Roadmap to Success: Achieving a Net-Zero Carbon Future by 2050

A Strategic Plan for the Liquid Heating Fuel Industry to Accelerate and Achieve Net Carbon Reductions

Author: Kearney & the National Energy & Fuels Institute (NEFI)
Publish date: October 2020

KEARNEY

nefi Serving Main Street Energy Providers Since 1942

Table of Contents

Overview

This paper presents the National Energy & Fuels Institute's (NEFI) strategic plan for the United States to dramatically reduce greenhouse gas emissions from home heating below 1990 levels, while providing customers with an equitable, lower cost option that is available today and maintaining the small, multi-generational family businesses that deliver warmth and comfort to six million American homes. NEFI's plan is supported by extensive research and data proving that renewable liquid heating fuels can, and should be, the lever driving significant carbon reductions at the consumer level. NEFI is excited to present the path forward for the United States to increasingly become a leader in fighting climate change through concerted efforts to reduce greenhouse gas emissions in the home heating sector.

National Energy & Fuels Institute (NEFI)

NEFI is a nationally recognized non-partisan, non-profit trade association that has served liquid heating fuel providers since 1942. NEFI continues to be a voice for the heating fuels industry before regional and federal policy makers, media and the public. There are many aspects to our diversified activity base in support of the fuel distribution market, and we offer several channels and events for communications and resource promotion. For more information, visit nefi.com.

Kearney

As a global consulting partnership in more than 40 countries, our people make us who we are. We're individuals who take as much joy from those we work with as the work itself. Driven to be the difference between a big idea and making it happen, we help our clients break through. Learn more at Kearney.com.

KEARNEY

Executive Summary

Widespread acceptance of man-made climate change as a legitimate phenomenon has placed greater scrutiny on anthropogenic contributors of greenhouse gases, of which conventional heating oil is a contributor. A recent poll revealed 70 percent of Americans want aggressive government action to combat climate change, specifically citing a complete shift to renewable, clean energy.[1] Increased pressure from the public is resulting in aggressive policy proposals at the global, national and local levels, such as banning or taxing, to a prohibitive extent, energy sources that emit high levels of CO2 and other harmful greenhouse gases and air pollutants.

Coupled with this, social consciousness about the environmental externalities of individuals' behaviors and choices is now factored into consumer's decision making. Consumers increasingly view climate change as a major problem and see purchasing petroleum-based liquid heating fuel as an unacceptable choice. Research indicates there is a valuable opportunity for the oilheat industry help customers bridge the gap between sentiment and action. In other words, by offering low cost, low-carbon alternative renewable liquid heating fuels that are easy to adopt.

Since 2000, market forces and climate-driven policy changes have resulted in conversion of 3.5 million American homes from heating oil to other fuels, primarily utility-provided electricity and natural gas.[2]

In September 2019, the liquid heating fuel industry came together and committed to taking action – acknowledging public acceptance of man-made climate change and embracing the desire to be seen as part of the country's energy efficient, low-carbon future. Ratification of the *Providence Resolution* was a commitment by the liquid heating fuel industry to shift its product to increasingly higher blends of renewable liquid heating fuels with the goal of delivering a net zero carbon liquid heating fuel by 2050.

NEFI recognizes the importance of supporting the fight against climate change through offering consumers an alternative and renewable product. Accordingly, NEFI developed a strategy to rebrand the industry as the renewable liquid heating fuel industry to better reflect its commitment to accelerating and achieving net-zero carbon reductions by 2050.

The path forward begins with converting the industry's petroleum-based heating oil portfolio to a 20% - 50% fuel blend of ultra-low sulfur heating oil and renewable biodiesel made from organic and recycled feedstocks, such as soybean oil, used cooking oils, inedible corn oil, canola, tallow, fats and algae. Research shows that along the supply chain today, from production, through transportation, to heating the consumer's home, the required supply infrastructure, production capacity, and technical standards to make this feasible are already in place in North America. Achieving the Providence Resolution's short-term goals of a 15% emissions reduction by 2023 and a 40% emissions reduction by 2030 are attainable with a lower-cost, low-carbon alternative fuel product that exists today.

Achieving the longer term (2050) net-zero goal will require infrastructure and research investments, including into cellulosic biofuels; supportive policy actions at all levels of government; and a unified industry approach. While some modifications to delivery and home heating equipment will be required for higher fuel blends (containing greater than 50% renewable fuel), these solutions are largely available today and are already in use by dealers across the industry. This is what holds the liquid heating fuel industry apart – the hurdles to overcome for a true net-zero 2050 are solvable today with a clearly outlined path forward.

[1] This poll was conducted by Climate Nexus, the Yale Program on Climate Change Communication and the George Mason University Center for Climate Change Communication on behalf of the Guardian, Vice Media Group and Covering Climate Now
[2] Source: U.S. Census Bureau, American Community Survey, primary heating fuel by occupied housing unit, 2000 vs. 2018 five year average

Industry Spotlight

The liquid heating fuel industry is a key contributor to home comfort and employment in its operational areas

5.5 million

homes in Northeast and Mid-Atlantic regions are heated with liquid heating fuel

~3,000

heating oil companies in the Northeast & Mid-Atlantic regions

Majority

small, multi-generational family businesses

1.7B gallons

of biodiesel currently produced in the United States, with 3.1 billion gallons of capacity

28

well-paying jobs supported by the average dealer

160,000+

workers employed by the United States oilheat

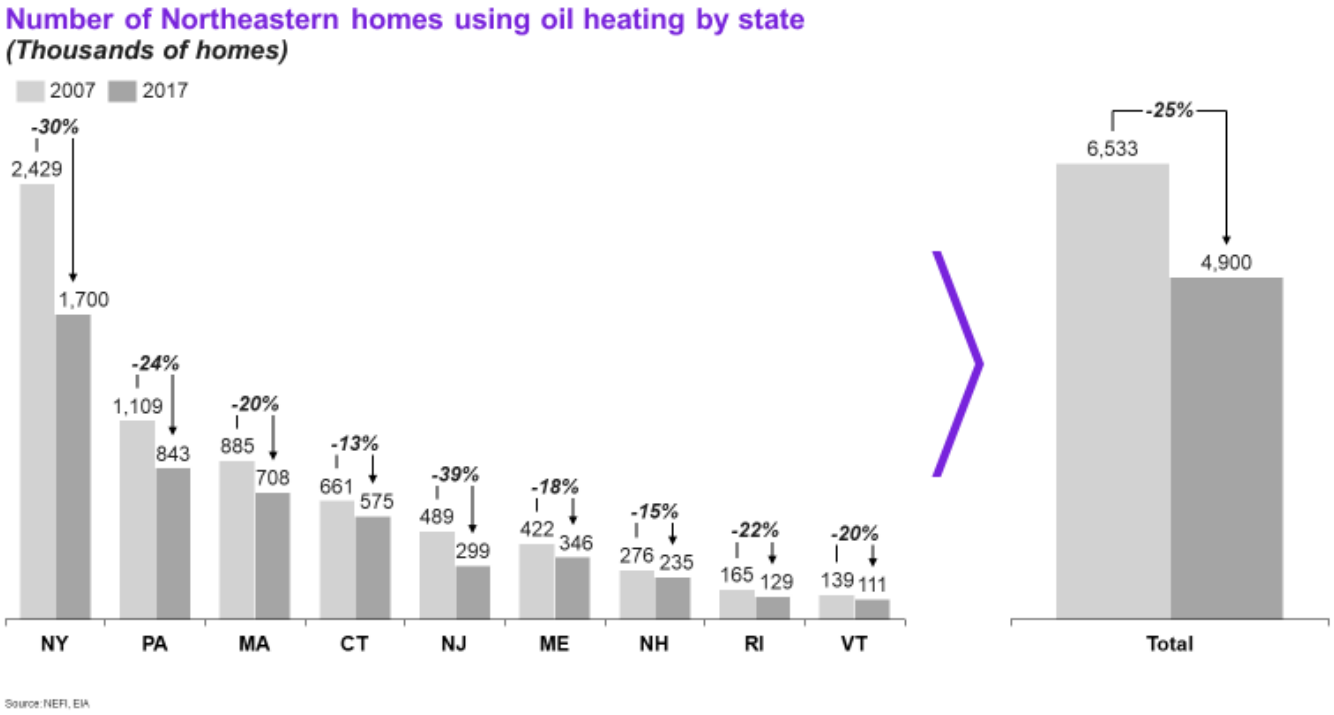
Who is the liquid heating fuel industry?

The liquid heating fuel industry is largely comprised of small, multi-generational family businesses that are important contributors to the local economies in which they operate. “My company is my family’s legacy. We’ve owned and operated it for almost 100 years,” reported one Massachusetts dealer, whose story is like so many others across this industry. Across the country these businesses – often referred to as “fuel dealers” – support 160,000 good paying jobs in their local communities and through support for ancillary products and services. The transition to renewable fuels also supports biodiesel producers and feedstock growers and suppliers, such as American farmers who grow soybeans and restaurants that provide waste cooking oil for processing into biodiesel. This additionally supports economic growth and job creation, particularly in rural communities.

These businesses are also “known entities” in their cities and towns. They personally deliver warmth and comfort to American families and often have the keys to their customers’ homes. “We know our customers on a personal basis, and we know their home heating system better than they do,” said one New York dealer. These are the men and women who have been working on customers’ homes for two decades and who always pick up the phone at 2AM in the middle of January when the heat is not on to make sure their customers stay warm.

Introduction

Historically, the liquid heating fuel industry has delivered petroleum-based heating oil or propane to millions of homes across the United States. The majority of these homes (85 percent) are located in the Northeast region from Maryland to Maine. In 2007, the oilheat industry served 6.5 million homes in the Northeast, but by 2017 that number dropped to 4.9 million. Nationwide, the oilheat industry has declined from 9.5 million homes served in 2000 to 6 million today, a loss of 3.5 million homes or 38 percent. This was the result of market forces and policy changes encouraging greenhouse gas emission reductions by converting home heating systems from deliverable fuel-based to utility-provided fuels (e.g. converting from heating oil or propane to compressed natural gas or electricity).



In September 2019, the liquid heating fuel industry formally acknowledged the imperative of joining the fight to combat climate change. The *Providence Resolution* was ratified by industry stakeholders at the 2019 Heating & Energizing America Trade Show (the HEAT Show) in Providence, Rhode Island to establish renewable liquid heating fuels as a more attractive home heating method relative to both current liquid fuel options and electric/gas alternatives. This resolution signalled a commitment by the industry to position itself as a leader in accelerating carbon reductions while remaining competitive in the home heating market.

The *Providence Resolution* proposes the oilheat industry reduce its overall greenhouse gas emission profile, based on 1990 levels, by:

- 15% by 2023;
- 40% by 2030; and
- 100% (or Net-Zero) by 2050

In response to ratification of the Providence Resolution, NEFI developed a strategic plan outlining the comprehensive approach required for the industry to make an immediate and effective transition to a renewable, low-carbon future. This plan is the result of a broad months-long collaboration with stakeholders

across the industry and contends that the goals set forth in the Providence Resolution are both *feasible and achievable* with the renewable products already available and sold by the industry. A pulse survey completed by over 300 industry stakeholders from states throughout the Northeast confirmed overwhelming support and hopeful sentiment for the Resolution. The industry is onboard with the transition to renewable liquid heating fuels and excited for the opportunity to contribute to a sustainable future. However, meeting these emissions targets will require proactive and immediate actions across the board – from policy makers to producers, wholesale and retail fuel dealers, and consumers.

For more information on the approach behind development of this plan, see Appendix 1 – Kearney Approach

Short-Term Outlook (2030)

Liquid fuels with lower carbon footprints exist today and can compete in the future.

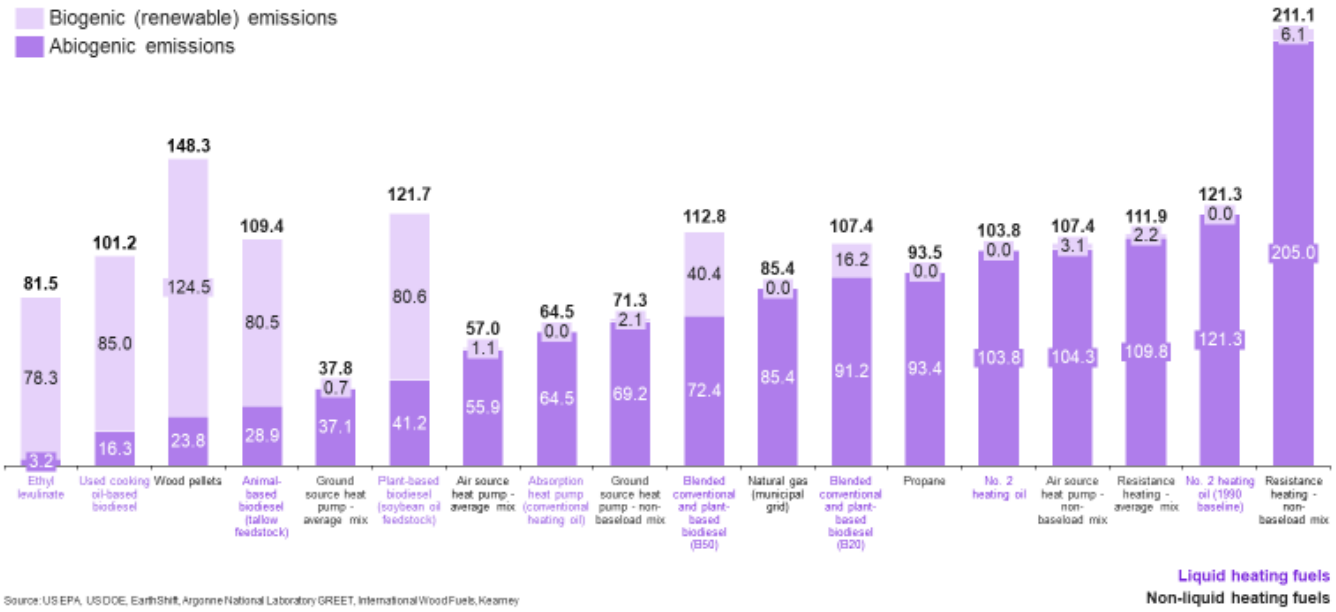
An analysis of 13 conventional & alternative heat sources concluded that the liquid heating fuel industry has the renewable fuel product today to drive immediate carbon reductions faster than alternative electric or gas options.

When looking at heat source emissions, the entire lifecycle of the heat source is a critical consideration. This includes both abiogenic (non-renewable) and biogenic (renewable) emissions from the initial production of the fuel, through transportation to the home, and actual use.

Biogenic (Renewable)
Emissions from renewable resources, like soybeans or wood waste, that typically get emission credits. These emissions do not contribute to climate change in the long term because the carbon comes from plants and was recently in the atmosphere.

Abiogenic (Non-renewable)
Emissions from non-renewable resources like oil or other fossil fuels that contribute to climate change in the long term and count towards GHG emissions. The aim is to reduce abiogenic emissions.

Carbon footprint of heating methods – 2020 emission intensity
(kg CO_2e/mmBtu heat delivered, 100-year global warming potentials)



Source: US EPA, USDOE, EarthShift, Argonne National Laboratory GREET, International Wood Fuels, Kearney

A baseline of today's conventional number 2 heating oil shows abiogenic emissions equal to releasing 104 kg of CO2 for every million BTUs delivered to the household. This is all non-renewable carbon and contributes to long-term climate change.

Proponents of electrification tout air-source heat pumps as a low carbon solution for the home energy sector. However, while air-source heat pumps (using an average electricity mix) release lower CO2 per unit of heat delivered to the household (only 57 kg of CO2), almost all of this (56 kg) consists of abiogenic (non-renewable) emissions that in fact contribute to climate change.

By comparison, biodiesel made from soybean oil has double the total carbon emissions, at 122 kg of CO2, but about two thirds (81 kg) of that is renewable carbon that comes from soybeans. Only 41 kg is non-renewable – 15 kg less than air-source heat pumps.

The liquid heating fuel industry has the opportunity to drive further emissions reductions through renewable liquid heating fuels made from alternative feedstocks, including animal-based (tallow) feedstocks, used cooking oil-based feedstocks, or ethyl levulinate. These offer the possibility of cutting abiogenic (non-renewable) emissions by at least 50% compared to air-source heat pumps, and 66% compared to natural gas.

Recommendation #1:

Drive accelerated decarbonization of the heating sector

The data shows that air-source heat pumps and natural gas are not the lowest carbon solutions. If all homes that currently utilize heating oil were to switch to a 100% blend of soy biodiesel today, there would be an automatic reduction of non-renewable carbon emissions by about two thirds (66%). In the interim, consumers should use and policy makers should support B20 or B50 blends, which can make significant reductions as transitional fuels today. Specific Recommendations Include:

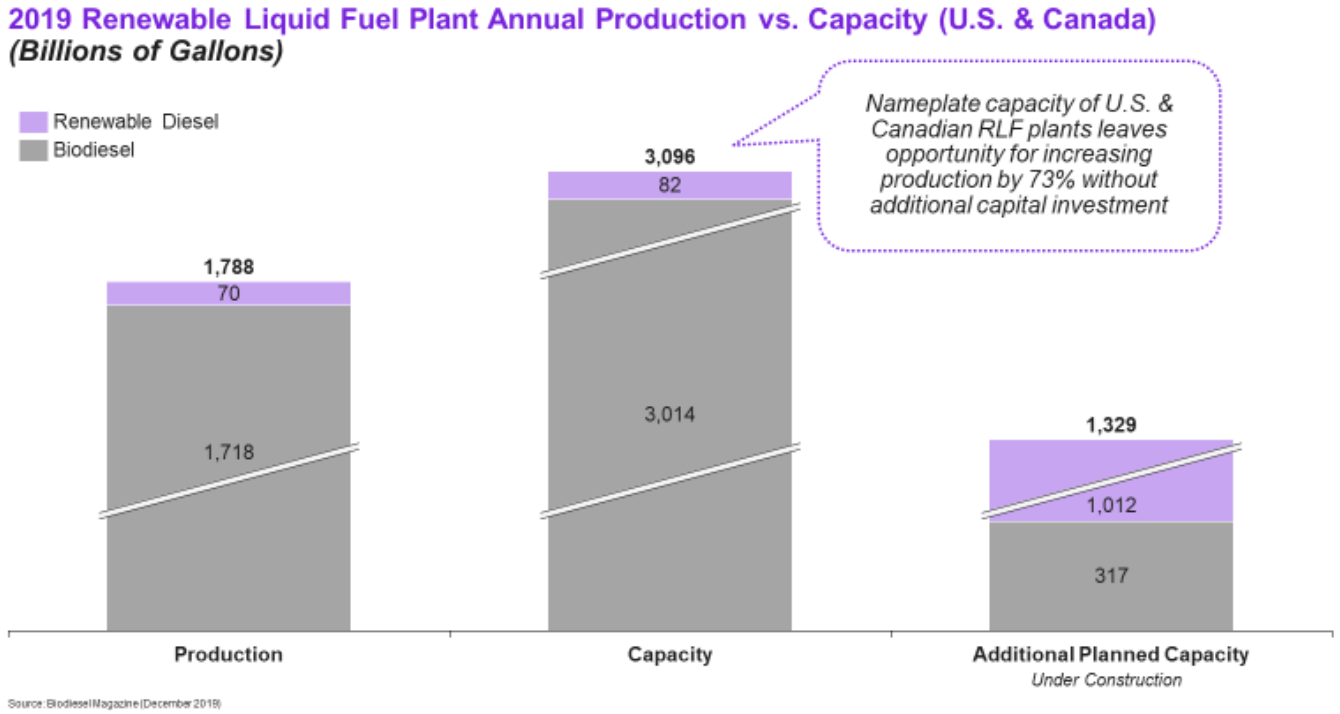
- Educate consumers, industry professionals, and policy makers about the benefits of renewable liquid heating fuels relative to other renewable energy sources
- Continue research into technological advancements in equipment to improve biofuel options
- Leverage those renewable liquid fuels already commercially available, such as used cooking oil-based biodiesel and animal-based (tallow) biodiesel
- Further develop cellulosic fuels that are currently in pilot stages of production, such as ethyl levulinate
- Examine funding options for fuel and equipment innovations to expand adoption

Much of the required supply infrastructure is already in place, and supply can be built-up to meet future demand

Supply

Adequate supply and production capacity currently exists to support widespread adoption of renewable liquid heating fuels. Projections show the Northeast will need nearly 800MM gallons of renewable liquid heating fuels to reach a 20% (B20) blend by 2023. While the Northeast currently only has the capacity to produce roughly 150 million gallons, the remainder could be supplied from existing plants in North America.

Data shows current North American production of renewable liquid fuels is significantly less than is possible with current nameplate production capacity. In 2019, North American plants only produced 1.7 billion gallons, while current nameplate production capacity was at nearly 3 billion gallons and an additional 1.3 billion gallons of capacity is planned. This would allow an additional 73% increase in production immediately without any additional capacity, capital investment or reliance on imports from outside of North America, which are critical from an economic and energy security perspective.



The demand cycle for home heating fuel offers further assurance of adequate and reliable supply to the Northeast. Heating oil demand for biofuels occurs in the winter and is therefore countercyclical to diesel transportation demand, which peaks in the summer. It is a natural complement, from an infrastructure perspective, for transportation demand declines during the winter months (November – March). This ensures reliable supply because transportation demand competes very little with heating demand. This steady stream of demand in both summer and winter helps producers keep plants operational year-round.

Finally, today ~100 million gallons of renewable liquid heating fuel produced in PADD 2 goes West due to favorable pricing. In fact, some producers have indicated it is more economically viable to send rail cars of fuel out of New England into California, despite the extra 50-60 cents/gallons cost of transportation. This favorable pricing is because of the California Low Carbon Fuel Standard (LCFS).

The California Low Carbon Fuel Standard aims to **reduce the net carbon intensity** of the transportation fuel pool by at least 20% by 2030. It does this by **setting annual carbon intensity benchmarks** that reduce over time, combined with a **total allowable inventory of carbon**, the credits for which can be banked into the future.

Supply Infrastructure

The supply infrastructure required to transport renewable fuels into the Northeast for use in the heating sector exists today. The system can support larger volumes of renewable fuels if the industry expresses serious interest in making the transition. There are three practical ways to transport product across the country, all of which exist today and should be leveraged in the near term.

Rail

- Eager for market expansion
- Confident could transport product with adequate preparation
- Single carload carries 28K gal. of biofuel

Pipeline

- Pipelines have potential to transport B20 blend in near future
- Work is in progress facilitate pipeline transportation of RLHF
- Owners of underused pipelines are open to market expansion

Barge / Ship

- East Coast port infrastructure exists
- Small barge transports 450K gal.
- Large barge transports 2.9M gal.
- Higher blends will require new terminal heating capabilities

Source: IHS Markit / NORA Sustainable Supply Study 2020; Geospatial data from the U.S. Department of Transportation (December 2019); Pan Am Railways; Pipeliner Biodiesel Steering Committee; Buckeye; EIA Interactive State Map (2020); Kearney

Alternate or low carbon liquid fuels are a cost-effective and environmentally friendly choice supported by published, mature and broadly accepted technical standards

A comparison of a 100% renewable fuel blend (B100) versus other home heating sources concluded that B100 offers consumers with an existing oil heat system an appealing list of advantages.

Wood pellet stoves are a cost-effective method of home heating, but present maintenance issues and often require an external power source. While they offer higher combustion efficiencies that produce minimal greenhouse gas emissions, this comes with much higher particulate emissions than those produced by liquid fuels, which can contribute to local ambient and indoor air pollution and cause adverse health effects.

Electric air-source heat pumps claim to lower costs over time but have the highest cost to upgrade from an oil heat system and often require a supplemental heat source. 93 percent of homeowners keep their existing heat source or install an additional, external heat source along with the air-source heat pump. Another downside of heat pumps is their reliance on grid-electricity generated at peak usage times. Current renewable electricity inputs to the grid such as wind and solar, or other low-carbon generators like nuclear, cannot provide the extra electricity required to meet peak demand because their output cannot vary quickly. For peaking electricity production, utilities rely on highest emission fossil fuels like coal, oil, or natural gas, which can be quickly and easily controlled to fluctuate in accordance with peak demand.

	Cost to upgrade from oil heat	GHG emissions (kg CO_2e / mmBtu)	Cold weather operability	Energy Source
Bioheat® (B100)	$0 to ~$2,000	Biogenic: 80.5-85 Abiogenic: 16.3-41.2	Burner & storage must be located inside or underground	Plant or Animal Based
Wood Pellet Stove	$1,700 to $3,000 (per stove)	Biogenic: 124.5 Abiogenic: 23.8	Only provides partial space heating	Wood pellets
Natural Gas	Average $17,000	Biogenic: 0 Abiogenic: 85.4	Supply issues in cold weather	Natural gas
Air-Source Heat Pump	Average $19,600	Biogenic: 4.2 Abiogenic: 91.1	Requires backup heat source under 40F and exacerbates electric grid peaking problem	Electricity

Source: Genesee Energy; Kearney

In comparison, using blends of B100 is cheaper to upgrade from an existing oil heat system, more efficient in cold climates, and has lower carbon emissions compared to the alternatives. Cold weather performance of blends up to B50 can be managed with additives, which are readily available and affordable (+/- $0.05 per gallon) and a proven method of improving cold flow properties in colder climates. Additionally, there are only minimal changes required to existing delivery and home heating equipment for blends up to B50. Required changes are similar to routine or periodic heating system maintenance and unlikely to exceed normal and anticipated maintenance costs.

Finally, the industry can rely on or seek amendments to existing fuel standards from primary governing bodies such as Underwriters Laboratory (UL) and ASTM. ASTM standards cover Bioheat® up to B20; UL standards cover Bioheat® up to B5 in most cases. These are both mature standards with existing wide-spread acceptance in the industry and by consumers. The National Oilheat Research Alliance (NORA) has been instrumental in the frontline work in compliance integrity and developing updates to existing technical standards. Importantly, NORA drove the Developmental Fuel Spec, which is a specification for development and testing of fuels.

About NORA

NORA drove creation of the Developmental Fuel Spec, which is a specification for development and testing of fuels. Current specifications cover B50 and higher blends, but this specification can be used as an interim standard for testing of fuels in equipment.

Recommendation #2:

Transform the heating sector through lower cost, eco-friendly oil-to-renewable liquid fuel conversions

The data shows that renewable liquid heating fuel exists today and is less expensive than electrification. The cost of transitioning the home from conventional oilheat to renewable fuel is lower than alternatives and requires minimal technical changes, especially below B50 blends. Specific recommendations include:

Supply

- Keep current Northeast production in the region and attract additional plant construction to further increase production
- Signal demand increase to drive national production closer to plant capacity
- Adopt market-based incentive programs that encourage competitive pricing with California and attract domestic product from the region
- Increase imports from Europe, if necessary, to help mitigate short term supply challenges

Infrastructure

- Begin conversations with pipelines about transporting renewable liquid heating fuels
- Build additional heated bulk storage locations to manage peak demand throughout the region
- Outfit existing terminals for blending and build additional heated and well-insulated infrastructure
- Build additional rail line extensions and transloading capabilities
- Install heating and insulation in rail cars and trucks for transporting higher blends
- Outfit secondary and tertiary storage with heating and insulation

Technical Standards

- Expedite plans to standardize fuel to B100 to ensure widespread adoption

Long-Term Outlook (2050)

Achieving the longer-term goal of delivering a net-zero liquid heating fuel by 2050 will require additional infrastructure and research investments, coupled with persistent and original policy action at all levels of government. A clear path forward is outlined below for the three areas where action is required.

Further develop lowest emission renewable liquid heating fuels

To meet the ultimate 2050 goal of net-zero, the industry will need to leverage those renewable liquid fuels already commercially available, such as used cooking oil-based biodiesel and animal-based (tallow) biodiesel.

The industry must also support the development of next-generation renewable fuels in the pilot stages of production. One promising example is ethyl levulinate, which has the potential for net-negative greenhouse gas emissions.

Invest in infrastructure required for highest blends with lowest carbon impact

Additional investments are also recommended for terminal operators. It will be critical to outfit existing terminals for biodiesel blending capabilities and install heated and insulated infrastructure. This includes building additional heated bulk storage as necessary to manage peak demand throughout the region, outfitting existing secondary storage with heating and insulation, and investing in heated rail cars, intermodal transloading capabilities, and additional terminals to make rail delivery more viable.

Did you know?

U.S. production of animal-based biodiesel currently consumes 12.7B lbs. of feedstock to produce 1.7B gallons biodiesel annually. However, global demand for protein is expected to increase, driving feedstock supply. Of the 15MM lbs. of feedstock expected to be available in 2023, only 6MM gallons will be needed to meet the 800MM gallons of B100 for the Northeast. Additionally, this increased demand will incentivize production through intensification of existing acreage, innovation, and new technologies as well as produce a ripple effect of more jobs for supporting industries.

A Closer Look at Ethyl Levulinate:

Ethyl levulinate (EL) is a renewable liquid fuel that can be made from biomass (e.g., wood waste left behind after logging and wastepaper), municipal solid waste (MSW), and other waste materials. The mere production of ethyl levulinate actively combats climate change. If left in the ground, wood waste will rot and release methane gas into the atmosphere. Methane has a global warming potential of 28-36, meaning every molecule of methane released would contribute absorb 28-36 times more energy than a molecule of CO2 over a 100-year period. In other words, the same amount of methane is much more harmful to the climate than CO2. By taking the carbon sequestered in rotting wood waste and preventing it from turning to methane, the production of ethyl levulinate generates emission credits. When ethyl levulinate is later burned, most of the carbon is biogenic, resulting in net zero or even net-negative greenhouse gas emissions. Ethyl levulinate also has exceptional cold weather properties and does not require many changes to delivery and home heating equipment. Although ethyl levulinate is not produced at commercial scale today, there are pilot projects under way.

Improve federal and state policies to make renewable liquid heating fuels financially attractive

Well-designed policies are key to ensuring investments required for adequate and reliable supply and supply infrastructure are viable.

At a federal level, preserving the benefit of allowing heating oil to contribute to the federal biofuel program for transportation fuels under a modified renewable fuel standard or a national low carbon fuel standard will be decisive to the success of the liquid heating fuel industry. Under the current renewable fuel standard, biofuels blended into heating oil generate credits without being a regulated fuel, like gasoline and diesel fuel. It is essential that this is preserved as law makers consider modifying the renewable fuel standard or replacing it with a national low carbon fuel standard, as has been recently proposed in Congress.

Additional key federal policy initiatives must include new or expanded tax incentives to encourage downstream infrastructure; strengthening the USDA's Higher Blends Infrastructure Incentive Program by allocating greater funds towards renewable liquid heating fuels and related infrastructure; and implementing federal financing options like low-no interest loans, loan guarantees, and grants for emerging renewable liquid heating fuel technologies. These policies will allow the industry to reach 2050 net-zero goals by promoting R&D and ensuring all parties along the supply chain can make the necessary capital infrastructure investments.

At a state and regional level, a dual approach will create minimal predictable demand, while rewarding lower carbon intensive fuels. States must pursue adoption of minimum B20 renewable blending requirements, and drive creation of regional market-based incentive programs (i.e. APS, T-REC). This approach will be essential to create an even playing field for the wholesale distribution market by enabling competitive pricing with California, ensure supply from around the country, and encourage increased production in the Northeast.

Recommendation #3:

Inform policymakers that renewable fuels are a low cost and turnkey solution for reducing emissions in the heating sector

While public policy is in flux and somewhat unpredictable, there are opportunities to claim a seat at the table and influence the future. Specific recommendations include:

Federal

- Adopt a modified Renewable Fuel Standard ("RFS 3.0") or national Low Carbon Fuel Standard (LCFS) that continues to drive growth in renewable fuels in the heating sector
- Develop new or expanded tax incentives & grant programs (e.g. HBIIP)
- Investigate public financing options

State / Regional

- Pursue state adoption of minimum B20 renewable blending requirement
- Pursue market-based incentives program with carbon intensity scoring parameters
- Encourage regional cooperation across industry

Conclusion

The world is on the edge of a precipice. The general public and policy makers alike accept the threat of man-made climate change as reality. Consumers are demanding lower-carbon alternatives and aggressive action by policymakers. Industries that rely on conventional petroleum fuels are challenged by these trends. They must transition away from non-renewable products that are anthropogenic contributors to climate change or be left behind.

But this industry of small, multi-generational family businesses offers the fight against climate change fresh hope - a realistic, immediate, and cost-effective solution for dramatic emissions reductions in the home heating sector. They offer a solution that reduces emissions faster and without the high costs associated with natural gas and thermal electrification (i.e., heat pumps). But the window for action is rapidly closing.

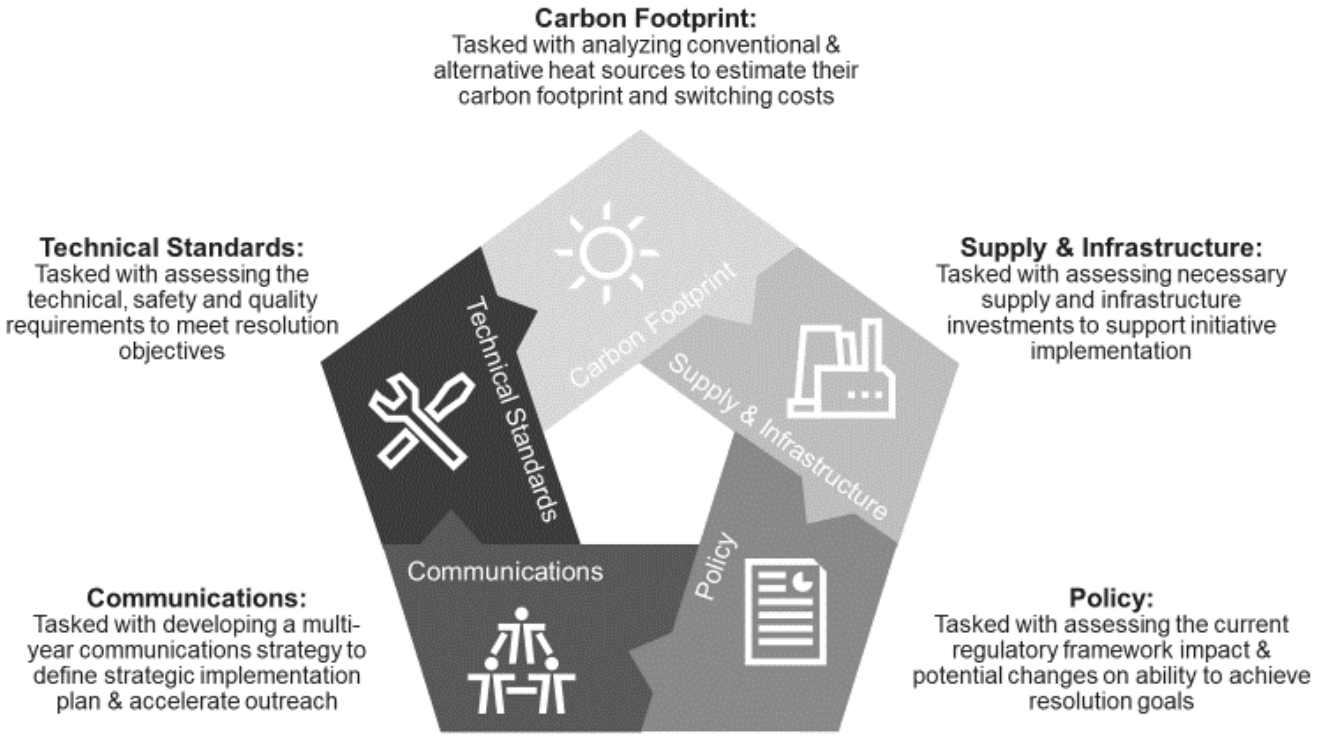
Policy makers, producers, fuel dealers, and consumers must act decisively and take advantage of the opportunity presented by renewable liquid heating fuels to combat climate change and remain competitive. Doing so will help sustain more than 160,000 good paying jobs and ensure that the industry can continue to provide warmth and comfort to millions of American families for generations yet to come. Renewable liquid heating fuels are the solution that can make the promise of a Net-Zero Carbon 2050 a reality.

Want to learn more?

Reach out to NEFI's Communication Coordinator, Jessica Levaggi at jessica@nefi.com or visit NEFI's website at nefi.com to access the five detailed recommendation decks

Appendix 1 – Kearney Approach

NEFI engaged Kearney in June 2020 to develop a comprehensive and strategic plan to implement the goals set forth in the Resolution – broadening the pool of input and addressing concerns relative to the proposed path forward. Kearney worked directly with more than 150 industry stakeholders, forming five working groups aligned to the critical areas requiring additional research: Heat Source Comparison, Supply & Infrastructure, Technical Standards, Policy and Communications. This inclusive approach, which involved hundreds of hours of interviews, research, follow-up sessions and workshops, gave a voice to a wide range of perspectives from across the industry.



Neal Walters
Partner
Neal.Walters@kearney.com

Yuri Kopylovski
Manager
Yuri.Kopylovski@kearney.com

Elena Rohner
Consultant
Elena.Rohner@kearney.com

Additional Contributors:
Agustin Gil, Karina Toy, Samara Wyant

A.T. Kearney Limited
7 Times Square #36
New York, NY
United States
+1 (212) 751 7040 (office)
kearney.com

KEARNEY