



# The Renewable and Low Carbon Fuel Requirement Regulation

Current Impacts and Future potential of British Columbia's Transportation Fuel Regulation

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# Introduction

In 2010, the *Renewable and Low Carbon Fuel Requirements Regulation* (RLCFRR) came into effect in British Columbia (BC). This policy reduces greenhouse gas (GHG) emissions because it requires a minimum renewable fuel content in all transportation fuels and it requires an average 10% reduction in the lifecycle GHG emissions intensity (emissions per unit of energy, measured as gCO<sub>2</sub>e/MJ) of transportation fuels.

As of 2012 (the most recent data year available), alternative transportation fuels now account for 4.6% of transportation energy consumption. This uptake of alternative fuels, which has been supported by the RLCFRR, has reduced BC's annual GHG emissions by roughly 900 kt/yr. This reduction makes up 25% of the net reduction in provincial GHG emissions between 2007 and 2012, with other policies and offsets accounting for the rest.

Nonetheless, the RLCFRR is virtually unknown among BC citizens. A recent representative survey of British Columbians found that only 0.3% of respondents could identify the RLCFRR as an existing policy in BC. However, once the policy is explained, the vast majority of respondents support it (90%). To increase public knowledge of the policy, and perhaps thereby increase support for maintaining and strengthening it, we have produced an infographic (see Figure 1: The RLCFRR at a glance) and a brief to explain the RLCFRR, communicate its impact to date, and discuss what it could achieved in the future.

Figure 1: The RLCFRR at a glance

The regulation requires:



Minimum renewable content in fuel

and



10% less lifecycle greenhouse gas emissions

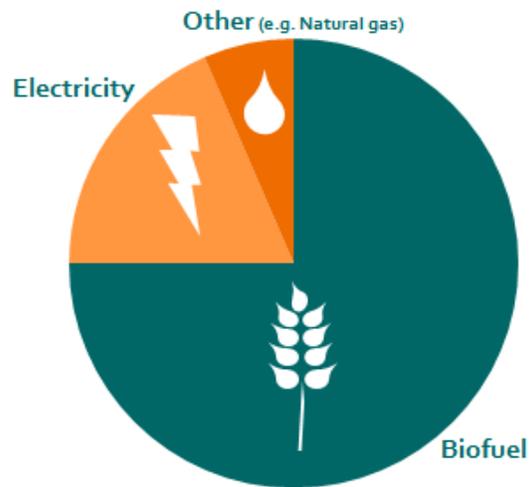
In 2012...

4.5% of transportation energy came from alternative fuels

Greenhouse gas emissions per unit of transportation energy fell by 3.5%

Avoided emissions rose to 905 kt/yr, 25% of the change since 2007

75% of the avoided emissions resulted from using biofuels

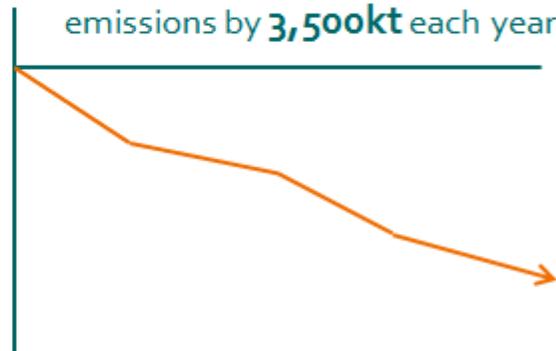


A recent survey indicates very few British Columbian know about the policy

However, 90% of survey respondents support the policy once it is explained to them



By 2020, the RLCFRR could reduce annual greenhouse gas emissions by 3,500kt each year



# The regulation

In 2010, the *Renewable and Low Carbon Fuel Requirements Regulation* (RLCFRR) came into effect in British Columbia. This policy is designed to reduce the greenhouse gas (GHG) emissions that result from transportation by requiring fuel providers to:

Because the fuel regulation accounts for lifecycle greenhouse gas emissions, it results in a measurable global emissions reduction.

- **Include a minimum amount of renewable fuel blended with all petroleum fuels.** Specifically, the requirement is a minimum of 5% by volume in gasoline (e.g. ethanol) and 4% by volume in diesel (e.g. biodiesel or hydrogenation-derived renewable diesel, known as HDRD)
- **Achieve a 10% reduction in the lifecycle carbon intensity of transportation fuels by 2020.** This requirement means that the average GHG emissions per unit of transportation fuel (i.e. the GHG intensity) sold in British Columbia must be 10% less than the lifecycle GHG intensity of petroleum derived gasoline and diesel.<sup>1</sup> Because the policy is based on lifecycle carbon intensity, it accounts for emissions released during production (e.g. growing biofuel crops and refining them for fuel) and consumption of fuels (e.g. combustion in the vehicle itself). Therefore, compliance with the policy requires a real and measurable global change in GHG emissions intensity.

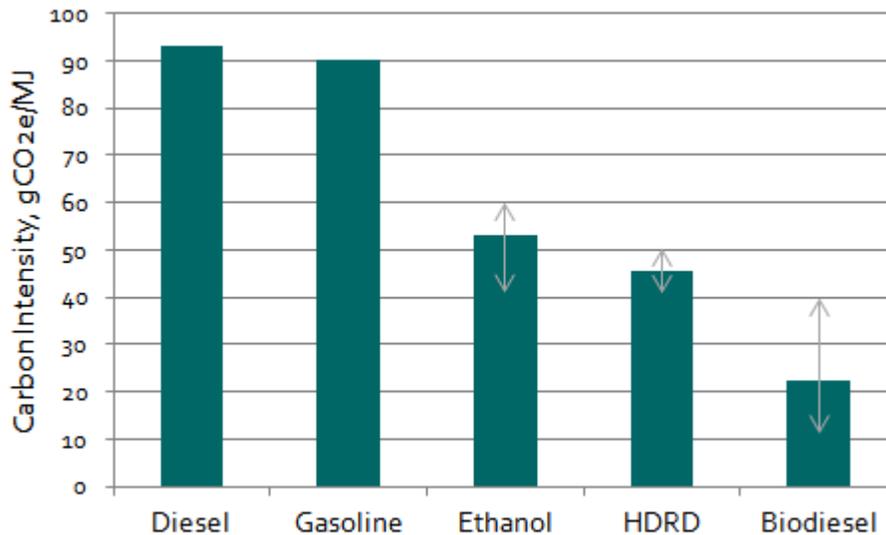
**The lower carbon intensity requirement can be achieved by increasing the consumption of low carbon fuels (offsetting the use of fossil fuels).** For example, substituting a unit of energy from gasoline or diesel with a unit of energy from a biofuel will typically reduce GHG emissions by 30-90% (Based on fuels used under RLCFRR in 2012, Figure 2). Biofuels such as ethanol, biodiesel and HDRD result in zero net GHG emissions from vehicle tailpipes because the carbon dioxide they released during combustion is equivalent to what is re-absorbed by the energy crop during the next growing season. However, growing, refining, and transporting biofuels requires energy, fertilizer, and land, all of which produce GHG emissions; these emissions are included in the lifecycle calculations.

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<sup>1</sup> More information is available at the policy website [www.empr.gov.bc.ca/RET/RLCFRR/Pages/default.aspx](http://www.empr.gov.bc.ca/RET/RLCFRR/Pages/default.aspx) which links to the actual legislation

The lower carbon intensity requirement can also be achieved by reducing the carbon intensity of a given fuel. For example, biofuel could be produced using less fertilizer or less fossil fuel inputs, or create co-products that displace other GHG emissions. The RLCFRR policy creates the incentive for such innovations, which have already supported the development of biofuels with zero or negative lifecycle GHG emissions.<sup>2</sup>

Figure 2: Average carbon intensities of selected fuels in the RLCFRR in 2012



Source: BC Ministry of Energy and Mines Quantified with GHGenius 4.01b model. Arrows show the typical range of carbon intensities for biofuels supplied in 2012 under the RLCFRR. Other fuels included in the policy but not shown in the figure are natural gas, propane, hydrogen and electricity.

## Impact to date

With the introduction of the RLCFRR in 2010, alternative fuel consumption rose to 3.5% of total transportation fuel consumption (in units of energy). The average carbon intensity of transportation fuels fell by roughly 2.2% and the avoided GHG emissions were 559 kt/yr (1% of BC's 2007 emissions).<sup>3</sup> In 2012, the most recent data year available:

- The alternative fuel share, in terms of energy, was 4.5%

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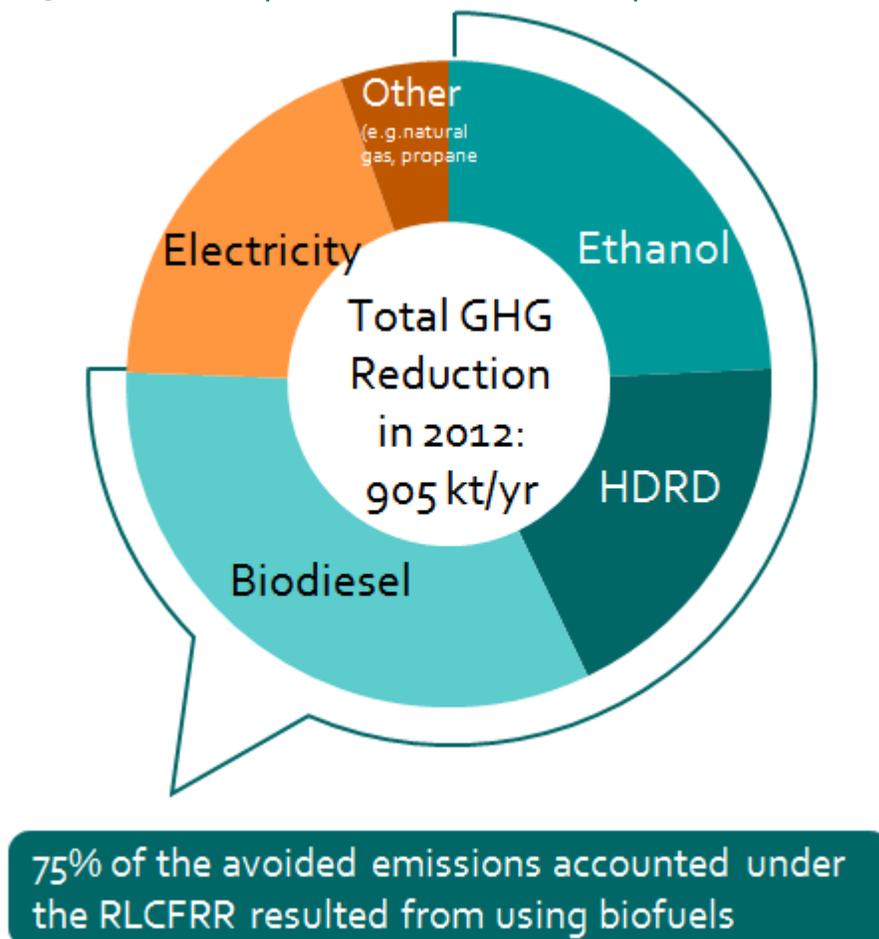
<sup>2</sup> See Ministry of Energy, 2014, Approved Carbon Intensities and read about the Growing Power Hairy Hill Integrated Bio-Refinery at [www.growingpower.com/](http://www.growingpower.com/)

<sup>3</sup> Renewable and Low Carbon Fuel Requirement Regulation, Summary of Compliance Period 2010, BC Ministry of Energy and Mines, 2012

- The average carbon intensity of transportation fuels had fallen by roughly 3.5%
- Avoided GHG emissions had risen to 905 kt/yr (1.5% of BC's 2007 emissions).<sup>4</sup> For context, that change is similar to the annual GHG emissions of all passenger vehicles in Vancouver.

Several alternative transportation fuels contributed to this change (e.g. electricity, natural gas), **but over 75% of the policy's GHG impact in 2012 resulted from the consumption of biofuels** (Figure 3). Out of the range of commercially available biofuels in the market today, biodiesel made the largest GHG impact. Due to its lower average carbon intensity, it gives fuel suppliers the biggest GHG reduction per litre of fuel (an 80% reduction, based on average carbon intensities in 2012).

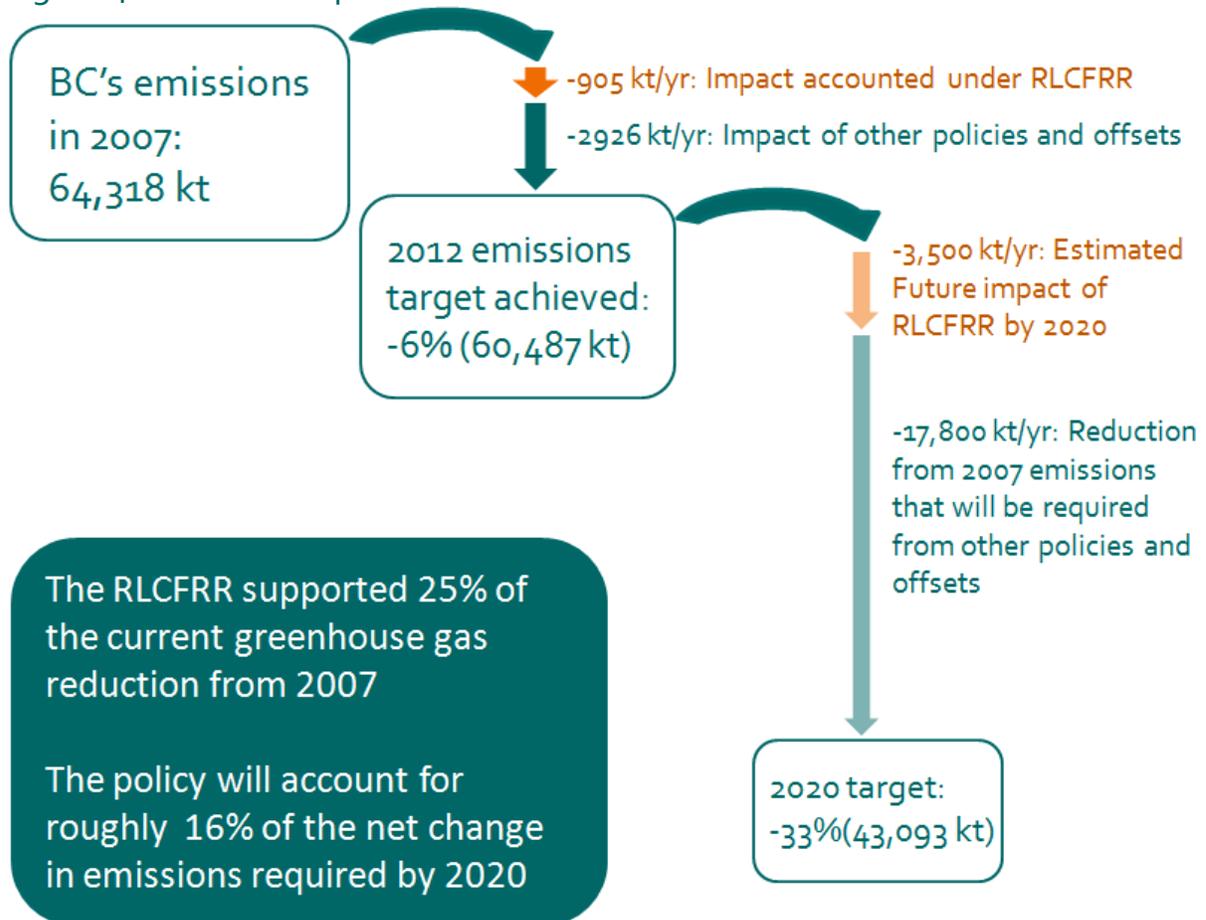
Figure 3: The GHG impact of low carbon transportation fuels



<sup>4</sup> Renewable and Low Carbon Fuel Requirements Regulation, Summary of Compliance Period 2012, BC Ministry of Energy and Mines, 2014

These avoided emissions represent a significant portion of the net change in BC's GHG emissions since 2007. Annual emissions have fallen by 6% since 2007 and the uptake of low carbon fuels (supported by the RLCFRR) accounts for 25% of this change (Figure 4). Since the implementation of the policy, biofuel consumption in BC has increased dramatically, indicating that much of this change can be attributed to the policy.<sup>5</sup>

Figure 4: The GHG Impact of the RLCFRR in context of BC's Emissions



Source: the British Columbia Provincial Inventory Report, Climate Action in British Columbia: 2014 Progress Report, and the quantitative modelling inputs to the 2008 British Columbia Climate Action Plan.

## Future of the policy

The RLCFRR is currently undergoing a review by the Ministry of Energy and Mines to evaluate how fuel providers will comply with the policy in 2020 to ensure that

<sup>5</sup> Based on a comparison of biofuel volumes reported for tax exemptions before 2010 and biofuel volumes reported under the RLCFRR in 2010 to 2012

compliance is feasible. While it is important to re-affirm that compliance is possible without undue costs, a review also opens the door to weaken the policy. Backing away from this policy would be unfortunate because the RLCFRR:

- Will make a substantial contribution to meeting BC's 2020 emissions target
- Broadens the number of and type of fuel suppliers resulting in more choice and competition in the supply and price of fuels
- Is accepted and supported by the general public
- Has the potential to achieve even deeper GHG reductions beyond 2020

**The RLCFRR will make a significant contribution to meeting the provincial emission target in 2020.** Analysis of the quantitative modelling inputs to the BC Climate Action Plan indicates that if the policy remains in effect to 2020, it will reduce annual emissions by roughly 3,500 kt/yr,<sup>6</sup> or 16% of the required net change from 2007 (Figure 4).

**The policy also diversifies the business models of traditional petroleum firms and creates space for new market entrants.** Until recently, transportation fuels have been derived from one commodity and supplied by a few large firms. The RLCFRR is broadening the range of feedstocks as well as the number of suppliers, resulting in increased consumer choice and increased competition to supply low-cost fuels. As of early 2014, there are 25 additional fuel suppliers producing fuel with 58 different feedstocks and processes.<sup>7</sup>

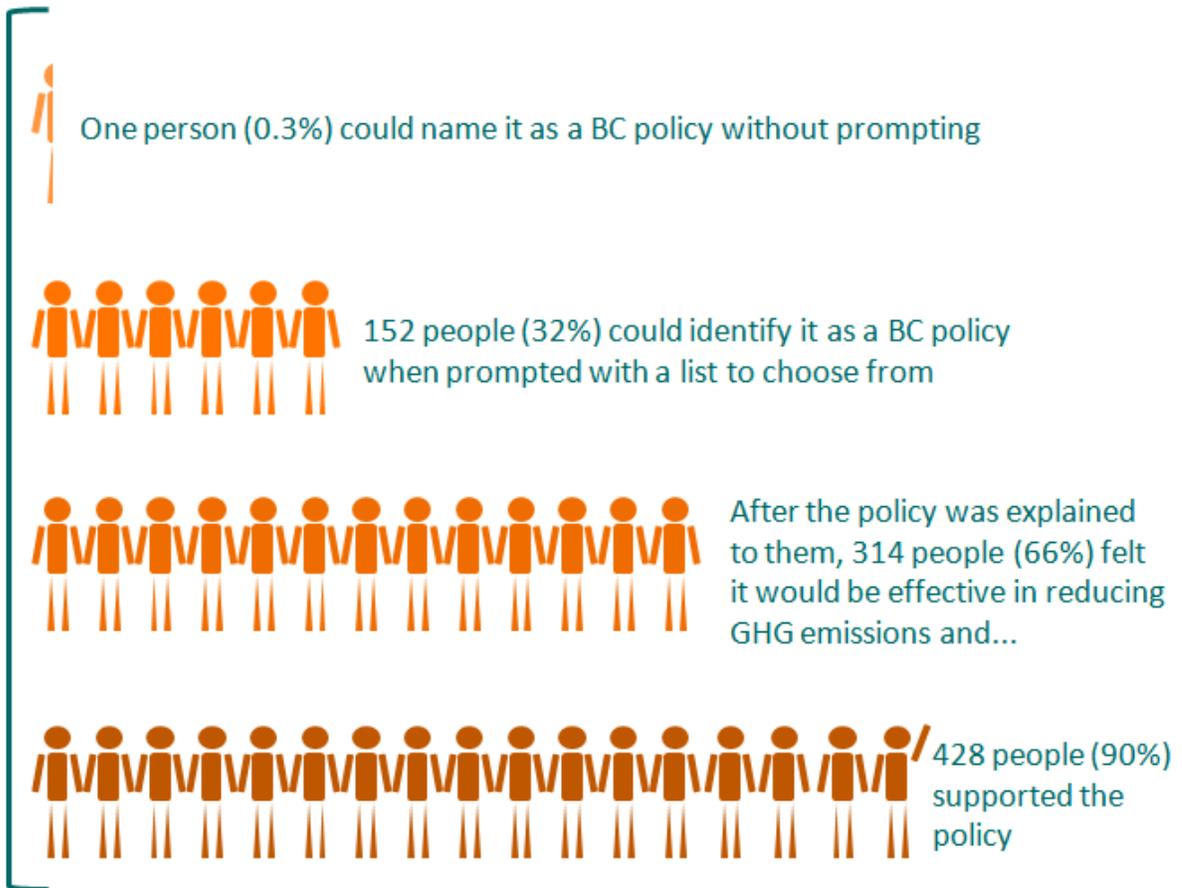
**The RLCFRR is largely unknown, but is highly acceptable to the public.** A recent representative survey of British Columbians reveals that very few people know about the policy. However, when the policy is explained to them, it is strongly supported:

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<sup>6</sup> Appendix I, British Columbia's Climate Action Plan, shows the transportation sector consuming 408 PJ of refined petroleum products in 2020. Based on an average of the lifecycle carbon intensity of gasoline and diesel with and without the RLCFRR (91.8 g/MJ without, and 86.6 g/MJ with), lifecycle GHG emissions from the transportation sector are approximately 37,500 kt/yr without the policy and 34,000 kt/yr with the policy.

<sup>7</sup> Renewable and Low Carbon Fuel Requirements Regulation, Approved Carbon Intensities, BC Ministry of Energy and Mines, 2014

## In 2013, 475 British Columbians were surveyed about the Renewable and Low Carbon Fuel Requirements Regulation



Finally, the RLCFRR can be used to achieve deeper GHG reductions beyond 2020 because:

- **Higher blends of renewable fuels can be used.** Fuel blends with renewable content greater than what is used in British Columbia are already certified to meet national quality standards <sup>8</sup> and are sold by major retailers. For example, there are hundreds of high-volume interstate fuel stations in the US selling biodiesel blends ranging from 6% to 20%. The companies selling these blends sell more diesel fuels

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<sup>8</sup> See ASTM standard D7467 for 6%-20% biodiesel blends, ASTM D5798 for 75%-85% ethanol blends, the Canadian General Standards Board CAN/CGSB-3.512-2013 for 50%-85% ethanol blends, and CAN/CGSB 3.522-2011 for 6%-20% biodiesel blends

alone than is sold in all of Canada.<sup>9</sup>

- **The RLCFRR complements other provincial and federal GHG policies.** The federal vehicle emissions regulations are increasing the energy efficiency of the transportation sector<sup>10</sup> while the carbon tax is affecting driver behaviour and vehicle purchases.<sup>11</sup> Meanwhile, the RLCFRR will ensure that each unit of energy that is consumed for transportation results in fewer GHG emissions from a full lifecycle perspective, including production, transportation and consumption of the fuels. Once the RLCFRR is well established, the carbon intensity of fuels can be further reduced to match the need for GHG reductions and create the demand for more low carbon fuels.
- **The policy creates a larger market for biofuels where investment and innovation can thrive.** A low carbon fuel standard also exists in California and Washington and Oregon have committed to enact similar policies,<sup>12</sup> creating a larger market for biofuels and other low-carbon fuels. The combined market creates larger reward opportunities, which spurs larger investments in new technologies and supply chains.
- **It creates policy certainty that will, over the longer term, increase industry investments in low carbon fuels, increasing their potential to reduce GHG emissions.** For example, a recent PricewaterhouseCoopers survey of the biofuel markets showed that while the North American biofuel market is expected see the fastest growth, globally, the biggest risk to this growth is perceived to be government and policy support.<sup>13</sup> Similarly, the International Energy Agency has reduced their medium term forecast of biofuel production in regions where policy is vague or has stalled.<sup>14</sup> For British Columbia, investments could be directed to emerging technologies to produce advanced fuels and bio-chemicals from forest,

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<sup>9</sup> For example, biodiesel blends sold at Pilot Flying J stations is available at <http://pilotflyingj.com/fuel-prices>

<sup>10</sup> See the federal regulations on the GHG emissions of passenger and heavy duty vehicles at [www.ec.gc.ca/cc/default.asp?lang=En&n=E97B8AC8-1](http://www.ec.gc.ca/cc/default.asp?lang=En&n=E97B8AC8-1)

<sup>11</sup> For example: Rivers, Nicholas and Schaufele, Brandon, Saliency of Carbon Taxes in the Gasoline Market (June 10, 2013). Available at SSRN: <http://ssrn.com/abstract=2131468> or <http://dx.doi.org/10.2139/ssrn.2131468>

<sup>12</sup> See the recent announcement from the Pacific Coast Collaborative: [www.pacificcoastcollaborative.org/Documents/Pacific%20Coast%20Climate%20Action%20Plan.pdf](http://www.pacificcoastcollaborative.org/Documents/Pacific%20Coast%20Climate%20Action%20Plan.pdf)

<sup>13</sup> See PwC's Cleantech Practice, 2014, 2014 Biofuels Market Insights Survey at [www.pwc.com/en\\_US/us/technology/publications/assets/2014-biofuels-market-insights-survey.pdf](http://www.pwc.com/en_US/us/technology/publications/assets/2014-biofuels-market-insights-survey.pdf)

<sup>14</sup> International Energy Agency, 2014, Renewable Energy Medium-Term Market Report 2014: Market Analysis and Forecasts to 2020

waste and agricultural residues, but only if capital markets perceive the province to be committed to its existing framework of policies and regulations.

- **The RLCFRR is driving a transition towards more sustainable use of our bioenergy resources.** The policy creates an incentive for fuel providers to produce and sell biofuels with lower GHG intensities. Lower GHG intensity biofuels are generally those that result in less land disturbance and are produced with fewer energy and fertilizer inputs. This incentive complements the sustainability criteria that producers must meet to maintain access to US and European markets. For example, to qualify under the renewable fuel standard in the United States, advanced biofuels and biodiesel must achieve at least a 50% GHG reduction.<sup>15</sup> Similarly, biofuel that complies with the European Union Renewable Energy Directive must meet a minimum lifecycle GHG reduction threshold (50% reduction by 2017 increasing to 60% by 2018), cannot be produced on land with high biodiversity value, and must have a verifiable chain of custody from the farm to fuel that allows reporting on issues such as food security and labour practices.<sup>16</sup>

To stay up to date with the development and the impact of the RLCFRR, please visit the policy website at [www.empr.gov.bc.ca/RET/RLCFRR/Pages/default.aspx](http://www.empr.gov.bc.ca/RET/RLCFRR/Pages/default.aspx).

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<sup>15</sup> [www.afdc.energy.gov/laws/RFS](http://www.afdc.energy.gov/laws/RFS)

<sup>16</sup> See articles 17, 18, and 19 of the Directive 2009/28/EC of 23 April 2009 on the promotion of the use of energy from renewable sources, [http://ec.europa.eu/energy/renewables/biofuels/biofuels\\_en.htm](http://ec.europa.eu/energy/renewables/biofuels/biofuels_en.htm)