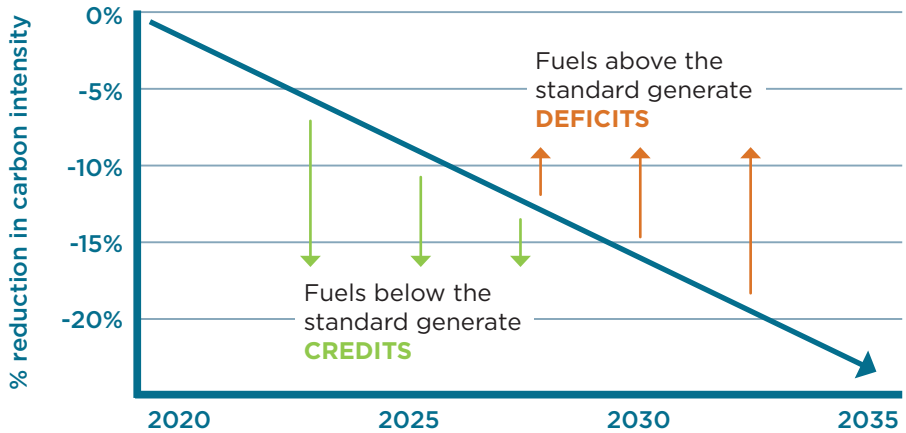
What is a Clean Transportation Standard?

An Introduction by the Clean Transportation Standard Network Action Team

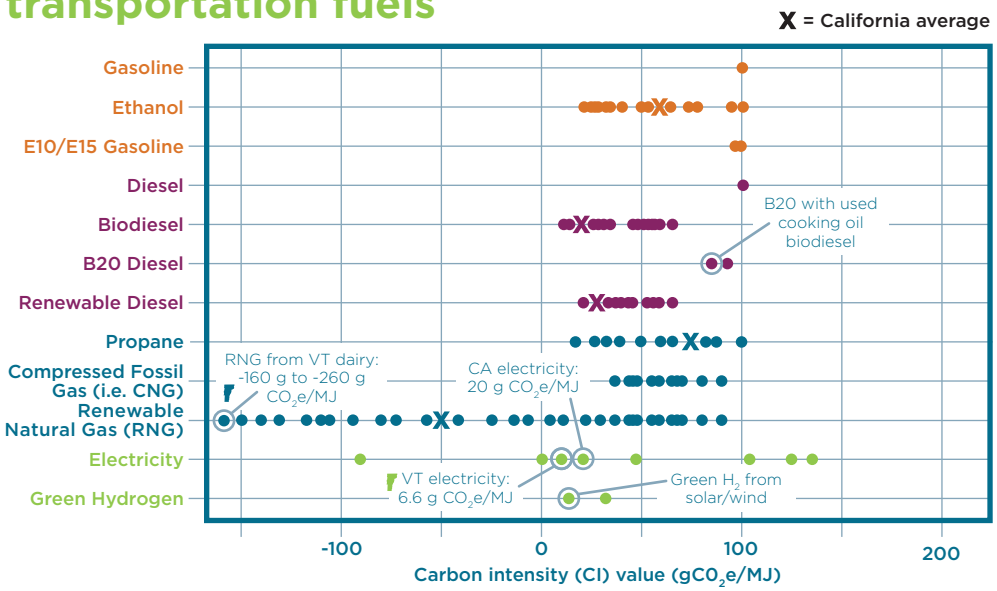
To help Vermont meet the requirements of the Global Warming Solutions Act, a proven approach worthy of consideration is a Clean Transportation Standard: a market-based program that lowers carbon and other emissions in the transportation sector. California enacted a clean transportation standard in 2011, Oregon in 2015, and Washington State followed suit in 2021. The policy assesses all fuels on a carbon intensity (CI) scale that measures their life-cycle emissions. Fuels that pollute more than the CI standard will generate deficits, and fuels cleaner than the standard will generate credits. The credits generated by low CI fuels will make it easier for Vermont businesses to move to electric or clean alternatives. Vermont's dependance on liquid petroleum fuels will not end overnight. A Clean Transportation Standard can immediately reduce this dependence in our existing vehicles while driving innovations and adoption of electric vehicles. Petroleum importers are required to meet these tightening requirements.

Declining carbon intensity curve



Source: California's Low Carbon Fuel Standard Dashboard: https://ww2.arb.ca.gov/resources/documents/lcfs-data-dashboard

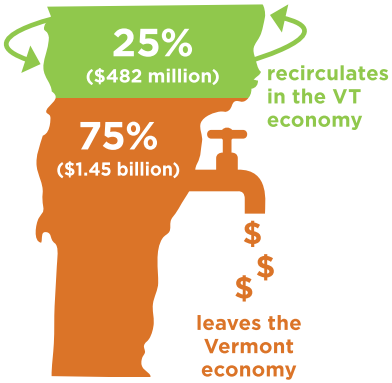
Carbon intensity values of different transportation fuels



Source: Oregon Clean Fuels Program, Department of Environmental Quality: Fuel Pathways – Carbon Intensity (CI) Values. The carbon intensity values for the program are expressed in grams of carbon dioxide equivalent per megajoule of energy (gCO2e/MJ). VT electricity carbon intensity figure is added by EAN and based on 2019 data from ANR of 15 lbs/MMBTU or 52 lbs/MWh. California Low Carbon Fuel Standard average CIs based on LCFS Data Dashboard updated 4/29/22.

A switch to electric vehicles, heat pumps, and/or advanced biofuel energy often allows consumers to save money year after year with lower-cost, price stable renewable alternatives, while helping to create good, local jobs. The efficient and renewable alternatives keep a higher share of our energy dollars recirculating in Vermont, helping employ our neighbors and improving our state economy.

Avg. annual fossil fuel spending in VT, 2009–2018



Source: Vermont Agency of Commerce and Community Development, 2022.

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What does Vermont's transportation system look like today?

Transportation Facts

Petroleum-based fuels accounted for about **95% of the total energy** used by the Vermont transportation sector in 2019, and **40% of VT GHGs.**

In 2020, Vermont had **525,000 gasoline vehicles** and **4,400 EVs** (both AEV and PHEV).

Diesel consumption

- 80 million gallons inclusive of off-road
- 2 million gallons of biodiesel

Electricity consumption

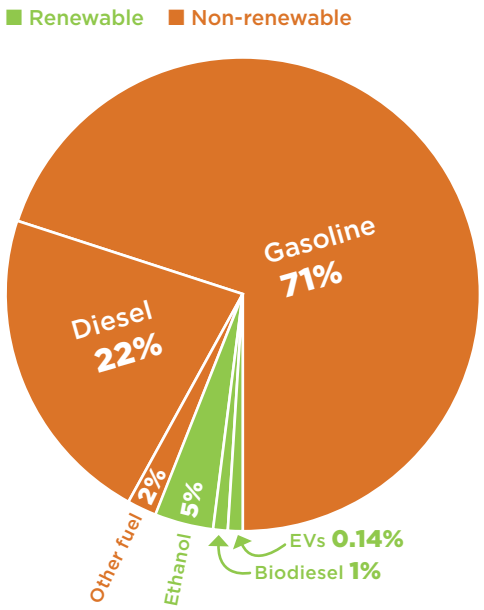
- >1 million Gasoline Gallon Equivalents of electricity

Gasoline consumption:

- 270 million gallons per year
- 30 million gallons of ethanol

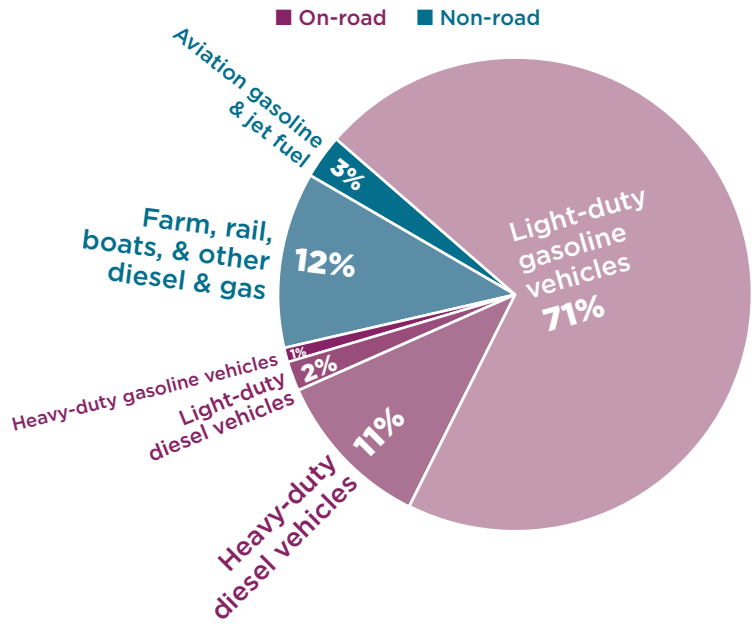
Source: Energy Information Administration,

Energy sources for transportation in Vermont



Sources: Energy Information Administration, Efficiency Vermont, Vermont Department of Public Service, Vermont Agency of Natural Resources, and Energy Action Network.

VT GHG emissions from transportation by type and fuel, 2017



Source: Vermont Agency of Natural Resources, Vermont Greenhouse Gas Emissions Inventory and Forecast (1990-2017), 2021.

Other states, including California and Oregon, already conduct lifecycle emissions analysis related to transportation energy use, building on the GREET model developed by Argonne National Labs.[1] GHG emissions from a broad fuel type can vary depending on unique characteristics. **In particular, different biofuels have very different lifecycle emissions factors (or carbon intensities) based on how each fuel is sourced and produced, so it is important to distinguish between them rather than lump them together.**

Lifecycle analyses of biofuels can and should also account for emissions related to both direct and indirect land use change, as Oregon, California, and Washington do for assessing compliance with their Clean Fuels policies.

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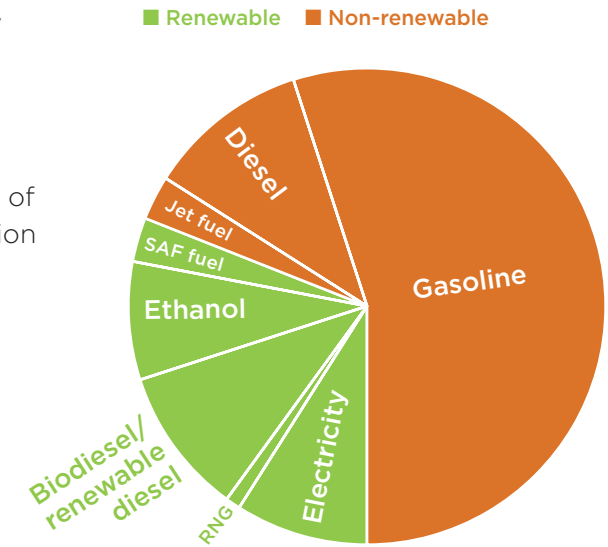
1. Argonne National Laboratory's (GREET): The Greenhouse gases, Regulated Emissions, and Energy use in Technologies Model: https://greet.es.anl.gov/

What could Vermont look like in 2030 with a Clean Transportation Standard in place?

Clean Transportation Standard policies in other parts of the U.S. have demonstrated that the fuel mix can be decarbonized and diversified quickly by providing policy certainty and meaningful incentives. Vermont can reduce pollution and distribute economic benefits more equitably.

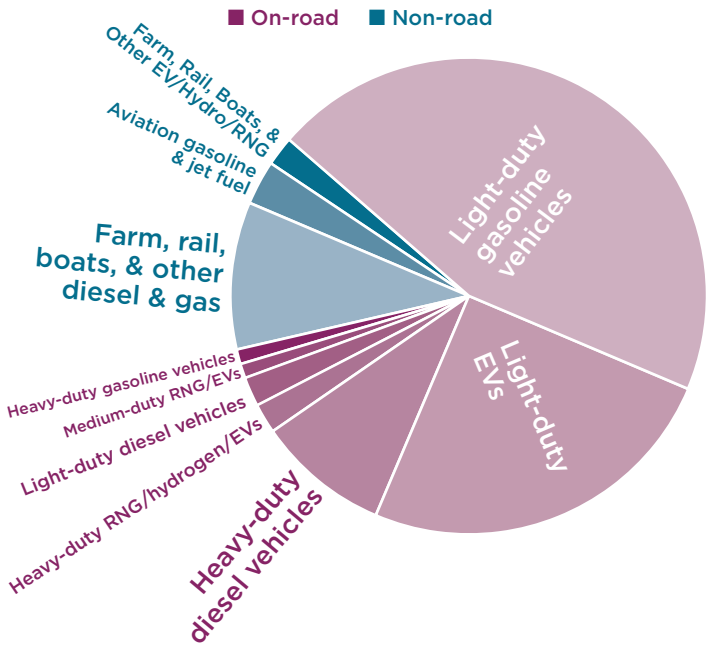
In addition to increasing the number of electric vehicles, a clean transportation standard allows farmers and their commodity suppliers to provide renewable fuels to compete directly with fossil fuels. Such renewable fuels reduce greenhouse gases and substantially reduce air pollution compared to diesel and gasoline, creating real health benefits.[1] Building markets for biofuels can decrease the cost of food by adding demands for both proteins and oils and bolsters innovation in the bioeconomy.[2]

Energy sources for VT transportation in 2030, with CTS potential



These estimates based on California's Low Carbon Fuel Standard quarterly data and Vermont's Fuel Pool in 2019.

VT GHG emissions from transportation with CTS potential



Existing liquid fuel and gas infrastructure, equipment, and vehicles can be utilized with biofuels to displace fossil carbon and reduce harmful pollutants in sectors of our economy that will be difficult to reach with electrification; for example freight transportation, heavy-duty construction vehicles, and some farm vehicles. Any strategy that reduces carbon intensity wins in a clean fuel standard. Biofuels provide the additional benefit of transforming wastes and co-products of food production into carbon reducing and cleaner emitting fuels — today. Low-emission fuel options that can be deployed safely and immediately offer tangible results for our planet, our state, our rural economies, and public health.

1. Dept. of Energy Biofuels & Greenhouse Gas Emissions: Myths versus Facts: https://www.energy.gov/sites/prod/files/edg/media/BiofuelsMythVFact.pdf
2. United Nations: Long-Term Drivers of Food Prices: https://documents1.worldbank.org/curated/en/832971468150565490/pdf/WPS6455.pdf

Regional Resources

California's Low Carbon Fuel Standard Program: This policy is designed to decrease the carbon intensity of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve air quality benefits. arb.ca.gov/fuels/lcfs/lcfs.htm

Oregon's Clean Fuel's Program: Oregon's Department of Environmental Quality (DEQ) gradually lowers the amount of carbon intensity in fuel allowed each year to meet the annual reduction goal. oregon.gov/deq/ghgp/cfp/Pages/default.aspx

New York's Clean Fuel Coalition: Formed to demonstrate the broad and diverse support for New York State to create a clean fuel standard to reduce greenhouse gas (GHG) emissions from the transportation sector. cleanfuelsny.org

A Clean Fuels Policy for the Midwest: A white paper form the Midwestern Clean Fuels Policy Initiative. betterenergy.org/wp-content/uploads/2020/01/Clean-Fuels-Policy-for-the-Midwest.pdf

Canadian's Clean Fuel Regulations. Under this policy, the gasoline and diesel Canadians use every day will become progressively cleaner over time and affordable alternatives will be increasingly available to consumers. canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-regulations.html

A Colorado Clean Fuel Policy Analysis: A Colorado-specific life cycle assessment model to support evaluation of low-carbon transportation fuels and policy. iopscience.iop.org/article/10.1088/2634-4505/ac3f2a/pdf

Low Carbon Fuels Coalition: a technology neutral trade association with a proven track record of supporting and expanding clean fuel standards. lcfcoalition.com

Further Analysis

California LCFS Status Review (2018 Update): This review series provides updates on LCFS compliance and markets. its.ucdavis.edu/research/californias-low-carbon-fuel-standard

Oregon Clean Fuels Program Status Review: As part of the state's overall strategy to reduce greenhouse gas (GHG) emissions, Oregon's Clean Fuels Program (CFP) aims to reduce transportation sector emissions by incentivizing innovation, technological development, and deployment of low-emission alternative fuels and vehicles. escholarship.org/uc/item/0ct4m7gs

Deep Data Analysis of the LCFS. This application is designed for users to conveniently access, visualize, and interact with public data on low carbon fuel standards both over time and across jurisdictions. asmith.ucdavis.edu/data/LCFS

Adoption of Low-Carbon Fuels Reduces Race/Ethnicity Disparities in Air Pollution Exposure in California: An environmental justice (EJ) analysis shows that adoption of low-carbon energy sources in the year 2050 reduces the race/ethnicity disparity in air pollution exposure in California by as much as 20% for PM2.5 mass and by as much as 40% for PM0.1 mass. itspubs.ucdavis.edu/publication_detail.php?id=3664

Driving California's Transportation Emissions to Zero – UC Davis' Institutes of Transportation Studies Report on Carbon Neutrality in CA Transportation: The purpose of this report is to provide a research-driven analysis of options that can put California on a pathway to achieve carbon-neutral transportation by 2045. doi.org/10.7922/G2MC8X9X

Forbes blog written by Dan Sperling and Colin Murphy; **"How (Almost) Everyone Came to Love the LCFS".** This discusses the history of the LCFS and the political coalition that has emerged to defend it. forbes.com/sites/danielsperling/2018/10/17/how-almost-everyone-came-to-love-low-carbon-fuels-in-california/?sh=66d2289e5e84

Join the Vermont Conversation

Required Climate Action: Exploring a Clean Transportation Standard for Vermont: Introductory talk for Vermont policy makers. youtube.com/watch?v=_KXCgdeg6ZE

Building A Resilient Path to Vermont's Low Carbon Future. Another useful talk for Vermont policy makers considering a Clean Transportation Standard. youtube.com/watch?v=bp4rtnOfNsU

Clean Heat Standard in Vermont. The Clean Heat Standard would require fossil fuel corporations and utilities that sell heating fuels in Vermont to reduce their climate pollution over time, in line with Global Warming Solutions Act requirements. eanvt.org/events-and-initiatives/clean-heatstandard

For more information, please contact the
Clean Transportation Standard Network Action Team:
Ryan Lamberg: rlamberg@tiedbranch.com or
Peggy O'Neill-Vivanco: Peggy.ONeill-Vivanco@uvm.edu