

**BEFORE THE STATE OF MINNESOTA  
OFFICE OF ADMINISTRATIVE HEARINGS  
FOR THE MINNESOTA PUBLIC UTILITIES COMMISSION**

**In the Matter of the Application of Enbridge  
Energy, Limited Partnership, for a Certificate  
of Need for the Line 3 Replacement Project in  
Minnesota From the North Dakota Border to  
the Wisconsin Border**

**OAH 65-2500-32764  
MPUC PL-9/CN-14-916**

**In the Matter of the Application of Enbridge  
Energy, Limited Partnership for a Routing  
Permit for the Line 3 Replacement Project in  
Minnesota From the North Dakota Border to  
the Wisconsin Border**

**OAH 65-2500-33377  
MPUC PL-9/PPL-15-137**

**Rebuttal Testimony**

**of**

**Lorne Stockman**

**On Behalf of**

**Honor the Earth**

**October 11, 2017**

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1 **I. INTRODUCTION, PURPOSE, AND SUMMARY OF TESTIMONY**

2 **1Q. Would you please state your name?**

3 **A.** My name is Lorne Stockman.

4 **2Q. Are you the same Lorne Stockman who previously submitted Direct Testimony in**  
5 **this proceeding on behalf of Honor the Earth?**

6 **A.** Yes, I am.

7 **3Q. What is the purpose of your testimony?**

8 **A.** The purpose of this Rebuttal Testimony is to respond to the Direct Testimonies of the  
9 following Enbridge Energy, LP, (“Enbridge”) witnesses:

- 10 • Neil K Earnest, the President of Muse, Stancil & Co., (“Muse Stancil”), whose  
11 testimony generally relates to the commercial need for the Line 3 Replacement  
12 Project (“Project”), and more specifically to crude oil supply and demand  
13 forecasts upon which such alleged need is based;
- 14 • John Glanzer, the Director, Infrastructure Planning & Lifecycle Effectiveness,  
15 whose testimony relates to the potential commercial and operational impact of the  
16 Project, and alleged need for additional capacity on the Enbridge Mainline  
17 System, and the alleged operational benefits of the Project; and
- 18 • William J. Rennie, a partner in Oliver Wyman, Inc., whose testimony relates to  
19 the potential impact of denial of approval of the Project on rail transportation in  
20 Minnesota.

21 In addition, my Rebuttal Testimony responds to the Direct Testimonies provided by  
22 Shippers for Secure, Reliable and Economical Petroleum Transportation (“Shippers  
23 Group”), including those of Paul Kahler and John Van Heyst.

24 **4Q. Could you please summarize your Rebuttal Testimony?**

25 **A.** With regard to the Earnest and Van Heyst Testimonies, they provides very limited  
26 insights into the future of oil production in Canada and the future of petroleum demand in

27 Minnesota, the PADD 2 region, and the U.S. In my opinion, these testimonies  
28 significantly overestimates both the future demand for petroleum products and the  
29 potential for crude oil production and supply growth in western Canada.

30 With regard to the Glanzer and Paul Kahler Direct Testimonies, in my opinion  
31 they overstate the risk of apportionment on the Mainline System because their  
32 apportionment forecasts and calculations are entirely dependent on the supply and  
33 demand forecasts provided in the Earnest Testimony and/or the CAPP forecasts, which  
34 are incorrect, in my opinion. The Glanzer and Kahler apportionment forecasts do not  
35 represent independent assessments of commercial need for the Project, but rather describe  
36 *possible* adverse economic impacts that could occur if Mr. Earnest's and/or the CAPP  
37 forecasts of Canadian crude oil production and supply and U.S. demand for crude oil and  
38 petroleum are considered to be accurate. Denial of the Project would result in an increase  
39 in apportionment only to the extent that demand for transportation of crude oil on the  
40 Mainline System increases, which would happen if (a) crude oil supply and demand both  
41 increase; and (b) such demand cannot be met by existing pipeline capacity, planned  
42 capacity expansions, and appropriate use of railroad transportation. Since the Glanzer and  
43 Kahler apportionment forecasts are based on the defective supply and demand forecasts,  
44 these apportionment forecasts do not provide an accurate assessment of future  
45 apportionment of the Mainline System or the potential risks and economic harms faced  
46 by Mainline System shippers.

47 With regard to the Rennie Testimony, in my opinion it overstates the risk of adverse  
48 impacts on rail transportation in Minnesota, because (a) it also is expressly based on the  
49 crude oil supply and demand forecasts provided by the Earnest Testimony; and (b) is  
50 based on dated rail transportation data that fails to recognize the dramatic drop in crude-  
51 by-rail shipments through Minnesota in recent years. As result, the Rennie Testimony  
52 substantially overstates the potential adverse impacts that denial of the Project would  
53 have on rail transportation in Minnesota.

54 **II. THE TESTIMONY OF NEIL EARNEST INCLUDES A SUBSTANTIALLY**  
55 **INACCURATE FORECAST OF FUTURE CANADIAN CRUDE OIL**  
56 **PRODUCTION AND SUPPLY AND FUTURE DEMAND FOR CRUDE OIL BY**

57 **PETROLEUM PRODUCT CONSUMERS IN MINNESOTA, THE FIVE-STATE**  
58 **REGION, THE MIDWEST REGION, AND THE U.S. AS A WHOLE**

59 **5Q. Have you reviewed the Direct Testimony of Enbridge witness Earnest and Shippers**  
60 **for Secure, Reliable and Economical Petroleum Transportation witness John Van**  
61 **Heyst with regard to the alleged need for the Project?**

62 **A.** Yes, I have.

63 **6Q. Do you agree with these testimonies?**

64 **A.** No, I do not. In my opinion, Mr. Earnest substantially overstates future increases in  
65 Canadian crude oil supply available for export and overstates future increases in demand  
66 for petroleum products by consumers in Minnesota, the five-state region, the Midwest,  
67 and the U.S. as a whole. Mr. Earnest’s testimony suffers from being over-reliant on the  
68 overly optimistic Canadian crude oil supply forecasts of the Canadian Association of  
69 Petroleum Producers (“CAPP”), the National Energy Board of Canada (“NEB”), and the  
70 Alberta Energy Regulator (“AER”). The Direct Testimony of Mr. Van Hyest relies  
71 entirely on the crude oil production and supply forecasts produced by CAPP, and  
72 therefore suffers from similar deficiencies.

73 These testimonies also fail to adequately address the threat to petroleum product  
74 demand posed by electric vehicles and other transportation technologies. While there was  
75 data available on electric vehicle development that Mr. Earnest could have referred to, he  
76 did not refer to it. Also, in the nine months since his testimony was submitted, several  
77 developments have taken place that serve to dramatically increase the potential for  
78 electric vehicles (“EV’s”) to substantially reduce demand for petroleum fuel in both the  
79 mid and long-term. These developments reinforce the urgent need to consider the impact  
80 of EVs on petroleum demand, which fundamentally challenges the market need for  
81 expanded pipeline capacity. Overall, the testimony assumes a return to significantly  
82 higher oil prices while ignoring increasing evidence that oil demand will not increase  
83 with the result that oil prices will generally remain at or below the long-term historical  
84 average oil price, which price is too low to support an increase in crude oil production  
85 from western Canada.

86 **7Q. Would you describe any deficiencies you see in the CAPP, NEB, and AER Canadian**  
87 **crude oil supply forecasts?**

88 **A.** In my opinion, the CAPP, NEB, and AER Canadian crude oil supply forecasts are  
89 inaccurate because they *assume* that oil prices will increase and remain higher than  
90 current oil prices and that oil prices do not drop. Moreover, these forecasts also assume  
91 an oil price level that is substantially higher than the long-term average oil price, because  
92 only such high oil prices would be sufficient to make enough future expansions of oil  
93 sands extraction projects economic to the point that they would both: (a) provide enough  
94 new Canadian crude oil to offset ongoing production losses from existing oil wells and  
95 facilities in Canada; and (b) also increase the amount of crude oil available for export to  
96 the U.S. In order to show continued growth in western Canadian oil production, the  
97 CAPP, NEB, and AER forecasts must assume a future of sustained high oil prices, but  
98 these forecasts do not expressly discuss the rationale behind such oil price assumption,  
99 and they do not discuss all factors that are likely to impact oil prices during the forecast  
100 period.

101 With regard to the oil price forecasts used in the CAPP 2017 Report, the oil  
102 production and supply forecasts in this report is based in part on a survey of oil sands  
103 producers conducted in the first quarter of 2017. Attachment LS-5 (Direct Testimony)  
104 CAPP Report 2017 at 3. The report states:

105 Producers were asked to respond to the survey based on their own  
106 company's view of the price outlook as well as recent policy  
107 developments including federal and provincial climate change  
108 policies. The survey results were then "risked" based on each  
109 project's stage of development while giving consideration to each  
110 company's past performance for previous phases of projects  
111 relative to public announcements. The reasonableness of the  
112 overall forecast was then assessed against historical trends during a  
113 final review. (Emphasis added.)

114 Thus, the CAPP report is not based on a particular oil price forecast, but rather is based  
115 on a variety of price forecasts that best suit individual Canadian producers. It appears  
116 that CAPP does not disclose the price forecasts used by Canadian oil producers and does  
117 not even require that individual producers disclose these price forecasts to CAPP. As a

118 consequence, the CAPP production and supply forecasts are not based on a known price  
119 forecast. Instead, it should be assumed that the individual producers chose price forecasts  
120 that support the commercial goals of these companies. Moreover, the CAPP 2017 Report  
121 also states (at p. 3) that it reviews the “reasonableness” of its forecast during a final  
122 review, without further describing what factors are considered in such review or how this  
123 “reasonableness” assessment impacted its overall production and supply forecasts. The  
124 lack of transparency and objective analysis in this “black box” process makes the CAPP  
125 forecasts unreliable and indicates that its forecasts are merely biased projections based on  
126 the commercial aspirations of western Canadian crude oil producers. As such, the  
127 Minnesota Public Utilities Commission should not rely on this biased, self-serving, and  
128 non-transparent industry forecast, nor should it rely on the Direct Testimonies of Mr.  
129 Earnest and Mr. Van Heyst that use the CAPP forecasts as a basis for their testimonies.

130 Likewise, it does not appear that the NEB provides a detailed description of its  
131 forecasting methodology and modelling. The Earnest Direct Testimony relies on the  
132 NEB’s January 2016 Energy Futures Report and its October 2016 Update. Muse Stancil  
133 Report at 44. However, Mr. Earnest does not describe the analytical methodology used  
134 by the NEB in its forecast creation, nor does it appear that a description of such  
135 methodology is available online at the NEB’s website for this report.<sup>1</sup>

136 My opinion is that crude oil prices will fluctuate, but that on-average they will not  
137 exceed the long-term historical average price of about \$50/bbl. Moreover, current market  
138 trends indicate that oil prices are more likely to decrease from the long-term average  
139 during the forecast period, particularly due to the increased use of EVs and technologies  
140 that reduce oil consumption, as well as due to continued global efforts to stop global  
141 warming.

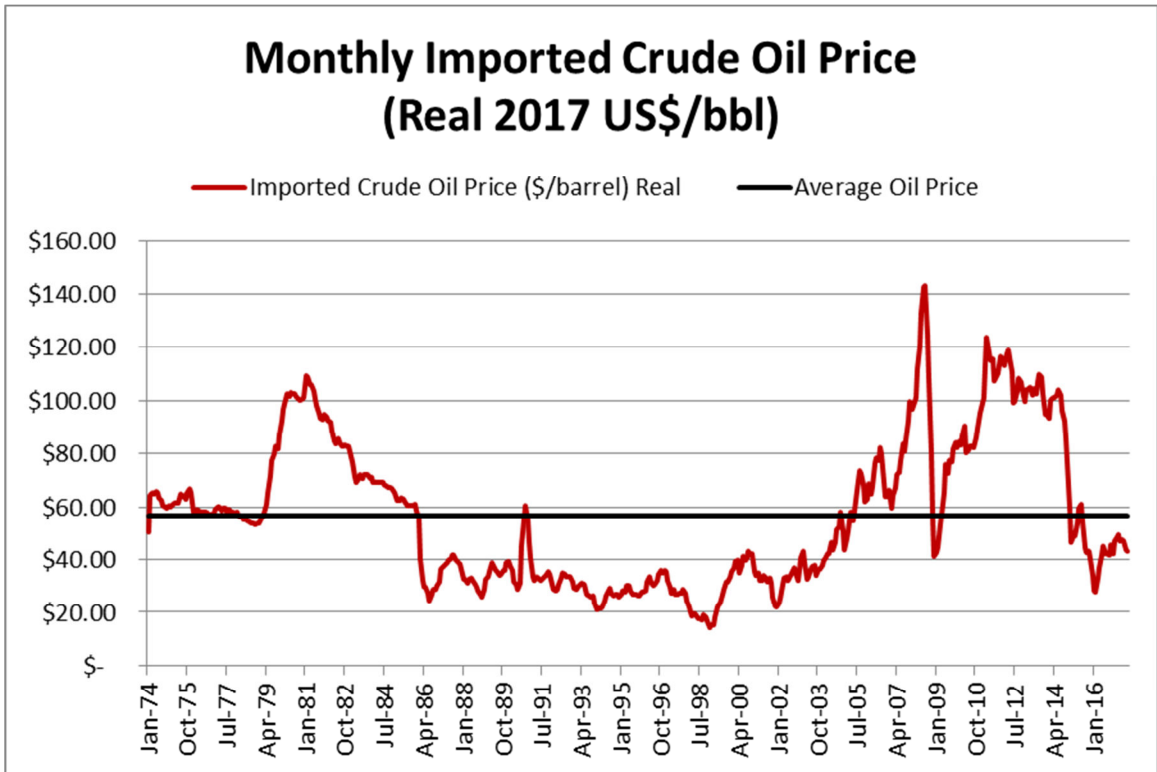
142 As discussed in my Direct Testimony at Lines 224-226, the 100-year average  
143 price of crude oil in real inflation-adjusted dollars is approximately \$50.00. Although  
144 the U.S. Energy Information Agency’s (“EIA”) real oil price data extends back to only

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<sup>1</sup> <https://www.neb-one.gc.ca/nrg/ntgrtd/ft/index-eng.html>



145 January 1974, it shows that the real price of crude oil averaged \$56.74/bbl between then  
146 and July 2017. Attachment LS-35.



147 The U.S. began recording oil price data at the time of the first Mideast Oil Crisis, such  
148 that the EIA data captured the relatively high oil prices in the late 1970s and early 1980s,  
149 but it does not capture the generally lower oil prices in prior decades.

151 Accordingly, the CAPP, NEB, and AER forecasts relied on by Mr. Earnest are  
152 inaccurate because these forecasts all assume a return to above average oil prices in the  
153 2020s and thereafter, based on an assumption of continued growth in global oil demand.  
154 The Earnest Direct Testimony does not consider a future in which oil price remain at  
155 current levels or drop, or a future in which demand goes into decline. In such a scenario,  
156 which appears increasingly likely, it is feasible that the demand for petroleum products in  
157 Minnesota, the wider Midwest region, and the U.S. would decline in line with, or more  
158 likely ahead of, global trends. This would lead to reduced utilization of the refineries in  
159 Minnesota, and the Midwest in general.

160 As discussed in my Direct Testimony, an average oil price of \$50/bbl is not  
161 sufficient to allow development of new oil sands extraction projects and it substantially

162 limits the return on investment from existing oil stands extraction projects. Also, oil  
163 sands crude oil is generally expensive to extract and process, such that it requires oil  
164 prices that are substantially higher than the long-term average to support new investment.  
165 An assumption that oil prices will not exceed the long-term average on a sustained basis  
166 means that crude oil production growth in western Canada is unlikely to occur. In this  
167 regard, my Direct Testimony provided a projection by the Rystad UCube Database  
168 showing that western Canadian crude oil production drops if a \$50/bbl oil price is  
169 assumed over the long-term.

170 **8Q. What are the differences between the CAPP, NEB, and AER forecasts used by Mr.**  
171 **Earnest and the projections provided by you from the Rystad Energy UCube**  
172 **Database?**

173 **A.** The CAPP, NEB and AER projections are publicly available, but the assumptions and  
174 methodology behind them are not transparent, nor has Mr. Earnest provided or described  
175 the data, calculations, and assumptions used by the agencies and CAPP in developing  
176 their forecasts.

177 In contrast, the Rystad Energy UCube Database is a commercial, “bottom up”  
178 database of the world’s oil and gas projects. The data is sourced from a continuously  
179 updated process that includes company reporting, government data and professional  
180 analysis and modeling. Over 65,000 oil and gas projects are assessed for costs, taxes and  
181 royalties, markets, geology and technological development. The real-life performance of  
182 similar projects is assessed and compared. Rather than assuming a utilization rate based  
183 on nameplate capacity, or taking company projections at face value, production is  
184 projected based on analysis of real world data. The database is updated monthly and thus  
185 incorporates the latest developments in oil and gas markets as well as company reports  
186 and announcements. The latest update was published on October 3, 2017. The UCube  
187 Database is accessed by paid subscription and intended to be of use to a wide range of  
188 energy professionals and investors. Although I do not have commercial access to all of  
189 the assumptions and data behind the Rystad data and charts presented in my testimony, I  
190 have provided information on Rystad Energy’s methodology and data sources in  
191 Attachment LS-36. I have presented the Rystad data to the Minnesota Public Utilities

192 Commission (“Commission”) because in my opinion it provides valuable independent  
193 insight into historical, current, and future development in the oil sands and likely future  
194 Canadian crude oil production and supply for export.

195 The following table (Attachment LS-37) compares the CAPP, the NEB low,  
196 reference, and high price, and AER western Canadian crude oil production forecasts to  
197 the western Canadian crude oil production projection generated by the Rystad UCube  
198 Database assuming both a fixed price of \$50/bbl and the Rystad “base case” oil price  
199 forecast. It shows that if an average future crude oil price is assumed, then oil production  
200 in the near-term will be much less than forecast by CAPP or the Canadian agencies.  
201 Even if the Rystad “base case” prices are assumed in which the West Texas Intermediate  
202 oil price rises to \$73/bbl (real 2017 US\$) by 2022, the UCube Database indicates that  
203 future western Canadian oil production will be significantly lower than forecast by the  
204 agencies or CAPP. Again, my opinion is that the Rystad UCube Database provides a  
205 superior assessment of likely future western Canadian crude oil production because it is  
206 an independent ‘bottom up’ database that is grounded in far more real-world data than  
207 the CAPP or agency forecasts.

Comparison of CAPP, NEB, AER, and Rystad Annual Production and Supply Growth Forecasts								
kbpd	Production Forecasts					Supply Forecasts		
	CAPP June 2017 Production	NEB Update Oct 2016 Production Low Price	NEB Update Oct 2016 Production Ref Price	NEB Update Oct 2016 Production high Price	Rystad Sept 2017 Production \$50/bbl Case (Att LS-22)	Rystad Sept 2017 Production Base Case (Att LS-22)	CAPP June 2017 Supply	AER ST98 Feb 2017 Removals from Alberta (equivalent to CAPP Supply)
2017	356	235	237	359	147	147	287	310
2018	281	168	198	219	189	214	321	170
2019	75	169	192	210	34	72	84	190
2020	64	81	99	123	76	112	69	210
2021	47	86	101	118	15	42	54	180
Sum 2017-2018	636	403	435	578	335	361	607	480
Sum 2017-2019	712	573	627	788	369	433	691	670
Sum 2017-2020	776	653	727	911	445	545	760	880
sum 2017-2021	823	740	827	1,030	460	587	813	1,060

209

210 This being said, the UCube Database does not take account of likely future reductions in  
211 crude oil demand that will be caused by increased use of EVs and other energy efficiency  
212 technologies. Thus, if it is assumed that oil prices will drop overtime to an average below  
213 \$50/bbl, then the Rystad UCube Database projection should be considered to be a high  
214 estimate of future western Canadian crude oil production.

215 **9Q. Could you summarize your opinion of the future of western Canadian oil**  
216 **production beyond 2020?**

217 A. Assuming an oil price of \$50/bbl or below, production growth in western Canada will not  
 218 grow substantially after 2020, and instead will decrease after 2023. As mentioned above  
 219 and as detailed in my original testimony, the growth in western Canadian oil production  
 220 over the next three to five years is primarily based on final investment decisions that were  
 221 made for major oil sands projects prior to 2014. Only a small amount of oil sands  
 222 capacity has been approved since 2013. So far in 2017, no new project has been  
 223 approved. If an oil price of \$50/bbl is assumed, then very little new western Canadian oil  
 224 production will come online after the current “under construction” extraction projects are  
 225 completed. This means that western Canadian oil production will peak in 2023. The  
 226 Rystad Energy data in Attachment LS-22 from my Direct Testimony showing future  
 227 western Canadian oil production peaking in 2023 is provided below:

<b>Rystad Energy Western Canadian Production Forecast Low Case</b>						
<b>(Crude Oil at \$50/bbl)</b>						
<b>Year</b>	<b>Conventional</b>	<b>Oil sands</b>	<b>Extra heavy oil</b>	<b>Tight oil</b>	<b>Sum</b>	<b>Annual Growth</b>
2015	618	2,047	484	292	3,441	
2016	530	2,147	413	278	3,368	(73)
2017	465	2,367	400	282	3,514	147
2018	410	2,627	383	283	3,703	189
2019	363	2,748	368	258	3,737	34
2020	316	2,892	353	252	3,813	76
2021	276	2,963	341	247	3,827	15
2022	243	3,032	334	244	3,853	26
2023	214	3,055	325	242	3,835	(18)

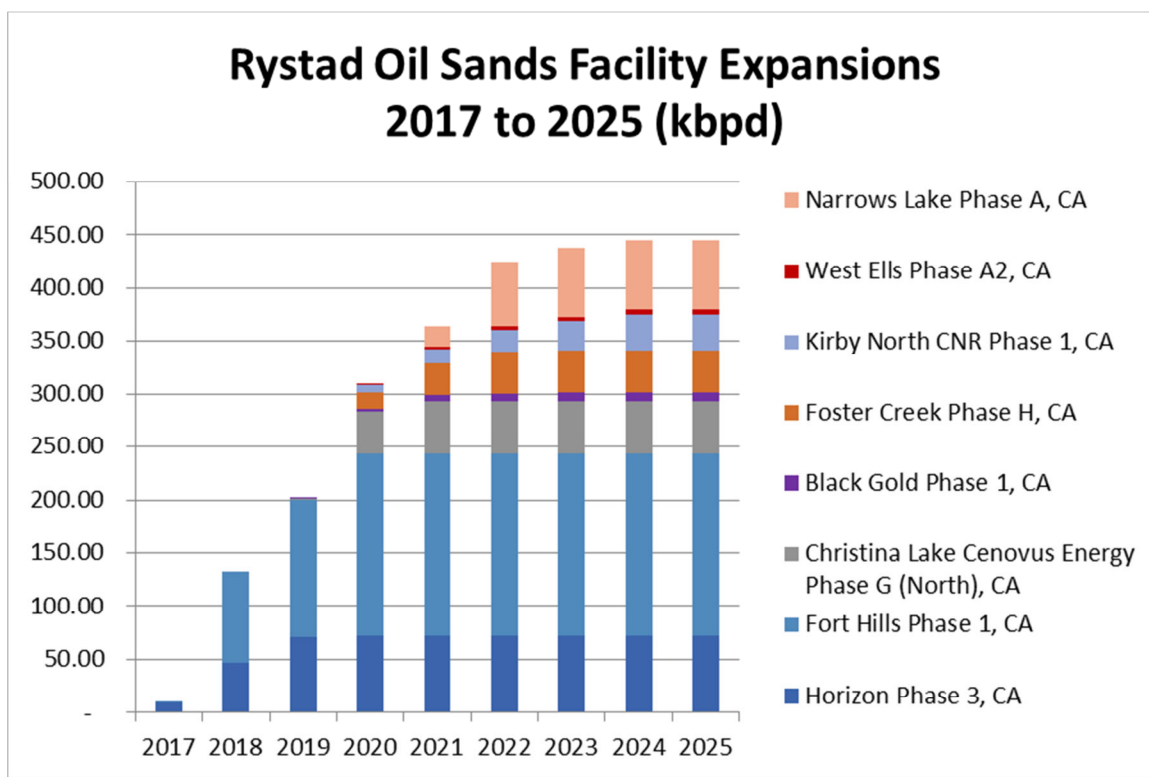
2024	188	3,062	314	240	3,803	(32)
2025	166	3,064	300	238	3,768	(35)
2026	148	3,065	286	236	3,734	(34)
2027	132	3,068	267	231	3,698	(36)
2028	119	3,088	245	225	3,677	(21)
2029	108	3,108	223	219	3,659	(18)
2030	100	3,108	205	211	3,623	(35)

228

229 The lower estimated western Canadian crude oil production figures generated by the  
230 Rystad UCube Database are supported by historical evidence related to the slower than  
231 anticipated development of “under construction” projects, relative to timeframe  
232 projections by project developers, as well as the fact that some completed extraction  
233 projects have failed to produce their full nameplate capacity. For example, when we look  
234 at the 10 highest producing oil sands facilities that use the Steam-assisted gravity  
235 drainage (SAGD) or Cyclic Steam Stimulation (CSS) extraction methods used by the vast  
236 majority of oil sands producers and which are predicted to comprise the vast majority, if  
237 not all, of extraction methods for future projects, we see that seven are producing  
238 approximately 19% to 60% under nameplate capacity based on average production  
239 figures for May to July 2017 published by AER, being the most recent period publicly  
240 available. The under-producing facilities include many with large nameplate capacities,  
241 including Suncor’s 203,000 bbl/day Firebag facility, which operated 36% under capacity,  
242 ConocoPhillips Canada Ltd.’s 150,000 bbl/day Surmont facility, which operated almost  
243 19% under capacity, the Canadian Natural Resources Limited Wolf Lake and Primrose  
244 facilities, which together operated 38% under their combined capacity of 120,000  
245 bbl/day, and Nexen’s 72,000 bbl/day Long Lake operation, which operated 42.5% under  
246 capacity during that three-month period.

247 **10Q. What other evidence supports your opinion that western Canadian oil production**  
248 **will be less than forecast by CAPP, the NEB, and AER?**

249 **A.** The lower estimated western Canadian crude oil production figures generated by the  
250 Rystad UCube Database assuming a long-term average \$50/bbl oil price are supported by  
251 historical evidence related to the slower than anticipated development of “under  
252 construction” projects based on project developer estimates, as well as the fact that some  
253 completed extraction projects have failed to produce their full nameplate capacity. The  
254 following chart of data from the Rystad UCube Database shows currently sanctioned oil  
255 sands capacity expansions through 2025. Attachment LS-38. Essentially, this chart  
256 provides a list of the oil sands extraction projects that CAPP claims would provide much  
257 of the new crude oil supply that would flow through the Project.



258

259 The data for this table is shown below:

260

261

(kbb/d)	2017	2018	2019	2020	2021	2022	2023	2024	2025
<b>CNRL Horizon Phase 3</b>	10	47	71	72	72	72	72	72	72
<b>Suncor Fort Hills Phase 1</b>	1 <sup>st</sup> oil	86	128	171	171	171	171	171	171
<b>Cenovus Christina Lake Phase G (North)</b>			2	40	50	50	50	50	50
<b>Harvest Black Gold Phase 1</b>			1	3	6	7	8	8	8
<b>Cenovus Foster Creek Phase H</b>				15	30	40	40	40	40
<b>CNRL Kirby North CNR Phase 1</b>				7	14	21	27	34	34
<b>Sunshine West Ells Phase A2</b>				1	2	3	4	4	4
<b>Cenovus Narrows Lake Phase A</b>					20	60	65	65	65
<b>Total</b>	10	133	202	309	364	424	438	445	445

262

263 As an initial observation of this data, it should be noted that just because the foregoing  
264 projects have been sanctioned does not guarantee that they will be constructed, or that if  
265 constructed that they will operate at their proposed nameplate capacities. The further into  
266 the future that a project is slated to start operations, the less certain is its capacity and  
267 schedule. For example, with regard to both the Foster Creek Phase H and Narrows Lake  
268 Phase A projects (together ~100 bpd), Cenovus has recently stated that construction of  
269 these projects will have to await debt reduction (Cenovus public comments at Aug 2017  
270 conference in Calgary), and in a July 2017 Investor Update described these projects as  
271 only “sanction ready” and stated that their construction timing is “TBD”. Attachment  
272 LS-39.

273 In addition to such clear statements, other projects are subject to commercial  
274 uncertainty, including the Suncor Fort Hills Project, which is the subject of a dispute  
275 between its majority owner, Suncor, and Total E&P, which owns a 29.2% share, because  
276 Total has refused to invest additional funding in the project as it has been the subject of  
277 multiple cost overruns and is now estimated to have a price tag of \$17 billion, up from



278 \$13.5 billion in 2013. Attachment LS-40. It is unclear how this funding dispute might  
279 impact the rate of development.

280 Further, the Rystad UCube “base case” projection is not appropriate because it  
281 rests on an assumption of continued global oil demand growth. As a result, oil prices in  
282 the UCube base case rise above the historical average, triggering new growth in supply  
283 from expensive oil sands projects.

284 The future of oil demand growth is now seriously in question because growth in  
285 EVs deployment is accelerating. Mr. Earnest’s testimony at line 109-113 dismissed the  
286 potential impact of EVs but provided no evidence to support his statement:

287 Q. Are electric vehicles anticipated to substantially reduce the use  
288 of petroleum products in Minnesota over the forecast period?

289 A. No. There is no combination of renewable fuel or electrical car  
290 initiatives that promise to reduce gasoline and diesel demand such  
291 that it could be met by local supply over the forecast period.

292 While the foregoing answer sought to qualify the dismissal of any threat to petroleum  
293 demand by EVs deployment by mentioning “initiatives” and by constraining the  
294 significance of any reduction to whether it is commensurate with local supply, the answer  
295 blatantly ignores widely accepted forecasts for EV adoption and the projected impact of  
296 this option on oil demand. In my opinion, EVs alone will reduce oil demand significantly  
297 in the forecast period, but so will more efficient internal combustion engines and other  
298 technology advances such as autonomous vehicles and ride sharing. I rely on a  
299 substantial number of detailed reports that document the rapid growth of EV technology  
300 and sales and forecast even greater acceleration. Some of these reports are included in  
301 Attachment LS-41 and include:

- 302 • International Energy Agency, *Global EV Outlook 2017: Two Million and Counting* (June  
303 2017)
- 304 • Edison Electric Institute, *Plug-in Electric Vehicle Sales Forecast Through 2025 and the*  
305 *Charging Infrastructure Required* (June 2017)

- 306 • J. Arbib & A. Seba, *Rethinking Transportation 2020-2030* (May 2017)
- 307 • UBS Evidence Lab, *Electric Car Teardown – Disruption Ahead?* (May 2017)
- 308 • Blackrock, *The Future of the Vehicle* (April 2017)
- 309 • The International Council on Clean Transportation, *Electric Vehicle Capitals of the*
- 310 *World Demonstrating the Path to Electric Drive* (March 2017)
- 311 • International Renewable Energy Agency, *Electric Vehicles: Technology Brief* (February
- 312 2017)
- 313 • The Brattle Group, *Electrification: Emerging Opportunities for Utility Growth* (January
- 314 2017)
- 315 • Fung Global Retail & Technology, *Electric Vehicles Global Markets* (2017)
- 316 • Transport & Environment, *Electric Vehicles in Europe – 2016: Approaching Adolescence*
- 317 (October 2016)
- 318 • Rocky Mountain Institute, *From Gas to Grid Building Charging Infrastructure to Power*
- 319 *Electric Vehicle Demand* (2017)

320

321 In addition, a number of banks and investment firms have published reports that predict  
322 accelerating EV sales and rapid development. The full reports are behind paywalls and  
323 are not within Honor the Earth’s financial capacity to provide, but links to report  
324 descriptions are provided below.

- 325 • CNBC, *JPMorgan thinks the electric vehicle revolution will create a lot of losers* (August
- 326 22, 2017) (Oil industry set up to be a loser as EV sales increase.)

327 [https://www.cnbc.com/2017/08/22/jpmorgan-thinks-the-electric-vehicle-revolution-will-](https://www.cnbc.com/2017/08/22/jpmorgan-thinks-the-electric-vehicle-revolution-will-create-a-lot-of-losers.html)

328 [create-a-lot-of-losers.html](https://www.cnbc.com/2017/08/22/jpmorgan-thinks-the-electric-vehicle-revolution-will-create-a-lot-of-losers.html)

329

- 330 • ING (Dutch bank), *Electric cars will take over, threatening European car industry* (July
- 331 13, 2017) (Electric cars are on a breakthrough, and even faster than we thought.)

332 [https://www.ing.com/Newsroom/All-news/Electric-cars-will-take-over-threatening-](https://www.ing.com/Newsroom/All-news/Electric-cars-will-take-over-threatening-European-car-industry.htm)

333 [European-car-industry.htm](https://www.ing.com/Newsroom/All-news/Electric-cars-will-take-over-threatening-European-car-industry.htm)

334

- 335 • Morgan Stanley, *One billion BEVs by 2050?* (May 5, 2017)

336 <https://www.morganstanley.com/ideas/electric-cars-sales-growth>

337

- 338 • Goldman Sachs, Cars 2025 (2017) (By 2025, 25% of cars sold will have electric engines,  
339 up from 5% today.)

340 <http://www.goldmansachs.com/our-thinking/technology-driving-innovation/cars-2025/>

341

- 342 • The Car Connection, OPEC thinks the electric car revolution is upon us, too (July 17,  
343 2017) (Just last year, OPEC predicted that by 2040, 46 million electric cars would roam  
344 Planet Earth's roads. This year, that number has been revised upward to 266 million.)

345 [http://www.thecarconnection.com/news/1111573\\_opec-thinks-the-electric-car-](http://www.thecarconnection.com/news/1111573_opec-thinks-the-electric-car-revolution-is-upon-us-too)  
346 [revolution-is-upon-us-too](http://www.thecarconnection.com/news/1111573_opec-thinks-the-electric-car-revolution-is-upon-us-too)

347

348 In the last few months, we have seen government announcements from China,  
349 India, France, Norway, the United Kingdom, and Germany all indicating they will set  
350 deadlines to end sales of internal combustion vehicles in their countries.<sup>2</sup> We have also  
351 seen the world's auto manufacturers announce plans to electrify their product base, some  
352 of them within a few years from now. These include Volvo, VW Group, Jaguar-Land  
353 Rover, GM, Ford and others.<sup>3</sup>

353

354 The data I draw on to conclude that EVs will have a substantial near-term impact  
355 on U.S. crude oil demand investigates EV deployment and/or crude oil demand for the  
356 US and/or at a global level, so does not discuss Minnesota or surrounding states directly.  
357 However, there appears no reason to believe that Minnesota and its neighboring states  
358 would be isolated from the impact of EV sales and other energy efficiency technology on  
359 petroleum demand during the forecast period, nor will these states be isolated from the  
360 economic and environmental benefits that this technology will bring.

360

361 My Direct Testimony contained projections from Bloomberg New Energy  
362 Finance (BNEF), which is probably the world's leading entity gathering data and  
363 providing analysis on the global new energy economy. It employs hundreds of experts  
364 and analysts across six continents that produce over 700 reports and forecasts annually.  
BNEF's electric vehicle team is unrivaled. In June 2017, BNEF updated its EV

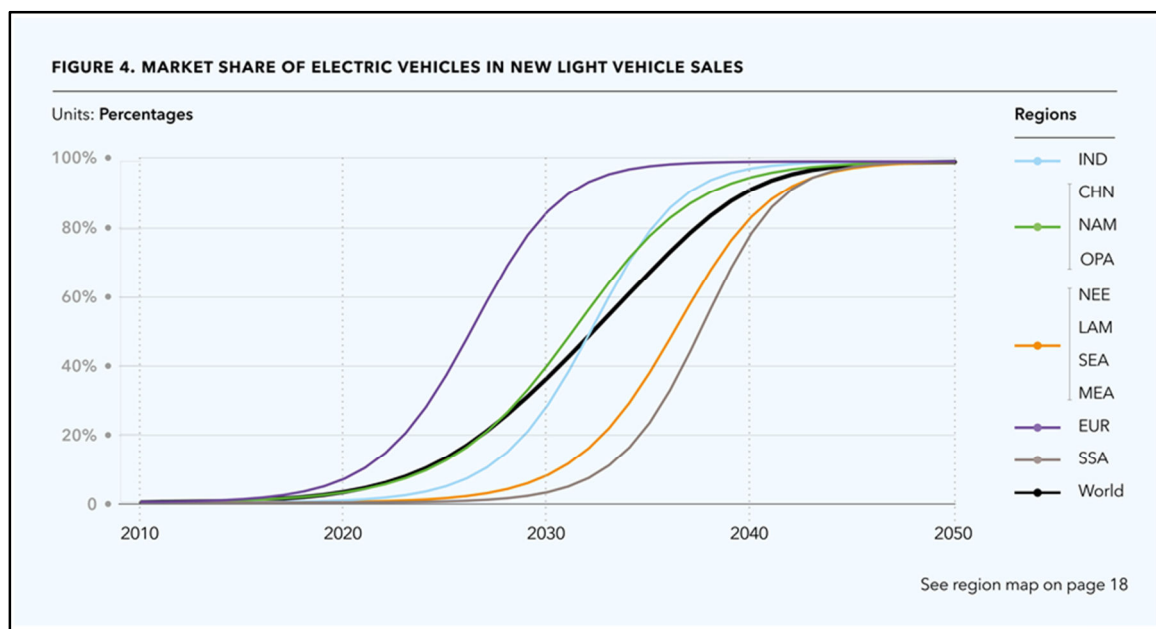
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<sup>2</sup> <http://money.cnn.com/2017/09/11/autos/countries-banning-diesel-gas-cars/index.html>

<sup>3</sup> <http://mashable.com/2017/10/03/electric-car-development-plans-ford-gm/#x17HaVTFPig9>

365 projections in its Long Term Electric Vehicle Outlook 2017, which projects out to 2040.  
 366 Compared to its 2016 publication, projections were revised up for EV sales primarily due  
 367 to battery costs falling faster than expected in the intervening period. It revised up the  
 368 number of EVs projected to be on the road by 2040 from 405.8 million in the 2016 report  
 369 to 530 million in the 2017 report, a 30% increase. BNEF projects that globally, EVs  
 370 alone will cause a reduction in oil demand of between 8.6 and 9.2 million barrels per day  
 371 by 2040. In the 2020s, oil displacement from EVs could be well over 1 million bpd.

372 There are in fact even more aggressive projections of EV adoption available.  
 373 DNV GL is a 150-year-old global quality assurance and risk management company with  
 374 roots in the Norwegian maritime industry. It has been involved in the energy sector for  
 375 decades. Earlier this year it produced a major analysis of the global energy transition  
 376 (Attachment LS-42). The publication, entitled *Energy Transition Outlook 2017, A*  
 377 *Global and Regional Forecast of the Energy Transition to 2050*, projects 100% EV  
 378 adoption in the light vehicle sector by 2050, with the North America region (green line in  
 379 chart below) reaching 60% by the mid-2030s, as shown in the following chart. As a  
 380 result, DNV projects a peak in global oil demand by 2022.



381  
 382 It is worth noting that the sharp decline in oil prices that occurred in late 2014 and  
 383 2015 was primarily due to a global oil glut of approximately 2 Mbpd. Given the

384 potentially substantial decrease in crude oil demand that would result from forecast  
385 deployment of EVs, it is highly likely that EVs will reduce the demand for petroleum  
386 products in Minnesota and the Midwest within the forecast period, and that this  
387 deployment could also lead to lower global oil prices than are currently projected by  
388 many agencies and private companies. If this occurs, the outlook for western Canadian  
389 crude oil production will be much lower than any of the projections presented by Mr.  
390 Earnest and the Muse Stancil Report, and also lower than the current Rystad Energy  
391 UCube base case scenario.

392 **III. THE TESTIMONIES OF JOHN GLANZER AND PAUL KAHLER RELATED TO**  
393 **POTENTIAL APPORTIONMENT RESULTING FROM DENIAL OF THE**  
394 **PROJECT ARE NOT ACCURATE BECAUSE THEY ASSUME FUTURE OIL**  
395 **FLOW THROUGH THE MAINLINE SYSTEM BASED ON THE FORECASTS**  
396 **PROVIDED BY MR. EARNEST AND CAPP**

397 **11Q. Have you reviewed the Direct Testimony of Enbridge witness Glanzer and Shippers**  
398 **for Secure, Reliable and Economical Petroleum Transportation witness Paul Kahler**  
399 **with regard to the alleged need for the Project?**

400 **A.** Yes, I have.

401 **12Q. Do you agree with these testimonies?**

402 **A.** No, I do not. Both testimonies assert that if the Project is not built that the Enbridge  
403 Mainline System will suffer substantial “apportionment,” meaning that Enbridge’s  
404 customers will seek to transport more oil on the system than it has the capacity to  
405 transport, with the result that Enbridge will apportion its capacity in accordance with its  
406 FERC tariff rules. At lines 214-216 and 358-372, Mr. Glanzer’s expressly references Mr.  
407 Earnest’s testimony as the source for his projections for future demand for the Mainline  
408 System. Should demand for crude oil transportation services on the Mainline System not  
409 increase as forecast by Mr. Earnest, then the apportionment forecast by Mr. Glanzer  
410 would decrease proportionally. Put another way, Mr. Glanzer’s testimony related to  
411 apportionment does not contain an independent forecast of need, but rather represents an  
412 assessment of a possible adverse impact – if Mr. Earnest’s forecasts of need are correct.  
413 Denial of the Project would result in an increase in apportionment only to the extent that

414 demand for transportation of crude oil on the Mainline System increases, which would  
415 happen if (a) crude oil supply and demand both increase; and (b) such demand cannot be  
416 met by existing pipeline capacity, planned capacity expansions, and appropriate use of  
417 railroad transportation. Since the Glanzer apportionment forecasts are based on the  
418 defective supply and demand forecasts provided by the Earnest Testimony, these  
419 apportionment forecasts do not provide an accurate assessment of future apportionment  
420 of the Mainline System. Similarly, the Kahler Direct Testimony assumes that future  
421 western Canadian crude oil supply will be as forecast by CAPP, which forecast is  
422 unreasonable and unreliable.

423 **IV. THE TESTIMONY OF WILLIAM RENNICKE RELATED TO POTENTIAL**  
424 **IMPACTS ON RAIL TRANSPORTATION FROM DENIAL OF THE PROJECT**  
425 **IS NOT ACCURATE BECAUSE IT ASSUMES FUTURE OIL FLOW THROUGH**  
426 **THE MAINLINE SYSTEM BASED ON THE FORECASTS PROVIDED BY MR.**  
427 **EARNEST AND IS BASED ON OUT-OF-DATE DATA**

428 **13Q. Have you reviewed the Direct Testimony of Enbridge witness Rennie with regard**  
429 **to the alleged need for the Project?**

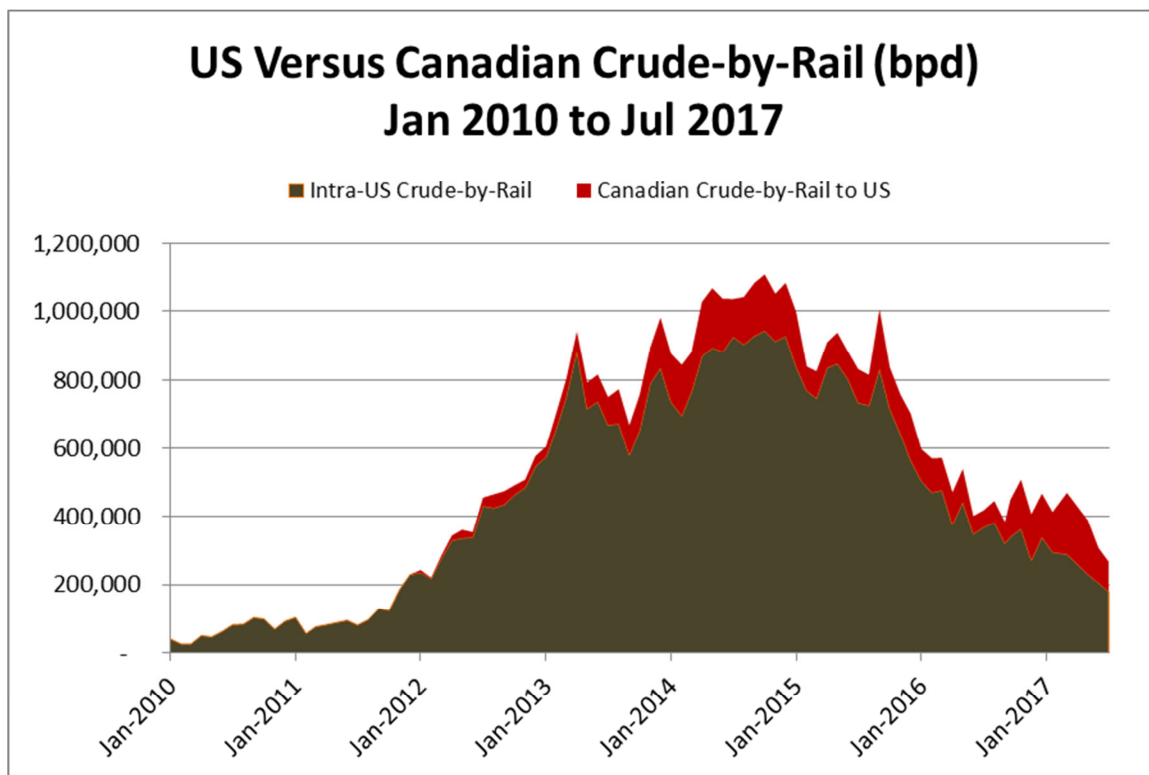
430 A. Yes, I have.

431 **14Q. Do you agree with this testimony?**

432 No, I do not. The testimony of Mr. Rennie claims that if the Project is not built that  
433 rail shipments of crude oil through Minnesota will increase dramatically and create  
434 adverse impacts on railroad service in Minnesota. Rennie Testimony Lines 34-43.  
435 Likewise, the report attached to his testimony (“Rennie Testimony”) at page 60 reaches  
436 the same conclusion. However, his testimony about the potential volumes of oil that  
437 might be transported through Minnesota is based on the crude oil supply forecast  
438 provided by Witness Earnest. Rennie Report at 10-11. Since Mr. Earnest’s forecast is  
439 not accurate and significantly overstates the volume of crude oil that is likely to be  
440 exported from Canada in the future, it follows that Mr. Rennie’s estimation of the  
441 potential impact of moving such volume of crude by rail is also inaccurate. In addition, I  
442 agree with the critique of the Rennie Report provided by Department Witness Fagan

443 with regard to the Report’s failure to evaluate potential U.S. demand, Fagan Report at  
444 Section 4.4. In addition, the assumption that all oil not transported through the Project  
445 would instead be shipped by rail through Minnesota is unreasonable, because, even  
446 assuming for the sake of argument that Mr. Earnest’s western Canadian crude oil supply  
447 forecasts are correct, some of this oil could travel to the U.S. and Canadian West and East  
448 Coasts on routes that do not pass through Minnesota.

449 In addition, the data in Mr. Rennie’s report is out-of-date with regard to  
450 existing crude-by-rail shipments through Minnesota and the degree of rail congestion  
451 caused by these existing shipments, and is based on data from 2014 and 2015. The U.S.  
452 Energy Information Agency (“EIA”) tracks crude-by-rail shipments within the U.S. as  
453 well as imports by rail from Canada. The following chart shows that total U.S. crude-by-  
454 rail (intra U.S. shipment plus imports from Canada) has dropped dramatically from its  
455 2014 annual average peak of 1,045,760 bpd, and the monthly all-time high of 1,138,567  
456 bpd in November 2014 (Attachment LS-43).

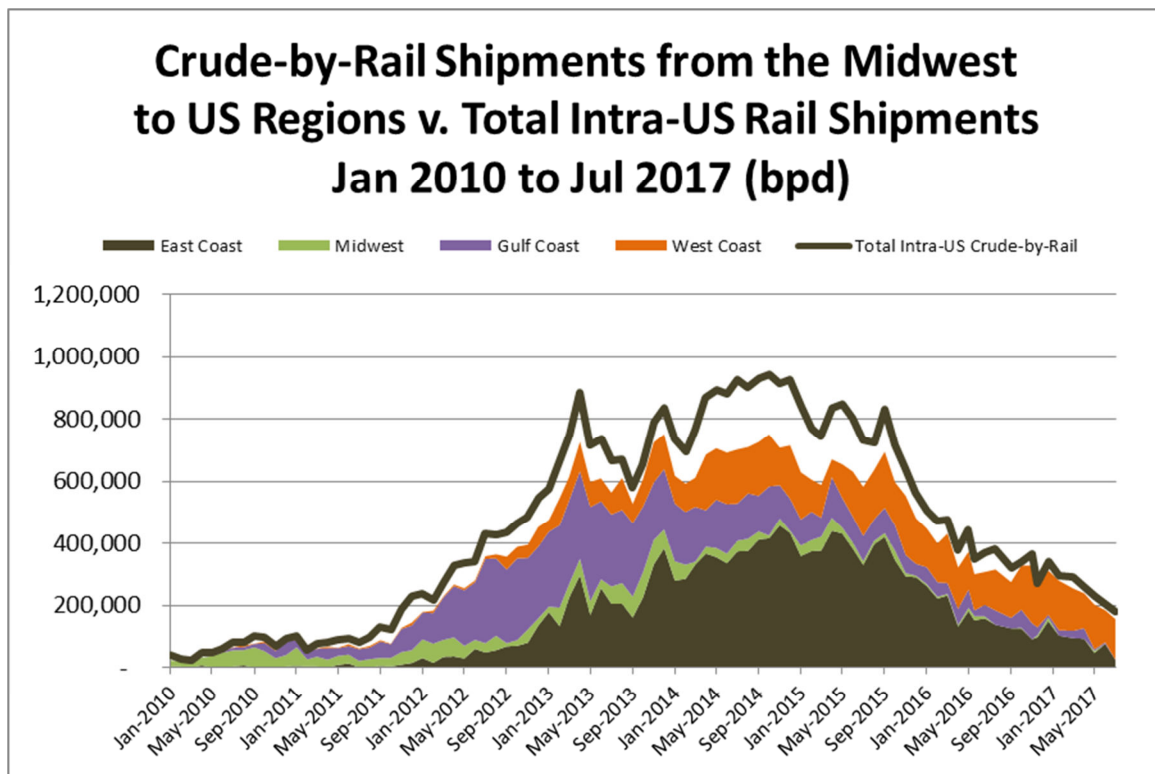


457

458 The 2017 annual average through July is 391,798 bpd, but the July data shows that total  
459 shipments have dropped to 275,798 bpd. This equates to a drop in the annual average of  
460 63%, but the July 2017 shipments were 77% below the November 2014 monthly peak.

461 Moreover, the trend in overall crude-by-rail shipments is downwards, due to  
462 increased pipeline take-away capacity from North Dakota on the a number of pipeline  
463 expansion including the Dakota Access Pipeline, which came online in June 2017, and a  
464 drop in crude oil production in North Dakota. The chart below shows that historically the  
465 vast majority of crude-by-rail shipments within the U.S. originated in PADD 2  
466 (Midwest), and that a decrease in these shipments of crude oil from the Midwest has  
467 resulted in a crash in the crude-by-rail boom. *Id.* In July 2017, there were zero  
468 shipments of crude-by-rail shipments from the Midwest to the Gulf Coast and within the  
469 Midwest. *Id.* Moreover, shipments from the Midwest to the East Coast in July 2017  
470 dropped to an average of just 23,839 bpd, *id.*, which using the Rennie estimate of 600  
471 barrels per car load, equates to roughly 40 rail cars per day from the entire Midwest to  
472 East Coast customers. Likely, not all of these cars would pass through Minnesota. As of  
473 July 2017, the only crude-by-rail route with substantial volumes of oil was from the  
474 Midwest to the West Coast, none of which would pass through Minnesota. Given that  
475 the Dakota Access Pipeline came online in June 2017, and that it may take some time for  
476 oil producer contracts with railroad shippers to expire, it is possible that the downward  
477 trend in crude-by-rail shipments will continue.





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Thus, crude-by-rail shipments from Midwestern oil fields, including those in the Williston Basin, are no longer of sufficient volume to create a substantial volume of rail traffic through Minnesota.

482

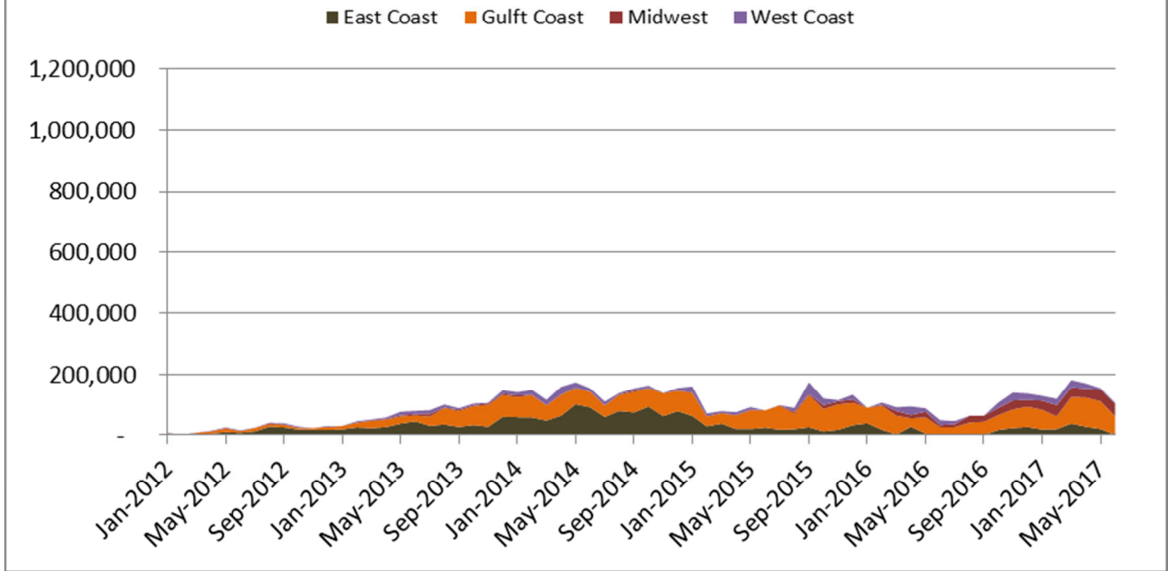
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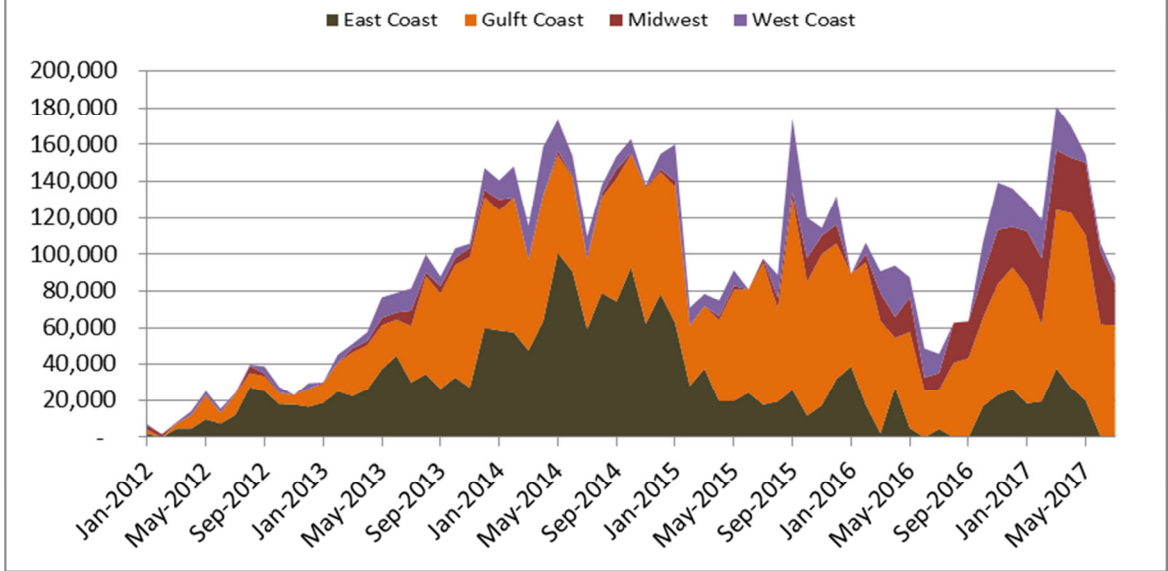
With regard to imports by rail from Canada, the following chart (the first at the same scale as the previous chart for total U.S. shipments, and the second at larger scale to show the destination trends more clearly) shows the most recent EIA data for imports of rail from Canada by destination of shipments. *Id.*

### Crude-by-Rail Shipments from Canada to US Regions Jan 2012 to Jul 2017 (bpd)



486

### Crude-by-Rail Shipments from Canada to US Regions Jan 2012 to Jul 2017 (bpd)



487

488 Although there was a recent increase in total imports by rail, imports have moderated and  
 489 are currently at 87,742 bpd, *id.*, which is approximately 146 rail car loads per day  
 490 (approximately one and one-third unit trains per day) to all destinations. Again, this is

491 not a relatively large amount of rail shipments. Further, not all of these shipments would  
492 pass through Minnesota.

493 Taken together and assuming that all current rail shipments from the Midwest and  
494 from Canada pass through Minnesota, then total rail shipments as of July 2017 would be  
495 less than 200 carloads per day, or on average the equivalent of about two unit trains per  
496 day. This being said, not all of these shipments would pass through Minnesota and the  
497 volume trends are downwards. Given the much higher historical levels of crude-by-rail  
498 shipments through Minnesota, these residual shipments cannot be said to congest  
499 Minnesota's rail network.

500 Further, it is very unlikely that crude-by-rail shipments from the Williston Basin  
501 will increase in the foreseeable future because pipeline take-away capacity from the  
502 North Dakota's Williston Basin far exceeds current oil production levels. According to  
503 the North Dakota Pipeline Authority, total pipeline and refinery take-away capacity from  
504 North Dakota's oil fields is 1,371,000 bpd. Attachment LS-44.<sup>4</sup> This being said, the  
505 Authority assigns the Dakota Access Pipeline a capacity of 520,000 bpd, whereas it could  
506 be expanded via the addition of pumps to 570,000 bpd (+50,000 bpd). In comparison,  
507 North Dakota Department of Mineral Resource data shows that July 2017 crude oil  
508 production in North Dakota was 1,047,526 bpd.<sup>5</sup> This means that if the Dakota Access  
509 Pipeline is increased to its maximum capacity, there is approximately 375,000 bpd of  
510 unused pipeline take-away capacity from North Dakota. In order for crude-by-rail from  
511 North Dakota through Minnesota to increase substantially, crude oil production in North  
512 Dakota would need to either increase by nearly this much, and/or North Dakota oil  
513 producers would need to receive an oil price that is high enough to justify the higher costs  
514 of shipping by rail to markets not served by pipelines, which from North Dakota means  
515 shipments to either the East or West Coasts. As long as pipeline capacity from North  
516 Dakota to Midwestern and Gulf Coast markets have unused capacity, it is not likely that  
517 oil producers would use rail, due to its higher cost.

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<sup>4</sup> Available at: <https://ndpipelines.files.wordpress.com/2012/04/oil-table-6-1-171.png> .

<sup>5</sup> Available at: <https://www.dmr.nd.gov/oilgas/stats/statisticsvw.asp> .

518                   Therefore Mr. Rennie's testimony is highly inaccurate, both because it relies on  
519 the unreasonable crude oil production and supply forecasts provided by Mr. Earnest, and  
520 because it is based on old crude oil transportation data that does not account for the  
521 dramatic crash in crude-by-rail shipments.

522 **V. THE TESTIMONY PRESENTED BY ENBRIDGE AND THE SHIPPERS DOES**  
523 **NOT JUSTIFY CONSTRUCTION OF THE PROJECT**

524 **15Q. Based on your review of the testimonies referenced in your rebuttal testimony, what**  
525 **conclusions do you draw about whether or not construction of the Line 3**  
526 **Replacement Project is needed?**

527 **A.** Neither Enbridge nor the Shippers have provided an accurate independent forecast of  
528 future crude oil supply or US petroleum demand sufficient to justify construction of the  
529 Project, particularly when the growing impact of EVs, other energy efficiency  
530 technology, and global greenhouse gas reduction policies are taken into consideration.  
531 The witnesses provided by Enbridge and the Shippers assume a *status quo* future, and  
532 turn a blind eye to impending changes in global oil markets. Further, this testimony  
533 ignores the vulnerability of operating and planned oil sands projects to a future of  
534 declining oil prices, or even a future in which global oil prices remain at or near historical  
535 averages. The oil sands industry is premised on assumptions that global demand for  
536 crude oil will increase indefinitely, that oil prices will rise and remain above historical  
537 averages, that EV adoption will not impact demand for crude oil, and that global climate  
538 change policy will fail. None of these assumptions are valid. Therefore, the forecasts  
539 proffered and/or used by the Enbridge and Shipper witnesses are inaccurate and paint a  
540 world of increasing pollution and higher prices for oil and all of the services it currently  
541 provides, instead of a world of innovation, efficient technology, and clean energy.

542 **16Q. Does this conclude your testimony?**

543 **A.** Yes, subject to an Honor the Earth request to provide surrebuttal testimony and updates  
544 to account for more recent data that should be available between the date of this  
545 testimony and the date of my testimony at the forthcoming Minnesota Public Utilities  
546 Commission hearing.