Renewable and Low Carbon Fuel Requirements Regulation Summary: 2010-2017

British Columbiaôs Renewable and Low Carbon Fuel Requirements Regulation (Regulation) resulted in the avoidance of over 1.36 million tonnes of greenhouse gas emissions globally in 2017, and a total of 7.73 million tonnes between 2010 and 2017.

This Bulletin presents summary compliance data for the *Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements)* Act (Act) and the Regulation. The Act has two parts that are designed to avoid greenhouse gas emissions associated with the use of transportation fuels in British Columbia: Part 2 establishes requirements for renewable content; and Part 3 sets out requirements for greenhouse gas emission intensity reductions.

The data that follow are based on supply data submitted to the Ministry by fuel suppliers as part of their compliance reporting obligations. This Bulletin incorporates updates and corrections to data from all compliance periods as a result of compliance and verification activities, and supersedes the values reported in the previously published annual summaries.

Part 2: Renewable Fuel Requirements

Part 2 of the Act requires fuel suppliers to include renewable content in the gasoline and diesel fuels supplied in B.C. for transportation or heating. Since 2010, fuel suppliers have been required to include five percent renewable content in the gasoline pool. In the diesel pool, the renewable requirement was three percent in 2010 and four percent thereafter. Companies who supply less than a total of 75 million litres of gasoline and diesel class fuels in a year are required to report gasoline and diesel fuel volumes, but are otherwise exempt from the requirements of the Regulation.

Table 1 – Annual Part 2 fuel volumes (million litres) and percentages

	2010	2011	2012	2013	2014	2015	2016	2017
Total Gasoline	4,741.1	4,469.9	4,284.6	4,343.3	4,497.3	4,600.2	4,828.1	4,817.0
Non-exempt Gasoline	4,459.2	4,311.0	4,079.1	4,199.7	4,320.4	4,500.5	4,717.6	4,792.6
Exempt Gasoline	281.9	159.0	205.5	143.6	176.9	99.7	110.5	24.4
Ethanol	234.7	262.7	250.8	274.9	299.0	342.9	375.1	376.0
% Renewable Content	5.0%	5.7%	5.8%	6.1%	6.5%	7.1%	7.4%	7.3%
Total Diesel	3,305.1	3,654.3	3,676.4	3,642.8	3,694.9	3,460.0	3,422.9	3,803.6
Non-exempt Diesel	2,977.2	3,459.2	3,530.8	3,525.7	3,520.6	3,349.5	3,305.9	3,711.1
Exempt Diesel	327.9	195.1	145.6	117.1	174.2	110.6	117.0	92.4
HDRD[A] and Biodiesel	91.7	155.6	158.7	192.6	226.6	221.2	178.7	213.0
% Renewable Content	3.0%	4.3%	4.3%	5.2%	6.0%	6.2%	5.1%	5.4%

A ï Hydrogenation-Derived Renewable Diesel

Part 3: Low Carbon Fuel Requirements

Part 3 of the Act requires fuel suppliers to reduce the greenhouse gas emission intensity, also known as carbon intensity, of the transportation fuel mix that they supply. Compliance is measured in terms of credits and debits, which represent the difference between the carbon intensity of the fuel and the current Part 3 (low carbon fuel) requirements for the relevant fuel class. The Ministry has established a schedule of reductions that will reduce the carbon intensity of the transportation fuel mix in B.C. by 10% by 2020 relative to 2010. The fuel supply industry has maintained compliance with the Part 3 requirements since 2010.

Table 2 – Annual Part 3 fuel quantities reported

	Units (millions)	Fuel Class	2010	2011	2012[A]	2013[B]	2014[C]	2015	2016	2017
Gasoline	L	Gasoline	4,741.1	4,469.9	4,284.6	4,343.3	4,497.3	4,600.2	4,828.1	4,817.0
Diesel	L	Diesel	3,305.1	3,654.3	3,676.4	3,642.8	3,694.9	3,460.0	3,422.9	3,803.6
Ethanol	L	Gasoline	234.7	262.7	250.8	274.9	299.0	342.9	375.1	376.0
Electricity	kWh	Gasoline	0.0	0.0	0.0	0.1	0.3	0.9	1.3	1.7
	kWh	Diesel	166.6	168.7	178.1	173.4	168.8	171.4	170.8	193.2
Biodiesel	L	Diesel	61.1	96.3	89.1	95.1	101.1	100.7	105.4	107.3
HDRD	L	Diesel	30.6	59.3	69.6	97.5	125.5	120.5	73.3	105.8
CNG	m^3	Gasoline	0.3[D]	1.2	1.4	1.4	1.3	1.5	2.0	0.9
	m^3	Diesel	0.0[D]	0.1[D]	4.4	6.2	7.9	13.6	14.9	20.9
Propane	L	Gasoline	1.5[E]	76.8	70.7	66.8	62.8	70.5	70.3	68.3
LNG	kg	Diesel	0.0	0.2	2.4	4.3	6.2	8.6	9.0	12.1
Hydrogen	kg	Diesel	0.2	0.3	0.3	0.2	0.1	0.0	0.0	0.0
	kg	Gasoline	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

A ï Quantities represent 2/3 of the 18 month compliance period ending June 30, 2013
B ï Quantities represent 1/3 of the values for the 18 month compliance period ending June 30, 2013 plus 1/3 of the values for the 18 month compliance period ending December 31, 2014
C ï Quantities represent 2/3 of the 18 month compliance period ending December 31, 2014
D ï The supply of CNG was likely under-reported in 2010 and 2011
E ï The supply of propane was under-reported in 2010

Transportation Energy Use

Table 3 shows that total transportation energy use in B.C. increased from 2010 to 2017. However, an increasing proportion of this demand is being met by fuels with lower carbon intensities than the fossil fuels they replace.

Table 3 – Annual energy in Petajoules supplied by Part 3 fuels

	2010	2011	2012[A]	2013[B]	2014[C]	2015	2016	2017
Gasoline	164.5	155.1	148.6	150.7	156.0	159.6	167.5	167.1
Diesel	127.7	141.2	142.1	140.8	142.8	133.7	132.3	147.0
Ethanol	5.5	6.2	5.9	6.5	7.1	8.1	8.8	8.9
Electricity	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.7
Biodiesel	2.3	3.6	3.3	3.5	3.7	3.7	3.9	3.8
HDRD	1.1	2.2	2.5	3.6	4.6	4.4	2.7	3.9
CNG	0.0[D]	0.0[D]	0.2	0.3	0.4	0.6	0.6	0.8
Propane	0.0[E]	2.0	1.8	1.7	1.6	1.8	1.8	1.7
LNG	0.0	0.0	0.1	0.2	0.3	0.5	0.5	0.6
Hydrogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total	301.8	310.9	305.3	307.9	317.1	313.0	318.7	334.5

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Carbon Intensity

Fuel producers may apply for a unique carbon intensity based on the specific lifecycle parameters of the fuel they produce. Once the carbon intensity is approved, anyone who supplies that fuel must use the approved carbon intensity and corresponding B.C. low carbon fuel code. For the current list of approved carbon intensities and fuel codes, see: Approved Carbon Intensities (RLCF-012) (PDF).

In order to encourage producers to apply for specific carbon intensities, the Regulation sets a precautionary high default carbon intensity for each fuel type recognized by the Regulation.

Table 4 – Annual weighted average carbon intensity (gCO_2e/MJ) of fuels reported

	2010	2011	2012	2013	2014	2015	2016	2017
Ethanol	55.51	51.66	53.11	51.27	49.74	49.47	41.00	32.48
Electricity	11.94	11.94	11.94	11.48	11.00	11.00	11.00	19.73
Biodiesel	15.23	16.20	21.84	21.06	20.37	15.98	15.24	6.49
HDRD	48.04	40.30	45.42	32.11	24.72	16.37	16.40	20.08
CNG	59.74	59.74	59.74	61.21	62.14	62.14	62.14	63.64
Propane	78.29	78.29	78.29	73.66	68.44	68.15	68.02	67.97
LNG	-	66.54	66.54	64.18	63.26	63.26	63.26	63.08
Hydrogen	92.06	92.06	92.06	92.95	95.51	95.51	95.51	96.82

The calculation of average carbon intensity excludes fuels reported with default carbon intensity

Table 5 – Annual supply of ethanol (million litres) by carbon intensity range

	2010	2011	2012	2013	2014	2015	2016	2017
CI ≤ 10	-	-	-	-	-	-	-	-
10 < CI ≤ 20	-	-	-	0.9	1.8	17.2	64.3	105.0
20 < CI ≤ 30	-	-	-	-	-	-	-	-
30 < CI ≤ 40	15.1	27.6	-	6.5	12.9	2.4	93.0	219.6
40 < CI ≤ 50	0.5	91.3	113.1	114.2	115.2	108.5	102.8	19.8
50 < CI ≤ 60	132.1	88.4	94.3	125.8	157.2	177.5	108.2	31.3
60 < CI ≤ 70	54.2	48.7	38.1	24.7	11.4	37.2	6.8	0.0
CI > 70	-	3.3	-	-	-	-	-	-
Default	32.8	3.6	5.3	2.8	0.4	-	-	0.3

Table 6 – Annual renewable content (Biodiesel + HDRD) volume supplied (million litres) by carbon intensity range

	2010	2011	2012	2013	2014	2015	2016	2017
CI ≤ 0	-	-	-	-	-	-	1.7	10.0
0 < CI ≤ 10	-	-	-	9.3	18.6	11.0	26.6	90.3
10 < CI ≤ 20	39.0	75.8	40.4	81.3	122.2	182.3	118.6	76.6
20 < CI ≤ 30	6.6	25.7	16.7	31.6	46.5	18.6	30.7	35.4
30 < CI ≤ 40	-	-	29.3	19.3	9.4	9.4	1.2	0.4
40 < CI ≤ 50	30.6	42.4	64.0	41.8	19.6	-	-	-
50 < CI ≤ 60	-	-	5.6	6.0	6.4	-	-	-
CI > 60	-	2.9	-	1.9	3.7	-	-	2.6
Default	15.5	8.8	2.7	1.4	0.2	-	-	-

Biofuel Feedstocks

As part of the approval process for the carbon intensity of a fuel, the producers are required to identify the feedstock being used to manufacture the fuel. This allows the Ministry of Energy, Mines and Petroleum Resources to quantify the fuels that were supplied in each year by feedstock.

Table 7 – Annual renewable fuel volume by feedstock supplied (million litres)

	2010	2011	2012	2013	2014	2015	2016	2017
Barley & Wheat	-	-	-	6.4	12.8	0.2	1.0	-
Canola	38.6	71.1	48.1	62.4	76.8	90.2	96.1	92.9
Canola & Soy	3.2	2.7	39.2	19.6	-	-	-	-
Canola & Tallow	-	3.4	-	-	-	-	-	-
Corn	66.5	106.0	92.4	181.6	270.7	287.0	269.2	236.0
Corn Oil	-	-	-	3.5	7.1	1.5	1.3	-
Corn & Wheat	121.8	115.9	157.8	78.9	-	-	-	-
Refined Palm Oil (RPO)	30.6	42.4	56.9	43.3	29.7	-	-	0.3
Palm (RPO) & Rapeseed	-	-	5.6	2.8	-	-	-	-
Palm Sludge Oil (PSO)	-	-	-	46.4	92.7	71.6	43.7	42.3
Soy	14.8	2.8	-	7.6	15.2	10.8	10.3	14.4
Spent Bleaching Earth Oil (SBEO)	-	-	-	-	-	-	-	34.6
Tallow	-	16.9	7.0	3.5	-	0.3	0.4	0.5
Unknown	25.6	29.6	2.5	1.6	0.6	-	-	-
Wheat	25.2	27.6	-	8.4	16.8	55.6	104.9	139.9
Yellow Grease (UCO)	-	-	-	1.6	3.2	46.8	26.9	27.9

Lifecycle Greenhouse Gas Emissions Avoided

ñEmissions avoidedò for a given compliance period means the avoided lifecycle emissions calculated according to the following formula, which is similar to the formula used for calculating credits and debits under the Act. Most fuels have lifecycle emissions that occur in several jurisdictions. The values below therefore include emission reductions that occur in British Columbia and elsewhere.

Tonnes of CO_2e Avoided = (CI fossil fuel displaced x EER fuel ï CI of fuel) x EC fuel /1,000,000

Where:

CI fossil fuel displaced = the carbon intensity prescribed for the displaced fuel in that compliance period

EER fuel = the prescribed energy effectiveness ratio of the low carbon fuel

CI fuel = the carbon intensity of the low carbon fuel

EC fuel = the energy content of the low carbon fuel calculated in accordance with the Regulation, using the prescribed energy densities

Table 8[A] – Lifecycle emissions avoided (tonnes CO_2e) by fuel

	2010	2011	2012[B]	2013[C]	2014[D]	2015	2016	2017
Ethanol	192,072	238,823	219,394	242,074	264,753	305,801	409,500	493,529
Electricity	144,008	145,830	153,891	150,487	147,083	149,946	149,934	165,981
Biodiesel	176,238	274,372	235,316	254,255	273,195	288,446	304,916	335,198
HDRD	50,564	114,878	121,702	218,554	315,406	339,641	206,529	288,400
CNG	294[E]	1,496[E]	5,740	6,837	7,934	12,847	14,509	17,923
Propane	456[F]	23,437	21,571	25,942	30,312	34,520	34,673	35,062
LNG	-	219	3,418	6,638	9,858	13,814	14,428	20,168
Hydrogen	1,821	2,654	2,888	1,925	963	17	20	20
Total	565,452	801,709	763,918	906,711	1,049,504	1,145,032	1,134,508	1,356,283

A ï The calculations in this table do not account for the difference in efficiency between compression ignition engines (i.e. diesel) and spark ignition engines (i.e. gasoline), and are therefore conservative estimates of emissions avoided for those fuels that were consumed in a compression ignition engine. Prior to July 1, 2013, compression ignition engines were prescribed an EER of 1.2 under the Regulation (relative to spark ignition engines).
B ï Quantities represent 2/3 of the 18 month compliance period ending June 30, 2013
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Credit Market Scope

Under section 6 of the Act, Part 3 fuel suppliers generate credits by supplying a fuel with a carbon intensity below the prescribed carbon intensity limit, and incur debits when supplying a fuel with a carbon intensity above the limit (e.g. petroleum-based gasoline and diesel). In addition, Part 3 fuel suppliers may also enter into Part 3 Agreements with the Director under the Act to take actions that would have a reasonable possibility of reducing GHG emissions through the use of Part 3 fuels sooner than would occur without the agreed-upon action. The table below shows the quantity of debits incurred and credits generated each year. All values are subject to adjustment as a result of compliance and verification activities.

Table 9 – Credit Market Scope

Compliance Period	Debits Incurred From Fuel Supply	Credits Generated From Fuel Supply	Credits Awarded from Part 3 Agreements	Surplus Credits/(Debits)
2013	161,293	513,389	-	352,096
2014	322,587	1,026,778	-	704,191
2015	643,140	1,101,998	66,380	525,238
2016	918,776	1,067,105	166,618	314,947
2017	1,412,245	1,258,615	97,833	(55,797)

The credits awarded from Part 3 Agreements are for the completion of project milestones during a given compliance period. For the 2013 and 2014 time periods, the quantities of debits and credits represent 1/3 and 2/3 respectively of the 18th month compliance period ending December 31, 2014. In comparison to

the April 2018 Low Carbon Fuel Credit Market Report, minor adjustments have been made to the quantity of debits and credits generated from fuel supply as a result of revised compliance reporting.

Need more information?

Please visit the Low Carbon Fuels website at www.gov.bc.ca/lowcarbonfuels or email us at lcfrr@gov.bc.ca.

This information is for your convenience and guidance only, and does not replace or constitute legal advice. It is recommended that parties who may be a Part 3 Fuel Supplier review the Greenhouse Gas Reduction (Renewable and Low Carbon Fuel Requirements) Act and the Renewable and Low Carbon Fuel Requirements Regulation seek independent legal advice to confirm their status, legal obligations and opportunities. 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.