

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

RÉPONSE DU GROUPE DE TRAVAIL
À LA DEMANDE DE RENSEIGNEMENTS N^o 2 DE LA
FÉDÉRATION CANADIENNE DE L'ENTREPRISE INDÉPENDANTE (FCEI)

Note: Unless otherwise specified, all references pertain to March 8, 2011 report entitled “Research for Gaz Metro’s Performance Incentive Mechanism” prepared by Pacific Economics Group Research, LLC (Gaz Métro-2, Document 1).

Reference : i) p. 6, footnote 6.

i) « We intend the term “rate adjustment mechanism” here to be broad enough to include the new approach to the design of the Performance Incentive Mechanism that Gaz Metro has proposed. »

1. Why does PEG refers to the approach to the design of the Performance Incentive Mechanism that is proposed as “new”?

Answer :

The mechanism is called « new » because it differs from the current mechanism.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

Références : i) page 23
ii) page 15.
iii) Table A-1

i) *«To aid in the design of cost-based output indexes, we developed econometric cost models using data for a large sample of U.S. gas distributors. »*

ii) *«An econometric approach to setting productivity targets has been developed that can be customized to the business conditions of a distributor without using its own data or the data of a peer group. We implement this approach for Gaz Métro in work that is discussed in Section 4.1. »*

2. Table A-1 is a sample of gas distributors used in the empirical research. Is it possible to obtain the relevant summary statistics of variables (number of customers, retail delivery, lines miles, price of capital services, price of labour services, price of materials, average OPEX, average CAPEX, etc) in the benchmarking study for these utilities with the corresponding values for Gaz Métro?

Answer :

Yes. The comparisons are made in the table below. Please note the following.

- The company's operating scale is well below the norm of our U.S. sample but by no means an outlier.
- The pace of customer and line mile *growth* is modestly above the sample norm.
- The *mix* of customers and line miles is more unusual. Gaz Metro has an unusually low customer density (customers/line km) due in large measure to price competition from Hydro Quebec.
- Partly by virtue of its low customer density, Gaz Metro's opex and capex cost per customer are well above the sample norm.
- Like most of the sampled utilities, Gaz Metro
 - i. has few problematic cast iron mains (there are some cast iron mains but they now have plastic inserts)
 - ii. has no electric customers
 - iii. serves a densely settled urban core.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

HOW GAZ METRO BUSINESS CONDITIONS COMPARED TO U.S. SAMPLE MEANS

	Gaz Metro 2009 [A]	U.S. Sample Mean 1998-2009 [B]	Ratio [A/B]
Output Variables			
Number of Customers	179,370	874,233	20.5%
Change in Customers	4,614	13,017	35.4%
Miles of Main	6,292	10,816	58.2%
Change in Main	110	192	57.3%
Summary Output Quantity Level Index (US sample mean = 1.00)			
O&M	0.205	1.00	20.5%
Capex	0.456	1.00	45.6%
Total	0.269	1.00	26.9%
Average Annual Growth in Output			
Number of Customers	1.9%	1.4%	138.0%
Miles of Main	2.0%	1.9%	107.6%
Change in Customers	12.5%	-7.1%	-175.1%
Change in Main	-4.1%	-4.9%	85.3%
Input Prices			
Purchasing Power Parity 2009 (C\$/US\$)	1.197	1.000	119.7%
Wage Level	759.42	740.95	102.5%
RSMears City Cost Index	107.10	100.00	107.1%
Other Business Condition Variables			
Urban Core Dummy	1	0.78125	128.0%
Number of Electric Customers	0	641,078	0.0%
Percent of Main that is Cast Iron	0	10.11%	0.0%
Cost per Customer			
O&M Expenses	\$590.00	\$191.60	3.08
Capex	\$602.00	\$129.60	4.65

3. From reference ii), should the reader posit that even if Gaz Metro's variables are different from the average variables of the sample, Gaz Metro's productivity targets will still be relevant?

Answer :

Yes. The econometric productivity target method is designed to produce an external and forward looking productivity target that is customized to reflect the business conditions faced by Gaz Metro. Statistical theory does suggest that econometric model parameter estimates that are used in the exercise will be less precise to the extent that

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

- the model excludes relevant business conditions;
- the model was not estimated using an appropriate procedure;
- the business conditions of Gaz Metro differ from the norms for the sample used in econometric model estimation;
- the model has an incorrect functional form.

With respect to the first issue, we have been doing econometric research on the cost of gas distributors for years and have had the opportunity to identify numerous business conditions that influence cost. We considered many variables and included all three of our cost models all business conditions that were found to have sensible and statistically significant parameter estimates. With respect to the second issue, we have had years to develop an estimation procedure that is appropriate for this kind of statistical cost research. We use a custom econometric software package that corrects for autocorrelation and groupwise heteroskedasticity.

With respect to the last two issues, we have in each model featured the output specification that is most strongly supported by the data, subject only to the constraint that the model use a “double log” functional form in the name of simplicity. We have tried to customize the output index weights for capex and total factor productivity (which involve multiple output variables) to reflect the unusual output mix of Gaz Metro.

Reference: i) Table 1

4. Please confirm that elasticity weights were derived from the same econometrical work as presented in appendix A.3. Please explain the rationale underlying footnote 27.

Answer :

The elasticity weights for the output indexes for capex and total cost were based in part on the econometric work presented in Appendix 3. Please see our answer to the following question for further explanation. As explained on p. 50 of the report, we were concerned that the elasticity shares of Gas Metro would differ from those of the typical distributor in the US sample due to Gaz Metro's unusually low customer density. We could have addressed the problem with a more flexible and complex functional form but chose this method in the name of simplicity.

5. Please provide the elasticities that underlie the Elasticity Weights (and the calculation of those elasticities).

Answer :

The general formula for the calculation of a cost elasticity with respect to a given output variable i is:

$$\text{Cost Elasticity}_i = \text{Marginal Cost}_i / \text{Average Cost}_i$$

To calculate custom elasticity shares for the development of our output quantity indexes for Gaz Metro, we used as elasticity estimates the ratio of the marginal cost estimate from our US econometric work to the average cost of Gaz Metro. Here is the formula:

$$\text{Elasticity Share} = \frac{\text{Marginal Cost}_i^{\text{US}} / \text{Average Cost}_i^{\text{Gaz Metro}}}{\sum_i \text{Marginal Cost}_i^{\text{US}} / \text{Average Cost}_i^{\text{Gaz Metro}}}$$

Here, for each output variable i , $\text{Marginal Cost}_i^{\text{US}}$ is the average of our econometric estimates of the marginal cost of the gas distributors in our U.S. sample, adjusted for inflation to a 2008 value. $\text{Average Cost}_i^{\text{Gaz Metro}}$ is the corresponding average cost of Gaz Metro, expressed in US dollars.

Here are the details of the custom *capex* elasticity calculations, with the sample mean US elasticity results added for comparison.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

Capex Elasticity Calculations

Output Variable	Gaz Metro Custom		US Sample Mean		
	MC^{US}/AC^{GM}	Elasticity	Elasticity Share	Elasticity	Elasticity Share
Customers	62 / 460	= 0.135	0.1160	0.3389	.357
Line Miles	7,307 / 12,956	= 0.564	0.4833	0.5297	.559
Growth of Customers	7,152 / 25,328	= 0.282	0.2420	0.0441	.047
Growth of Line Miles	122,217 / 660,101	= 0.185	0.1587	0.0353	.037
Total		1.168	1.0000	0.9480	1.000

Here are the details of the custom *total cost* elasticity calculations, with the sample mean US elasticity results added for comparison.

Capex Elasticity Calculations

Output Variable	Gaz Metro Custom		US Sample Mean		
	MC^{US}/AC^{GM}	Elasticity	Elasticity Share	Elasticity	Elasticity Share
Customer	344/1584 =	0.217	0.7385	0.757	.895
Line Miles	3.432/44672 =	0.077	0.2615	0.089	.105
Total		0.294	1.0000	0.846	1.000

As discussed in our answer to question 4, we wanted to customize the elasticity *shares* because Gaz Metro has an unusual mix of customers, line miles, and growth in same. It can be seen that the custom Gaz Metro elasticity shares are quite different. Our methodology reduced the weight assigned to the number of customers in the output indexes for capex and also for total cost. Elasticity weights are not relevant to the design of the cible plafond for O&M expenses since our research identified only one statistically significant output variable: the number of customers.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

References: i) Tables 2 and 3
ii) Gaz Métro-1, Document 2, section 3.3.1.

It is FCEI's understanding that the definition of the O&M cost data used by PEG to compute the O&M productivity is different than the definition of the O&M cost data defined under section 3.3.1 of the proposed incentive mechanism.

6. Please compute the O&M productivity using the data provided in answer to question 2 directed at the Groupe de Travail by the FCEI.

Answer :

The productivity research for the proposed Gaz Metro cible plafond for dépenses d'exploitation did not include expenses for employee pensions or other benefits. Certain benefit expenses are subject to indexing in the final mécanisme incitatif proposal. Itemized benefit expenses are not readily available for Gaz Metro or our U.S. sample. However, we do not believe that a correction for any disparities between the costs included in the productivity research and the costs included in the cible plafond for dépenses d'exploitation would change results greatly because the costs in question are not that important. The inclusion of benefit expenses in the research would be certain to lower the estimated O&M productivity growth trend for Gaz Metro by a small amount because it would place more weight on the labor quantity, which grew more rapidly than other input quantities.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

References: i) p.30
ii) Tables 6 and 7

i) *"The volatility makes the output differential unusually sensitive to the choice of sample period. Our preliminary judgment is that the 0.27% annual growth rate in total throughput for the 2000-2007 period is more representative of the long run trend in the service territory. The difference between 0.27% and the 1.93% growth trend of the elasticity-weighted output quantity index for the same period is -1.65%. The difficulty of choosing an appropriate sample period for the calculation of an output differential is a disadvantage of Gaz Metro's current approach to revenue cap design." (p.30)*

7. Would you, please, elaborate on the underlined sentence?

Answer :

Gaz Metro's current mécanisme incitatif involves a price cap index, and thus requires a productivity index that uses an output index that is consistent with the price that is capped. Since the "price" that is capped is revenue/total throughput, the appropriate output measure is total throughput. Total throughput is volatile due to its sensitivity to local economic conditions such as weather and the demand for the products of heavy industry in southern Quebec. Because of this volatility, the productivity trend and the resultant productivity growth target are very sensitive to the choice of a sample period.

Under the alternative approach to the design of a revenue cap, the output measures used (e.g. line miles and the number of customers served) are cost drivers, and these are generally much more stable than total throughput. The choice of a sample period is therefore less of an issue.

8. Please indicate if volumes used in the output differential calculation were revenue weighted (in fact price weighted). If not, please reconcile with formulas [5] and [13] on pages 8 and 12 of the report. Why aren't contract demand and number of customers considered in the output differential calculation?

Answer :

The output index in a productivity index used to design the price cap in Gaz Metro's current mécanisme incitatif would not be revenue-weighted. Because the output differential is the difference between the trends in this output index and a cost-elasticity-weighted index, it wouldn't make sense to use a revenue-weighted output index in this case.

9. If possible, comment on output differential volatility once volumes are weighted. How does weighting the volumes affect the statement below?

Answer :

This calculation was not performed but may not help much because heavy industry accounts for an unusually large share of Gaz Metro's base rate revenue.

10. The output differential is calculated on the basis of the total throughput which includes declining volumes in small customers. The current incentive mechanism includes a factor that compensates Gaz Métro for the declining volumes in small customers (exogène "variation de volumes"). If the output differential derived in table 6 was applied to the current incentive mechanism, is it correct that Gaz Métro would be compensated twice for the same declining volume phenomenon? If so, would eliminating the exogenous factor "variation de volumes" and using a productivity measure that accounts for the output differential computed as per formulas [5] and [13] fix the double counting issue?

Answer

Yes, there is a potential for double counting of a portion of the decline in the average use of residential and commercial customers under the Company's current incentive mechanism. Any supplementary revenue adjustment that is designed expressly to remove Gaz Metro's disincentive to promote conservation should, accordingly, be designed to avoid double counting by compensating Gaz Metro only for the tendency of the actual output differential to deviate from any output differential that is built into a price or revenue cap index. Alternatively, the output differential may be adjusted to reflect the operation of the other mechanism. The fact that such adjustments might be needed and are complicated is a good argument in favor of a cost-based design for the revenue cap index (à la Enbridge) or, alternatively, index-based cost targets. Consider, however, that the output differential has the broader role of compensating Gaz Metro for expected volume declines from *all* sources and not just from the Company's small-volume customers.

Reference: i) Table 10

11. How does Gaz Métro compare to the companies included in the US sample (with respect to its operating scale, business conditions, input prices, pace of output growth, average OPEX, average CAPEX, rate base, etc.)?

Answer :

Please see our answer to Question 2.

12. Please provide the weighted average OPEX and CAPEX per customer from the US sample (weighted by the number of customers).

Answer :

This task has not been performed but would produce the same result. The average cost per customer is implicitly customer weighted since

$$\sum_h \frac{N_h}{\sum_h N_h} \frac{C_h}{N_h} = \frac{\sum_h C_h}{\sum_h N_h}$$

13. Based on GM's average OPEX (737\$/customer) and CAPEX (634\$/ customer) and the elasticity factor found in PEG's study for OPEX (0.8) and CAPEX (0.95), is it correct that the implied marginal cost of adding a new customer would be 590\$ and 602\$ for OPEX and CAPEX respectively? If not, please indicate what the implied marginal costs would be. Please compare those values with the actual US marginal cost and comment on the differences. Please compare those values with the marginal cost used by Gaz Métro to assess the profitability of its customer additions and comment on the differences?

Answer :

Since

Elasticity = marginal cost / average cost,

it is also true that

Marginal cost = elasticity x average cost.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

Our econometric work suggests that, at mean values of the business conditions in our US sample, the elasticity of cost with respect to the number of customers served is .80 for O&M expenses but only 0.34 for capex. We could in principle use these results to provide the following marginal cost estimated for Gaz Metro.

$$MC_{\text{opex}} = \$ 737 \times .80 = \$ 590$$

$$MC_{\text{capex}} = 634 \times .34 = \$ 216.$$

However, we do not believe that these estimates would be accurate because the elasticity of O&M expenses and capex with respect to customers in the United States is likely to be much higher than that for Gaz Metro due to a higher level of customer density in the States.

The mean estimates of the marginal costs of customers for the utilities in our sample with respect O&M and capex are, in 2008 dollars, \$157 and \$62.

14. Please confirm that the Forward Productivity Growth Target calculation assumes that, at “expected” growth rate, all economies of scale would be returned to the clients through the productivity factor. Please explain the rational for this.

Answer :

Under the proposed mécanisme incitatif, Gaz Metro would realize 50% of the difference between the cible plafond and its actual cost per customer. The cible plafond depends on expected productivity growth. Realization of scale economies is an important means by which gas distributors realize productivity growth. A properly designed cible plafond would return to customers all of the economies of scale from 2% expected customer growth.

15. Please confirm that the Forward Productivity Growth Target calculation assumes that, at “above than expected” growth rate, some economies of scale would be share between the clients and Gaz Métro. Please explain the rational for this.

Answer :

The forward-looking productivity growth target assumes the achievement of normal productivity growth for a gas distributor in Gaz Metro’s situation. Gaz Metro then receives 50% of the benefit from productivity growth from all sources that exceeds the target. The realization of scale economies is an important source of productivity

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

growth for gas distributors. To the extent that customer growth is beyond the company's control, however, the realization of scale economies from unexpectedly rapid customer growth is a windfall gain. Windfall gains and losses are a normal part of PBR, as they are in competitive markets. However, our econometric results could in principle be used to eliminate windfall gains.

The analysis of Denny, Fuss, and Waverman implies that

$$\begin{aligned}\text{Growth Cost} &= \text{growth Input Prices} + \text{growth Customers} \\ &\quad - \text{growth Productivity.}\end{aligned}$$

For a company like Gaz Metro which has no electric customers, our O&M econometric work suggests that

$$\begin{aligned}\text{Growth Productivity} &= (1 - \text{elasticity}^{\text{Customers}}) \times \text{growth Customers} + \text{Trend} \\ &= .20x \text{ growth customers} + \text{Trend}\end{aligned}$$

The X factor in the mécanisme incitatif could in principle be designed to rise and fall with the number of customers added. Alternatively, the cible plafond formula can be revised as follows :

$$\begin{aligned}\text{Growth Cost} &= \text{growth Input Prices} + \text{growth Customers} \\ &\quad - (.20x \text{ growth customers} + \text{trend}) \\ &= \text{growth Input Prices} - \text{trend} + 0.80 \text{ growth Customers.}\end{aligned}$$

This would reduce the impact of customer growth on the cible plafond but make a proportionate reduction in the X factor. An analogous adjustment could be made for the capex formula.

16. Please confirm that the Forward Productivity Growth Target calculation assumes that, at "below than expected" growth rate, more economies of scale would be returned to customer than that amount actually realized. Please explain the rationale for this.

Answer :

The forward-looking econometric productivity growth target assumes the achievement of normal productivity growth for a gas distributor in Gaz Metro's situation. Gaz Metro must absorb 50% of the higher cost that results if productivity growth is less than the target. The realization of scale economies is an important source of productivity growth for gas distributors. To the extent that customer growth is beyond the company's control, however, the failure to realize scale economies from unexpectedly slow customer growth would be a windfall loss.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

Référence : i) p. 45

i) *"All things considered, the indicated range of potential stretch factors when the X factor is based on our forward looking external productivity growth projections is [0.20, 0.50]. If the Company's own historical productivity growth trend is used to set X, our research indicates no need for a stretch factor if there is symmetrical 50/50 sharing since the new Performance Incentive Mechanism would have the same incentive power as the old mechanism."*

17. Please confirm that your conclusion that the Performance Incentive Mechanism would have the same incentive power as the old mechanism is based on the fact that both mechanisms have a symmetrical 50/50 sharing.

Answer :

This conclusion is based on the fact that current mechanism has symmetrical 50/50 sharing and a similar plan term.

18. Anything else being equal, would the Performance Incentive Mechanism still have the same incentive power as the old mechanism if the stretch factor was set to any value in the 0.20-0.50 range? Please explain.

Answer :

Yes. The incentive power is insensitive to the value of the stretch factor and of X.

19. Please indicate if the new Performance incentive mechanism that you were referring to at the time of preparing your report is the same as the one filed as of August 29, 2011. If not, please indicate if the modifications have an impact on any of your recommendations and how.

Answer :

The plan differs from the one on which we based our research in several important respects.

- Five year term, not seven
- Cap on bonifications
- Capital target is depreciation expenses per customer, not capital expenses.

This would modify my recommendations in several respects.

Société en commandite Gaz Métro
Renouvellement du mécanisme incitatif à l'amélioration
de la performance de Gaz Métro, R-3693-2009

- The inflation measure for the capital cost target should be a weighted average of past values for the construction cost index. We might suggest a “triangularized” weighted average as follows.

$$NDX = \text{SUM}_{s=0}^{34} [(35-s) / \text{SUM}_{s=1}^{35} s] WK_{t-s}.$$

This can be shown to be consistent with the assumption of constant real additions.

- The econometric productivity target for capital would be substantially lower than the one we recommended for capex, and would likely be below the implicit X factor in the Group de Travail proposal. We don't know what it would be exactly because we didn't develop an econometric depreciation expenses model. Alternatively, the same 1.11% productivity target could be used for *both* O&M expenses and depreciation that we recommended for TFP.
- Reduce or eliminate the stretch factor due to the weaker performance incentives of the final plan.
- For maximum precision, the output term for the capital cost measurement would be a weighted average of the growth in customers and line miles.