the PEMBINA institute Sustainable Energy Solutions

Memorandum

For: Casey Brennan, Wildsight
By: Alison Jamison and Greg Powell
Re: Elk Valley Coal Mines GHG Footprint

Project: 211-004
Date: November 2007

Wildsight retained the Pembina Institute to estimate the total greenhouse gas (GHG) emissions associated with Elk Valley Coal's five coal mines near Fernie, BC: Coal Mountain, Elkview, Fording River, Greenhills, and Line Creek.[1] This memo reports the estimated GHG emissions and outlines the methodology used.

The following table summarizes the estimated annual GHG footprint of the five Elk Valley Coal mines.

Annual Emissions Summary (kt CO_2e / yr)

Activity	Coal Mountain	Elkview	Fording River	Greenhills	Line Creek	Elk Valley Totals
Extract inputs (natural gas, diesel, coal, etc)	10	27	40	20	10	118
Generate electricity	0.8	2.0	2.9	1.5	0.7	8.7
Transport inputs within Canada (to Elk Valley facilities)	86	224	336	169	80	985
On-site processes (mine and process coal, on-site transportation)	125	351	451	352	99	1,378
Transport product (coal) within Canada	37	97	145	73	35	426
Use coal in manufacturing within Canada	281	727	1,091	551	260	3,201
Emissions within Canada	**541**	**1,428**	**2,066**	**1,167**	**484**	**6,117**
Transport product (coal) outside Canada	220	570	855	432	204	2,509
Use coal in manufacturing outside Canada	4,408	11,428	17,143	8,653	4,082	50,285
Emissions outside Canada	**4,628**	**11,999**	**17,998**	**9,085**	**4,285**	**52,794**
Total Emissions	**5,169**	**13,427**	**20,064**	**10,252**	**4,769**	**58,911**

Considering the entire coal product cycle, Elk Valley Coal's five mines are expected to emit 59 Mt CO_2e/yr, which represent approximately 90% of British Columbia's total GHG emissions and 8% of Canada's total GHG emissions in 2005. The annual product cycle emissions of Elk Valley Coal's five mines are approximately equivalent to the greenhouse gas emissions from

- adding 15 million cars to the road for one year,[2]
- 23 million homes heated for one year,[3] or

[1] Elk Valley Coal also operates the Cardinal River mine but its emissions are not included in this estimate.

[2] Transport Canada. *Transportation in Canada 2004 - Annual Report*. Ottawa: Government of Canada, 2004. Also available at http://www.tc.gc.ca/pol/en/report/anre2004/tc2004ae.pdf (accessed November 19, 2007).

- 170 Burrard Thermal Generating Stations operating for one year.[4]

The majority (90%) of these emissions are expected to occur outside Canada, primarily from the use of the coal in steel manufacturing. The estimated emissions that occur within Canada represent approximately 9% of BC's total GHG emissions and 1% of Canada's total GHG emissions in 2005. The annual product cycle emissions of Elk Valley Coal's five mines that occur within Canada are approximately equivalent to the greenhouse gas emissions from

- adding 1.6 million cars to the road for one year,[5]
- 2.4 million homes heated for one year,[6] or
- 18 Burrard Thermal Generating Stations operating for one year.[7]

All emissions associated with the 'product cycle' of the coal mined at the Elk Valley sites are included in this estimate. The product cycle includes activities that occur upstream of the coal mine (e.g. extracting inputs such as natural gas and diesel), activities that occur on-site (i.e. within the mines' spatial boundaries), and activities that occur downstream of the mine (e.g. transporting the product to the end user). The following table summarizes the major emissions-generating activities that are required to operate a coal mine and are included in this estimate.

Activity Name	**Components of Activity**
Extract inputs (upstream of site)	Extract, process, upgrade, and refine natural resource inputs used at Elk Valley facilities (e.g. natural gas, diesel, and coal).
Generate electricity	Operate hydropower and thermal plants as per normal BC Hydro operations. Transmission losses are not included.
Transport inputs to site	Transport diesel by truck from the refinery where it is produced to the Elk Valley facilities.
On-site processes (at coal mines and facilities)	Mine coal in open pit truck and shovel mine, prepare coal in plants (crush or screen, remove extraneous material, wash and dry), and load coal.
Transport coal to markets (downstream of site, some overseas)	Transport coal by truck, rail, or ship to markets in Canada (Exshaw, AB and Hamilton, ON) and abroad (Rio de Janeiro, Shanghai, Rotterdam, and Mexico).

The source of the on-site emissions is those reported to Environment Canada by Elk Valley Coal. Therefore, a significant assumption inherent in this estimate is that the five Elk Valley mines reported their emissions accurately and correctly. Other assumptions and data sources include the following:

[3] Natural Resources Canada. *Energy Use Data Handbook*. Ottawa: Government of Canada, 2006. Also available at http://www.oee.nrcan.gc.ca/Publications/statistics/handbook06/pdf/handbook06.pdf (accessed November 19, 2007).

[4] British Columbia Hydro and Power Authority, *Facility and GHG Information - Burrard Generating Station* (Environment Canada, November 19, 2007, 2005); available from http://www.ec.gc.ca/pdb/ghg/onlineData/FacilityAndGHG_e.cfm?facil=428&year=2005.

[5] Transport Canada. *Transportation in Canada 2004 - Annual Report*.

[6] Natural Resources Canada. *Energy Use Data Handbook*.

[7] British Columbia Hydro and Power Authority, *Facility and Ghg Information - Burrard Generating Station*.

- Product is assumed to be bituminous coal (67% carbon)[8];
- Elk Valley Coal's total production was reported in Teck Cominco's 2006 Annual Report[9]; emissions for individual mines are prorated based on production capacity *as per* the brochures on the Elk Valley Coal website[10];
- All inputs are assumed to come from within Canada;
- Outputs are assumed to go to Exshaw (1%) Hamilton (5%), Rio de Janeiro (8%), Manzanillo, Mexico (8%), Rotterdam (34%), and Shanghai (45%), based upon Elk Valley Coal's markets presentation[11];
- End use of the coal is primarily steel manufacturing, with some cement kilning;
- Emissions associated with on-site coal mine activities are based upon 2005 data reported to Environment Canada by Elk Valley Coal; and
- Mines are assumed to have access to grid electricity.

[8] Elk Valley Coal uses the term "metallurgical coal"

[9] http://www.teckcominco.com/Generic.aspx?PAGE=Investors+Pages%2FAnnual+Financial+Report&portalName=tc Accessed October 9, 2007

[10] http://www.elkvalleycoal.ca/operations/ Accessed October 9, 2007

[11] Elk Valley Coal, *Our Market*, Presentation September 14-16, 2006 www.elkvalleycoal.ca/upload/media_element/10/01/2943_060912evccoalmarketspresentation.pdf Accessed October 9, 2007