Guidelines For Estimating

Canola Biodiesel Production Costs - Farm Fuel

Based on 15,000 Litres per year

Date: **May, 2011**

This guide is designed to provide you with planning information and a format for calculating costs of production for on-farm biodiesel production based on the cost of growing canola on your farm. Opportunity costs related to potential canola market prices are included. Adjustments will be necessary when applying these figures to your own enterprise.

The budget estimates are based on a number of assumptions which are clearly defined in the supporting pages. Input costs are based on industry information. Proper plant management in the production process and compliance to all applicable environmental requirements is assumed. Most OEM require biodiesel to meet ASTM D6751 fuel quality standard.

Disclaimer: This budget is only a guide and is not intended as an in depth study of the cost of production of the Manitoba biodiesel industry. Interpretation and utilization of this information is the responsibility of the user. If you require assistance with developing your individual budget, please contact your local MAFRI Business Development Specialist.

Biodiesel Production Costs - Farm Fuel May, 2011

Based on 15,000 Litres and Canola Production Costs of $256.23 per Acre and Yield of 39 bushels per Acre

A. Operating Costs	Cost/Litre	Total Cost	Your Cost
1. Input Costs			
1.01 Feedstock - canola oil	$0.3231	$4,847	
1.02 Methanol	$0.0688	$1,032	
1.03 Catalyst	$0.0088	$132	
Subtotal Input Cost	**$0.4007**	**$6,011**	
2. Other Operating Costs			
2.01 Electricity	$0.0145	$218	
2.02 Maintenance	$0.0583	$875	
2.03 Misc. Administration	$0.0333	$500	
2.04 Insurance	$0.0117	$175	
2.05 Property Taxes	$0.0210	$315	
Subtotal Operating Costs	**$0.1389**	**$2,083**	
2.06 Operating Interest	$0.0040	$60	
Total Operating Costs	**$0.5436**	**$8,154**	
B. Fixed Costs			
3. Depreciation			
3.01 Buildings	$0.0600	$900	
3.02 Equipment	$0.0900	$1,350	
4. Investment			
4.01 Buildings	$0.0128	$193	
4.02 Equipment	$0.0096	$144	
4.03 Land	$0.0012	$18	
Total Fixed Costs	**$0.1736**	**$2,604**	
Total Operating and Fixed Costs	**$0.7172**	**$10,758**	
C. Labour	$0.0960	$1,440	
Total Cost of Production	**$0.8132**	**$12,198**	
D. Value			
5. Biodiesel			
5.01 Estimated on-farm biodiesel value	$0.8850	$13,275	
5.02 Estimated increased fuel efficiency value	$0.0222	$334	
5.03 Glycerol sales	$0.0000	$0	
Total Value	**$0.9072**	**$13,609**	
Total Value - Cost of Production	**$0.0940**	**$1,410**	

Breakeven price	$/Litre	$ Cost of Prod./Bushel	
A. Operating Costs	$0.5214	$9.4806	
B. Operating & labour Costs	$0.6174	$8.7122	
C. Operating & Fixed Costs	$0.6950	$8.0909	
D. Operating, Fixed & Labour Costs	$0.7910	$7.3225	

Breakeven Price $/Litre = (Cost - (Total Value - Est. on-farm biodiesel value)) ÷ 15,000 litres
Breakeven Price $COP/Bu. = Total Value - Cost ÷ 1874 bu. of canola + $6.57 COP per bu. (with canola meal = $262.15/tonne)

Opportunity Cost - Value Added Processing	$/Bushel	Total
Biodiesel processing margin	$0.75	$1,410
- Canola grain marketing margin	$5.68	$10,645
= Net Benefit from Value Added Processing	**-$4.93**	**-$9,235**

Biodiesel processing margin $/Bu = (Total Value - Cost of Production = $1410) ÷ 1874bu. of canola
Canola grain marketing margin $/Bu = $12.25/bu canola market price - $6.57 COP per bu. canola

Biodiesel Production Costs - Input

Assumptions

1. This budget outlines the cost of production for a biodiesel operation.
2. Buildings and equipment are valued at new cost.
3. All canola feedstock is valued at cost of production.
4. Feedstock cost (vegetable oil) includes the market value of canola meal produced.
5. All Biodiesel produced is for farm use only.

Biodiesel Plant Production

Plant size - thousands of litres annually	**15**	
Days per year	**30**	
Hours operation per day	**8**	
Employees per shift - biodiesel production	**0.25**	
Labour Rate	**$12.00**	/ hour
Vegetable oil required per litre biodiesel	**0.99088**	litres
Methanol	**$460**	/ tonne
Methanol recovery	**25**	%
Catalyst - potassium hydroxide	**$600**	/ tonne
Glycerol	**$0**	/ tonne
Diesel (coloured) farm fuel - ULSD	**$0.8850**	/ litre
On-farm biodiesel blend usage	**20**	%
On-farm fuel efficiency increase with biodiesel use	**0.5**	%

Canola Oil Production

Canola cost of production	**$256.23**	/ acre
Canola average yield - bushels	**39.0**	/ acre
Canola market price per bushel	**$12.25**	/ bushel
Canola meal - 34% protein	**$262**	/ tonne
Days per year	**30**	
Hours operation per day	**8**	
Employees per shift - canola oil production	**0.25**	
Labour Rate	**$12.00**	/ hour
Canola seed oil content	**42.0**	%
Residual oil in canola meal	**10.0**	%
Shrinkage in oilseed processing	**1.0**	%
Residual oil in canola meal (solvent extraction)	**3.5**	%
Barley price - 76% Total Digestible Nutrients	**$4.00**	/ bushel
Extra oil meal premium	**0**	%
Canola oil bulk density	**0.915**	kg / L

Other Operating Costs

Electricity	**$0.06899**	/ kWhr
Maintenance	**2.5**	%
Misc. Administration	**$500**	/ year
Insurance	**0.5**	%
Property taxes	**1.5**	%
Investment Rate	**1.75**	%
Operating Interest Rate	**5.75**	%

Capital Costs

Buildings	**Original Value**	**Salvage Value**	**Useful Life**
Biodiesel plant	**$5,000**	**10** %	**20** years
Canola oil plant	**$15,000**	**10** %	**20** years
Total	**$20,000**	**10** %	**20** years
Equipment			
Biodiesel plant	**$7,500**	**10** %	**10** years
Canola oil plant	**$7,500**	**10** %	**10** years
Total	**$15,000**	**10** %	**10** years
Total Bldg., Mach. & Equip	**$35,000**		
Total Land Value	**$1,000**		
Total Capital Investment	**$36,000**		

Assumptions

Assumptions

1. This budget outlines the cost of production for a biodiesel operation.
2. Buildings and equipment are valued at new cost.
3. All canola feedstock is valued at cost of production.
4. Feedstock cost (vegetable oil) includes the market value of canola meal produced.
5. All Biodiesel produced is for farm use only.

Biodiesel Production Worksheet

A. Operating Costs

1. Input Costs

1.01 Feedstock - vegetable oil

	42.0%	canola seed oil content	
-	10.0%	residual oil in canola meal	
=	**32.0%**	**net oil extraction**	
-	1.0%	shrinkage in processing	
=	**67.0%**	**net canola meal yield**	
x	1,000	kg per tonne	
=	**320.0**	**kg oil per tonne of canola**	
÷	0.915	Canola oil bulk density kg / L	
=	**349.73**	**Litres oil per tonne of canola**	
	15,000	Biodiesel Plant Capacity - litres	
x	0.99088	oil required per litre biodiesel	
÷	349.73	Litres oil per tonne of canola	
=	**42.50**	**Tonnes Canola required**	
	1,874	Bushels Canola required	
	$256.23	Canola cost of production per acre	
÷	39.00	Yield per acre	
=	**$6.57**	**Feedstock cost of production per bushel**	
	$289.68	Feedstock cost per tonne	
x	42.50	Tonnes Canola required	
=	**$12,311**	**Feedstock - Canola**	
	42.50	Tonnes of Canola required	
x	67%	net canola meal yield	
=	**28.47**	**Tonnes canola meal**	
	65	Kg extra oil content in meal	
	$476.91	Canola oil feed value equivalent per tonne (167.28 TDN)	
	$31.00	Residual oil canola meal premium	
x	0%	Oil premium payable	
=	**$0.00**	**Oil premium per tonne**	
+	$262.15	Canola meal - 34% protein	
=	**$262.15**	**Canola meal price per tonne**	
x	28.47	Tonnes canola meal	
=	**$7,465**	**Canola meal income**	
	$12,311	**Feedstock - Canola**	
-	**$7,465**	**Canola meal income**	
Total =	**$4,847**	**Net Feedstock Cost**	

1.02 Methanol

	15,000	Biodiesel Plant Capacity - litres	
x	0.99088	oil required per litre biodiesel	
x	0.915	Canola oil bulk density kg / L	
x	22%	Methanol required	
x	75%	Methanol recovery = 25%	
÷	1000	kg per tonne	
x	$460.00	Methanol per tonne	
Total =	**$1,032**	**Methanol**	

1.03 Catalyst

	15,000	Biodiesel Plant Capacity - litres	
x	0.99088	oil required per litre biodiesel	
x	0.915	Canola oil bulk density kg / L	
÷	1000	kg per tonne	
x	16.21	kg potassium hydroxide / tonne	
÷	1,000	kg per tonne	
x	600	Catalyst per tonne	
Total =	**$132**	**Catalyst**	

2. Other Operating Costs

2.01 Electricity

	42.50	**Total Tonnes of Canola**	
÷	30	Days per year - crush	
	1.42	**Tonnes canola per day**	
÷	8	Hours operation per day - crush	
	0.18	**Tonnes canola per hour**	
	1.4	Tonnes canola per day	
x	8.5	HP per tonne	
x	0.75	HP to kilowatts	
x	$0.069	Electricity rate - kWhr	
x	30	Days per year - crush	
x	8	Hours operation per day - crush	
=	**$150**	**Subtotal Electricity - crush**	
	15,000	Biodiesel Plant Capacity - litres	
x	0.066	kWhr per litre	
x	$0.069	Electricity rate - kWhr	
=	**$68**	**Subtotal Electricity - biodiesel**	
Total =	**$218**	**Electricity**	

2.02 Maintenance

	$20,000	capital cost - buildings	
+	$15,000	capital cost - equipment	
=	**$35,000**	**Total bldg. & equipment**	
x	2.5%	Maintenance rate	
=	**$875**	**Total Maintenance**	

2.03 Misc. Administration

	$500	misc. administration

2.04 Insurance

	$20,000	capital cost - buildings	
+	$15,000	capital cost - equipment	
=	**$35,000**	**Total bldg. & equipment**	
x	0.5%	Insurance rate	
=	**$175**	**Total Insurance**	

2.05 Property Taxes

	$20,000	capital cost - buildings	
+	$1,000	capital cost - land	
=	**$21,000**	**Total bldg. & land**	
x	1.5%	Property tax rate	
=	**$315**	**Total Property tax**	

2.06 Operating Interest

(Operating interest is charged on one half of the subtotal operating costs)

	$2,083	subtotal operating costs	
÷	2.00	average	
x	5.75	% operating interest rate	
=	**$60**	**Operating Interest**	

Capital Costs

Buildings	
Biodiesel Plant	$5,000
Canola oil Plant	$15,000
Total Building Cost	**$20,000**
Equipment	
Biodiesel Plant	$7,500
Canola oil Plant	$7,500
Total Equipment	**$15,000**
Total Building & Equipment	**$35,000**
Total Land Value	**$1,000**
Total Capital Investment	**$36,000**

B. Fixed Costs

3. Depreciation $\frac{\text{Original Cost - Salvage Value}}{\text{Useful Life}}$

		Biodiesel Plant	Canola Oil Plant	
3.01 Buildings				
		$5,000	$15,000	original cost
	-	$500	$1,500	salvage value
	÷	20	20	years useful life
	=	**$225**	**$675**	
3.02 Equipment				
		$7,500	$7,500	original cost
	-	$750	$750	salvage value
	÷	10	10	years useful life
	=	**$675**	**$675**	
Total Depreciation	**=**	**$2,250**		

4. Investment $\frac{\text{Original Cost + Salvage Value x Investment Rate}}{2}$

		Biodiesel Plant	Canola Oil Plant	
4.01 Buildings				
		$5,000	$15,000	original cost
	+	$500	$1,500	salvage value
	÷	2.00	2.00	average
	x	1.75	1.75	% investment rate
	=	**$48**	**$144**	
4.02 Equipment				
		$7,500	$7,500	original cost
	+	$750	$750	salvage value
	÷	2.00	2.00	average
	x	1.75	1.75	% investment rate
	=	**$72**	**$72**	
4.03 Land				
		$1,000		land value
	x	1.75		% investment rate
	=	**$18**		
Total Investment	**=**	**$354**		

C. Labour

Canola oil

	0.3	Employees per shift	
x	30	Days per year	
x	8	Hours operation per day	
x	$12.00	Labour Rate per hour	
Total =	**$720**	**Canola oil Labour Cost**	
	0.03	Full time job positions	

Biodiesel

	0.3	Employees per shift	
x	30	Days per year	
x	8	Hours operation per day	
x	$12.00	Labour Rate per hour	
Total =	**$720**	**Biodiesel Labour Cost**	
	0.03	Full time job positions	

Total =	**$1,440**	**Labour**	
Total =	**0.1**	**Full time job positions**	

5. Value

5.01 Estimated On-Farm Biodiesel value

	$0.8850	Diesel (coloured) farm fuel - #1 ULSD	
x	15,000	Biodiesel Plant Capacity - litres	
Total =	**$13,275**	**Biodiesel value**	

5.02 Estimated Increased Fuel Efficiency value

	0.7960	Diesel fuel used - portion of B20 blend	
x	$0.8850	Diesel (coloured) farm fuel - #1 ULSD	
=	**$0.7045**	**Diesel fuel value - portion of B20 blend**	
	$0.8850	Diesel (coloured) farm fuel - #1 ULSD	
-	$0.7045	Diesel fuel value - portion of B20 blend	
=	**$0.1805**	**Biodiesel fuel value - portion of B20 blend**	
÷	0.1990	Biodiesel fuel used - portion of B20 blend	
=	**$0.9072**	**Total Relative biodiesel value**	
-	$0.8850	Diesel (coloured) farm fuel - #1 ULSD	
=	$0.0222	Balance - Relative biodiesel value	
x	15,000	Biodiesel Plant Capacity - litres	
Total =	**$334**	**Increased Fuel Efficiency value**	

5.03 Glycerol Sales

	1.4	Tonnes glycerol produced	
x	$0	glycerol per tonne	
Total =	**$0**	**Glycerol**	

For further information contact your local MAFRI office.

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