

HEATING OIL THE RENEWABLE INDUSTRY

NORA/CEMA/NYOHA/OHI/MEC

November 1, 2016

Greenwich, CT

OIL HEAT 2016

NEW & IMPROVED

- ▶ **Cleaner**
 - ▶ **Cheaper**
 - ▶ **More Reliable**
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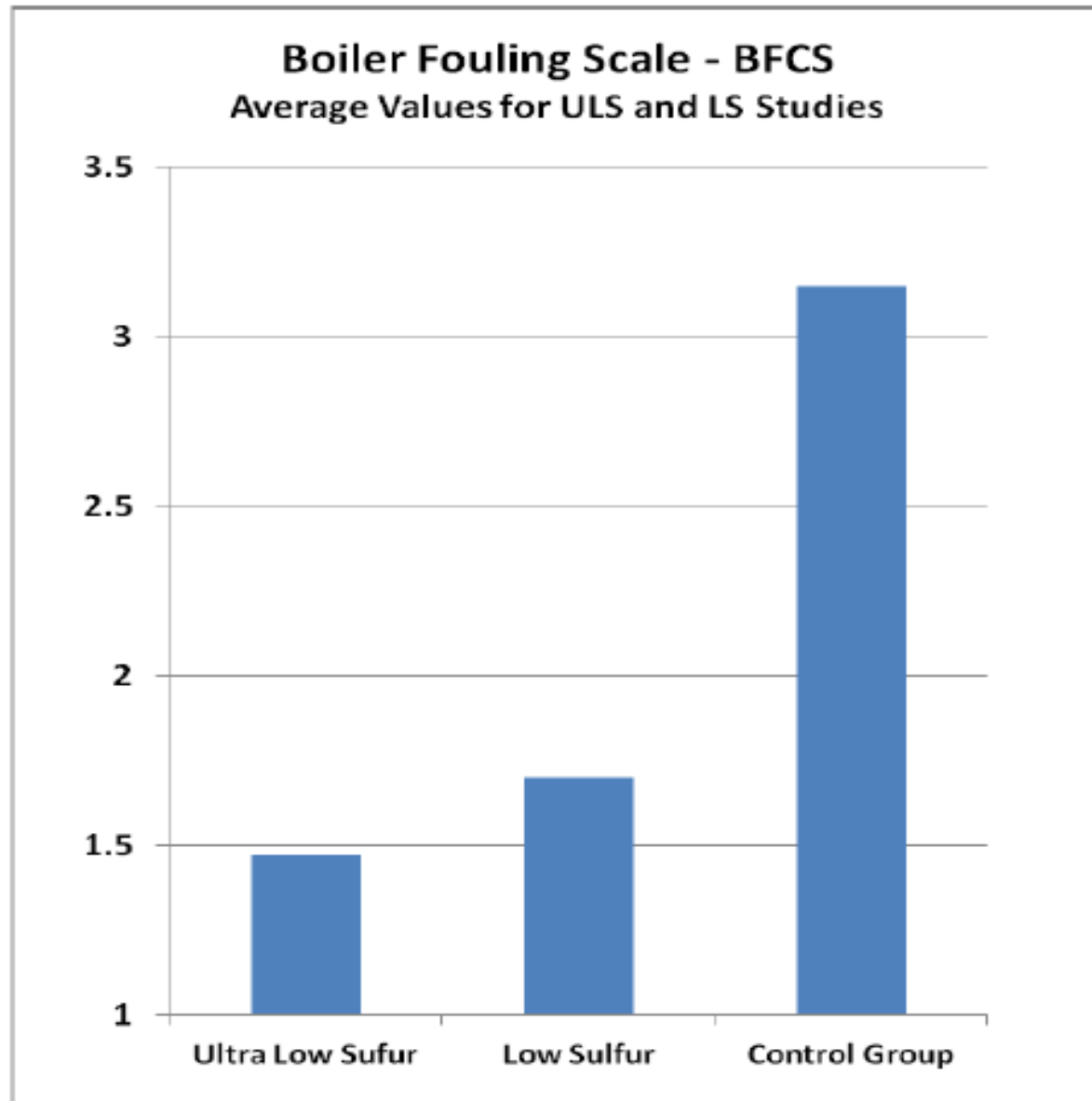


Figure 5-5. Comparison of ULS and LS Boiler fouling scales

Studies 10 years ago at Brookhaven National Laboratory showed that reducing sulfur in heating oil leads to cleaner combustion with less particulate adhering to and fouling the heat exchangers in boilers and furnaces.

With the move to Low Sulfur fuels we are seeing dramatic evidence of this in the field.

In 2018 with the move to Ultra Low Sulfur heating oil (15ppm) the boiler fouling rate will be cut in half

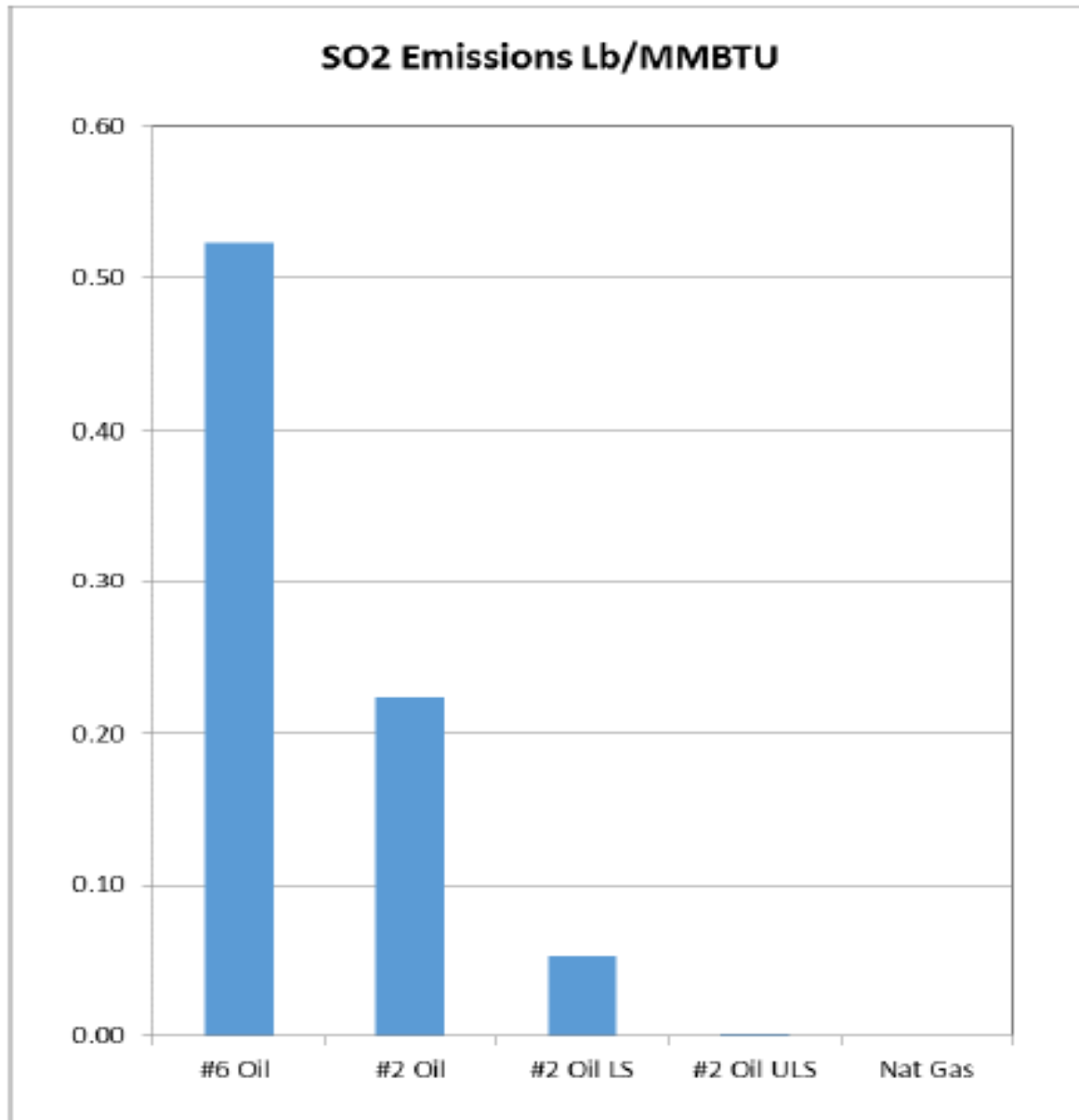


Figure 6-1. Sulfur Oxide Emissions for Various Fuels

Dramatic reduction in Sulfur Oxide emissions has already been seen with low sulfur 500ppm fuels.

With Ultra Low Sulfur Heating Oil at 15ppm the emissions are almost not measurable.

The majority of New England homes will be heated with 15 ppm fuel by 2018

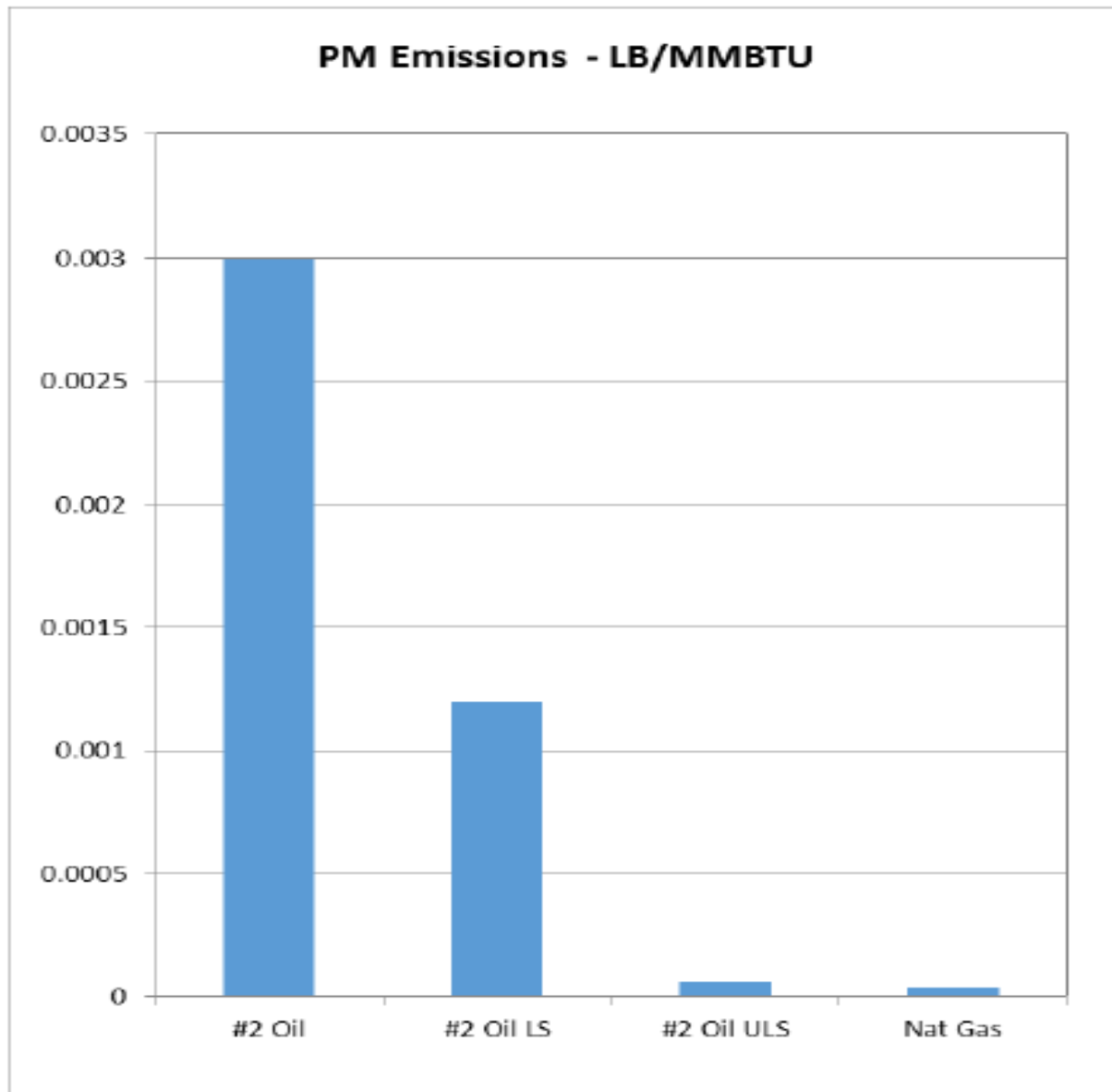
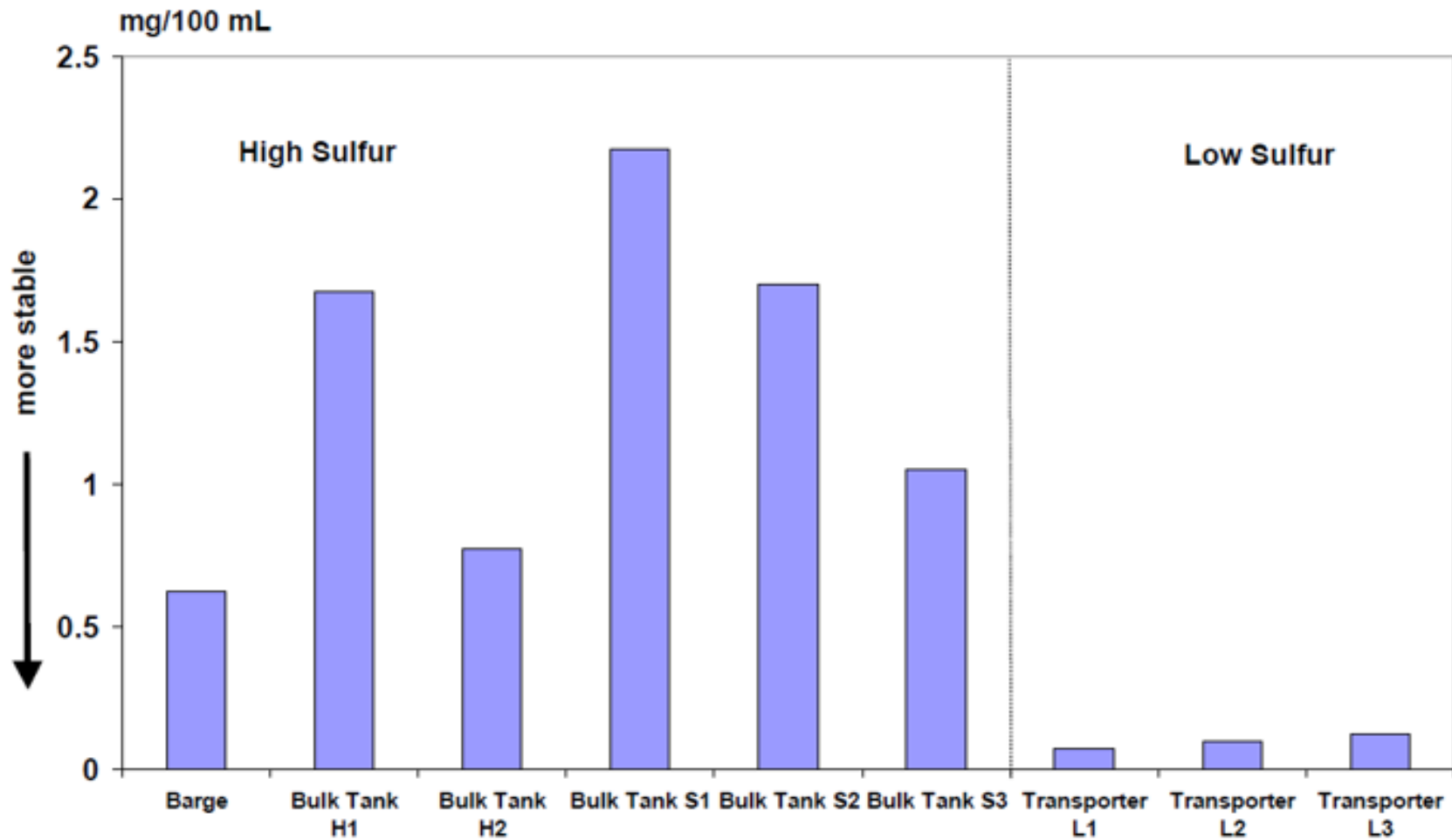


Figure 6-2. PM Emissions for Various Fuels

Particulate emissions are also nearly eliminated using Ultra Low Sulfur Heating Oil.

This results in remarkably clean combustion which improves reliability and efficiency. It also opens the door to remarkable new advances like 99% efficient oil appliances and advanced burner technology

Method D 4625 (13 weeks, 43 C)



Today's low sulfur heating oil is significantly more stable than high sulfur fuel. This results in less tank sediment with cleaner more reliable combustion.

API	FBP (F)	Sulfur(ppm)	Cetane	Cloud (F)	Haze
36.3	664	461	48.1	5	1
36.2	659	498	48.7	6	1
35.9	664	496	47.7	7	1
37.2	661	483	50.5	5	1
37.2	664	484	50.0	7	1
36.7	662	494	40.6	7	1
36.0	662	490	48.6	7	1
33.3	662	414	47.1	9	1
34.0	658	387	47.6	7	1
36.6	651	481	47.8	3	1
37.2	656	499	48.3	3	1
36.6	656	493	47.8	3	1
36.1	665	490	48.3	7	1
35.7	667	498	47.5	7	1
38.2	663	479	53.6	3	1
36.0	666	485	48.5	5	1
36.8	663	416	47.5	1	1
35.6	661	477	47.9	7	1

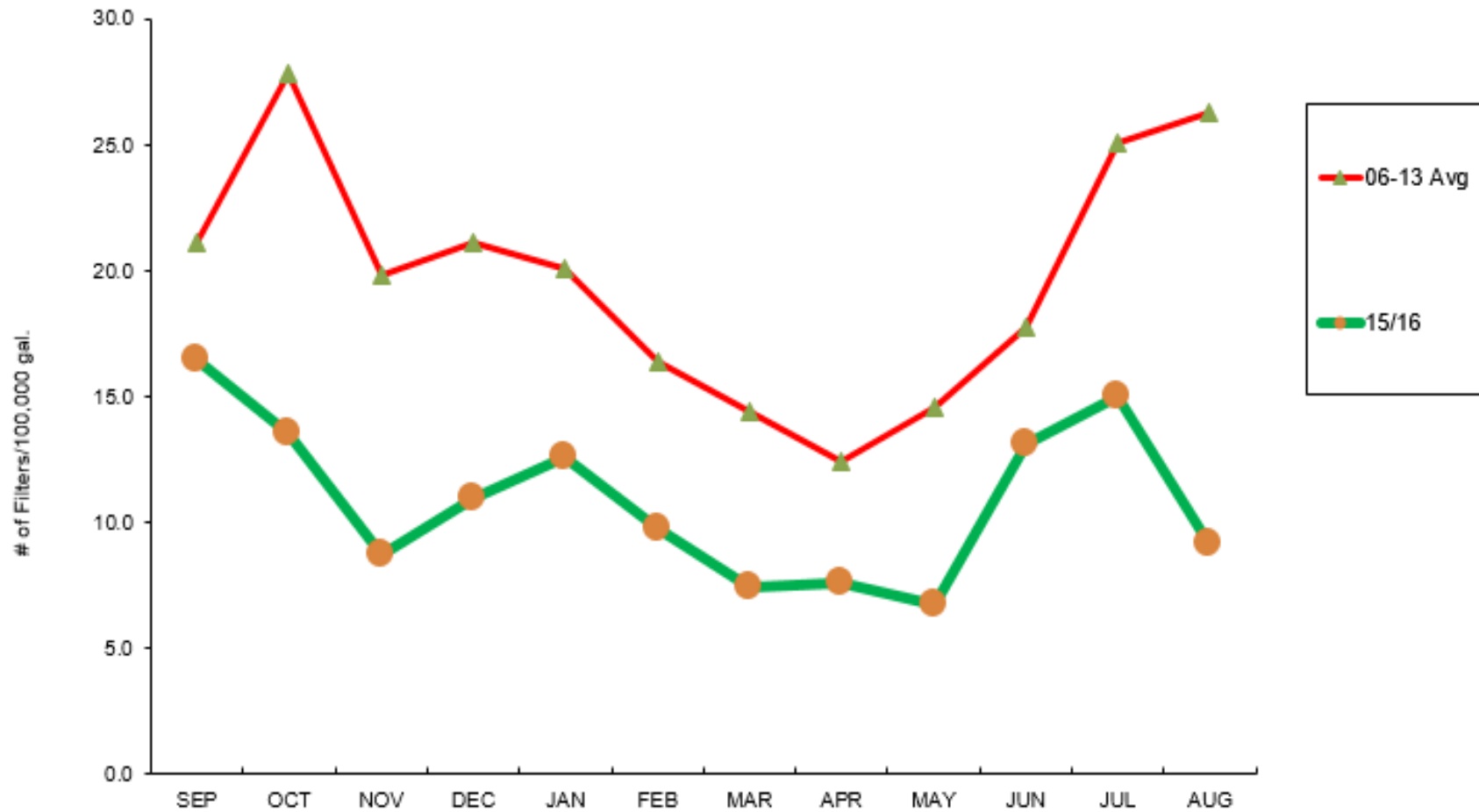
INLAND FUEL TERMINALS BRIDGEPORT INBOUND BARGE ANALYSIS

The Low Sulfur heating oil being received from refineries is remarkably consistent and high quality compared to just a few years ago.

This will improve even further when we move from today's 500ppm sulfur product to 15ppm in 2018

Filter Replacement Rate

Filters per 100,000 gal. delivered



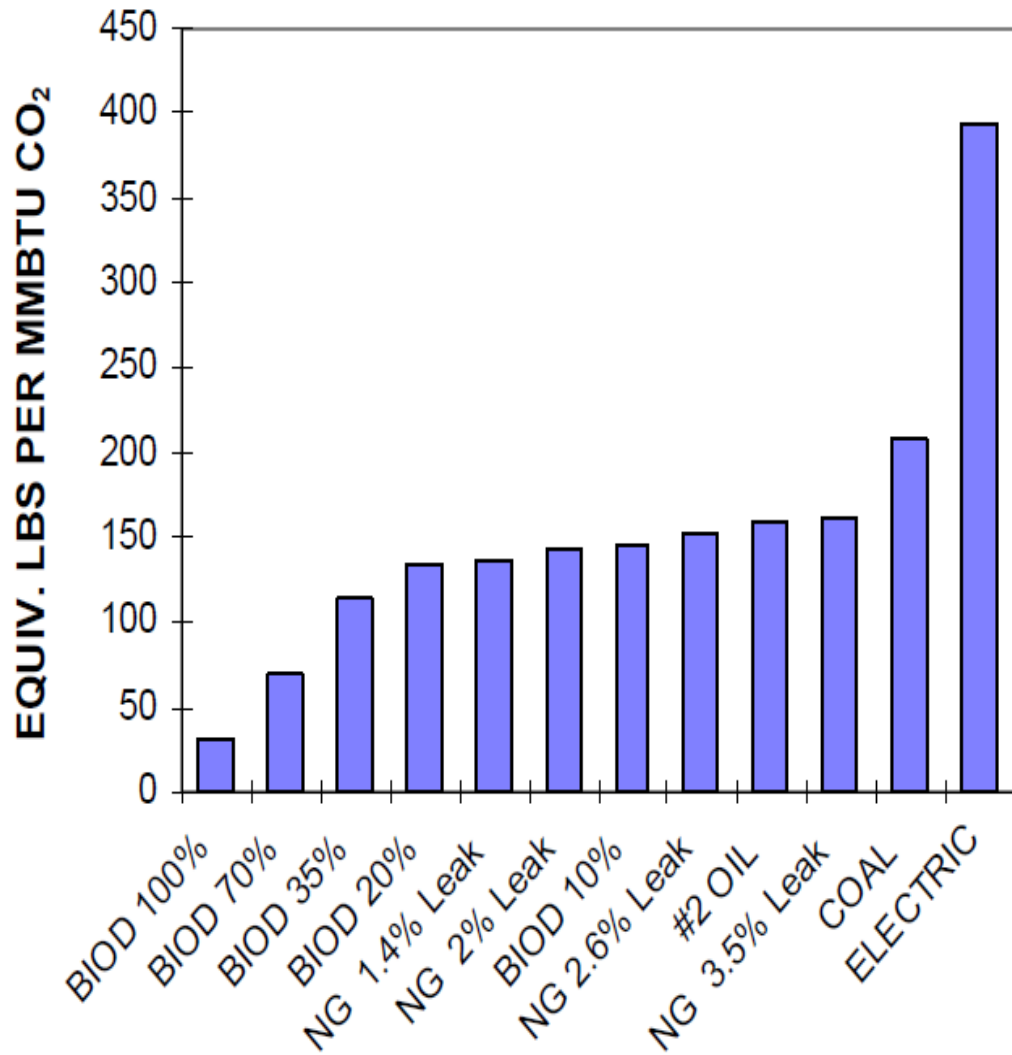
As a result of the cleaner more stable fuel the rate of heating failure due to clogged filters has dropped by one half.

NORTHEAST STATES FOR COORDINATED AIR USE MANAGEMENT (NESCAUM)

Biomass

NESCAUM is active in assessing biomass as a climate-friendly alternative energy source for the Northeast. Attractive options are biomass fuels for residential and commercial space heating and in combined heat & power (CHP) systems. NESCAUM provides reasoned analyses to help exploit the use of biomass as a clean Northeast energy source when coupled with clean air technologies and sustainable practices to minimize adverse air quality and environmental impacts. Biodiesel is another interest area at NESCAUM for its potential climate and public health benefits in displacing a portion of high-sulfur heating oil commonly used in the Northeast.


Figure 2-5: Global Warming Potentials of Various Energy Sources



When we introduce Bio Heat into the blend heating oil moves to the top of clean fuels.

A blend of 20% Biofuel is measurably lower carbon emissions than utility gas

ADVANTAGES OF LIQUID FUELS

- ▶ High Energy Density
 - ▶ Diverse and Resilient Supply Sources
 - ▶ Readily Transportable
 - ▶ Storable Distributed Energy
 - ▶ Robust Infrastructure in Place and Paid For
 - ▶ No Need for Capital Investment in New Multibillion Dollar Pipelines
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**CONNECTICUT RETAIL
HEATING OIL**

\$/GAL

LATEST	October 3, 2016	2.221
WEEK AGO	September 26, 2016	2.170
MONTH AGO	September 5, 2016	2.157
YEAR AGO	October 5, 2015	2.325

SRC: DEEP



**CT RESIDENTIAL
NATURAL GAS**

\$/MCF

LATEST	Jul-2016	21.75
YEAR AGO	Jul-2015	18.26
2 YEARS AGO	Jul-2014	20.34
3 YEARS AGO	Jul-2013	18.29

SRC: EIA

UTILITY GAS @ \$21.75 EQUATES TO HEATING OIL @ \$3.00/GALLON

OIL IS 25% LESS EXPENSIVE

OIL HEAT W/BIOFUEL

- ▶ **Cleaner**
 - ▶ **Cheaper**
 - ▶ **More Reliable**
 - ▶ **& Renewable!**
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