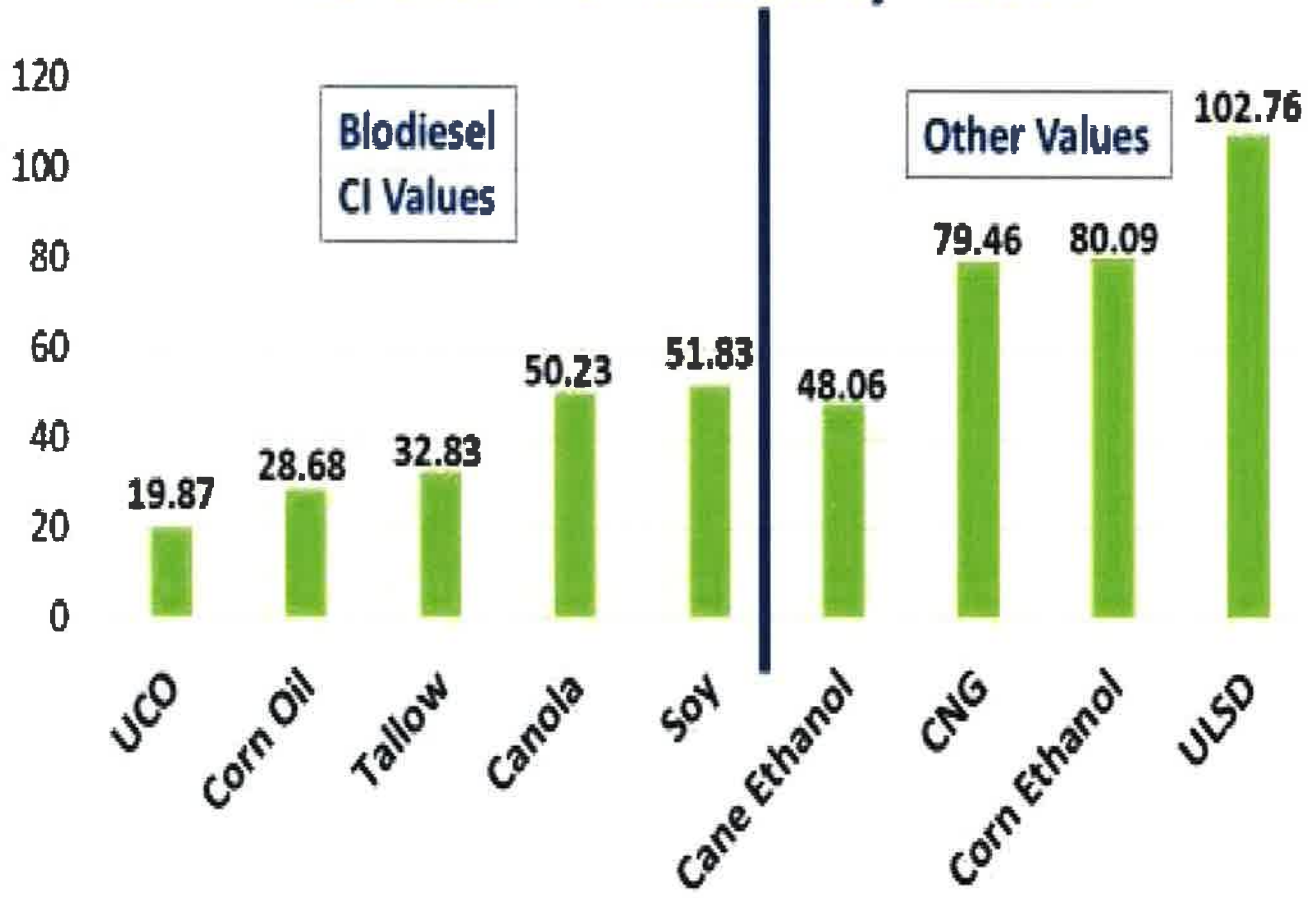
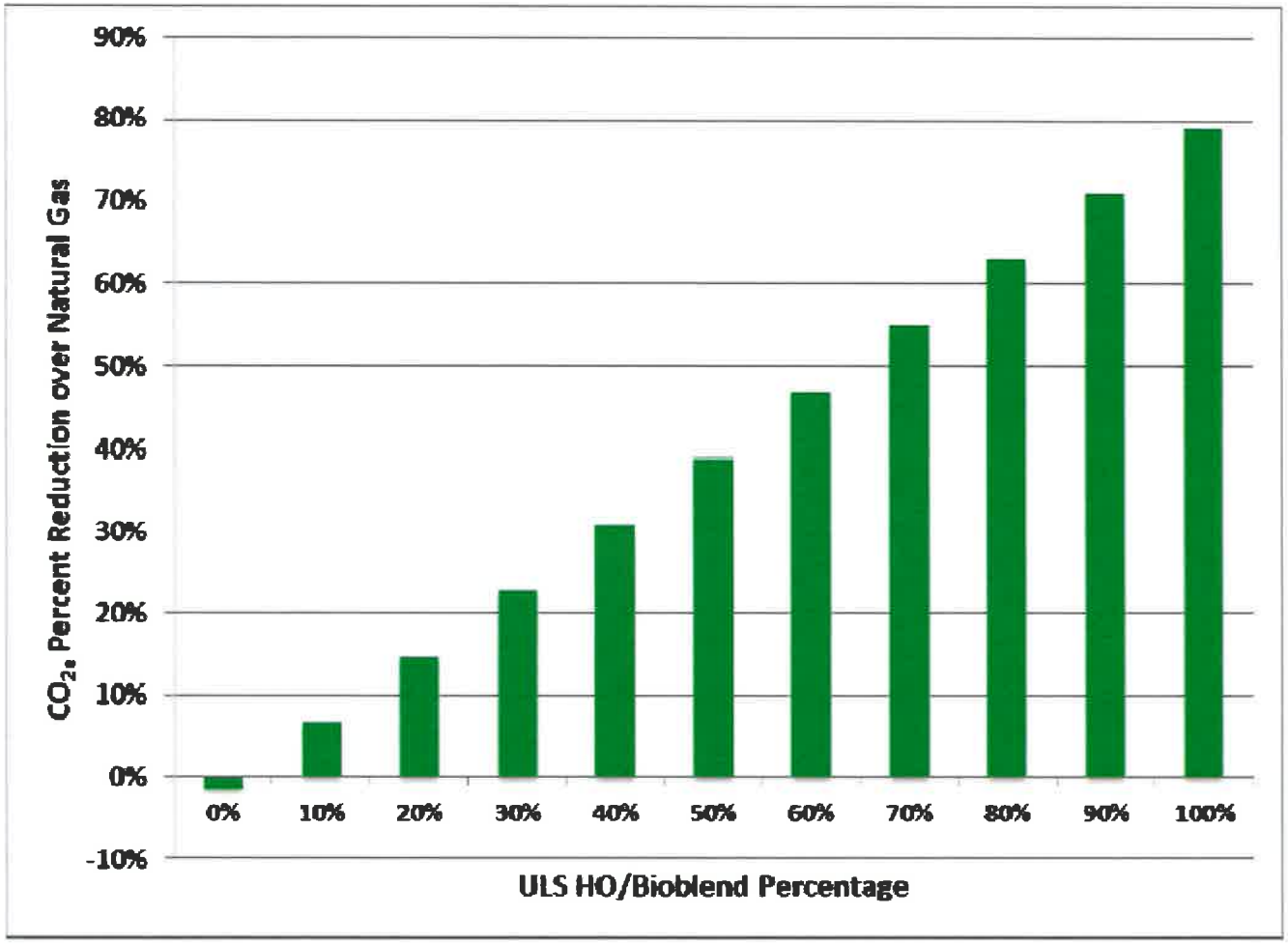


Figure 5) ULS HO/Bioblend CO_{2e} Reduction versus Natural Gas 20 Year Atmospheric Lifetime without Indirect Land Use[6]



e 5 shows that, as technology advances, biodiesel blends with heating oil, CO_{2e} reductic
xceed conventional natural gas and shale gas. Given that biodiesel blends with heating
sions can easily be lower than natural gas GHG emissions, there is no climate change re
switching from oil to natural gas.

Low Carbon Liquid Heating Fuel Pathways

United Nations Intergovernmental Panel on Climate Change is developing a report that will focus on assessing ways to limit global warming to a 1.5°C goal by the end of the century and will examine mitigation pathways, impacts on natural and human systems, global responses, and sustainable development.

To achieve this 1.5°C goal, according to the Stockholm Environment Institute, will require elimination of all fossil fuel-based carbon emissions by 2050.

Natural gas, heating oil and biodiesel blended with heating oil provide space heating and hot water services in the residential sector. Choosing a specific energy source for these services has significant implications in terms of energy efficiency, economics and environmental impact. While the ultimate fuel choice is made by builders and consumers, and most often based on economics, this choice is also influenced by perceptions of how efficiently, or inefficiently, our energy resources are being used and how the choice might impact the environment, including the release of greenhouse gases (GHG) into the atmosphere.

The National Oilheat Research Alliance (NORA) new study "Analysis of Fuel Cycle Energy Use and Greenhouse Gas Emissions from Residential Heating Boilers" (June 2018) focuses on moving todays heating systems into a low carbon future.

The study concludes that domestic liquid fuels have the potential to play an important role in the future national energy mix, with or without increased electrification. The high energy density of liquid fuels makes transporting and storage simple and cost-efficient, and technical advancements in biofuels and technology can provide low carbon energy services at the point of use, unburdening the electricity supply and transmission system, supporting grid stability and enhancing energy resilience:

- Advanced biofuel blends with ultra-low sulfur diesel heating oil can become a clean and cost-effective net zero GHG emissions residential heat source alternative before 2050.
- Development of new, renewably fueled, thermally driven (heating only) heat pump technologies promise to rival source energy efficiencies of electric heat pumps and provide greater comfort at low ambient temperatures.

Biodiesel/Heating Oil Blends Today

Heating oil, with modest levels of soybean-based biofuel blending (20 to 25 percent), remains a competitive alternative to natural gas for residential heating in terms of overall energy use and GHG emissions based on conventional 100-year atmospheric lifetime calculations. To illustrate, New York City is one of six cities where boiler performance and GHG emissions were calculated for natural gas, heating oil and heating oil/biofuel blends. Figure 1 shows that, for New York City, the GHG emissions of a typical replacement residential oil boiler using a B20[1] blend are equivalent to the emissions from a typical replacement natural gas boiler based on 100-year atmospheric lifetime calculations[2]. Blends up to B100[3] have been used in the field today, with B20 blend being quite typical.

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[1] B20 is 20% biodiesel and 80% ultra-low sulfur diesel

[2] without considering induced land use change impacts

[3] B100 (100% biodiesel) has been applied in the field, but very special care must be taken with respect to clod flow properties.

Today, a blend of 7 to 20% soybean-based biodiesel and 80 to 93% heating oil is equivalent to natural gas in total fuel cycle GHG emissions.

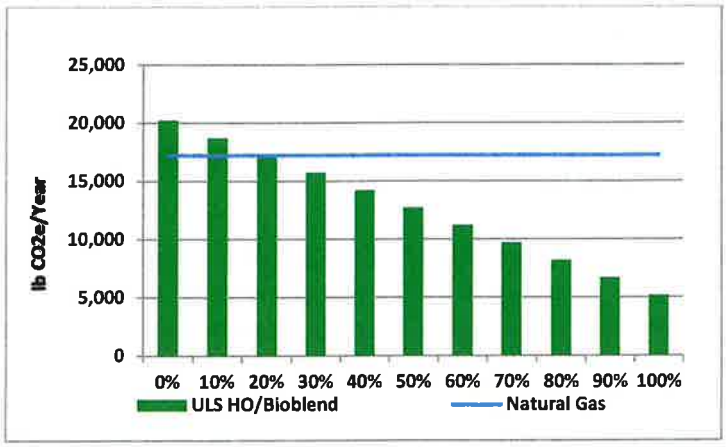

Figure 1 - 100 Year Atmospheric Lifetime

Heating oil with even lower levels of biofuel blending (7 percent) remains a competitive alternative to natural gas for residential heating in terms of overall energy use and GHG emissions based on carbon forcing 20-year atmospheric lifetime calculations. Figure 2 shows that the GHG emissions of a typical replacement residential oil boiler using a B7[4] blend of heating oil are equivalent to the emissions from a typical replacement natural gas boiler based on 20-year atmospheric lifetime calculations without considering induced land use change impacts. Again, blends up to B100[5] have been used in the field today, with B20 blend being quite typical.

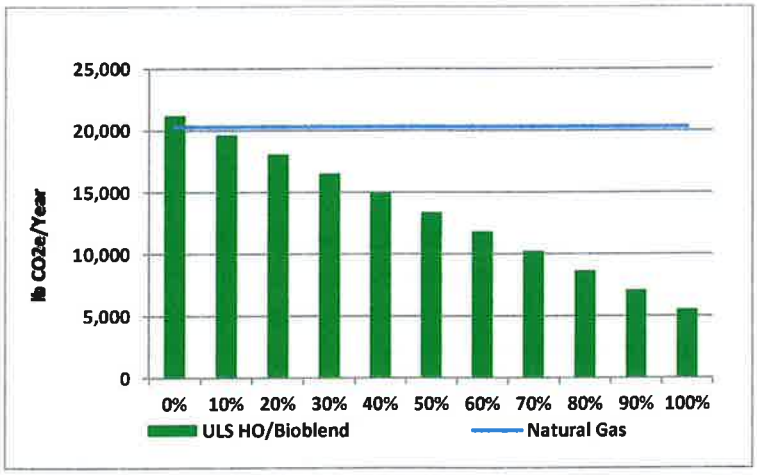

Figure 2 - 20 Year Atmospheric Lifetime

[4] B7 is 7% biodiesel and 93% ultra-low sulfur diesel

[5] B100 (100% biodiesel) has been applied in the field, but very special care must be taken with respect to clod flow properties.

In the future, a blend of 79% soybean-based biodiesel and 21% ethyl levulinate will contribute zero total fuel cycle GHG emissions.

Zero Carbon Combustion by 2040

The heating oil industry is actively incorporating existing biofuels into product blends in order to reduce GHG emissions and is working with suppliers to ensure these product blends are compatible with existing and new oil heating equipment.

Advanced biofuels, such as ethyl levulinate, show even greater promise at reducing the GHG footprint of heating oil blends, well beyond the levels of competing fuels such as natural gas. Figure 3 illustrates the total annual GHG emissions from providing heating and hot water services to a representative 2,500 square foot house in the New York City regions for typical replacement boilers being sold today using a blend of ULS heating oil, biodiesel and ethyl levulinate as fuel. A blend of just 10% biodiesel, 10% ethyl levulinate and 80% ULSD has lower annual GHG emissions than natural gas. The graph shows that increasing biodiesel and ethyl levulinate blend content significantly improves GHG emission compared to natural gas. In fact, because of the feedstock used, production techniques and multiple usable products, ethyl levulinate actually enables the potential for reduction of GHG beyond a neutral point – a blend of 79% soybean-based biodiesel and 21% ethyl levulinate contributes zero total fuel cycle GHG emissions, based on using the 100-year atmospheric lifetime global warming potential (GWP) factors with carbon feedback.

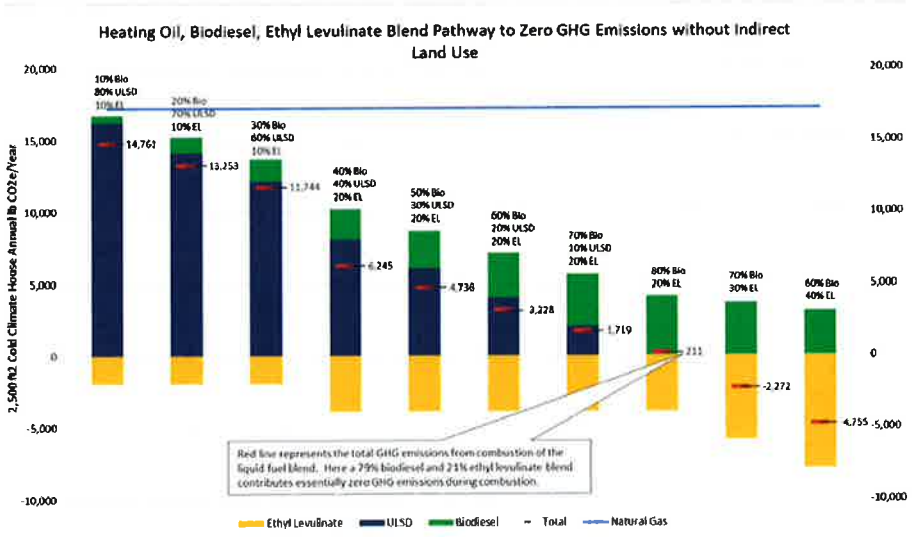

Figure 3 - Heating System Emissions Comparison with Advanced Biodiesel Blends