

Cleaner Driving with Cleaner Fuel: Economic & Environmental Benefits of Ethanol Blends

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy



Metropolitan Energy Center and Clean Cities Program Overview

January 26, 2021

Tami Alexander, Program Coordinator

Metropolitan Energy Center
Central Kansas Clean Cities

Metropolitan Energy Center

Our Mission: To create resource efficiency, environmental health and economic vitality in mid-America



Metropolitan
ENERGY CENTER

Kansas City area nonprofit since 1983

- Over 35 years of energy efficiency

Energy Efficiency in the Built Environment

- Small Commercial Buildings
- Multi-Unit Dwellings
- *Project Living Proof* demonstration home

Reducing Petroleum Use in Transportation

- Kansas City Regional Clean Cities - 1998
- Central Kansas Clean Cities – 2013

What is Clean Cities?

Clean Cities

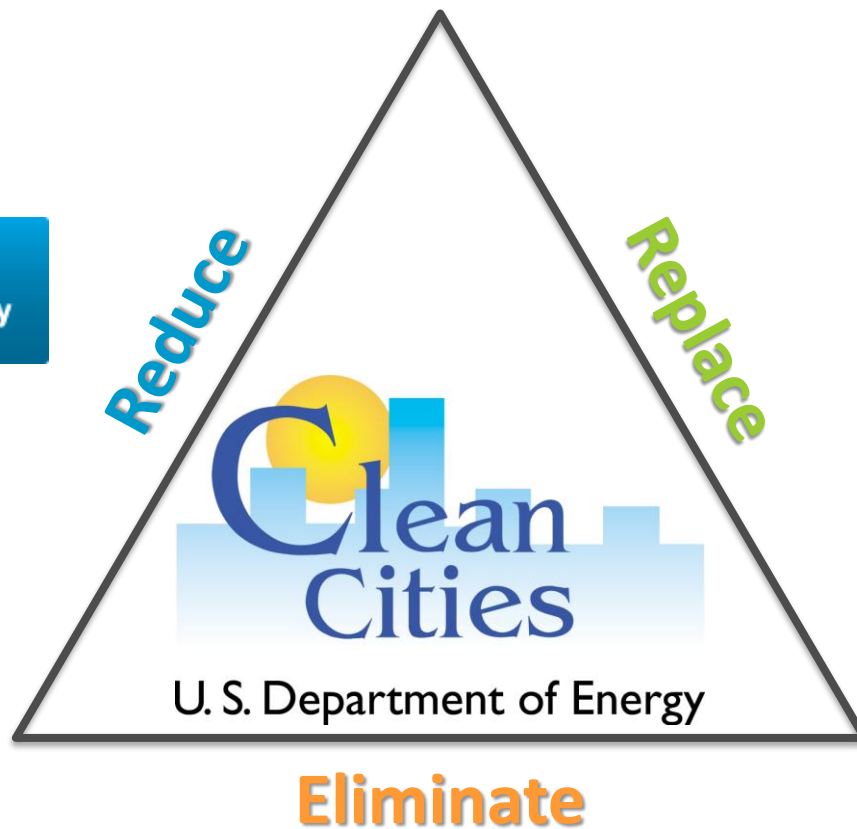
advances the energy,
economic, and
environmental security of
the United States by
supporting *local* actions
to cut petroleum use in
transportation.

Reduced petroleum consumption
for transportation

Reduced greenhouse gas
(GHG) emissions

Reduced dependence
on imported petroleum

Portfolio



Complementary Framework



Clean Cities coalitions are locally based with the ability to tap national resources.

Map Date: 1/6/20

- 
- Clean Cities
U.S. Department of Energy

Local Partnerships: Build Relationships & Strengthen Markets



- Connecting fleets with fuel providers and industry partners
- Offering training and information
- Supplying access to technical assistance
- Identifying funding
- Providing public recognition
- Collecting data and tracking progress



What is ethanol?

Why use ethanol?

Who can use ethanol?

Where can I find ethanol blends?

Ethanol Facts

- Renewable fuel that can be made from various plant materials such as grains, trees, grasses, agricultural residue, algae, and other biological materials. In the U.S., most ethanol is made from corn.
- Ethanol use is widespread and more than 98% of gasoline in the U.S. contains some ethanol, most commonly E10 (10% ethanol, 90% gasoline) which is 'regular' gas.
- Ethanol is also available in higher blends from E15 up to E85
- First used to power engines in the early 19th century
- Henry Ford powered his 1908 Model T on ethanol
- First used to increase octane in 1920s
- Modern ethanol production began in 1970s to reduce pollutants in gasoline and dependence on foreign oil. Production methods have greatly improved in the past half-century.
- Reduces emissions by more than 34% vs. petroleum gasoline

Why use Ethanol?

Lower emissions than petroleum gas

Reduces dependence on imported fuel

Little to no initial costs for fleets

Decreased fuel costs

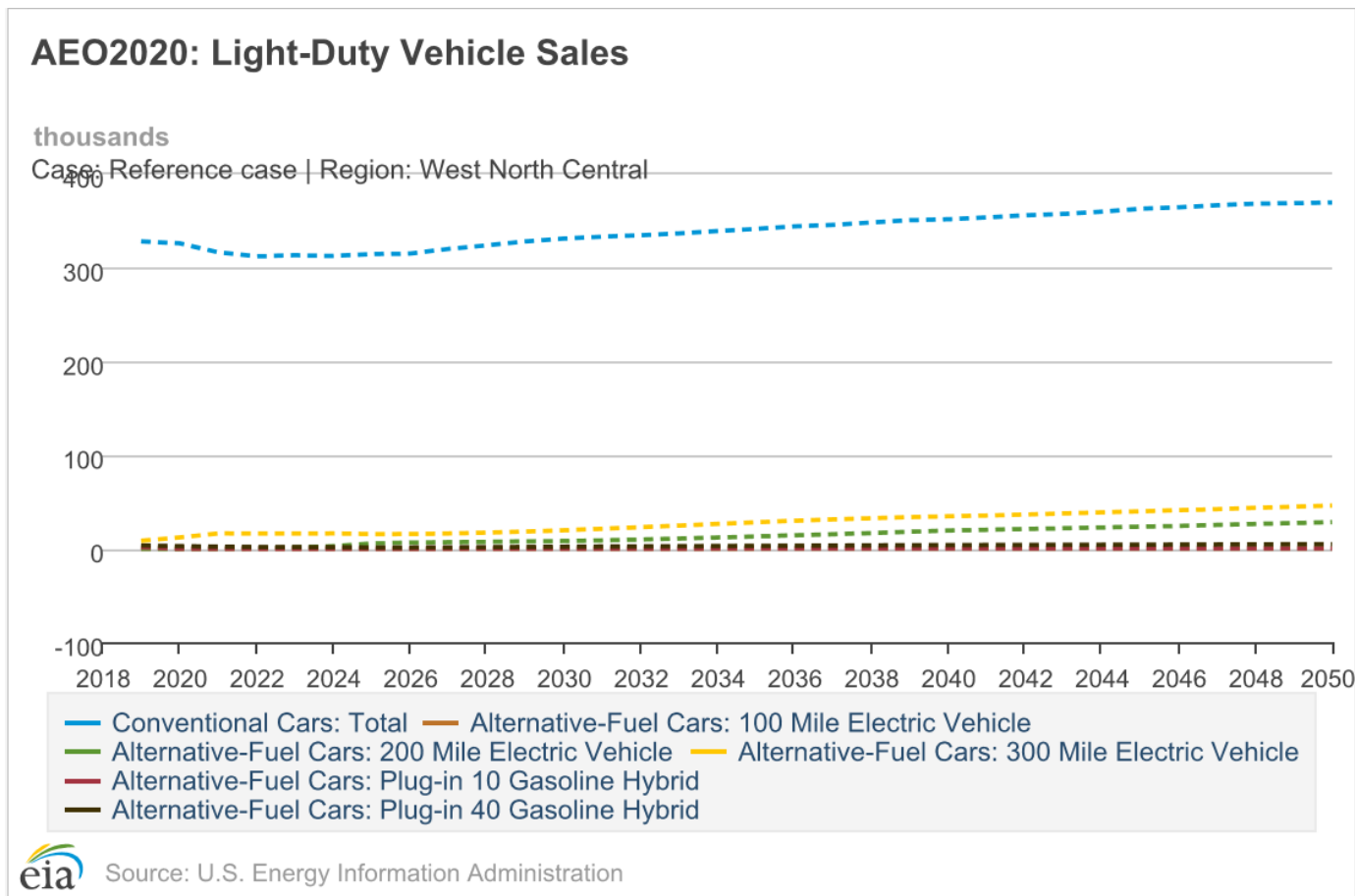
Higher octane is needed for modern, more efficient engines

Reduces harmful toxins in emissions

Works with existing vehicles and infrastructure

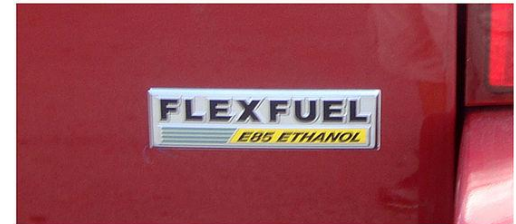
Why use Ethanol?

- Over 90% of light-duty vehicles on the road today use gasoline
- Less than 2% of vehicles in the US are electric
- Offsets in emissions now improves future climate outlooks
- Our region is predicted to have less than 22% electric vehicles by 2050



Who can use Ethanol?

- All gasoline engines can use E10
- Conventional gasoline vehicles MY 2001 and newer can use E15
- Flex-fuel vehicles can use ethanol blends up to E85



Where can I find Ethanol Blends?

Alternative Fuels Data Center at afdc.energy.gov

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

EERE Home | Programs & Offices | Consumer Information

Alternative Fuels Data Center

Search the AFDC

SEARCH

FUELS & VEHICLES

CONSERVE FUEL

LOCATE STATIONS

LAWS & INCENTIVES

Maps & Data

Case Studies

Publications

Tools

About

Home

[EERE](#) » [AFDC](#) » Fuels & Vehicles

[Printable Version](#)

Alternative Fuels and Advanced Vehicles

More than a dozen [alternative fuels](#) are in production or under development for use in [alternative fuel vehicles](#) and [advanced technology vehicles](#). Government and private-sector vehicle fleets are the primary users for most of these fuels and vehicles, but individual consumers are increasingly interested in them. Using alternative fuels and advanced vehicles instead of conventional fuels and vehicles helps the United States conserve fuel and lower vehicle emissions.



Biodiesel ▶

Biodiesel is a renewable fuel that can be manufactured from vegetable oils, animal fats, or recycled cooking grease for use in diesel vehicles.

Diesel Vehicles ▶



Electricity ▶

Electricity can be used to power plug-in electric vehicles, which are increasingly available. Hybrids use electricity to boost efficiency.

Hybrid & Plug-In Vehicles ▶



Ethanol ▶

Ethanol is a widely used renewable fuel made from corn and other plant materials. It is blended with gasoline for use in vehicles.

Flexible Fuel Vehicles ▶



Hydrogen ▶

Hydrogen is a potentially emissions-free alternative fuel that can be produced from domestic resources for use in fuel cell vehicles.

Fuel Cell Vehicles ▶



Natural Gas ▶

Natural gas is a domestically abundant gaseous fuel that can have significant fuel cost advantages over gasoline and diesel fuel.

Natural Gas Vehicles ▶



Propane ▶

Propane is a readily available gaseous fuel that has been widely used in vehicles throughout the world for decades.

Propane Vehicles ▶

Emerging Fuels ▶

Several emerging fuels are considered alternative fuels under the [Energy Policy Act](#) and may be under development or already developed and available in the United States.

Contact Information & Questions

Tami Alexander

Program Coordinator
Metropolitan Energy Center
Central Kansas Clean Cities
tami@metroenergy.org

Brandt Hertenstein

Program Coordinator
Metropolitan Energy Center
Kansas City Regional Clean Cities
brandt@metroenergy.org

www.metroenergy.org

cleancities.energy.gov



URBAN **AIR** INITIATIVE

The Urban Air Initiative (UAI) is a non-profit organization dedicated to improving air quality and protecting public health by reducing vehicle emissions. We are focused on increasing the use of clean ethanol blends to reduce the need for harmful aromatic compounds in gasoline.



Choosing a Cleaner Fuel



Ethanol reduces toxic tailpipe emissions and improves air quality.



Save significantly at the pump with E15 and higher ethanol blends.



Ethanol blends will not damage your engine.

Choosing a Cleaner Fuel



Solutions for Today- We Can't Wait for EVs

2020: When electric vehicle excitement kicked into high gear

CNN.com

**2020 Has Proven that Electric Vehicles
Are the Future of Transportation**

Engadget.com

**Electric cars can save billions in
climate change, air pollution damage**

The Driven.com

Solutions for Today- We Can't Wait for EVs



On the road in the United States as of 2019:

1.4 million plug in electric vehicles EVs *

280 million internal combustion engines

* [How many electric cars are on the road in the United States? \(usafacts.org\)](https://usafacts.org/transportation/electric-vehicles)

Why Ethanol is a Solution



Why Ethanol is a Solution



These fuels contain 10% ethanol unless otherwise stated.

Two Octane Sources Now Available

1. Aromatics
2. Ethanol

Why Ethanol is a Solution

Ethanol = Cleaner Fuel + Cleaner Air

Each year 10% ethanol replaces
8 billion gallons
of toxic aromatics
from our gasoline supply.

That's the most toxic stuff
coming out of your tailpipe!



With even more **ethanol** in our gasoline,
the world would breathe easier.

Why Ethanol is a Solution

New Studies Show Ethanol Reduces Emissions And Improves Air Quality

April 11, 2018: Ethanol blends reduce toxic tailpipe emissions by up to 50%, significantly improving air quality and protecting public health according to two new studies. The separate studies were conducted by the [North Carolina State University \(NCSU\)](#) and the [University of California Riverside](#)

New Study: Ethanol Reduces Emissions Connected To Heart Disease And Asthma

A new study finds that ethanol blends reduce particulate matter (PM) coming out of the tailpipe, which in turn reduces overall toxic emissions. The study was conducted by the University of California Riverside and the University of Wisconsin, Madison and commissioned by the Urban Air Initiative. It was [published in Elsevier's journal 'Science of the Total Environment'](#).

* [Comparison of real-world vehicle fuel use and tailpipe emissions for gasoline-ethanol fuel blends](#)

* [Emissions from a flex fuel DDI vehicle operating on ethanol fuels](#)

Why Ethanol is a Solution

Report: Greenhouse Gas Emissions From Corn Ethanol 46% Lower Than Gasoline

“In light of the United States’ renewed effort to achieve a net zero carbon economy, our research team believes this critical review is a timely contribution to establishing an accurate, common understanding of the greenhouse gas profile for corn ethanol in comparison to gasoline refined from crude oil. Our findings indicated that displacement of gasoline with ethanol produced from biofuels yields greater greenhouse gas benefits than are generally recognized and that prior analyses of the payback period for conversion of land to corn production should be updated. We believe the results of our analysis are relevant to continued development and refinement of low carbon fuel standard programs in the US,” said MacIntosh.

* [Environmental Research Letters: Carbon Intensity of Corn Ethanol in the United States](#)

Why Ethanol is a Solution

Transitioning to higher ethanol blends like E15 would be the equivalent of removing **3.85 million** cars from the road each year.



* [GHG Benefits of 15% Ethanol \(E15\) Use in the United States](#)

Why Ethanol is a Solution

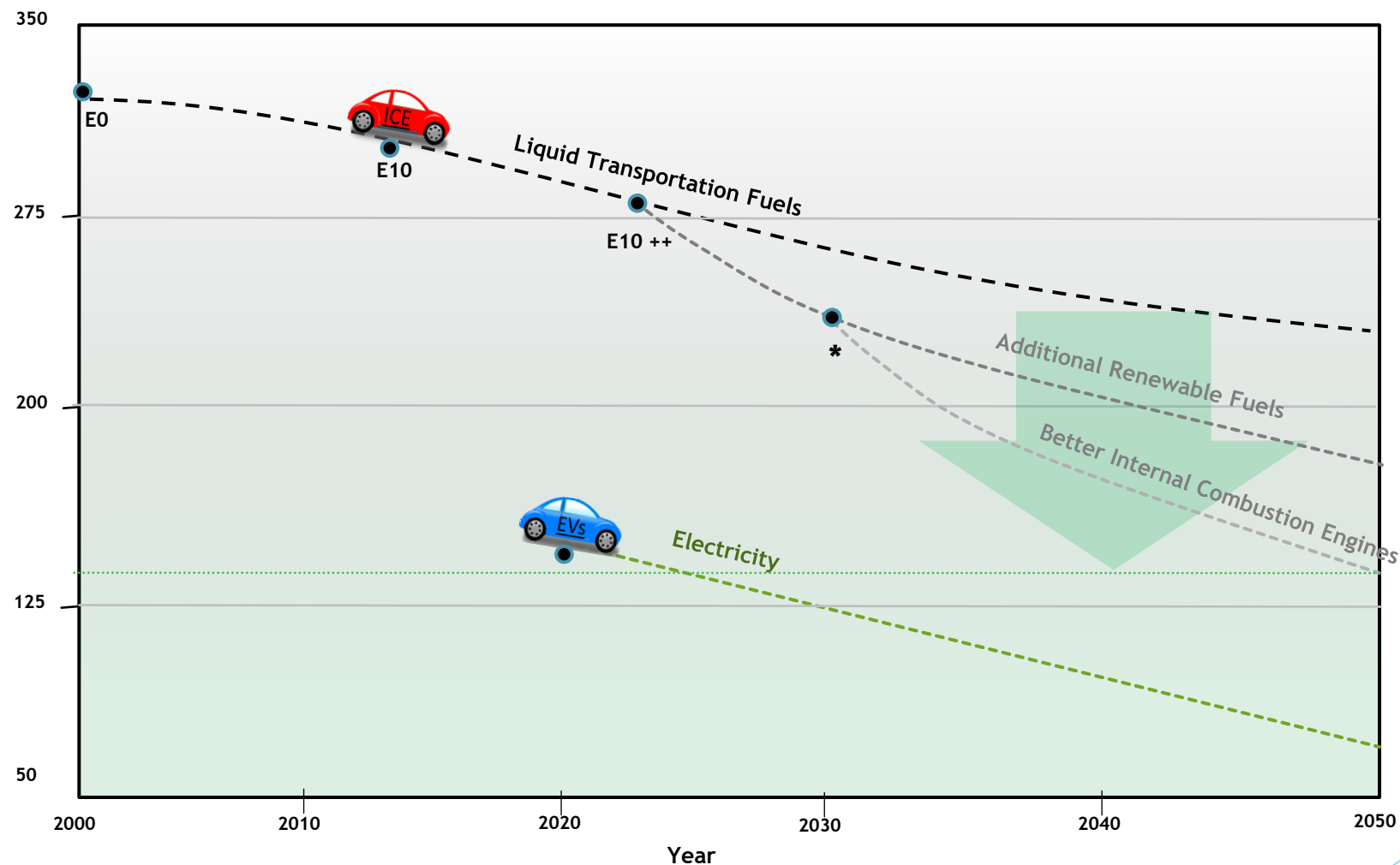


Why Ethanol is a Solution



Why Ethanol is a Solution

Grams of CO2 Emitted per Mile



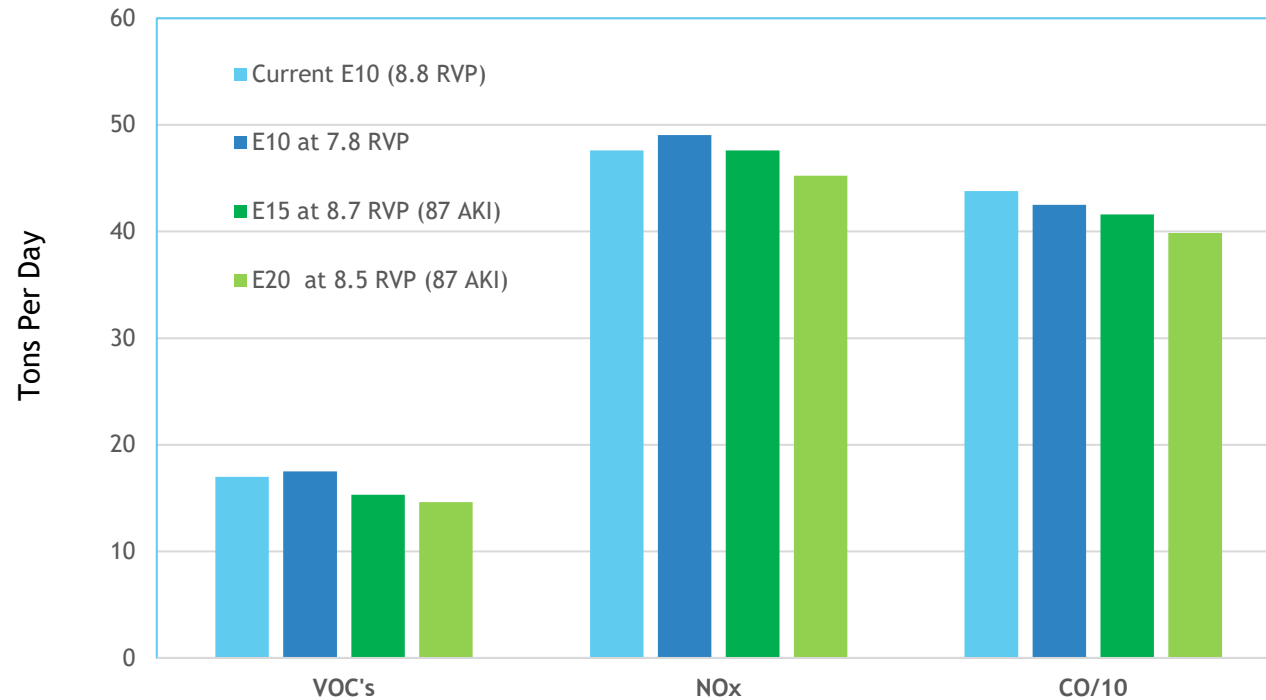
*Reduced grams/CO2/mile from internal combustions engines achieved with higher efficiency ICE vehicles using higher octane renewable fuel blends

* [Volvo Carbon footprint report](#)

* [MIT News: What's the best way to cut vehicle GHG emissions?](#)

Why Ethanol is a Solution

On Road Vehicle Tail Pipe Emissions in the Denver Metro Area



* [EPAct/V2/E-89 Tier 2 Gasoline Fuel Effects Study](#)

Additional Benefits



ETHANOL BLENDS

SAVE MONEY

Fuel for thought

Ethanol blends cost less than conventional fuels. Save significantly at the pump every time you choose E15 or a higher ethanol blend. More ethanol means more savings. ***Make the jump today.***

Additional Benefits



ETHANOL BLENDS ARE
**ENGINE
SAFE**

**Fuel for
thought**

E15 and other mid-level ethanol blends run great in all vehicles and there's no mileage loss. Mid-level ethanol blends help clean your engine and improve performance. *It's time to make the jump.*

* [Comparison of real-world vehicle fuel use and tailpipe emissions for gasoline-ethanol fuel blends](#)

Making the Switch

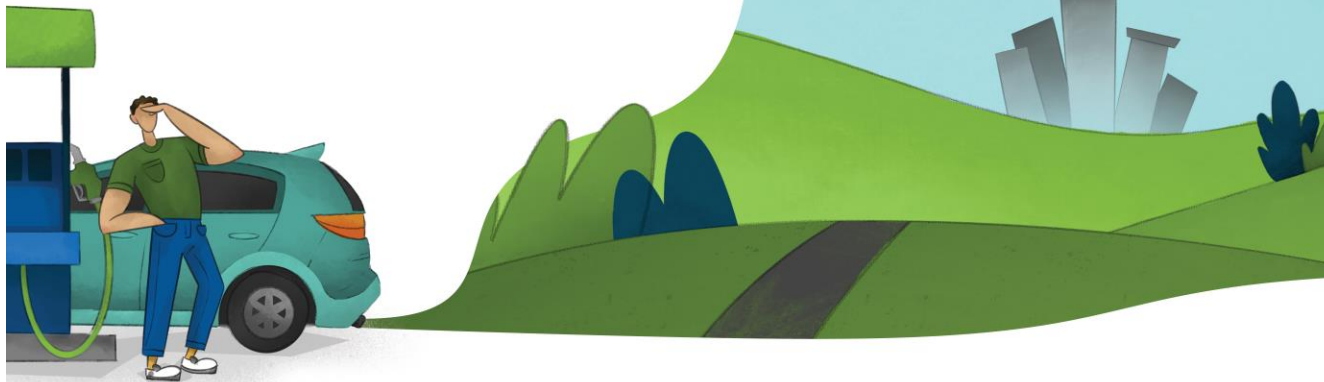


You can switch back and fourth between regular gasoline and mid-level ethanol blends without issue. The ethanol is diluted by whatever fuel is in your tank previously.



LET'S CLEAR THE AIR

ClearTheAir.co



Find E15 and E30 near you.

Find E15 and E30 near you.

www.ClearTheAir.co

URBAN **AIR** INITIATIVE

Questions?

Kim@UrbanAirInitiative.com





JumpStart

Impacting Retail
Fuel Choice

Phil Near

President, JUMP START STORES, INC.

HOW CAN WE MAKE AN IMPACT

- 2% of the vehicles on the road today are EV (a majority of which are in California)
- To make an immediate impact we must address our current fleet rather than wait for the average US driver to convert to EV
- Increasing the use of midlevel blends amongst the 280 million combustion engines on the roadway makes an immediate impact
- Thinking BIG: Utilizing a 30% blend ratio could reduce emissions over 50%





INFRASTRUCTURE UPGRADE COSTS
ARE MINIMAL FOR RETAILERS.
REQUIRE LITTLE TIME TO IMPLEMENT



LOCATION AVAILABILITY
INCREASES AS RETAILERS ADOPT
HIGHER BLENDS



COMPETITIVELY PRICED FUEL
ENCOURAGES CONSUMER CHANGE



ETHANOL AT THE RETAIL LEVEL



FUEL MARKETING & EDUCATION

CASE STUDY: Metro Couriers

- Switched their non-Flex Fuel vehicles to Super Premium in 2018
- The change in fuel required no infrastructure changes to their current fleet
- Currently saving \$5,000 a month in fuel cost
- Reporting enhanced performance and no loss of mpg





LOCAL SUPPORT: Lee Olson Racing

- Vehicle Converted to run on E85
- Speeds from 0-60 in under 3 seconds
- 1/4 mile race time is under 10 seconds
- 1400 Horse Power
- 24 MPG average



ETHANOL'S FUTURE IN FUEL

We can....

- Save drivers (and corporate fleets) thousands of dollars a year in fuel
- Impact air quality for our families and the community
- Help reduce foreign oil dependence
- Help our local economy
- Create jobs in our state