



# Ultra-Low Carbon Fuel

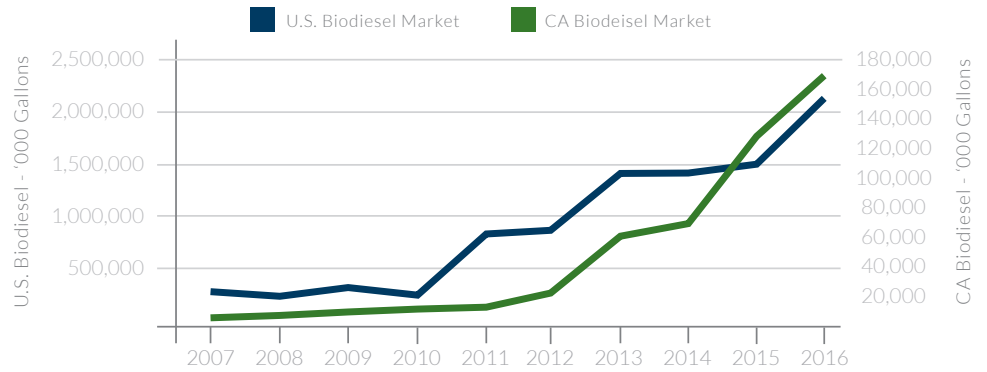
Crimson is making important contributions to America's renewable energy future. As the largest producer of ultra-low carbon biodiesel in California, we take pride in our innovations and efforts to develop local, sustainable energy. Our advanced biodiesel scores below 20 gCO<sub>2</sub>e/MJ via California's Low Carbon Fuel Standard carbon intensity model.

# Benefits of Ultra-Low Carbon Biodiesel

Ultra-low carbon biodiesel is a sustainable, cleaner-burning diesel substitute that reduces emissions by 80+% and other harmful pollutants by up to 50% compared to petroleum-based diesel fuel. It boosts engine performance and longevity. Since 2012, biodiesel has become more cost-effective. That's due to an increase in demand and infrastructure combined with an increase in biodiesel availability in California.

- Renewable
- Reduces Harmful Pollutants
- Increases Energy Independence
- Safe and Easy-to-Use
- Improves Fuel Lubricity

## Biodiesel Consumption<sup>1</sup>

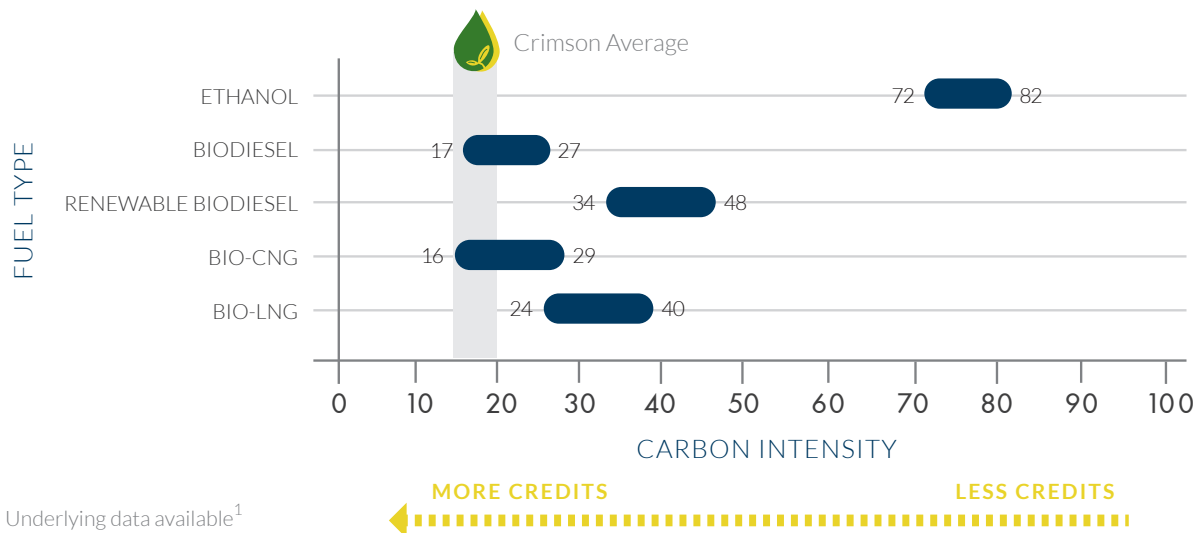


## Why Low Carbon Matters

The Low Carbon Fuel Standard (LCFS) was established in 2007 and was extended through 2030 through the enactment of Senate Bill 32 in 2016. It uses a fuel-neutral, market-based approach designed to encourage the use and production of cleaner, low-carbon fuels in California, and lower the greenhouse gas emissions from petroleum-based transportation fuels like gasoline and diesel.<sup>2</sup> Fuel is graded by its “carbon intensity” (CI) or the amount that the fuel reduces carbon emission compared to petroleum-based transportation fuel.<sup>3</sup>

The program is based on the principle that all fuels have “lifecycle” greenhouse gas emissions during its extraction, production, transportation, sales and use.<sup>3</sup> The carbon reduction created by biodiesel is a cost-effective way to achieve LCFS goals.

## 2013-2017 Average Carbon Intensity (CI) in (gCO<sub>2</sub>e/MJ)<sup>1</sup>



1 Source: US Dept of Energy, Energy Information Administration  
 2 Source: [http://www.energy.ca.gov/low\\_carbon\\_fuel\\_standard/](http://www.energy.ca.gov/low_carbon_fuel_standard/)

3 Source: <https://www.arb.ca.gov/fuels/lcfs/lcfs.htm>

## What We Deliver

Crimson offers a variety of term supply, logistics, and pricing structures to meet the varying needs of partners who purchase ultra-low carbon biodiesel.

## Commitment to Quality

Crimson biodiesel will meet or exceed the highest industry standards for fuel quality. This includes proprietary major oil and terminal specifications year-round.

## An Economical Way to Meet Regulations

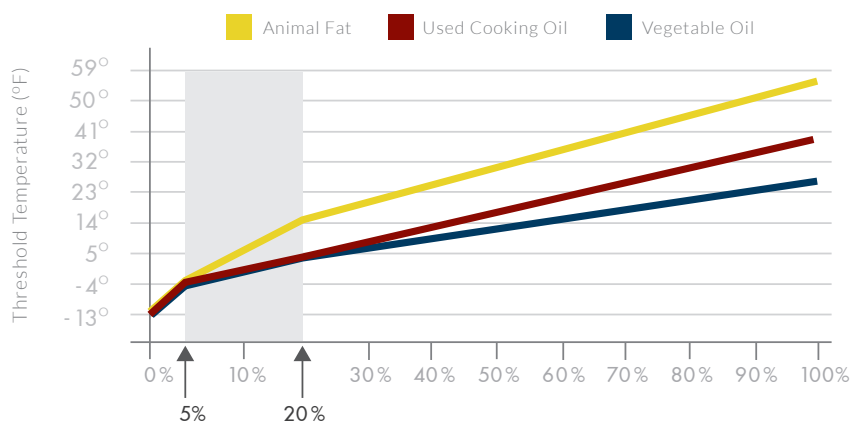
Leading refiners, wholesale distributors, and retailers use biodiesel blends as an economic way to improve the environmental performance of petroleum-based diesel fuel.

## Select Properties of Typical Diesel and Biodiesel Fuels<sup>5</sup>

Fuel Property	Diesel No. 2	Biodiesel No. 1-8 Grade
Fuel Standard	ASTM D975	ASTM D6751
Higher Heating Value, Btu/gal / Lower Heating Value, Btu/gal	-138,490 / -129,488	-119,550 / -127,960
Kinematic Viscosity, mm <sup>2</sup> /s @ 40 <sup>o</sup> C (104 <sup>o</sup> F)	1.3 - 4.1	4.0 - 6.0
Specific Gravity, kg/l @ 15.5 <sup>o</sup> C (60 <sup>o</sup> F)	0.85	0.88
Density, lb/gal @ 15.5 <sup>o</sup> C (60 <sup>o</sup> F)	7.079	7.328
Carbon, wt %	87	77
Hydrogen, wt %	13	12
Oxygen, by dif. wt %	0	11
Sulfur, wt % (parts per million [ppm])	0.0015 max. (15 ppm max.)	0.0 - 0.0015 (0 - 15 ppm)
Boiling Point, <sup>o</sup> C ( <sup>o</sup> F)	180 - 340 (356 - 644)	315 - 350 (599 - 662)
Flash Point, <sup>o</sup> C ( <sup>o</sup> F)	60 - 80 (140 - 176)	100 - 170 (212 - 338)
Cloud Point, <sup>o</sup> C ( <sup>o</sup> F)	-35 - 5 (-31 - 41)	-3 - 15 (26 - 59)
Pour Point, <sup>o</sup> C ( <sup>o</sup> F)	-35 - -15 (-31 to 5)	-5 - 10 (23 - 50)
Cetane Number	40 - 55	47 - 65

### Cloud Point<sup>6</sup>

(based on ASTM D 2500)



<sup>5</sup> <http://biodiesel.org/docs/using-hotline/nrel-handling-and-use.pdf?sfvrsn=4>

<sup>6</sup> Biodiesel Demonstration and Assessment by Societe de Transport de Montreal, Mar. 2002 through Mar. 2003

## The Future of Fuels

Crimson is helping make petroleum fuels better using innovative technologies. Renewable transportation fuels like Crimson's ultra-low carbon biodiesel, used alongside conventional petroleum diesel, deliver more sustainable energy sources that help address climate change and reduce environmental impacts.

## Our Commitment to Communities

Crimson's locally-produced, ultra-low carbon biodiesel provides regional and global benefits such as high-paying jobs, increased regional demand for goods and services, cleaner air, and significant carbon and particulate reductions.

### We Help Boost Local Economic Activity

We acquire waste materials from area businesses, such as used cooking oil, and use it to create biodiesel that delivers high-quality, high-paying manufacturing jobs in the Bakersfield area. We also support neighbors with the purchase of additional goods and services.

### We Help Improve Area Health and the Environment

Air quality is measurably worse in industrial areas and major transit corridors with high truck traffic volume and heavy diesel use. Cleaner burning fuels like ultra-low carbon biodiesel lead to cleaner air, which means less asthma and reductions in lung cancer and other respiratory illnesses.

## Contact Us Today to Learn More



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