

## Appendix A – Benefit Cost Scenarios

### Comparison Cost and Returns Dynamic vs Historic Baseline

**Project Condition:** 2940 kg canola/ha on a 64.8 ha field near Lacombe, Alberta that received 110 kg N/ha fertilizer at basic level of implementation. Assumes 5% yield increase and 15% N use reduction through adoption of 4R source, time and place BMPs and field specific optimization of N rate. Farmer receives \$20/tCO<sub>2e</sub>.

#### ***Dynamic Baseline Approach***

Baseline = 1054 kg CO<sub>2e</sub>/ha

Project = 1054 kg CO<sub>2e</sub>/ha

#### **Basic Level of Implementation**

GHG Reduction =  $1054 - (0.85 \times 1054) = 158$  kg CO<sub>2e</sub>/ha

GHG Field = 158 kg CO<sub>2e</sub>/ha X 64.8 ha = 10,238 kg = 10.238 tCO<sub>2e</sub>

#### **Farmer Nets Out for Field**

\$3870 for additional canola (\$430/tonne X 9 tonne)

\$1390 saving in N fertilizer (\$1.30/kg N X 1,069 kg)

\$205 in carbon credits (\$20/tonne X 10.238 tCO<sub>2e</sub>)

\$324 for 4R Plan and data collection (\$5.00/ha, \$2.00/acre)

**\$4,978** increase in net revenue

#### ***Historic Baseline Approach***

Baseline = 0.4126 kg CO<sub>2e</sub>/kg crop

Project = 0.3584 kg CO<sub>2e</sub>/kg crop

#### **Basic Level of Implementation**

GHG Reduction =  $(0.4126 - (0.3584 \times 0.85)) = 0.1080$  kg CO<sub>2e</sub>/kg crop

GHG Field = 0.1080 X 2940 X 64.8 = 20,575 = 20.575 tCO<sub>2e</sub>

#### **Farmer Nets Out for Field**

\$3870 for additional canola (\$430/tonne X 9 tonne)

\$1390 saving in N fertilizer (\$1.30/kg N X 1,069 kg)

\$412 in carbon credits (\$20/tonne X 20.575 tCO<sub>2e</sub>)

\$324 for 4R Plan and data collection (\$5.00/ha, \$2.00/acre)

**\$5,348** increase in net revenue

**Note:** Example scenarios above used in Tables A1 and A2 to demonstrate gross returns and margins.

Table A1 – Potential Gross Farm Revenue from 4R Climate Smart Offsets.

Carbon Price	Return to Farmer	Basic 15% Reduction	Advanced 25% Reduction	Basic Annual Farm	Advanced Annual Farm	Basic Project Farm	Advanced Project Farm
\$/tCO <sub>2</sub> e		\$/ha/yr		\$/1000 ha			
<i>Dynamic Baseline</i>							
15.00	10.00	1.58	2.63	1,580	2,630	12,640	21,040
20.00	13.20	2.09	3.47	2,086	3,472	16,685	27,773
25.00	16.50	2.61	4.34	2,607	4,340	20,856	34,716
30.00	20.00	3.16	5.26	3,160	5,260	25,280	42,080
35.00	23.35	3.69	6.14	3,689	6,141	29,514	49,128
40.00	26.70	4.22	7.02	4,219	7,022	33,749	56,177
45.00	30.00	4.74	7.89	4,740	7,890	37,920	63,120
50.00	33.35	5.27	8.77	5,269	8,771	42,154	70,168
<i>Historic Baseline</i>							
15.00	10.00	3.18	5.30	3,180	5,300	25,440	42,400
20.00	13.20	4.20	7.00	4,198	6,996	33,581	55,968
25.00	16.50	5.25	8.75	5,247	8,745	41,976	69,960
30.00	20.00	6.36	10.60	6,360	10,600	50,880	84,800
35.00	23.35	7.43	12.38	7,425	12,376	59,402	99,004
40.00	26.70	8.49	14.15	8,491	14,151	67,925	113,208
45.00	30.00	9.54	15.90	9,540	15,900	76,320	127,200
50.00	33.35	10.61	17.68	10,605	17,676	84,842	141,404
<sup>1</sup> Typically two-thirds of sale price returned to farmer. Values based on 0.158 tCO <sub>2</sub> e/ha in offsets, dynamic baseline scenario and 0.318 tCO <sub>2</sub> e/ha in offsets, historic baseline scenario.							
<sup>2</sup> Typical commercial farm in Prairie Canada where basic level could be achieved within 1 to 3 crop cycles.							
<sup>3</sup> Assumes 8 year project life							