What are Low Carbon Fuel Standards?
Low Carbon Fuel Standards Program Update

The proposed low carbon fuel standards regulate fuel producers and importers. These are known in the low carbon fuel standard program as regulated and opt-in parties. Fuel users, such as the public, construction companies, railroads and trucking companies, are not regulated under this rule, as required by the authorizing statute, House Bill 2186.

The proposed Oregon low carbon fuel standards program requires regulated and opt-in parties to reduce the average *carbon intensity* of gasoline and diesel fuel 10 percent over a 10-year period. The program does not limit the amount of fuel sold or imported. DEQ uses the period 2012 to 2022 to calculate the required carbon intensity reductions.
The low carbon fuel standard establishes average carbon intensity values for various fuels such as gasoline, diesel, biofuels, natural gas and electricity. Carbon intensity values are calculated using a life-cycle analysis. This accounts for all greenhouse gas emissions associated with a fuel's production, distribution and use - as opposed to a simple measure of carbon emissions when a fuel is burned.

Fuel combustion causes greenhouse gasses which in turn cause the temperature of the atmosphere to rise. The amount of greenhouse gasses created by combustion varies depending on the fuel being combusted. Therefore, the degree of global warming caused by the greenhouse gasses is best expressed as the carbon dioxide equivalent per unit of fuel energy, or CO2e per Megajoule. This standard of measurement allows a comparison between liquid fuels with different energy content per gallon, such as gasoline versus ethanol, as well as a comparison of liquid and alternative fuels that are delivered in different forms, such as gasoline versus compressed natural gas versus electricity.
The overarching principles in the development of the low carbon fuel standard program are to provide flexibility for compliance and to keep the program market-based.

Regulated parties have several options to reduce carbon intensity. They can reduce the average carbon intensity of the mix of fuels they supply by increasing their use of low carbon ethanol, low carbon biodiesel, or low carbon renewable diesel, or by acquiring credits from providers of low carbon fuel alternatives including electricity and compressed natural gas. The rules also allow fuel providers of biofuels, biogas, hydrogen or liquefied natural gas to establish custom carbon intensity values for their fuels if they can demonstrate that the carbon intensity of their feedstock, production process and transportation system is significantly lower than the industry average.

Exemptions and Adjustments
Oregon rules protect consumers by providing exemptions and deferrals if there is an inadequate supply of low carbon fuels or if the price of gasoline or diesel in Oregon becomes non-competitive with other states.

Under House Bill 2186, the rules also exempt fuel used in farm tractors, registered farm vehicles, implements of husbandry and log trucks.

At this time, Oregon's rules do not adjust the carbon intensity values of biofuels to compensate for the greenhouse gases generated by indirect land use changes caused by the new regulations. DEQ intends to adjust the carbon intensity in the future to account for indirect effects such as indirect land use change. These adjustments will acknowledge the greenhouse gases that are released when crops grown to produce biofuels indirectly lead to changes like deforestation to bring new land into cultivation or more intensive cultivation on existing agricultural land. DEQ is not including indirect effects at this time because the science of quantifying indirect effects is still in development. The rules also make adjustments for drive train efficiencies of alternative vehicles through the use of Energy Economy Ratios. This adjustment allows the rules to reflect the differences between drive train technologies including the three-fold greater efficiency that electric motors have compared to internal combustion engines, and the current decreased efficiency of heavy-duty natural gas vehicles compared to diesel fuel use.

The new regulations are fuel-neutral in that all fuels are rated according to their effect on greenhouse gas emissions. The low carbon fuel standard program does not mandate any particular fuel. It simply requires regulated parties to reduce the overall average carbon content of the mix of fuels they sell by ten percent over ten years. There are many ways in which a regulated party can choose to accomplish this.

Implementation

The low carbon fuel standards phase in over time, with small carbon intensity reductions required in the early years of the program, and larger reductions required towards the end of the program. Sources will be given time to comply with the rules, in a strategy known as backloading the compliance schedule, which allows sources more time for the development of lower carbon intensity fuels, and for the development and more widespread use of alternatively fueled vehicles and infrastructure.

Oregon hired a contractor to conduct an economic analysis that evaluated the economic impact of eight different compliance scenarios. The eight different compliance scenarios were developed with input from the advisory committee. The final results are not yet available, but will be provided to the commission when available.

Oregon's low carbon fuel standards will be reviewed regularly. Some program elements will be reviewed on an as-needed basis, some annually, some in 2014 and some in 2016 as part of a planned comprehensive program review. These reviews will keep the program current and allow adjustments for evolving science, implementation needs, and developments in other related programs or a federal low carbon fuel standard.

Oregon low carbon fuel standards policy issues

1. **Consumer cost safety net** (House Bill 2186, Section 6, (2)(d))
   House Bill 2186 requires the low carbon fuel standards rules to provide exemptions and deferrals "as necessary to mitigate the costs of complying with the low carbon fuel standards," based upon a finding by the Environmental Quality Commission that fuel prices in Oregon are "not competitive" with fuel prices in neighboring states. What will be the guidelines for the Environmental Quality Commission to make a finding as required, and what types of exemptions and deferrals can mitigate the costs of compliance?

2. **Covered fuels (including opt-In)**
   Based on their carbon intensities, compliance could be compulsory for some fuels, while some low carbon fuels would be able to opt-in. At issue is which fuels should be covered under the low carbon fuel standards. Which fuels will be regulated, and which fuels should be able to opt-in and sell credits?

3. **Exemption threshold** (HB 2186, Section 6, (2)(b)(E)) and e**xempted fuels** (HB 2186, Section 6, (4)(a)-(d))
   What should the exemption threshold be for small-volume fuel producers? Should all fuel producers below the exemption threshold be exempt? House Bill 2186 authorizes the low carbon fuel standards program to exempt propane and other alternative fuels falling below a volume threshold to be determined by the Environmental Quality Commission.

   Some fuels have specific regulatory, performance, or other reasons why they should be exempted from a low carbon fuel standards. DEQ staff proposes to exempt any transportation fuel used by aircraft, racing vehicles, military tactical vehicles, oceangoing marine vessels and interstate trains. House Bill 2186 exempts fuel used by farm equipment and logging trucks from a low carbon fuel standard.

4. **Oregon's approach to lifecycle analysis and calculating carbon intensities** (HB 2186, Section 6, (2)(b)(B), including drive train efficiencies, Section 6 (2)(b)(G))
   DEQ has conducted a lifecycle analysis of the greenhouse gas emissions attributable to the various fuels sold in Oregon, including emissions from production, storage, transportation and combustion, and accounting for drive train efficiencies[1] and co-products[2]. The final result of this analysis is a table with carbon intensity values for each fuel that is covered under the program. DEQ used the GREET model (greenhouse gases, regulated emissions and energy use in transportation) developed by Argonne National Laboratory and also used by California in developing its table of carbon intensities. The model requires substantial information gathering

[1] "Drive train efficiency" is used to account for differences in energy efficiency among different types of fuels and vehicles. For example, electric vehicles require much less energy than a gasoline engine to travel a specified distance due to the greater efficiency of the engine. As a result of their much lower per mile energy consumption, electric vehicles emit less greenhouse gas than gasoline vehicles on a per mile basis.

[2] Some production of biofuels generates useful co-products such as distillers grain that can be fed to livestock. The carbon intensity of this co-product is deducted from the carbon intensity of the fuel.

for model inputs. DEQ has coordinated with the state of Washington to complete technical lifecycle analyses on fuel carbon intensities and pathways.

5. Economic analysis

DEQ has hired an independent contractor to assist with the economic analysis needed for this rulemaking. DEQ discussed its proposed plan for economic analysis with the advisory committee, at the December 2009 meeting. The contractor presented the results of the economic analysis for comment by the advisory committee in October and November of 2010. The contractor has also completed an evaluation of economic studies of other states' measures, as required in House Bill 2186, Sec. 6 (3)(d)).

6. Regulated parties (HB 2186, Section 6 (2)(b) (C))

Who should be a regulated party under the low carbon fuel standard? Because each fuel type has a different distribution network, each type requires a different definition of regulated party.

7. Credits and deficits, including buying and selling credits

The low carbon fuel standards program is based upon a system where credits generated from selling fuels with lower carbon intensity than the annual standard can be sold to fuel suppliers with fuels of higher carbon intensity than the standard. Such credits could help a producer or distributor of higher carbon fuels meet their compliance obligations under the program.

8. Compliance scenarios/feasibility (HB 2186, Section (3) (a))

As part of the supporting analysis for the low carbon fuel standards, Oregon created eight example scenarios comprising different mixes of traditional and lower carbon alternative fuels that would comply with the standards. With the input of the advisory committee, DEQ used these scenarios to demonstrate ways to reach the standard, and to estimate program costs.

9. Storage and distribution of low carbon fuels

What is the storage capacity for alternative fuels at each level of the fuel distribution chain (i.e. from terminal to retail)? What is the storage capacity for different commodities and the fungibility of infrastructure? What effect would a low carbon fuel standard have on these issues?

10. Electricity-specific issues

There are two main discussion areas related to the use of electricity as a transportation fuel: infrastructure and determining carbon intensity values.

11. Temporary fuel supply deferrals (HB 2186, Section 6, (2)(b)(D))

House Bill 2186 allows for deferrals of the low carbon fuel standard to ensure an adequate fuel supply in case of unanticipated disruptions in existing fuel production or infrastructure. Unusual events such as the unanticipated closure of a large fuel plant or a natural disaster that disrupts fuel distribution could cause Oregon to experience a shortage of low carbon fuels. What kinds of deferrals can ensure an adequate fuel supply?

12. Forecasted fuel supply deferrals (HB 2186, Section 6, (2)(b)(D))

House Bill 2186 also allows for deferrals of the low carbon fuel standard to ensure an adequate fuel supply in the event anticipated increases in the production of lower carbon alternative fuels, such as advanced biofuels, do not materialize as planned.

13. Indirect land use change (HB 2186, Section 6 (2)(b)(B))

Indirect land use change is an adjustment factor for all agricultural crop-based fuel products to account for increases in greenhouse gas emissions due to more intensive cultivation and land conversions, which are a response to higher crop prices resulting from increased biofuels production. The science of calculating indirect land use change is in development.

14. Process for updating or adding a carbon intensity number to the table

As new fuels and new production methods arise over time, DEQ must revise the table of carbon intensity values under the low carbon fuel standards program. DEQ has created a process for fuel producers to add new carbon intensities to the carbon intensity table.

15. Implementation issues

Reporting

Reporting requirements for the low carbon fuel standard must balance the need for timely and accurate information with the desire to minimize the burden on affected parties.

Flexible implementation approaches

DEQ must structure the program to offer flexible implementation approaches and minimize compliance costs.

16. Phase-in schedule for implementation (HB 2186, Section 6 (2)(b)(A))

Oregon's proposed low carbon fuel standards are heavily "backloaded," meaning that small decreases in carbon intensity are required in the early years of the program and larger decreases required in later years as the availability of lower carbon alternative fuels increases. The first year of the program is reporting only with no reductions required, so that regulated parties can get accustomed to new reporting and tracking obligations.

17. Public health and environmental impacts (HB 2186, Section 6 (3)(a) and (b))

House Bill 2186 requires the Environmental Quality Commission to evaluate "net reduction of greenhouse gas emissions" and "…potential adverse impacts to public health and the environment, including but not limited to air quality, water quality and the generation and disposal of waste in this state…."

18. Review of rule and future updates

Should there be a periodic review of the program? If so, should the review be on a mandatory timeframe, or left flexible? What should this review entail, and what process should be used?

19. Effect of sunset (HB 2186, Section 9 (2)(d))

Section 8 of House Bill 2186 stipulates that the low carbon fuel standard rules adopted under the bill will sunset Dec. 31, 2015. The bill requires DEQ, on or before Dec. 31, 2010, to report to the interim legislative committees on environment and natural resources on the anticipated effects of

the sunset “on the availability of low carbon fuels and the development of biofuels production facilities and electric vehicle infrastructure in Oregon.”

Low Carbon Fuel Advisory Committee Member List

Low Carbon Fuel Standards Program Update

Name	Affiliation
Mark Reeve, Chair	Reeve Kearns, PC
Emily Ackland	Association of Oregon Counties
Carrie Atiyeh (alternate)	ZeaChem
Jonathan Burke (alternate)	Westport Innovations Inc.
Todd Campbell (alternate)	Clean Energy
Eric Chung	PacifiCorp
Kyle L. Davis (resigned)	PacifiCorp
Marie Dodds	AAA
Brian Doherty (alternate)	Miller Nash/WSPA
Katie Fast (alternate)	Farm Bureau
Abe Fouhy	American Hydrogen Association Northwest
Jana Gastellum (alternate)	Oregon Environmental Council
Robert Grott	Northwest Environmental Business Council
Sam Hartsfield	Port of Portland
Marion Haynes	Oregon Business Association
Ian Hill	SeQuential Biofuels
Frank Holmes	Western States Petroleum Association
Brock Howell	Environment Oregon
Randy James	Portland and Western Railroad
Michael A. Johns	Lane County Department of Public Works
Christine Kelly	Oregon State Univ: Chemical, Biological & Env. Engineering
Mark Kendall	Oregon Environmental Council
Dan Kirschner	Northwest Gas Association
Tom Koehler	Pacific Ethanol
Allison Koenker (alternate)	Associated General Contractors
Geoff McPherson (resigned)	Citizen
Matt Michel	Canby Utility
David N. Patterson	Mitsubishi Motors R&D of America
Harrison Pettit	ZeaChem Inc.
Andrew Plambeck	Ecumenical Ministries of Oregon
Sam Pounds	Tidewater Barge Lines
Joshua Proudfoot	Good Company
Marcy Putman	Labor Union – IBEW
John Rakowitz	Associated General Contractors
Danelle Romain (alternate)	Oregon Petroleum Association
Paul Romain	Oregon Petroleum Association
Bob Russell	Oregon Trucking Association
Jennifer Shmikler	Farm Bureau