

Please note: The following guideline may be updated from time to time. If there is a discrepancy between this guideline and the grant agreement, the terms of the grant agreement shall prevail.

Under the Bioenergy Producer Program Agreement, a lifecycle emission form must be completed if bioenergy production invoices will be submitted for production in a given Program Period.

Timelines

Program **Period 1** starts on April 1, 2016 and ends March 31, 2017. Program **Period 2** starts on April 1, 2017 and ends September 30, 2017. A Life Cycle Emission Assessment and Verification Report is due with the first invoice, and the Annual Report-Schedule A is due with the Annual Report.

Life Cycle Emission Assessment

The life cycle emission assessment (LEA) should be completed twice, once when submitting the first invoice, and again with the annual report. There are differences between the two assessments required, especially end product transportation and distribution part. The details are as follows:

Directions when included with the First Invoice

- A Life Cycle Emission Assessment and Verification Report are required with the first invoice for eligible bioenergy production.
- This life cycle emission assessment is strictly establishing eligibility under bioenergy producer program based on the production process which is supported by the program. As part of the Bioenergy Producer Program's requirements, all supported production must demonstrate an emission reduction when compared to a baseline conventional alternative.
- To demonstrate this reduction, the Alberta Climate Change Office (ACCO) provides the emission values for different modes of transport and probable routes for rail and marine for biofuels and pellets, respectively. For more information see Appendix A and B. If the facility location is not in the tables of Appendix A, a distance tracking system could be used for the road distance estimation (e.g., Google Map).
- For product exported out-side of Alberta (e.g. renewable diesel, ethanol and wood pellets), all products supported by the BPP will be assumed to be transported to the furthest realistic market. We assumed default markets for these three products as follows:
 - Liquid biofuel production is assumed to be consumed in California's market. Life cycle emission calculations must use this market as a point of consumption when calculating the transportation emissions (transport by truck, rail etc.) from the facility to market.
 - Wood Pellet production is assumed to be consumed in the United Kingdom. Life cycle emission calculations must use this market when calculating the transportation emissions from the facility to market.
- Electricity production is assumed to be consumed on-site or nearby places, so emission estimation for end product transportation is not required.
- Should the assessment demonstrate that an emission reduction does not occur; the production will not be eligible for funding.

- The *Bioenergy Producer Program- Life Cycle Emission Assessment Form* and *BPP Project Verification Report* (template provided) must be completed based on their respective guidelines.
- The greenhouse gas assertion and supporting information cannot be changed once the verifier has signed the statement of verification. Any changes to these documents after the verifier has issued a statement of verification will void the verification.
- You must submit an electronic version of the excel form in addition to the printed and signed copy.

Directions when included as part of the Annual Report

- An Annual Report-Schedule A is needed with each Annual Report. This report is not required to be verified by a third party, so long as the processes and method verified by the third party as part of the first invoice report are maintained.
- When filing as part of the annual report the requirement is to estimate GHG reductions achieved under the program for the eligible production volume and assessing the real market situation of these products. It is understood the facility will know where the products are consumed at this time. This information is solely for better understanding the market.
- You have to include the real volume of production exported outside Alberta and the real mode of transport, destination and distances where known. Otherwise report based on your best known information.
 - In the absence of knowing the final market destination, these volumes should be reported as being consumed at the furthest realistic market used in the assessment included with the first quarterly invoice.
- The *Annual Report-Schedule A*, to be included in the Annual Report, will show the different markets the eligible production was consumed in where known.
- The ACCO provides the emission intensity values of different modes of transport for the transportation of the final product.
- The grant recipient must include the emissions resulting from the volumes transported to markets outside of Alberta and for transportation of product consumed in Alberta. These volumes should match with volumes provided in the Annual Report.
- You must submit an electronic version of the excel form in addition to the printed and signed copy.

Life Cycle Emission Form and Supporting Documents

1. The life cycle emission form is comprised of the life cycle emission reporting template with a provision for the signature of the third-party verifier (outside the grant recipient organization with technical expertise reviewing the report), and any supporting documents including, but not limited to, methodology, calculations and assumptions used to complete the report. This form should be completed based on this guideline document.
2. A verification report consists of a report template which must be completed based on the corresponding Verification Report Guideline document. The verifier (outside the grant recipient organization) completing the report should be a technical expert with engineering and/or greenhouse gas accounting experiences and be familiar with similar project activities. As long as the processes and method verified by the third party as part of first invoice report are maintained, the verification report is not required with Annual Report.

3. The verifier will issue a Verification Report including a signed statement of verification, signed statement of qualifications, signed statement of certification and signed conflict of interest checklist, all of which must be submitted to the ACCO as part of the supporting documents for the applied project.

Life Cycle Emissions

Life cycle emissions reductions are the reduction in greenhouse gas emissions as a result of production and consumption of bioenergy, compared to the fossil fuel production process and consumption that would otherwise occur for a similar or assumed purpose. This includes all stages of feedstock production and recovery, fuel production and distribution, through final consumption of the bioenergy product:

- Under liquid biofuels, regardless if exported or not, renewable diesel is compared to petroleum-based diesel and ethanol fuel is compared to gasoline on an energy equivalent basis (different fuels do not necessarily have the same energy content in the same quantity of fuel).
- Biogas that is sold is assumed to replace natural gas and therefore is compared based on natural gas used for domestic heating.
- Wood pellets are compared to natural gas used for heating as it is the most common fossil fuel used for heating in Alberta, and provides a conservative estimate when calculating reductions achieved in markets outside of the province.
- Emissions associated with the production of heat from biomass are compared against heat that would be produced from natural gas for the same purpose. Companies receiving support for heat produced from biomass usually produce and consume the heat on site at the same facility.
- Emissions associated with electricity generated from biomass is compared against Alberta's overall "grid displacement factor". The grid displacement factor is obtained from the Specified Gas Emitters Regulation *Carbon Offset Emission Factors Handbook*.

Life cycle stages for reporting purposes are outlined in the Glossary (below).

Both the value and a source or citation (published source or supporting documentation submitted with Schedule A) for that value must be supplied for each number entered.

Standard Reference Sources

Links to relevant resources are provided on the Bioenergy Producer Program webpage

- [Bioenergy Producer Program](#)

Key sources provided include:

- Carbon Offset Emission Factors Handbook, 2015
- Technical Guidance for Offset Protocol Developers issued under the Specified Gas Emitters Regulation
- GHGenius (3.19 or more current versions are acceptable)

Assurance Standards

Assurance refers to the confidence level that a third party verifier uses to express a written conclusion concerning an applicant's compliance.

With respect to verification of the calculation of life cycle emission assessment, the person providing assurance must be satisfied with the data and material used as evidence to assert that a criteria has been met.

Level of Assurance

For Bioenergy Producer Program Grant Agreement, demonstration of a limited level of assurance for the life cycle emission assessment is required. For further guidance on verification, please see the resources listed under the Standard Reference Sources in this document.

General Instructions

When completing the tables in the *Life Cycle Emission Form and Annual Report- Schedule A*, please fill out the spreadsheet in electronic format, not a print copy or a pdf version, as automatic calculations will only work in spreadsheet format. You must submit an electronic version of the excel form in addition to the printed and signed copy.

Only fill out the section(s) of this form corresponding to the product(s) for which support has been claimed under the Bioenergy Producer Program in the applicable Program Period.

- For example, if you submitted to receive support for ethanol production, only complete Section 1a

For integrated operations, count the incremental emissions related to bioenergy production; ignore emissions associated with other co-products. Examples:

- If the facility is a pulp mill which produces biofuel as an additional product, you do not need to count the emissions associated with the pulp production life cycle.
- If ethanol is a co-product of producing flour and distiller's grain, only count the emissions associated with the ethanol life cycle. The emissions should be allocated between ethanol and the co-product using the same methodology used in GHGenius.

Supporting documentation must be submitted showing calculations, input data and assumptions for all emissions numbers used in completing the schedule.

- For example, in the "Fuel Production" row enter the greenhouse gas emissions for every gigajoule of product.

In the corresponding "source" cell, refer to the section of your accompanying documentation to demonstrate how this value was derived.

- For example, in the production stage of the life cycle, the calculations should show how much natural gas and electricity was used in production, any factors or assumptions, and how this result leads to the emissions value entered for that life cycle stage.

Provide full and specific references -- with Internet links where available -- for any industry, international or government (e.g., Specified Gas Emitters Regulation guidance documents) average or standard values used in your calculations.

	Section on Form	Tips for Producers
	Grant Number	Please enter the nine digit grant number on the top right corner of the form.
	Company	Please enter the company name.
	Reporting for the Period Covering:	Please Specify the Program Period as applicable by choosing one of the following from the dropdown list (note: if submitting as part of the first quarterly invoice, select the Program Period the invoice pertains to): Period 1 From April 1 st 2016 to March 31 st 2017 Period 2 From April 1 st 2017 to September 30 th 2017
	Signature Line	The third party verifier must sign the report.

Please note: complete only the cells shaded yellow on the form.

1a.	Liquid Biofuels - Renewable Alcohol	
	a. Bioenergy Product	Enter the type of renewable fuel produced. If necessary, replace the default renewable fuel (ethanol) with the appropriate renewable fuel (e.g., fuel grade-methanol).
	b. Feedstock Used	List all of the feedstocks used (e.g. corn, wheat, municipal solid waste).
	c. Life Cycle Stages (grams/GJ column)	<p>For each row in this section, enter the value, in grams of carbon dioxide equivalent, you have calculated for the greenhouse gas emissions from that life cycle stage for each gigajoule of renewable fuel produced.</p> <ul style="list-style-type: none"> • For example, in the case of “Fuel dispensing”, calculate the emissions resulting from electricity used in the pumps, card locks, etc. • Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. • For example, if you run your own generator you should know the actual fuel input and efficiency and be able to calculate the emissions resulting for each kWh generated. • If you rely on grid electricity use accepted emission factors for baseline and project provided by Alberta Environment and Sustainable Resource Development in their Carbon Offset Emission Factors Handbook (March 2015). • Similarly, if you buy rather than produce your own feedstock you may have to estimate land-use change, cultivation and fertilizer manufacture emissions based on third party data. • In the <i>Life Cycle Emission Form</i> (as attached with the invoice), BPP supported renewable alcohol production is assumed to be exported to markets beyond Alberta. In this case, it is assumed that the furthest realistic market is California, USA. Emissions associated with the transportation

	Section on Form	Tips for Producers
		<p>of the products to these markets will be included in the estimation. See Appendix A and B for more information.</p> <ul style="list-style-type: none"> • In the Annual Report- Schedule A, emissions have to be determined for the real volume of production (eligible production for BPP) consumed in Alberta and exported outside of Alberta using types of transport, destination of the products, where known. Otherwise, use your best known information. • Submit associated data and calculations as supporting documentation. • There is no need to fill out the “subtotal of production stages” row or the “Total life cycle emissions” row. These values are calculated automatically based on what you enter in the other rows.
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> • You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. • Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Parks, and your own internal data (ensure you keep corresponding records on file in the case of an audit). • You may also refer to academic studies or industry publications. • The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production (litres)	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.
1b.	Liquid Biofuels - Renewable Diesel	
	a. Bioenergy Product	Enter the type of renewable fuel produced. If necessary, replace the default renewable fuel (Biodiesel) with the appropriate renewable fuel (Hydrogenation-derived renewable diesel, etc).
	b. Feedstock Used	List all of the feedstocks used (e.g. canola, tallow, etc.).
	c. Life Cycle Stages (grams/GJ column)	<p>For each row in this section, enter the value, in grams, you have calculated for the emissions from that life cycle stage for each gigajoule of renewable diesel produced.</p> <ul style="list-style-type: none"> • For example, in the case of “Fuel dispensing”, calculate the emissions resulting from electricity used in the pumps, card

	Section on Form	Tips for Producers
		<p>locks, etc.</p> <ul style="list-style-type: none"> • Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. • For example, if you run your own generator you should know the actual fuel input and efficiency and be able to calculate the emissions resulting for each kWh generated. • If you rely on grid electricity use accepted emission factors for baseline and project provided by Alberta Environment and Sustainable Resource Development in their Carbon Offset Emission Factors Handbook (March 2015).. • Similarly, if you buy rather than produce your own feedstock you may have to estimate land-use change, cultivation and fertilizer manufacture emissions based on third party data. • In the <i>Life Cycle Emission Form</i> (as attached with the invoice), BPP supported renewable diesel production is assumed to be exported to markets beyond Alberta. In this case, it is assumed that the furthest realistic market is California, USA. Emissions associated with the transportation of the products to these markets will be included in the estimation. See Appendix A and B for more information. • In the Annual Report- Schedule A, emissions have to be determined for the real volume of production (eligible production for BPP) consumed in Alberta and exported outside of Alberta using types of transport and, destination of the products, where known. Otherwise, use your best known information. • Submit associated data and calculations as supporting documentation. • There is no need to fill out the “subtotal of production stages” row or the “Total life cycle emissions” row. These values are calculated automatically based on what you enter in the other rows.
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> • You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. • Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Parks, and your own internal data (ensure you keep corresponding records on file in the case of an audit).

	Section on Form	Tips for Producers
		<ul style="list-style-type: none"> You may also refer to academic studies or industry publications. The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production (litres)	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.
2	Gas Products	
	a. Bioenergy Product	Enter the type of renewable fuel being produced. If necessary, replace the default bioenergy product (Biogas) with the appropriate renewable fuel (syngas, etc.)
	b. Feedstock Used	List all of the feedstocks used (e.g. manure, landfill-gas, municipal solid waste, etc.)
	c. Life Cycle Stages (grams/GJ column)	<p>For each row in this section, enter the value, in grams, you have calculated for the emissions from that life cycle stage for each gigajoule of gas produced.</p> <ul style="list-style-type: none"> For example, in the case of “Feedstock transmission/Delivery” you need to calculate the emissions resulting from moving the feedstock product from wherever it originates to your facility where it is converted to gas. All factors must be included, for example emissions resulting from the electricity to run pumps or compressors, or the emissions from trucks or trains used to haul raw feedstock, etc. Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. For example, if you run your own generator to provide electricity to transmit feedstock you should know the actual fuel input and efficiency and be able to calculate the emissions resulting for each kWh generated. If you rely on grid electricity you must use accepted emission factors provided by Alberta Environment and Sustainable Resource Development in their Carbon Offset Emission Factors Handbook (March 2015). Similarly, if you buy rather than produce your own feedstock you may have to estimate the “feedstock recovery” component based on third party data. If the emission is displaced in any life cycle stages of production process, you can include that value in "Less emission displaced (if any)" as a negative value to get the credit from that displacement amount. For emission offset registered projects, you must use same baseline which you use for Alberta Emission Offset System projects for calculating emission displacement credit.

	Section on Form	Tips for Producers
		<ul style="list-style-type: none"> There is no need to fill out the “subtotal of production stages” row or the “Total life cycle emissions” row as these are calculated automatically based on what you enter in the other rows.
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Sustainable Resource Development, and your own internal data (ensure you keep corresponding records on file in the case of an audit). You may also refer to academic studies or industry publications. The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production (GJ)	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.
3	Electricity	
	a. Bioenergy Product	Leave the default bioenergy product (Electricity).
	b. Feedstock used	List all of the feedstocks used (e.g. biogas, woodchips, etc.)
	c. Life Cycle Stages (grams/MWh column)	<p>For each row in this section, enter the value, in grams, you have calculated for the emissions from that life cycle stage for each megawatt hour of electricity produced.</p> <ul style="list-style-type: none"> For example, in the case of “Feedstock transmission/Delivery” you need to calculate the emissions resulting from moving the feedstock product from wherever it originates to your facility where it is converted to heat. All factors must be included, for example emissions resulting from the electricity to run pumps or compressors, or the emissions from trucks or trains used to haul raw feedstock, etc. Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. For example, if you run your own generator to provide electricity to transmit feedstock you should know the actual fuel input and efficiency and be able to calculate the

	Section on Form	Tips for Producers
		<p>emissions resulting for each kWh generated.</p> <ul style="list-style-type: none"> • If you rely on grid electricity you can use accepted emission factors provided by Alberta Environment and Parks in their Carbon Offset Emission Factors Handbook (March 2015). • Similarly if you buy rather than produce your own feedstock you may have to estimate the feedstock recovery component based on third party data. • If the emission is displaced in any life cycle stages of production process, you could put that value in "Less emission displaced (if any)" as a negative value to get the credit from that displacement amount. For example, if heat production from wood waste displaces some emission from beehive burner, emission from beehive burner could come as a credit (see Appendix C for emission intensity of wood waste in beehive burner). • For emission offset registered projects, you must use same baseline which you use for Alberta Emission Offset System projects for calculating emission displacement credit. • There is no need to fill out the "subtotal of production stages" row or the "Total life cycle emissions" row as these are calculated automatically based on what you enter in the other rows.
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> • You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. • Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Sustainable Resource Development, and your own internal data (ensure you keep corresponding records on file in the case of an audit). • You may also refer to academic studies or industry publications. • The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.
4	Heat	
	a. Bioenergy Product	Leave the default bioenergy product (heat).
	b. Feedstock used	List all of the feedstocks used (e.g. biogas, sawdust, etc.)
	c. Life Cycle Stages	For each row in this section, enter the value, in grams, you have

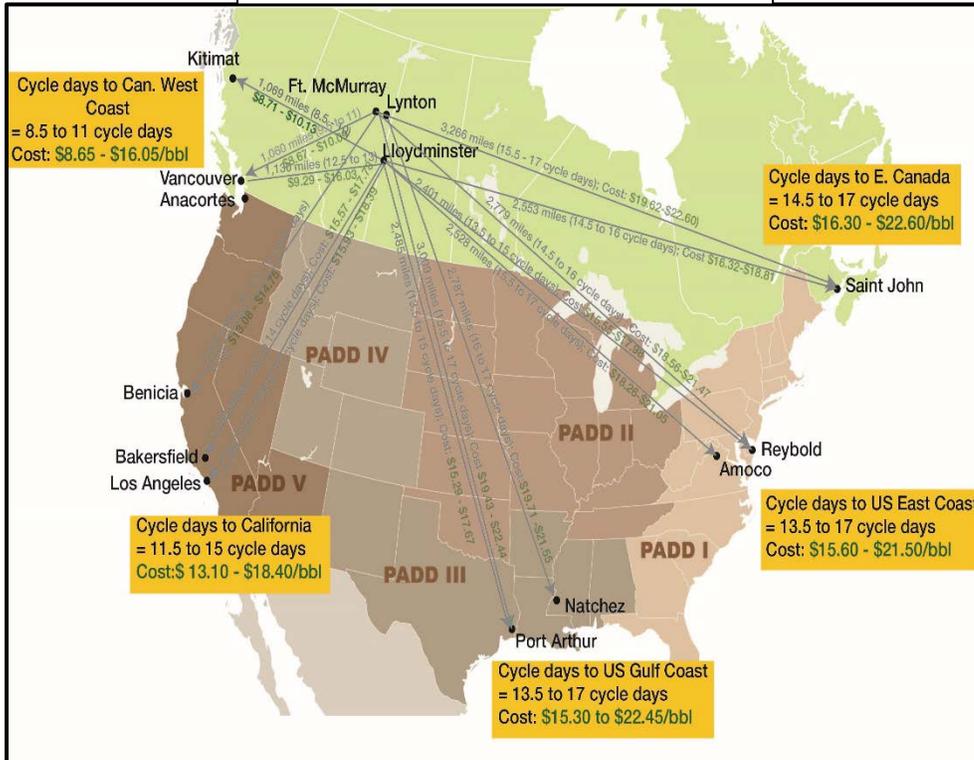
	Section on Form	Tips for Producers
	(grams/GJ column)	<p>calculated for the emissions from that life cycle stage for each gigajoule of heat produced.</p> <ul style="list-style-type: none"> • For example, in the case of “Feedstock transmission/Delivery” you need to calculate the emissions resulting from moving the feedstock product from wherever it originates to your facility where it is converted to heat. • All factors must be included, for example emissions resulting from the electricity to run pumps or compressors, or the emissions from trucks or trains used to haul raw feedstock, etc. • Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. • For example, if you run your own generator to provide electricity to transmit feedstock you should know the actual fuel input and efficiency and be able to calculate the emissions resulting for each kWh generated. • If you rely on grid electricity you can use accepted emission factors provided by Alberta Environment and Sustainable Resource Development in their Carbon Offset Emission Factors Handbook (March 2015). • Similarly if you buy rather than produce your own feedstock you may have to estimate the feedstock recovery component based on third party data. • If the emission is displaced in any life cycle stages of production process, you could put that value in “Less emission displaced (if any)” as a negative value to get the credit from that displacement amount. For example, if heat production from wood waste displaces some emission from beehive burner, emission from beehive burner could come as a credit (see Appendix C for emission intensity of wood waste in beehive burner). • For emission offset registered projects, you must use same baseline which you use for Alberta Emission Offset System projects for calculating emission displacement credit in the case of biogas to heat. • There is no need to fill out the “subtotal of production stages” row or the “Total life cycle emissions” row as these are calculated automatically based on what you enter in the other rows.

	Section on Form	Tips for Producers
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Sustainable Resource Development, and your own internal data (ensure you keep corresponding records on file in the case of an audit). You may also refer to academic studies or industry publications. The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production (GJ)	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.
5	Pellets	
	a. Bioenergy Product	Specify the type of pellets being produced.
	b. Feedstock used	List all of the feedstocks used (e.g. waste wood, sawdust, etc.)
	c. Life Cycle Stages (grams/GJ column)	<p>For each row in this section, enter the value, in grams, you have calculated for the emissions from that life cycle stage for each tonne of pellets produced.</p> <ul style="list-style-type: none"> For example, in the case of “Feedstock transmission/Delivery” you need to calculate the emissions resulting from moving the feedstock product from wherever it originates to your facility where it is converted to pellets. All factors must be included, for example emission resulting from the electricity to run pumps or conveyers, or the emissions from trucks or trains used to haul raw feedstock, etc. Use actual numbers where possible and accepted industry averages or standards where you do not possess the necessary data. For example, if you run your own generator to provide electricity to transmit feedstock you should know the actual fuel input and efficiency and be able to calculate the emissions resulting for each kWh generated. In the <i>Life Cycle Emission Form</i> (to be attached with the invoice), pellets are assumed to be exported to the furthest realistic market UK. Emissions associated with the transportation of the product to these markets will be included in the total emission estimation. See Appendix A and B for more details.

	Section on Form	Tips for Producers
		<ul style="list-style-type: none"> • In the <i>Annual Report- Schedule A</i>, Emission to be determined for real volume of products (from eligible production amount) consumed in Alberta and that exported outside of Alberta using transport type and destination used. Use your best known information. • If you rely on grid electricity you can use accepted emission factors provided by Alberta Environment and Parks in their Carbon Offset Emission Factors Handbook (March 2015). • Similarly if you buy rather than produce your own feedstock you may have to estimate feedstock recovery component based on third party data. • If the emission is displaced in any life cycle stages of production process, you could put that value in "Less emission displaced (if any)" as a negative value to get the credit from that displacement amount. For example, if pellet production from wood waste displaces some emission from beehive burner, emission from beehive burner could come as a credit (see Appendix C for emission intensity of wood waste in beehive burner). • There is no need to fill out the "subtotal of production stages" row or the "Total life cycle emissions" row as these are calculated automatically based on what you enter in the other rows.
	c. Life Cycle Stages (Source column)	<p>Enter in this column the source of the data you supplied in the corresponding row of the grams/GJ column.</p> <ul style="list-style-type: none"> • You may reference a document prepared by you or on your behalf as long as the supporting data and calculations are clearly laid out. • Be sure to include the heating value of your pellets in your supporting documentation. • Acceptable sources demonstrating calculations include emissions reporting in accordance with the Specified Gas Emitters Regulation, reports that include GHGenius modeling, any other reports recommended by Alberta Environment and Sustainable Resource Development, and your own internal data (ensure you keep corresponding records on file in the case of an audit). • You may also refer to academic studies or industry publications. • The Alberta Climate Change Office reserves the right to disqualify data if it is not determined to be from a reliable source.
	d. Total eligible production (GJ)	In <i>Annual Report – Schedule A</i> , this value should be taken from the Annual Report Form, Question 3.e. - Total Eligible Production.

Appendix A

Rail Route (Source: CAPP)



North American pellet shipping routes

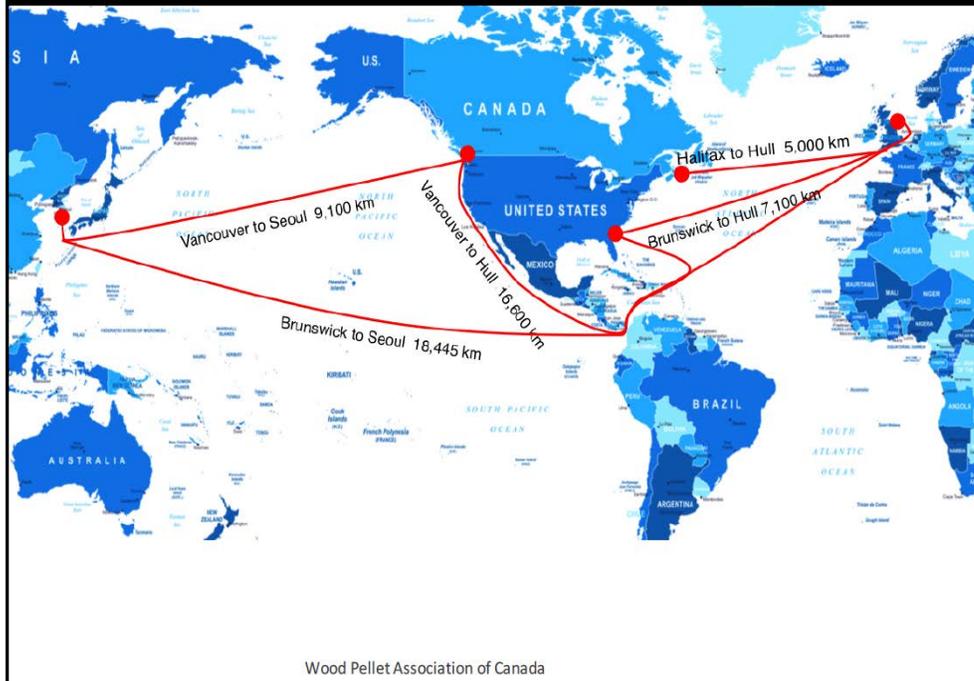


Table A-1: Different modes of transport and corresponding distances

Rail route	Rail distance (km)
Lloydminster-Los Angeles	3941
Lloydminster-Bakersfields	3673
FortMacMurray- Benicia	3335
Road	Road distance (km)
Red Deer- Lloydminster	400
Edmonton- Lloydminster	250
Lethbridge -Lloydminster	580

Source: Crude by Rail presentation, GOA, 2016

Table A-2: Different mode of transportation and distance

Marine Route	Marine distance (Km)
Vancouver-Hull, UK	16,600
NB-Hull, UK	7100
Halifax-Hull, UK	5000
NB-Seoul, South Korea	18445
Vancouver-Seoul	9100
Rail Route	Rail (km)
Ft. McMurray-Vancouver	1705
Lloydminster- Vancouver	1819
Lloydminster- Kitimat	1720
Road	Road (km)
Slave lake- Ft. McMurray	436
La Crete- Ft. McMurray	850
Manning -Ft McMurray	775
Peace River-Ft McMurray	700

Appendix B

Table B-1: Emission intensity of different mode of transport

Mode of transport	Emission intensity gmCO ₂ e/tonne-km
Heavy duty truck	202
Medium duty truck	649.8
Rail	22.5
Marine freight (container)	22.2

Source: GHGenius

Procedure of calculating emissions due to transportation and distribution of the product

For exported products, calculate the transportation distance (in KM) from the facility to the market, including marine, rail and truck.

Multiply distance with the emission intensity of the corresponding mode of transport from Table 1.

Divide the result by energy content of the fuel (in GJ/tonne) to get emission from distribution of product (in gm CO₂e/GJ)

Appendix C

Table C-1: Emission from Beehive Burner

Emission from Beehive Burner tCO ₂ e/tonne of wood waste	Emission from Beehive Burner* t CO ₂ e/GJ
0.02524	0.00252

*Considering energy content of wood waste 10 GJ/tonne

Glossary

25% Fewer Emissions to meet the Renewable Fuels Standard	For liquid biofuels, the baseline criteria is 25 per cent fewer emissions than the equivalent fossil fuel (gasoline), consistent with the emission reductions required for renewable fuels supporting compliance with the Renewable Fuels Standard Regulation under the Alberta <i>Climate Change and Emissions Management Act</i> .
CO₂, H₂S Removed from Natural Gas	Carbon dioxide emissions credit arising from the use of a renewable carbon source that obtains carbon from the air.
Emission Displacement Credit	Carbon dioxide credit arising from the use of waste biomass to a bioenergy production.
Exhaust Emissions	Emissions associated with the use of fuel in the vehicle. Includes all greenhouse gases.
Feedstock Recovery	Feedstock production and recovery. Direct and indirect emissions from recovery and processing of the raw feedstock, including fugitive emissions from storage, handling, upstream processing prior to transmission, and mining.
Feedstock Transmission/Delivery	Feedstock Transport. Direct and indirect emissions from transport of feedstock, including pumping, compression, leaks, fugitive emissions, and transportation from point of origin to the fuel refining plant. Import/export, transport distances and the modes of transport are considered. Includes energy and emissions associated with the transportation infrastructure construction and maintenance (trucks, trains, ships, pipelines, etc.)
Fertilizer Manufacture	Direct and indirect life cycle emissions from fertilizers and pesticides used for feedstock production, including raw material recovery, transport and manufacturing of chemicals. This is not included if there is no fertilizer associated with the fuel pathway.
Fuel Dispensing	Fuel Dispensing at the Retail Level. Emissions associated with the transfer of the fuel at a service station from storage into the vehicles. Includes electricity for pumping, fugitive emissions and spills.
Fuel Distribution and Storage	Fuel Storage and Distribution at all Stages. Emissions associated with storage and handling of fuel products at terminals, bulk plants and service stations. Includes storage emissions, electricity for pumping, space heating and lighting.
Fuel Production	Fuel Production from raw materials. Direct and indirect emissions associated with conversion of the feedstock into a saleable energy product. Includes process emissions, combustion emissions for process heat/steam, electricity generation, fugitive emissions and emissions from the life cycle of chemicals used for fuel production cycles.
Gas Leaks and Flares	Leaks and flaring of greenhouse gases associated with production of oil and gas. Fugitive hydrocarbon emissions and flaring emissions associated with oil and gas production.
Land-use changes, cultivation	Land use changes and cultivation associated with biomass derived fuels. Emissions associated with the change in the land use in cultivation of crops, including N ₂ O from application of fertilizer, changes in soil carbon and biomass, methane emissions from soil and energy used for land cultivation.
Less Emissions Displaced	Emissions displaced by co-products of alternative fuels. Emissions displaced by co-products of various pathways. System expansion is used to determine displacement ratios for co-products from biomass pathways.