

Environmental Commissioner's Ontario Energy Report Comments from Ministry of Energy

Section Page Paragraph	Language from Report	Comments
Introduction pg. 2, Paragraph 5.	As it ran up failed to make investments...	Awkward, recommend rephrasing
Introduction, pg. 4, Paragraph 5.	But solar and wind-generated electricity were infant industries at the time with high costs and little local expertise; they would need time and support to grow.	Suggested edits: But solar and wind-generated electricity were infant industries at the time in Ontario with high costs and little local expertise; they would need time and support to grow. Rationale: Not correct to characterize solar and wind as 'infant industries' globally at the time given the extensive experience in Europe, as well as jurisdictions in the US such as California, and even more locally in Alberta.
Introduction pg. 5, Paragraph 1	It was successful in achieving the first two objective	Makes it sound like the GEA failed on its third objective by omission (economic development), but the footnote makes it clear that the third objective is simply out-of-scope for this report. Suggest amending in-text language to make it clear that the report is not suggesting Ontario failed on this objective.
Introduction, pg. 6, Paragraph 3.	Second, about 53% of the cost increase (27% for solar and 26% for wind) pays for renewable electricity under the GEA. Solar and biomass have the highest cost per unit of energy.	Suggest that a source be provided for these figures.
Introduction, pg. 6, Paragraph 4.	...through a Feed In Tariff	Suggested edit: ...through a Feed-In Tariff Rational: Gramatical edit. Feed-In Tariff, not Feed In Tariff.

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Introduction, pg. 6, Paragraph 5.	Suggested edits: Ontario also agreed to pay especially high prices for individual, aboriginal and community projects, so that these groups could afford to participate in the renewable energy economy.	Suggested edits: Ontario also agreed to provide price adders pay especially high prices for individual, aboriginal and community- led projects, so that these groups could afford to participate in the renewable energy economy. Rationale: Suggested change to mirror FIT program terminology.
Introduction, pg. 6, Paragraph 6.	The Large Renewable Procurement	Suggested edits: The first Large Renewable Procurement process
Introduction, pg. 6, Paragraph 6.	(roughly 9 c/kWh for wind, and 16 c /kWh for solar)	Suggested edits: (roughly 8.59 9 cents /kWh for wind, and 15.67 16 c cents /kWh for solar) Rationale: Source: IESO, 2016 (http://www.ieso.ca/en/corporate-ieso/media/news-releases/2016/03/ieso-announces-results-of-competitive-bids-for-large-renewable-projects)
Introduction, pg. 7, Paragraph 1.	The equipment may continue to produce power for years after that, at very low operating costs.	Suggested edits: The equipment may continue to produce power for years after that, at very low operating costs– and generators may choose to continue selling their electricity to the Ontario grid. Rationale: Suggested addition to describe how generators which are out of contract could be paid for the electricity which they produce.

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Introduction, pg. 7, Paragraph 4.	The many fixed costs of the electricity system must therefore be spread over fewer kWh, increasing the cost per kWh.	Suggested edits: The many fixed costs of the electricity system must therefore be spread over the fewer kilowatt -hours (kWh), which are consumed , increasing the cost per kWh.
Introduction, pg. 9, Table 1.1, Year 2009	Launch of feed-in tariff program, and related GEA initiatives to remove barriers to renewables	Suggested edits: Passage of the GEA, L aunch of feed-in tariff program, and related GEA initiatives to remove barriers to renewables
Introduction, pg. 9, Table 1.1, Year 2014.	Return to competitive procurements for large renewable projects	Suggested edits: Launch of competitive Large Renewable Procurement process Return to competitive procurements for large renewable projects
Introduction, pg. 9, Table 1.1, Year 2017.	End of feed-in tariff program, introduction of net metering	Suggested edits: End of feed-in tariff program, enhancements introduction of to Ontario's net metering framework
Introduction – Page 3, Paragraph 3	“As a result, 96% of Ontario’s electricity in 2017 was low-carbon.”	Suggested edit: “As a result, 96% of Ontario’s electricity in 2017 was non-emitting.”
Introduction – Page 6, Paragraph 6	“All sources of electricity (except conservation) have advantages and disadvantages, and all sources are intermittent, over different time scales.”	Use of intermittent is inconsistent with the concept from an electricity system perspective. Intermittent generation refers to wind and solar. It is also untrue that conservation has no disadvantage as conservation programs have associated costs. Suggested edit: All sources of electricity have advantages and disadvantages, and all sources are intermittent, over different time scales.

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Introduction – Page 8, Paragraph 1	“At those times, Ontario is dealing with the surplus by selling whatever it can on the international market for whatever it can get, because some revenue is better than none.”	Suggested edit: At those times, Ontario is dealing with the surplus by selling whatever it can on the export market at the prevailing market price, because some revenue is better than none.
Introduction, Page 8, Paragraph 1	“Any power that cannot be exported is simply wasted, or “curtailed”.”	Wasted is not an appropriate synonym for “curtailed”. Similarly the next sentence describes curtailed power as “thrown away”. It is misleading to say that “curtailment” is the same as “wasting” or “thrown away” power. Curtailment is technical terminology. Suggestion: Recommend altering language to reflect the comment above.
Introduction – Page 8, Paragraph 3	“Ontario’s current abundance of electricity will therefore be just a temporary blip if we take Ontario’s climate obligations (and its climate law) seriously. Ontario’s current Long-Term Energy Plan does not take these obligations seriously, and therefore plans to add little new electricity supply. The LTEP would make it virtually impossible for Ontario to meet its climate law obligations.”	Ontario’s climate change legislation sets caps for total provincial GHG emissions. The CCAP provides incentives for GHG reductions through the use of allowances. While the LTEP does not explicitly set targets for increased renewable generation, it affirms its commitment to decarbonize the electricity system by creating opportunities for this evolution through Market Renewal, as noted by the ECO in Chapter 2. It should also be noted that the CCAP and LTEP have different timelines. The LTEP’s energy demand outlook extends to 2035 with a review period every three years. This provides the needed planning flexibility to address changes in demand and secure additional electricity supply as needed. It is more prudent and cost-effective to secure supply as demand emerges. Comment is also applicable to Chapter 15.

Section Page Paragraph	Language from Report	Comments
Introduction Page 8, Bullet point 3	“Ontario should...do a much better job of moving electricity demand off-peak...”	Ontario has several programs in place that are intended to reduce peak demand, including the Industrial Conservation Initiative (reduced peak by an estimated 1,300MW in 2016), Demand Response, conservation and demand management (CDM) programs (with net persisting peak demand savings of 2,651 MW in 2016) and Time-of-Use pricing (59 MW peak demand savings in 2015 – IESO 2016 OPO).
Chapter 8, Page 1, first para in answer bubble	Further reductions on residential electricity bills took effect In June 2017.	<u>Initial reduction was effective May 2017 (RPP and removal of OESP charge).</u> <u>Additional reductions took place effective July 1, 2017.</u> <u>The May reduction may not have been seen on consumers’ bills until June. However, this comment is provided for clarification.</u>
Chapter 8, p.2, top of page	• transmission (building and operating major power lines); • distribution (building and operating smaller power lines that take power from transmission lines to consumers);	• <u>transmission (building, operating and maintaining high-voltage power lines and associated infrastructure);</u> • <u>distribution (building, operating and maintaining low-voltage power lines and associated infrastructure);</u>
Chapter 8, p.3, 2 nd para under Not Everyone is ‘Average’	As of June 2017, many rural residents benefit from a lower maximum monthly distribution charge.	As of <u>July 1, 2017</u> , many rural residents benefit from a lower maximum monthly <u>base</u> distribution charge.
Chapter 8 – Page 4	Figure 8.3	Only a small proportion of dwellings in the urban classification are electrically heated. Consider using a rural distribution rate instead.

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Chapter 8 Page 5 Paragraph 2	“The province also currently has a low-income electricity bill subsidy program to limit energy poverty. Ontario’s Electricity Support Program provides on-bill credits (now paid for by taxes) for low-income households (\$45-\$75/month), including higher credits for low-income households with electric heating (\$68-\$113/month). For those residents that don’t quite qualify for the OESP program, the \$100M Affordability Fund set up as part of the Fair Hydro Plan supports free efficiency upgrades.”	Updates to the figures, and proposed re-positioning of the program. “The province also provides rate relief to vulnerable electricity consumers currently has a low-income electricity bill subsidy program to limit energy poverty. through the Ontario’s Electricity Support Program. Eligible applicants can receive monthly provides on-bill credits (now paid for by taxes) for low-income households (ranging from \$35 45-\$75/month.), including higher credits for low-income Households with greater electricity needs, such as electric heating, can receive an enhanced credit ranging from (\$68-\$52-\$113/month). This program was originally paid for through a special rate, but is now being financed using government funds. For those residents that don’t quite qualify for the OESP program, the \$100M Affordability Fund set up as part of the Fair Hydro Plan supports free efficiency upgrades.
Chapter 8, p.6, 2 nd para under ‘Where are we now?’	In January 2017, all electricity bills saw a rebate of 8%, and in June 2017, a further 17% rebate (on average) took effect.	<u>In January 2017, all electricity bills saw a rebate of 8%. In May 2017 and again in July 2017, further reductions as result of the Ontario Fair Hydro Plan combined with the 8% rebate, resulted in lower bills for residential customers by 25 per cent, for a typical customer. Many small businesses and farms also benefitted.</u>

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Chapter 8 – Page 6, Paragraph 2	“This reduction was achieved in 2 stages. In January 2017, all electricity bills saw a rebate of 8%, and in June 2017, a further 17% rebate (on average) took effect.”	Suggested edit : This reduction was achieved in three stages. In January 2017, costumers eligible for the Regulated Price Plan (RPP) saw a rebate of 8% equivalent to the provincial portion of the HST. The OEB reflected a portion of the bill reduction related to the planned refinancing of a portion of the costs of Global Adjustment under Ontario’s Fair Hydro Plan starting in May 1, 2017. The remainder took effect on July 1, 2017 for eligible costumers.
Chapter 8 – Page 6, Paragraph 3	“As of November 2017, residents in Toronto (Ontario’s most populous and one of its most expensive electricity distribution regions) were no longer paying Canada’s most expensive electricity prices, that honour has passed to Charlottetown, Regina, and Halifax (see Figure 8.5).”	The OEB’s comparison chart is based on Hydro Quebec’s report for all non-Ontario jurisdictions. Hydro Quebec’s report in turn reflects a select number of geographic locations and utilities/local distribution companies. These cities are a proxy. Depending on the province, there are LDCs with higher rates than the ones specified. Suggested edit : Based on a comparison of select citites, residents in Toronto (Ontario’s most populous and one of its most expensive electricity distribution regions) were no longer paying one of Canada’s most expensive electricity prices as of November 2017; Charlottetown, Regina, and Halifax paid higher rates(see Figure 8.5).
Chapter 8 – Page 2, Paragraph 2	Until 2009, the Ontario Energy Board defined the average Ontario household used 1,000kWh/month	Awkward, recommend rephrasing
Chapter 8 – Page 3 Graph and Note		Title and footnote seem in disagreement over whether these values are inflation-adjusted. Not sure if this is being fixed with an updated data set.

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Chapter 8 – Page 11, Paragraph 2	However, according to the Ministry of Energy’s analysis, which includes the average impact of bill savings due to the Industrial Conservation Initiative, Ontario industrial electricity rates were actually far more competitive	Since this is based on current analysis (not a past year), this should read “rates are actually far more competitive” (not “were”).
Chapter 8 – Page 12, paragraph 4	“A rebate on the provincial portion of the HST”	Suggested edit : A rebate <u>equivalent to</u> the provincial portion of the HST...
Chapter 8 Page 12 Paragraph 4	“The Ontario Electricity Support program which lowers electricity costs for low-income customers;”	Proposed repositioning of the program. “The Ontario Electricity Support program, which provides rate relief to vulnerable which lowers electricity costs for low-income customers; ”
Chapter 8 – Page 12, paragraph 5	“Ontario’s 2017 budget includes an estimate of \$1.438 billion in 2017-18 spending on “electricity cost relief programs” which is assumed to include the first four items above”	Figure is consistent with the 2017 Budget (https://www.fin.gov.on.ca/en/budget/ontariobudgets/2017/budget2017.pdf)
Chapter 8 – Page 12, paragraph 5	“In addition, the Fair Hydro Plan is borrowing an average of \$2.5 billion per year to reduce current electricity bills, to be repaid in future years.”	This statement implies that borrowing continues indefinitely. The FAO report this statement is sourced from is clear that the borrowing continues only through 2027.
Chapter 8 – Page 13, Footnote 2	Table 1.1 Average unit cost and total cost of electricity service (Ontario, 2005-2016, real dollars).	Please specify that it is in <u>2016</u> real dollars in the title. 2016 real dollars is applicable to both the unit cost the total cost.

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Chapter 8 Page 15 Footnote 36	“The regulatory charge also covers renewable connection costs from LDCs and the Standard Supply Service Charge which is an administrative charge approved by the OEB for customers that buy electricity directly from LDCs. As of June 1, 2017, the Rural and Remote Electricity Rate Protection (RRRP) and the Ontario Electricity Support (OESP) charges were removed from this line item and moved to the tax base.”	For accuracy, the OESP did not immediately move to the tax base. See proposed edit below: “The regulatory charge also covers renewable connection costs from LDCs and the Standard Supply Service Charge which is an administrative charge approved by the OEB for customers that buy electricity directly from LDCs. As of June 1, 2017, the Rural and Remote Electricity Rate Protection (RRRP) and the Ontario Electricity Support (OESP) charges were removed from this line item, and, in the case of RRRP, was immediately moved to the tax base and moved to the tax base. Due to a positive variance in the account used to manage OESP funds, this program switched to the tax base in March 2018.”
Chapter 12 – Page 1	“Ontario air quality has improved dramatically since our coal shutdown began – from 53 smog days/year to zero. The credit goes to Ontario’s coal shut down, to the drop in coal-fired electricity in upwind US states, and to emission reductions from other sources.”	Long-range transport of smog pollutants from neighbouring U.S. industrial and urbanized states during the flow of warm air from the southwest to the northeast are known to contribute to smog. As stated on page 13 of chapter 12, MOECC found that air emissions reductions from the elimination of coal account for 24% of Ontario’s overall NOx reductions between 1990 and 2015; the percentages for SO2 and mercury are 22% and 29% respectively. This supports how significant reductions are related to other measures, including the 2008 recession and a reduction in output. Suggested edit : The credit goes to <u>amended environmental regulations</u>, Ontario’s coal shut down, drop in coal-fired electricity and emissions from other industrial sources in upwind US states, and to emission reductions from other sources.

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Chapter 12 – Page 3, Paragraph 3	“The Air Quality Health Index is based primarily on three common air pollutants known to harm human health, which are commonly grouped together as “smog”...”	The AQHI is based on these three pollutants, but these three alone do not constitute smog. The footnoted source itself does not say that in the same terms. Smog can include VOCs, and at times is a photochemical reaction and can be exacerbated by inversion. Suggested edit : The Air Quality Health Index is based primarily on three common air pollutants known to harm human health, which are commonly grouped together as “smog”...
Chapter 12 – Page 4, Paragraph 2	“...also known as soot...”	Soot is elemental carbon. Soot can include PM2.5 depending on the composition of the particulate. Soot and PM2.5 are not necessarily the same.
Chapter 13 Page 2, Paragraph 1	The LTEP’s planning horizon is twenty years, but its focus is on initiatives and policies that will be implemented within the next three years.	The energy planning process - enshrined in the Electricity Act, 1998 - is designed to be flexible and responsive to changing technology, emerging trends within the sector, and policy and program needs. The process includes twenty-year outlooks and initiatives with varying implementation timelines. The three year review period aligns with the Ministry of Energy’s commitment to ensuring energy plans and policies are up-to-date and reflective of current as well as emerging trends in the sector.

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Chapter 13 – Page 4 Paragraph 2	The long-term conservation target remains 30 TWh of conservation by 2032. This implies continuing conservation program activity and spending at current levels throughout that time, although the current budget and framework go only to the end of 2020.	Suggested Edits The long-term conservation target remains 30 TWh of conservation by 2032, which will be achieved through a combination of conservation programs and updates to building codes and product standards. This implies continuing conservation program activity and spending at current levels throughout that time, although the current budget and framework go only to the end of 2020. Comments • The 30 TWh target comprises of two key components- savings from programs and savings from codes and standards. • The target allows for flexibility in terms of future conservation program budgets. For example, increased portion of savings from codes and standards could lead to reduced program budgets. • While Ontario is committed to a long term target of 30 TWh savings in 2032, a decision on conservation spending beyond 2020 has not been made at this point.
Chapter 12, Page 16, Paragraph 2	Pollution is the largest environmental cause of disease and premature deaths in the world, causing an estimates 9 million premature deaths	“estimates” should be “estimated”
Chapter 13 – Page 4, Bullet 1	using demand response to meet 10% of Heak demand by 2025	“Heak” should be “peak”

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Chapter 13 – Page 4 Paragraph 2	For demand response, (an important subcategory of conservation that is used to reduce peak electricity demand), the LTEP states that “demand response capacity realized each year will depend on system needs and the competitiveness of demand response with other resources.” ⁱ	Suggested Edits For demand response, (an important subcategory of conservation where consumers reduce their consumption in response to price and system need that is used to reduce peak electricity demand), the LTEP states that “demand response capacity realized each year will depend on system needs and the competitiveness of demand response with other resources.”ⁱⁱ Comments • While the focus of the former demand response programs (DR1, DR2 and DR3) was to reduce system peak, IESO has evolved demand response to more broadly meet system need. • Through the DR auction, procured DR resources are required to make themselves available during an availability window. The actual activation of these resources depends on market prices. • The types of DR resources that are procured has also been expanded to include dispatchable loads (DR which can respond to 5-minute schedule), in addition to the traditional 4-hour block DR. As a result of these changes, DR’s use is no longer exclusive to times of system peak, but it can also be triggered during general operation for ramping, power balancing and for emergency events.
Chapter 13 – Page 5, Bullet point 2	“use taxes (instead of electricity rates) to pay for a Harmonized Sales Tax rebate on electricity bills and targeted relief for some groups of electricity customers.”	Suggested edit : ... to pay for the rebate equivalent to the provincial portion of the HST...

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Chapter 13 – Page 6, Paragraph 3	It is also a clear breach of the legal requirement that the Long-Term Energy Plan cover Ontario's energy needs	We disagree that the Ministry has contravened the legal requirements of the Electricity Act, 1998.
Chapter 13 – Page 6 Bullet on top of page 7	“Facilitating utility investment in smart electric vehicle charging, where the timing of charging is controlled by the utility, and thus better matched to system needs, such as making use of surplus electricity at off-peak times.”	Smart charging does not specifically relate to giving utilities full control of EV charging or to make use of surplus electricity at off-peak times. The primary goals are to avoid the charging of EVs increasing peak power periods, and to shift load to off-peak times through incentives and utility business models. <u>Proposed Amendments</u> “Facilitating utility investment in smart electric vehicle charging through the encouragement of innovative business models and incentives to reduce electric vehicle charging impacts for peak time periods, and to shift load to off-peak times, where the timing of charging is advantageous to both the customer and the grid. of charging is controlled by the utility, and thus better matched to system needs, such as making use of surplus electricity at off-peak times.”

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Chapter 13 – Page 9 Row 3	“removing regulatory barriers such as the Global Adjustment charge for companies providing electricity storage (p. 61);”	It is important to note that the Ministry has already taken action on this initiative: on December 15, 2017, amendments to the regulation governing global adjustment (O. Reg. 516/17 under the Electricity Act, 1998) will ensure that certain energy storage facilities will only be charged Global Adjustment on the electricity they withdraw but do not return to the grid. Through their implementation plans, the Independent Electricity System Operator and the Ontario Energy Board will be exploring other barriers to energy storage. The Ministry is also seeking to support the adoption of cost-effective energy storage and other smart grid technologies/“non-wires alternatives” by addressing barriers to innovation in the sector (see LTEP 69-70).
Chapter 13 – Page 9 Row 3	“working with the Ontario Energy Board (OEB) to enable electric utility control over timing of charging of electric vehicles (p. 61);”	It should be noted that not all smart charging is related to utility control. There are other options that the Ministry directed the OEB to explore, for example the use of residential smart chargers and incentives to provide more options and choices to customers. While there may be opportunities for utility control, full control over EV charging is not the only option that is being investigated by the OEB. <u>Proposed Amendments</u> “working with the Ontario Energy Board (OEB) to evaluate options for the further integration of electric vehicles into utility networks, enable electric utility control over timing of charging of electric vehicles (p. 61);”

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Chapter 13 – Page 10 Table	No draft LTEP was released.	Release of a draft is not a requirement of the LTEP development process. The LTEP process provides opportunities for the public and stakeholders to review material and provide input. For example • The Ministry released technical reports in September 2016 on the electricity and fuels sectors. The two technical reports contained outlooks on both sectors. These documents were intended to inform the LTEP engagement process and to solicit feedback. • After the IESO and OEB implementation directives were issued, the IESO provided opportunities for feedback prior to the release of their plans. The plans themselves also identify further opportunities for engagement on specific initiatives.
Chapter 13 – Page 10 Table	At the time of writing, the submitted plans have not been made public and it is unclear as to whether the Ministry of Energy will conduct any additional consultation before approving these plans.	The two agencies' implementation plans are public and additional engagement activities are included in the implementation plans. IESO's implementation plan is available here: https://www.ieso.ca/en/sector-participants/planning-and-forecasting/implementation-plan-for-2017-ltep OEB's implementation plan is available here: https://www.oeb.ca/newsroom/2018/moving-forward-ontarios-long-term-energy-plan

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Chapter 14 – Page 1 (and throughout)	Reference to the “aging” Pickering plant	This is a misleading characterization of the plant. While the Pickering A units were brought into service between 1971-73, the Pickering B units were brought into service from 1983-86, which is after the Bruce A units (1977-79) and around the same time as the Bruce B units (1984-87). As mentioned in our comments below, Pickering operates safely and is subject to rigorous oversight by the CNSC through the licencing process as well as continuous monitoring by on-site CNSC staff. In 2016 (the latest year on record), CNSC has awarded Pickering with the highest safety rating as part of its annual safety evaluation of Canada’s nuclear power plants. This is the second year in a row that Pickering has achieved this distinction.

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Chapter 14 – Page 3 Paragraph 4	“Since Ontario has not yet attempted to decommission a commercial nuclear reactor, we do not yet know for sure how much it will cost, how long it will take, nor whether the site can be genuinely decontaminated enough to be used for other purposes.”	This is an inaccurate and misleading statement. As a requirement for obtaining a licence from CNSC to operate a nuclear power plant, the operator must submit a decommissioning plan, outlining how it plans to manage the dismantling of the power plant – a series of well-defined and discrete activities. A financial guarantee, which is based on the plan, is used by CNSC staff to evaluate how the operator will guarantee financing for decommissioning activities. Note that, Pickering Unit 2 and Unit 3 have already commenced the initial steps required for decommissioning, starting with <i>safe storage</i>. Between 2005 and 2010, Units 2 and 3 were placed into safe storage and disconnected from the rest of the operating facility in preparation for decommissioning. For additional information on CNSC’s requirements on nuclear power plant decommissioning, please see: 1) http://www.nuclearsafety.gc.ca/eng/pdfs/Presentations/CNSC_Staff/2017/20171004-decommissioning-and-dismantling-eng.pdf 2) http://nuclearsafety.gc.ca/eng/resources/fact-sheets/decommissioning-of-nuclear-power-plants.cfm 3) http://nuclearsafety.gc.ca/pubs_catalogue/uploads/G219_e.pdf For an example of the decommissioning plan for Ontario’s nuclear power reactors, please see the Preliminary Decommissioning Plan for Pickering: https://www.opg.com/generating-power/nuclear/Documents/P-PLAN-00960-00001_PNGS_PDP.pdf

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 3 Last paragraph	“We are creating highly dangerous wastes without knowing how we, or they, will deal with them.”	This is an incorrect and misleading statement. Ontario is proactively ensuring that all nuclear waste is safely stored and disposed of – now and in the future. As noted elsewhere in this chapter, there are a number of steps that the operators, regulator and government are taking to reasonably ensure that any and all waste from nuclear power reactors are accounted for and disposed of in a manner that protects the people and the environment. a) Deep Geological Repositories (DGRs): DGRs are recognized as best international practice for the long-term management of used fuel and low and intermediate-level waste as stated by the International Atomic Energy Agency (IAEA)’s <i>Safety Standards for the Disposal of Radioactive Waste</i>. Finland has been successful in obtaining a license for a used fuel DGR which is currently under construction. Additionally, underground repositories for low and intermediate level waste are currently in operation around the world b) OPG and NWMO are pursuing a low- and intermediate level DGR and a high level waste DGR, respectively, to ensure that the waste can be safely stored and isolated for the period that it is harmful to the public and the environment; c) The Ontario Nuclear Funds Agreement (ONFA) ensures that OPG regularly updates the financial estimates required for the long-term waste management on a 5-yearly basis with expert input;

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		d) CNSC, as a full life-cycle regulator, ensures that the operators have adequately taken into account all waste generated from “cradle to grave” when licensing the facilities; and e) All funds required are already being collected in the price of power from the facilities and set aside by OPG during the operating lives of the facilities so future generations are not responsible for generating the funds required for undertaking such activities. The Province and CNSC can access the funds to pay for associated costs even if OPG ceased to exist. For additional background please see: 1) https://www-pub.iaea.org/MTCD/publications/PDF/Pub1449_web.pdf 2) https://www.opg.com/generating-power/nuclear/nuclear-waste-management/Pages/assuring-the-future.aspx 3) https://www.opg.com/about/regulatory-affairs/Documents/2017-2021/C2-01-02_Nuclear_Waste_Management_and_Decommissioning-Supplementary_Information_updated_20170322.pdf 4) https://www.opg.com/generating-power/nuclear/Documents/Financial_Guarantee_Commission_Member_Document.pdf

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 4 Paragraph 1	“Operating safety is a particular concern for the proposed Pickering extension, given the advanced age of the existing reactors; the two oldest reactors proposed for extension have been in operation since the early 1970s.”	This is an incorrect and misleading statement. Pickering operates safely and is subject to rigorous oversight by the CNSC through the licencing process as well as continuous monitoring by on-site CNSC staff. In 2016 (the latest year on record), CNSC has awarded Pickering with the highest safety rating as part of its annual safety evaluation of Canada’s nuclear power plants. This is the second year in a row that Pickering has achieved this distinction. For more information, please see: 1. https://www.opg.com/news-and-media/news-releases/Documents/20170816_CNSC_Safety_Awards.pdf 2. http://nuclearsafety.gc.ca/eng/resources/educational-resources/feature-articles/regulatory-oversight-report-for-canadian-npp-2016.cfm 3. http://www.nuclearsafety.gc.ca/eng/reactors/power-plants/regulatory-oversight-report-npp/2016-NPP-ROR-Executive-Summary.cfm

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Chapter 14 – Page 4 Paragraph 1	“In particular, the uranium fuel channels in the reactor core were originally designed for 210,000 operating hours. Their operating lifetime has already been extended once, and OPG is seeking a second extension, to 295,000 operating hours.”	Design life of the fuel channels is not an absolute value. An assumption of their life was made at the time of construction but will ultimately be determined through ongoing condition assessments and safety licensing through CNSC. Suggested Edit: In particular, the design life of uranium fuel channels in the reactor core were originally assumed to be designed for 210,000 operating hours. Based on technical studies on the condition of the fuel channels which have demonstrated continued fitness-for-service, their operating lifetime has already been extended once, and OPG is seeking a second extension, to 295,000 operating hours. <u>Comment:</u> For additional background information on the fitness-for-service of Pickering fuel channels and “defense-in-depth” approach to ensuring continued safety, please see: 1. https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/PickeringFuelChannel_FitnessForServiceReport.pdf
Chapter 14 – Page 4 Paragraph 4	“OPG’s focus is on minimizing the likelihood of an accident or its consequences, through its actions at the facility. However, if a nuclear accident does occur, Ontario, through Emergency Management Ontario, has responsibility for off-site emergency response preparation. The province has recently updated its Provincial Nuclear	The last sentence in the paragraph is misleading and provides a one-sided perspective on the updated PNERP. It only highlights the criticism of the plan and makes no mention of how the updated PNERP specifically took into account lessons learned from Fukushima and international best practices. As additional balance to the narrative it should be noted that:

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	Emergency Response Plan; however, the updated Plan has been criticized as being inadequate to deal with a radiation release of Fukushima-like proportions.”	a) Nuclear Power Plants have safely generated power in Ontario for over 40 years and in this period there has not been a single accident that has led to release of radiation to the public and the environment, or triggering of off-site emergency measures; b) Nuclear operators hold periodic emergency simulations to ensure that they can test their processes and procedures in the event of an emergency and achieve maximum preparedness; and c) Notwithstanding the criticisms from anti-nuclear campaigners like Greenpeace (as referenced here), the updated PNERP has been prepared with significant public and stakeholder input (including through an advisory group) and will be periodically updated to ensure that the plan takes into account the most up-to-date information. For additional information please see: 1. https://www.opg.com/news-and-media/news-releases/Documents/20171114_ExerciseUnifiedControl.pdf 2. http://www.brucepower.com/in-the-community/programs/emergency-preparedness/ 3. https://news.ontario.ca/mcscs/en/2017/12/strengthening-ontarios-nuclear-preparedness.html
Chapter 14 – Page 4	“Although the CNSC calls such an incident “extremely unlikely to occur”, a large radiation	The bolded portion is purely speculative and not supported by facts.

Section Page Paragraph	Language from Report	Comments
Paragraph 6	release from Pickering would have such a high cost that even the miniscule growth of the risk due to the age of the plant might be more risk than Ontario should accept. “	CNSC’s power reactor operating licence process will ensure that Pickering will only operate in the 2018-2024 period if it is able to do so safely and following a comprehensive evaluation of safety. Regardless of the age of the facility, the licensing process would be underpinned amongst other elements by CNSC’s acceptance of the fitness-for-service of all safety-related components as well as “aging management plans” that ensure worn-out components are repaired and replaced as required. The public and transparent licensing process would also ensure that OPG continues to undertake the necessary improvements during the operating life of the plant to meet modern safety codes and standards. Probabilistic and Deterministic Safety analyses of Pickering will inform CNSC’ licensing on Pickering’s safety and preparedness in response to both internal and external events. For additional information please see: 1. https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-CORR-00531-05055_PickeringNGS_Licence_Renewal.pdf 2. https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/PNGSA_PRA_SummaryReport.pdf 3. https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/NK30-REP-03611-00021.pdf 4. https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/Application/P-

Section Page Paragraph	Language from Report	Comments
		CORR-00531-05223.pdf
Chapter 14 – Page 5 Paragraph 3	“Nuclear construction projects have a history of going over budget. Ontarians are partially protected against cost overruns at Bruce, but not against overruns at the Darlington refurbishment or the Pickering extension.”	The narrative on refurbishment performance is incomplete without mentioning the status of the Darlington refurbishment which is now underway. In the 2013 Long-Term Energy Plan government laid out a set of principles for the refurbishment projects to follow in order to ensure that the refurbishments are carried out on time and on budget, minimize risk for ratepayers and incorporate lessons learned from previous projects. In October 2016, OPG commenced the first Darlington unit (i.e., Unit 2) refurbishment, after completing more than 5-years of detailed planning and preparation. Darlington Unit 2 refurbishment is off to a great start – on track to be complete within budget and schedule. For more information please see: 1. http://www.energy.gov.on.ca/en/files/2014/10/LTEP_2013_English_WEB.pdf 2. https://www.opg.com/darlington-refurbishment/Documents/DarlingtonRefurb_KeyPerf_Dec2017.pdf In addition, the narrative neglects to mention that while Ontario taxpayers may be at risk from cost overruns, FAO notes that taxpayers are also set to benefit from Darlington refurbishment through higher profits at OPG if the project is completed within budget and schedule (as it is currently tracking). For more information please see: 1. http://www.fao-on.org/web/default/files/publications/Nuc%20Refurb%20nov%202017

Section Page Paragraph	Language from Report	Comments
		/Nuclear-Refurb-EN.pdf Pickering extension is not a refurbishment or a nuclear construction project. OPG is carrying out work mainly in the form of technical studies and enhanced maintenance, monitoring and inspection activities in order to enable the continued operation of Pickering up to 2024. Therefore the risk is not comparable to that of a refurbishment project and should not be included in this narrative. For more information, please see: 1. https://www.opg.com/about/regulatory-affairs/Documents/2017-2021/F2-02-03_Pickering_Extended_Operations_20161110.pdf
Chapter 14 – Page 5 Paragraph 5	“After the FAO report, the Ontario Energy Board issued a decision on OPG’s application to increase its rates. Nuclear plants have high operating costs, and Pickering is the highest cost nuclear plant in North America. “	The bolded part is an incorrect and misleading statement. (Note: The preceding statement is included for context for this comment.) No source is provided to support the statement that Pickering is the highest cost nuclear plant in North America. In addition, owing to the energy density of uranium fuel, nuclear power plants have very low fuel costs, resulting in one of the lowest plant operating costs <u>per unit of electricity generated</u>. Consequently, nuclear power plants are a cost-effective source of bulk power. For more information, please see: 1. https://www.eia.gov/electricity/annual/html/epa_08_04.html 2. http://energyeducation.ca/encyclopedia/Energy_density 3. http://www.world-nuclear.org/information-

Section Page Paragraph	Language from Report	Comments
		library/nuclear-fuel-cycle/introduction/energy-for-the-world-why-uranium.aspx The comparatively low cost of generation is borne out by the cost of generating electricity for Darlington and Pickering that is included in the OEB's decision on OPG's rate application, parts of which have been referenced. Specifically, while noting in the section on benchmarking that OPG must do better to improve performance and achieve its targets – and the Ministry agrees with OEB on this – OEB also stated that the actual rolling 3-year average cost of generating electricity in 2014 was \$67.93 per MWh for Pickering and \$37.73 per MWh for Darlington – which is quite competitive against other sources of generation in Ontario.
Chapter 14 – Page 5 Paragraph 5	“In total, OPG spends more than \$2.8 billion every year just to operate its nuclear plants, while never hitting its own power production forecasts.”	No source is provided for the statement that OPG has “never” hit its own power production forecasts. Is this a reference to the 2008-2015 period reviewed in the OEB rate decision? The proper parameters should be made clear rather than making a blanket statement. OPG has significantly improved reliability at Pickering in the most recent years. For example, in its Pickering licence renewal application, OPG has noted that Pickering achieved the best forced loss rate performance in site history at approximately 3% and 4% in 2015 and 2016, respectively. This is lower than OPG's assumed forced loss rate of 5% in its production forecast approved by the OEB for 2017-2021. In addition, it is misleading to cite the total dollar value of operating costs (i.e., \$2.8 billion) and not take into account the volume of electricity generated.

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		As noted in a previous comment, from a ratepayer perspective, the more relevant statistic is the plant operating cost <u>per unit of electricity</u> generated since that determines the cost of power from the facilities. As OEB stated in its decision on OPG's 2017 to 2021 rate application the actual rolling 3-year average cost of generating electricity in 2014 was \$67.93 per MWh for Pickering and \$37.73 per MWh for Darlington – which is quite competitive against other sources of generation in Ontario. The fact that OPG annually invests around \$2.8 billion in operating the facilities is also relevant from a economic impact and jobs perspective on the local and broader Ontario economy and support for Ontario's world-renowned nuclear industry that is made up of more than 200 companies and supports around 60,000 jobs, as noted in 2017 Long-Term Energy Plan.
Chapter 14 – Page 6 Paragraph 2	“This Reference Plan is confidential, and it is unclear what level of diligence the Province undertakes in its analysis of these estimates.ⁱⁱⁱ There has been no public or independent testing of these estimates, and Ontario has ample experience with non-nuclear cleanups costing much more than originally predicted.”	Ministry of Finance/Ontario Financing Authority are responsible for the implementation of the Ontario Nuclear Funds Agreement (ONFA) and the Reference Plan. We recommend that MOF/OFA review the following section and provide their comments. In addition, the comparison of nuclear decommissioning and non-nuclear remediation projects is specious. There is no evidence provided to suggest any link between the cost estimation process for unique projects in nuclear versus non-nuclear industries.

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 6 Paragraph 3	“However, as the ECO and other parties have noted, the government has never explained the process or the criteria that it would use to choose these off-ramps.”	This is an incorrect statement. In the 2017 Long-Term Energy Plan, government has noted the following: 1. <u>Bruce Refurbishment</u>: Contractual off-ramps allow Ontario to stop work on any Bruce refurbishment if the estimated cost exceeds a pre-defined amount. Refurbishment at Bruce can also be stopped if demand drops or lower-cost resources emerge. 2. <u>Darlington Refurbishment</u>: The Province has established off-ramps for the Darlington refurbishment that may be used in the event of OPG failing to adhere to the approved costs and schedule. This could result in the Province not proceeding with the remaining units. For additional information please see: 1. https://files.ontario.ca/books/ltep2017_0.pdf http://www.brucepower.com/wp-content/uploads/2015/12/Amended-and-Restated-Bruce-Power-Refurbishment-Implementation-Agreement.pdf

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 7 Paragraph 4	Costs for wind and solar used to be much higher, but have been dropping rapidly. Ontario's 2016 renewable procurement awarded wind contracts with an average price of 8.6¢/kWh, very close to the projected nuclear price. The price of renewables has come down even farther since then; Alberta recently signed wind contracts at 3.7¢/kWh.	Note to ECO: While the general cost of developing wind power has digressed, the existing narrative does not take into account Ontario-specific factors which would likely impact the cost of future wind power development and factored into the price of wind power in Ontario's 2016 procurement (LRP 1). These factors are also important when comparing LRP 1 with Alberta's 2017 procurement (REP 1). For instance, many of the locations with the most favourable wind resources in Ontario have already been developed, which impacted the economics of wind projects in LRP 1, and which would impact the economics of any future utility-scale wind development. In addition, transmission constraints in certain areas of the province impacted the location and size of wind projects for LRP 1 (i.e. largest LRP 1 wind project was 100 MW as compared to 248.4 MW for REP 1). These transmission constraints would limit further utility-scale wind project development. LRP 1 also incented Indigenous and/or community participation. Three of the 5 wind projects selected included participation of one or more Indigenous communities, with 2 of the 5 receiving community support. Participation and community support add to development costs. By comparison, Alberta's REP 1 benefitted from the price digression of wind turbine technology in recent years, as well as the availability of transmission capacity in areas with an excellent wind resource. Alberta also increased the procurement from 400 MW to 600 MW and selected only wind projects (allowing for larger and more economic projects). Further, REP 1 did not require Indigenous or community participation.

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 8, Paragraph 6	“The issue is whether Ontario can, at a reasonable cost and emissions impact, using existing infrastructure, replace the capacity that Pickering provides to reliably meet peak demand....Quebec may have additional power to sell after 2020...”	Replacing a significant amount of nuclear generation with imported electricity would require the establishment of firm contracts with neighbouring jurisdictions that guarantee that power is available when we need it. IESO’s May 2017 report, <i>Ontario-Quebec Interconnection Capability: A Technical Review</i> , concluded that a large, firm import agreement would require significant transmission investment, and possibly generation investment in the exporting jurisdiction. As recommended by IESO, ENERGY continues to investigate the potential for smaller import agreements and the participation of imports in IESO capacity auctions later in the decade.

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 8 Paragraph 4	“However, the FAO did not assess the potential for a shorter-term agreement to purchase power from Quebec instead of extending the operation of the Pickering station through 2024. This might save considerable costs for Ontario electricity consumers, as well as avoiding the risk of operating such old nuclear plants for four more years.”	See comment for page 1 (i.e., characterization of Pickering as “old” or “aging”). This narrative is incomplete without mentioning the cost of power that will be generated from continued Pickering operation to 2024. In its submission to the OEB as part of its rate application, OPG has stated that the incremental cost of power from continued Pickering operation is \$65 per MWh (or 6.5 c/kWh) – which is highly cost-effective. The bolded part is incorrect and misleading because – as noted else where in the comments - it fails to take into account the rigorous and transparent regulatory process that is in place to ensure that Pickering would operate to 2024 only if it is safe to do so. The statement also doesn’t take into account the significantly improved reliability that OPG has achieved with Pickering in the most recent years. For example, in its Pickering licence renewal application, OPG has noted that operational reliability has improved significantly. Pickering achieved the best forced loss rate performance in site history at approximately 3% and 4% in 2015 and 2016, respectively. For more information please see: 1. https://www.opg.com/about/regulatory-affairs/Documents/2017-2021/F2-02-03_Pickering_Extended_Operations_20161110.pdf https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-CORR-00531-05055_PickeringNGS_Licence_Renewal.pdf

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 9 Paragraph 2 (Conclusion)	“Extending the operating life of the aging and poorly performing Pickering nuclear station is a far more doubtful choice.”	As noted elsewhere in the comments, the characterization of Pickering as aging and poorly performing is misleading because it fails to take into account the rigorous and transparent regulatory process that is in place to ensure that Pickering would operate to 2024 only if it is safe to do so. The statement also doesn’t take into account the significantly improved reliability that OPG has achieved with Pickering in the most recent years. For example, in its Pickering licence renewal application, OPG has noted that operational reliability has improved significantly. Pickering achieved the best forced loss rate performance in site history at approximately 3% and 4% in 2015 and 2016, respectively. For more information please see: 1. https://www.opg.com/about/regulatory-affairs/Documents/2017-2021/F2-02-03_Pickering_Extended_Operations_20161110.pdf https://www.opg.com/generating-power/nuclear/stations/pickering-nuclear/Documents/P-CORR-00531-05055_PickeringNGS_Licence_Renewal.pdf
Chapter 14 – Page 3, Paragraph 4	Ontario has made an all in, 50 year commitment to nuclear power, despite its environmental risks, without a full independent assessment of all relevant costs	While the ECO has described costs that it feels were not adequately captured in reports so far, this statement is misleading as a part of the conclusion. It does not recognize extensive reporting by the FAO, OEB, or the various levels of independent oversight for refurb. Suggest instead the language, “and independent assessments have not all accounted for all costs deemed relevant by the ECO.”

Section Page Paragraph	Language from Report	Comments
Chapter 14 – Page 3 Nuclear Waste Paragraph 2	All six municipalities currently under consideration as host communities are located in Ontario. ^{iv}	NWMO currently has five municipalities (not six) under consideration as willing host communities within Ontario. Suggested Edit: All six five municipalities currently under consideration as host communities are located in Ontario. ^v .
Chapter 14 – Page 3 Nuclear Waste Paragraph 3	“The three existing nuclear stations generate a combined volume of roughly 5,000-7,000 cubic metres of low- and intermediate-level waste annually. ^{vi} ”	This is a misleading statement. This section considers the impacts of nuclear waste and its storage for the long term (i.e., DGRs). Low and intermediate level waste generated ranges from 5,000m ³ to 7,000m ³ annually from all three plants <u>but actual storage of these wastes results in only 2,000m³ to 3,000m³ annually after processing (i.e., volume reduction due to compaction and incineration).</u> Suggested Edit: The three existing nuclear stations generate result in a combined volume of roughly 5,000-7,000 2,000 - 3,000 cubic metres of low- and intermediate-level waste annually stored at the Western Waste Management Facility. ^{vii} Source: http://www.ceaa-acee.gc.ca/050/documents/p17520/101595E.pdf

ⁱ 2017 LTEP, p. 14

ⁱⁱ 2017 LTEP, p. 14

ⁱⁱⁱ https://www.opg.com/about/regulatory-affairs/Documents/2017-2021/OPG_IRR_Issue_8.0_20170210.pdf. See response to SEC interrogatory 91B

^{iv} <https://www.nwmo.ca/en/Site-selection/Study-Areas>

^v <https://www.nwmo.ca/en/Site-selection/Study-Areas>

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- ^{vi} Joint Review Panel report: <http://www.ceaa-acee.gc.ca/050/documents/p17520/101595E.pdf>, p. 54
- ^{vii} Joint Review Panel report: <http://www.ceaa-acee.gc.ca/050/documents/p17520/101595E.pdf>, p. 54