Biodiesel, Renewable Diesel, Ethyl Levulinate:
A low carbon liquid fuel future

Matt Cota

Vermont Fuel Dealers Association

Heating Oil Industry Commits to Net-Zero Emissions by 2050

Historic resolution passed unanimously at Northeast Industry Summit

PROVIDENCE, RI — The Northeast's heating oil industry has resolved to achieve net-zero carbon dioxide (CO_2) emissions by 2050. This ambitious goal was set at the Northeast Industry Summit held during the 2019 Heating & Energizing America Trade Show (the HEAT Show) at the Rhode Island Convention Center.

The industry's resolution calls for a 15% reduction in CO_2 emissions by 2023, a 40% reduction by 2030, and net-zero-carbon emissions by 2050.

Biodiesel

Feedstock: natural fats, vegetable oils, and greases

Mono-alkyl ester, which has different physical properties and different fuel specifications (ASTM D6751 and EN 14214) than petroleum diesel. Poor cold flow properties. Cost comparable to petroleum diesel

Renewable Diesel

Feedstock: natural fats, vegetable oils, and greases,

Renewable diesel is chemically similar to petroleum diesel, produced through very different processes. Due to hydrogenation, renewable diesel also burns cleaner than biodiesel. Because it has the same chemical structure as petroleum diesel, renewable diesel can be used in engines that are designed to run on conventional diesel fuel — with no blending required. More expensive.

Ethyl Levulinate

Feedstock: Cellulous, sawdust, old cardboard boxes, logging residues, such as wood pulp, or any wood biomass,

Converted into distillate with heat and pressure rather than chemicals. A potential diluent for biodiesel which improves cold flow properties. Great potential in Northern New England, unknown cost.

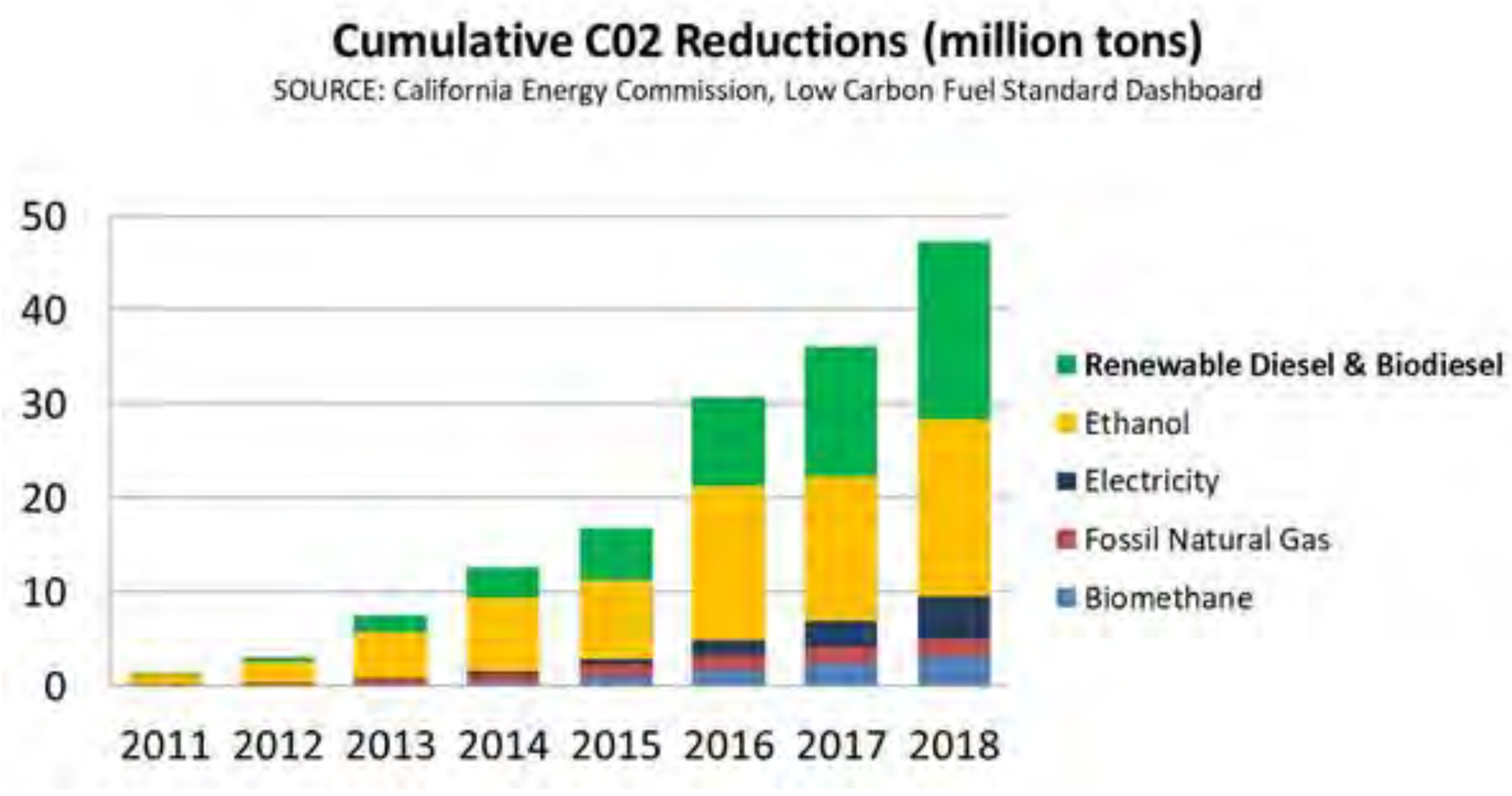

OIL
BURNER
ON
OFF
EMERGENCY
SWITCH


No.2 oil
Swell Test
B100
Swell Test
Teflon
Swell Test
100% EL
50150
Bio:EL
Viton


Thermo
22
200

Bio-based Diesel Fuels Deliver the Biggest Reductions in Transportation-Related Greenhouse Gas Emissions in California

New Data from California's Air Resources Board Confirms Key Role of Biodiesel and Renewable Diesel Fuels in CO2 Reductions



The Federal Renewable Fuel Standard requires 9 billion gallons of biofuel to be blended into the downstream supply every year. Biodiesel is blended at various levels into the diesel and oilheat distribution system and receives full credits from the EPA under RFS.

Authoring Agency	Year Published	Carbon Intensity (g/MJ)	GHG reduction compared to baseline petroleum
Argonne National Lab.	2017	26.40	66-72%[2] *
California Air Resources Board	2015	51.83	50%[3] *
U.S. Department of Agriculture	2012	21.20	76%[4] *
California Air Resources Board	2011	83.25	12%[5] *
Argonne National Lab.	2011		73-90%[6]
U.S. Environmental Protection Agency	2010	38.60	57%[7] *
Argonne National Lab.	2008		66-94%[8]
U.S. Environmental Protection Agency	2008	70.00	22%[9] *
National Renewable Energy Lab.	1998		78%[10]

*indicates indirect emissions from palm oil deforestation and peat oxidation. These are included as a penalty to the soy biodiesel pathway.

RFS2 Protections

- **Renewable Fuel Standard (RFS2) requires all renewable fuels to meet minimum GHG reduction threshold compared to petroleum.[11]**
- **GHG calculations must include international indirect land use change.[12]**
- **All renewable fuel must certify that feedstock came from land that was already managed in agricultural production before 2008. No land conversion is allowed.**
- **EPA has determined that palm oil does not meet the minimum GHG requirement to participate.**

Palm Oil Use

- **Virtually zero palm oil biodiesel has been used in the U.S. since implementation of the RFS2.13**

ENVIRONMENTAL BENEFITS OF BIODIESEL

GREENHOUSE GASES REDUCED 50% TO 86% WITH BIODIESEL COMPARED TO PETROLEUM DIESEL.

RFS2: All renewable fuels meet minimum GHG reductions.

U. S. Biodiesel Sources

More forests. more food. more efficient crops like soybeans.

CO_2 Emissions studies consider everything about feedstock & production along with impact on other markets.

BIODIESEL, THE RENEWABLE/LOW CARBON OPTION FOR AMERICA...NOW.