Illinois Commerce Commission
Response to Data Request dated July 20, 2006
Enbridge Energy
Docket No. 06-0470

ATTACHMENT H

Dr. Ronald Promboin's Economic Benefit Study
And
Related Work Papers

Typical operations period impacts are 1,100+ jobs along the Wisconsin portion of Southern Access (and 600+ for Southern Lights). Total economic output impacts are slightly over $300 million/ year, roughly two-thirds from Southern Access.

Comparable job impacts for Illinois are somewhat under 400 and 300, respectively, for Southern Access and Southern Lights. Total economic output impacts are around $135 million per year, 60 percent from Southern Access.

The Project

Enbridge (Enbridge) has proposed building a 454 mile pipeline through Wisconsin and Illinois to deliver crude oil south from the Canadian Oil Sands projects of northeast Alberta to U.S. refineries in Wisconsin, Illinois, and, via other pipelines, to refineries beyond those two states. Current plans are to construct 454 miles of 42" pipeline, 343 miles in Wisconsin and 111 miles in Illinois. In addition, Enbridge plans to build Southern Lights, a 16" pipeline to carry diluent north to be used in producing oil from the Oil Sands.[2] This pipeline will adjoin the main Southern Access line but extend further south into Illinois and northwest into Minnesota and North Dakota.

Enbridge projects that construction of Southern Access will cost slightly over $1 billion, excluding land. Construction of Southern Lights is expected to cost an additional $401 million. Enbridge made these cost projections in early 2006 and they were based on the company's expected construction schedule and assumed per-mile costs of construction.[3]

We exclude land acquisition from the analysis. The purchase of land is an exchange of assets (dollars for land), not economic activity such as the Bureau of Economic Analysis recognizes in constructing the RIMS II model.. To be sure, land acquisition does entail some real estate services, but these activities are small and not included in the analysis.[4]

One further step is needed. Enbridge's cost estimates are in current dollars as of the first quarter of 2006. RIMS II, however, is calibrated to 2003 dollars. Thus, we deflated the projected construction costs by the producer price index for construction to yield the requisite model input in 2003 dollars.

Enbridge provided indicative estimates of potential annual revenues from the two pipelines over their first ten years of operation (2007-2016 for Southern Access, 2009-2018 for Southern Lights). Since the purpose of the modeling exercise is to estimate general levels of impacts, specific annual projections over long time stretches do not add useful information. Year-by-year projections might also focus readers' attention on

[2] The Oil Sands yield bitumen, which is very dense material. It must be diluted to allow it to be transported via pipeline. Typical diluents are light hydrocarbons that are produced at refineries.
[3] All details of the analysis are shown in the associated Excel workbook, SouthernAccess.xls.
[4] We have also ignored the costs of fulfilling the requirements of the state regulatory processes.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

forecast details that will no doubt differ from what actually occurs, yet the message is in the typical level of activity.

Modeling Approach

The premise of the impact estimates is that pipeline construction and operation require the purchase of intermediate goods and services. Let us consider construction for discussion purposes.

Construction activity requires intermediate inputs of machinery and steel pipe. The totality of such purchases is known as "total requirements", "direct and indirect requirements", or "direct, indirect, and induced requirements" by various writers in various contexts. The direct requirements are whatever is spent, net of land, on construction; indirect requirements include purchases of intermediate inputs.

We estimate total jobs created by using unit coefficients derived from the RIMS II modeling system. RIMS II is an example of a regional Input-Output (I/O) model[5]. We discuss some of the I/O mathematics in the Appendix. The technique is commonly used in estimating the economic impacts of such proposed developments as sports facilities.[6]

The underlying data for RIMS II come from the quinquennial economic censuses (manufacturing and trade). These data show who sells what to whom, and RIMS II reflects in-region activity. The BEA maintains data on a county-by-county basis and provides aggregations of counties to users on a fee basis. We obtained multipliers for the entire states of Illinois and Wisconsin. We have shown several sets of multipliers in the Appendix.

Results

The results of applying the RIMS II multipliers are shown in detail in the associated Excel workbook, SouthernAccess.xls.

Overall, we estimate that constructing the Southern Access pipeline will create over13,000 person-years of jobs in Wisconsin, primarily in 2007, as well as nearly 4,000 person-years of jobs in Illinois, all in 2008. Total economic impacts are over $1.5 billion in Wisconsin (almost all in 2007) and over $500 million in Illinois (2008). These dates

[5] Wassily Leontief received the 1973 Nobel Prize in Economics for his pathbreaking work in I/O, though there are historical antecedents to his work. The earliest reference to the I/O approach is in the work of François Quesnay, whose *Tableau Economique* was published in 1758.

[6] Many studies of sports facilities have led to serious controversy. The issues in such cases, however, have rarely been with the I/O model (RIMS II, commonly) but with how it has been used. Promoters of stadiums typically count all attendance as new final demand in the region. In fact, at least some portion of attendance at sporting events is at the expense of attending, say, movie theaters or theme parks. The issue of substitution does *not* apply to the development of a new pipeline.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

should be understood to be notional, but the analysis is little changed (if at all) if there are unanticipated delays.

We estimate that constructing Southern Lights, the diluent line will create nearly 4,200 jobs in Wisconsin and over 2,500 jobs in Illinois. Total economic output will increase by nearly $500 million in Wisconsin and over $350 million in Illinois. These impacts occur in 2008 according to our modeling assumptions.

Typical operations period impacts are 1,100+ jobs along the Wisconsin portion of Southern Access (and 600+ for Southern Lights). Total economic output impacts are slightly over $300 million/ year, roughly two-thirds from Southern Access. Comparable job impacts for Illinois are somewhat under 400 and 300, respectively, for Southern Access and Southern Lights. Total economic output impacts are around $135 million per year, 60 percent from Southern Access.

Employment or jobs should be understood as person-years of employment in the state. Total Output Generated reflects in-state purchases in the activity plus the intermediate inputs purchased to support final demand in construction or operations.

Upside Potential

Our impact estimates are based on a representative scenario for the development and use of the Southern Access Pipeline. There is, however, a potential for additional economic activity that is worth recognizing but that is too speculative for us to try to quantify: refinery expansion.

We understand that Enbridge is sponsoring a study of potential refinery additions in Wisconsin and Illinois to utilize crude oil from the Canadian Oil Sands. Such projects can easily run to hundreds of millions of construction dollars (which are subject to the construction multipliers shown in the Appendix). In addition, refinery operations create jobs and economic output. We have included the relevant RIMS II multipliers in the Appendix table.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

Appendix

We discuss two issues in this Appendix: input projections and input-output model mathematics. We also present a table of selected RIMS II multipliers.

Input Issues

Enbridge Projections

All of the cost and revenue projections were provided by Enbridge. Construction cost estimates were developed on a per-mile basis, then allocated by state and project stage according to projected mileage.

Enbridge's phasing of the construction project – the association of Stage 1 to 2007 and Stage 2 to 2008 should be understood to be notional – the dates are predicated on completing regulatory clearance requirements in a timely manner. The analysis is little-changed (if at all), however, if the regulatory process takes longer than anticipated.

The revenue projections for both the Southern Access Pipeline and the Southern Lights line were provided by Enbridge. Both were built up from complex sets of assumptions and should be considered to be indicative of magnitudes rather than definitive. That is why they are expressed as annual averages over the first decade of operations.

Deflation

We used two fairly specific Producer Price Index (PPI) measures to deflate Enbridge's early-2006 cost estimates to the 2003 dollars needed for RIMS II. For construction, we used the PPI for "Other heavy construction" (Series ID: PCUBHVY). For pipeline revenues, we used the PPI for "Pipeline transportation of crude oil, except on the TAPS" (Series ID: PCU486110486110312).[7]

To bring the total output estimates to early 2006 dollars, we inflated the RIMS II 2003-dollar output by the PPI for "Finished goods" (Series ID: WPSSOP3000). It is clear that the goods and services purchased to build the pipelines or operate them cover a wide range, and this index is the broadest industrial (vs. consumer-based) measure.

[7] TAPS is the Trans Alaska Pipeline System.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

The Basic Input-Output Model

We describe briefly the mathematical structure of the I/O approach below. The intent is to motivate the approach, not to provide a full textbook treatment.

Suppose we partition economic activity into, say, 400 industries. Then, the premise is that the total output of an industry (measured in dollars) – let us pick construction – is distributed as an intermediate input to other industries and as final demand. If we express this point mathematically, collapsing the other 399 industries into "all other" industries for expository purposes, we have

(1) Construction total = sales to construction + sales to all other + final demand
All other total = sales to construction + sales to all other + final demand

We can restate equation (1) in matrix terms:

(2) [Total output] = [Intermediate inputs] + [Final demand],

or

(3) [To] = [Io] + [Fd].

The key assumption is that the intermediate outputs can be expressed as constant proportions.

Then,

(4) [To] = [A][To] + [Fd].

Subtract [A][To] from both sides to yield

(5) [I – A][To] = [Fd],

where I is the identity matrix.

We can then determine [To] by inverting [I – A] to yield

(6) [To] = $[I-A]^{-1}$[Fd].

The total output or direct and indirect requirements multipliers are then given as the elements of $[I-A]^{-1}$.

The employment multipliers can be calculated similarly, replacing dollar values in the A matrix with employment.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

RIMS II Multipliers: Jobs per $MM (2003$) and Total Output[8]

Industry	RIMS Code	State	Jobs	Output
Construction	**230000**	**Illinois**	20.1222	2.5748
		Wisconsin	22.2323	2.3593
Pipeline Transportation	**486000**	**Illinois**	13.2148	2.4171
		Wisconsin	12.7320	1.9792
Petroleum Refineries	**324110**	**Illinois**	5.3600	1.7168
		Wisconsin	4.7660	1.4396

[8] RIMS II provides two sets of multipliers that might be used. We chose Table 1.4 multipliers as being based on finer industry detail than their Table 2.4 counterparts. The differences in actual values are small.

8190 Madrillon Court Vienna, VA 22182-3752 703/ 790-5395
rpromboin@cox.net

Illinois: 42" Pipeline, 16" Diluent Line

Line	Averaging Period	Annual Revenue Requirements	Deflator (PPI)	2003 $ Annual Revenue Requirements	Total Employment	Total Output (2006 $)
Southern Access	**2007-2016**	$33,720,605	1.1831	$28,500,840	377	$81,506,074
Southern Lights	**2009-2018**	$23,541,635	1.1831	$19,897,519	263	$56,902,486

Employment multipliers (jobs per $MM, 2003 $)	**Table 1.4**
Total	13.2148

Output multipliers	**Table 1.4**
Total	2.4171

PPI values	**2003**	**2006: Q1**	**Ratio**
Pipeline transportation of crude oil (except Alaska TAPS)	123.4	146.0	1.1831

Wisconsin: 42" Pipeline Case, 16" Diluent Line

Line	Averaging Period	Annual Revenue Requirements	Deflator (PPI)	2003 $ Annual Revenue Requirements	Total Employment	Total Output (2006 $)
Southern Access	**2007-2016**	$104,199,706	1.1831	$88,070,163	1,121	$206,232,059
Southern Lights	**2009-2018**	$56,864,654	1.1831	$48,062,317	612	$112,546,523

Employment multipliers (jobs per $MM, 2003 $)	**Table 1.4**		
Total	12.732		
Output multipliers	**Table 1.4**		
Total	1.9792		

PPI values	**2003**	**2006: Q1**	**Ratio**
Pipeline transportation of crude oil (except Alaska TAPS)	123.4	146.0	1.1831