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September 20, 2007

Ms. Kirsten Walli
Board Secretary
Ontario Energy Board
P.O. Box 2319
2300 Yonge Street
27th Floor
Toronto, ON
M4P 1E4

Dear Ms. Walli:

Re: EB-2007-0673 – LPMA Comments on Staff Scoping Paper

These are the comments made on behalf of the London Property Management Association ("LPMA") on the 3rd Generation Incentive Regulation for Electricity Distributors Staff Scoping Paper EB-2007-0673 dated August 2, 2007.

Principles underlying the development of 3rd generation IRM

The scoping paper lists four principles underlying the development of a third generation IRM:

1) the financial viability of the electricity distribution sector should continue to be balanced with the interests of consumers.

2) the pursuit of economic efficiency should be encouraged.

3) the incentive regulation framework must be sustainable.

4) rate volatility should minimized.

It is submitted that these principles are not adequate. LPMA recommends that the Board adopt the following principles:

1) Distribution rates should be predictable and stable. This should provide and environment where utilities and consumers are better able to plan and make decisions.

2) The rate adjustment mechanism should be clear. The mechanism should be clearly articulated and not be subject to multiple interpretations by stakeholders.

3) The pursuit of efficiency should be encouraged. The plan should encourage greater economic efficiency by providing incentives for the implementation of sustainable operational efficiency improvements. The benefits of these efficiency improvements should be shared by customers and shareholders.

4) Utilities should be encouraged to continue infrastructure investment to maintain safety and reliability. The plan should encourage investment of funds to maintain safety and reliability of electricity delivery.

5) Customer service standards should be maintained. Appropriate service quality standards are the cornerstone of consumer protection. A service quality framework should include performance standards, reporting requirements, and compliance measures to ensure customer service standards are maintained.

6) CDM activities should be encouraged. The IRM framework and the conservation and demand management policies should be compatible.

7) A balance between the financial viability of the utilities and the interests of electricity consumers should be maintained. A financially viable electricity distribution sector will help to sustain a robust electricity market in Ontario, which will benefit consumers in terms of price, reliability and safety.

These principles are not new to the Board or to Board Staff. Indeed, they have been taken (and modified where required) from the Staff Discussion Paper on an Incentive

Regulation Framework for Natural Gas Utilities dated January 5, 2007. Theses principles are as relevant for the electricity sector as they are for the natural gas sector.

Issues regarding the development of 3rd generation IRM

With respect to the service quality regulation, Staff have indicated that work would be resumed in this area. However, it is unclear how this work will be incorporated into the 3rd generation IRM process. Regardless of how it is incorporated, the staff paper should incorporate the issue of penalties for distributors that fail to maintain or increase their service quality to the level determined to be appropriate. In addition to significant financial penalties, there should be a detailed process that is know in advance to get the utilities back to their service quality requirements. Another issue, or sub-issue that should be reviewed is whether any costs incurred to return the distributor to the level of service quality required should be recoverable from ratepayers through, for example, a Y or Z factor adjustment.

Necessary Elements

The Staff paper lists a number of issues that should be focused on. In addition to those issues, LPMA suggests the following should be added or modified. The lost revenue due to changes in electricity consumption should be changed to the changes in revenue due to changes in electricity consumption. There is no need to focus on one side of the issue. While electricity consumption may be declining in some areas, it may be increasing in others. Changes in consumption observed yesterday and today may be significantly different from changes in consumption tomorrow, based on changes in technology, relative energy costs and changes in the economy.

It should be noted that some of the issues listed by Staff may not necessarily be issues depending on the type of IRM framework adopted. For example, a rate freeze plan with an off ramp whenever a distributor wants to file a cost of service rebasing application would not need to deal with the term of the plan(it would be indefinite and up to each distributor to determine when/if to rebase); the inflation and productivity factors would not need to be calculated (under a rate freeze program I=X). Such an IRM would still

allow for pass through (Y factors) and unforeseen events (Z factors). Capital investment would not be an issue until the distributor rebased. Changes in revenue would only be relevant when rebasing as well. Distributor diversity would be managed through the diversity provided by a rate freeze IRM. Some distributors may need to rebase frequently if they are dealing with substantial capital investment, rapidly changing consumption or issues specific to the areas they serve. Other distributors may have lower capital investment requirements and insignificant changes in consumption and other issues that allow them to maintain rates for long periods of time.

Other issues that should be reviewed include the rebasing mechanism and the reporting requirements during an IRM period. LPMA suggests that in determining the relevant issues for scoping would be to begin with the Board approved issues list in the combined EB-2007-0606/EB-2007-0615 proceeding for multi year incentive rate applications for Union Gas Limited and Enbridge Gas Distribution Inc. A copy of the approved issues can be found in Appendix A to Procedural Order No. 4 dated August 13, 2007 in that proceeding. A copy of the issues is provided as Appendix A to these comments. With the exception of Issue 7, it would appear that all of the issues identified in the natural gas sector are relevant in the electricity sector.

Capital Investment

The Staff scoping paper identifies the potential for approval of a multi-year capital plan rather than just capital items that may arise in the following year (i.e. a future test year).

The Staff scoping paper should identify a potential 3rd generation IRM as a multi-year cost of service filing. The Board has some experience with such multi year cost of service filings. Natural Resource Gas Limited pioneered this approach in Ontario and has used this methodology a number of times over the last decade.

Such a mechanism not only allows the Board and all interested stakeholders to review a multi year capital plan, but also the associated multi year financing plan that would be required to fund the capital expenditures, but also takes into account the continuity of

accumulated depreciation throughout this period and any asset retirements or replacements that are expected. In addition, the OM&A expenditure forecasts can reviewed in detail, to ensure that any changes in costs reflect the additions of assets, the retirement of assets and the replacement of assets. A customer, volume and revenue forecast will also be important, especially if the capital additions relate to growth in the customer base. In summary, a multi year cost of service filing ensures a complete and balanced review of all aspects of the operation that influence the level of rates, not just one particular area such as capital expenditures.

LPMA recommends that capital investments be treated equally with other factors that may affect rates including customer additions and revenues, capital asset retirements and replacements, OM&A, changes in capital cost allowance rates and rules and changes in capital and income tax rates and thresholds.

Lost Revenue

Depending on the type of IRM mechanism adopted, changes in revenue due to changes in electricity consumption may not be issue. For example, in the Gas IRM proceeding, Dr. Lowery has identified a separate "average use" factor component of the overall productivity or X factor for Union and Enbridge under a price cap regime. This average use factor, however is significantly different under a revenue cap regime.

It should also be noted that changes to rate design can have significant impacts on the implications associated with lost revenue. For example, if the Board were to mandate a move to the full cost recovery of fixed customer costs through the monthly customer charge, the full cost recovery of demand related costs through a demand charge and the full cost recovery of variable costs through a per kWh charge, then a reduction in kWh due to conservation should have no significant impact on a distributor since a reduction in kWh would also mean a reduction in the variable costs associated with the energy consumption. A reduction in demand on a system due to conservation, or the loss of a major customer, may mean that capital additions can be delayed or avoided entirely. The impact by rate class is most likely very different from other rate classes, and is probably

different by distributor. Staff may want to add rate design and cost recovery as a possible mechanism to address the impact on revenues of changes in electricity consumption.

Changes in electricity consumption can be driven by factors that are specific to a certain rate class or classes. For example, conservation in the residential rate class may reduce distributors revenues. But should those lost revenues be somehow recovered from other rate classes, or just from the residential rate class? Under a cost of service multi year filing, this could be easily and routinely addressed through the cost allocation and rate design process. However, under some other IRM approach, an "average use" component of an X factor may be appropriate (see comments above related to Union and Enbridge).

Again, LPMA does not believe that the issue related to revenue should be limited to loses due to changes in electricity consumption. Some distributors may well have gains due to changes in electricity consumption. The mixture of gains and loses may very well be different between rate classes and different amongst distributors. A robust methodology needs to be put in place to address gains and loses, differences between rate classes and differences between distributors.

Distributor Diversity

LPMA does not believe that at this time the Board or Staff or any party should rely on the work done in relation to the comparative utility cost analysis to provide a contribution to the development of an X factor that recognizes distributor diversity.

If distributor diversity should be reflected in an IRM framework, then LPMA believes again that a multi year cost of service filing framework and a rate freeze framework would allow each distributor to reflect its unique circumstances. For example, one distributor may be able to file a five year cost of service application, while another may only be able to forecast with any degree of certainty for a two year period. However, the second utility may be able to operate under a rate freeze for a further year or two before it needs to come back to rebase. If the distributors do, indeed, face unique circumstances, such as rates of customer growth, need for replacement of aging capital, capital vs

OM&A tradeoffs, changes in customer mix and or usage, financing costs, etc., then it would seem that a combination of a multi year cost of service filing and a rate freeze for years with no cost of service filing provides maximum flexibility to distributors to reflect their circumstances.

Approach and Overall Project Timeline

LPMA believes that the approach to this process should be split into two phases. The first phase would determine the appropriate framework or frameworks that could be adopted for an IRM. This may include a price cap, revenue cap, rate freeze, multi-year cost of service or some other form of IRM, a combination of the above approaches, or recognition that a distributor can use any of the above. The first phase would also determine what the necessary elements and components of each of the IRM frameworks should be.

The second phase would be the determination of how the specific parameters of each framework that comes out of the first phase should be calculated, if applicable. There may be common factors across a number of the potential frameworks that may be adopted by the Board and/or the distributors, including such items as Y factors, Z factors, off ramps, earning sharing, the components of an X factor, the proper inflation factor, etc.

In LPMA's view this provides a more structured approach on what can be a complex set of issues. However, to expedite the process, work on a number of issues in the second phase could begin immediately. For example, the methodology and data need to calculated and industry wide X factor, and the selection of the I factor could begin immediately. This information is most likely to be needed for at least some of the IRM frameworks that are likely to emerge from the phase one consultation.

Should the results of this process be used to adjust rates for 2009 for those utilities that rebase in 2008? That may depend on the status of this project in mid 2009. LPMA does not believe that this process should be rushed or truncated just to get a model or models to use for 2009 rate adjustments. The 2nd generation IRM mechanism could be applied to

those utilities that have rebased for 2008 rates. This may be more appropriate than insisting on applying some new generation approach that is not complete or may be subject to significant changes.

Other Comments

a) With regards to specific service charges, Staff may want to consider whether this issue is adequately covered in Issue # 12.4 Non-Energy Services in Appendix A to these comments (from Procedural Order No. 4 in EB-2007-0606/EB-2007-0615).

b) Should the issue of LRAM/SSM be specifically identified as and issue or should this be dealt with as a Y factor pass through adjustment?

c) How should the issue of line loses (i.e. distribution loses) be dealt with in an IRM mechanism? Should the treatment of these loses be independent of the type of IRM mechanism used or should different approaches be identified for each particular type of IRM?

d) If the impact on revenues due to changes in electricity consumption is limited to lost revenues, then should separate issues related to fuel switching (to or from electricity) be included?

e) How much time and effort should the Board and stakeholders invest in estimating the various components of an X factor (productivity differential, input price differential, average use factor, stretch factor)?

f) Can the Board rely on third party data for any of this X factor information? For example, Statistics Canada publishes data related to multifactor productivity in Canada by year, including a breakdown by a number of industries including the utility industry, which is further broken down into further detail. Examples of this information are provided in Appendices B, C and D to these comments.

g) If the Board is going to use data from the distributors for use in the TFP analysis, the data required should be identified as soon as possible so that it can be collected and analyzed.

<u>Summary</u>

In summary, LPMA believes that any 3rd generation IRM mechanism must be robust enough to enable its use by all distributors in Ontario. Given the diversity of electricity distributors across Ontario and the significant differences in the challenges facing them and their ratepayers in the near term, medium term and long term, any IRM mechanism must be able to accommodate a wide variety of circumstances. If it does not, the probability is high that different distributors will use different mechanisms when applying to set future rates.

Please contact me if the Board requires any further information related to these comments.

Sincerely,

Randy Aiken

Randy Aiken
Aiken & Associates

APPENDIX A

**UNION GAS LIMITED
ENBRIDGE GAS DISTRIBUTION INC.
EB-2007-0606 / EB-2007-0615**

ISSUES LIST

1. Multi-Year Incentive Ratemaking Framework

1.1   What are the implications associated with a revenue cap, a price cap and other alternative multi-year incentive ratemaking frameworks?

1.2   What is the method for incentive regulation that the Board should approve for each utility?

1.3   Should weather risk continue to be borne by the shareholders, and if so what other adjustments should be made?

2. Inflation Factor

2.1   What type of index should be used as the inflation factor (industry specific index or macroeconomic index)?

2.1.1 Which macroeconomic or industry specific index should be used?

2.2   Should the inflation factor be based on an actual or forecast?

2.3   How often should the Board update the inflation factor?

2.4   Should the gas utilities ROE be adjusted in each year of the incentive regulation (IR) plan using the Board's approved ROE guidelines?

3. X Factor

3.1   How should the X factor be determined?

3.2   What are the appropriate components of an X factor?

3.3   What are the expected cost and revenue changes during the IR plan that should be taken into account in determining an appropriate X factor?

4. Average Use Factor

4.1   Is it appropriate to include the impact of changes in average use in the annual adjustment?

4.2   How should the impact of changes in average use be calculated?

4.3   If so, how should the impact of changes in average use be applied (e.g., to all customer rate classes equally, should it be differentiated by customer rate classes or some other manner)?

5. Y Factor

5.1 What are the Y factors that should be included in the IR plan?

5.2 What are the criteria for disposition?

6. Z Factor

6.1   What are the criteria for establishing Z factors that should be included in the IR plan?

6.2   Should there be materiality tests, and if so, what should they be?

7. Natural Gas Electricity Interface Review (NGEIR) Decisions

7.1   How should the impacts of the NGEIR decisions, if any, be reflected in rates during the IR plan?

8. Term of the Plan

8.1   What is the appropriate plan term for each utility?

9. Off-Ramps

9.1   Should an off-ramp be included in the IR plan?

9.2   If so, what should be the parameters?

10. Earning Sharing Mechanism (ESM)

10.1   Should an ESM be included in the IR plan?

10.2   If so, what should be the parameters?

11. Reporting Requirements

11.1   What information should the Board consider and stakeholders be provided with during the IR plan?

11.2   What should be the frequency of the reporting requirements during the IR plan (e.g., quarterly, semi-annual or annually)?

11.3   What should be the process and the role of the Board and stakeholders?

12. Rate-Setting Process

12.1   Annual Adjustment

12.1.1   What should be the information requirements?

12.1.2   What should be the process, the timing, and the role of the stakeholders?

12.2   New Energy Services

12.2.1   What should be the criteria to implement a new energy service?
12.2.2   What should be the information requirements for a new energy service?

12.3   Changes in Rate Design

12.3.1   What should be the criteria for changes in rate design?

12.3.2   How should the change in the rate design be implemented?

12.3.3   What should be the information requirements for a change in rate design?

12.4   Non-Energy Services

12.4.1   Should the charges for these services be included in the IR mechanism?

12.4.2   If not, what should be the criteria for adjusting these charges?

12.4.3   What should be the criteria to implement new non-energy services?

12.4.4   What should be the information requirements for new non-energy services?

13. Rebasing

13.1   What information should the Board consider and stakeholders be provided with at the time of rebasing?

14. Adjustments to Base Year Revenue Requirements and/or Rates

14.1   Are there adjustments that should be made to base year revenue requirements and/or rates?

14.2   If so, how should these adjustments be made?

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Statistics Canada Statistique Canada

Canada

Table 383-0021[1] - Multifactor productivity, value-added, capital input and labour input in the aggregate business sector and major sub-sectors, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Geography=Canada

North American Industry Classification System (NAICS)=Business sector[1]

Table 383-0021[1] - Multifactor productivity, value-added, capital input and labour input in the aggregate business sector and major sub-sectors, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Line		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	**Multifactor productivity[2]**	1.3	0.7	2.0	2.3	-0.4	0.7	-0.5	-0.4	0.2	-0.2
2	**Labour productivity[3]**	3.0	2.1	3.4	3.7	1.1	1.0	0.6	0.2	2.3	1.1
3	**Capital productivity[4]**	-0.2	-0.2	0.7	1.5	-1.1	0.9	-1.4	-0.5	-1.5	-1.8
4	**Real Gross Domestic Product (GDP)[5]**	5.6	4.7	6.6	6.3	1.7	2.6	1.9	3.3	2.9	2.7
5	**Labour input[6]**	3.3	3.1	3.7	3.5	1.4	2.0	1.9	3.5	1.4	1.7
6	Hours worked (x 1,000,000)[7]	2.5	2.6	3.1	2.5	0.5	1.6	1.3	3.1	0.7	1.6
7	Labour composition[8]	0.7	0.5	0.4	1.1	0.9	0.5	0.5	0.4	0.8	0.1
8	Labour input of workers with primary or secondary education[9]	-2.9	0.3	3.6	2.0	-1.8	1.2	-2.2	2.1	-0.2	1.4
9	Labour input of workers with some or completed post-secondary certificate or diploma[10]	7.9	3.5	3.2	3.5	2.1	2.5	3.8	3.4	-0.3	0.3
10	Labour input of workers with university degree or above[11]	5.6	7.9	4.2	6.8	5.1	2.5	4.2	5.7	6.7	4.5
11	**Capital input[12]**	5.7	5.1	5.8	4.8	2.7	1.6	3.4	3.8	4.6	4.6
12	Capital stock[13]	3.4	2.8	2.9	3.1	1.5	1.2	2.2	2.4	3.1	3.5
13	Capital composition[14]	2.3	2.2	2.9	1.5	1.2	0.4	1.1	1.4	1.5	1.1
14	Capital input of information and communications technologies[15]	20.4	21.6	19.4	16.8	8.4	6.0	8.7	11.5	11.1	11.2
15	Capital input of non-information and communications technologies[16]	4.2	3.2	4.2	3.4	2.2	1.1	2.7	3.0	4.0	3.9
16	**Combined labour and capital inputs[17]**	4.2	4.0	4.5	4.1	2.0	1.8	2.5	3.7	2.7	2.9
17	**Gross Domestic Product (GDP) (dollars x 1,000,000)[18]**	6.6	4.0	8.6	11.3	3.1	2.8	5.7	••	••	••
18	**Labour compensation (dollars x 1,000,000)[19]**	6.2	6.2	6.4	8.8	4.3	3.5	3.8	••	••	••
19	Labour compensation of workers with primary or secondary education	-1.5	3.0	6.0	6.9	0.3	2.1	0.0	••	••	••

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	(dollars x 1,000,000)										
20	Labour compensation of workers with some or completed post-secondary certificate or diploma (dollars x 1,000,000)	10.4	6.2	5.7	8.8	5.0	3.6	6.2	••	••	••
21	Labour compensation of workers with university degree or above (dollars x 1,000,000)	13.4	12.1	8.5	12.2	9.2	5.2	4.6	••	••	••
22	Capital cost (dollars x 1,000,000)[20]	7.2	1.0	12.0	14.7	1.5	1.8	8.3	••	••	••
23	Capital cost of information and communications technologies (dollars x 1,000,000)	8.6	17.7	6.5	2.8	2.5	6.6	11.5	••	••	••
24	Capital cost of non-information and communications technologies (dollars x 1,000,000)	7.1	-0.8	12.7	16.2	1.4	1.3	7.9	••	••	••
25	Contribution of capital intensity to labour productivity growth[21]	1.4	0.9	1.0	0.9	1.0	0.0	0.9	0.2	1.7	1.3
26	Contribution of labour composition to labour productivity growth[22]	0.4	0.3	0.3	0.6	0.5	0.3	0.3	0.3	0.4	0.1

Source: CANSIM, table 383-0021 (for fee), Statistics Canada

Symbol legend:
•• Not available

Footnotes:
1.
The business sector covers the whole economy less public administration, non-profit institutions and the rental value of owner-occupied dwellings.
2.
Multifactor productivity measures the efficiency with which all inputs are used in production. It is the ratio of real Gross Domestic Product (GDP) to combined labour and capital inputs.
3.
Labour productivity is measured as real Gross Domestic Product (GDP) per hours worked. It shows the time profile of how productively labour is used to generate value-added. Changes in value-added-based labour productivity reflect the joint influence of capital, skill upgrading, and overall productive efficiency.
4.
Capital productivity is measured as real Gross Domestic Product (GDP) per unit of capital services.
5.
Real Gross Domestic Product (GDP) (or real value-added) is a chained Fisher quantity index of Gross Domestic Product (GDP) at basic prices.
6.
Labour input is obtained by chained-Fisher aggregation of hours worked of all workers, classified by education, work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights.
7.
The number of hours worked in all jobs is the number of all jobs times the annual average hours worked in all jobs. According to the retained definition, hours worked means the total number of hours that a person spends working, whether paid or not. In general, this includes

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regular and overtime hours, breaks, travel time, training in the workplace and time lost in brief work stoppages where workers remain at their posts. On the other hand, time lost due to strikes, lockouts, annual vacation, public holidays, sick leave, maternity leave or leave for personal needs are not included in total hours worked.

8.

Labour composition is the ratio of labour input to hours worked. Changes in labour composition reflect the shifts in the educational attainment and work experience of the workforce.

9.

Labour input of workers with primary or secondary education is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights.

10.

Labour input of workers with some or completed postsecondary certificate or diploma is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights. Workers with some or completed postsecondary certificate or diploma include those who attended university but did not obtain a Bachelor's degree.

11.

Labour input of workers with university degree or above is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers vs. self-employed and unpaid family workers) using hourly compensation as weights.

12.

Capital input measures the services derived from the stock of fixed reproducible business assets (equipment and structures), inventories, and land. It is obtained by chained-Fisher aggregation of capital stocks using the cost of capital to determine weights.

13.

Capital stocks for fixed reproducible assets are estimated using the perpetual inventory method that assumes that investments follow geometric depreciation patterns. Capital stocks for inventories and land are measured by methods other than the perpetual inventory method.

14.

Capital composition is the ratio of capital input to capital stock. Capital composition increases as investment shifts towards assets with short lived assets (such as equipment) that provide more capital services per dollar of capital stock, and away from long lived assets (such as office buildings).

15.

Capital input of information and communications technologies measures the services derived from computer hardware, software and telecommunication equipment. It is obtained by chained-Fisher aggregation of those assets using the cost of capital to determine weights.

16.

Capital input of non-information and communications technologies measures the services derived from assets other than computer hardware, software and telecommunication equipment. It is obtained by chained-Fisher aggregation of those assets using the cost of capital to determine weights.

17.

Combined labour and capital inputs are obtained by chained-Tornqivst aggregation of labour and capital input using cost shares of labour and capital as weights.

18.

Gross Domestic Product (GDP) is valued at basic prices. It is calculated as gross output at

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basic prices minus intermediate inputs at purchaser prices. Data on Gross Domestic Product (GDP) are available up to the most current year of the input-output table.
19.
Labour compensation consists of all payments in cash or in kind made by domestic producers to workers for services rendered - in other words, total payroll. It includes the salaries and supplementary labour income of paid workers, plus an imputed labour income of self-employed workers. Data on labour compensation are available up to the most current year of the input-output table.
20.
Capital cost represents the surplus-profits, depreciation, rent, and net interest-intended as compensation to the owners of capital. It is calculated as nominal Gross Domestic Product (GDP) at basic prices minus labour compensation. Data on capital income are available up to the most current year of the input-output table.
21.
Contribution of capital intensity to labour productivity growth is calculated as the growth in capital services per hour times capital's share of nominal Gross Domestic Product (GDP). It reflects the effects of capital investment on labour productivity growth.
22.
Contribution of labour composition to labour productivity growth is calculated as the growth rate of labour composition times labour's share of nominal Gross Domestic Product (GDP). It reflects the effects on labour productivity growth of skill upgrading as measured by increases in the experience and education composition of the workforce.

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Statistics Statistique
Canada Canada

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Table 383-0021[1] - Multifactor productivity, value-added, capital input and labour input in the aggregate business sector and major sub-sectors, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Geography=Canada
North American Industry Classification System (NAICS)=Utilities

Table 383-0021[1] - Multifactor productivity, value-added, capital input and labour input in the aggregate business sector and major sub-sectors, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Line		1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	**Multifactor productivity[2]**	1.9	-1.9	3.1	1.4	3.5	5.3	-1.2	-1.4	2.2	-5.4
2	**Labour productivity[3]**	3.1	-4.6	6.5	-0.7	2.0	4.4	-6.8	-3.6	2.0	-2.1
3	**Capital productivity[4]**	1.7	-1.3	2.1	2.7	3.6	6.0	0.4	-0.7	2.2	-6.4
4	**Real Gross Domestic Product (GDP)[5]**	-0.9	-1.8	1.2	0.0	2.6	4.3	0.8	0.7	4.2	-1.6
5	**Labour input[6]**	-3.6	2.1	-5.0	2.7	-0.3	1.5	7.1	4.4	2.3	1.0
6	Hours worked (x 1,000,000)[7]	-4.0	3.0	-5.0	0.7	0.6	-0.1	8.2	4.4	2.2	0.5
7	Labour composition[8]	0.4	-0.9	0.0	2.1	-1.0	1.7	-1.0	-0.1	0.2	0.4
8	Labour input of workers with primary or secondary education[9]	-10.9	14.5	-6.7	-8.5	-7.7	-6.1	11.0	9.5	-7.2	1.2
9	Labour input of workers with some or completed post-secondary certificate or diploma[10]	-0.8	4.6	-7.1	1.6	4.4	-4.8	9.4	7.5	2.6	-0.8
10	Labour input of workers with university degree or above[11]	-2.9	-13.2	2.6	16.4	-4.8	19.6	1.1	-4.6	8.1	4.6
11	**Capital input[12]**	-2.6	-0.6	-0.8	-2.7	-0.9	-1.8	0.5	1.3	2.1	5.1
12	Capital stock[13]	-2.8	-1.5	-2.8	-3.8	-1.5	-1.0	0.3	0.9	1.8	3.4
13	Capital composition[14]	0.1	1.1	2.0	1.2	0.5	-0.7	0.2	0.4	0.3	1.6
14	Capital input of information and communications technologies[15]	22.8	41.4	36.6	17.9	6.6	-3.1	7.8	6.0	7.0	••
15	Capital input of non-information and communications technologies[16]	-3.6	-2.4	-3.2	-4.1	-1.5	-1.7	0.0	1.0	1.7	••
16	**Combined labour and capital inputs[17]**	-2.9	0.1	-1.8	-1.5	-0.8	-1.0	2.0	2.2	2.0	4.1
17	**Gross Domestic Product (GDP) (dollars x 1,000,000)[18]**	1.1	-2.0	1.1	4.0	6.6	-2.4	6.6	••	••	••
18	**Labour compensation (dollars x 1,000,000)[19]**	5.0	5.1	-0.6	2.7	2.5	2.4	8.9	••	••	••
19	Labour compensation of workers with primary or secondary education	-4.8	17.9	-3.9	-10.6	-8.1	-5.5	17.4	••	••	••

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	(dollars x 1,000,000)										
20	Labour compensation of workers with some or completed post-secondary certificate or diploma (dollars x 1,000,000)	6.2	10.0	-0.9	-0.1	6.1	-5.2	13.8	••	••	••
21	Labour compensation of workers with university degree or above (dollars x 1,000,000)	11.3	-14.9	3.8	23.4	2.5	23.8	-3.3	••	••	••
22	**Capital cost (dollars x 1,000,000)[20]**	0.0	-4.0	1.7	4.4	7.9	-3.8	5.8	••	••	••
23	Capital cost of information and communications technologies (dollars x 1,000,000)	4.0	38.2	24.0	1.4	-2.3	-2.0	9.1	••	••	••
24	Capital cost of non-information and communications technologies (dollars x 1,000,000)	-0.2	-5.9	0.3	4.6	8.7	-3.9	5.6	••	••	••
25	**Contribution of capital intensity to labour productivity growth[21]**	1.0	-2.6	3.3	-2.6	-1.3	-1.2	-5.5	-2.2	-0.1	3.4
26	**Contribution of labour composition to labour productivity growth[22]**	0.1	-0.2	0.0	0.4	-0.2	0.4	-0.2	-0.1	0.1	0.1

Source: CANSIM, table 383-0021 (for fee), Statistics Canada

Symbol legend:
•• Not available

Footnotes:

1.
The business sector covers the whole economy less public administration, non-profit institutions and the rental value of owner-occupied dwellings.

2.
Multifactor productivity measures the efficiency with which all inputs are used in production. It is the ratio of real Gross Domestic Product (GDP) to combined labour and capital inputs.

3.
Labour productivity is measured as real Gross Domestic Product (GDP) per hours worked. It shows the time profile of how productively labour is used to generate value-added. Changes in value-added-based labour productivity reflect the joint influence of capital, skill upgrading, and overall productive efficiency.

4.
Capital productivity is measured as real Gross Domestic Product (GDP) per unit of capital services.

5.
Real Gross Domestic Product (GDP) (or real value-added) is a chained Fisher quantity index of Gross Domestic Product (GDP) at basic prices.

6.
Labour input is obtained by chained-Fisher aggregation of hours worked of all workers, classified by education, work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights.

7.
The number of hours worked in all jobs is the number of all jobs times the annual average hours worked in all jobs. According to the retained definition, hours worked means the total number of hours that a person spends working, whether paid or not. In general, this includes

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regular and overtime hours, breaks, travel time, training in the workplace and time lost in brief work stoppages where workers remain at their posts. On the other hand, time lost due to strikes, lockouts, annual vacation, public holidays, sick leave, maternity leave or leave for personal needs are not included in total hours worked.

8.
Labour composition is the ratio of labour input to hours worked. Changes in labour composition reflect the shifts in the educational attainment and work experience of the workforce.

9.
Labour input of workers with primary or secondary education is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights.

10.
Labour input of workers with some or completed postsecondary certificate or diploma is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers versus self-employed and unpaid family workers) using hourly compensation as weights. Workers with some or completed postsecondary certificate or diploma include those who attended university but did not obtain a Bachelor's degree.

11.
Labour input of workers with university degree or above is obtained by chained-Fisher aggregation of hours worked of those workers, classified by work experience, and class of workers (paid workers vs. self-employed and unpaid family workers) using hourly compensation as weights.

12.
Capital input measures the services derived from the stock of fixed reproducible business assets (equipment and structures), inventories, and land. It is obtained by chained-Fisher aggregation of capital stocks using the cost of capital to determine weights.

13.
Capital stocks for fixed reproducible assets are estimated using the perpetual inventory method that assumes that investments follow geometric depreciation patterns. Capital stocks for inventories and land are measured by methods other than the perpetual inventory method.

14.
Capital composition is the ratio of capital input to capital stock. Capital composition increases as investment shifts towards assets with short lived assets (such as equipment) that provide more capital services per dollar of capital stock, and away from long lived assets (such as office buildings).

15.
Capital input of information and communications technologies measures the services derived from computer hardware, software and telecommunication equipment. It is obtained by chained-Fisher aggregation of those assets using the cost of capital to determine weights.

16.
Capital input of non-information and communications technologies measures the services derived from assets other than computer hardware, software and telecommunication equipment. It is obtained by chained-Fisher aggregation of those assets using the cost of capital to determine weights.

17.
Combined labour and capital inputs are obtained by chained-Tornqivst aggregation of labour and capital input using cost shares of labour and capital as weights.

18.
Gross Domestic Product (GDP) is valued at basic prices. It is calculated as gross output at

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basic prices minus intermediate inputs at purchaser prices. Data on Gross Domestic Product (GDP) are available up to the most current year of the input-output table.

19.

Labour compensation consists of all payments in cash or in kind made by domestic producers to workers for services rendered - in other words, total payroll. It includes the salaries and supplementary labour income of paid workers, plus an imputed labour income of self-employed workers. Data on labour compensation are available up to the most current year of the input-output table.

20.

Capital cost represents the surplus-profits, depreciation, rent, and net interest-intended as compensation to the owners of capital. It is calculated as nominal Gross Domestic Product (GDP) at basic prices minus labour compensation. Data on capital income are available up to the most current year of the input-output table.

21.

Contribution of capital intensity to labour productivity growth is calculated as the growth in capital services per hour times capital's share of nominal Gross Domestic Product (GDP). It reflects the effects of capital investment on labour productivity growth.

22.

Contribution of labour composition to labour productivity growth is calculated as the growth rate of labour composition times labour's share of nominal Gross Domestic Product (GDP). It reflects the effects on labour productivity growth of skill upgrading as measured by increases in the experience and education composition of the workforce.

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Table 383-0022[1] - Multifactor productivity, gross output, value-added, capital, labour and intermediate inputs at a detailed industry level, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Geography=Canada
Multifactor productivity and related variables=Multifactor productivity based on value-added[2]

Table 383-0022[1] - Multifactor productivity, gross output, value-added, capital, labour and intermediate inputs at a detailed industry level, by North American Industry Classification System (NAICS), annual (percent change (year-to-year))

Line		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
1	**Agriculture, forestry, fishing and hunting [11]**	2.7	2.8	3.3	-4.0	6.0	8.2	1.2	-4.1	-6.0	12.4
2	Crop and animal production[24]	5.4	4.5	4.4	-6.9	9.6	10.9	-2.4	-7.7	-10.1	19.6
3	Forestry and logging [113]	0.9	0.1	3.1	2.4	1.2	-0.2	10.9	1.3	6.8	-2.1
4	Fishing, hunting and trapping [114]	-19.1	-11.5	1.9	6.7	-6.2	3.0	4.8	12.6	3.4	5.1
5	Support activities for agriculture and forestry [115]	-8.3	5.4	1.2	-3.7	-7.6	15.0	1.7	6.1	-10.6	0.4
6	**Mining and oil and gas extraction [21]**	-3.4	-1.6	-3.4	-6.1	0.7	1.7	-4.3	-9.7	0.7	-3.5
7	Oil and gas extraction [211]	-4.2	-4.0	-5.1	-6.2	-0.3	-0.4	-7.6	-12.9	1.7	-5.7
8	Mining (except oil and gas) [212]	0.6	1.1	1.4	-6.2	0.4	8.2	5.4	-0.2	-4.4	6.8
9	Support activities for mining and oil and gas extraction [213]	-2.8	4.2	-3.3	-1.9	4.7	-4.5	5.4	2.1	1.2	-1.1
10	**Utilities [221]**	4.9	5.8	3.9	2.1	-1.9	3.1	1.5	3.4	5.4	-1.2
11	Electric power generation, transmission and distribution [2211]	5.9	6.1	4.0	2.9	-1.4	2.7	-0.7	-4.1	6.5	-2.2
12	Natural gas distribution, water and other systems[25]	-2.1	3.3	4.5	-6.5	-4.8	7.4	16.9	27.8	0.8	5.7
13	**Construction [23]**	-1.7	-0.7	2.5	-0.3	2.8	1.6	1.2	4.2	0.7	0.0
14	**Manufacturing [31-33]**	5.0	0.6	-1.4	2.6	2.8	4.1	5.8	-3.5	2.7	-1.2
15	Food manufacturing [311]	2.2	1.1	-2.5	-0.6	4.5	-3.1	6.2	7.4	-1.9	-2.9
16	Beverage and tobacco product manufacturing [312]	10.2	-0.9	0.9	-0.3	7.0	-5.3	9.2	-1.9	1.7	-8.4
17	Textile and textile product mills[26]	6.1	2.0	-4.8	6.2	6.8	-0.6	8.4	-0.9	1.1	-4.7
18	Clothing manufacturing [315]	3.5	7.7	-1.1	5.4	-0.6	-6.7	12.3	-7.0	1.6	4.9
19	Leather and allied product manufacturing [316]	6.9	-7.2	-9.9	13.3	-2.5	-10.6	28.1	-1.9	-0.6	-7.4
20	Wood product manufacturing [321]	-5.8	-3.0	-0.3	4.9	6.3	2.4	3.5	0.1	13.9	2.8
21	Paper manufacturing [322]	4.3	-4.1	1.9	3.3	2.5	9.9	6.9	-3.3	9.1	-0.8
22	Printing and related support activities [323]	-3.5	-6.1	-2.7	4.2	-4.5	-1.1	10.9	8.3	-3.3	-2.5
23	Petroleum and coal products	9.9	1.2	8.9	-3.2	9.4	-4.8	-3.8	12.0	-5.2	-12.1

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	manufacturing [324]										
24	Chemical manufacturing [325]	7.9	5.4	-1.8	3.4	-0.8	-1.4	8.6	0.6	6.4	-2.3
25	Plastics and rubber products manufacturing [326]	7.9	-0.7	4.1	0.3	-0.2	2.7	7.5	0.1	5.3	-2.6
26	Non-metallic mineral product manufacturing [327]	1.2	-1.3	3.6	9.9	4.2	-0.8	5.1	6.0	1.4	0.6
27	Primary metal manufacturing [331]	3.5	2.2	4.8	-1.7	5.4	2.3	4.8	4.1	4.7	1.3
28	Fabricated metal product manufacturing [332]	7.7	1.5	-5.0	11.7	0.7	3.6	7.3	-3.9	2.6	-2.4
29	Machinery manufacturing [333]	6.9	4.6	-5.2	-0.6	0.7	-0.3	9.1	3.2	-1.4	-2.5
30	Computer and electronic product manufacturing [334]	9.5	4.8	-8.3	10.2	8.1	23.1	6.6	-39.3	-7.6	13.7
31	Electrical equipment, appliance and component manufacturing [335]	8.2	-3.4	10.0	4.0	5.4	-6.5	15.1	-6.0	-9.2	-6.7
32	Transportation equipment manufacturing [336]	7.5	0.0	-3.0	1.0	2.2	16.8	2.2	-9.0	3.5	0.7
33	Furniture and related product manufacturing [337]	5.0	1.2	1.8	0.2	8.2	2.1	7.3	4.1	-2.5	-5.3
34	Miscellaneous manufacturing [339]	3.5	-4.7	2.7	26.4	6.6	-6.5	4.7	-0.1	12.6	-1.4
35	**Wholesale trade [41]**	3.5	-2.2	-1.9	4.0	6.0	3.2	1.4	1.6	1.1	2.0
36	**Retail trade [44-45]**	2.3	0.5	1.6	3.0	2.8	4.1	2.7	4.6	1.8	-0.4
37	**Transportation and warehousing [48-49]**	3.4	-0.9	0.1	-0.1	-5.3	0.7	3.7	0.4	-1.1	-0.7
38	Air, rail, water and scenic and sightseeing transportation and support activities for transportation[27]	7.0	-3.2	3.6	3.4	-6.4	1.4	-0.8	-0.1	-6.6	-0.3
39	Truck transportation [484]	3.6	1.9	-3.4	-2.5	-5.0	1.6	6.6	0.6	3.7	-2.5
40	Transit and ground passenger transportation [485]	2.6	-3.9	-5.3	0.6	-3.6	2.5	5.2	-8.9	-1.0	-3.8
41	Pipeline transportation [486]	2.7	-2.4	1.5	-4.8	-8.0	-9.1	7.8	20.3	4.2	3.6
42	Postal service and couriers and messengers[28]	-1.7	6.0	2.0	0.6	3.4	2.1	3.5	-1.2	-3.8	3.8
43	Warehousing and storage [493]	-2.4	-5.0	15.4	0.4	-11.1	0.8	10.6	1.0	0.7	-5.7
44	**Information and cultural industries [51]**	2.0	0.4	-1.2	1.0	-1.3	2.1	0.4	2.1	4.0	2.0
45	Motion picture and sound recording industries [512]	-2.7	3.0	-7.6	11.3	-2.3	-6.9	3.8	-1.6	13.5	-7.6
46	Broadcasting and telecommunications [513]	1.6	0.8	0.9	-2.1	-2.3	6.7	1.4	1.3	7.2	6.6
47	Publishing industries, information services and data processing services[29]	3.8	-0.4	-3.8	8.1	1.6	-5.1	-2.9	4.8	-5.9	-5.1
48	**Finance, insurance, real estate and renting and leasing[30]**	6.9	0.7	-0.7	3.3	-0.2	-0.9	-0.5	2.3	-1.2	-0.2
49	**Professional, scientific and technical services [54]**	-4.5	-0.4	-4.7	2.9	0.4	2.7	0.7	-0.1	1.7	0.8
50	**Administrative and support, waste**										

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	management and remediation services [56]	-2.5	3.6	-1.1	-6.9	1.2	3.4	2.5	2.1	1.9	-4.4
51	Administrative and support services [561]	-3.8	3.4	-2.1	-7.0	1.6	3.1	2.4	1.1	0.5	-5.0
52	Waste management and remediation services [562]	12.0	6.1	8.3	-5.5	-3.0	8.5	2.2	13.7	18.2	0.1
53	**Educational services (except universities)[31]**	x	x	x	x	x	x	x	x	x	x
54	**Health care and social assistance (except hospitals)[32]**	0.4	-4.2	-4.1	1.0	-5.0	-9.0	-3.1	-1.0	-3.4	-5.4
55	**Arts, entertainment and recreation [71]**	3.7	-0.8	-9.2	-1.9	-3.4	0.5	2.9	1.7	-4.3	-8.1
56	**Accommodation and food services [72]**	0.6	3.7	-0.8	0.3	3.2	2.0	3.7	3.4	0.3	0.4
57	**Other services (except public administration) [81]**	-1.6	-5.0	-5.3	1.5	0.3	2.0	2.4	0.6	3.2	-0.9
58	Repair and maintenance [811]	2.7	3.3	-3.6	0.3	6.0	10.0	2.5	7.0	3.5	2.2
59	Religious, grant-making, civic, and professional and similar organizations [813]	-2.8	-0.8	-4.4	-3.4	-2.7	7.5	-2.7	-0.9	1.5	1.6
60	Personal and laundry services and private households[33]	-5.7	-19.3	-10.5	1.9	-3.4	-5.6	1.8	-4.2	2.4	-4.2

Source: CANSIM, table 383-0022 (for fee), Statistics Canada

Symbol legend:
x Suppressed to meet the confidentiality requirements of the Statistics Act

Footnotes:
1.
Multifactor productivity based on gross output measures the efficiency with which all inputs including capital, labour and intermediate inputs are used in production. It is the ratio of real gross output to combined units of all inputs.
2.
Multifactor productivity based on value-added measures the efficiency with which capital and labour inputs are used to generate value-added. It is the ratio of real Gross Domestic Product (GDP) (real value-added) to combined labour and capital inputs.
24.
This combines the North American Industry Classification System (NAICS) codes 111-112.
25.
This combines the North American Industry Classification System (NAICS) codes 2212-2213.
26.
This combines the North American Industry Classification System (NAICS) codes 313, 314.
27.
This combines the North American Industry Classification System (NAICS) codes 481-483, 487.
28.
This combines the North American Industry Classification System (NAICS) codes 491-492.
29.
This combines the North American Industry Classification System (NAICS) codes 511, 514.
30.

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This excludes owner-occupied dwellings industry.
31.
This only includes privately-owned establishments. Publicly-owned establishments that provide education are included in the non-business sector.
32.
This only includes privately-owned establishments. Publicly-owned establishments that provide health services are included in the non-business sector.
33.
This combines the North American Industry Classification System (NAICS) codes 812, 814.