

ENBRIDGE GAS INC.
Answer to Interrogatory from
Board Staff (STAFF)

Reference: Exhibit C1/ Tab 2/ Schedule 1/ Section 1.8 – Condition and Strategy Overview, pgs. 20-41

Question:

Enbridge Gas Distribution presents series of asset class tables starting on page 20 through to page 41. The heading on the majority tables is “ASSET SUBCLASS AVG. AGE (YR)/CONDITION RISK / OPPORTUNITY MAINTENANCE STRATEGY REPLACEMENT / RENEWAL STRATEGY”

- a) Please present the capital values for each of the assets in these tables?
- b) Typical End-Of-Life (EOL) criteria would address function/purpose, economy of continued operation, safety, reliability/ risk, and design/ obsolescence). Has Enbridge Gas defined such EOL criteria? If so, does it apply them in determining asset replacement rates? If yes, please explain how this has been done?
- c) Corporate values do not appear to be consistently reflected in description of RISK/OPPORTUNITY column. Examples are to be seen on page 20 for “Integrity Mains” and for Distribution Steel Mains. There is no explicit mention of injury/Loss of Life under the Risks/ opportunity. In general, expenditures to prevent injury/loss of life would be expected to receive the highest weighting, with proportionally less financial weighting to reducing other risks such as “relighting customer gas appliances”. Would it be possible to show the linkage from Risk/opportunity to the financial weighting applied to risks in order to determine the appropriateness of the balance struck and where proportionate savings have been allocated for lower impact risks? If yes, please present or highlight this?
- d) Discussion of risk of injury/loss of life is generally associated with the three risks listed: Safety, Financial and Customer satisfaction. Does the Enbridge Gas asset management policy and strategy fully reflect these risks? If so, please substantiate the linkages.

RISK / OPPORTUNITY

Risks identified for integrity mains:

Safety Risk: Gas leaks and migration through underground infrastructure into buildings can result in gas accumulation and explosions.

Financial Risk: Total repair costs, commodity loss, relighting customer gas appliances, regulatory penalties, and any property damages caused by a gas leak.

Customer Satisfaction (CSAT) Risk: Greenhouse Gas (GHG) emissions, environmental impact, extensive customer outage, and reputational damages.

Emergency Replacement Program: Main repairs or reactive replacements to address leaks and condition issues as identified. The approach depends on the extent of the main's poor condition. Localized poor condition is managed through pipeline repairs. Broader condition issues are managed through more extensive replacement.

e) Failure curve predictions for pre-1985 plastic mains vs/risk/opportunity (pdf p83)

Pre-1985 plastic mains are found to be in good condition; however, the failure curve predicts a rapid degradation over a very short period of time.

“The maintenance strategy for distribution plastic mains requires a leak survey to be conducted every five years”

Please explain or point to a section in this document which explains:

- I. How is the shape of the failure curve referred to above derived and verified?
- II. Is the failure curve referred to above qualified through laboratory examination of Enbridge Gas Distribution field samples sufficient to reliably predict rate of progression and ultimate failure? If so, please provide an example of how it is used in the analysis to narrow the uncertainty in the risk?

Response

- a) By “capital values” Enbridge Gas believes the question is referring to the capital investment associated with each asset sub-class or category of spend. The summary tables at the end of each asset class section in Section 5 of the EGD rate zone’s AMP provide this information, and are reproduced in Attachment 1 with a column added (first column) to better align with the summary tables at Exhibit C1, Tab 2, Schedule 1, pages 20 and 41.
- b) No. The term “End-of-Life” used is a generic term used to imply an asset’s end state. The renewal/maintenance strategy takes into consideration each asset class, and their unique objectives and life-cycle management policies. As shown in Figure 4.1-6, several inputs are used to inform decision-making during an asset’s life.¹

Consistent criteria were used for each asset section in the EGD rate zone’s AMP: “*Condition Methodology*”, “*Condition Findings*”, “*Risk and Opportunity*”, and “*Strategy*”. This was designed to clearly outline the methodology and subsequent conclusions that led to each renewal /maintenance strategy.

- c) The series of tables starting on page 20 through to page 41 in the EGD rate zone AMP was intended to provide a high level summary by asset subclass category. In its risk management framework, Enbridge Gas weighs safety risk higher than customer satisfaction and financial risk. This is presented in the EGD rate zone AMP strategy and planning section:
- Risk tolerances are defined for each risk dimension and *Figure 4.2-4: Safety Risk Matrix* on this page illustrates the lower tolerance for safety related risks compared to Financial (*Figure 4.2-5*) and Customer Satisfaction (*Figure 4.2-6*).²
 - When calculating discounted lifetime risk reduction, “customer satisfaction and financial risk are discounted over the life of the asset, while safety risk is not, as it is of paramount importance.”³

- d) Yes. As EGD’s asset management policy states in Section 4, under Strategy and Planning:

Core asset management goals are employee and public safety, compliance, financial performance, operational reliability, environmental sustainability, and customer satisfaction.⁴

¹ Exhibit C1, Tab 2, Schedule 1, p. 70.

² Ibid., p.82.

³ Ibid., p.89.

Risk assessments use the dimensions of Safety, Financial, and Customer Satisfaction (CSAT) to quantify risk. These are described in Table 4.1-2: EGD's Risk Dimensions and align to the Enterprise Strategic Priorities and the Asset Management Core Process.⁵

Figure 4.1-8 illustrates how EGD's Asset Management Policy, Strategies and Risk Dimensions align with the Company's Enterprise Strategic Priorities. This alignment is the core of EGD's Asset Management Strategic Framework.⁶

e)

- I. The failure projection is created by applying statistical model on historical failure data from 2007-2017. The projection is being monitored and verified against actuals on an annual basis. Sections in the EGD rate zone AMP that explain this are provided below.

a leak projection model created by applying a structured methodology to convert historical failure data into a statistical model that forecasts the probability of failure (PoF). The leak projections are refined with input obtained through direct assessment, internal and external industry studies, and SMA input.⁷

EGD continually monitors the performance of these assets and refines its analytical models based on best available data. As the quality of models and data continue to improve through the Plan-Do-Check-Act methodology, EGD will be better able to predict asset condition and manage its long term replacement strategy accordingly.⁸

- II. The EGD rate zone has collected gas pipe samples of pre-1977 plastic mains to send to the Gas Technology Institute ("GTI") for testing and analysis. The GTI was able to produce a Rate Pre-process Method model for the pre-1977 Aldyl A plastic mains, which was used to estimate time to first failure for this asset sub-class.

In addition to statistical modeling, EGD has also concluded an extensive study on pre-1977 Aldyl A plastic pipe with GTI to develop data-driven predictions on the remaining useful life expectancy of the Aldyl A plastic pipe used in the EGD system.⁹

⁴ Ibid., p.64.

⁵ Ibid., p.71.

⁶ Ibid., p.76.

⁷ Ibid., p.132.

⁸ Ibid., p.138

⁹ Ibid., p.132.