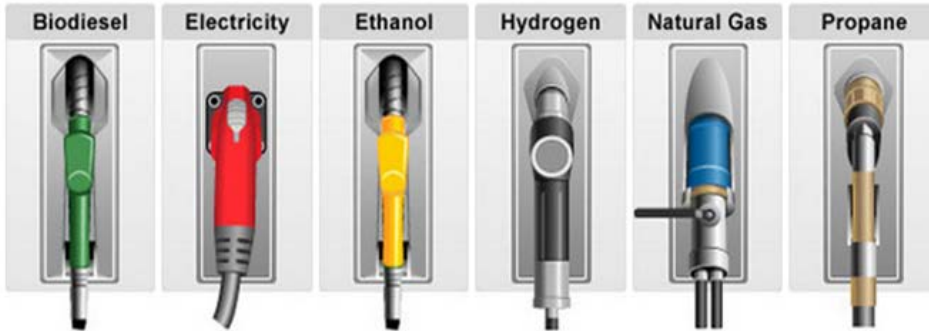


# refuel



## Alternative Fuels for Consumers

This Alternative Fuel Toolkit was developed as part of the San Diego Regional Alternative Fuel Readiness Plan with support from the San Diego Regional Alternative Fuel Coordinating Council (Refuel San Diego), which seeks to reduce barriers to alternative fuel adoption in the region.

As California works toward achieving its ambitious climate goals, transitioning from gasoline and diesel vehicles into alternative fuel vehicles is an important facet in lowering greenhouse gas emissions (GHG).

Alongside public agencies, consumers also can begin to empower themselves with knowledge about alternative fuel vehicles. This may encourage consumers to make more well-informed choices in their next vehicle purchase.

Driving an alternative fuel vehicle often has the following benefits:

- Cost savings
- Protection against petroleum price volatility and supply uncertainty
- Reduction of GHG emissions
- Improves local air quality
- Decreased reliance on foreign oil sources

### How do I use this Alternative Fuel Toolkit?

This Alternative Fuel Toolkit provides resources and general information about alternative fuel vehicles for consumers. Within this toolkit, six different alternative fuels are discussed, detailing fuel-specific information such as:

- Guidance on availability of funding for alternative fuel vehicle purchases;
- Maps of public infrastructure locations;
- Diagrams of how an alternative fuel vehicle works; and
- Fuel savings comparisons.





# Biodiesel

## FACTS ABOUT BIODIESEL

## What is biodiesel?

Biodiesel is a non-petroleum-based diesel that is made from vegetable oil, recycled restaurant grease, or animal fats. Pure biodiesel is renewable and clean-burning form of diesel.

Typically, biodiesel can be blended with petroleum diesel. Biodiesel blends range from B2 (2% biodiesel, 98% petroleum diesel) to B99 (99% biodiesel, 1% petroleum diesel). B20 is the most common biodiesel blend in the United States.

Renewable diesel has been growing in popularity. Renewable diesel is also made from biomass feedstocks, but is processed in a different way that makes it more chemically similar to diesel than biodiesel.

*How many public stations are in the San Diego region?*

There is currently one public Biodiesel station in the San Diego region; however, there are many private fleets that have B20 delivered to their own facilities.

*How much does it cost to fuel my vehicle?*

Biodiesel is generally less expensive than diesel. Below are the 24-month averages of both fuels.

24-month average*	
Diesel	\$3.44
B20	\$3.15
Savings	\$0.31

\*June 2013-June 2015

- Biodiesel is biodegradable, nontoxic, and safe for handling
- Biodiesel is produced from co-products and byproducts of crops already being grown
- B20 provides similar fuel economy, horsepower, and torque as diesel fuel
- Between 2004 and 2014, 8.2 billion gallons of biodiesel have been used in the U.S. Carbon emissions were reduced by 75.5 million metric tons. This is equivalent to removing 15.9 million cars off the road.
- Biodiesel reduces lifecycle carbon emissions by up to 86%

# What types of vehicles can use biodiesel?

Any vehicle that runs on diesel can also use biodiesel, including, but not limited to:

- Passenger vehicles
- Vanpool – shuttles
- School buses
- Refuse haulers
- Sweepers
- Construction equipment



## Did you know...

Many light-duty diesel vehicles can also take low percentage blends of biodiesel. 85% of all manufacturers will allow B20 in newer model vehicles. Visit the National Biodiesel Board for more information:

<http://www.biodiesel.org/using-biodiesel/oem-information>.



# Where can I learn more?

- Alternative Fuel Data Center - [www.afdc.energy.gov/fuels/biodiesel.html](http://www.afdc.energy.gov/fuels/biodiesel.html)
- National Biodiesel Board – [www.biodiesel.org](http://www.biodiesel.org)
- Biodiesel Education Network – [www.askben.info](http://www.askben.info)
- Drive Biodiesel – [www.drivebiodiesel.net](http://www.drivebiodiesel.net)
- National Biodiesel Foundation – [www.biodieselfoundation.org](http://www.biodieselfoundation.org)

# Using biodiesel

You may not be sure whether or not a biodiesel vehicle is the right decision for you. The following tools and resources are available to help guide you through your decision-making process.

## Where Can I Find Biodiesel?

You can buy biodiesel directly from biodiesel producers and marketers, petroleum distributors, or at some public retailers found throughout the nation.

## Is Biodiesel the Same as Vegetable Oil?<sup>1</sup>

Biodiesel is produced from fats or oils through a process called transesterification. This process removes the glycerin by reacting the oil/fat with an alcohol. Biodiesel must meet strict standards (ASTM D6751) in order to perform properly.

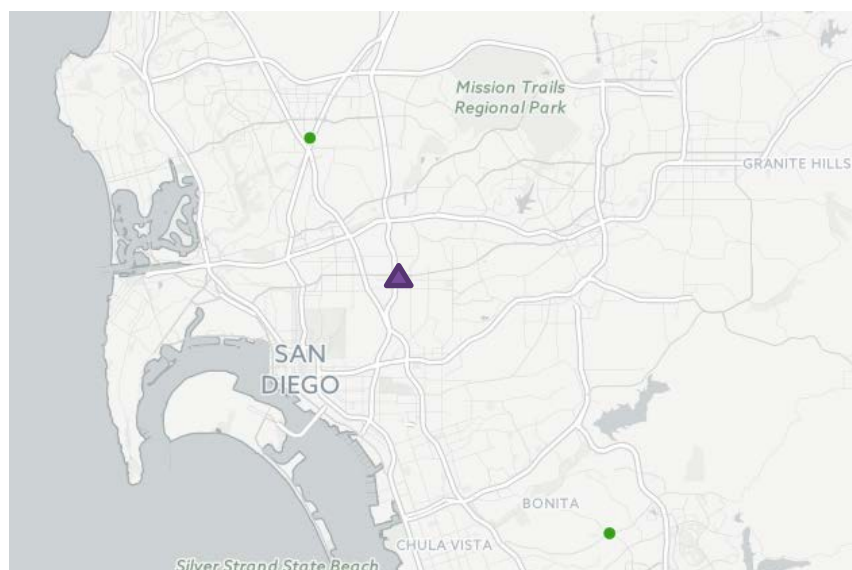
## What is Renewable Diesel?

Renewable diesel is also made from biomass feedstocks, but is processed in a different way that makes it more chemically similar to diesel than biodiesel. Renewable diesel has a higher cetane rating than biodiesel. There is continued research about renewable diesel, and more information can be found here:

[http://www.afdc.energy.gov/fuels/emerging\\_green.html](http://www.afdc.energy.gov/fuels/emerging_green.html).



## Map of Public Biodiesel or Renewable Diesel Fueling Stations in San Diego Region



\*Triangle indicates biodiesel station; circles indicates renewable diesel station  
(Map updated as of September 2015)

[http://www.afdc.energy.gov/fuels/biodiesel\\_locations.html](http://www.afdc.energy.gov/fuels/biodiesel_locations.html)

<sup>1</sup> <http://biodiesel.org/what-is-biodiesel/biodiesel-faq's>



# Electric Vehicles

## WHAT IS CHARGING?

## What is a PEV?

A plug-in electric vehicle (PEV) is a vehicle in which there is an onboard battery that is powered by energy delivered from the electricity grid. It is commonly referred to as just an electric vehicle (EV). There are two types of plug-in electric vehicles: a battery electric vehicle (BEV) and a plug-in hybrid electric vehicle (PHEV). BEVs run exclusively on the power from their onboard battery. PHEVs have both an onboard battery and a gasoline tank that is used when the car's battery is depleted.

There are upwards of 17,500 PEVs in the San Diego region (as of Summer 2015).

*How many stations are in the San Diego region?*

Currently, there are over 600 public charging stations in the San Diego region.

*How much does it cost to fuel my vehicle?*

It generally costs less than half as much to drive an electric vehicle as an internal combustion engine.

### 24-month average\*

Gasoline	\$3.35
Electricity**	\$1.22
Savings	\$2.13

\*June 2013-June 2015

\*\*Gasoline gallon equivalent at \$0.12/kWh



### Level 1 Charging

Level 1 charging uses 120 volts AC. A PEV can be charged with just a standard wall outlet.

### Level 2 Charging

Level 2 charging uses 240 volts AC. This is the same type of voltage as an outlet used for a dryer or washing machine.

### DC Fast Charging

DC fast charging is very quick. Some PEVs can charge up to 80% of its battery in 30 minutes.

# What types of vehicles can use electricity?

Electric vehicles come in all shapes and sizes. They are not limited to light-duty passenger vehicles (of which there are over 25 models!) anymore.

- Passenger vehicles
- Vanpool shuttles
- Pickup trucks
- Medium-duty vehicles
- Transit buses
- Forklifts
- Low-speed vehicles (like a golf cart)



## TYPES OF ELECTRIC VEHICLES

**Battery Electric Vehicle (BEV):** Battery electric vehicles run entirely on the energy stored on an onboard battery. The vehicle is charged by electricity from the grid. On average, the vehicle's range is upwards of 80 miles on a single charge.

**Plug-in Hybrid Electric Vehicle (PHEV):** A plug-in hybrid electric vehicle runs on electricity and a gasoline as well. The vehicle's onboard battery is charged by electricity from the grid, and when the battery is depleted, the gasoline engine is used.

# Where can I learn more about plug-in electric vehicles?

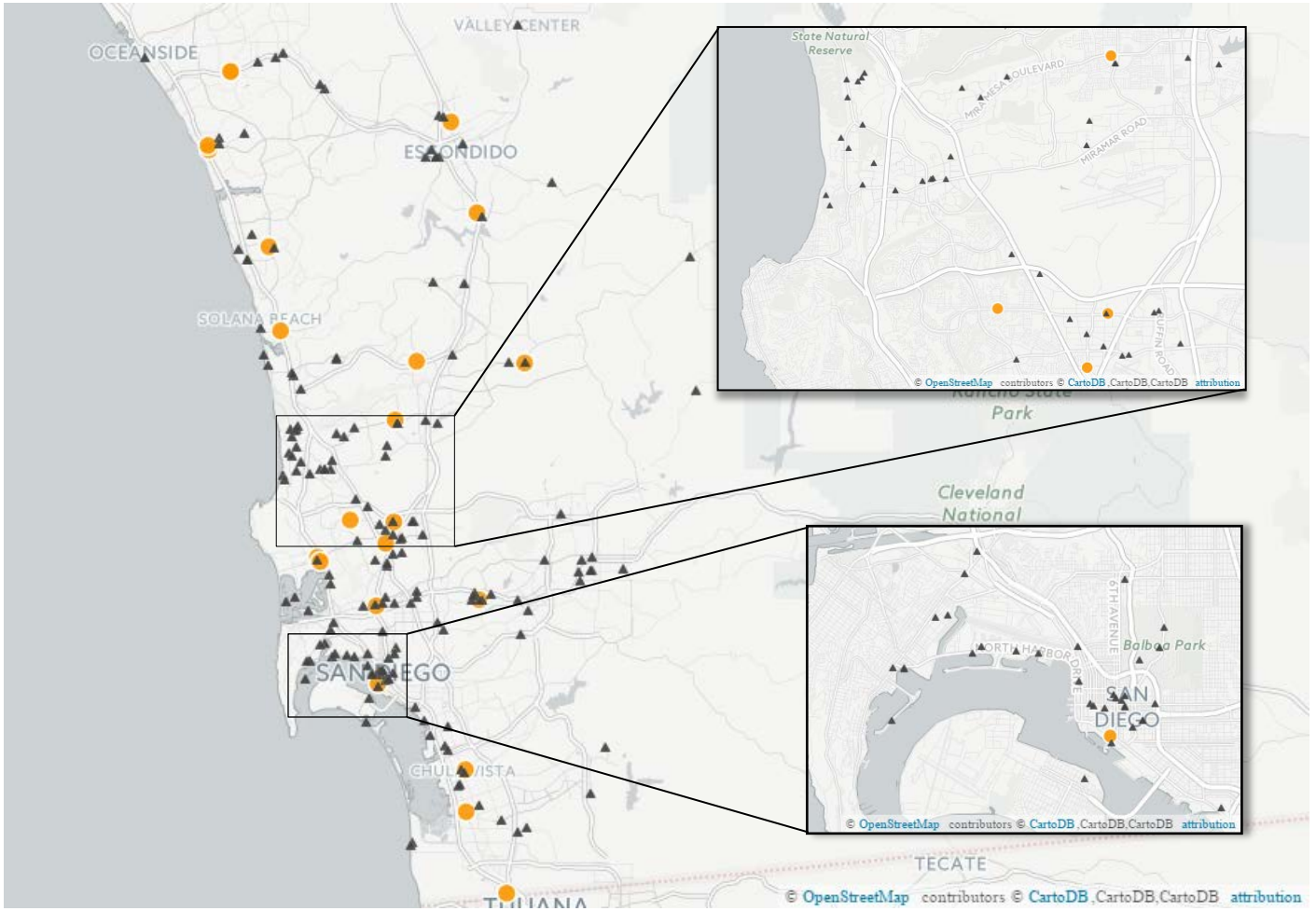
You can learn more about PEVs on the following websites:

- Alternative Fuel Data Center – [www.afdc.energy.gov](http://www.afdc.energy.gov)
- Plug-in Electric Vehicle Collaborative- [www.pevcollaborative.org](http://www.pevcollaborative.org)
- Plug-in America – [www.pluginamerica.org](http://www.pluginamerica.org)
- Plug-in Cars – [www.pluginincars.com](http://www.pluginincars.com)
- Go Electric Drive – [www.goelectricdrive.org](http://www.goelectricdrive.org)



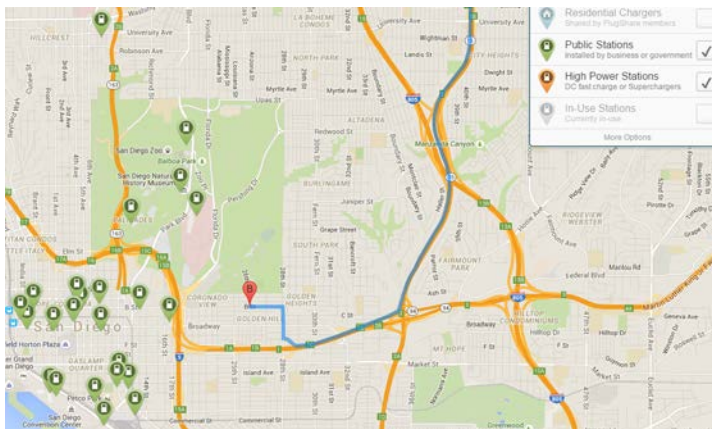
# Charging plug-in electric vehicles

Map of Public PEV Charging Stations in San Diego Region



\*Triangles indicate Level 2 site; circle indicates DCFC site (Map updated as of August 2015)

[http://www.afdc.energy.gov/fuels/electricity\\_locations.html](http://www.afdc.energy.gov/fuels/electricity_locations.html)



The website (and mobile app) [PlugShare.com](http://www.plugshare.com) is a crowd-sourced website for gathering information about charging stations.

Users post comments, photos, and check-ins at all these charging locations for accurate, up-to-date information.

PlugShare also offers a trip planner tool which will let see what charging stations are on your travel route.

<http://www.plugshare.com/>

## What are Charging Stations?



### Level 1 Charging

Uses a 110/120-volt outlet  
 Low installation cost  
 Can use existing household outlet  
 Mostly used for home charging  
 Approx. 7-15 miles per hour of charging  
 (depends on vehicle)



### Level 2 Charging

Uses 220/240-volt outlet  
 Higher installation cost  
 Many different models and types  
 Found in public spaces  
 Approx. 2-4 hours for a full charge (depends on  
 vehicle)



### DC Fast Charging

Uses high voltage  
 Most expensive  
 installation  
 Found alongside  
 travel corridors  
 Approx. 30 minutes  
 for 80% charge

## Charging at Home

There are two types of home charging environments: single family homes and multi-unit dwellings (MuDs). While both are private residences, they offer different types of considerations when installing charging stations.

### Single Family Homes

Single family homes usually face basic and straightforward installations. The steps to installation are:

1. **Decide** between Level 1 (120 volt outlet) vs. Level 2 (240 volt) charging.
2. **Research charging equipment options** (visit <http://www.goelectricdrive.org/charging/charging-equipment-virtual-showroom-new-ged>).
3. **Contact** an electrical contractor to conduct a site assessment.
  - a. Determine if a service upgrade is needed (if yes, contact San Diego Gas & Electric).
4. Contractor prepares cost estimate, applies for permits, and installs the charging station.
5. Begin charging!

#### What EV Charging Station to Choose?

Visit Plug-in America's website to find a list of charging stations available for consumers: <http://www.pluginamerica.org/accessories>.

### Multi-unit Dwellings

MuD charging offers a few more considerations when installing infrastructure. Though an individual wants to install a charging station at his/her parking spot, it is often the case that s/he must work with the homeowners' association or property manager to get approval for and complete the installation of a charging station.



The Plug-in Electric Vehicle Collaborative offers a comprehensive guide for MuD charging found here:

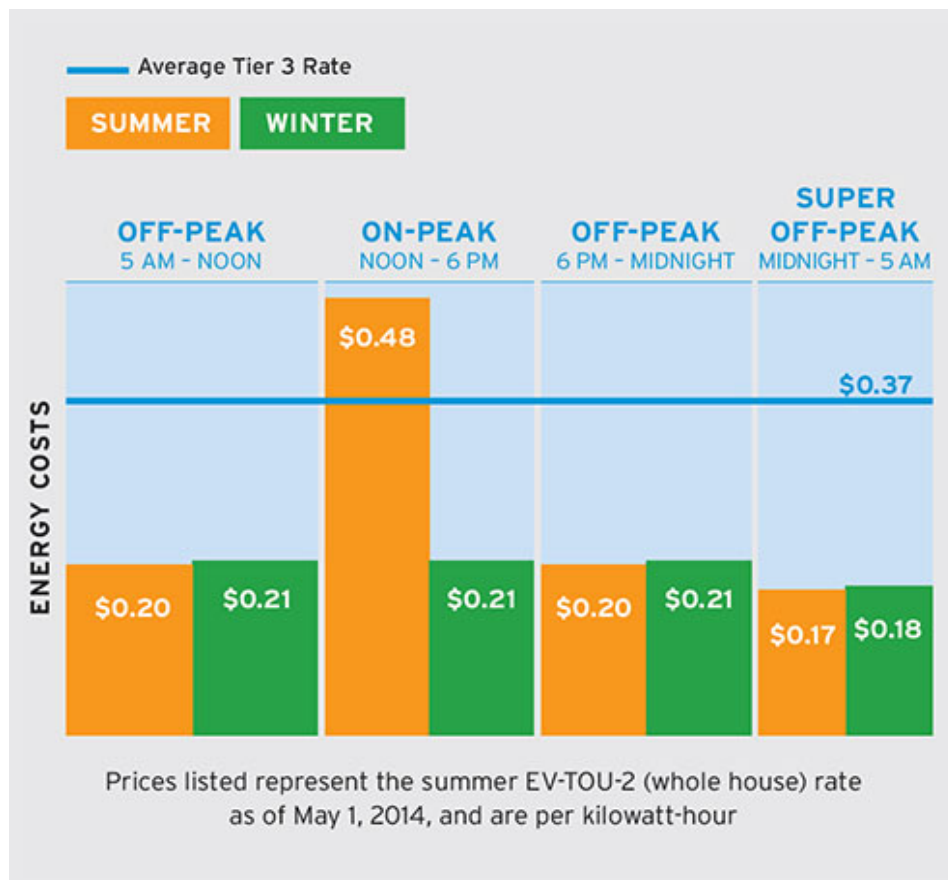
[http://www.pevcollaborative.org/sites/all/themes/pev/files/docs/reports/MUD\\_Guidelines4web.pdf](http://www.pevcollaborative.org/sites/all/themes/pev/files/docs/reports/MUD_Guidelines4web.pdf).

PEV drivers should also understand their legal rights for charging at a MuD:

1. [AB 2565](#)<sup>1</sup>: States that a person can void a term in lease renewed or extended on or after Jan 1, 2015 if the property does not allow an owner to install EV charging stations in their space. There are certain restrictions for this, though (ex: if property has fewer than 5 parking spaces, parking is not part of lease agreement, etc.).
2. [SB 880](#)<sup>2</sup>: Allows condos, apartment projects, etc. to install EV charging station in an owner's designated parking space. This also makes any provision that had said EV charging station installs are not allowed unenforceable.

## Utility Rates

SDG&E offers special rates for PEV drivers who charge their vehicles at home. Learn more at [www.sdge.com/ev](http://www.sdge.com/ev).



<sup>1</sup> [http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill\\_id=201320140AB2565](http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB2565)

<sup>2</sup> [http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml;jsessionid=73210777ecf27e4ea7ed74add052?bill\\_id=201120120SB880](http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml;jsessionid=73210777ecf27e4ea7ed74add052?bill_id=201120120SB880)

# Plug-in electric vehicles

## Which Vehicle Should I Buy?

In California, there are over 25 models of PEVs for sale from a variety of manufacturers. To find the right vehicle for you, there are a few resources:

1. Clean Cities 2015 Buyer's Guide: [http://www.afdc.energy.gov/uploads/publication/2015\\_vehicle\\_buyers\\_guide.pdf](http://www.afdc.energy.gov/uploads/publication/2015_vehicle_buyers_guide.pdf)
2. Alternative Fuel and Advanced Vehicle Search : <http://www.afdc.energy.gov/vehicles/search/>
3. Plug-in America Vehicle Tracker: <http://www.pluginamerica.org/vehicles>

## Incentives

The statewide Clean Vehicle Rebate Project offers up to \$2,500 for the purchase or lease of a new battery electric vehicle and up to \$1,500 for the purchase or lease of a new plug-in hybrid electric vehicle. Learn more by visiting [cleanvehiclerebate.org](http://cleanvehiclerebate.org).





# E85/ Flex-Fuel

## FACTS ABOUT ETHANOL

## What is E85?

Ethanol is a renewable fuel made from various plant materials ("biomass") including corn, sugar cane, barley, and wheat.

There are several blends of ethanol: E10 (10% ethanol, 90% gasoline), which is universal in California gasoline, E15 (15% ethanol), and E85 (85% ethanol). E85 can be used in flex-fuel vehicles.

*How many public stations are in the San Diego region?*

As of July 2015, there are seven public (E85) stations in the San Diego region. By 2016, three additional stations are expected to be open to the public.

*How much does it cost to fuel my vehicle?*

The chart below shows the average prices of gasoline and E85 over the past 24-months.

24-month average*	
Gasoline	\$3.35
E85	\$3.09
Savings	\$0.26

\*June 2013-June 2015

- The use of 13.3 billion gallons of ethanol in 2012 reduced GHG emissions from vehicles by 33.4 million metric tons – that's like removing 5.2 million vehicles from the road
- One bushel of corn equals approximately 2.8 gallons of ethanol
- Flex-fuel vehicles can use any blend between 0-85%
- Flex-fuel vehicles account for one out of three vehicles in the entire federal fleet
- Advanced cellulosic ethanol could reduce life cycle GHG emissions by up to 86%

# What types of vehicles can use ethanol?

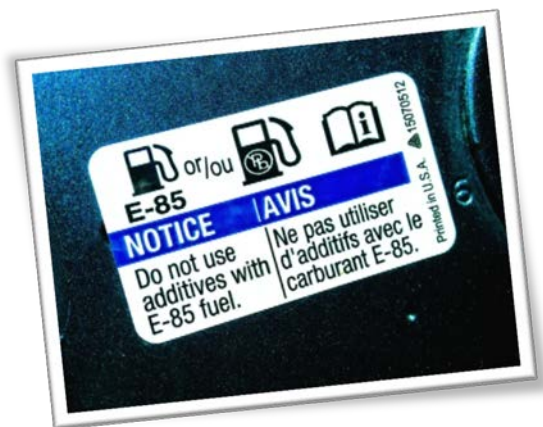
- Passenger vehicles
- Pick-up trucks
- Police vehicles
- Vans
- Medium-duty trucks

Flex-fuel vehicles can use regular gasoline and E85 interchangeably.



## Did you know...

There are over 80 model year 2015 flex-fuel vehicles available in the U.S. You may already have a flex-fuel capable vehicle.

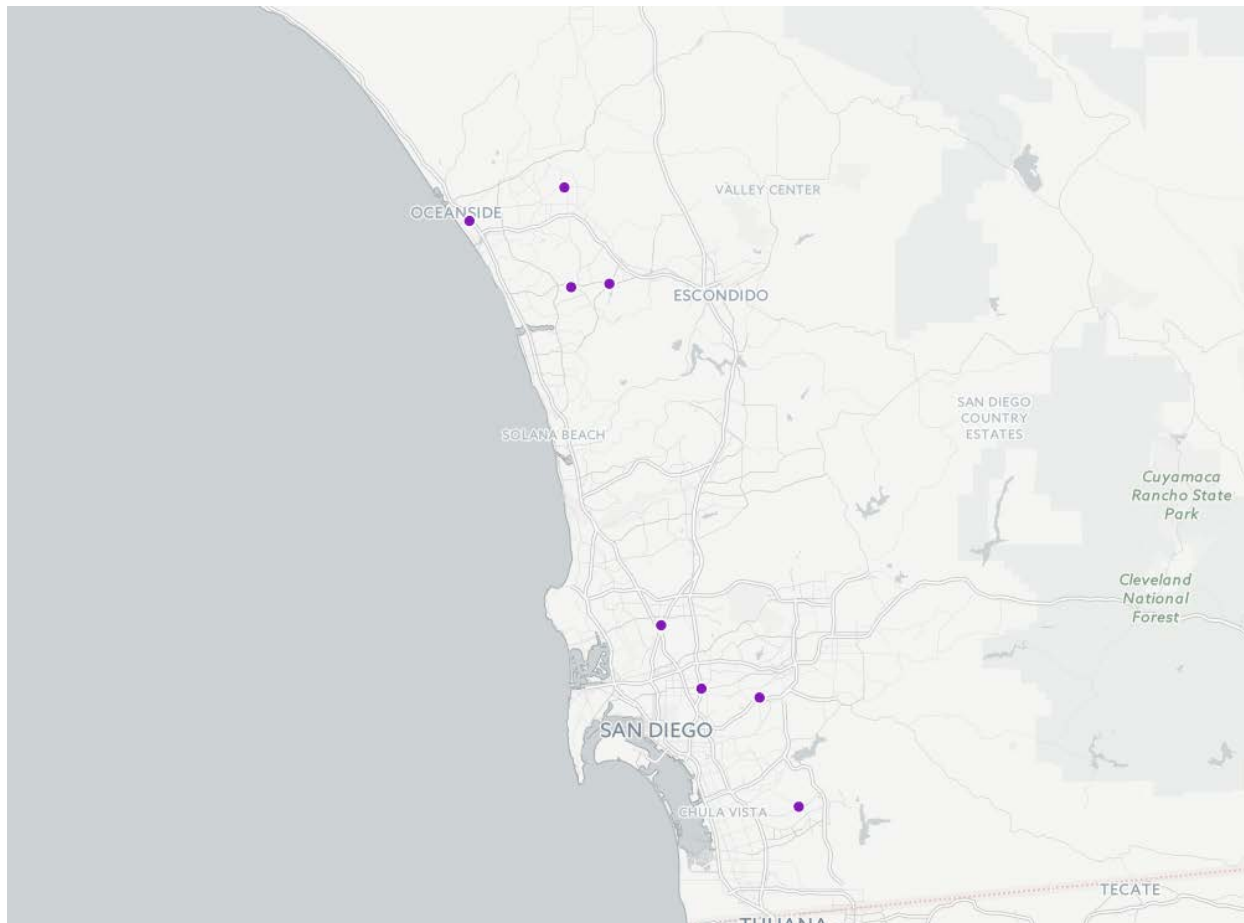


# Where can I learn more?

- Alternative Fuel Data Center - [www.afdc.energy.gov/fuels/ethanol.html](http://www.afdc.energy.gov/fuels/ethanol.html)
- Choose Ethanol - [www.chooseethanol.com/](http://www.chooseethanol.com/)
- American Coalition for Ethanol – [www.ethanol.org](http://www.ethanol.org)
- Ethanol Across America – [www.ethanolcrossamerica.net](http://www.ethanolcrossamerica.net)

# Using E85

## Map of Public E85 Fueling Stations in the San Diego Region



(Map updated as of August 2015)

[http://www.afdc.energy.gov/fuels/e85\\_locations.html](http://www.afdc.energy.gov/fuels/e85_locations.html)



## What is a Flex-Fuel Vehicle?

Flex-fuel vehicles run on both gasoline and ethanol. Usually you can tell if you are driving a flex-fuel vehicle if the gas cap is yellow and/or says "E85 compatible". The rear of the vehicle should also say "Flex-Fuel".

A full list of flex-fuel vehicles can be found on: <http://www.EthanolRetailer.com/ffv>.

Using a flex-fuel vehicle is no different than using a gasoline vehicle. FFVs have the same power, acceleration, payload, and cruise speed as a conventional vehicle.

## Manufacturers

These are the biggest manufacturers of E85 vehicles. Look through the [2015 Clean Cities Vehicle Buyer's Guide](#) for more details.<sup>1</sup>



## How a Flex-Fuel Vehicle Works

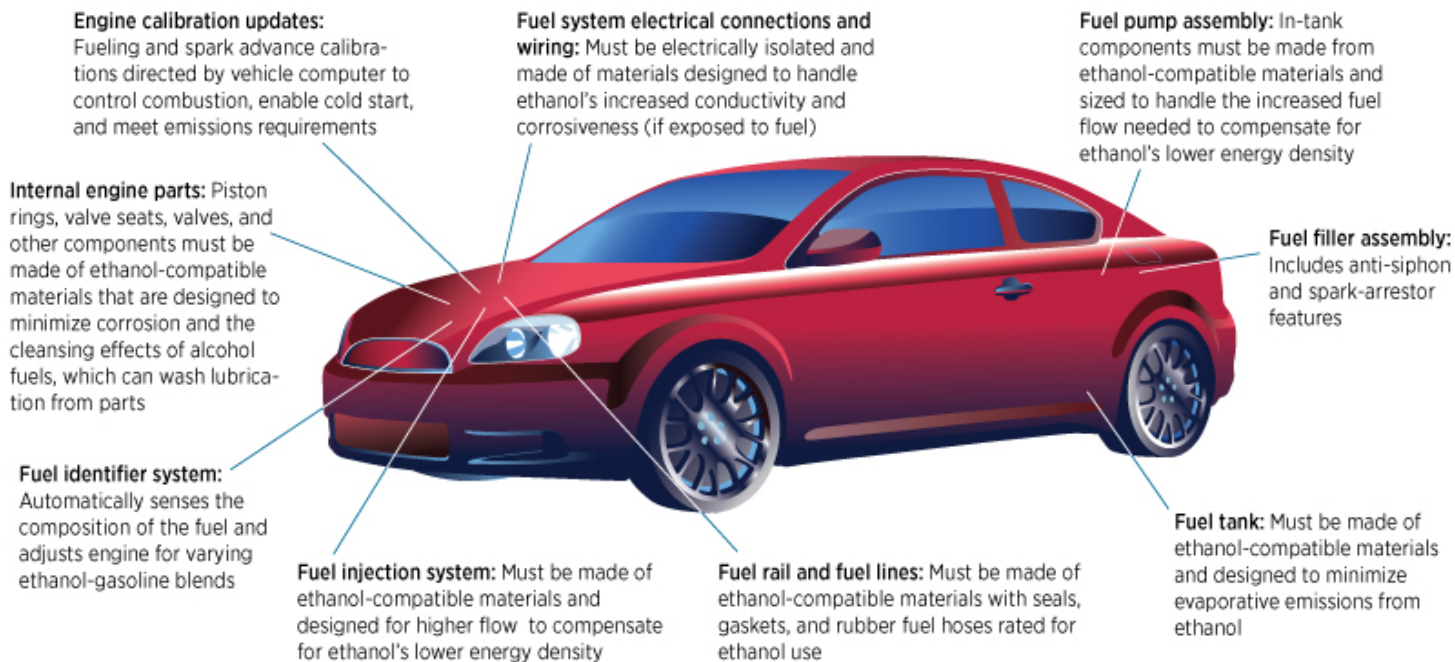


Image from [http://www.afdc.energy.gov/vehicles/flexible\\_fuel.html](http://www.afdc.energy.gov/vehicles/flexible_fuel.html).

<sup>1</sup> [http://www.afdc.energy.gov/uploads/publication/2015\\_vehicle\\_buyers\\_guide.pdf](http://www.afdc.energy.gov/uploads/publication/2015_vehicle_buyers_guide.pdf)



# Hydrogen Fuel Cells

## FACTS ABOUT HYDROGEN

## What is hydrogen?

Hydrogen is found in organic matter and in water (H<sub>2</sub>O). The majority of hydrogen for transportation is produced by extracting it from natural gas. Hydrogen can also be extracted from water; however, this is a more energy intensive method.

A hydrogen fuel cell electric vehicle (FCEV) is a vehicle that is powered by hydrogen. Hydrogen is pumped into pressurized cylinders in the vehicle. The fuel cell converts the hydrogen into electrical energy to drive the motor.

Fuel cell vehicles are zero-emission vehicles that emit only water vapor and warm air as exhaust.

*How many public hydrogen stations are in the San Diego region?*

The region's first public hydrogen station is scheduled to be installed

by early 2016. More are expected by 2020.

*How much does it cost to fuel my vehicle?*

According to the Department of Energy (DOE), a full tank of compressed hydrogen will cost around \$50 (and provide a range of approximately 300 miles). The DOE also estimates that future costs will fall to \$30 for a tank of hydrogen.

The target price for hydrogen is \$4.00/gallon of gasoline equivalent.

Auto manufacturers such as Toyota and Hyundai provide vehicle buyers free hydrogen for three years.



- Much of the hydrogen in the U.S. is produced in three states: California, Louisiana, and Texas (Energy Information Administration, EIA)
- Approximately 10-11 million metric tons of hydrogen are produced in the U.S. each year; enough to power 20-30 million cars or 5-8 million homes (EIA)
- Hydrogen fuel can be made from many sources, including wind, solar, biogas and biomass in addition to natural gas
- A fuel cell is required to last 5,000 hours or 150,000 miles before needing to be replaced

Courtesy of CA Fuel Cell Partnership

# What types of vehicles use hydrogen?

Though hydrogen fuel cells are a fairly new technology, there are still plenty of vehicles that can use this type of fuel.

- Passenger vehicles
- Shuttle buses
- Transit buses
- Forklifts

A sampling of the available vehicles can be found on the California Fuel Cell Partnership (CAFCP) website: <http://www.caftp.org/carsandbuses/makesandmodels>.



## Did you know...

- More than 80 hydrogen-powered buses operate globally, including 15 in California
- Fuel Cell vehicles take less than five minutes to refuel
- FCEVs emit zero-emissions and run on compressed hydrogen fed into a fuel cell "stack" that produces electricity to power the vehicle
- Learn about the Fuel Cell Electric Bus Roadmap for California here: <http://www.caftp.org/sites/files/FCEB-RoadMap-Infographic.pdf>.



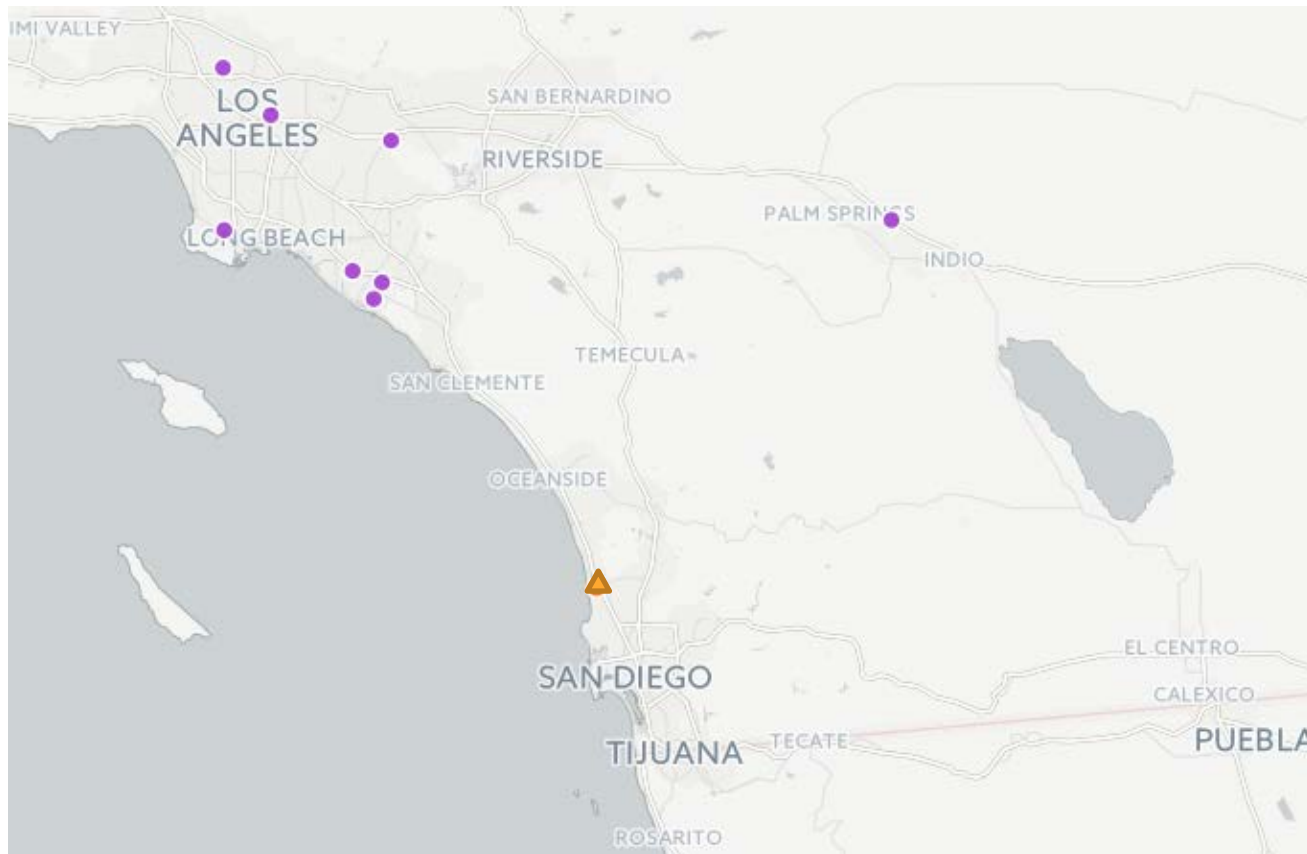
# Where can I learn more about hydrogen?

- Alternative Fuel Data Center: [www.afdc.energy.gov/fuels/hydrogen.html](http://www.afdc.energy.gov/fuels/hydrogen.html)
- California Fuel Cell Partnership: [www.fuelcellpartnership.org/](http://www.fuelcellpartnership.org/)
- DOE Fuel Cells Technology Office: [energy.gov/eere/fuelcells/fuel-cell-technologies-office](http://energy.gov/eere/fuelcells/fuel-cell-technologies-office)
- FuelCells.org: [www.fuelcells.org/](http://www.fuelcells.org/)
- Fuel Cell & Hydrogen Energy Association: [www.fchea.org/](http://www.fchea.org/)
- International Association for Hydrogen Energy: [www.iahe.org](http://www.iahe.org)
- Hydrogen Analysis Resource Center: [hydrogen.pnl.gov/](http://hydrogen.pnl.gov/)



# Fueling stations

Map of Existing and Future Public Hydrogen Fueling Stations

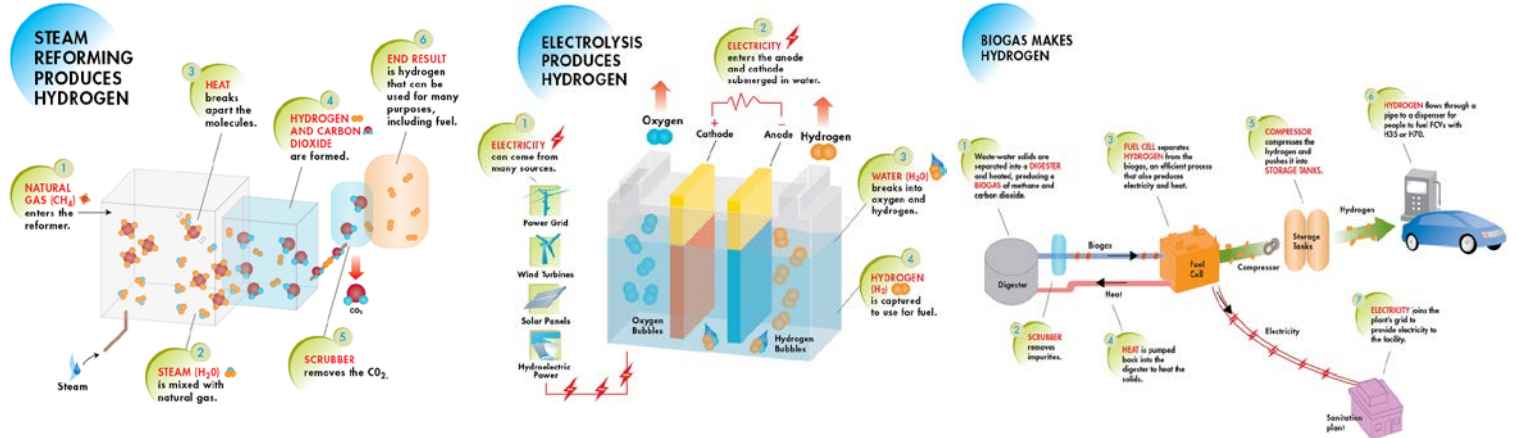


\*circles indicate existing fueling stations; triangles indicate planned stations  
(Map updated as of August 2015)

[http://www.afdc.energy.gov/fuels/hydrogen\\_locations.html](http://www.afdc.energy.gov/fuels/hydrogen_locations.html)



## How is Hydrogen Made?<sup>1</sup>

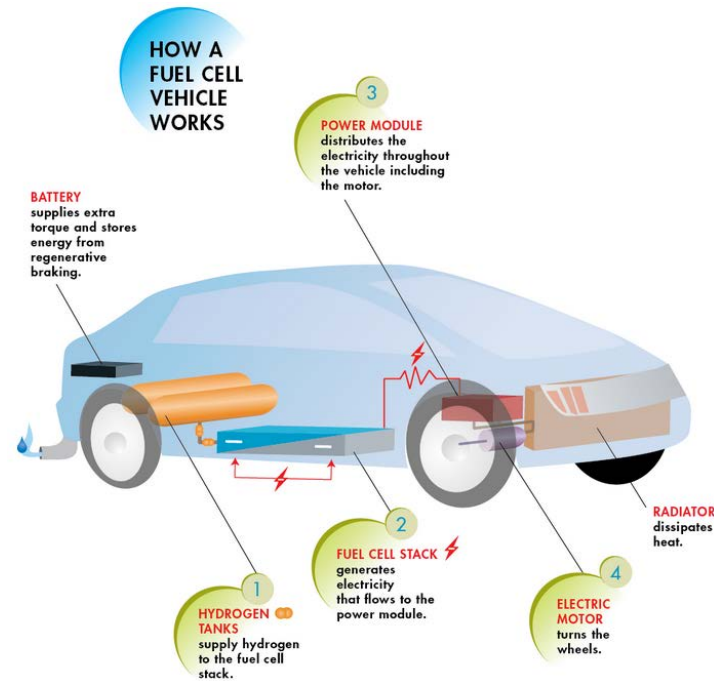


Steam reforming uses natural gas mixed with steam to produce hydrogen and carbon dioxide, of which the  $CO_2$  is scrubbed, and the end result is hydrogen.

In Electrolysis, electricity enters an anode and cathode underwater, which helps the water break into oxygen and hydrogen.

Wastewater solids are separated into a digester and heated, producing biogas. A fuel cell separates hydrogen from the biogas. A compressor compresses the hydrogen into storage tanks.

## How a Hydrogen Fuel Cell Vehicle Works<sup>2</sup>



### Makes and Models of Available Vehicles

- Honda FCX Clarity
- Mercedes-Benz B-Class Fuel Cell
- Toyota Mirai
- Hyundai Tucson Fuel Cell

Receive a rebate of up to **\$5,000** for the purchase or lease of a new hydrogen fuel cell electric vehicle from the **Clean Vehicle Rebate Project**. Learn more at <http://www.cleanvehiclerebate.org>.

<sup>1</sup> <http://cafcp.org/carsandbuses/howitworks>

<sup>2</sup> Ibid.



# Natural Gas

## FACTS ABOUT NATURAL GAS

## What is natural gas?

Natural gas used as a transportation fuel is used as compressed natural gas (CNG) or liquefied natural gas (LNG). Natural gas is a mixture of hydrocarbons, predominantly methane (CH<sub>4</sub>).

CNG is natural gas that has been compressed and stored as a gas in high pressure tanks up to 3,600 pounds per square inch (psi). LNG is natural gas that is cooled to a temperature below -260°F.

Nearly 87% of U.S. natural gas is domestically produced and it boasts 20-40% less carbon monoxide and 80% particulate matter than gasoline. According to the natural gas vehicle coalition, there are about 112,000 natural gas vehicles on U.S. roads.

*How many public natural gas stations are in the San Diego region?*

There are approximately eight public CNG stations in the San Diego region, with two more in development.

*How much does it cost to fuel my vehicle?*

CNG is generally less expensive than gasoline. Further, the price per gallon equivalent of CNG does not experience volatile fluctuations like gasoline or diesel.

24-month average*	
Gasoline	\$3.35
CNG	\$2.13
Savings	\$1.22

\*June 2013-June 2015

- On a well-to-wheels basis, natural gas vehicles (NGVs) produce 22% less greenhouse gas than comparable diesel vehicles and 29% less than gasoline vehicles
- Nearly one in five transit buses in the county run on CNG
- CNG passenger vehicles are eligible for California's HOV lane access decal, which allows single-occupant vehicles to drive in the HOV lanes

# What types of vehicles can use natural gas?



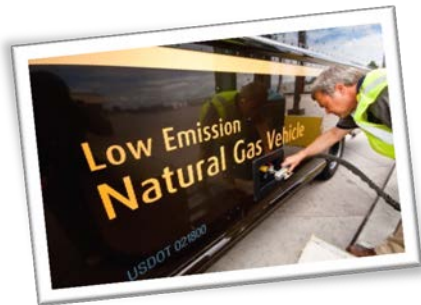
Several types of vehicles can use natural gas, as it is a very versatile fuel.

- Vans
- Pick-up trucks
- Refuse haulers
- Low-speed vehicles
- Med- and heavy-duty trucks
- Transit Buses
- Light-duty vehicles

## Types of natural gas vehicles

- **Dedicated:** These vehicles are designed to run only on natural gas.
- **Bi-fuel:** These vehicles have two separate fueling systems that enable them to run on either natural gas or gasoline.
- **Dual-fuel:** These vehicles are traditionally limited to heavy-duty applications, have fuel systems that run on natural gas, and use diesel fuel for ignition assistance.

**Renewable Natural Gas (RNG)**, also called biomethane, or sustainable natural gas, is produced from biogas (i.e., swamp gas, landfill gas, or digester gas). When processed to a higher purity standard, RNG can be used as an alternative fuel in NGVs.



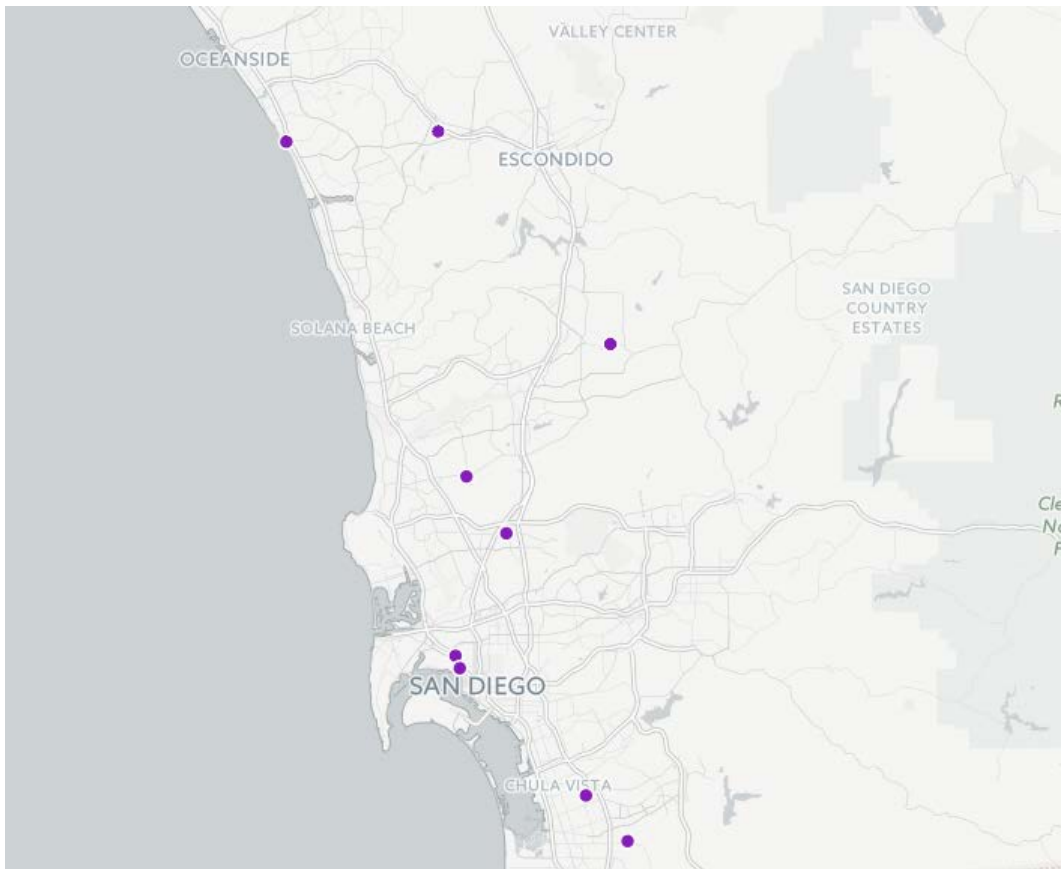
# Where can I learn more about natural gas?

- Alternative Fuel Data Center: [www.afdc.energy.gov/fuels/natural\\_gas.html](http://www.afdc.energy.gov/fuels/natural_gas.html)
- AFDC Renewable Natural Gas: [www.afdc.energy.gov/fuels/emerging\\_biogas.html](http://www.afdc.energy.gov/fuels/emerging_biogas.html)
- Natural Gas Vehicles for America: [www.ngvamerica.org/](http://www.ngvamerica.org/)
- CNG Now!: [www.cngnow.com/](http://www.cngnow.com/)
- California Natural Gas Vehicle Coalition: [www.cngvc.org/](http://www.cngvc.org/)
- Department of Energy: [energy.gov/natural-gas](http://energy.gov/natural-gas)
- American Gas Association: [www.aga.org](http://www.aga.org)

# Using natural gas

Natural gas vehicles can save users a lot of money in total cost of ownership. Not only are fuel costs low, but overall maintenance costs are similar to that of gasoline vehicles.

## Map of Public CNG Fueling Stations in San Diego Region



(Map updated as of August 2015)

[http://www.afdc.energy.gov/fuels/natural\\_gas\\_locations.html](http://www.afdc.energy.gov/fuels/natural_gas_locations.html)



## Savings in Fuel Costs

Typically, natural gas costs \$1 to \$2 less than diesel and gasoline, and is projected to remain this way into the future, as predicted by the U.S. Energy Information Administration. There are tools available to estimate your fuel savings when switching to a NGV. When using these tools, the following basic information is helpful to have on-hand:

- Average number of miles driven per year
- Average MPG of the fleet vehicle
- Number of vehicles to be switched to NGVs

The [Alternative Fuel Data Center's Vehicle Cost Calculator](http://www.afdc.energy.gov/calculator) shows the total cost of ownership and emissions for a large variety of makes and models of most vehicles, including alternative fuel vehicles. You can also create your own custom vehicle if you cannot find the model you want. The tool is: <http://www.afdc.energy.gov/calculator>.

[CNG Now!](http://www.cngnow.com) has a CNG calculator that determines your fuel savings at the pump when switching from gasoline vehicles to CNG. The tool is <http://www.cngnow.com/vehicles/calculator/pages/information.aspx>.

There are options for consumers to [refuel at home](#). Utilities such as SoCalGas offer NGV owners a home refueling appliance to be installed at home, which uses the customer's existing natural gas and electrical supply to refuel their NGV without having to go to a public station. Learn more at SoCalGas: <http://www.socalgas.com/innovation/natural-gas-vehicles/policy/home-fueling.shtml>.





# Propane Autogas

## FACTS ABOUT PROPANE AUTOGAS

## What is propane autogas?

Propane autogas is also known as liquefied petroleum gas (LPG).

While gaining popularity as an alternative fuel in the United States, propane autogas is the third most common transportation fuel in the world.

Nearly all U.S. propane autogas is produced domestically and over half of it is a byproduct of natural gas purification.

Propane autogas is a clean burning fossil fuel with lower greenhouse gas emissions than gasoline.

*How many public propane stations are in the San Diego region?*

There are 15 public propane autogas stations in the San Diego region.

*How much does it cost to fuel my vehicle?*

Generally, propane autogas is less expensive than gasoline.

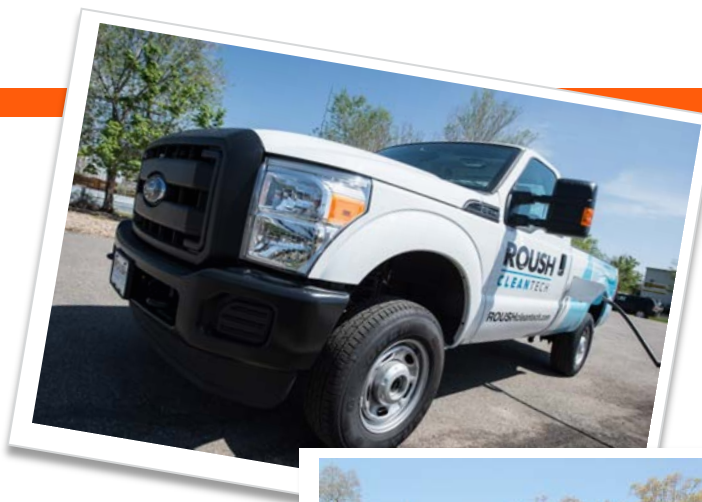
24-month average*	
Gasoline	\$3.35
LPG	\$2.86
Savings	\$0.49

\*June 2013-June 2015

- There are over 80,000 bus, taxi, and delivery services nationwide that use propane autogas in their fleets
- Propane autogas is the third most common transportation fuel in the world
- Propane autogas accounts for 2% of the nation's energy use
- There are more propane autogas fueling stations available in the U.S. than any other alternative fuel station (aside from electric vehicle charging stations)

# What kinds of vehicles use propane autogas?

- Forklifts
- Low-Speed Vehicles
- Buses
- School Buses
- Lawn equipment
- Trucks
- Shuttle Vans
- Delivery services



# Where can I learn more?

- Alternative Fuel Data Center: [www.afdc.energy.gov/fuels/propane.html](http://www.afdc.energy.gov/fuels/propane.html)
- National Propane Association: [www.npga.org](http://www.npga.org)
- Propane Education and Research Council: [www.propanecouncil.org](http://www.propanecouncil.org)
- Autogas USA: [www.autogasusa.org](http://www.autogasusa.org)
- Propane: [www.propane.com](http://www.propane.com)





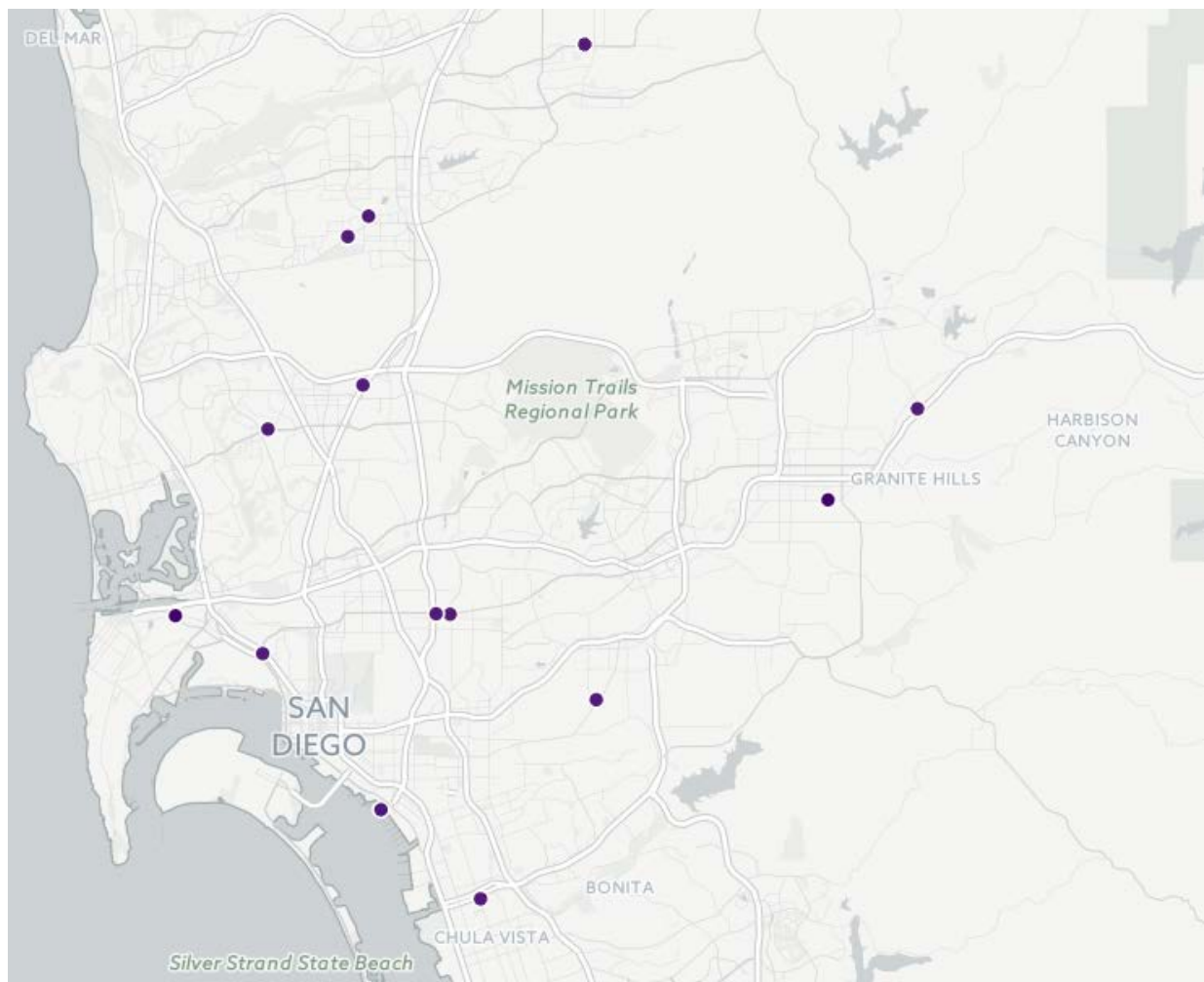
# Propane autogas vehicles

There are many benefits to driving an LPG vehicle.<sup>1</sup>

- Save up to 40% on fuel costs
- LPG vehicles emit 70% less smog
- Propane autogas is made in America
- Horsepower and torque of propane autogas is greater than or equal to its gasoline equivalent
- Ample number of public fueling stations

Currently, Roush CleanTech, CleanFuel USA, and Isuzu offer light-duty vehicles that run on LPG. Roush and CleanFuel are upfits for Ford, GM, and Freightliner vehicles.

## Map of Public LPG Fueling Station in San Diego Region



(Map up dated as of August 2015)

[http://www.afdc.energy.gov/fuels/propane\\_locations.html](http://www.afdc.energy.gov/fuels/propane_locations.html)

<sup>1</sup> <http://www.cleanfuelusa.com/vehicles.html>