Clean Fuels Forecast Methodology – 2024 Forecast

This document outlines the methodology used to construct the Clean Fuels forecast for the 2024 compliance year. Oregon Revised Statutes Chapter 468A, Section 272 authorizes the Office of Economic Analysis (OEA), with substantial assistance from the Department of Environmental Quality, to assess the availability of fossil and alternative fuels to Oregon. In particular, the forecast is to determine whether fuel supply will be sufficient to generate the necessary number of carbon reduction credits from alternative fuels (ethanol, electricity, and diesel substitutes - including biodiesel, renewable diesel, natural gas, and propane) to meet the scheduled applicable low carbon fuel standards for the compliance period. The forecast report is required to include an assessment of banked deficits and credits at the beginning of the compliance period. The forecast is to be published no later than 90 days prior to the onset of the compliance period.

The document adheres to the following outline:

A. Data Sources
B. Consumption forecasts
    a. Gasoline and diesel
    b. Alternative fuels
C. Supply forecasts
D. Estimation of Deficits and Credits
    a. Fossil Fuels
    b. Alternative Fuels

A. Data Sources

The forecast uses available public and program data to develop the estimates of low-carbon fuels available to Oregon and estimated consumption of fossil and alternative fuels in Oregon. The sources of this data include:

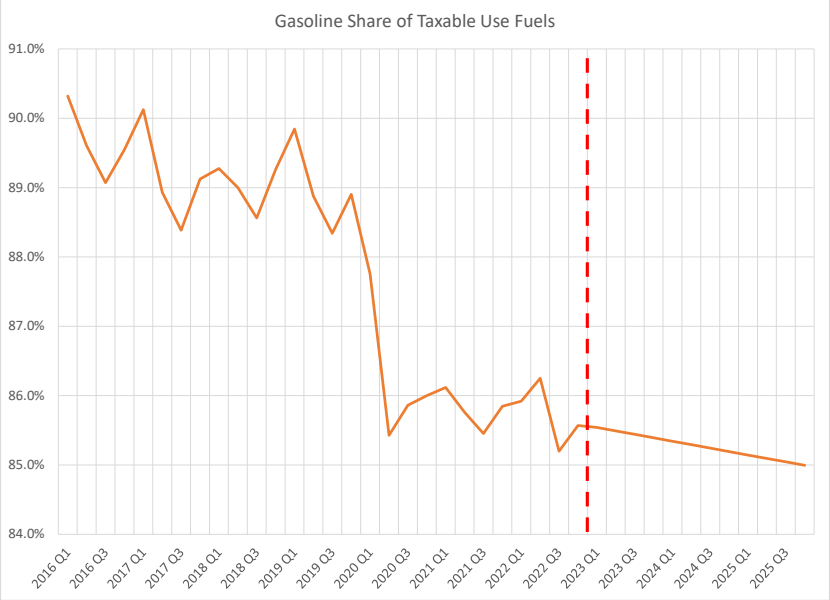
- Oregon Clean Fuels Program (CFP) Online System[1]
- Fuel Pathway Codes (carbon intensity values) approved in Oregon and California
- Oregon Department of Transportation's (ODOT) Revenue Model
- Oregon DMV vehicle registration data
- US Energy Information Administration, including the Annual Energy Outlook and biofuel facility data.
- The US Environmental Protection Agency
- Trade associations (Renewable Fuels Association and the National Biodiesel Board) on their members' production capacity

B. Reported volume forecasts

[1] https://www.oregon.gov/deq/ghgp/cfp/Pages/Quarterly-Data-Summaries.aspx

Gasoline and diesel

The forecast for reported volumes of gasoline and diesel begin with the ODOT Revenue forecast. For the 2024 Clean Fuels forecast cycle, the April 2023 Revenue forecast was the latest available. ODOT reports motor gasoline and diesel subject to the gas tax separately, but projects total motor fuel growth, including both gasoline and diesel, only. In order to derive growth estimates for gasoline and diesel separately, the historical share of motor fuels comprised of gasoline is extrapolated to split the motor fuels forecast into its component parts. The following chart presents this split through fourth quarter 2022 and the projected values used to decompose the motor fuels series.



In addition to diesel subject to the per-gallon tax, ODOT also tracks and projects diesel consumption subject to the weight-mile tax (heavy trucks). Combining the two provides a forecast for total diesel consumption.

Given that volumes of gasoline and diesel reported to the Clean Fuels program do not mirror those covered by ODOT taxation, adjustments to the ODOT growth projections may be made in light of forecaster judgement as well as input provided from the Clean Fuels Forecast Advisory Committee. Once forecasts for total motor gasoline and diesel are compiled, the fossil components that would generate deficits are derived by subtracting the biofuel components. Those components are projected as follows.

Ethanol

As with fossil fuels, the base-year reported values for ethanol come from CFP data. A blend rate is estimated based on historical averages and trends, as well as on data from California's Low Carbon Fuel Program, and applied to the total gasoline consumption value.

Biodiesel and renewable diesel

Both diesel biofuel forecasts are derived from blend rate assumptions based on historical CFP data, as well as observed rates from California's more tenured Low Carbon Fuel Program. Input from the Cleans Fuels Advisory Committee is also pertinent to the final selection of blend rates for the compliance period, as well as the intervening year for which data are as yet unavailable.

On-road electricity

Consumption of electricity for on-road vehicles is based on a projection of the number of plug-in hybrid and battery electric vehicles in use for the compliance period. The Oregon Department of Transportation maintains the stock vehicle forecast, including electric vehicles. The same average Kilowatt hour per vehicle year estimate used to generate the residential charging series is used to calculate electricity from residential charging. Historical volumes of electricity from non-residential charging stations are used to calculate average Kilowatt hours per vehicle year from this source. Given that rates of non-residential charging have been rising over time, a trend forecast is used in projecting total electricity for on-road vehicles.

Natural Gas and Propane

Reported values of natural gas and propane are based on data reported to the Clean Fuels Program. Growth rate assumptions are used to generate forecasts for total reported volumes, while blend rate projections based on historical trends and patterns are used to estimate the biofuel components.

C. Fuel Supply estimation

Oregon Revised Statutes Chapter 468A, Section 272 directs the Office of Economic Analysis to estimate the "potential volumes of gasoline, gasoline substitutes and gasoline alternatives and diesel, diesel fuel substitutes and diesel alternatives available to Oregon." In order to make such estimates, a number of assumptions must be made. Potential is read to mean "could be made available to Oregon under a wide range of market conditions". Currently, suppliers must be certified by the Department of Environmental Quality to deliver fuel into Oregon. In addition, they must report volumes of fuel sold in Oregon to the Clean Fuels reporting system. Thus, the capacity of facilities that were certified for the most recent compliance period (2019) is assumed to be theoretically "available" to Oregon.

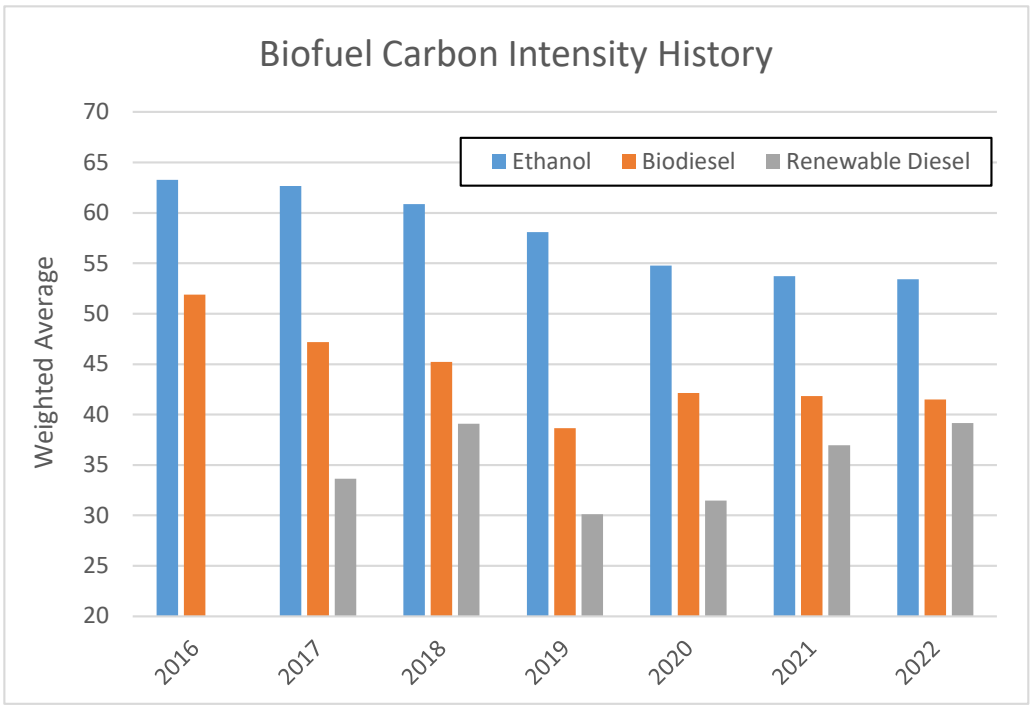
D. Deficit and Credit calculations

Deficit and Credit forecasts are generally derived using energy densities published by the Department of Environmental Quality, as well as estimated and target carbon intensities published here (see Tables 1, 2, and 4 starting on page 209). The most recent versions of these tables are available here.

The estimated carbon intensities for ethanol, biodiesel and renewable diesel that are not published in rule are projected based a number of factors. The first is the historical movement in the series themselves (see Chart 1). The certified carbon intensities of facilities registered in Oregon are also reviewed to ascertain the levels that might be obtained if market forces favor lower CI facilities. Finally, realized carbon

intensities in California are reviewed. Final parameters are based on all three factors, forecaster judgement and input from stakeholders.

Chart 1: Biofuel Carbon Intensities



The following are the formulas resulting in the deficits and credits presented in Table 4 of the Clean Fuels Forecast.

Gasoline

$Deficit_G = CBOB * ED_G * (CIT_G - CIA_G)/1,000,000$

Diesel

$Deficit_D = V_D * ED_D * (CIT_D – CIA_D)/1,000,000$

Ethanol

$Credit_E = V_E * ED_E * (CIT_G – CIA_E)/1,000,000$

Biodiesel

$Credit_{BD} = V_{BD} * ED_{BD} * (CIT_D – CIA_{BD})/1,000,000$

Renewable Diesel

$Credit_{RD} = V_{RD} * ED_{RD} * (CIT_D – CIA_{RD})/1,000,000$

Electricity

$Credit_C = K_C * EER_C * ED_C * (CIT_G – (CIA_C/EER_C)/1,000,000$

Natural Gas

$Credit_{NG} = V_{FNG} * ED_D * EER_{NG} * (CIT_D – (CIA_{FNG}/ EER_{NG})/1,000,000 + V_{RNG} * ED_D * EER_{NG} * (CIT_D – (CIA_{RNG}/ EER_{NG})/1,000,000$

Propane

$Credit_P = V_P * ED_P * (CIT_D – CIA_P)/1,000,000$

Table 1: Definition of Symbols

Where:	
G = Gasoline	D = Diesel
CBOB = Conventional Blendstock for Oxygenated Blending	E = Ethanol
	BD = Biodiesel
ED = Energy Density	RD = Renewable Diesel
V = Volume consumed	C = Electricity
CIT = Carbon Intensity Target	NG = Natural Gas
CIA = Carbon Intensity Actual	FNG = Fossil Natural Gas
K = Total Kilowatts (Total Electric Vehicles * Kilowatts Per Vehicle per Year)	RNG = Renewable Natural Gas
EER = Energy Economy Ratio	P = Propane

The following table presents key parameter values factored into the 2024 forecast for deficits and credits owing to fossil and alternative fuel consumption.

Table 2: Parameter Values for 2024 Forecast

	Energy Density	Carbon Intensity Target	Carbon Intensity Assumption	
			2023	2024
Gasoline	122.48	90.21	100.14	100.14
Ethanol	81.51	90.21	51.00	50.00
Diesel	134.48	90.84	100.74	100.74
Biodiesel	126.13	90.84	41.00	40.50
Renewable Diesel	129.65	90.84	40.50	41.45
Electricity	3.60	90.21	10.00	0.00
KWh/vehicle (res)	*3103*			
EERelect	*3.40*			
EER_NG	*0.90*			
Natural Gas	134.48	90.84	79.98	79.98
Biogas	134.48	90.84	5.00	2.50
Liq. Petroleum Gas	89.63	90.21	53.00	48.00