

Simplified DCF+ Example on Additivity

Background: A simplified DCF+ example was developed to compare an energy efficiency IRPA vs a pipeline, and in particular to illustrate some methodological differences between the results of the “customer test” run according to Enbridge’s proposed approach (adding stage 1 and stage 2 results) and Chris Neme’s proposed approach (having a stand-alone customer test). The scenario and results are described below, with calculations in an associated Excel spreadsheet.

It is taken as a starting assumption that the intended purpose of the DCF+ “customer test” is the same under Enbridge’s and Chris Neme’s perspective - to calculate the direct net benefit of the solution to Enbridge Gas customers¹.

Geotargeted energy efficiency IRPA vs Pipeline Scenario

Scenario: Enbridge is experiencing a system constraint due to increasing demand from existing customers, and is considering either a pipeline reinforcement project or a geotargeted energy efficiency program to address this need.

Option 1: A pipeline reinforcement project will be needed in 5 years, with a one-time cost of \$3M.

Option 2: A geotargeted energy efficiency program will be implemented for a 5 year period, and will reduce demand sufficiently to avoid the pipeline reinforcement. The expected cost of the program to ratepayers is \$500,000 annually - \$100,000 in the form of program admin costs, and \$400,000 in the form of incentives to participating customers. The customer incentive covers 25% of the cost of incremental energy efficiency upgrades. Participating customers cover the remaining 75% (\$1.6 million per year). The estimated energy savings on an annual basis (once all 5 years of savings are implemented) is 1 million m³ annually.

Simplifying Assumptions:

- EE program savings persist for 20 years, and then drop to zero. Pipeline life also assumed to be 20 years. No consideration given to what happens after that time.
- Neither project is intended to facilitate connection of new customers – hence any benefits/costs associated with new customer connections are ignored (revisit simplifying assumption in future scenario).
- Simplified scenario does not include tax impacts, non-energy benefits, demand forecast risk, performance risk, etc. (will be built on in future scenarios)

¹ Wording from Enbridge’s recently filed Panhandle Expansion Project (EB-2022-0157): “Stage 2 consists of discounting the quantified benefits to customers resulting from the Project at a social discount rate and the results are added to the Project NPV from Stage 1 to calculate the direct net benefit of the Project to Enbridge Gas customers.” ([EB-2022-0157 Application](#): Exhibit E, Tab 1, Schedule 1, Page 5 of 10).

- Input assumptions (discount rates, gas costs) shown in attached spreadsheet

Test Results

Utility/Ratepayer Test Results						
Test	Project	Baseline	Benefits	Costs	NPV	Conclusion
Ratepayer Impact Measure (RIM)	EE	Pipeline reinforcement	Avoided Capital Costs	Incentive Costs, Program admin costs, Lost Utility Revenue (T&D only, not commodity)	-\$5,191,729	NPV of EE < 0, hence pipeline reinforcement is preferred
DCF Stage 1	Pipeline	Do nothing		Capital costs	-\$2,183,038	NPV of pipeline reinforcement is higher (less negative) than EE measure, hence pipeline reinforcement is preferred from "ratepayer/utility perspective". ²
DCF Stage 1	EE	Do nothing		Incentive Costs, Program admin costs, Lost Utility Revenue (T&D only, not commodity)	-\$7,374,767	
Customer Test Results						
Test	Project	Baseline	Benefits	Costs	NPV	Conclusion

² Note also that (at least in the simplified example), the NPV for the RIM test is equal to the differences in NPV for the DCF Stage 1 tests of the pipeline and EE solutions, showing that comparing separate DCF Stage 1 tests for a facility and an IRPA solution to a "do nothing" approach is mathematically equivalent to using a RIM test for an IRPA (relative to a facility solution).

Enbridge DCF Stage 2 (incremental costs and benefits)	Pipeline	Do nothing	None	N/A	\$0	
Enbridge DCF Stage 2 ³ (incremental costs and benefits)	EE	Do nothing	Bill savings from reduced energy use (commodity only) ⁴	Incremental customer costs of EE equipment	\$16,068,071	
Enbridge DCF Stage 1 + Stage 2	Pipeline	Do nothing	Add pipeline results for DCF Stage 1 to results of DCF Stage 2		-\$2,183,038	EE measure has higher NPV under this test, so is preferred to pipeline solution from “customer perspective”
Enbridge DCF Stage 1 + Stage 2	EE	Do nothing	Add EE results for DCF Stage 1 to results of DCF Stage 2		\$8,693,304	
“Chris Neme” customer test	Pipeline	Do nothing		Capital costs ⁵	-\$2,700,712	EE solution has higher NPV under this test, so is preferred to pipeline solution. However, the difference is greater than using Enbridge’s
“Chris Neme” customer test	EE	Do nothing	Bill savings from reduced energy use	Program admin costs Incremental costs of EE	\$13,669,931	

³ Per Enbridge proposal, incremental costs and benefits in stage 2 are discounted at societal discount rate

⁴ Per table of Enbridge’s proposed costs and benefits in IRP decision

⁵ For discussion: From the customer’s perspective, I believe in the “Chris Neme customer test”, it would be appropriate to first convert this cost to an associated annual revenue requirement based on WACC and accounting for depreciation (as this is the cost the customers actually pay), and then discount this at the societal discount rate (their perceived time value of money). This assumption should be confirmed by Chris Neme. This methodology would result in a different project cost (from the customer perspective) than simply using a lump sum. For simplicity, however, I have not done this yet in the Excel sheet. I have used a lump sum and discounted at societal discount rate.

			(commodity only) ⁶	equipment (sum of incentives paid by utility and incremental costs paid by customers)		methodology, primarily because the lost revenues (carried over by adding stage 1 results) drag down the value of the EE solution in Enbridge's approach.
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Conclusions: Key Methodological Differences For Customer Test

The simplified DCF+ test shows two key differences in the customer test between Chris Neme and Enbridge's approach that can affect the test results.

- **Discount rate:** By combining stage 1 and stage 2 results, Enbridge's approach essentially uses two different discount rates for different costs and benefits. Chris Neme's approach would use the societal discount rate for all costs and benefits included in the "customer test".
 - OEB staff's initial view is that Chris Neme's approach is correct – from the customer perspective, it's unclear why the costs and benefits they experience should have different discount rates.
- **Treatment of Lost Revenues/Avoided T&D Costs:** Under Enbridge's approach (by combining stage 1 and stage 2 results) the impact of lost utility T&D revenues (arising from reduced customer gas use due to EE measures) ends up being a net cost in the "customer test". Under Chris Neme's approach, these are not considered a benefit or a cost in the customer test.
 - OEB staff's initial view is that Chris Neme's approach is correct - from the perspective of the entire set of Enbridge customers, this is net neutral – the lost utility revenues would be experienced as benefits by one set of customers (those participating in the conservation programs and seeing reduced T&D costs) and a cost experienced (indirectly, through a rate increase needed to meet the revenue requirement) by the broader group of Enbridge customers.
 - This could be rectified in Enbridge's approach by adding "Avoided Distribution/Transmission On-Bill Costs" as an incremental customer benefit at stage 2. As this would be equivalent in magnitude to lost revenue at stage 1, the two items would cancel out

⁶ In the Chris Neme test, bill savings from reduced T&D costs are not included as a benefit, nor are the lost utility revenues included as a cost, because these cancel one another out

when the stages are added together (if the discount rate issue discussed above is also resolved).⁷ However, a similar issue may arise with other costs and benefits – for this reason, OEB staff’s initial view is that it is clearer to have a separate customer test than to add the results of different stages, as it is easier to logically define the costs and benefits that should be pertinent to the test.

⁷ In fact, Enbridge already does exactly this in its current DCF approach with respect to taxes paid by the utility – they are considered a cost at stage 1, but then netted out by treating them as an incremental benefit at stage 3.