



The use of renewable and low carbon fuel in 2011 resulted in the avoidance of 920,101 Tonnes of CO₂e greenhouse gas emissions being released into the environment, the equivalent of about 193,705 cars being removed from the road.

This summary highlights benefits achieved in 2011 under the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act* (the Act) and the Renewable and Low Carbon Fuel Requirements Regulation (the Regulation).

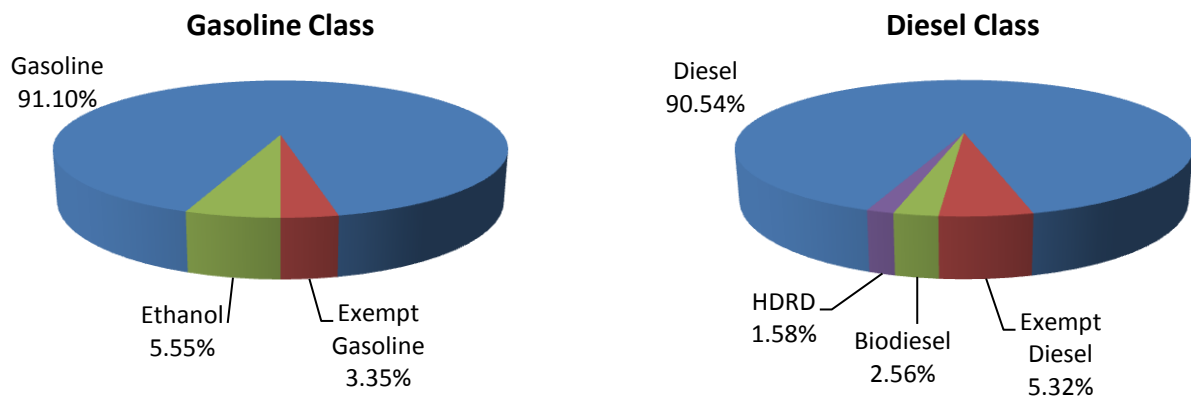
In 2011, all fuel suppliers were in compliance with the Regulation.

The Act has two parts that reduce the greenhouse gas emissions from fuel: Part 2 sets requirements for renewable content; Part 3 requires greenhouse gas emission intensity reductions.

Part 2: Renewable Fuel

Part 2 of the Act requires fuel suppliers to include renewable content in the gasoline and diesel pools. In 2011, suppliers were required to include five percent renewable content in the gasoline pool, and four percent renewable content in the diesel pool.

The renewable fuel requirements apply to fuel that is used for transportation or heating. Companies who supplied less than a total of 50 million litres of gasoline and diesel class fuels in 2011 were exempt from the Regulation, and accounted for less than five percent of all of the fuel supplied.

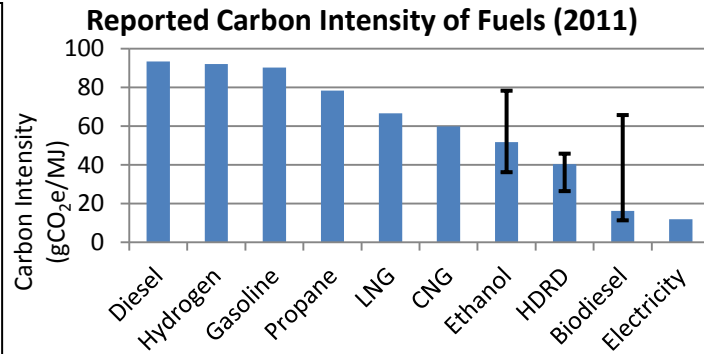


Part 3: Carbon Intensity

Part 3 of the Act requires fuel suppliers to reduce greenhouse gases by reducing the carbon intensity of the fuel mix that they supply. This provides a strong incentive to supply fuels with low carbon intensity.

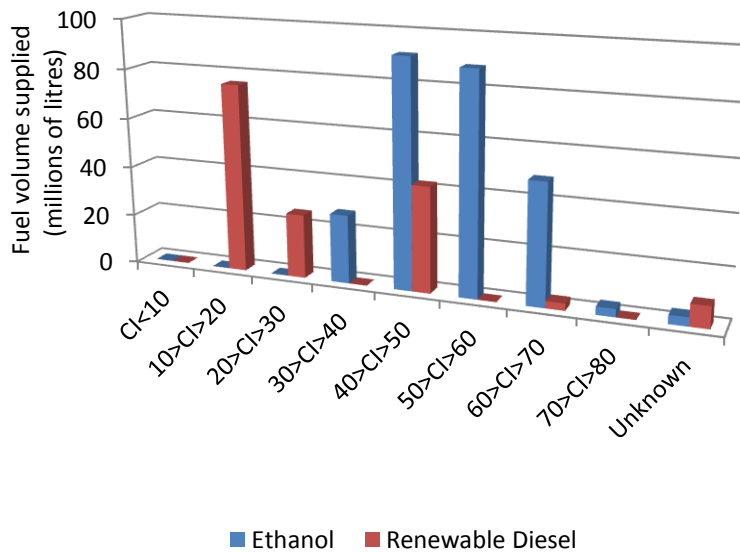


Renewable and low carbon fuels have a range of carbon intensities. The blue bars in this chart illustrate the weighted average carbon intensity for all fuels supplied in British Columbia in 2011. The black bars show the range of carbon intensities reported for ethanol, biodiesel and HDRD.



In 2011, while there was no requirement to achieve any specific carbon intensity, fuel suppliers were required to report the quantities and carbon intensities of the fuels they supplied. The chart below illustrates the amount of fuel supplied in a number of ranges of carbon intensity. The volume of fuel supplied in each range will vary as fuel suppliers develop strategies to comply with the Regulation.

Carbon Intensity of Renewable Fuels (2011) (gCO₂e/MJ)





Tonnes of CO₂e Emissions Avoided

As of July 1, 2013 the Act requires that credits or debits be calculated using the equation:

$$\text{Credit (or Debit)} = (\text{CI class} \times \text{EER fuel} - \text{CI of fuel}) \times \text{EC fuel} / 1,000,000$$

Where:

Credit (or Debit) = the number of credits generated, if the number is positive, or the number of debits incurred, if the number is negative, for the compliance period.

CI class = the prescribed carbon intensity limit for the compliance period for the class of fuel of which the fuel is a part.

EER fuel = the prescribed energy effectiveness ratio for that fuel in that class of fuel.

CI fuel = the carbon intensity of the fuel.

EC fuel = the energy content of the fuel calculated in accordance with the regulations.

For consistency with the requirements that came into force on July 1, 2013, the quantity of greenhouse gases avoided through implementation of the low carbon fuel requirements is calculated using the initial gasoline class carbon intensity of 90.21 gCO₂e/MJ and the initial diesel class carbon intensity of 93.33 gCO₂e/MJ.

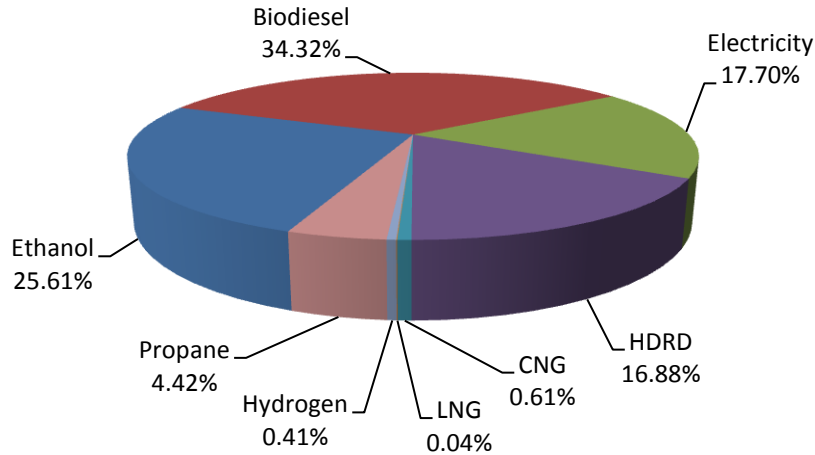
Fuel	Quantity	Average Reported Carbon Intensity (gCO ₂ e/MJ)	Greenhouse Gases Avoided (Tonnes)
Gasoline	4,310,982,513 litres	90.21	
Ethanol	262,745,998 litres	51.66	235,617
CNG	4,816,133 m ³	59.74	5,615
Propane	133,440,547 litres	78.29	40,704
Diesel	3,411,198,104 litres	93.33	
Biodiesel	96,295,142 litres	16.20	315,824
HDRD	59,333,898 litres	40.30	155,314
Hydrogen	259,378 Kg	92.06	3,816
Electricity	168,748,917 KWh	11.94	162,839
LNG	154,719 Kg	66.54	372

The use of renewable fuel resulted in the avoidance of 706,755 Tonnes of CO₂ equivalent greenhouse gases. The use of other low carbon fuels resulted in the avoidance of another 213,345 Tonnes, for a total of 920,101 Tonnes of CO₂ equivalent greenhouse gases avoided through the use of low carbon fuels.

The primary consumer of electricity for transportation was TransLink for use in trolley buses and SkyTrain for use in the Vancouver LRT system. Hydrogen was supplied from Quebec to power twenty fuel cell buses operating in Whistler.



Contribution to Emissions Avoided (2011), by fuel type



Summary

Emissions Avoided

In 2011, the quantity of greenhouse gases avoided increased compared to 2010. The increase in avoided emissions can be attributed to an increase in the volume of both renewable and low carbon fuels supplied in B.C. The Regulation required the renewable fuel percentage in the diesel class to increase from 3% to 4%. LNG was introduced as a transportation fuel and reporting was improved for propane used as transportation fuel in B.C.

Fuel Reported	Greenhouse Gases Avoided (Tonnes)	
	2010	2011
Ethanol	192,107	235,617
CNG	5,068	5,615
Propane	*	40,704
Biodiesel	176,249	315,824
HDRD	50,564	155,314
Hydrogen	1,861	3,816
Electricity	132,810	162,839
LNG	Not supplied	372
Total	558,659	920,101

* Propane was under-reported in 2010



Energy Use

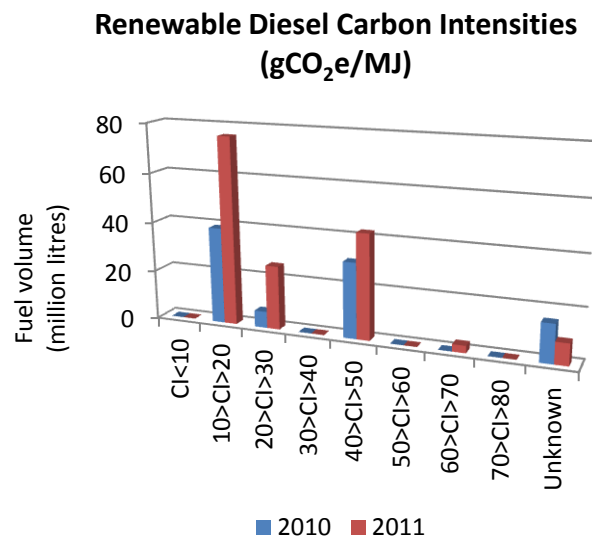
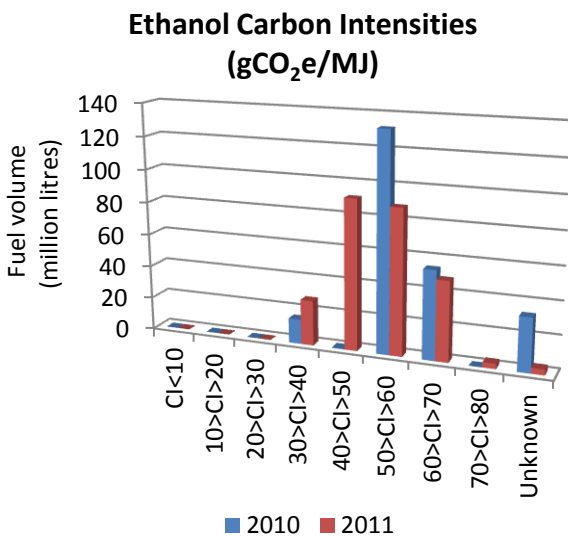
Total energy use of gasoline class fuels increased less than 1% from 2010 to 2011, for a total of 162 Petajoules (PJ). Total energy use for diesel class fuels increased 16% from 2010 to 2011, for a total of 140 PJ.

Fuel Reported	Units (millions)	Quantity	
		2010	2011
Gasoline	litres	4,459	4,311
Ethanol	litres	235	263
Diesel	litres	2,977	3,411
Biodiesel	litres	61	96
HDRD	litres	31	59
LNG	Kg	0	0.16
Electricity	KWh	167	169
Hydrogen	Kg	0.18	0.26
CNG	m ³	4.35	4.82
Propane	litres	*	133

* Propane was under-reported in 2010.

Propane was not reported correctly in 2010, but the issue has been addressed, resulting in correct reporting from 2011 onward.

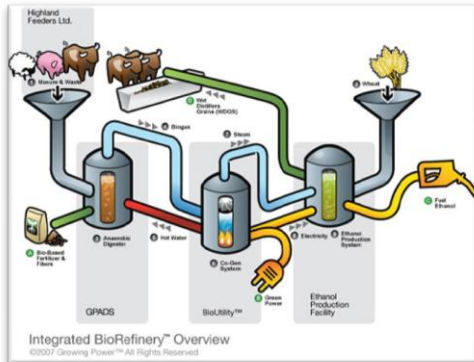
The charts below show that ethanol and renewable diesel (biodiesel and HDRD) that was supplied in B.C. shifted towards fuels with lower carbon intensities in 2011.





Growing Power Hairy Hills Limited Partnership is an example of a fuel producer using an innovative closed loop production process for fuel production. The process integrates a cattle feedlot with an ethanol plant. Feedlot manure processed in a bio-digester produces methane to power the ethanol plant and the grain co-product from the ethanol is fed to the cattle.

The range of carbon intensities approved for the ethanol produced is - 4.5 CO₂e/MJ to 25 CO₂e/MJ, depending on the feedstock used. These carbon intensities are among the lowest worldwide.



Negative carbon intensity is the result of an assessment of the total lifecycle emissions of the fuel. This includes several factors such as: the capture of production emissions; the energy use of the process; and the production of co-product that can be used to replace material that would otherwise have to be produced. The co-product has the ability to offset the emissions created when the fuel is burnt in an engine. Please visit: growingpower.com

If you have any questions about this summary, please contact us at lcfr@gov.bc.ca.

For more information, check the Renewable and Low Carbon Fuel website at <http://www.empr.gov.bc.ca/RET/RLCFRR/Pages/default.aspx>.

The *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act* and the Renewable and Low Carbon Fuel Requirements Regulation can be found on the internet at: <http://www.bclaws.ca>.