

The Future of Home Heating



WHY WE ARE HERE

- **Perception that Oil Comes from Middle East**
- **Everyone Loves to Hate Oil, Major Fundraising**
- **Several Years of Price Rises, Rapid and Steady**
- **Pent up Demand for New Environmental Regulations**



Major Actors

- EPA
- Congress
- States
- NESCAUM
- RGGI
- CARB



Some would have us believe this is the future



Introducing a Low Carbon Fuel Standard in the Northeast

Technical and Policy Considerations


Prepared by
NESCAUM
Northeast States Council for a Clean Air Future

July, 2009



Others believe natural gas is the answer

- Natural gas has only 117 lb CO₂ / MMBTU - abundant
- Heating oil has 168 lb CO₂ / MMBTU - imported




Natural Gas
A Bridge Fuel for the 21st Century
John D. Podesta and Timothy E. Wirth August 10, 2009

Summary

Natural gas is the cleanest fossil fuel—it produces less than half as much carbon pollution as coal. Recent technology advancements make affordable the development of unconventional natural gas resources. This creates an unprecedented opportunity to use gas as a bridge fuel to a 21st-century energy economy that relies on efficiency, renewable sources, and low-carbon fossil fuels such as natural gas.

Despite the potential energy, economic, and security benefits of natural gas, the recently House-passed American Clean Energy and Security Act, H.R. 2454, does not include enough opportunities to expand its use. The Center for American Progress and the Energy Future Coalition therefore propose a number of policies that would increase the use of natural gas and low-carbon energy sources while providing additional protection for our climate and communities.



**America Has Discovered
A Bountiful Wealth of New Natural Gas Supplies**

Over the past few years, a number of leading energy companies have discovered and developed record new supplies of important natural gas resources in the USA – and in ways that can reduce the way we address energy and climate challenges in this country.


With an entrepreneurial spirit, new technologies and price incentives as guiding forces, America now has an abundance of clean natural gas to help improve our nation's energy security, climate challenges and economic growth.

Natural gas production historically has come from "conventional" reservoirs, according to the U.S. Energy Information Administration (EIA). EIA classifies unconventional sources of natural gas as including supplies from tight sand formations, coal bed methane and shale formations, where natural gas is trapped within specific types of geologic structures.

A number of leading companies have recently made multi-billion-dollar investments to unlock production of unconventional shale gas. The result is a treasure chest of important new natural gas resources in North America.

UNCONVENTIONAL GAS CHANGES CONVENTIONAL WISDOM

In its Annual Energy Outlook 2009, EIA, as the official keeper of energy statistics for the U.S. government, noted a "re-evaluation of the resource base results in higher unconventional natural gas production." The EIA forecasts rising natural gas consumption, including a 40 percent increase in the use of natural gas for electric power generation by 2035, with other industry sources noting the figure could be much higher.



Source: EIA, September 2008 presentation

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The Environmentalist Conventional Wisdom

Heating Oil Fuel

Dirty fuel that produces soot
164 lb/MMBTU CO₂ emissions
~82-86 AFUE
Outdated technology
Always more expensive
Best target for conversion



Clean Natural Gas Fuel

Zero Soot
117 lb/MMBTU CO₂ emissions
98% AFUE
Subsidized replacement for oil systems
Shale gas = Abundant Domestic Supply
Best for existing oil customer value



Modern Pellet Fuel

PM 2.5 emissions can be managed
Best CO₂ benefits
High heating efficiency
Modern technology
Most environmentally responsible
Uses forest residue



So what is our scientific, technical and economic position

- **Understand the facts**
- **Use the latest atmospheric science**
- **Make GHG policy based on 20 year atmospheric lifetime**
- **Adopt 15 ppm sulfur standard as soon as practicable**
- **Import and develop more condensing appliances**
- **Develop means (policy, marketing, etc) to drive efficient ULS systems into the market**
- **Increase awareness that ULS liquid fuels and bio-blends are the new clean energy source**
- **Develop even more advanced technologies like thermal heat pumps and microCHP systems**



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Use the latest atmospheric science

“Short-lived carbon forcers like methane, black carbon, and tropospheric ozone contribute significantly to the warming of the Arctic, because they are short-lived, they also give us an opportunity to make rapid progress if we work to limit them,”
Secretary of State Hillary Clinton head of the U.S. Delegation to the Climate Change Summit in Copenhagen – April, 2009.



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**Make GHG policy based on 20 year atmospheric lifetime
What does this mean?**

IPCC Second Assessment Report (1995) SAR		
	20 year	100 year
Carbon dioxide	1	1
Methane	56	21
Nitrous oxide	280	301

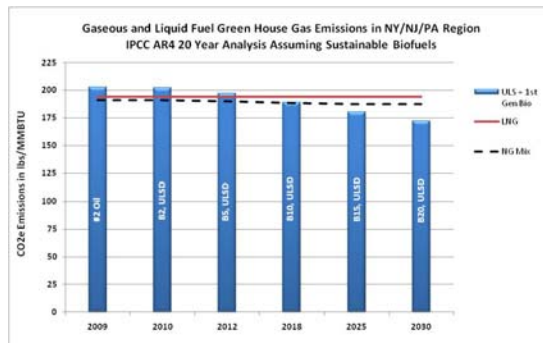
IPCC Third Assessment Report (2001) TAR		
	20 year	100 year
Carbon dioxide	1	1
Methane	62	23
Nitrous oxide	275	296

IPCC Fourth Assessment Report (2007) AR4		
	20 year	100 year
Carbon dioxide	1	1
Methane	72	25
Nitrous oxide	289	298

Using 20 years as a basis for comparison increases the importance of methane leakage and improves the relative position of oil.



**Make GHG policy based on 20 year atmospheric lifetime
What does this mean?**

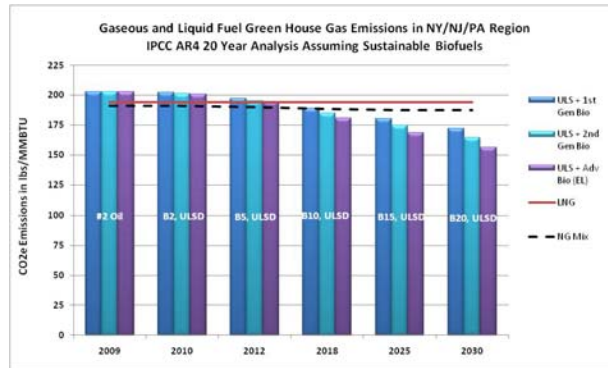


It means that soy-based B10 is equal to the average NG mix for NY/NJ/PA region in CO₂e emissions basis and lower than LNG

Note that the 38.74 lbs/MMBTU CO₂e use assumes that there is no land displaced as a result of this first generation biofuel.



The future of Bio-Blends What does this mean?



It means that 2nd and advanced B5 blends are equal to LNG delivered to the NY/NJ/PA region in CO_{2e} emissions

Note that second generation biofuels assume zero GHG impact (0 lbs/MMBTU CO_{2e}) and advanced biofuels generate a negative carbon impact, (Ethyl Levulinate was used with a -40.67 lbs/MMBTU CO_{2e})



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Adopt 15 ppm sulfur standard What does this mean?

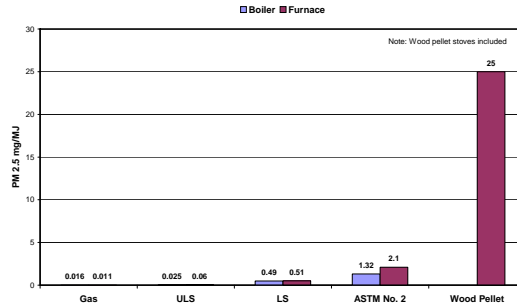
- Promotes products like the Kerr condensing furnace and the Pinnacle condensing boiler
- Immediate access to European condensing boilers
- Incentives U.S. manufacturers to develop condensing oil products.
- Opportunity for ULS fuel based condensing appliance efficiencies to equal natural gas condensing appliance efficiencies
- Reason to develop more condensing appliances
- Ability to develop advanced premix burners that mimic gaseous behavior and can use gas burner type technology
- Helps reduce MP 2.5 emissions and states achieve EPA targets



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Adopt 15 ppm sulfur standard What does this mean?

Comparison of Average PM2.5 for Five Heating Fuel Types
for Hydronic Boilers and Warm Air Furnaces

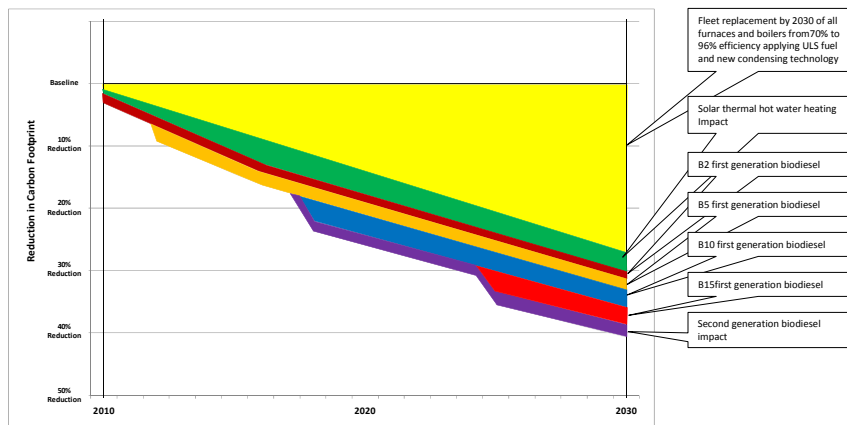


It means that ULS heating oil is equal to natural gas in PM 2.5 emissions.



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Aggressively move forward



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The Real Environmentalist Choice



Advanced Liquid Fuel

ULS equal to NG in PM 2.5 emissions
B10 equal to NG in CO₂ emissions
High heating efficiency
Lowest oil for oil replacement cost
Ideal for high bio fraction future
Best for existing oil customer value



VS



Clean Natural Gas Fuel

PM 2.5 emissions same as ULS
CO₂ emissions same as B10
High heating efficiency
Costly replacement for oil system
Shale gas vs FRAC Act?
Best for existing gas customer value



VS

Modern Pellet Fuel

Bad PM 2.5 emissions
Questionable CO₂ benefits
Lowest heating efficiency
High capital cost
Large Space requirement
Lifestyle changes required



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Bioheat® Focus Group

Bioheat® Focus Group Waltham, Massachusetts

August 28, 2009

12 Participants were screened to meet the following criteria:

- Age 25 or older
- Homeowners
- Responsible for paying the home heating bill
- Use oil heat to heat their home
- Cross section of gender, income and education levels



Perceptions of Oil Heat

The focus group was unanimous in their choice and use of oil heat

- **Safety, efficiency, reliability and personal service**
- **Pricing options**
- **Industry competition**
- **Trusting service technician**
 - Energy advisor
 - Consultant in home renovation and building projects



Bioheat® - Awareness and Perceptions

Most participants were generally unaware of Biodiesel and Bioheat®

Highlights:

- **Renewable, sustainable, cleaner, better health effects are appealing**
- **Participants would be willing to pay a little more for Bioheat®**
- **Reducing our nation's dependence on foreign oil is a major benefit**
- **America should pursue Biodiesel and Bioheat®**



In Summary

- The scientific community is now focusing on short-lived carbon forcers like carbon black and methane as a means to quickly impact global climate change.
- US political leaders are also now focusing on short-lived carbon forcers as a means to quickly impact global climate change.
- Using the 20-year IPCC AR4 data shows a B5 ULS blend approximately equals marginal LNG emissions and a B10 ULS blend equals the current delivered natural gas mixture to the region.
- A robust residential liquid fuels program could reduce residential heating oil's carbon footprint in 2020 by over 20% and by over 40% in 2030.



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In Summary

- Moving from #2 oil to ULS fuel (15 ppm) yields a 97 to 98% reduction in PM 2.5 emissions that will bring parity with natural gas regarding fine particulate emissions.
- Wood pellet stoves and boilers exhibit 1,000 times more PM 2.5 emissions than gas or ULS heating oil and natural gas and PM 2.5 emissions have been associated with a reduction in life expectancy.
- Policies that promote "...replacement of inefficient oil burning furnaces with modern, higher efficiency wood burning furnaces, such as pellet stoves, would reduce carbon emissions..." make no technical, scientific or economic sense and are fraught with errors and should be abandoned.



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UPDATE on NORA Reauthorization

- **GAO Study Began Earlier this Year on PERC and NORA**
- **Initially Started with a Ten Year Authorization**
- **Now Working on a Short Term Bridge**
- **Will review GAO Report at End of Year to Determine Other Changes**

