

From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Subject: FW: LTEP Deck - FHP Analysis
Date: Friday, August 25, 2017 2:23:14 PM
Attachments: [Interest Rate Sensitivities \(2017 08 23\)_v4.pptx](#)

Hi Gadi,

FYI, for interest if you have a few seconds, but don't let it otherwise intrude on vacation time!
BTW, while staff have the 3% scenario in the slide, it does not seem, from the Thursday meeting, to be an option that would be picked up.

Not sure if Scott Nelms still sends around any summaries of the Energy (bi-)weeklies, but I'd note that Atel said that last week's FPC item is not being rescheduled, as decision makers see the FHP as on an implementation track – and the TB in September will serve for that purpose.

Ron

From: John Kim
Sent: August-25-17 14:07
To: Ronald Kwan ; Bruno Amara
Cc: Shajee Kathirgamanathan
Subject: RE: LTEP Deck - FHP Analysis

Hi Ron,

As requested.

Thanks,

John

From: Ronald Kwan
Sent: Wednesday, August 23, 2017 7:05 PM
To: Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>; John Kim <John.Kim@ofina.on.ca>
Subject: Re: LTEP Deck - FHP Analysis
Thanks Bruno, et al.
Ron

On Aug 23, 2017, at 6:36 PM, Bruno Amara <Bruno.Amara@ofina.on.ca> wrote:

Hi Ron

Some preliminary analysis based on Energy modelling.

Bruno

From: John Kim
Sent: Wednesday, August 23, 2017 3:30 PM
To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>
Cc: Bruno Amara <Bruno.Amara@ofina.on.ca>
Subject: RE: LTEP Deck - FHP Analysis

Hi Ron,

We are working to see if it is doable. Will get back to you.

John

From: Ronald Kwan

Sent: Wednesday, August 23, 2017 1:41 PM

To: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>

Cc: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>

Subject: RE: LTEP Deck - FHP Analysis

Thanks Shajee. Any interest rate sensitivity analysis that you could do?

Ron

From: Shajee Kathirgamanathan

Sent: August-23-17 13:36

To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>

Cc: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>

Subject: LTEP Deck - FHP Analysis

Hi Ron,

Just wanted to share with you some quick investigations into Energy's LTEP deck (attached, and found in [this folder](#)).

The data below was from the model embedded in the Powerpoint, used to make the charts.

Slides 22 and 24 present two scenarios for future price forecasts depending on how the FHP gets implemented:

	~5% cap post 2% inflationary cap (Slide 22)	3% inflationary cap (Slide 24)
Max Debt (year)	21.3B (May 2029)	19.6B (May 2029)
Total Interest Costs	21.3B	19.4B
Year to Pay off Debt	2047	2047
Max Interest Costs paid in a 6 month period*	538M	496M
Max interest costs over 12 month period*	1076M	991M
Average interest costs (calculated)**	686M	627M

*Note the 6 month periods are in line with RPP periods, therefore the 12month period while not exactly in line with a calendar year would be close.

**Average 6 month RPP period, extrapolated to 12 months.

Thanks,

Shajee

Shajee Kathirgamanathan

Senior Advisor

Electricity Finance Branch, Corporate and Electricity Finance Division

Ontario Financing Authority

Office: 416-325-1402 | Mobile: 647-294-3359

shajee.kathirgamanathan@ofina.on.ca

Interest Rate Scenarios: Energy LTEP Model

DRAFT

- The preliminary interest cost estimates are based on Ministry of Energy Global Adjustment cost amounts to be deferred consistent with LTEP modelling assumptions.
 - o The sensitivities were modelled by assuming alternate interest rates and allowing term to differ from the status quo 30-year assumption.
 - o There are other assumptions in the Energy model, such as the YOY increase after 2022, that could also be changed. The current analysis does not explore all scenarios.
 - o GA deferral estimates are subject to updates from the Ministry of Energy.
 - o Actual annual and cumulative interest costs are sensitive to actual borrowing rates.
 - o Sensitivities shown on lower interest rates assume faster debt pay down.

2% inflation Cap: 2018-2021

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.648 billion in 2029	\$10.7 billion	2042 (25-year term)
4.0%	\$0.777 billion in 2029	\$13.3 billion	2043 (26-year term)
4.5%	\$0.918 billion in 2029	\$16.9 billion	2045 (28-year term)
5.0%	\$1.076 billion in 2030	\$21.3 billion	2047 (30-year term)

3% inflation Cap: 2018-2021

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.598 billion in 2029	\$9.8 billion	2042 (25-year term)
4.0%	\$0.717 billion in 2029	\$12.1 billion	2043 (26-year term)
4.5%	\$0.848 billion in 2029	\$15.4 billion	2045 (28-year term)
5.0%	\$0.991 billion in 2030	\$19.4 billion	2047 (30-year term)

Note: Above tables provide interest rate sensitivity scenarios based on Energy's draft LTEP deck dated August 15, 2017 and are subject to change

From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Subject: FW: LTEP Deck - FHP Analysis
Date: Friday, August 25, 2017 4:42:19 PM
Attachments: [Interest Rate Sensitivities \(2017 08 23\)_v5.pptx](#)

Hi Gadi,

A new column added. The past confusion on max debt and accumulated interest cost won't be alleviated by this, at least in the 5% sensitivity!

Ron

From: Shajee Kathirgamanathan
Sent: August-25-17 16:40
To: Ronald Kwan ; John Kim ; Bruno Amara
Subject: RE: LTEP Deck - FHP Analysis

Hi Ron,

Please find attached the revised deck with max debt columns.

File attached and found here:

S:\Users\CEF\Hydro 2017\LTEP\Modelling

Thanks,

Shajee

Shajee Kathirgamanathan

Office: 416-325-1402 | Mobile: 647-294-3359

shajee.kathirgamanathan@ofina.on.ca

From: Ronald Kwan
Sent: Friday, August 25, 2017 3:50 PM
To: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>
Subject: RE: LTEP Deck - FHP Analysis

Hi John,

A belated suggestion. Could you add a column on the peak debt too?

Thanks,

Ron

From: John Kim
Sent: August-25-17 14:25
To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>
Subject: RE: LTEP Deck - FHP Analysis
Great, thanks.

From: Ronald Kwan
Sent: Friday, August 25, 2017 2:24 PM
To: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>
Subject: RE: LTEP Deck - FHP Analysis

Thanks John.

Fine to include, but I had a sense that the 3% scenario is unlikely to be picked up.

Ron

From: John Kim

Sent: August-25-17 14:07

To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>

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**Average 6 month RPP period, extrapolated to 12 months.

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Shajee

Shajee Kathirgamanathan

Senior Advisor

Electricity Finance Branch, Corporate and Electricity Finance Division

Ontario Financing Authority

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shajee.kathirgamanathan@ofina.on.ca

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DRAFT

- The preliminary interest cost estimates are based on Ministry of Energy Global Adjustment cost amounts to be deferred consistent with LTEP modelling assumptions.
 - o The sensitivities were modelled by assuming alternate interest rates and allowing term to differ from the status quo 30-year assumption.
 - o There are other assumptions in the Energy model, such as the YOY increase after 2022, that could also be changed. The current analysis does not explore all scenarios.
 - o GA deferral estimates are subject to updates from the Ministry of Energy.
 - o Actual annual and cumulative interest costs are sensitive to actual borrowing rates.
 - o Sensitivities shown on lower interest rates assume faster debt pay down.

2% inflation cap: 2018-2021

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Peak Debt	Term (Approximate)
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4.0%	\$0.777 billion in 2029	\$13.3 billion	\$19.3 billion	2043 (26-year term)
4.5%	\$0.918 billion in 2029	\$16.9 billion	\$20.3 billion	2045 (28-year term)
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4.5%	\$0.848 billion in 2029	\$15.4 billion	\$18.7 billion	2045 (28-year term)
5.0%	\$0.991 billion in 2030	\$19.4 billion	\$19.7 billion	2047 (30-year term)

Note: Above tables provide interest rate sensitivity scenarios based on Energy's draft LTEP deck dated August 15, 2017 and are subject to change

From: [Ronald Kwan](#)
To: [David McLean \(MOF\)](#); [Christopher Pearce \(MOI\)](#)
Cc: [Gadi Mayman](#); [Christina Zhang](#); [Gavin He](#)
Subject: RE: \$25B
Date: Monday, March 06, 2017 5:53:09 PM
Attachments: [GA Financing - Interest Cost Scenarios - Mar 1 Deck v6.pptx](#)
Importance: High

Hi David, Chris,

Attached is a response to the request from the MO (see the email chain). MO had asked for a response ASAP (now EOD). (Doc internal PW.)

I'd note that this is for internal briefing only, and is not intended for further distribution, but should help inform the issue.

I'd note that our analysis is a refinement from the Energy analysis. And that our modelling has not been shared with or reviewed by Energy. Following further analysis and discussions with Energy, the modelling could be further refined. (I'd note that they usually round their numbers, too, for their decks, which we have not done for this distribution.)

Energy said in its CabSub that it was using a 5% interest rate, compounded monthly, but its actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the tables from the Energy decks have zero in-year interest costs in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year debt balance only, not financing the in-year deferrals.

Staff have taken Energy's GA deferral amounts and calculated in-year interest costs based on even monthly GA deferral amounts (a simplification) to generate a table with interest costs starting in 2017. However, since interest costs in the proposed plan are deferred and capitalised, that changes the annual and accumulated debt amounts a bit from what Energy had estimated.

In both the revised and Energy cases, on a rounded basis, the cumulative interest cost is \$25 bn, with an annual peak of \$1.4 bn in the 5% interest rate scenario. The peak cumulative debt rounds in both cases to \$28 bn, but is a little lower in Energy's table, and a little higher in the detailed modelling with interest compounding monthly.

Communications have also talked about implementation in the summer. As such, staff did some sensitivity modelling on a July 1, 2017, implementation date, effectively assuming only half the estimated deferral amount in 2017. The impact on estimated life-cycle cumulative interest costs is significant.

Also included are some interest rate sensitivities, which have significant impacts.

Ron

-----Original Message-----

From: Nguyen, Marianne (MOF) [<mailto:Marianne.Nguyen@ontario.ca>]
Sent: March-06-17 09:37
To: Gadi Mayman <Gadi.Mayman@ofina.on.ca>
Cc: Christopher Pearce (MOI) <Christopher.Pearce@ontario.ca>; Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Gavin He <Gavin.He@ofina.on.ca>
Subject: \$25B
Importance: High

Good morning Gadi,

Do you have a detailed chart or breakdown that shows how we get to \$25B over 30 years? Ali has requested this ASAP.

Thanks!
Marianne

GA Financing:
Interest Rate Base Scenario & Sensitivities
March 1, 2017, Energy Deck Case

Corporate and Electricity Finance Division
March 6, 2017

GA Financing *(Calendar Year Basis) – (Effective January 1, 2017) March I Deck*

- The interest cost estimates are based on Ministry of Energy estimates of the Global Adjustment cost amounts to be deferred, per its March I Cabinet submission.
 - GA deferral estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are slightly adjusted from Ministry of Energy amounts, to reflect in-year interest costs. Energy's base case interest costs shown were an assumed 5%, compounded monthly, calculated in the following year, with a term of 30-years (2047).

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.879 billion in 2027	\$12.6 billion	2042 (25-year term)
4.2%	\$1.1 billion in 2027	\$17.4 billion	2044 (27-year term)
5.0%	\$1.4 billion in 2028	\$25.1 billion	2047 (30-year term)

Total GA deferral amount being financed is approximately \$20.3 billion (plus deferred, capitalised interest, that can increase peak debt to about \$28 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655
Annual Interest Cost	58	189	327	485	658	822	980	1,120	1,244	1,337	1,389	1,396	1,353	1,307	1,260	1,209
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655	23,622

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,622	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	25,137
Annual Interest Cost	1,156	1,101	1,043	981	917	849	778	703	624	541	454	363	267	166	60	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	2	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 Higher interest rates results in extended the term of the financing. It is assumed that a cap of \$2.242 bn above the true cost of GA in any given year is continued to be applied to repay any remaining debt. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period. In this Scenario, the term would be extended to Year 2056.

GA Financing *(Calendar Year Basis) – (Effective July 1, 2017)*

March / Deck

- Ministry of Energy modelling estimates provided have been based on a full-year of GA deferral in 2017. Annual and cumulative interest and debt estimates would be sensitive to an in-year start date of, e.g., July 1, 2017, as below.
 - Otherwise, as before, modelling is based on Ministry of Energy estimates of the Global Adjustment cost amounts to be deferred in its March 1, 2017, Cabinet Submission.
 - GA deferral cost estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are adjusted from Ministry of Energy amounts, to reflect in-year interest costs and an assumed July 1, 2017 implementation date. Half-a-year of reduced deferred GA significantly reduces estimated cumulative interest costs.

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.817 billion in 2027	\$11 billion	2041 (24-year term)
4.2%	\$1.0 billion in 2027	\$14.9 billion	2042 (25-year term)
5.0%	\$1.3 billion in 2028	\$21.0 billion	2045 (28-year term)

Total GA deferral amount being financed is approximately \$19.1 billion (plus deferred, capitalised interest, that can increase peak debt to about \$26 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077
Annual Interest Cost	26	124	258	413	581	742	896	1,031	1,151	1,239	1,286	1,288	1,239	1,188	1,134	1,077
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077	20,912

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,912	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	
Annual Interest Cost	1,018	955	889	820	748	671	591	506	417	324	226	123	15	0	0	20,978
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,317	0	0	
Accumulated debt in present year	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	0	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

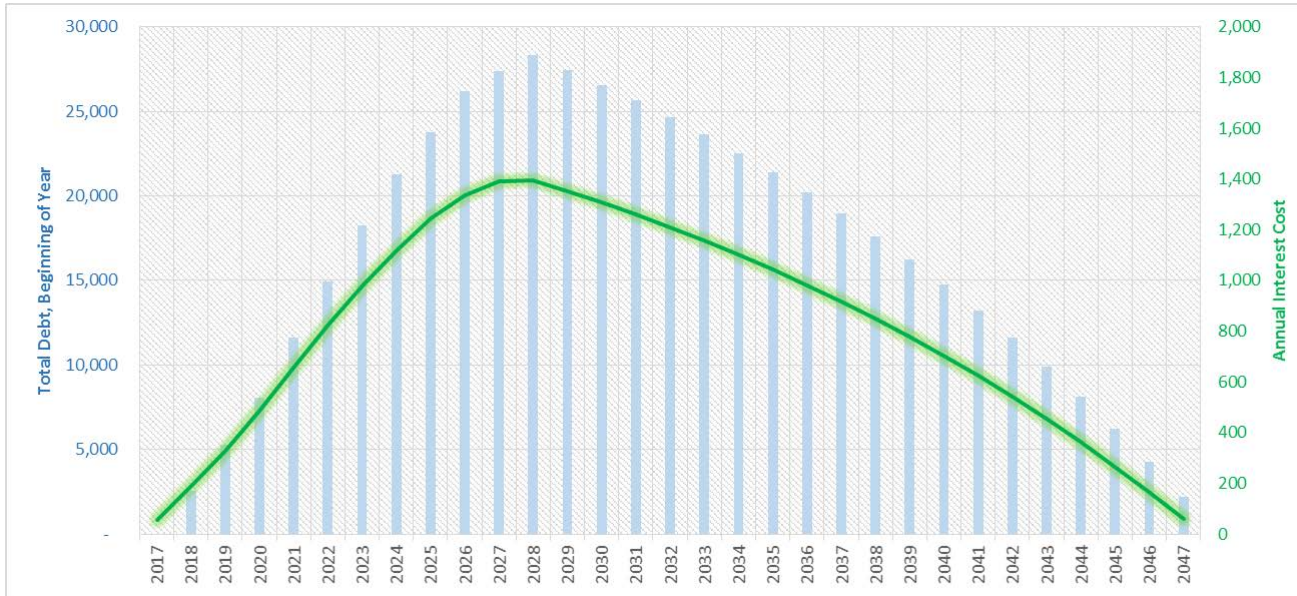
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APPENDIX

Effective Date: January 1, 2017

GA Financing (Base, 5%) (Calendar Year Basis)

(Effective January 1, 2017) March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.4B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655
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Annual Interest Cost	1,156	1,101	1,043	981	917	849	778	703	624	541	454	363	267	166	60	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
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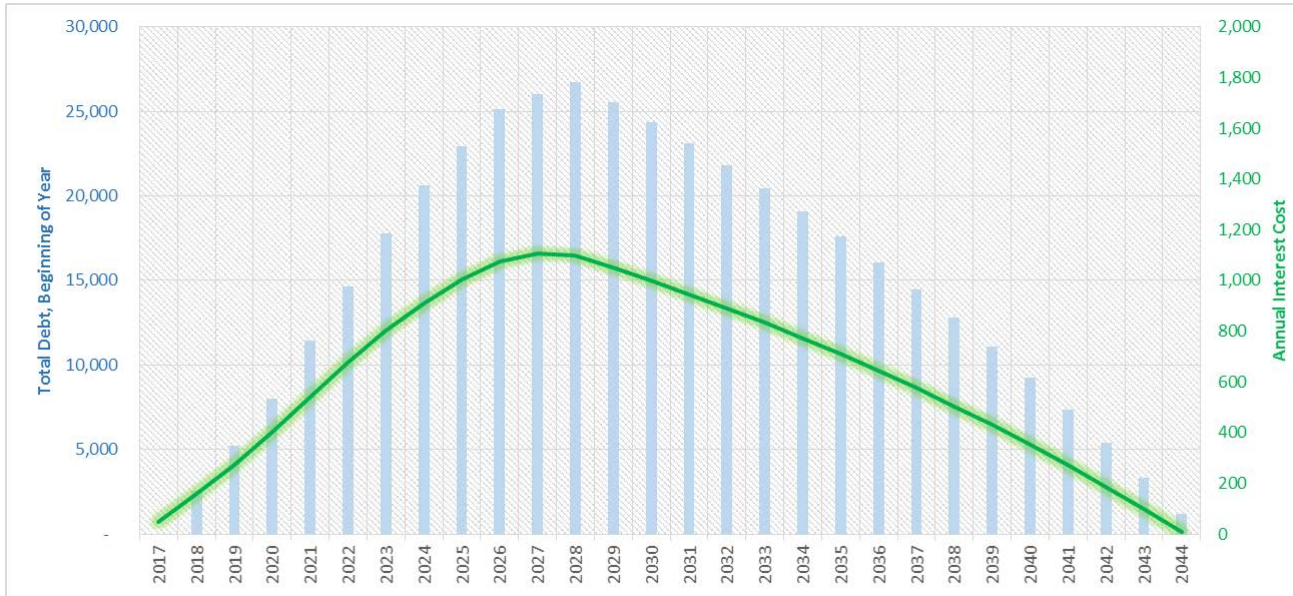
Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing: 4.2% (Calendar Year Basis) (Effective January 1, 2017)

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1.1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,549	5,215	7,988	11,465	14,667	17,797	20,637	22,933	25,149	26,019	26,692	25,550	24,358	23,116	21,821
Annual Interest Cost	49	158	272	402	543	676	802	911	1,006	1,073	1,106	1,099	1,050	999	946	891
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,549	5,215	7,988	11,465	14,667	17,797	20,637	22,933	25,149	26,019	26,692	25,550	24,358	23,116	21,821	20,470

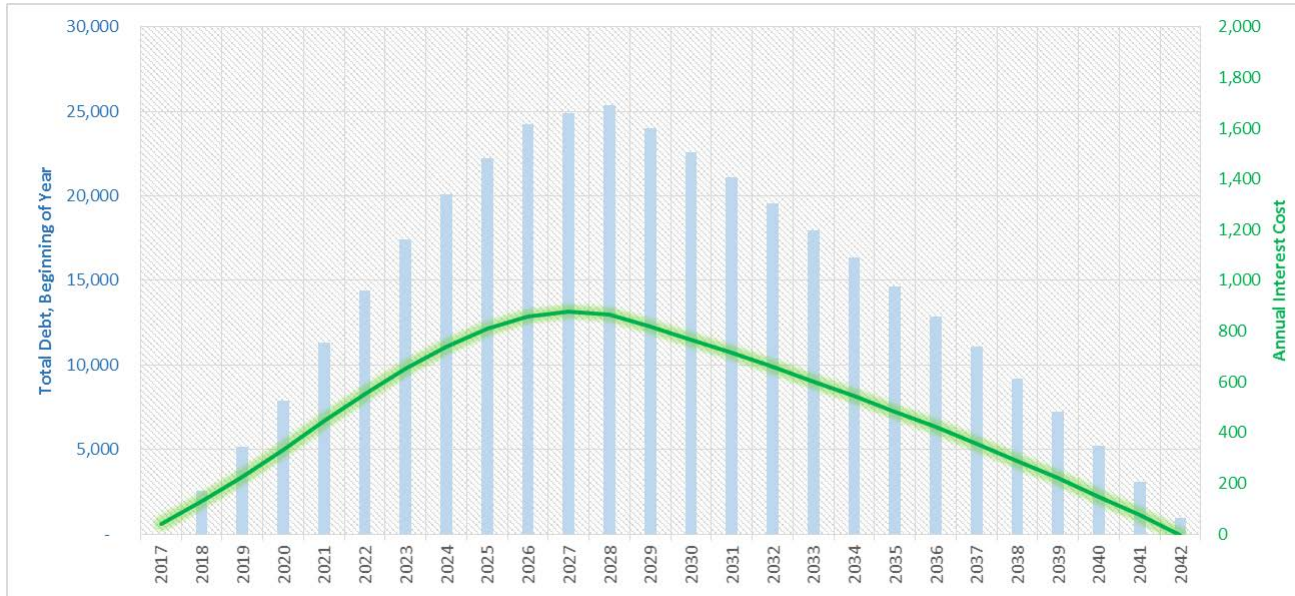
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,470	19,061	17,592	16,060	14,462	12,797	11,059	9,248	7,358	5,388	3,334	1,191	0	0	0	17,367
Annual Interest Cost	833	772	710	644	576	504	430	352	271	187	99	7	0	0	0	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,199	0	0	0	
Accumulated debt in present year	19,061	17,592	16,060	14,462	12,797	11,059	9,248	7,358	5,388	3,334	1,191	0	0	0	0	

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%.

GA Financing: 3.5% (Calendar Year Basis) (Effective January 1, 2017)

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$879M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,541	5,180	7,906	11,311	14,417	17,423	20,113	22,237	24,258	24,915	25,361	23,985	22,561	21,085	19,557
Annual Interest Cost	41	131	225	331	445	553	653	738	811	860	879	866	817	766	714	659
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,541	5,180	7,906	11,311	14,417	17,423	20,113	22,237	24,258	24,915	25,361	23,985	22,561	21,085	19,557	17,975

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	17,975	16,336	14,639	12,882	11,063	9,178	7,227	5,206	3,113	946	0	0	0	0	0	
Annual Interest Cost	603	545	484	422	357	290	221	149	74	34	0	0	0	0	0	12,665
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-980	0	0	0	0	0	
Accumulated debt in present year	16,336	14,639	12,882	11,063	9,178	7,227	5,206	3,113	946	0	0	0	0	0	0	

Actuals are subject to actual prices and actual interest rates.

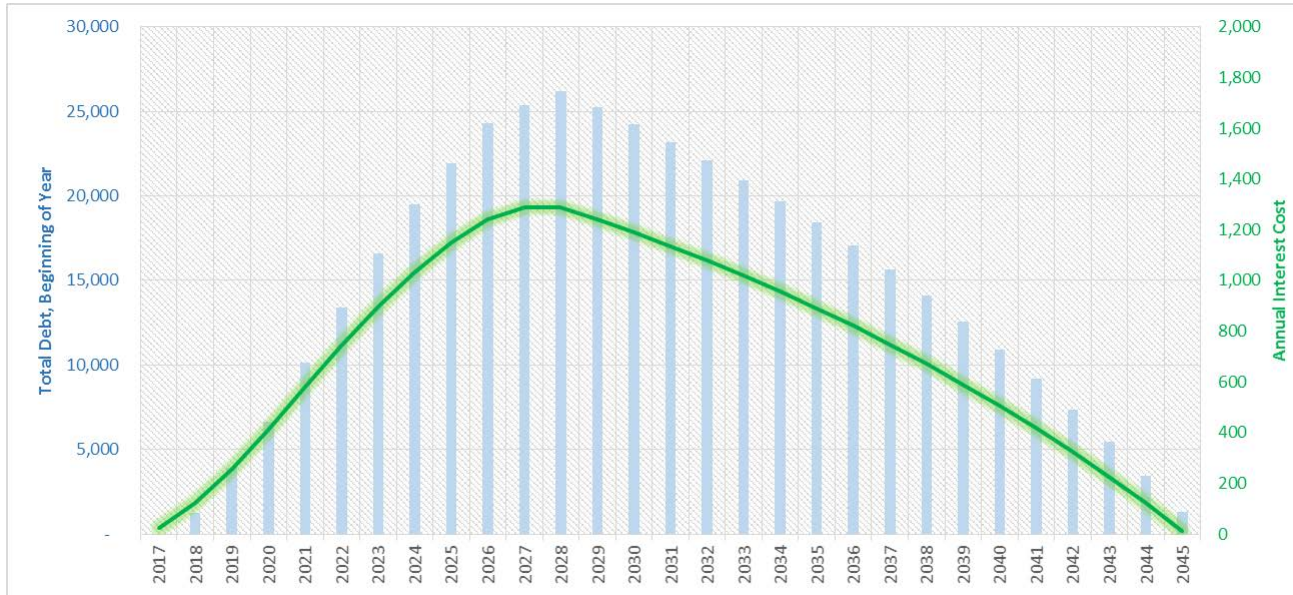
I Based on an interest rate of 3.5%.

APPENDIX

Effective Date: July 1, 2017

GA Financing (Base, 5%)^(Calendar Year Basis) (Effective July 1, 2017)

March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.3B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077
Annual Interest Cost	26	124	258	413	581	742	896	1,031	1,151	1,239	1,286	1,288	1,239	1,188	1,134	1,077
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077	20,912

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,912	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	20,978
Annual Interest Cost	1,018	955	889	820	748	671	591	506	417	324	226	123	15	0	0	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,317	0	0	
Accumulated debt in present year	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	0	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing: 4.2% (Calendar Year Basis) (Effective July 1, 2017)

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,272	3,884	6,600	10,017	13,157	16,222	18,994	21,220	23,364	24,157	24,750	23,524	22,246	20,914	19,524
Annual Interest Cost	22	103	215	342	481	611	734	840	932	996	1,026	1,016	964	909	852	792
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,272	3,884	6,600	10,017	13,157	16,222	18,994	21,220	23,364	24,157	24,750	23,524	22,246	20,914	19,524	18,075

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	18,075	16,564	14,988	13,344	11,630	9,843	7,979	6,036	4,009	1,895	0	0	0	0	0	
Annual Interest Cost	730	666	598	528	454	378	298	215	128	38	0	0	0	0	0	14,869
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,933	0	0	0	0	0	
Accumulated debt in present year	16,564	14,988	13,344	11,630	9,843	7,979	6,036	4,009	1,895	0	0	0	0	0	0	

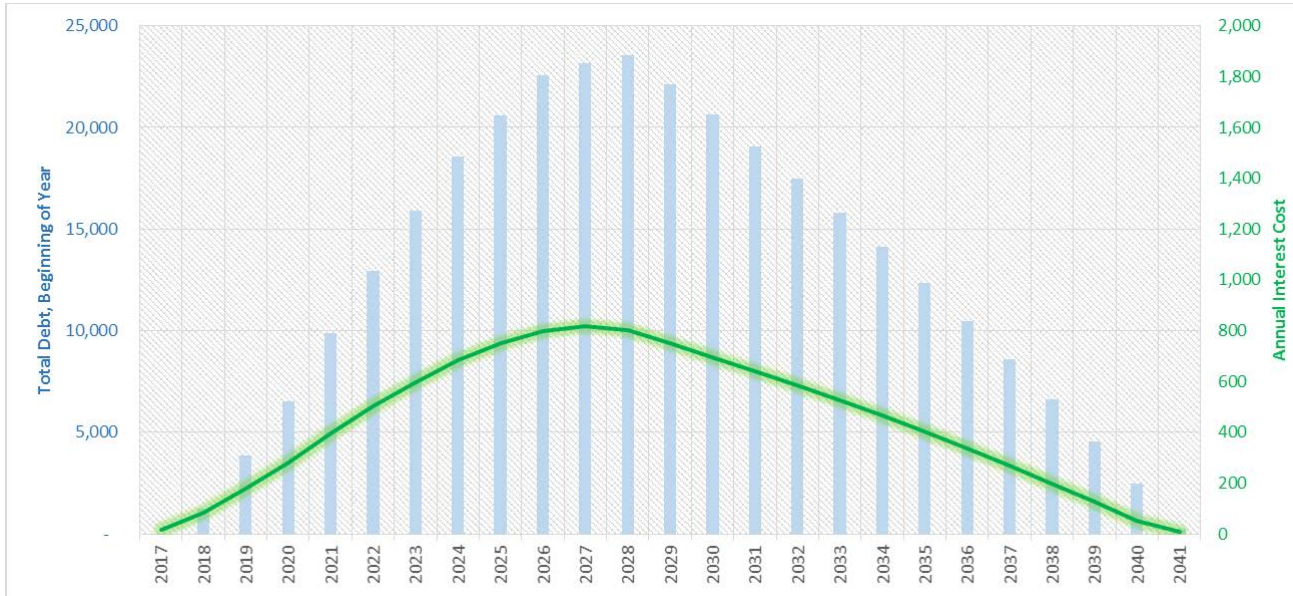
Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%.

GA Financing: 5%

(Calendar Year Basis)
(Effective July 1, 2017)

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$817M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,269	3,862	6,541	9,898	12,953	15,908	18,544	20,612	22,576	23,172	23,556	22,116	20,625	19,081	17,482
Annual Interest Cost	18	86	178	282	395	500	599	682	753	800	817	802	750	697	642	585
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,269	3,862	6,541	9,898	12,953	15,908	18,544	20,612	22,576	23,172	23,556	22,116	20,625	19,081	17,482	15,825

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	15,825	14,111	12,335	10,495	8,591	6,618	4,576	2,461	271	0	0	0	0	0	0	0
Annual Interest Cost	527	466	402	337	269	199	126	51	10	0	0	0	0	0	0	10,974
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-280	0	0	0	0	0	0	0
Accumulated debt in present year	14,111	12,335	10,495	8,591	6,618	4,576	2,461	271	0	0	0	0	0	0	0	0

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 3.5%.

From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Cc: [Christina Zhang](#)
Subject: RE: \$25B
Date: Monday, March 06, 2017 3:29:40 PM

Hi Gadi,

Staff continue to make good refinements, as it's not just the interest costs that should start mid-year, but the deferred GA amounts too (something I believe Scott was always asking about).

That would result in a bigger change, and should be done for the purposes of an external review by the FAO staff I would think.

Staff are doing up the numbers and charts on both bases.

Ron

-----Original Message-----

From: Gadi Mayman
Sent: March-06-17 14:36
To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>
Cc: Christina Zhang <Christina.Zhang@ofina.on.ca>
Subject: Re: \$25B

That's good work, and I'm glad that the totals with our methodology, which makes more sense to me as you've explained it and which should satisfy the FAO, still come out to the same maximums as what has been given out publicly from Energy's model.

I'd suggest passing it own to the DMO, noting that it's still a work in progress, and letting them decide when the appropriate time to give it to the MO would be.

Gadi

Original Message
From: Ronald Kwan
Sent: Monday, March 6, 2017 2:16 PM
To: Gadi Mayman
Subject: RE: \$25B

Hi Gadi,

A work in progress.

Energy had said that it was using a 5% interest rate, compounded monthly, but it's actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the detailed table from Energy (as attached -- Energy's 2nd PW) shows zero interest in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year balance only, not financing the in-year deferrals.

Staff have taken Energy's GA deferral amounts and calculated in-year interest costs based on even monthly GA deferral amounts (a simplification) to generate a table with interest costs starting mid-year 2017. However, that changes the annual accumulated debt amounts, as that means there is interest capitalised starting earlier than in Energy's table. I think what staff has done is more reasonable, but it does change the detailed numbers each year.

In both case, on a rounded basis, the cumulative interest cost is \$25 bn, with an annual peak of \$1.4 bn in the 5% interest rate scenario. The peak cumulative debt rounds in both cases to \$28 bn, but is a little lower in Energy's table, and a little higher with interest compounding monthly.

Also included are some interest rate sensitivities. (Doc internal PW)

Ron

-----Original Message-----

From: Nguyen, Marianne (MOF) [<mailto:Marianne.Nguyen@ontario.ca>]

Sent: March-06-17 09:37

To: Gadi Mayman <Gadi.Mayman@ofina.on.ca>

Cc: Christopher Pearce (MOI) <Christopher.Pearce@ontario.ca>; Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Gavin He <Gavin.He@ofina.on.ca>

Subject: \$25B

Importance: High

Good morning Gadi,

Do you have a detailed chart or breakdown that shows how we get to \$25B over 30 years? Ali has requested this ASAP.

Thanks!

Marianne

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To: [Gadi Mayman](#)
Cc: [Christina Zhang](#)
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Date: Monday, March 06, 2017 3:29:40 PM

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From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Subject: RE: \$25B
Date: Monday, March 06, 2017 2:16:39 PM
Attachments: [GA Financing Data for Cabinet Submission March 1_Table Excerpts.pdf](#)
[GA Financing - Interest Cost Scenarios - Mar 1 Deck v4_Markup3.pptx](#)

Hi Gadi,

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Energy had said that it was using a 5% interest rate, compounded monthly, but its actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the detailed table from Energy (as attached -- Energy's 2nd PW) shows zero interest in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year balance only, not financing the in-year deferrals.

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\$ million	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
March 1 Cabinet Option																																		
Amount borrowed/paid from/to debt account in present year	-2,501	-2,508	-2,501	-3,075	-2,660	-2,454	-2,038	-1,386	-1,211	203	433	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	0	0	0	
Interest on accumulated debt	0	-128	-263	-404	-582	-748	-912	-1,063	-1,188	-1,311	-1,367	-1,415	-1,573	-1,528	-1,282	-1,233	-1,181	-1,127	-1,070	-1,010	-947	-881	-811	-738	-661	-580	-495	-406	-312	-213	-109	0	0	0
Amount by which debt account changes in present year	-2,501	-2,636	-2,764	-3,479	-3,242	-3,202	-2,950	-2,448	-2,399	-1,108	-934	826	869	913	960	1,009	1,061	1,115	1,172	1,231	1,295	1,351	1,431	1,504	1,551	1,662	1,747	1,836	1,930	2,029	2,132	0	0	0
Accumulated debt	-2,501	-5,136	-7,900	-11,379	-14,621	-17,823	-20,773	-23,221	-25,620	-26,727	-27,662	-26,836	-25,967	-25,064	-24,094	-23,085	-22,025	-20,910	-19,738	-18,506	-17,212	-15,851	-14,420	-12,916	-11,335	-9,674	-7,927	-6,091	-4,161	-2,132	0	0	0	

GA Financing – Interest Scenarios

March 1, 2017 Deck

Corporate and Electricity Finance Division
March 6, 2017

GA Financing *(Calendar Year Basis)*

March / Deck

- The following interest cost estimates on the following slides are based on Ministry of Energy estimates, in its Cabinet submission, of the Global Adjustment cost amounts to be deferred. in its submission. GA deferral and interest cost estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates scenarios shown assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are slightly adjusted from Ministry of Energy amounts, to reflect show amounts starting in 2017 on an assumed July 1, 2017 implementation date (affects all years, due to interest capitalisation and compounding). Energy's base case interest costs shown were an assumed 5%, compounded monthly.

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs
3.5%	\$0.878 billion in 2027	\$12.6 billion
4.2%	\$1.1 billion in 2027	\$17.3 billion
5.0%	\$1.4 billion in 2028	\$25.0 billion

Total GA deferral amount being financed is approximately \$20.3 billion (plus deferred, capitalised interest, that can increase peak debt to about \$28 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596
Annual Interest Cost	29	188	325	483	656	821	978	1,118	1,242	1,334	1,387	1,394	1,350	1,305	1,257	1,206
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596	23,561

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,561	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	
Annual Interest Cost	1,153	1,098	1,039	978	913	845	774	698	619	536	449	358	261	160	53	25,007
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	0	

Actuals are subject to actual prices and actual interest rates.

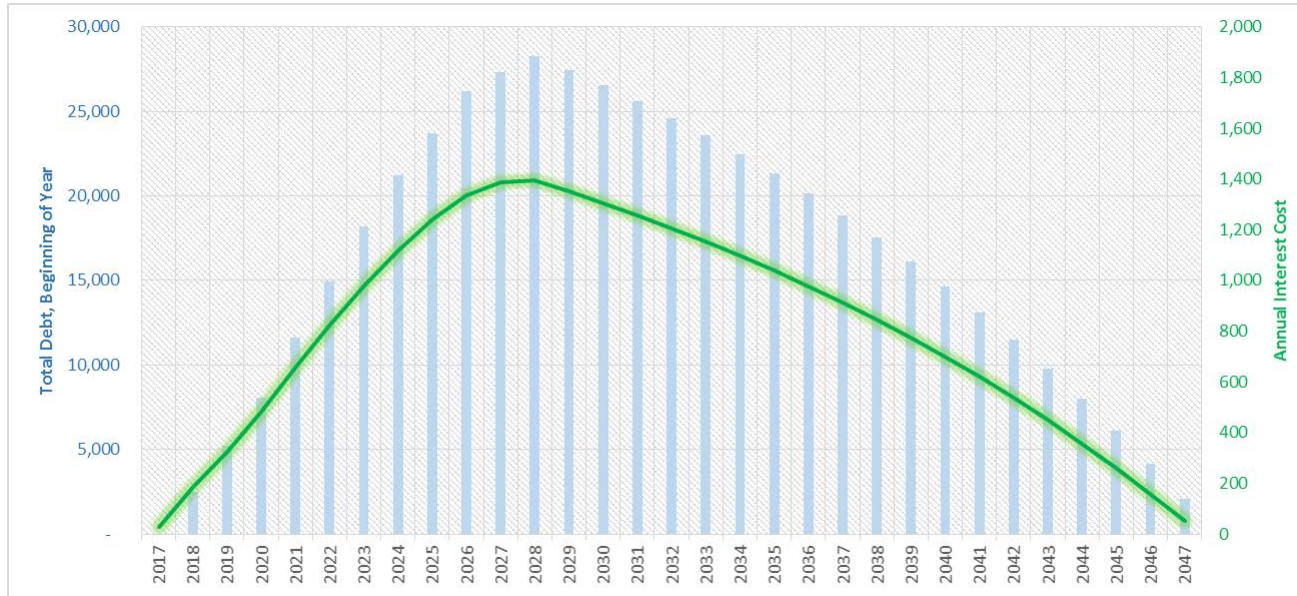
1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 Higher interest rates results in extended the term of the financing. It is assumed that a cap of \$2.242 bn above the true cost of GA in any given year is continued to be applied to repay any remaining debt. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period. In this Scenario, the term would be extended to Year 2056.

APPENDIX

GA Financing (Base) *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.4B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596
Annual Interest Cost	29	188	325	483	656	821	978	1,118	1,242	1,334	1,387	1,394	1,350	1,305	1,257	1,206
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596	23,561

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,561	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	25,007
Annual Interest Cost	1,153	1,098	1,039	978	913	845	774	698	619	536	449	358	261	160	53	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	0	

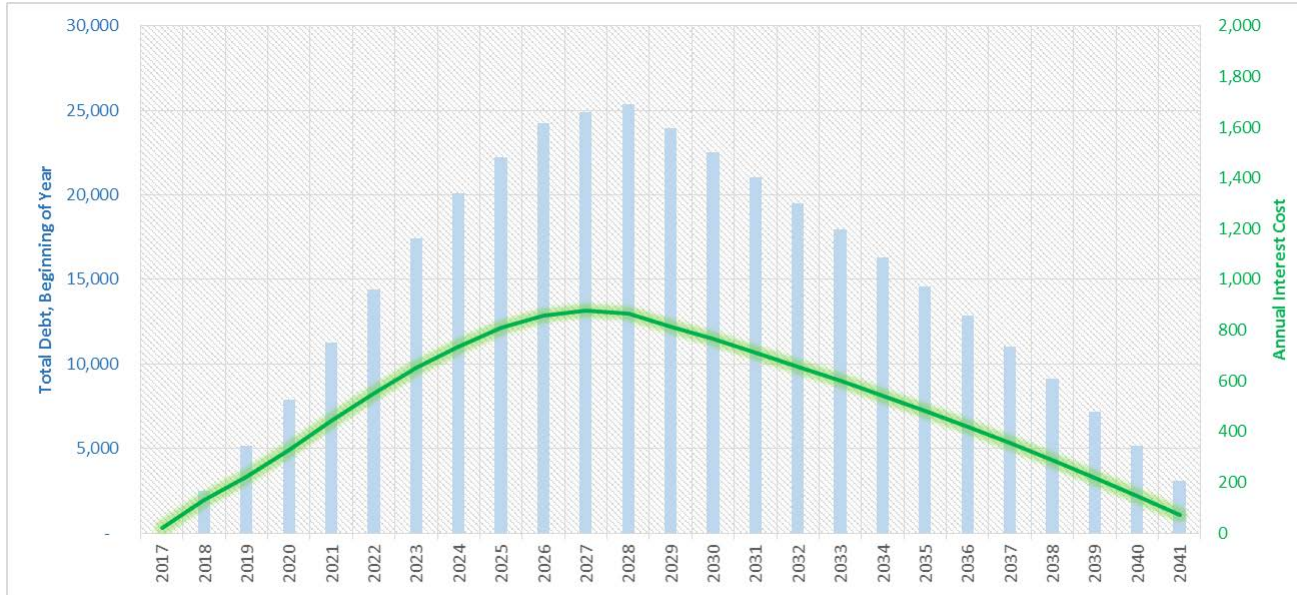
Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$878M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,521	5,159	7,884	11,289	14,393	17,399	20,089	22,211	24,232	24,887	25,332	23,956	22,530	21,053	19,524
Annual Interest Cost	20	130	224	330	445	552	652	737	810	859	878	865	816	765	712	658
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,521	5,159	7,884	11,289	14,393	17,399	20,089	22,211	24,232	24,887	25,332	23,956	22,530	21,053	19,524	17,941

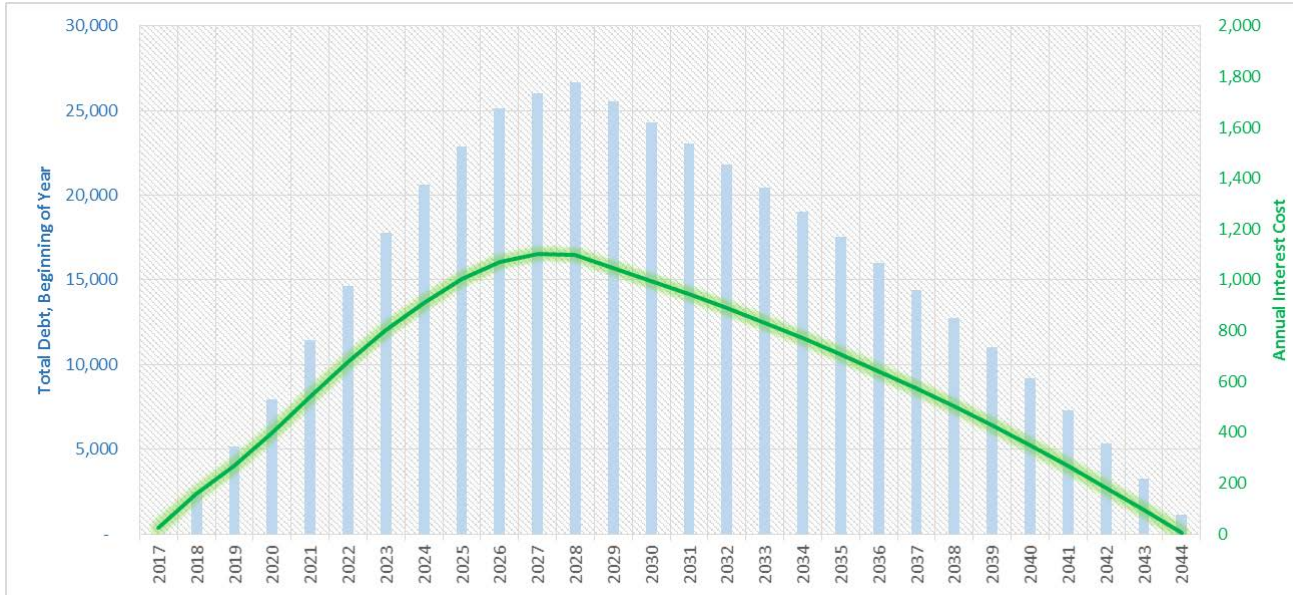
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	17,941	16,301	14,603	12,844	11,023	9,137	7,185	5,162	3,068							
Annual Interest Cost	602	543	483	421	356	289	219	147	73							12,585
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-3,141							
Accumulated debt in present year	16,301	14,603	12,844	11,023	9,137	7,185	5,162	3,068	0							

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 3.5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

GA Financing *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1.1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,525	5,190	7,962	11,437	14,638	17,767	20,605	22,900	25,115	25,984	26,655	25,511	24,318	23,074	21,777
Annual Interest Cost	24	157	271	401	542	675	800	909	1,004	1,071	1,104	1,098	1,049	998	944	889
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,525	5,190	7,962	11,437	14,638	17,767	20,605	22,900	25,115	25,984	26,655	25,511	24,318	23,074	21,777	20,424

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,424	19,013	17,542	16,008	14,408	12,740	11,000	9,186	7,294	5,322	3,264	1,119				
Annual Interest Cost	831	770	707	642	573	502	427	350	269	184	96	4				17,292
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,123				
Accumulated debt in present year	19,013	17,542	16,008	14,408	12,740	11,000	9,186	7,294	5,322	3,264	1,119	0				

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Subject: RE: \$25B
Date: Monday, March 06, 2017 2:16:39 PM
Attachments: [GA Financing Data for Cabinet Submission March 1_Table Excerpts.pdf](#)
[GA Financing - Interest Cost Scenarios - Mar 1 Deck v4_Markup3.pptx](#)

Hi Gadi,

A work in progress.

Energy had said that it was using a 5% interest rate, compounded monthly, but its actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the detailed table from Energy (as attached -- Energy's 2nd PW) shows zero interest in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year balance only, not financing the in-year deferrals.

Staff have taken Energy's GA deferral amounts and calculated in-year interest costs based on even monthly GA deferral amounts (a simplification) to generate a table with interest costs starting mid-year 2017. However, that changes the annual accumulated debt amounts, as that means there is interest capitalised starting earlier than in Energy's table. I think what staff has done is more reasonable, but it does change the detailed numbers each year.

In both case, on a rounded basis, the cumulative interest cost is \$25 bn, with an annual peak of \$1.4 bn in the 5% interest rate scenario. The peak cumulative debt rounds in both cases to \$28 bn, but is a little lower in Energy's table, and a little higher with interest compounding monthly.

Also included are some interest rate sensitivities. (Doc internal PW)

Ron

-----Original Message-----

From: Nguyen, Marianne (MOF) [<mailto:Marianne.Nguyen@ontario.ca>]
Sent: March-06-17 09:37
To: Gadi Mayman <Gadi.Mayman@ofina.on.ca>
Cc: Christopher Pearce (MOI) <Christopher.Pearce@ontario.ca>; Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Gavin He <Gavin.He@ofina.on.ca>
Subject: \$25B
Importance: High

Good morning Gadi,

Do you have a detailed chart or breakdown that shows how we get to \$25B over 30 years? Ali has requested this ASAP.

Thanks!
Marianne

\$ million	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
March 1 Cabinet Option																																		
Amount borrowed/paid from/to debt account in present year	-2,501	-2,508	-2,501	-3,075	-2,660	-2,454	-2,038	-1,386	-1,211	203	433	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	2,242	0	0	0
Interest on accumulated debt	0	-128	-263	-404	-582	-748	-912	-1,063	-1,188	-1,311	-1,367	-1,415	-1,573	-1,528	-1,282	-1,233	-1,181	-1,127	-1,070	-1,010	-947	-881	-811	-738	-661	-580	-495	-406	-312	-213	-109	0	0	0
Amount by which debt account changes in present year	-2,501	-2,636	-2,764	-3,479	-3,242	-3,202	-2,950	-2,448	-2,399	-1,108	-934	826	869	913	960	1,009	1,061	1,115	1,172	1,231	1,295	1,351	1,431	1,504	1,551	1,662	1,747	1,836	1,930	2,029	2,132	0	0	0
Accumulated debt	-2,501	-5,136	-7,900	-11,379	-14,621	-17,823	-20,773	-23,221	-25,620	-26,727	-27,662	-26,836	-25,967	-25,064	-24,094	-23,085	-22,025	-20,910	-19,738	-18,506	-17,212	-15,851	-14,420	-12,916	-11,335	-9,674	-7,927	-6,091	-4,161	-2,132	0	0	0	

GA Financing – Interest Scenarios

March 1, 2017 Deck

Corporate and Electricity Finance Division
March 6, 2017

GA Financing *(Calendar Year Basis)*

March / Deck

- The following interest cost estimates on the following slides are based on Ministry of Energy estimates, in its Cabinet submission, of the Global Adjustment cost amounts to be deferred. in its submission. GA deferral and interest cost estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates scenarios shown assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are slightly adjusted from Ministry of Energy amounts, to reflect show amounts starting in 2017 on an assumed July 1, 2017 implementation date (affects all years, due to interest capitalisation and compounding). Energy's base case interest costs shown were an assumed 5%, compounded monthly.

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs
3.5%	\$0.878 billion in 2027	\$12.6 billion
4.2%	\$1.1 billion in 2027	\$17.3 billion
5.0%	\$1.4 billion in 2028	\$25.0 billion

Total GA deferral amount being financed is approximately \$20.3 billion (plus deferred, capitalised interest, that can increase peak debt to about \$28 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596
Annual Interest Cost	29	188	325	483	656	821	978	1,118	1,242	1,334	1,387	1,394	1,350	1,305	1,257	1,206
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596	23,561

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,561	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	25,007
Annual Interest Cost	1,153	1,098	1,039	978	913	845	774	698	619	536	449	358	261	160	53	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	0	

Actuals are subject to actual prices and actual interest rates.

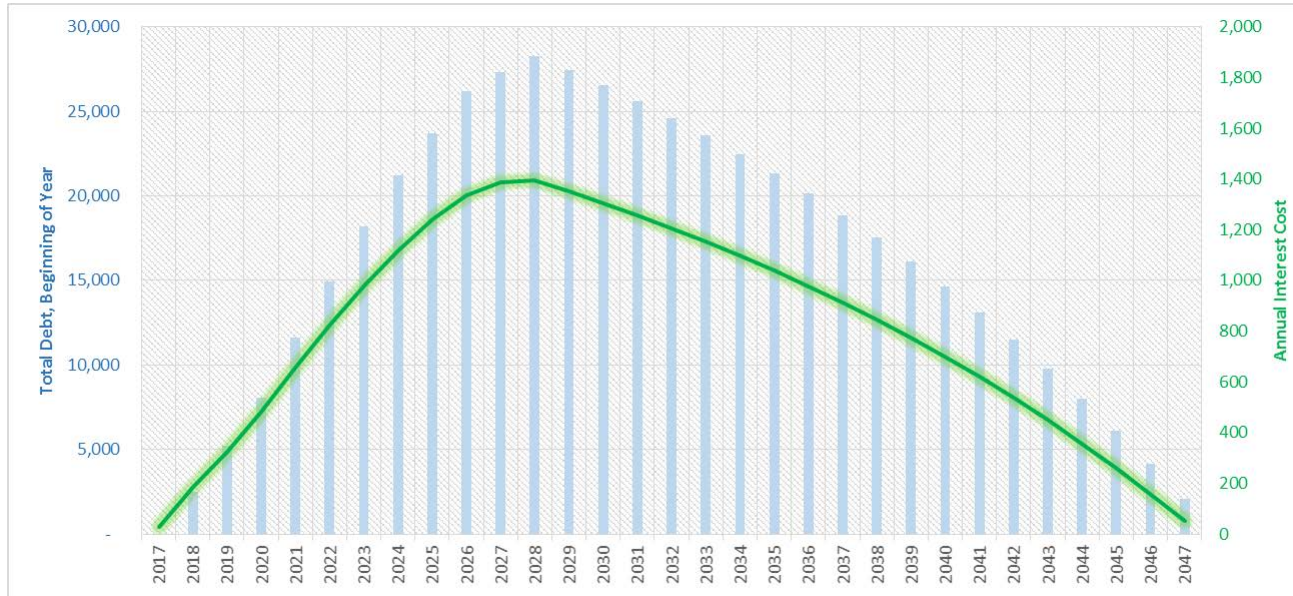
1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 Higher interest rates results in extended the term of the financing. It is assumed that a cap of \$2.242 bn above the true cost of GA in any given year is continued to be applied to repay any remaining debt. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period. In this Scenario, the term would be extended to Year 2056.

APPENDIX

GA Financing (Base) *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.4B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596
Annual Interest Cost	29	188	325	483	656	821	978	1,118	1,242	1,334	1,387	1,394	1,350	1,305	1,257	1,206
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,530	5,225	8,052	11,610	14,925	18,200	21,216	23,719	26,172	27,303	28,257	27,409	26,518	25,581	24,596	23,561

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,561	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	25,007
Annual Interest Cost	1,153	1,098	1,039	978	913	845	774	698	619	536	449	358	261	160	53	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,473	21,329	20,126	18,862	17,534	16,137	14,669	13,126	11,504	9,799	8,007	6,123	4,142	2,061	0	

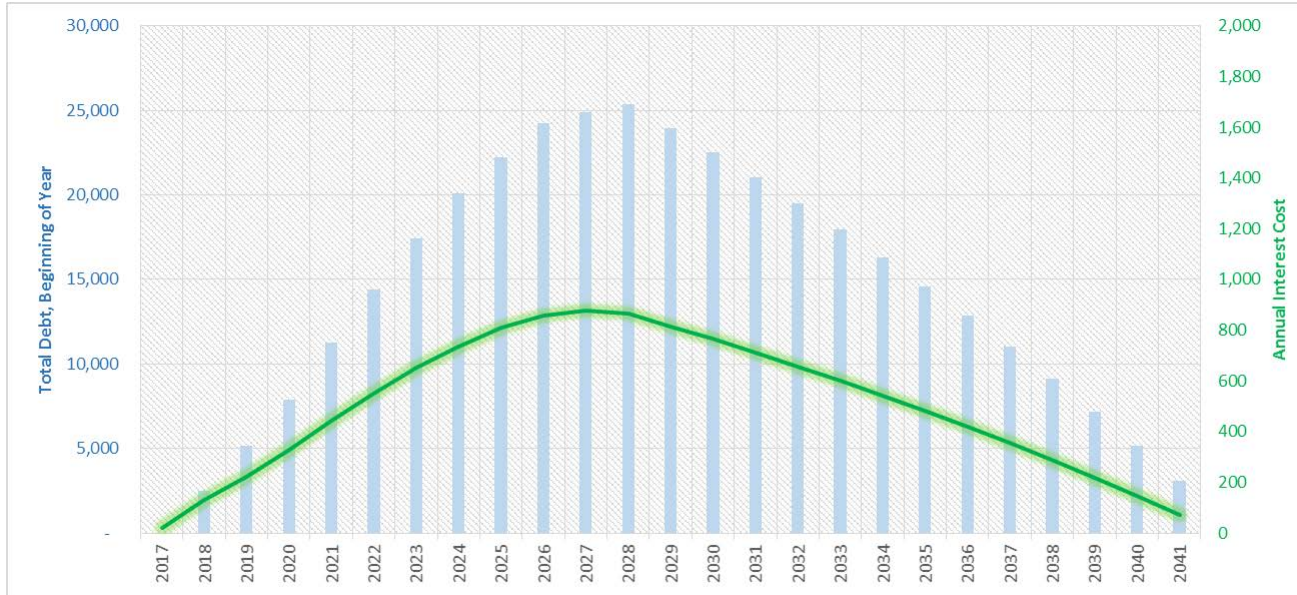
Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$878M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,521	5,159	7,884	11,289	14,393	17,399	20,089	22,211	24,232	24,887	25,332	23,956	22,530	21,053	19,524
Annual Interest Cost	20	130	224	330	445	552	652	737	810	859	878	865	816	765	712	658
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,521	5,159	7,884	11,289	14,393	17,399	20,089	22,211	24,232	24,887	25,332	23,956	22,530	21,053	19,524	17,941

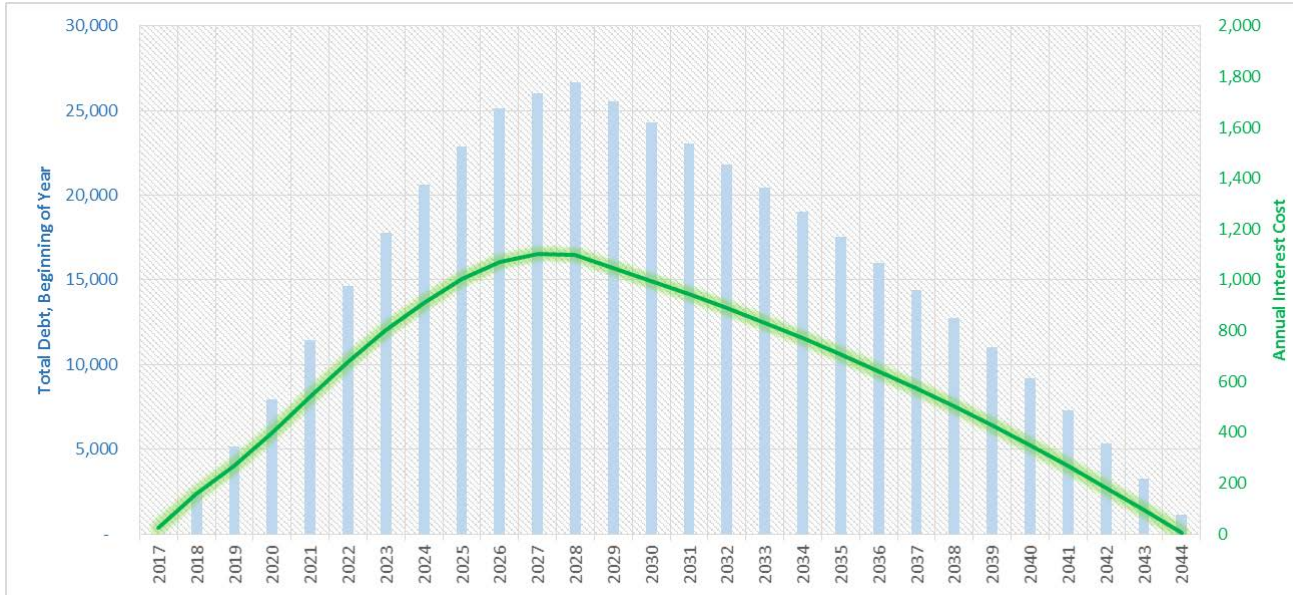
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	17,941	16,301	14,603	12,844	11,023	9,137	7,185	5,162	3,068							
Annual Interest Cost	602	543	483	421	356	289	219	147	73							12,585
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-3,141							
Accumulated debt in present year	16,301	14,603	12,844	11,023	9,137	7,185	5,162	3,068	0							

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 3.5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

GA Financing *(Calendar Year Basis)*

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1.1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,525	5,190	7,962	11,437	14,638	17,767	20,605	22,900	25,115	25,984	26,655	25,511	24,318	23,074	21,777
Annual Interest Cost	24	157	271	401	542	675	800	909	1,004	1,071	1,104	1,098	1,049	998	944	889
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,525	5,190	7,962	11,437	14,638	17,767	20,605	22,900	25,115	25,984	26,655	25,511	24,318	23,074	21,777	20,424

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,424	19,013	17,542	16,008	14,408	12,740	11,000	9,186	7,294	5,322	3,264	1,119				17,292
Annual Interest Cost	831	770	707	642	573	502	427	350	269	184	96	4				
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,123				
Accumulated debt in present year	19,013	17,542	16,008	14,408	12,740	11,000	9,186	7,294	5,322	3,264	1,119	0				

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

From: [Ronald Kwan](#)
To: [David McLean \(MOF\)](#); [Christopher Pearce \(MOI\)](#)
Cc: [Gadi Mayman](#); [Christina Zhang](#); [Gavin He](#)
Subject: RE: \$25B
Date: Monday, March 06, 2017 5:53:09 PM
Attachments: [GA Financing - Interest Cost Scenarios - Mar 1 Deck v6.pptx](#)
Importance: High

Hi David, Chris,

Attached is a response to the request from the MO (see the email chain). MO had asked for a response ASAP (now EOD). (Doc internal PW.)

I'd note that this is for internal briefing only, and is not intended for further distribution, but should help inform the issue.

I'd note that our analysis is a refinement from the Energy analysis. And that our modelling has not been shared with or reviewed by Energy. Following further analysis and discussions with Energy, the modelling could be further refined. (I'd note that they usually round their numbers, too, for their decks, which we have not done for this distribution.)

Energy said in its CabSub that it was using a 5% interest rate, compounded monthly, but its actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the tables from the Energy decks have zero in-year interest costs in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year debt balance only, not financing the in-year deferrals.

Staff have taken Energy's GA deferral amounts and calculated in-year interest costs based on even monthly GA deferral amounts (a simplification) to generate a table with interest costs starting in 2017. However, since interest costs in the proposed plan are deferred and capitalised, that changes the annual and accumulated debt amounts a bit from what Energy had estimated.

In both the revised and Energy cases, on a rounded basis, the cumulative interest cost is \$25 bn, with an annual peak of \$1.4 bn in the 5% interest rate scenario. The peak cumulative debt rounds in both cases to \$28 bn, but is a little lower in Energy's table, and a little higher in the detailed modelling with interest compounding monthly.

Communications have also talked about implementation in the summer. As such, staff did some sensitivity modelling on a July 1, 2017, implementation date, effectively assuming only half the estimated deferral amount in 2017. The impact on estimated life-cycle cumulative interest costs is significant.

Also included are some interest rate sensitivities, which have significant impacts.

Ron

-----Original Message-----

From: Nguyen, Marianne (MOF) [<mailto:Marianne.Nguyen@ontario.ca>]

Sent: March-06-17 09:37

To: Gadi Mayman <Gadi.Mayman@ofina.on.ca>

Cc: Christopher Pearce (MOI) <Christopher.Pearce@ontario.ca>; Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Gavin He <Gavin.He@ofina.on.ca>

Subject: \$25B

Importance: High

Good morning Gadi,

Do you have a detailed chart or breakdown that shows how we get to \$25B over 30 years? Ali has requested this ASAP.

Thanks!
Marianne

GA Financing:
Interest Rate Base Scenario & Sensitivities
March 1, 2017, Energy Deck Case

Corporate and Electricity Finance Division
March 6, 2017

GA Financing *(Calendar Year Basis) – (Effective January 1, 2017) March I Deck*

- The interest cost estimates are based on Ministry of Energy estimates of the Global Adjustment cost amounts to be deferred, per its March I Cabinet submission.
 - GA deferral estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are slightly adjusted from Ministry of Energy amounts, to reflect in-year interest costs. Energy's base case interest costs shown were an assumed 5%, compounded monthly, calculated in the following year, with a term of 30-years (2047).

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.879 billion in 2027	\$12.6 billion	2042 (25-year term)
4.2%	\$1.1 billion in 2027	\$17.4 billion	2044 (27-year term)
5.0%	\$1.4 billion in 2028	\$25.1 billion	2047 (30-year term)

Total GA deferral amount being financed is approximately \$20.3 billion (plus deferred, capitalised interest, that can increase peak debt to about \$28 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655
Annual Interest Cost	58	189	327	485	658	822	980	1,120	1,244	1,337	1,389	1,396	1,353	1,307	1,260	1,209
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655	23,622

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,622	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	25,137
Annual Interest Cost	1,156	1,101	1,043	981	917	849	778	703	624	541	454	363	267	166	60	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	2	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

2 Higher interest rates results in extended the term of the financing. It is assumed that a cap of \$2.242 bn above the true cost of GA in any given year is continued to be applied to repay any remaining debt. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period. In this Scenario, the term would be extended to Year 2056.

GA Financing *(Calendar Year Basis) – (Effective July 1, 2017)*

March / Deck

- Ministry of Energy modelling estimates provided have been based on a full-year of GA deferral in 2017. Annual and cumulative interest and debt estimates would be sensitive to an in-year start date of, e.g., July 1, 2017, as below.
 - Otherwise, as before, modelling is based on Ministry of Energy estimates of the Global Adjustment cost amounts to be deferred in its March 1, 2017, Cabinet Submission.
 - GA deferral cost estimates are subject to updates from the Ministry of Energy.
 - Actual annual and cumulative interest costs are very sensitive to actual borrowing rates. Table below is illustrative.
 - Sensitivities shown on lower interest rates assume faster debt pay down. Alternatively, pay down could be stretched out, but would result in relatively higher cumulative interest costs than shown for that interest rate.
- Interest cost estimates are adjusted from Ministry of Energy amounts, to reflect in-year interest costs and an assumed July 1, 2017 implementation date. Half-a-year of reduced deferred GA significantly reduces estimated cumulative interest costs.

Interest Rate	Peak Annual Interest Cost	Total Life-cycle Accumulated Interest Costs	Term (Approximate)
3.5%	\$0.817 billion in 2027	\$11 billion	2041 (24-year term)
4.2%	\$1.0 billion in 2027	\$14.9 billion	2042 (25-year term)
5.0%	\$1.3 billion in 2028	\$21.0 billion	2045 (28-year term)

Total GA deferral amount being financed is approximately \$19.1 billion (plus deferred, capitalised interest, that can increase peak debt to about \$26 bn under the 5% scenario.

Base Scenario — 5% Interest Rate with GA draw downs occurring on an equal monthly basis.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077
Annual Interest Cost	26	124	258	413	581	742	896	1,031	1,151	1,239	1,286	1,288	1,239	1,188	1,134	1,077
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077	20,912

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,912	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	
Annual Interest Cost	1,018	955	889	820	748	671	591	506	417	324	226	123	15	0	0	20,978
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,317	0	0	
Accumulated debt in present year	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	0	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%. Interest Cost in 2017 adjusted to represent implementation in July 2017.

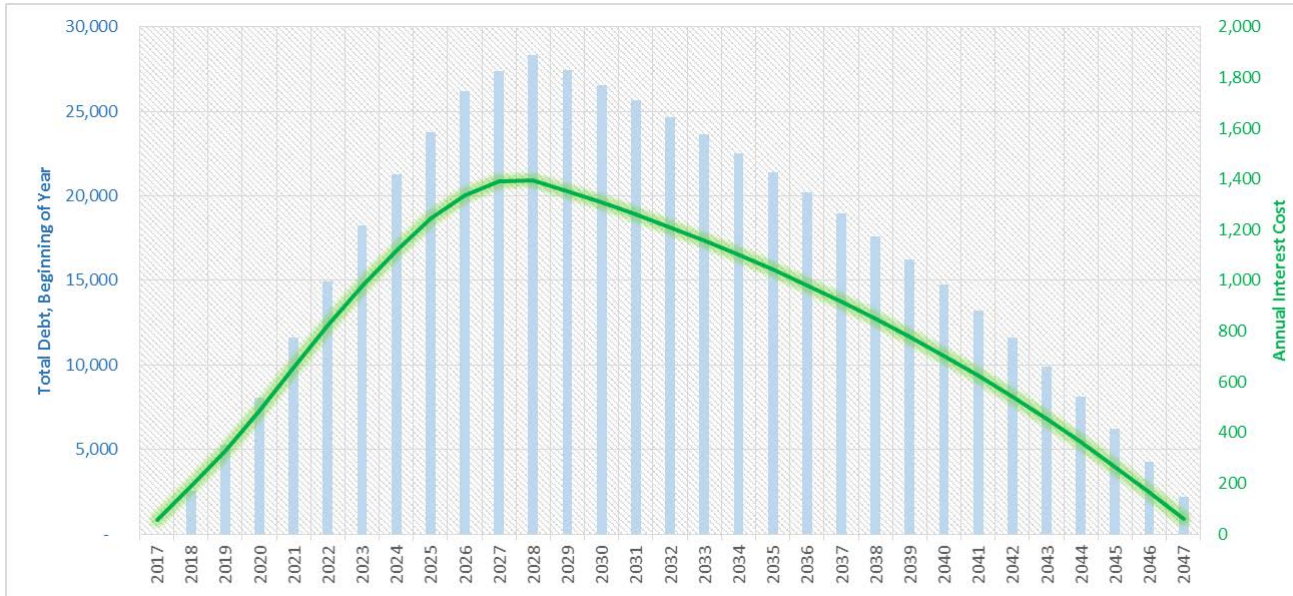
2 Higher interest rates results in extended term of the financing. It is assumed that a cap of \$2.242 bn above the true cost of GA in any given year is continued to be applied to repay any remaining debt. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period. In this Scenario, the term would be extended to Year 2056.

APPENDIX

Effective Date: January 1, 2017

GA Financing (Base, 5%)

(Calendar Year Basis)
(Effective January 1, 2017) March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.4B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655
Annual Interest Cost	58	189	327	485	658	822	980	1,120	1,244	1,337	1,389	1,396	1,353	1,307	1,260	1,209
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,559	5,256	8,084	11,643	14,961	18,237	21,255	23,761	26,215	27,349	28,305	27,460	26,571	25,637	24,655	23,622

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	23,622	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	25,137
Annual Interest Cost	1,156	1,101	1,043	981	917	849	778	703	624	541	454	363	267	166	60	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	
Accumulated debt in present year	22,537	21,397	20,198	18,937	17,613	16,220	14,756	13,218	11,600	9,900	8,113	6,234	4,260	2,184	2	

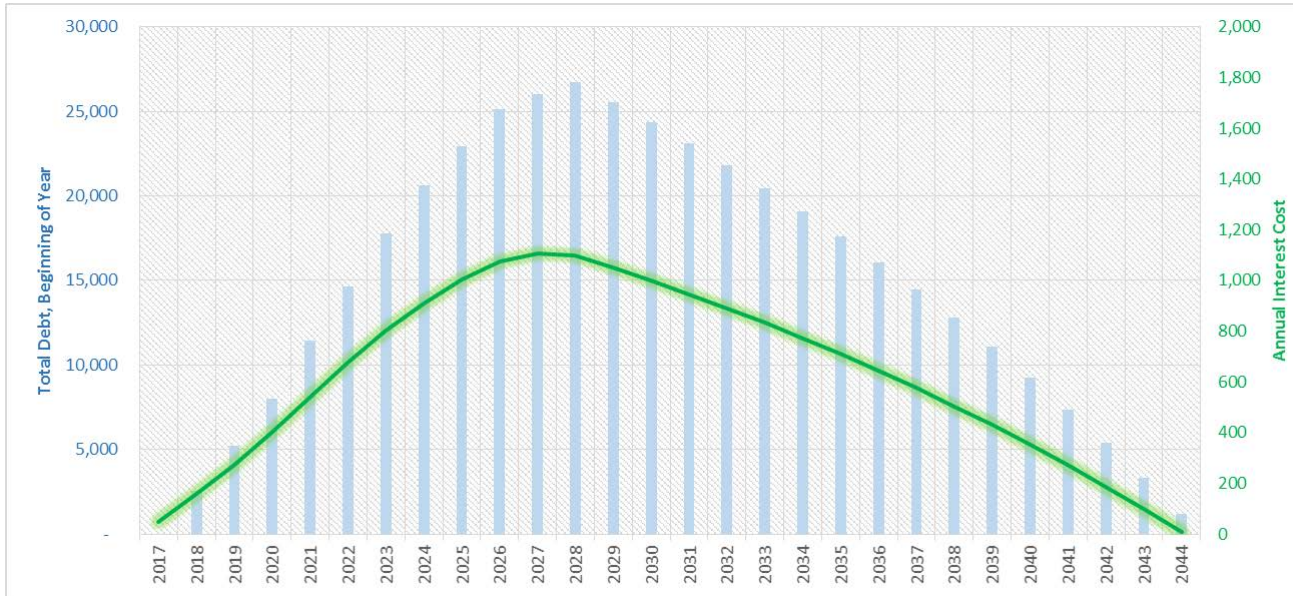
Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing: 4.2% (Calendar Year Basis) (Effective January 1, 2017)

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1.1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,549	5,215	7,988	11,465	14,667	17,797	20,637	22,933	25,149	26,019	26,692	25,550	24,358	23,116	21,821
Annual Interest Cost	49	158	272	402	543	676	802	911	1,006	1,073	1,106	1,099	1,050	999	946	891
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,549	5,215	7,988	11,465	14,667	17,797	20,637	22,933	25,149	26,019	26,692	25,550	24,358	23,116	21,821	20,470

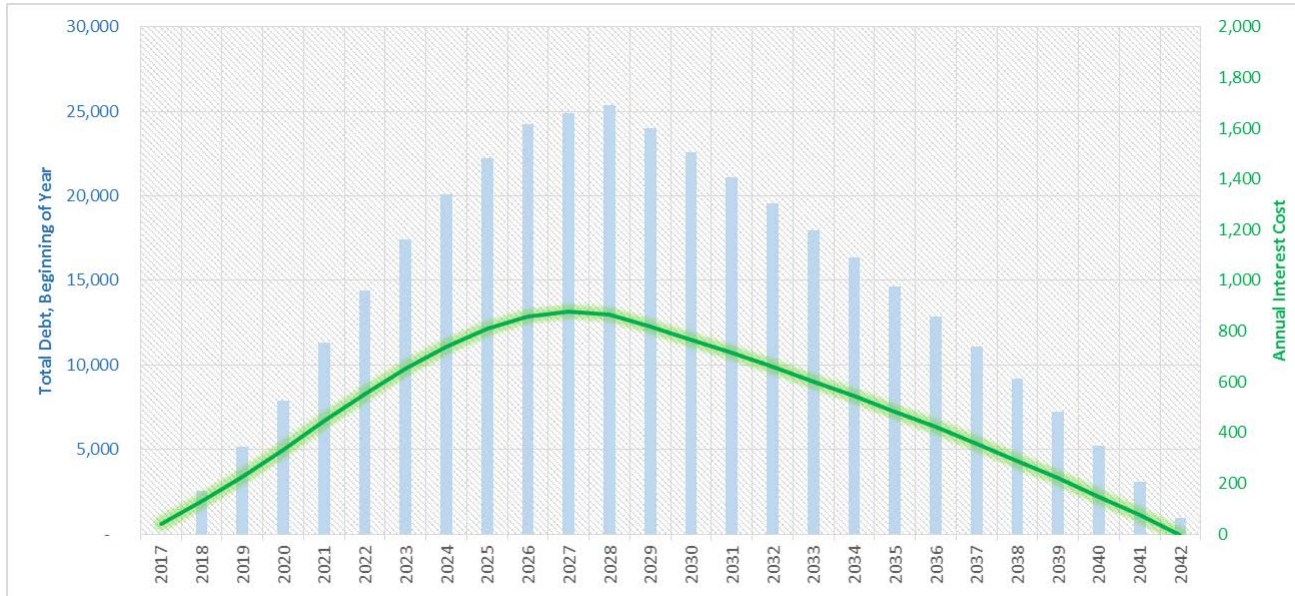
	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,470	19,061	17,592	16,060	14,462	12,797	11,059	9,248	7,358	5,388	3,334	1,191	0	0	0	17,367
Annual Interest Cost	833	772	710	644	576	504	430	352	271	187	99	7	0	0	0	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,199	0	0	0	
Accumulated debt in present year	19,061	17,592	16,060	14,462	12,797	11,059	9,248	7,358	5,388	3,334	1,191	0	0	0	0	

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%.

GA Financing: 3.5% (Calendar Year Basis) (Effective January 1, 2017)

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$879M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	2,541	5,180	7,906	11,311	14,417	17,423	20,113	22,237	24,258	24,915	25,361	23,985	22,561	21,085	19,557
Annual Interest Cost	41	131	225	331	445	553	653	738	811	860	879	866	817	766	714	659
Additional GA Debt Drawdown Required	2,501	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	2,541	5,180	7,906	11,311	14,417	17,423	20,113	22,237	24,258	24,915	25,361	23,985	22,561	21,085	19,557	17,975

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	17,975	16,336	14,639	12,882	11,063	9,178	7,227	5,206	3,113	946	0	0	0	0	0	
Annual Interest Cost	603	545	484	422	357	290	221	149	74	34	0	0	0	0	0	12,665
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-980	0	0	0	0	0	
Accumulated debt in present year	16,336	14,639	12,882	11,063	9,178	7,227	5,206	3,113	946	0	0	0	0	0	0	

Actuals are subject to actual prices and actual interest rates.

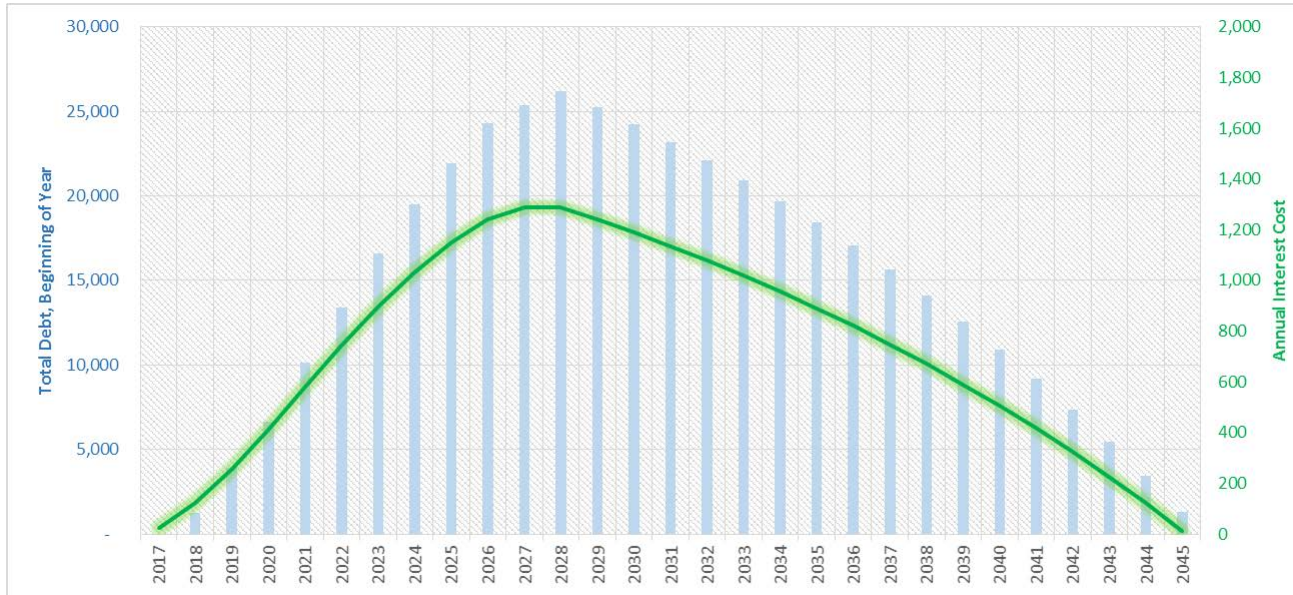
I Based on an interest rate of 3.5%.

APPENDIX

Effective Date: July 1, 2017

GA Financing (Base, 5%)^(Calendar Year Basis) (Effective July 1, 2017)

March / Deck



At an **Interest Rate of 5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2028 at approximately \$1.3B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077
Annual Interest Cost	26	124	258	413	581	742	896	1,031	1,151	1,239	1,286	1,288	1,239	1,188	1,134	1,077
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,277	3,908	6,667	10,154	13,395	16,592	19,526	21,943	24,304	25,340	26,194	25,240	24,238	23,184	22,077	20,912

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	20,912	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	20,978
Annual Interest Cost	1,018	955	889	820	748	671	591	506	417	324	226	123	15	0	0	
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,317	0	0	
Accumulated debt in present year	19,689	18,402	17,050	15,629	14,135	12,564	10,914	9,178	7,354	5,437	3,421	1,303	0	0	0	

Actuals are subject to actual prices and actual interest rates.

1 Based on an interest rate of 5%.

2 To forecast the repayment of the remaining balance, a cap of \$2.242 bn above the true cost of GA in any given year is applied. Thus, every year a maximum of \$2.242 bn is recovered by ratepayers until the debt is paid down, with interest still accumulating over this period.

GA Financing: 4.2% (Calendar Year Basis) (Effective July 1, 2017)

March / Deck



At an **Interest Rate of 4.2%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$1B.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,272	3,884	6,600	10,017	13,157	16,222	18,994	21,220	23,364	24,157	24,750	23,524	22,246	20,914	19,524
Annual Interest Cost	22	103	215	342	481	611	734	840	932	996	1,026	1,016	964	909	852	792
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,272	3,884	6,600	10,017	13,157	16,222	18,994	21,220	23,364	24,157	24,750	23,524	22,246	20,914	19,524	18,075

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	18,075	16,564	14,988	13,344	11,630	9,843	7,979	6,036	4,009	1,895	0	0	0	0	0	
Annual Interest Cost	730	666	598	528	454	378	298	215	128	38	0	0	0	0	0	14,869
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-1,933	0	0	0	0	0	
Accumulated debt in present year	16,564	14,988	13,344	11,630	9,843	7,979	6,036	4,009	1,895	0	0	0	0	0	0	

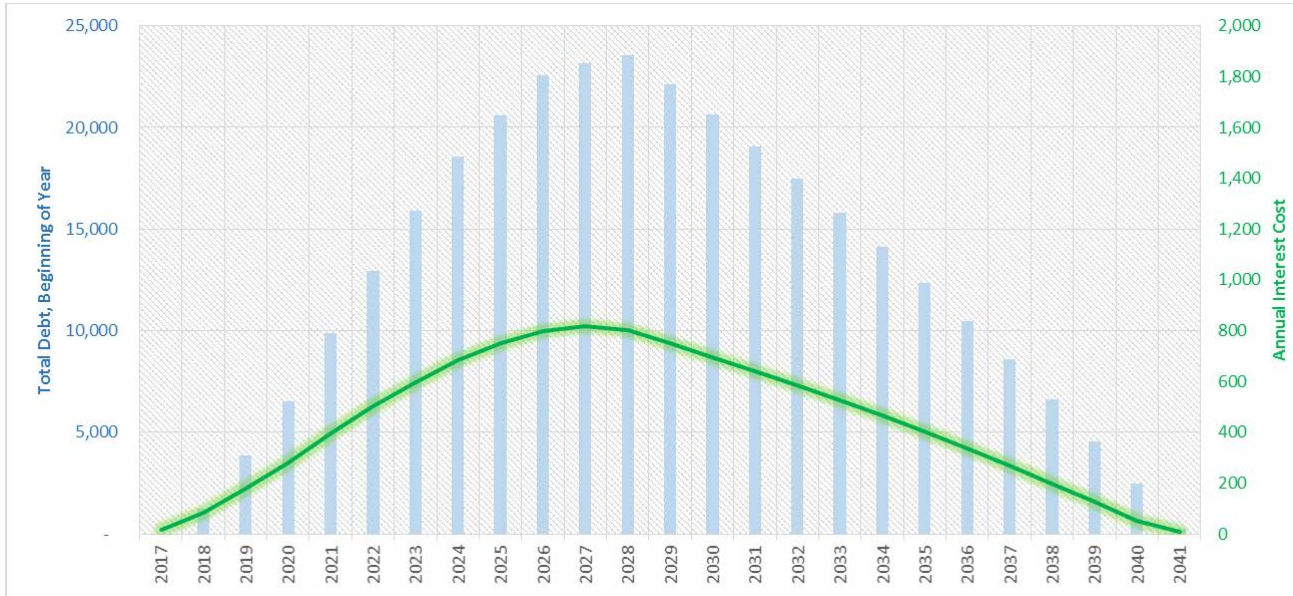
Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 4.2%.

GA Financing: 5%

(Calendar Year Basis)
(Effective July 1, 2017)

March / Deck



At an **Interest Rate of 3.5%** with GA draw downs occurring on an equal monthly basis.

Annual Interest Cost peaks in 2027 at approximately \$817M.

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Total Debt, Beginning of Year	-	1,269	3,862	6,541	9,898	12,953	15,908	18,544	20,612	22,576	23,172	23,556	22,116	20,625	19,081	17,482
Annual Interest Cost	18	86	178	282	395	500	599	682	753	800	817	802	750	697	642	585
Additional GA Debt Drawdown Required	1,250	2,508	2,501	3,075	2,660	2,454	2,038	1,386	1,211	-203	-433	-2,242	-2,242	-2,242	-2,242	-2,242
Accumulated debt in present year	1,269	3,862	6,541	9,898	12,953	15,908	18,544	20,612	22,576	23,172	23,556	22,116	20,625	19,081	17,482	15,825

	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	Total
Total Debt, Beginning of Year	15,825	14,111	12,335	10,495	8,591	6,618	4,576	2,461	271	0	0	0	0	0	0	0
Annual Interest Cost	527	466	402	337	269	199	126	51	10	0	0	0	0	0	0	10,974
Additional GA Debt Drawdown Required	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-2,242	-280	0	0	0	0	0	0	0
Accumulated debt in present year	14,111	12,335	10,495	8,591	6,618	4,576	2,461	271	0	0	0	0	0	0	0	0

Actuals are subject to actual prices and actual interest rates.

I Based on an interest rate of 3.5%.

From: [Ronald Kwan](#)
To: [Gadi Mayman](#)
Subject: RE: LTEP Deck - FHP Analysis
Date: Friday, August 25, 2017 4:28:31 PM

We'll see....

From: Gadi Mayman
Sent: August-25-17 14:59
To: Ronald Kwan
Subject: Re: LTEP Deck - FHP Analysis

I like the 3% inflation with 3.5% interest cost scenario!

I haven't seen one of Scott's summaries for quite some time, so I don't think he's still doing them.

Gadi

On Aug 25, 2017, at 2:23 PM, Ronald Kwan <Ronald.Kwan@ofina.on.ca> wrote:

Hi Gadi,

FYI, for interest if you have a few seconds, but don't let it otherwise intrude on vacation time!

BTW, while staff have the 3% scenario in the slide, it does not seem, from the Thursday meeting, to be an option that would be picked up.

Not sure if Scott Nelms still sends around any summaries of the Energy (bi-)weeklies, but I'd note that Atel said that last week's FPC item is not being rescheduled, as decision makers see the FHP as on an implementation track – and the TB in September will serve for that purpose.

Ron

From: John Kim
Sent: August-25-17 14:07
To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>
Subject: RE: LTEP Deck - FHP Analysis

Hi Ron,

As requested.

Thanks,

John

From: Ronald Kwan
Sent: Wednesday, August 23, 2017 7:05 PM
To: Bruno Amara <Bruno.Amara@ofina.on.ca>
Cc: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>; John Kim <John.Kim@ofina.on.ca>
Subject: Re: LTEP Deck - FHP Analysis

Thanks Bruno, et al.

Ron

On Aug 23, 2017, at 6:36 PM, Bruno Amara <Bruno.Amara@ofina.on.ca> wrote:

Hi Ron

Some preliminary analysis based on Energy modelling.

Bruno

From: John Kim

Sent: Wednesday, August 23, 2017 3:30 PM

To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>

Cc: Bruno Amara <Bruno.Amara@ofina.on.ca>

Subject: RE: LTEP Deck - FHP Analysis

Hi Ron,

We are working to see if it is doable. Will get back to you.

John

From: Ronald Kwan

Sent: Wednesday, August 23, 2017 1:41 PM

To: Shajee Kathirgamanathan <Shajee.Kathirgamanathan@ofina.on.ca>

Cc: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>

Subject: RE: LTEP Deck - FHP Analysis

Thanks Shajee. Any interest rate sensitivity analysis that you could do?

Ron

From: Shajee Kathirgamanathan

Sent: August-23-17 13:36

To: Ronald Kwan <Ronald.Kwan@ofina.on.ca>

Cc: John Kim <John.Kim@ofina.on.ca>; Bruno Amara <Bruno.Amara@ofina.on.ca>

Subject: LTEP Deck - FHP Analysis

Hi Ron,

Just wanted to share with you some quick investigations into Energy's LTEP deck (attached, and found in [this folder](#)).

The data below was from the model embedded in the Powerpoint, used to make the charts.

Slides 22 and 24 present two scenarios for future price forecasts depending on how the FHP gets implemented:

	~5% cap post 2% inflationary cap (Slide 22)	3% inflationary cap (Slide 24)
Max Debt (year)	21.3B (May 2029)	19.6B (May 2029)
Total Interest Costs	21.3B	19.4B
Year to Pay off Debt	2047	2047
Max Interest Costs paid in a 6 month	538M	496M

period*		
Max interest costs over 12 month period*	1076M	991M
Average interest costs (calculated)**	686M	627M

*Note the 6 month periods are in line with RPP periods, therefore the 12month period while not exactly in line with a calendar year would be close.

**Average 6 month RPP period, extrapolated to 12 months.

Thanks,

Shajee

Shajee Kathirgamanathan

Senior Advisor

Electricity Finance Branch, Corporate and Electricity Finance Division

Ontario Financing Authority

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shajee.kathirgamanathan@ofina.on.ca

From: [Ronald Kwan](#)
To: [Scott Thompson \(CAB\)](#); [Gadi Mayman](#)
Cc: [David McLean \(MOF\)](#); [Brandon Chaput \(MOF\)](#)
Subject: RE: Rate Mitigation - Cabinet Submission + Major Projects Deck
Date: Tuesday, February 28, 2017 5:59:05 AM
Attachments: [Electricity Mitigation Options - GA \(Interest\) Analysis \(2017-02-22\(26\) deck\) v2_PW.docx](#)

Hi Scott, Gadi,

Staff had also been working on different financing cost sensitivities on the version of the GA options from last Thursday.

The preliminary analysis, as attached, shows the extreme sensitivity to actual borrowing rates. (Energy PW.)

Compared to the 5% base case interest rate, with cumulative interest costs of about \$35.5 Bn, for a 25 basis points (bps) increase (0.25%), the cumulative interest cost over 30 years could increase by about \$4.7 Bn over that period. And for a 50 bps increase, by about \$7 Bn (or about 20%) over the 30 years.

At a 3.5% cost of financing (about the current long-term Provincial borrowing cost), the cumulative interest cost would be about \$18.4 Bn, or about \$17.1 Bn below the 5% base case (or about \$10.1 Bn lower than at a 4.5% rate).

Note that this sensitivity analysis just changes that one parameter value, not the GA amounts. To keep the same amortisation period to pay off the deferred GA balance amount, the GA payment profile would also have to change.

These sensitivity numbers will change as Energy revises modelling from its current 2.3% GA payment growth amounts for the post-2021 period, since that will decrease the deferred amount of GA and the cumulative debt and interest costs.

However, I thought it was illuminating how sensitive the cumulative interest amount is, and how sensitive the amount of potential incremental interest cost would be in the case of external debt, even at a modest spread (and about half externally financed).

Ron

From: Ronald Kwan
Sent: February-27-17 6:27 PM
To: Scott Thompson (CAB) ; Gadi Mayman
Cc: David McLean (MOF) ; Brandon Chaput (MOF)
Subject: FW: Rate Mitigation - Cabinet Submission + Major Projects Deck

Hi Scott, Gadi,

My apologies, I thought I had sent a revised staff BN on Energy's deck in advance of the meeting Sunday. It's now dated with the new deck from last night, but here it is, should it be still of some use. Staff had also received a draft TB assessment note on Sunday, which is also now dated, as the Minute no longer tracks the new timelines. It had used some information from an earlier version of the internal BN.

Ron

Begin forwarded message:

From: "McLean, David (MOF)" <David.McLean@ontario.ca>

To: "Gadi Mayman" <Gadi.Mayman@ofina.on.ca>, "Ronald Kwan" <Ronald.Kwan@ofina.on.ca>, "Tim Schuurman (MOF)" <Tim.Schuurman@ontario.ca>
Cc: "Birks, Ryan (MOF)" <Ryan.Birks@ontario.ca>, "Christopher Pearce (MOI)" <Christopher.Pearce@ontario.ca>
Subject: **Fw: Rate Mitigation - Cabinet Submission + Major Projects Deck**
Energy's MPC deck attached

Sent from my BlackBerry 10 smartphone on the Rogers network.
From: Katona, Keley (ENERGY) <Keley.Katona@ontario.ca>
Sent: Wednesday, February 22, 2017 9:20 PM
To: Bromm, William (CAB); Kwamena, Boafoa (CAB); Foster, Robert (CAB)
Cc: MacIntyre, Kyle (TBS); McLean, David (MOF)
Subject: Rate Mitigation - Cabinet Submission + Major Projects Deck

Hi,
Attached is the deck for Major Projects tomorrow (shorter deck) as well as the revised Cabinet submission. Understand the focus of tomorrow's discussion will be on the GA piece.
We will bring copies to Major Projects.
Keley

GLOBAL ADJUSTMENT (GA) FINANCING OPTIONS MODELLING: INTEREST COST ANALYSIS

The Ministry of Energy (Energy) has provided modelling of three GA options for potential price mitigation initiatives in the submission dated February 22, 2017.

All three options require financing a portion of the Global Adjustment (GA). Under the three options, GA related details includes as follows:

Option 1: GA Smoothing for RPP-Eligible Only (Borrow est. \$2.5 – 3.5 billion per year initially upfront, Residential Bills Lowered about 25% to 2021)

Option 2: GA Smoothing for RPP-Eligible Only (Borrow est. \$1.7 – 2.6 billion per year initially upfront, Residential Bills Lowered about 20% to 2021)

Option 3: GA Smoothing for RPP-Eligible Only (Borrow est. \$1.4 – 1.6 billion per year initially, Residential Bills Lowered about 18% to 2021)

Note that Energy's updated estimates are based on the electricity load eligible for the Regulated Price Plan (RPP).

Included in the analysis below is some sensitivity analysis on different interest rates. Compared to the 5% base case interest rate, with cumulative interest costs of about \$35.5 Bn, for a 25 basis points (bps) increase (0.25%), the cumulative interest cost could increase by about \$4.7 Bn. And for a 50 bps increase, by about \$7 Bn (or about 20%).

- This assumes that the period of recovery is reduced (with a lower interest rate) or increased (with a higher interest rate) compared to Energy's base case.
- In the case of a lower interest rate scenario, the negative bill impact as a result of the GA being above the True Cost of the GA will end early as the associated debt would be paid off in less than 30 years, and vice versa.
- Alternative modelling assumptions, such as maintaining a fixed amortisation period, would result in different estimates of total interest expense and peak amounts of debt.

At a 3.5% cost of financing (about the current long-term Provincial borrowing cost), the cumulative interest cost would be about \$18.4 Bn, or about \$17.1 Bn below the 5% base case (or about \$10.1 Bn lower than at a 4.5% rate).

Sensitivity to changes in interest rates is particularly high as it reflects the increase in interest rates and compounding, as in the first part of the GA smoothing period, interest costs are deferred and capitalised, resulting in significant cumulative interest expense over each period's debt balances. For example, under the base case option 1, the cumulative annual debt balance is about \$690 Bn, rising to about \$780 Bn if interest rates are 5.5%.

Energy Base Case / Status Quo Modelling: Approx. 5% interest rate, for a 30-year term.			
\$ millions	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$35,542	\$38,501 occurs in Year 2032
Option 2	\$14,760	\$19,733	\$21,477 occurs in Year 2029
Option 3	\$12,862	\$19,498	\$20,326 occurs in Year 2033

Assumes an interest rate of 5% (compounded monthly).

Sensitivities

Base Case plus 0.50%: Approx. 5.50% for a 30-year term.

\$ millions	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$45,516	\$40,838 occurs in Year 2032
Option 2	\$14,760	\$25,541	\$22,443 occurs in Year 2029
Option 3	\$12,862	\$24,810	\$21,721 occurs in Year 2033

Assumes an interest rate of 5.50% (compounded monthly).

Note: Accumulated Interest Costs for a 30-year term. With a higher interest rate, the amortization period extends beyond the 30-year forecasted period resulting in a remaining balance at the end of the 30-year period. At the end of a 30-year term, a balance of approximately \$8.4 billion (Option 1) and \$5 billion (Option 2) still remains. Therefore, accumulated total interest costs under all options will be significantly higher over a projected longer period to pay down the deferred costs.

For Option 3, Energy assumes conservation costs in any given year are financed over a 15 year period indefinitely which is why there is non-zero accumulated debt beyond the 30-year amortization period, resulting in an approximate balance of \$5.6 billion. With this sensitivity, this balance increases to approximately \$10 billion.

Base Case less 0.50%: Approx. 4.50% for a 30-year term.

\$ millions	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$28,522	\$36,344 occurs in Year 2031
Option 2	\$14,760	\$15,707	\$20,555 occurs in Year 2029
Option 3	\$12,862	\$15,119	\$19,162 occurs in Year 2032

Assumes an interest rate of 4.50% (compounded monthly).

Note: With a lower interest rate, the amortization period would be reduced. Instead of a 30-year period, the amortization period will be approximately 28.5 years (Option 1) and 28 years (Option 2).

Base Case plus 0.25%: Approx. 5.25% for a 30-year term.

\$ millions	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$40,288	\$39,652 occurs in Year 2032
Option 2	\$14,760	\$22,491	\$21,955 occurs in Year 2029
Option 3	\$12,862	\$22,028	\$21,012 occurs in Year 2033

Assumes an interest rate of 5.25% (compounded monthly).

Note: Accumulated Interest Costs for a 30-year term. At the end of a 30-year term, a balance of approximately \$4 billion (Option 1) and \$2.4 billion (Option 2) still remains. Therefore, accumulated total interest costs under all options will be higher.

For Option 3, Energy assumes conservation costs in any given year are financed over a 15 year period indefinitely which is why there is non-zero accumulated debt beyond the 30-year amortization period, resulting in an approximate balance of \$5.6 billion. With this sensitivity, this balance increases to approximately \$7.6 billion.

Base Case less 0.25%: Approx. 4.75% for a 30-year term.

\$ millions	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$31,810	\$37,382 occurs in Year 2032
Option 2	\$14,760	\$17,586	\$21,011 occurs in Year 2029
Option 3	\$12,862	\$17,202	\$19,729 occurs in Year 2032

Assumes an interest rate of 4.75% (compounded monthly).

Note: With a lower interest rate, the amortization period would be reduced. Instead of a 30-year period, the amortization period will be approximately 29.5 years (Option 1) and 29 years (Option 2).

Other Interest Rate Scenarios

Borrowing Rate: Approx. 4.20% for a 30-year term.

<i>\$ millions</i>	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$25,034	\$35,371 occurs in Year 2030
Option 2	\$14,760	\$13,739	\$20,021 occurs in Year 2029
Option 3	\$12,862	\$12,914	\$18,504 occurs in Year 2032

Assumes an interest rate of 4.20% (compounded monthly).

Note: With a lower interest rate, the amortization period would be reduced. Instead of a 30-year period, the amortization period will be approximately 28 years (Option 1) and 27.5 years (Option 2).

Borrowing Rate: Approx. 3.50% for a 30-year term.

<i>\$ millions</i>	Total Principal Debt	Total Accumulated Interest Costs	Peak Total Debt
Option 1	\$24,977	\$18,364	\$33,265 occurs in Year 2030
Option 2	\$14,760	\$10,024	\$18,956 occurs in Year 2028
Option 3	\$12,862	\$9,435	\$17,163 occurs in Year 2031

Assumes an interest rate of 3.50% (compounded monthly).

Note: With a lower interest rate, the amortization period would be reduced. Instead of a 30-year period, the amortization period will be approximately 26 years (Option 1) and 25 years (Option 2).

STAFF COMMENTS

- It should also be noted that all GA Options require that debt is increased each year. This means that there is a significant interest rate risk should rates rise in the years to come.
 - o Rates have been relatively low in recent years and could rise with the market.
 - o Even if market rates remain constant, as Ontario assumes more debt, there is a risk that Ontario's (or its agency's) cost of borrowing will increase should there be negative changes in its credit rating. With lower credit ratings, interest rates will also increase.
 - Ontario is currently Aa2 (Stable) by Moody's as of April 2016. This rating was Aa2 (Negative) in since July 2014.¹
- The requirement of debt and thereafter, the repayment of debt is based on the GA schedule provided by Ministry of Energy. Therefore, any interest rate sensitivities result in either shortening (due to lower interest rate) or extending (due to higher interest rate) the amortization period.
 - o Under all Options, when interest rates are increased, the amortization period is extended in that it exceeds the forecast of GA provided by Energy, resulting in significant debt balances at the end of the 30 year horizon. This means that the above mentioned Total Accumulated Interest Costs are under-estimated as no forecast is available to determine the higher end of the range.

Electricity Finance Branch, CEFD, OFA
February 27, 2017

¹ https://www.moodys.com/research/Moodys-assigns-negative-outlook-to-Ontarios-ratings-affirms-Aa2-ratings--PR_303116

From: [Gadi Mayman](#)
To: [Ronald Kwan](#)
Cc: [Christina Zhang](#)
Subject: Re: \$25B
Date: Monday, March 06, 2017 2:36:32 PM

That's good work, and I'm glad that the totals with our methodology, which makes more sense to me as you've explained it and which should satisfy the FAO, still come out to the same maximums as what has been given out publicly from Energy's model.

I'd suggest passing it own to the DMO, noting that it's still a work in progress, and letting them decide when the appropriate time to give it to the MO would be.

Gadi

Original Message
From: Ronald Kwan
Sent: Monday, March 6, 2017 2:16 PM
To: Gadi Mayman
Subject: RE: \$25B

Hi Gadi,

A work in progress.

Energy had said that it was using a 5% interest rate, compounded monthly, but it's actual calculations were done using a proxy annual 5.12%, with interest costs assumed to occur in the following year. That means that the detailed table from Energy (as attached -- Energy's 2nd PW) shows zero interest in 2017, which would be awkward to show, and interest cost in each year calculated based on the beginning of the year balance only, not financing the in-year deferrals.

Staff have taken Energy's GA deferral amounts and calculated in-year interest costs based on even monthly GA deferral amounts (a simplification) to generate a table with interest costs starting mid-year 2017. However, that changes the annual accumulated debt amounts, as that means there is interest capitalised starting earlier than in Energy's table. I think what staff has done is more reasonable, but it does change the detailed numbers each year.

In both case, on a rounded basis, the cumulative interest cost is \$25 bn, with an annual peak of \$1.4 bn in the 5% interest rate scenario. The peak cumulative debt rounds in both cases to \$28 bn, but is a little lower in Energy's table, and a little higher with interest compounding monthly.

Also included are some interest rate sensitivities. (Doc internal PW)

Ron

-----Original Message-----
From: Nguyen, Marianne (MOF) [<mailto:Marianne.Nguyen@ontario.ca>]
Sent: March-06-17 09:37
To: Gadi Mayman <Gadi.Mayman@ofina.on.ca>
Cc: Christopher Pearce (MOI) <Christopher.Pearce@ontario.ca>; Ronald Kwan <Ronald.Kwan@ofina.on.ca>; Gavin He <Gavin.He@ofina.on.ca>
Subject: \$25B
Importance: High

Good morning Gadi,

Do you have a detailed chart or breakdown that shows how we get to \$25B over 30 years? Ali has requested this ASAP.

Thanks!
Marianne

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Cc: [Christina Zhang](#)
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