

2017 Long-Term Energy Plan – Fuels and Electricity Outlooks

Working Draft

August 2017

Agenda for Discussion

1. Overview of 2017 Long-Term Energy Plan (2017 LTEP) Outlooks/Forecasts and confirmation of modelling assumptions:
 - A. Fuels; and
 - B. Electricity.

2. Discussion of inputs into the development of the 2017 LTEP Residential Electricity Price Forecast:
 - C. Ontario's Fair Hydro Plan; and
 - D. Options to bend the future cost curve for electricity ratepayers.

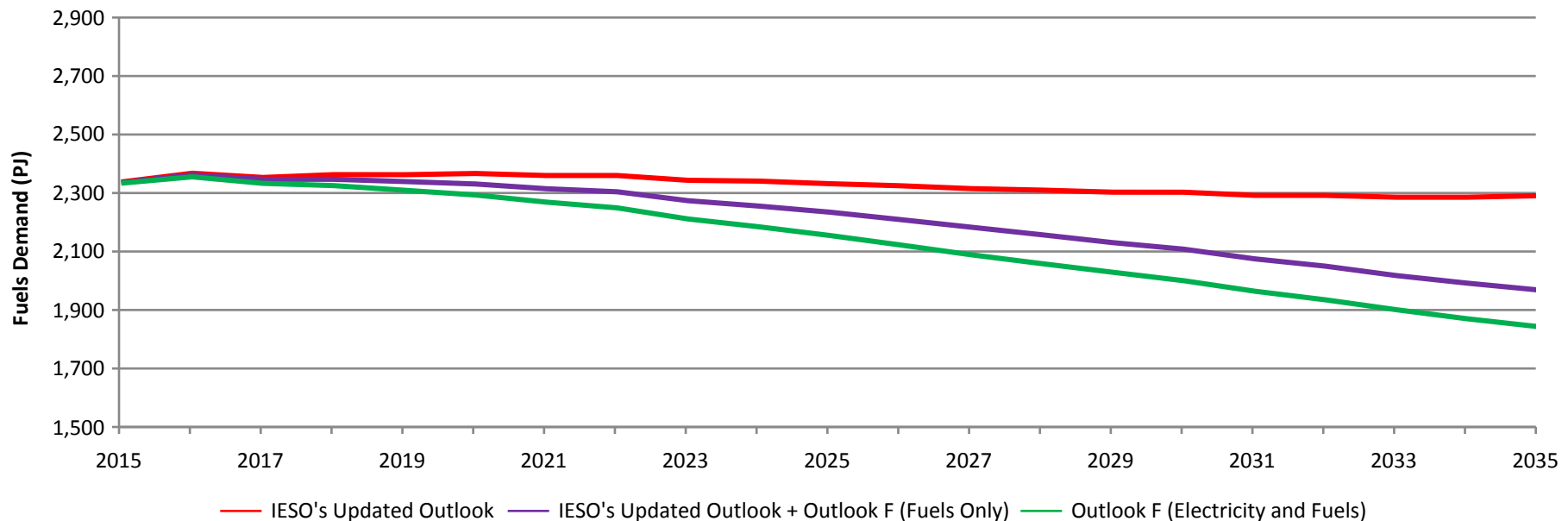
1. 2017 LTEP – OUTLOOK AND FORECASTS FOR FUELS AND ELECTRICITY

A. 2017 LTEP – Fuels Outlooks and Forecasts

- A Fuels Technical Report (FTR) was prepared in 2016 to assist in development of the 2017 LTEP.
 - The FTR outlined five scenarios based on the same primary assumptions contained in the Independent Electricity System's (IESO) Ontario Planning Outlook (OPO) with additional “fuels only” initiatives considered in FTR Outlooks E and F.
- Fuels modelling for 2017 LTEP aligns with IESO's Updated Outlook for electricity (i.e., higher electric vehicle uptake from Outlook C/D and updated prices carbon and natural gas).
- From there, two options are proposed:
 1. IESO Updated Outlook + Outlook F (Fuels Only)
 - IESO Updated Outlook with the following FTR Outlook F fuels only assumptions:
 - Natural gas demand-side management (e.g., conservation, building efficiency);
 - Renewable natural gas; and
 - Lower-carbon fuels for transportation (e.g., natural gas, ethanol, biodiesel).
 2. Outlook F (Electricity and Fuels)
 - FTR Outlook F assumptions (i.e., which includes electrification of space and water heating from IESO Outlook D). Note: This approach would affect the 2017 LTEP modelling of electricity demand, emissions and price.

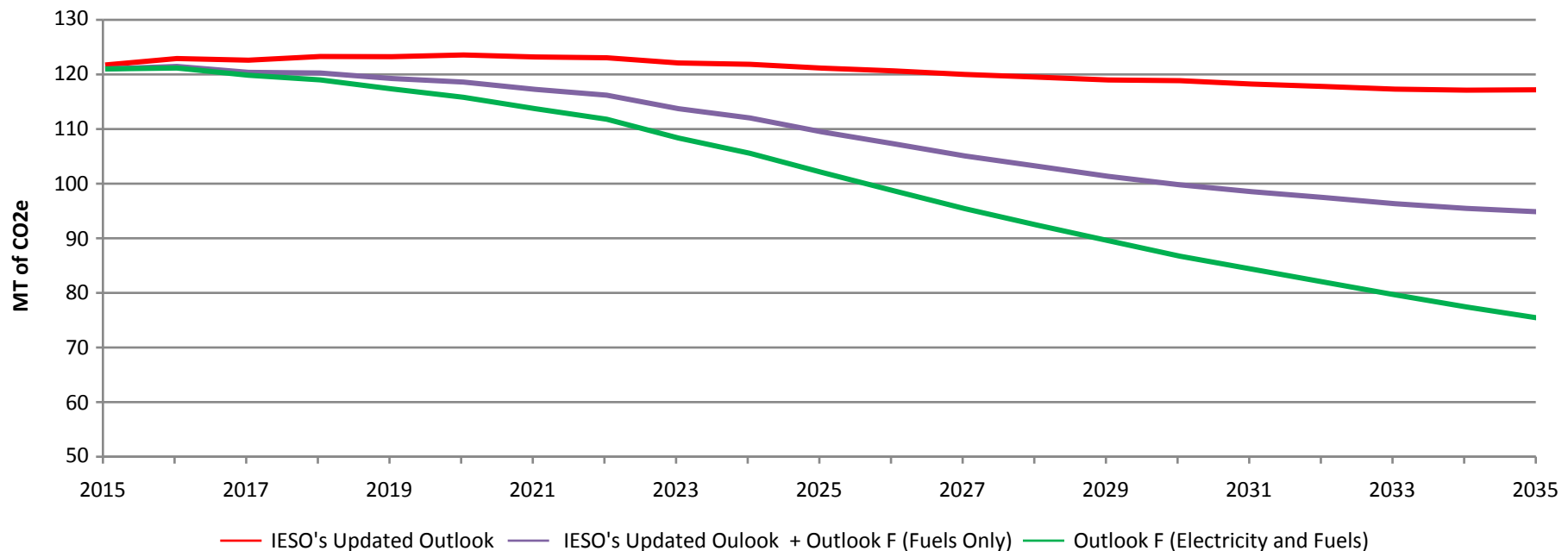
A. 2017 LTEP – Fuels Demand Outlook

- The chart below compares fuels demand under: IESO's Updated Outlook, IESO's Updated Outlook + Outlook F (Fuels Only) and Outlook F (Electricity and Fuels).
- The IESO's Updated Outlook + Outlook F (Fuels Only) scenario would lead to a reduction of fuels demand of 14% by 2035 relative to IESO's Updated Outlook.
- The Outlook F (Electricity and Fuels) scenario would lead to a reduction in fuels demand of 19% by 2035 relative to IESO's Updated Outlook.



A. 2017 LTEP – Fuels Emissions Outlook

- The chart below show that greenhouse gas (GHG) emissions from Ontario's fuels sector are expected to decline as a result of electrification of vehicles, as well as conservation and alternative fuel-switching.
- The IESO's Updated Outlook + Outlook F (Fuels Only) scenario would lead to a reduction in fuels sector GHG emissions of 19% by 2035 relative to IESO's Updated Outlook.
- The Outlook F (Electricity and Fuels) scenario would lead to a reduction in fuels sector GHG emissions of 36% by 2035 relative to IESO's Updated Outlook.

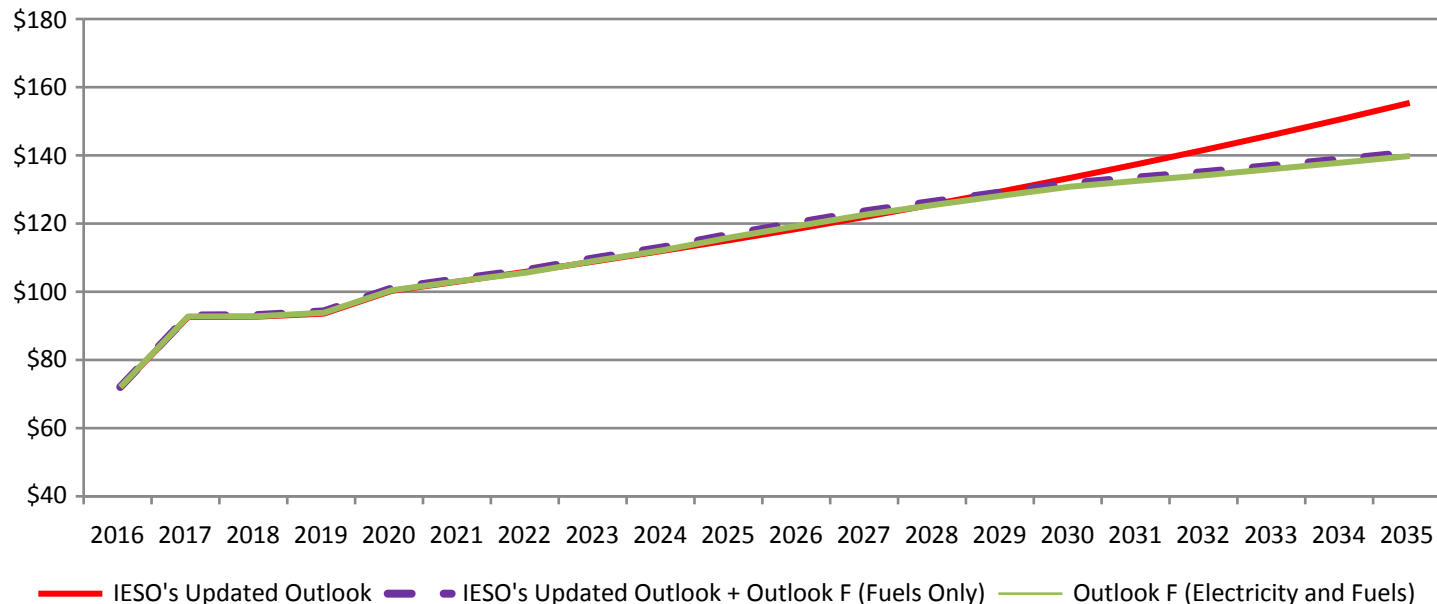


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A. 2017 LTEP – Residential Natural Gas Bill Outlook

- The chart below shows the residential bill under: IESO's Updated Outlook, IESO's Updated Outlook + Outlook F (Fuels Only) and Outlook F (Electricity and Fuels). Analysis is ongoing to ensure appropriate scenario modelling and bill treatment.
- The 2017 LTEP could include a forecast of residential natural gas bills to illustrate the upward pressure from higher commodity costs, increasing impact of carbon prices and the higher costs of introducing alternative fuels into the supply mix (e.g., renewable natural gas).
 - Bills relative to IESO's Updated Outlook decline in other scenarios due to lower residential natural gas demand (i.e., less commodity and carbon costs), partially offset by higher RNG costs. Demand declines due to conservation measures.

Typical Residential Natural Gas Bill (with tax, nominal \$ per month)



A. Considerations/Recommendations

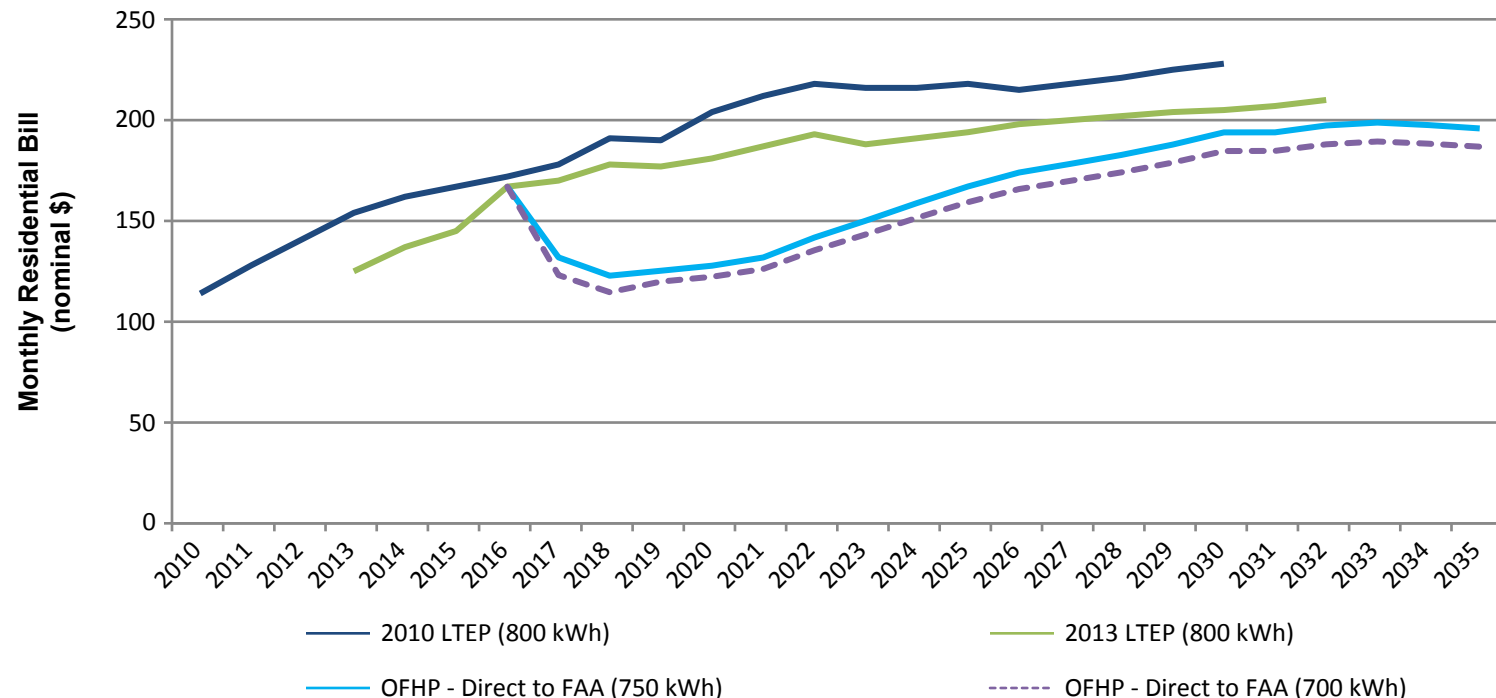
- Pending further analysis, IESO's Updated Outlook + Outlook F (Fuels Only) is recommended as it:
 - Accounts for conservation initiatives such as building energy efficiency upgrades through the use of demand-side management;
 - Includes a renewable natural gas component; and
 - Accounts for the adoption of lower-carbon fuels within the transportation sector (which would include such fuels as ethanol, biodiesel, and natural gas, likely in the form of compressed natural gas or liquefied natural gas).

B. 2017 LTEP – Electricity Outlooks and Forecasts

- The Long-Term Energy Plan (LTEP) is the energy sector's roadmap. It includes 20-year outlooks / forecasts, and identifies initiatives to position the energy sector for the future. Past LTEPs have included:
 - Forecast of typical residential electricity bills
 - Electricity Demand Outlook;
 - Electricity Supply Outlook; and
 - Emissions Outlook.
- The introduction of Ontario's Fair Hydro Plan (OFHP) has impacted the residential electricity bill by reducing costs in the near term. Over the long-term the incurred debt will be repaid by electricity consumers.
- ENERGY and its agencies are also considering options to remove costs from the electricity system through efficiencies, other funding sources and supply mix decisions.
- Savings from IESO's Market Renewal of up to \$5.2 billion over a 10-year period beginning in 2021 have been incorporated into the electricity outlooks. See appendix for more detail.

B. 2017 LTEP – Residential Price Forecast

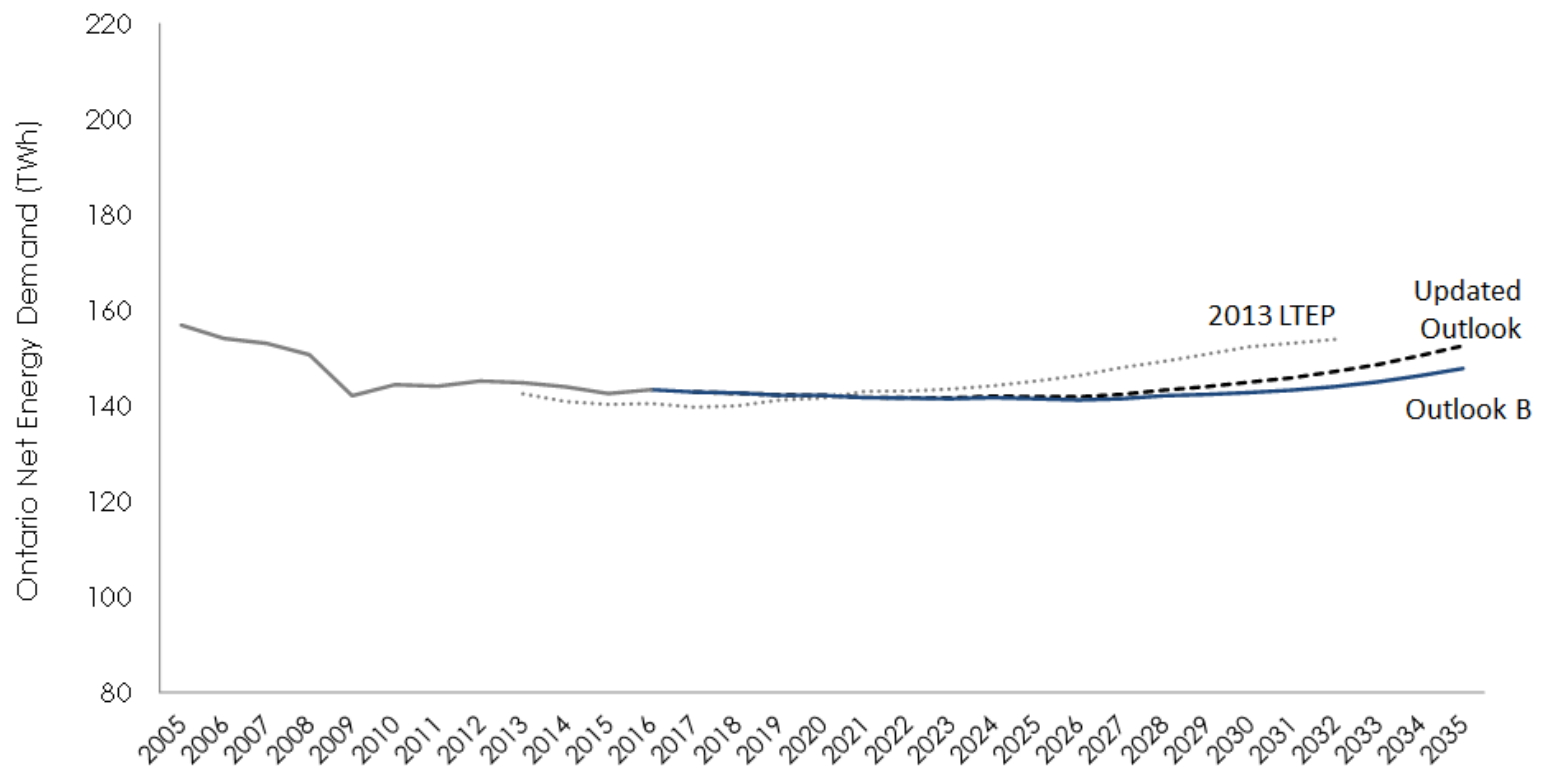
- The 2017 LTEP will include an updated residential electricity bill forecast.
- LTEP residential bill forecasts have followed a trend of being lower than the prior LTEP.
- Current OFHP forecasts remain below the 2013 LTEP curve (using 750 kWh per month) for the duration of the forecast period.



Note: OFHP – Direct to FAA (750 kWh) based on a preliminary July 2017 forecast; forecast is subject to change. As of 2017, the OEB reports residential bill impacts using an average consumption of 750 kWh per month. OPO outlooks A, B, C and D forecast that a rising share of multi-residential dwellings and significant improvements in energy efficiency could reduce this to 700 kWh or lower (See Appendix). However, the residential intensity outlooks do not factor in an increased adoption of EVs, which would increase average monthly electricity demand (preliminarily, by ~10 to 15% in 2035, based on 2.5 million EVs on the road in that year).

B. 2017 LTEP – Electricity Demand Outlook

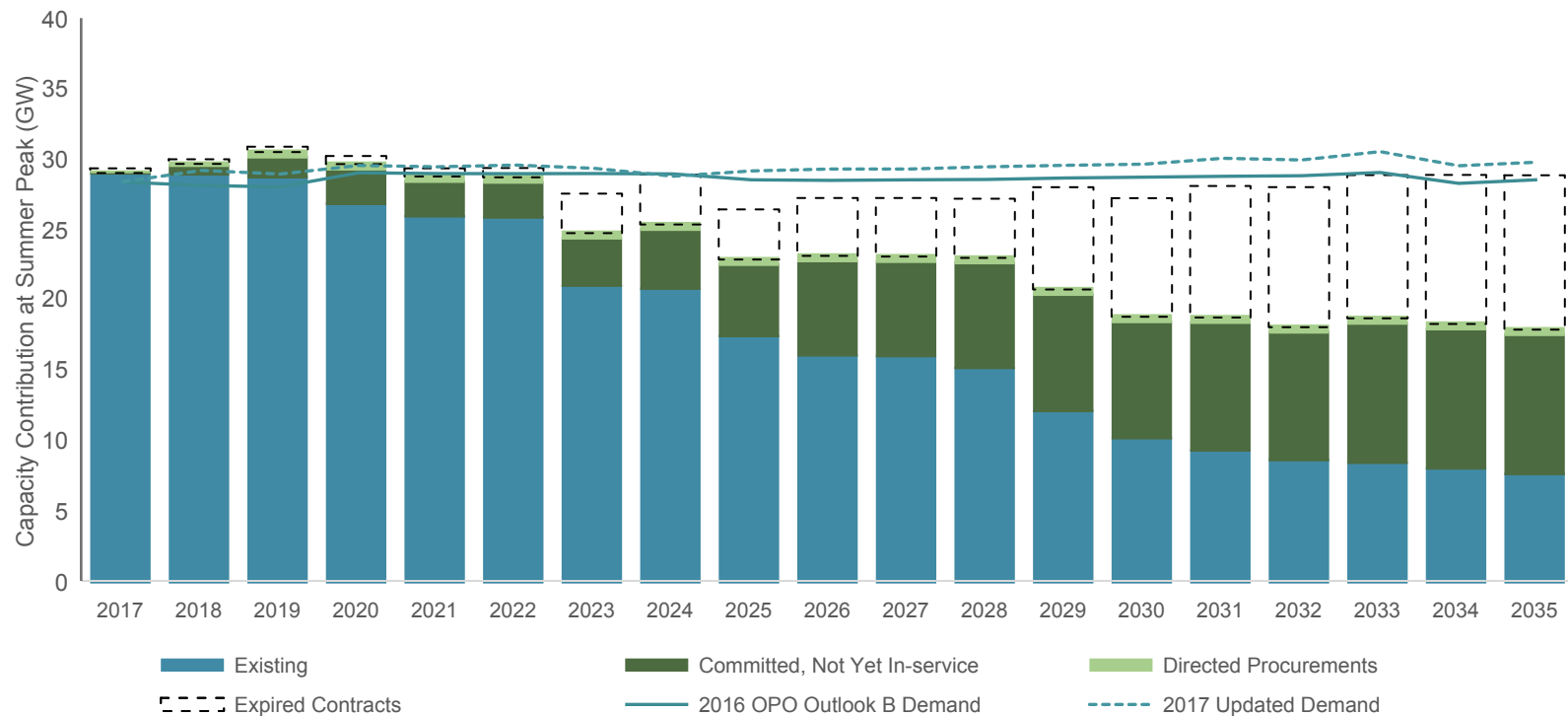
- The following chart compares the demand forecast in 2013 LTEP, IESO's outlook publically released in September 2016 (Outlook B), and the new updated outlook for 2017 LTEP.
- The updated outlook is based on Outlook B with increased EV uptake (2.4 million EVs by 2035) and recent sector updates (about 5 TWh higher than Outlook B by 2035).



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B. 2017 LTEP – Electricity Supply Outlook

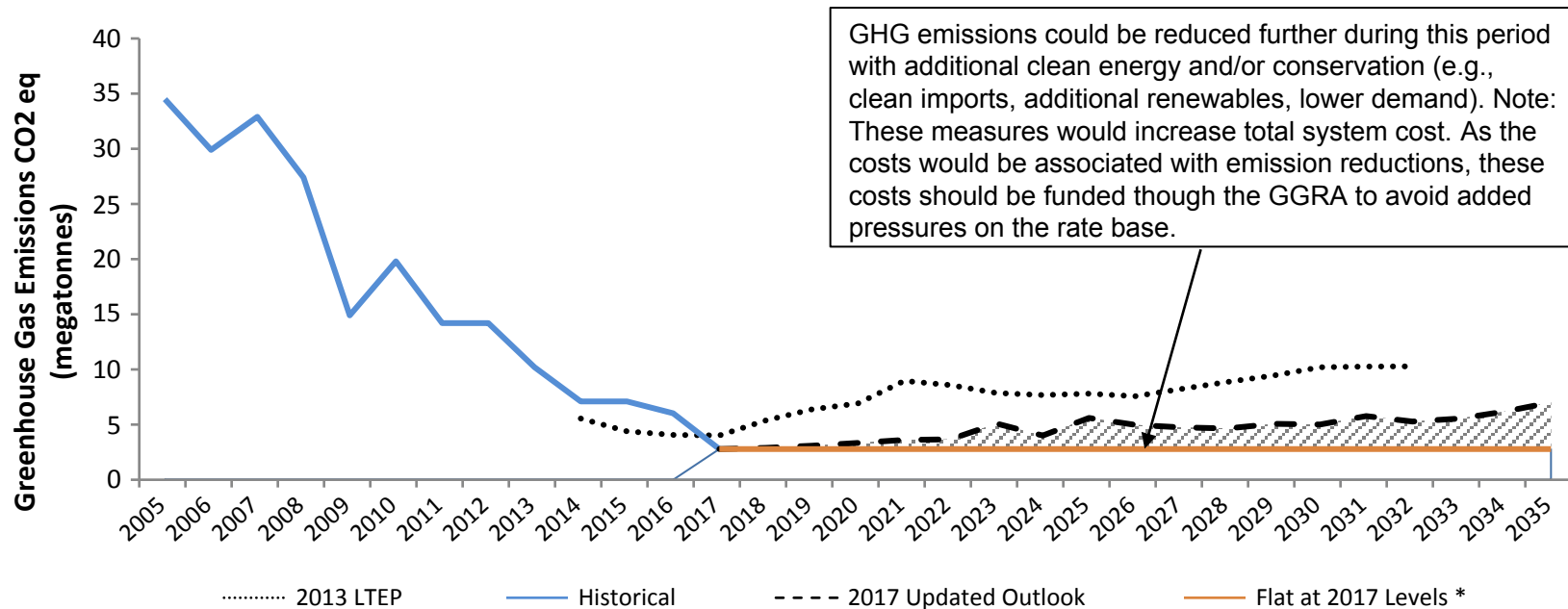
- 18 GW of supply resources will reach the end of their contact term by 2035. There will be a need for additional resources in the early 2020s.
 - These resources could offer into the electricity and/or capacity market to provide additional supply as required.
 - Maintaining flexibility allows for the electricity system to meet increases and decreases in future demand.



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B. 2017 LTEP – Electricity Emissions Outlook

- With the retirement of coal plants, greenhouse gas (GHG) emissions have dropped by over 80% in the past 10 years. Today, Ontario electricity sector GHG emissions represent about 2% of Ontario's overall economy-wide GHG emissions.
- The trend of lower emissions is forecast to continue over the planning outlook.
- IESO is undertaking analysis of new scenarios including a flat GHG outlook and a declining GHG outlook.



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2. INPUTS INTO THE DEVELOPMENT OF THE 2017 LTEP RESIDENTIAL ELECTRICITY PRICE FORECAST

2017 LTEP – Residential Electricity Price Forecast

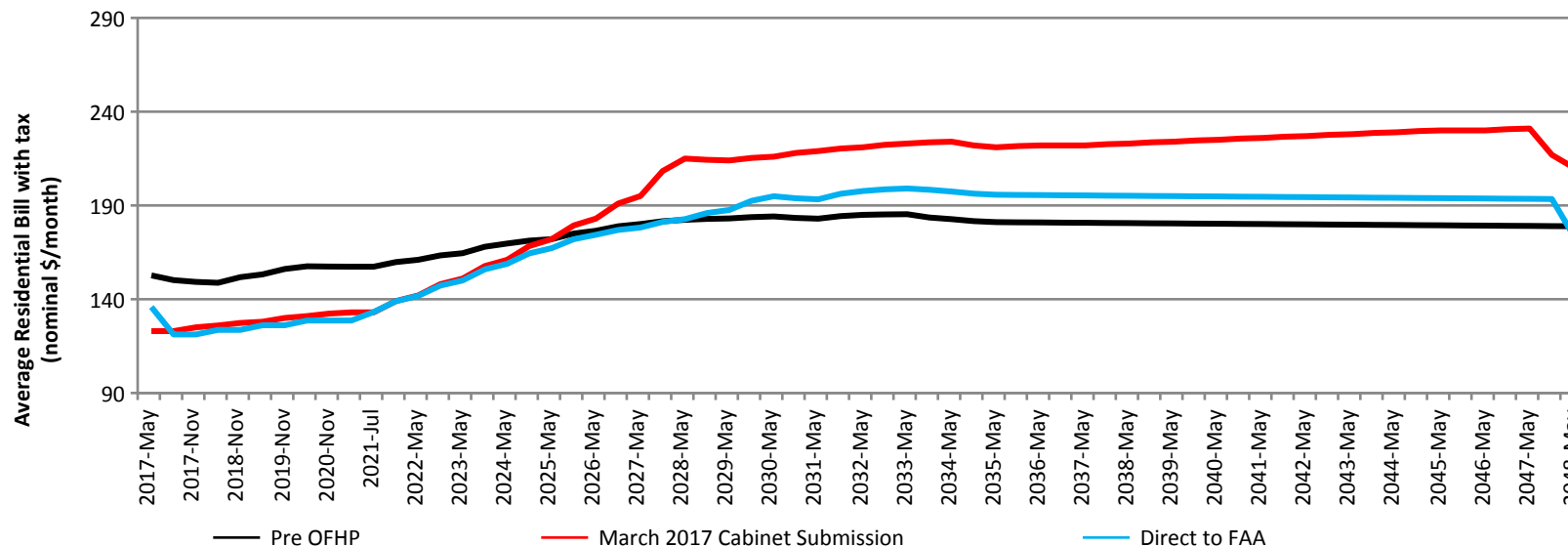
- The 2017 LTEP price forecast needs to show progress at lowering costs relative to the 2013 LTEP.
- The modelling assumptions for 2017 LTEP Residential Electricity Price Forecast include:
 - Benefits from implementing IESO's Market Renewal which includes a number of initiatives focused on more efficiently meeting demand; and
 - Ontario's Fair Hydro Plan (OFHP).
- A decision is required on actions to mitigate increases in the residential bill, in the near, medium and long term, including:
 - I. Adjusting the inflationary cap; and
 - II. Finding Greater Efficiencies (e.g., incenting further efficiencies in the distribution sector).

A. Ontario's Fair Hydro Plan

- The Ontario Fair Hydro Plan Act, 2017 requires the Minister of Energy to calculate the “Fair Allocation Amount” (FAA) for each 6-month period to 2047.
 - The FAA is the accumulated difference between the allocation of clean energy costs and any associated financing costs payable by specified consumers under the OFHPA and the allocation of clean energy costs that would have been payable by those same consumers absent the OFHPA.
- The FAA aligns clean energy costs with clean energy benefits into the future.
- The Minister is required by the Act to provided the FAA to the Ontario Power Generator (OPG) as Financial Services Manager.
 - The FAA is expected to be set out in a letter from the Minister to OPG.
- The FAA is a constraint on the debt that the Financial Services Manager can finance.
- This is an important input in the development of the 2017 LTEP residential price forecast curve (i.e., the forecast cannot be finalized until the OFHP payback period is finalized).
- The FAA is necessary for the development of a Financing Plan by OPG and must precede the rating and sale of the asset (Summer/Fall 2017 TBC).

A. Ontario's Fair Hydro Plan – Fair Allocation Amount

- Under current OFHP forecasts, residential electricity rates would increase at an average rate of about 6% between the end of the inflationary cap until the recovery period (i.e., 2021-2027).
- Demand, interest, financing, technology performance and system cost assumptions can significantly impact the price forecast.



	2017-May	2017-Jul	2018-May	2019-May	2020-May	2021-Jul	2022-May	2023-May	2024-May	2025-May	2026-May	2027-May	2028-May	2029-May	2030-May	2031-May	2032-May	2033-May	2034-May	2035-May	2036-May	2037-May	2038-May	2039-May	2040-May	2041-May	2042-May	2043-May	2044-May	2045-May	2046-May	2047-May	2048-May
Average Residential Bill (\$/month)	136	121	124	126	129	133	142	150	159	167	174	178	183	188	195	193	198	199	197	196	196	195	195	195	195	195	194	194	194	194	194	194	173
Change in bill (%)	n/a	-10.8%	2.0%	2.0%	2.0%	3.5%	6.5%	5.8%	5.9%	5.3%	4.3%	2.2%	2.5%	2.7%	3.9%	-0.8%	2.3%	0.7%	-0.8%	-0.9%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-10.4%
Total Accumulated Debt (\$B)	0.2	1.0	3.3	5.8	8.5	11.5	13.7	15.5	17.1	18.2	19.1	20.0	20.7	21.1	20.9	20.7	20.2	19.6	18.8	17.9	17.0	16.0	14.9	13.8	12.5	11.2	9.8	8.2	6.6	4.9	3.0	1.0	0.0

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Note: Based on a preliminary July 2017 forecast; forecast is subject to change. Assumes 30-year financing period and a nominal interest rate of 5% (compounded monthly). Pre-OFHP forecast beyond 2035 is extrapolated.

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A. Ontario's Fair Hydro Plan – Fair Allocation Amount (cont'd)

Considerations

- The Fair Allocation Amount (FAA) forecast includes a period capped at inflation and is consistent with the *Ontario Fair Hydro Plan Act, 2017*.
- Under the OFHPA, the recovery of debt created by the deferral of electricity charges must reasonably align with the fair allocation of clean energy costs.
- Under the FAA, the typical residential electricity bill increases by an average rate of about 6% between the end of the cap period until the recovery period.
- Smoothing post the inflationary cap period would provide a larger medium-term benefit to Regulated Price Plan (RPP) eligible consumers when compared to the FAA curve. However, smoothing results in increases above the FAA for the period 2026 to 2047.
 - Further smoothing at an annual 5% increase after inflation cap ends provides puts additional pressure on the incurred debt and represents a cumulative funding gap of \$3.5 billion over the same time period when compared to the FAA forecast.

Fiscal Year Impact of the Funding Gap	17-18	18-19	19-20	20-21	21-22	22-23	23-24	24-25	25-26	26-27	27-28	28-29	29-30	30-31
5% Smoothing	0.0	0.0	0.0	0.0	0.2	0.5	0.6	0.7	0.7	0.6	0.2	n/a	n/a	n/a

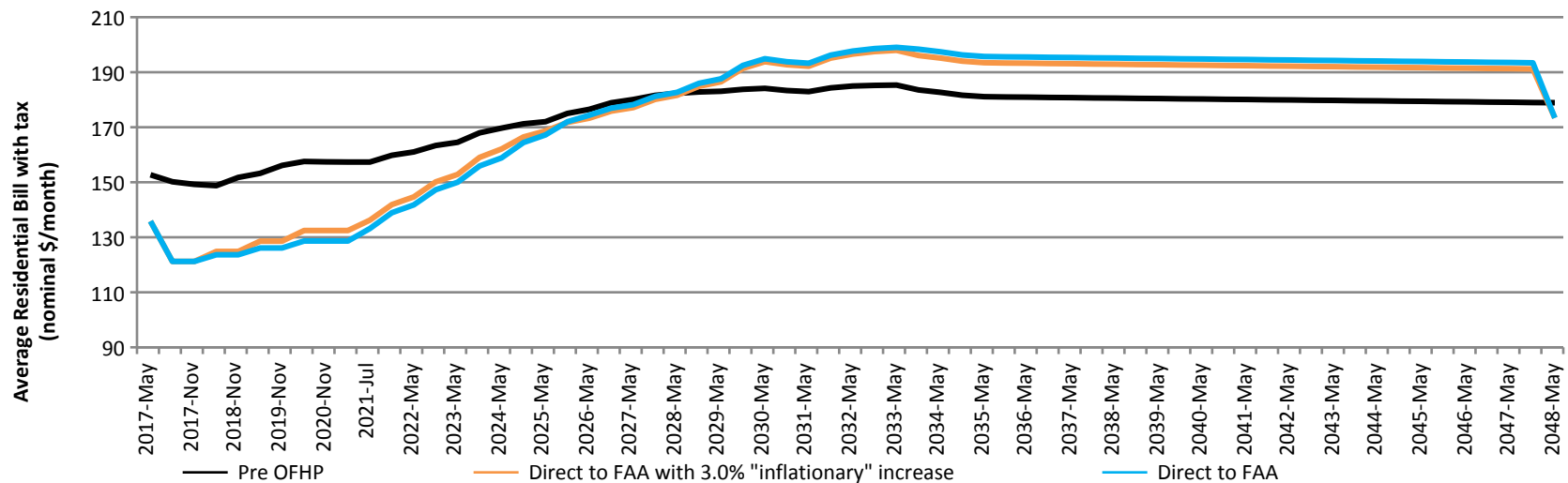
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B. Bending the Future Cost Curve for Electricity Ratepayers

- The 2017 LTEP is an opportunity to profile several initiatives to bend the future cost curve for OFHP-eligible and ineligible ratepayers that could include:
 - I. Adjusting the inflationary cap; and
 - II. Finding Greater Efficiencies (e.g., incenting further efficiencies in the distribution sector).
- The above initiatives reduce the rate increases during recovery period for OFHP-eligible electricity consumers, while simultaneously providing longer term persistent benefits to all ratepayers.
 - Options II, III(a) and III(b) above benefit all electricity consumers because it decreases total GA. Consumers that pay disproportionately more GA than other consumers (i.e., Class B) would see a greater reduction than consumers that pay lower GA (i.e., Class A). For example, under current forecasts, every \$100 million removed from GA reduces Class B rates by about \$0.76/MWh.
- Bending the future cost curve could be achieved through a combination of these initiatives. A summary of each is provided in the following slides.
- Both the fuels and electricity systems are adaptable and provide the opportunity to be leveraged to support the province's economy-wide greenhouse gas (GHG) emissions reduction targets.
 - In order to achieve Ontario's economy-wide GHG targets, increased electrification and additional investment beyond what is envisioned in the 2017 LTEP would be necessary. The Ministry and IESO continue to consider the costs related to these investments (e.g., displacement of some conventional fuels with less carbon-intense alternatives, new emissions-free generating capacity, etc.) and further analysis is pending.

I. Adjust the Inflationary Cap

- Under Ontario's Fair Hydro Plan (OFHP), typical residential bills would increase at the "rate of inflation" for four years.
- Increasing this cap would have the effect of reducing the incurred debt and smoothing the step change in rates when they return to the Fair Allocation Amount (FAA).
- OFHP modelling previously based on 2% "rate of inflation". A 3.0% increase during the inflationary cap period reduces the incurred debt by \$1.7 billion from 2018-2021. Furthermore, residential electricity rates would increase at an average rate of about 5.5% between the end of the inflationary cap until the recovery period (i.e., 2021-2027).

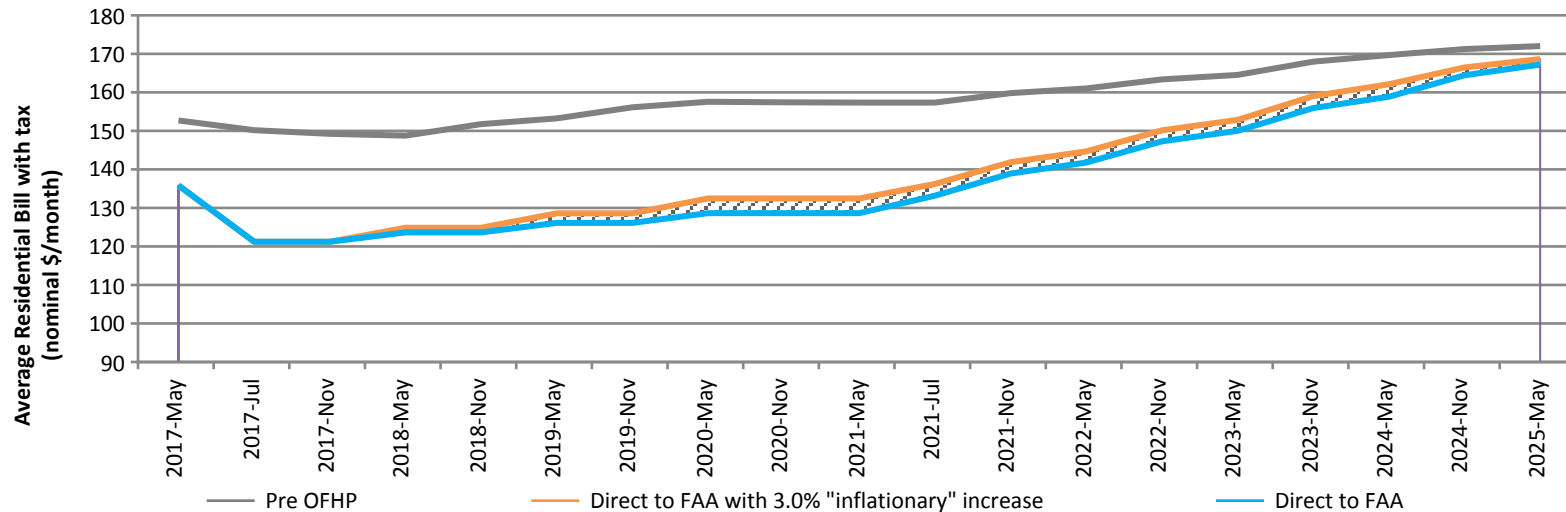


	2017-May	2017-Jul	2018-May	2019-May	2020-May	2021-Jul	2022-May	2023-May	2024-May	2025-May	2026-May	2027-May	2028-May	2029-May	2030-May	2031-May	2032-May	2033-May	2034-May	2035-May	2036-May	2037-May	2038-May	2039-May	2040-May	2041-May	2042-May	2043-May	2044-May	2045-May	2046-May	2047-May	2048-May
Direct to FAA																																	
Average residential bill	136	121	124	126	129	133	142	150	159	167	174	178	183	188	195	193	198	199	197	196	196	195	195	195	195	195	194	194	194	194	194	194	173
Change in bill (%)	n/a	-10.8%	2.0%	2.0%	2.0%	3.5%	6.5%	5.8%	5.9%	5.3%	4.3%	2.2%	2.5%	2.7%	3.9%	-0.8%	2.3%	0.7%	-0.8%	-0.9%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-10.4%
Total Accumulated Debt (\$B)	0.2	1.0	3.3	5.8	8.5	11.5	13.7	15.5	17.1	18.2	19.1	20.0	20.7	21.1	20.9	20.7	20.2	19.6	18.8	17.9	17.0	16.0	14.9	13.8	12.5	11.2	9.8	8.2	6.6	4.9	3.0	1.0	0.0
Direct to FAA with 3.0% "inflationary"																																	
Average residential bill	136	121	125	129	132	136	145	153	162	169	173	177	182	187	194	192	197	198	195	193	193	193	193	193	193	192	192	192	192	192	191	191	173
Change in bill (%)	n/a	-10.8%	3.0%	3.0%	3.0%	2.8%	6.2%	5.7%	6.0%	4.0%	2.8%	2.2%	2.5%	2.7%	3.9%	-0.8%	2.3%	0.7%	-1.4%	-0.9%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-0.1%	-9.4%
Total Accumulated Debt (\$B)	0.2	1.0	3.2	5.5	8.0	10.6	12.4	14.0	15.2	16.0	16.9	17.7	18.4	18.8	18.6	18.4	17.9	17.3	16.6	15.8	15.0	14.1	13.2	12.2	11.1	9.9	8.6	7.3	5.9	4.3	2.7	0.9	0.0

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Note: Based on a preliminary July 2017 forecast; forecast is subject to change. Assumes 30-year financing period and a nominal interest rate of 5% (compounded monthly). Pre-OFHP forecast beyond 2035 is extrapolated.

I. Adjust the Inflationary Cap (cont'd)



	2017-May	2017-Jul	2018-May	2019-May	2020-May	2021-Jul	2022-May	2023-May	2024-May	2025-May
Direct to FAA										
Average residential bill	136	121	124	126	129	133	142	150	159	167
Change in bill (%)	n/a	-10.8%	2.0%	2.0%	2.0%	3.5%	6.5%	5.8%	5.9%	5.3%
Total Accumulated Debt (\$B)	0.2	1.0	3.3	5.8	8.5	11.5	13.7	15.5	17.1	18.2
Direct to FAA with 3.0% 'inflationary'										
Average residential bill	136	121	125	129	132	136	145	153	162	169
Change in bill (%)	n/a	-10.8%	3.0%	3.0%	3.0%	2.8%	6.2%	5.7%	6.0%	4.0%
Total Accumulated Debt (\$B)	0.2	1.0	3.2	5.5	8.0	10.6	12.4	14.0	15.2	16.0

Considerations

- The four-year inflationary cap has been publicly communicated.
- Inflationary increases are specified in O.Reg. 195/17 to be applied by the Ontario Energy Board (OEB) when setting Regulated Price Plan (RPP) rates. This regulation would need to be amended to alter or extend the increase cap.

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I. Adjust the Inflationary Cap (cont'd)



Considerations

- Raising the “inflationary” increases during the cap period reduces total accumulated OFHP debt as shown in the summary provided above.

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II. Finding Greater Efficiencies – Distribution Sector Savings

- Ontario's distribution sector represents \$3.6 billion in annual costs, and typically makes up ~20% of the average residential electricity bill.
- The 2012 Ontario Distribution Sector Review Panel (ODSRP) Report proposed that there was opportunity for \$1.7 billion in savings over 10 years through capital planning optimization and operations, maintenance and administrative (OM&A) reductions as a result of LDC consolidation.
- While the ODSRP recommended legislating LDC consolidation, the majority of the savings they identified were in OM&A costs. These cost reductions could be targeted through other regulatory mechanisms, with a stretch savings target of about \$135 million, to be sustained year over year.

Considerations

- Through LTEP, the Ministry will request the Ontario Energy Board (OEB) via the LTEP implementation directive to use its authority to create more effective tools to harvest more efficiencies and savings in the distribution sector. Examples of potential mechanisms include:
 - Financial penalties for LDCs who do not meet performance expectations;
 - Requiring LDCs to partner and share back office services; and
 - Modernizing regulatory compliance processes to reduce costs.
- The Ministry will also ask the OEB to reevaluate its performance mechanisms to ensure that high-cost LDCs are becoming more efficient through the years and ensure clear metrics are in place to allow for proper evaluations of the low performing LDCs (e.g. further strengthen the scorecard that is already in place by the OEB that evaluates LDCs on various metrics and make it publicly available).
- Analysis is on going to develop a proportional estimate for a typical Toronto Hydro customer.

APPENDIX

Other Measures – Funding Conservation from GGRA Proceeds

- Removing conservation costs from the Global Adjustment (GA) starting in 2018 reduces accumulated debt associated with OFHP by \$3.2 billion from 2021 to 2029 under the scenario that directly returns to the FAA curve after the capped period.

Considerations

- The Ministry could take steps to further reduce the cost curve by transferring the cost of electricity conservation and demand management (CDM) programs, either in whole or in part, from rates to the Greenhouse Gas Reduction Account (GGRA):
 - The Conservation First Framework (CFF) and Industrial Accelerator Program (IAP) are in place until December 31, 2020, however transferring the costs of programs from rates to the GGRA could begin in 2018.
- Removing conservation costs from the Global Adjustment (GA) could achieve ratepayer cost reductions starting in 2027:
 - While less debt and interest is accrued in early years, the OFHP holds bills low until 2027.
- Initiatives funded through GGRA must undergo annual approval by the Minister of the Environment and Climate Change, are subject to fluctuations in the revenue amounts collected through Cap and Trade audits, and will compete with other GHG reduction initiatives.
- GA funding could be used as a backstop for CDM programs if GGRA funding was not available in a given year.
- Conservation must be considered in the context of supply/demand planning. Therefore, it is recommended that the Ministry and its agencies continue to maintain oversight of conservation programs even if funded by GGRA.

Other Measures – Supply Mix Funding Options or Suspension

- There are several supply mix and funding options to reduce system costs that achieve similar outcomes:
 - Suspending current and/or planned renewable initiatives; or
 - Funding current and/or planned renewable costs from a different source (e.g., GGRA, federal funding).

Considerations

- Similar funding systems are in place already in Canada. Alberta funds its renewable generating resources with funds generated through its carbon tax.
- Shifting the funding of a percentage (10%) of renewable costs from the Global Adjustment (GA) to the GGRA starting in 2017 would result in cumulative savings of \$7.4 billion, a portion of which would accrue to OFHP consumers (analysis ongoing).
 - The required GGRA funding would be variable due to changes in renewable capacity and generation, and well as variability in the wholesale electricity price.
 - Funding renewables would reduce available GGRA funding for other programs and initiatives.
 - There would be additional administrative burden to shift, manage and track a subset of total renewable costs.
- Not proceeding with MicroFIT 2017 and FIT 5, and exiting LRP1 contracts would result in cumulative savings of over \$1.5 billion.
 - LRP 1 contracts have already been issued. Contract amendments or terminations without the consent of developers could result in legal proceedings against IESO and the Province.
- Similar to seeking federal funding for transmission infrastructure, the 2017 LTEP could represent an opportunity to seek federal funding for renewable generation.

Other Measures – Enhancing Existing Measures (OREC)

- Enhancing the Ontario Rebate for Electricity Consumers (OREC) would reduce consumer bills by shifting costs to the tax base.
- Rate relief could be provided through on-bill rebates and ‘shaped’ to align with the post-inflation cap annual funding gap.

Considerations

- There will be a fiscal impact on the province resulting from increasing OREC funding.
- Should smoothing be provided to OFHP eligible consumers, increasing OREC funding could be combined with other initiatives to meet the funding gap between the FAA forecast and required funding.
- Potential impacts on OFHP accounting are still being analyzed.

Fuels Modeling Assumptions – Summary

- IESO's Updated Outlook adds the following to IESO's OPO Outlook B, by 2035:
 - An additional 1,400,00 light-duty electric vehicles (EVs) and 30,400 heavy duty EVs.
- IESO's Updated Outlook + Outlook F (Fuels Only) adds the following to IESO's Updated Outlook by 2035:
 - Building Envelope Improvements: 600,000 single family fossil-fuel heated dwellings improve building envelope to reduce heating load by 20 GJ/year;
 - Building Envelope Improvements: 255,000 multi-family fossil fuel heated dwellings improve building envelope to reduce heating load by 9 GJ/year;
 - Building Envelope Improvements: 6% reduction in heating load for fossil-fuel heated commercial buildings;
 - Transportation Sector Fuel Switching: Additional 1.3 billion litres of ethanol, additional 2 billion litres of biodiesel /renewable diesel, switching from diesel to natural gas / hydrogen / propane, etc.;
 - Renewable Natural Gas (RNG): 155 PJ of RNG injected into the system; and
 - Mode switching: Additional urban trips on buses (instead of cars).
- Outlook F (Electricity and Fuels) adds the following to IESO's Updated Outlook + Outlook F (Fuels Only) by 2035:
 - Electrification: 2,100,000 households upgrade/switch from natural gas to electricity for heating;
 - Electrification: 80 million square metres of commercial floor space switches from natural gas to electricity for heating;
 - Electrification: 57 PJ of industrial fossil fuel demand switches to electric equivalent; and
 - Mode Switching: Incremental 39,000,000 trips using electrified public transit.

Electricity Modeling Assumptions – Summary

- [Placeholder]

Residential Electricity Demand Forecast

- The table below charts the monthly residential electricity consumption forecasts outlined in IESO's Ontario Provincial Outlook (OPO).
- While the table considers increased residential electricity consumption due to increase in electricity's share of space heating and water heating, it does not consider the impact of EVs on residential demand (OPO modeled transportation electricity demand separate from residential demand).

Monthly Residential Forecast (2016-2035)

Residential Intensity (kWh/HH/month)	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Average (2016-2025)
Outlook A	735	729	713	703	688	672	658	648	636	627	681
Outlook B	735	729	713	702	688	672	659	648	637	628	681
Outlook C	735	730	714	705	693	680	670	664	656	653	690
Outlook D	735	730	715	707	696	685	677	673	669	669	696
	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Average (2016-2035)
Outlook A	619	613	607	603	598	595	590	590	590	589	646
Outlook B	621	615	609	605	601	598	594	594	594	594	647
Outlook C	650	649	649	651	653	657	658	665	672	679	678
Outlook D	670	674	678	685	692	700	708	720	733	747	701

Source: IESO, Ontario Planning Outlook, Module 2: Demand Outlook

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Bending the Cost Curve for Electricity Ratepayers

- The government has indicated publicly that the upcoming 2017 LTEP will continue the trend of taking costs out of the electricity system and making it more affordable for ratepayers.
- Ontario has taken a number of actions to lower electricity costs for all consumers by:
 - Deferring investments in generation (e.g., new build nuclear), improving market efficiency (e.g., wind dispatch) and decreasing the cost of renewable procurements (e.g., Green Energy Investment Agreement (GEIA) renegotiation, decreasing Feed-In Tariff (FIT) prices, competitive Large Renewable Procurement (LRP));
 - Increasing cost effectiveness and improving efficiency by adopting new electricity market approaches (e.g., no NUG contract extensions and demand response);
 - Suspending the LRP II and the Energy from Waste Standard Offer Program (EFWSOP) – up to \$3.8 billion in cost savings; and
 - Limiting FIT5 procurement target to 150 MW and suspending future FIT procurements – an average annual savings of \$15 million.
- ENERGY and its agencies are also considering options to remove costs from the electricity system through efficiencies, other funding sources and supply mix decisions.

Improving Processes – IESO's Market Renewal

- IESO's Market Renewal includes a number of initiatives focused on more efficiently meeting demand over the near and longer terms. Market Renewal includes the following:
 - Introduce a Day-Ahead Market based on a Single Schedule Market to provide greater certainty to market participants and lower the cost of producing electricity.
 - Reduce the cost of scheduling and dispatching resources to meet demand as it changes from hour to hour and minute to minute through Enhanced Real-Time Unit Commitment.
 - More efficiently manage unexpected short-term changes on the system by enabling More Frequent Intertie Scheduling.
 - Improve the way Ontario procures resources to meet our longer-term supply needs by implementing an Incremental Capacity Auction.

Considerations

- An independent third party report estimates that benefits from IESO's Market Renewal could reach up to \$5.2 billion over a ten-year period beginning in 2021. Note: IESO has incorporated some of this saving into its current Outlook for electricity system costs and residential bills (i.e., Through reduced capacity payments for generators once their contracts expire).
- In addition to the up to \$5.2 billion in estimated benefits, non-quantified benefits are likely to deliver additional value, for example:
 - Inefficiencies in the current market design need to be managed using extensive time and resources including expensive external legal expertise and consultants.
- In other jurisdictions that went through similar changes, actual efficiencies realized have been greater than those expected often because of the non-quantifiable benefits.
 - For example, Southwest Power Pool, a system operator covering 14 U.S. states, realized \$1 billion in savings over a two year period compared to an expected saving of \$400 million.