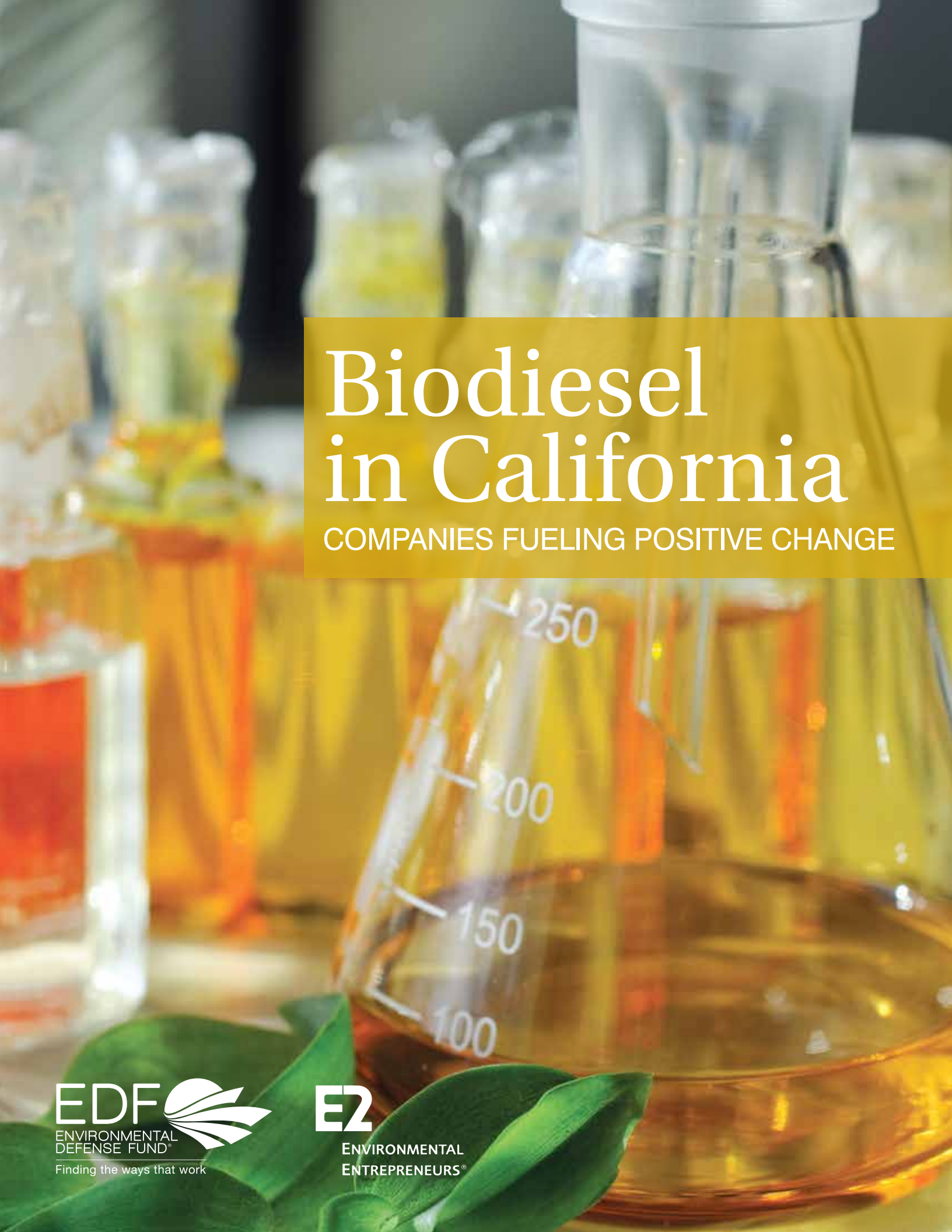

Biodiesel in California

COMPANIES FUELING POSITIVE CHANGE

EDF
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The biodiesel fuel value chain

Biodiesel is a renewable alternative to traditional diesel. It is made from feedstocks (raw materials) such as oils and recycled cooking grease, rather than fossil fuels. Biodiesel is commonly blended with traditional diesel, but is also sold in its pure form. It has considerably fewer emissions than its traditional counterpart and because much of the feedstock used in California is from the state, it reduces dependence on foreign sources. Successful growth of the companies profiled here demonstrates that the industry is creating jobs in California and growing the economy. EDF profiled one company to represent each step of the value chain: research and development, feedstock, collection, production, blending, and retail and distribution.

RESEARCH AND DEVELOPMENT Biodiesel companies that participate in Research and Development (R&D) work to identify new resources that can be used as feedstock or new process and technology breakthroughs that can accelerate the development and commercialization of cleaner diesel. These companies work to integrate science and engineering research to improve processing, conversion, storage, and product development and analysis.

FEEDSTOCK Biodiesel feedstock is the raw material that makes the fuel. Typical feedstocks are plant oils like soybean and canola; however lower-carbon footprint feedstocks like used cooking oil are also used by biodiesel producers. New feedstocks currently under investigation include algae and even sewage sludge. Abundant and steady sources of feedstock allow for biodesel to be scaled economically.

COLLECTION Biodiesel companies partner with restaurants and food service companies that produce waste grease in order to have readily available feedstock to use in biodiesel production. Biodiesel companies will either pick up grease that has been safely stored in drums, or pump the waste grease from the restaurants directly into a truck for transportation to the production facility.

PRODUCTION Biodiesel is produced through a process called "transesterification." In this process, glycerin (a colorless, odorless, syrupy liquid made from fats and oils) is separated from the fat or vegetable oil, leaving behind methyl esters (the scientific name for biodiesel) and glycerin (a byproduct that can be reused in soaps and other products).

BLENDING Many companies produce blends of biodiesel and traditional diesel, though pure biodiesel is available commercially. Common blends are B5 (5% biodiesel) and B20 (20% biodiesel). All blends must meet American Society for Testing and Materials standards. Today, blends are affordable due to smart policies like the Low Carbon Fuel Standard (LCFS) and the Renewable Fuel Standard.

RETAIL AND DISTRIBUTION Finally, biodiesel companies must distribute and sell their products. Some companies, like Imperial Western Products (IWP), deliver the product to business customers who then blend and distribute the product further. Other companies, like Propel, sell their biodiesel blends directly to consumers as a cleaner alternative at fuel stations across the state.


Biodico


Yokayo

IWP


Crimson

Kuva / Marja-Leena Kultanen


Propel Fuels

Research and development
Biodico

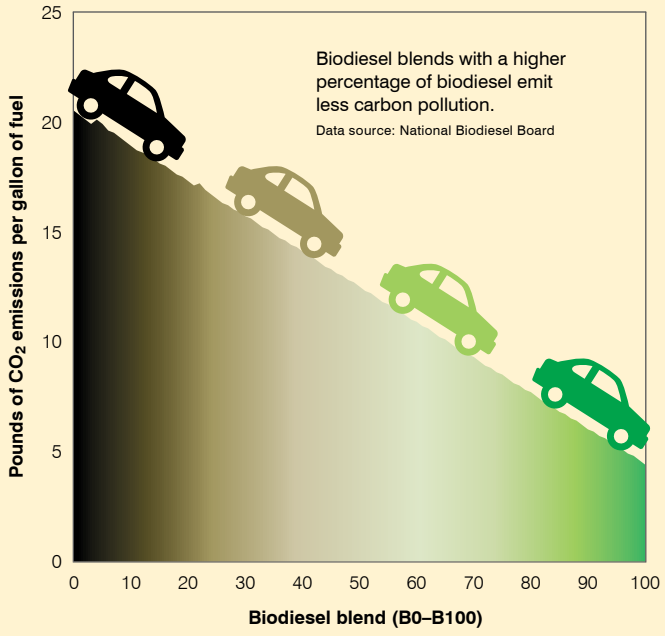
CASE STUDY The Navy is one of the largest users of diesel fuel in the world and without fuel, the Navy doesn't run. To make sure that doesn't happen, the Navy set a goal to reduce their petroleum use 50% by 2020 and they turned to innovative companies to help them reach it. Biodico, a company that leads in R&D of biodiesel fuel, was tasked by the Navy in 2002 to design, develop, and deploy modular biofuel and bioenergy systems that can use a variety of feedstocks and produce renewable on-demand primary heat and power. Biodico has built a sustainable biorefinery at Naval Base Ventura County that will have 10 million gallons/year of biodiesel production capacity and will supply biodiesel and bioenergy at prices competitive with conventional fuel and power. They are also building a sustainable biorefinery at Red Rock Ranch

"Ten years ago, biodiesel wasn't a significant part of statewide energy policy. LCFS carbon analysis highlights biodiesel as a clean, cost-effective way to reduce emissions."

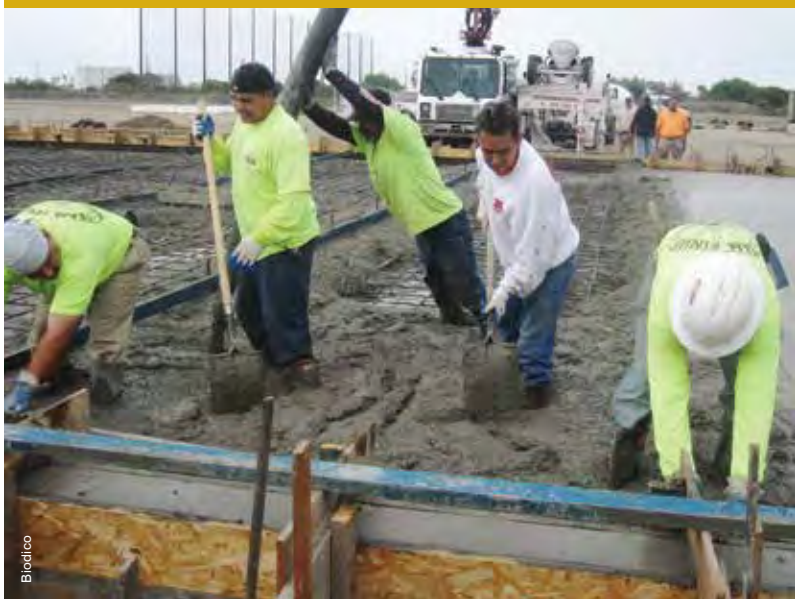
Russ Teall, CEO, Biodico

in California's Central Valley, their sixth commercial project since 1999, which will have 15 million gallons/year of production capacity. While Biodico has deployed commercial units in Australia, Colorado, Nevada and Texas, Russ Teall, their CEO, says California is propelling the growth of the company and the biodiesel industry, in large part because of policies like California's Low Carbon Fuel Standard (LCFS). ■

CARBON DIOXIDE EMISSIONS FROM BIODIESEL



Biodico's R&D is helping the Navy reduce its petroleum use, ensure energy security, and bring competitively priced fuels to market.



Feedstock
North Star Biofuels, LLC

CASE STUDY North Star Biofuels was formed as a joint venture between R Power Biofuels and Agri Beef Co. (AB) and finished building its new 20 million gallon/year production facility in Watsonville, California in June of this year. R Power Biofuels, founded by North Star CEO Jim Levine and inventor Michael Doyle, PE, started biodiesel production in 2011 with a small, fully operational

"California's LCFS has had a huge impact on the biodiesel industry. Biodiesel now leads the renewable fuel market, reducing CO_2 emissions and strengthening the economy."

James D. Levine, PE, CEO, North Star Biofuels, LLC

facility at the Port of Redwood City using a method designed to reduce an 8-12-hour biodiesel process to approximately 5 minutes, while limiting human error and process variability. North Star's feedstock consists of animal tallow and waste vegetable oils, all obtained from major suppliers. Currently, North Star has rights to 5 million gallons of AB's high-quality animal tallow annually, and through other partnerships, has access to many times its current production capacity. North Star's output is almost fully committed, primarily to oil companies who have started blending B5 in California. North Star's success stems from California's LCFS, innovative partnerships, and cutting edge technology that will reduce carbon emissions by approximately 200,000 metric tons annually from their Watsonville plant alone. To meet expected demand, North Star is already planning a second facility, which will likely yield 50 million gallons/year or more. ■

Propel operates many of their own stations and also partners with conventional station operators across the state to enable broader public access to biodiesel blends ranging from B5 to B99.

Propel Fuels

Collector
Yokayo Biofuels

CASE STUDY Yokayo Biofuels is a company that its founder and CEO, Kumar Plocher admits was built backwards. First, Plocher built a market, and then he collected feedstock and started producing. Currently, Yokayo produces

"California's fuel policies support Yokayo's commitment to sustainable production of biodiesel from waste grease and keeping sales local to provide maximum benefit to the region."
Kumar Plocher, CEO, Yokayo Biofuels

about 400,000 gallons of biodiesel/year, with plans to expand to 700,000 gallons in the very near future. Yokayo is an exciting example of the biodiesel industry because it is completely vertically integrated and committed to a "100 mile diet"—the entire process, from feedstock collection to production of a finished biodiesel product to distribution, is all completed in Northern California. They only use recycled restaurant fryer oil as their feedstock because they believe it is the most sustainable "starter feedstock" in the industry. As a fully-licensed "inedible kitchen grease hauler," they have three trucks that collect oil from 900 restaurants and food service facilities. Plocher never imagined Yokayo to be its current size and says over the past decade the growth of the industry has been incredible. He will soon be starting a nonprofit to educate the public about biofuels and to teach mechanics how to work on biodiesel-run cars and alter regular cars to be able to run on biodiesel. ■

Production
Crimson Renewable Energy, LP

CASE STUDY When it comes to biodiesel production in California, Crimson Renewable Energy, LP is leading the industry in production volume. Crimson's production facility in Bakersfield currently makes between 8–10 million gallons/year, but anticipates expanding to a 22–25 million gallon/year capacity, and is one of the largest of its kind in California. Crimson originally began production with soy bean oil feedstock in 2009, then redesigned the plant to be able to process multiple types of low-carbon feedstocks and began

"After 12 years in this industry, I'm especially excited about how the LCFS is driving demand for sustainable fuels, allowing the biodiesel industry to thrive."
Joe Gershen, Director of Sales & Marketing, Crimson Renewable Energy, LP

producing biodiesel again in 2011. The facility today runs entirely on used cooking oil, yellow grease, and corn oil from ethanol plants. Crimson doesn't collect their own feedstock, rather relying on a variety of suppliers such as renderers, ethanol plants that generate inedible corn oil from distiller's grains, and companies that specialize in used cooking oil from restaurants, hotels, cafeterias, etc. Though Crimson sells most of its biodiesel to the petroleum industry for blending with traditional diesel, they also sell to Propel Fuels, another company featured here. Crimson has roughly 30 permanent employees, with additional jobs for contractors. Crimson credits the LCFS for creating an environment where they can truly thrive and for putting the Golden State at the forefront of U.S. regulatory policy for greenhouse gas reduction and the American biodiesel industry. ■

Blending
Imperial Western Products

CASE STUDY Imperial Western Products (IWP) produces nearly 8 million gallons/year of biodiesel, making it one of the largest producers in California. IWP originally produced cattle feed from organic matter, but the company expanded to biodiesel in 2001 and has been making this clean fuel ever since. IWP is vertically integrated; the company has divisions

"Previously, biodiesel was a niche fuel with limited consumer demand. California fuel policies have enabled a broader, steady market by providing certainty and lower costs."

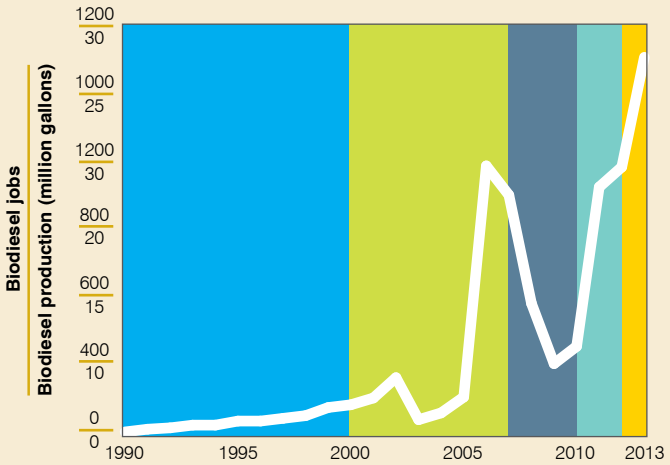
Curtis Wright, Plant Manager, Imperial Western Products

that pick up their primary feedstock of used cooking oil, process the oil into biodiesel, and blend it for sale to retail and wholesale consumers. IWP's philosophy is to produce locally based, environmentally friendly alternative fuels. This holds true across its business practices, as all of their feedstock oil comes from a 250 mile radius, with most of their product sold in California. Because of the state's policies like the LCFS, IWP has been highly successful. The biodiesel sector of the company employs around 60 people and with steady customers (trucks and haulers) and feedstock sources, IWP expects to be profitable for years to come. ■

IWP

Imperial Western Products produces nearly 8 million gallons a year of biodiesel, which is then blended for retail and wholesale consumers.

IN-STATE BIODIESEL PRODUCTION



- Biodiesel introduction fleet trials.
- Favorable biodiesel feedstock/diesel market economics. FDA incremental production incentives. Federal $1/gallon blenders credit January 2005-December 2013.
- Unfavorable biodiesel feedstock/diesel market economics. State policy interpretation leading to restricted underground biodiesel storage, uncertainty over continuation of Federal tax credits.
- Federal Blenders Credit/Federal Renewable Fuel Standard.
- California Low Carbon Fuel Program.

Data source: California Energy Commission and National Biodiesel Board

Retail and distribution
Propel Fuels

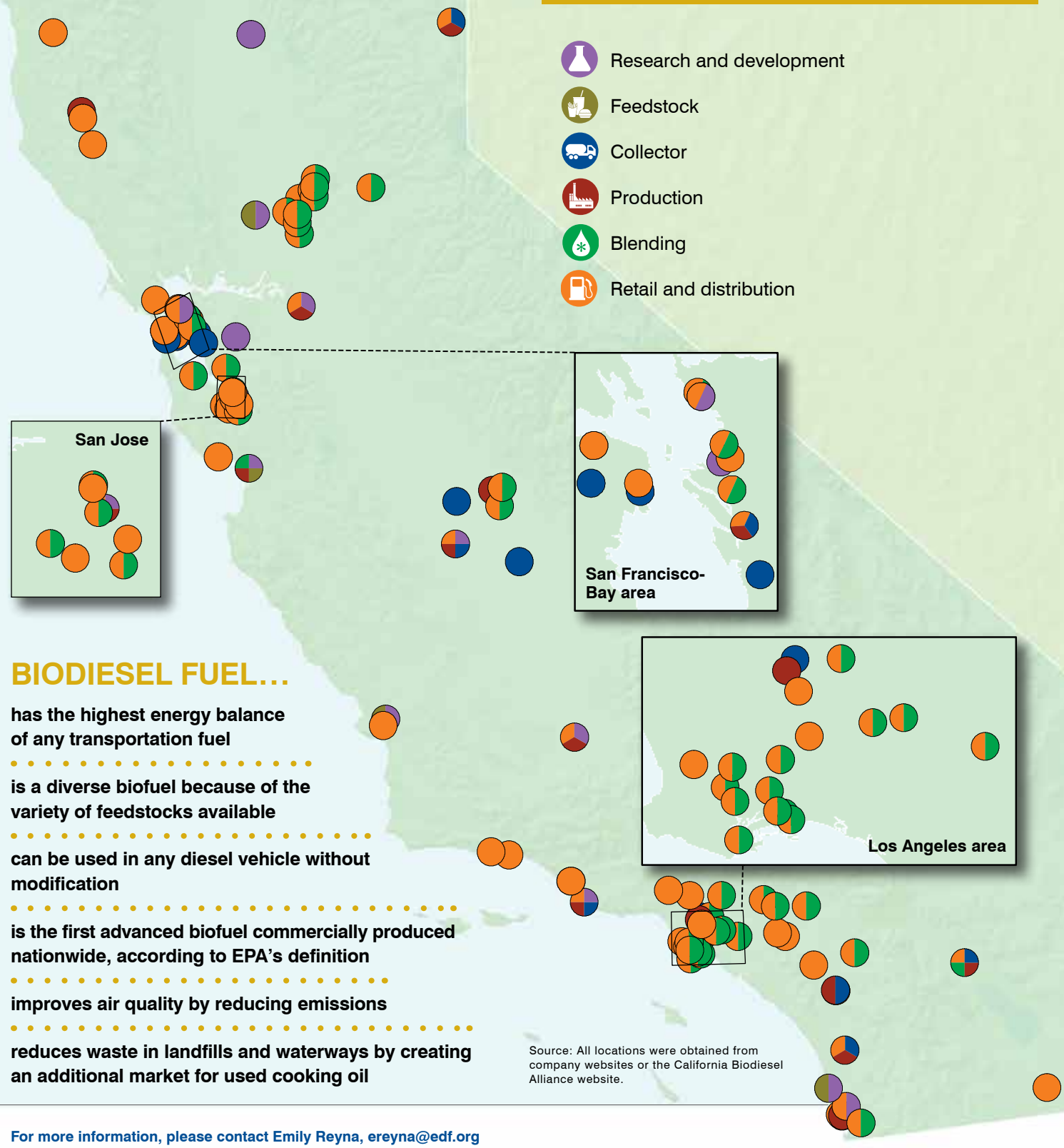
CASE STUDY What if making a positive change was as easy as picking a different pump? Propel Fuels, based out of Redwood City, CA, is a unique fuel retailer whose goal is to make that choice simple. They are dedicated to giving California customers a choice at the pump by making renewable fuels readily available at fueling stations in communities across the state. Propel currently has 38 sites that sell biodiesel and E85 Flex Fuel alongside conventional fuels, with plans to expand operations. To accomplish this goal, Propel

"Propel relocated to California to benefit from policies like the LCFS. California's support of development and use of clean fuels aids businesses and the environment."

Matt Horton, CEO, Propel Fuels

partners with conventional fueling stations or, in some cases, operates the whole station. Propel is seeing record sales, driven by the company's dedication to making renewable fuels mainstream through convenient locations, effective education, and competitive pricing. The decision to switch is now much easier for customers. Originally based in Seattle, WA, Propel relocated to California after seeing a huge, unmet need for their fuels in this market. Propel believes that California, especially given its LCFS, is at the forefront of this industry. ■

Locations of biodiesel facilities in California



BIODIESEL FUEL…

has the highest energy balance of any transportation fuel

is a diverse biofuel because of the variety of feedstocks available

can be used in any diesel vehicle without modification

is the first advanced biofuel commercially produced nationwide, according to EPA's definition

improves air quality by reducing emissions

reduces waste in landfills and waterways by creating an additional market for used cooking oil

Source: All locations were obtained from company websites or the California Biodiesel Alliance website.

For more information, please contact Emily Reyna, ereyna@edf.org

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