3GIRM consultation (EB-2007-0673):
productivity, stretch factor, and capital module materiality threshold

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August 5th - 7th , 2008
Toronto, Ontario

Agenda

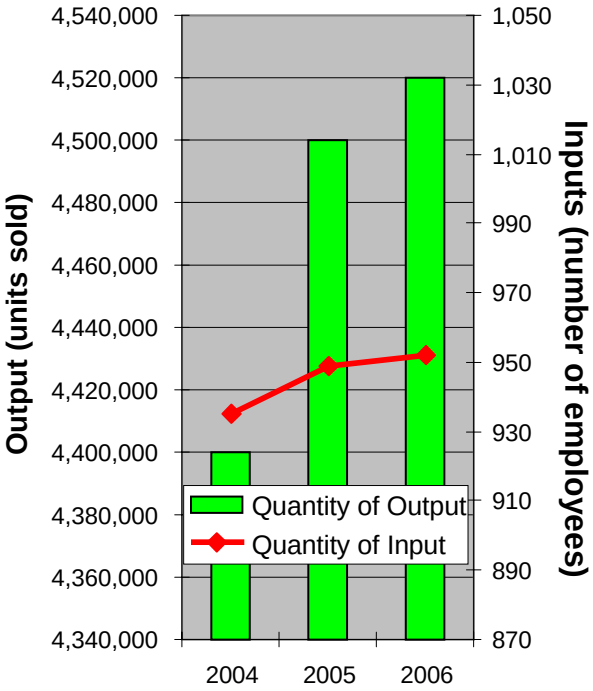
- ***Productivity Factor***
- ***Stretch Factors***
- ***Capital module – materiality threshold***
- ***Summary of key messages***

Recommendations for the industry-average productivity factor

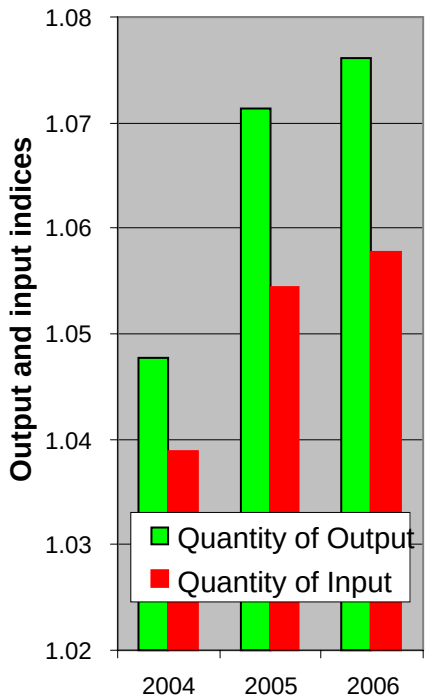
- 3GIRM productivity factor should be measured using Ontario data for the industry – results from other jurisdictions can be useful as checks but cannot substitute for Ontario-specific business circumstances
- We recommend using a 20-year average TFP growth measure combining 1GIRM productivity analysis (1988-2002) and our independent analysis of currently available data (2002-2007)
  - Over the most recent 6 years, on average, TFP growth for the industry has been negative, as the increase in quantities of inputs outpaced the increase in quantities of outputs. This negative trend needs to be acknowledged and included in the analysis.
- Although a complete reversal of recent trends is unlikely over the term of 3GIRM, a 20-year average TFP growth rate of 0.58% is a reasonable target for LDCs for the long term
- Such a productivity factor would create measureable savings for ratepayers in the near term

TFP calculations simply capture the year-to-year change in output quantity per unit of input

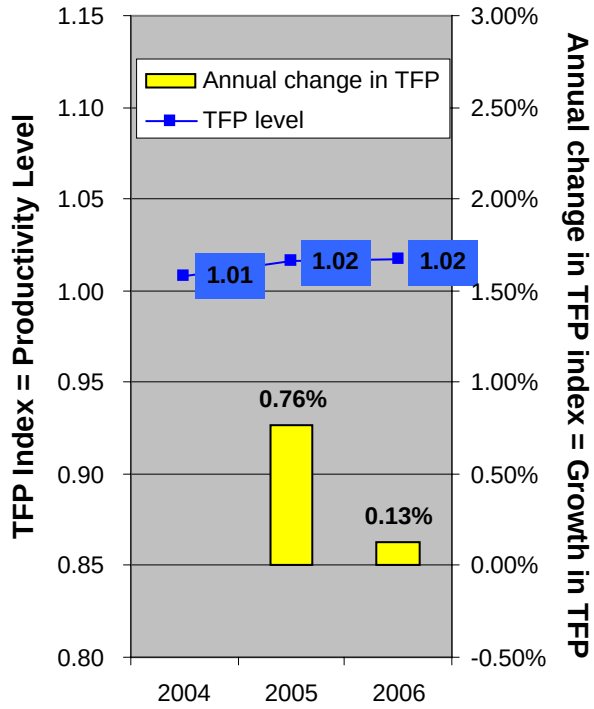
Step 1: Identify relevant inputs and outputs



Step 2: Calculate the quantity of inputs and outputs, TFP index



Step 3: TFP growth is the change year-on-year in the TFP Index



Average TFP growth = 0.45%

Illustrative data for a single-input, single-output calculation

Ontario's business and industry landscape is distinct from US peers

- Ontario has many smaller LDCs (US has typically much larger franchise areas in terms of geographical span and customers)
  - Average utility size in Ontario → 56,987 customers, 1.8 TWh average throughput delivered/annum
  - Average utility size in US sample created by PEG → 806,863 customers, 21 TWh average throughput delivered/annum
- Ontario LDCs, with few exceptions, operate only electricity distribution businesses
  - Many US LDCs are part of vertically integrated utility, with transmission, generation, and even pipeline gas (or gas LDC) businesses
- Ontario LDCs face unique weather, customer base, and distinct legacy of system configuration and network expansion because of government and municipal ownership which impacts input/output relationship and potential for productivity growth
- Ontario LDCs have been under rate freezes, de facto price caps since the mid 1990s, while also processing corporatization changes and market restructuring
  - Most US LDCs are investor-owned, under stable cost-of-service regulation
- Many Ontario LDCs will soon be in dramatic capex phase because of aging asset base resulting from provincial mandates to electrify in the 1960s and 1970s

Addition of 2007 data further confirms the negative TFP trend observed in recent LDC data

- **Inputs, especially OM&A, continue to grow faster than outputs**

Year	Throughput (output)		Customer numbers (output)		Peak demand (output)		OM&A (input)		Physical Capital (input)	
2002	1.000		1.000		1.000		1.000		1.000	
2003	1.014	*1.4%*	1.020	*2.0%*	0.968	*-3.2%*	1.015	*1.5%*	1.020	*2.0%*
2004	1.024	*1.0%*	1.037	*1.7%*	0.912	*-5.6%*	1.000	*-1.5%*	1.024	*0.4%*
2005	1.043	*1.9%*	1.053	*1.7%*	0.936	*2.4%*	1.032	*3.2%*	1.032	*0.8%*
2006	1.014	*-2.8%*	1.067	*1.4%*	0.986	*5.0%*	1.088	*5.6%*	1.039	*0.7%*
2007	1.037	*2.3%*	1.077	*1.0%*	0.943	*-4.4%*	1.141	*5.3%*	1.046	*0.7%*
Trend 2002-2007		**3.7%**		**7.7%**		**-5.7%**		**14.1%**		**4.6%**

- **Average annual TFP growth, 2002-2007, ranges from -0.50% p.a. (under Scenario 5, using two-output model specification) to as much as -1.7% p.a. (under Scenario 3, where peak demand is included with 50% weighting)**

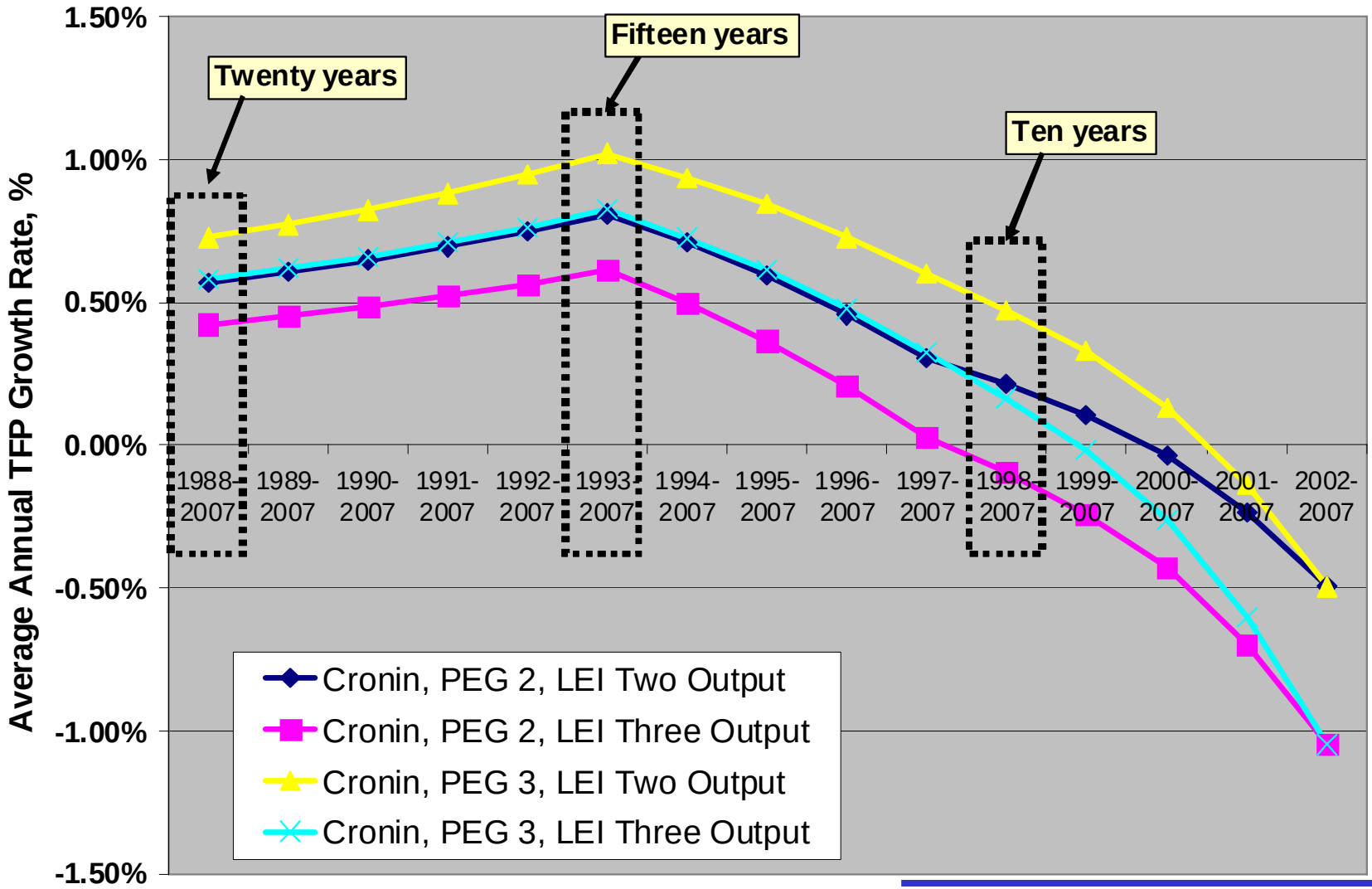
Average annual change in TFP for the Industry (82 LDCs), 2002-2007

Scenario 1: 33% (throughput), 33% (customer #), 33% (peak demand)	*Scenario 2: 25% (throughput), 50% (customer #), 25% (peak demand)*	*Scenario 3: 25% (throughput), 25% (customer #), 50% (peak demand)*	*Scenario 4: 10% (throughput), 45% (customer #), 45% (peak demand)*	*Scenario 5: 67% (throughput); 33% (customer #)*
-1.32%	**-1.05%**	**-1.67%**	**-1.44%**	**-0.50%**

Our TFP analysis is based on careful consideration of LDC business, input characteristics, and Ontario data

- Inputs must cover all cost drivers – labour, materials and capital
  - Economic theory, empirical evidence, industry experience and recent regulatory precedence all support the recognition of 'one hoss shay' depreciation when calculating the annual capital input quantity of electricity distribution assets -- accounting depreciation adjustments under monetary approach bias the quantity of capital input
  - Distribution lines represent the majority of asset base for an LDC – length (and voltage) of distribution lines is therefore a valid proxy for describing the quantity of capital employed
  - Physical method approximates the "asset efficiency profile" frequently being applied by Statistical Agencies in economy-wide TFP studies
  - Use of physical measures also overcomes current data shortcomings in Ontario for implementing monetary value approach
- Outputs selected to proxy the multi-dimensional service that LDCs provide to their customers
  - Three output model is standard used widely by practitioners of productivity analysis for electricity distribution in order to account for the multi-dimensional nature of electricity distribution service

A 20-year productivity growth estimate can be synthesized from combination of current analysis and TFP measures from previous studies



A productivity factor of 0.58% would best meet the Board's criteria

- This productivity target is effective and balanced – producing immediate benefits for ratepayers (prices will now increase slower than inflation) and motivating efficiency improvements from the LDCs
- Although recent history says that such a productivity improvement is unlikely to be achieved in the near future, a long term TFP measure is a valid productivity target for LDCs to strive for over the longer term
- Such a productivity factor is practical on multiple dimensions
  - its transparency and relevancy is unquestionable
  - it is based on publicly-available Ontario data, and employs easily replicable Index methods
  - the value of 0.58% recognizes and incorporates recent negative trends in TFP growth

Stakeholders need to recognize that increases in productivity target above recommended level would be extremely difficult for LDCs

Even a 30 basis points difference in the X factor makes a marked impact on revenue expectations and earnings

Hypothetical "average" LDC

"Average LDC" (2007)	
Distribution Revenues	$30,255,229
OM&A Expenses	$14,467,991
Interest Expense	$4,207,044
Depreciation Expense	$8,458,133
PIL, estimated at 33.5%	$1,045,890
Net Income	**$2,076,171**

	Price Cap, I=1.5%, X = 0.88%	Price Cap, I=1.5%, X = 0.58%
Base Year	$30,255,229	$30,255,229
Year 1	$30,442,812	$30,533,578
Year 2	$30,631,557	$30,814,486
Year 3	$30,821,473	$31,097,980
Cumulative total	$91,895,842	$92,446,044
Difference	**$550,202**	

Hypothetical "larger" LDC

"Larger LDCs" (2007)	
Distribution Revenues	$252,648,331
OM&A Expenses	$120,267,214
Interest Expense	$37,045,354
Depreciation Expense	$75,520,305
PIL, estimated at 33.5%	$6,638,178
Net Income	**$13,177,279**

	Price Cap, I=1.5%, X = 0.88%	Price Cap, I=1.5%, X = 0.58%
Base Year	$252,648,331	$252,648,331
Year 1	$254,214,751	$254,972,696
Year 2	$255,790,882	$257,318,445
Year 3	$257,376,786	$259,685,774
Cumulative total	$767,382,419	$771,976,915
Difference	**$4,594,496**	

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- *Productivity Factor*
- *Stretch Factors*
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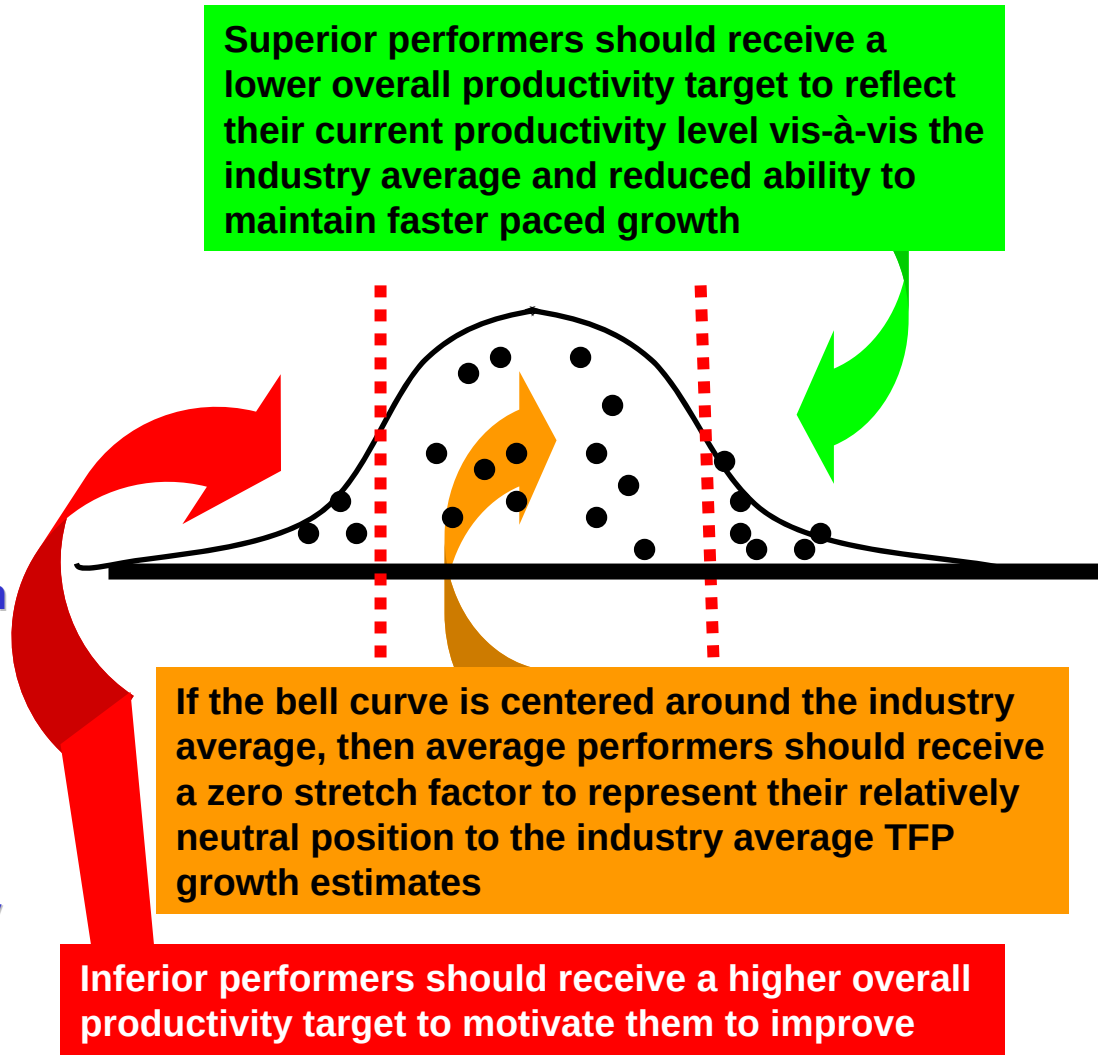
Board intends to use stretch factors to "recognize, promote, and reward distributors"

- We agree with the Board's objectives – stretch factors should be used to distinguish between 'laggards' and 'leaders,' reward the 'leaders' and further motivate the 'laggards'
- If starting position matters, then what are we saying?
  - Some utilities have been improving their productivity faster than their peers – already 'lean' and will not be able to keep pace with the rest of the industry. These more efficient utilities need to be rewarded as they have been delivering 'benefits' to customers all along through lower costs. Opportunity for higher profits – due to lower X factor – is a reward that is in fact consistent with competitive markets.
  - Some utilities are less efficient – have more 'fat', more capacity to make cost cuts without sacrificing service quality. A higher X factor is more easily achievable for these firms. Regulator should require that they 'catch up' to the industry, and therefore an adder to the industry-wide productivity target is appropriate

Analysis of relative efficiency (how to classify firms) and what values of stretch factor to assign are inter-linked

- In conventional statistics, the "bell curve" contains a distribution of performers
  - laggards must grow faster to catch up to the rest of the industry
  - leaders are rewarded with lower productivity targets
- The relative efficiency analysis can provide us with information on relative productivity which would inform on stretch factor values
- Problem: proposed benchmarking analysis is incomplete and cannot be fairly applied in a comprehensive price cap because it ignores allocative efficiency



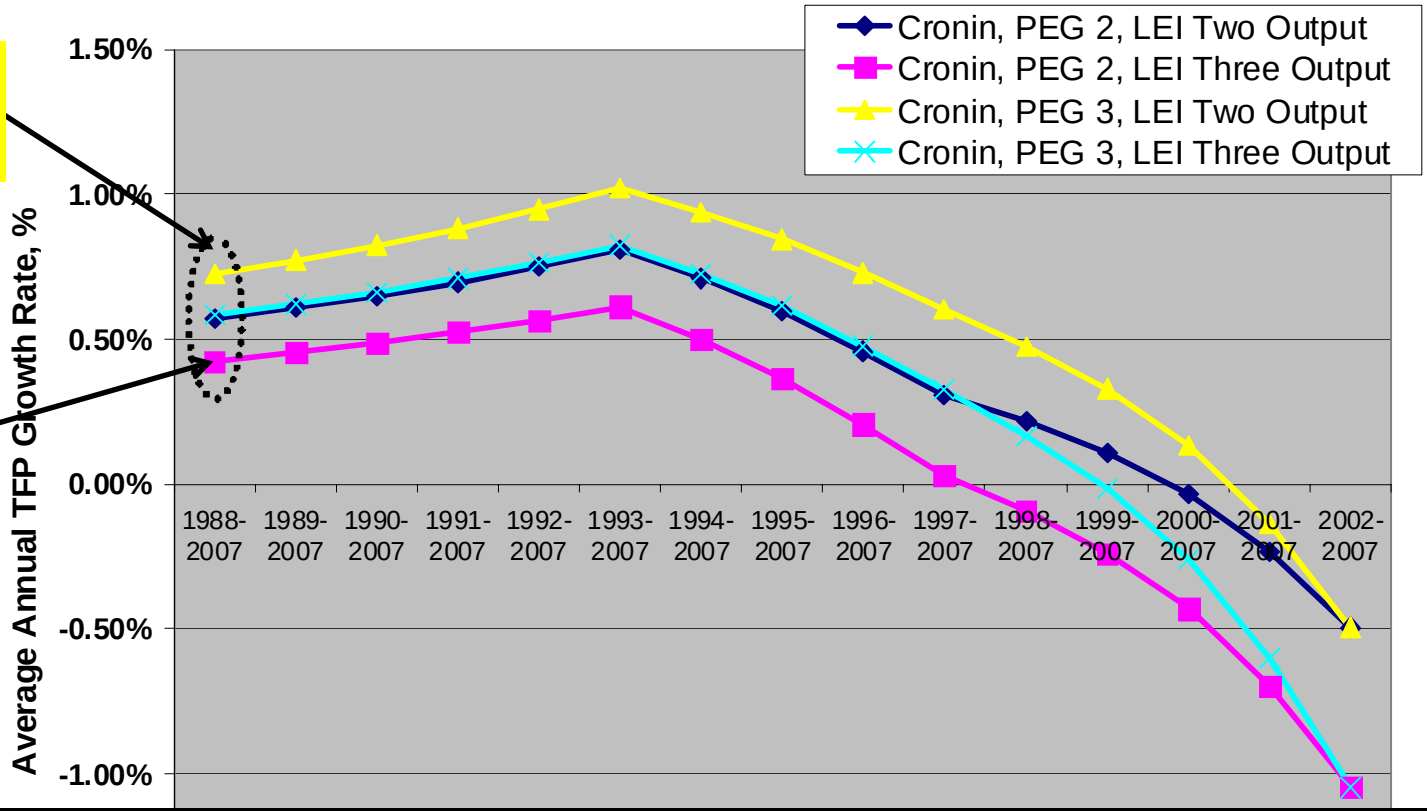
We should aim to do benchmarking on a total cost basis in the future

- Index methods can be extended to look at TFP growth and relative TFP levels of firms - this is referred to as “multilateral TFP” (MTFP)
- With a voltage breakdown and carrying capacity measures, we can account for differences among firms and also analyze different capital assets (distribution lines, underground versus aerial, substations) on an apples-to-apples basis across LDCs
  - MVA kilometer metric recognizes that the effective capacity of an individual piece of equipment depends not only on the voltage but also on a range of other factors, including the number, material and size of conductors used, the allowable temperature rise as well as limits through stability or voltage drop
- Cluster analysis of MTFP results will show whether there is natural groupings of firms that have similar efficiency traits
- Stretch factors will then be a function of the differences in productivity levels between poor performers and average, and high performers and average… informed by the pace with which the Board wants to see productivity spurt from laggards to catch up and reward the leaders

In order to minimize distortions of mis-classification in 3GIRM, we recommend basing Stretch Factors on implied lower and upper bounds from 20-year TFP analysis

Upper Bound
(Cronin, PEG 3, LEI Scenario 5)

Lower Bound
(Cronin, PEG 2, LEI Scenario 2)



Number of Years	Timeframe	Average Annual TFP						
		Cronin, PEG 2, LEI Two Output	Cronin, PEG 2, LEI Three Output	Cronin, PEG 3, LEI Two Output	Cronin, PEG 3, LEI Three Output	Median	Max	Min
20	1988-2007	0.57%	0.42%	0.73%	0.58%	**0.58%**	**0.73%**	**0.42%**

Our 'upper' and 'lower' bounds for 20-year productivity factor forms the basis for the 0.15% Stretch Factor

- Uncertainty on methodology for classifying firms suggests that we need to be cautious and employ conservative levels that have the lowest risk to derail 3GIRM and distort incentives
- Recall that small changes in overall X-factor can create unreasonable financial burdens – contradicting the Board's "effective" criteria
- A stretch factor of 0.15% is within the range of the 20-year productivity factor estimates derived from Ontario data
  - In order to accommodate Board's non-negative requirement, employ 0.075% and 0.15% as Stretch Factors on top of the industry-wide productivity factor of 0.58%
- We also need to commit to work towards a better method for classifying firms – annual reconfiguration based on OM&A alone will likely mis-classify some firms and distort incentives to improve overall productivity - no accounting for allocative efficiency improvements

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The need for incremental capital funding arises because ratebase grows faster than the rates under the price cap

- Return on and return of investment is provided through the revenue requirement which determines rates at the base year, but during the rest of the IR period, there is no rebasing, so rates assume a constant ratebase
- We acknowledge that some portion of ratebase growth already remunerated through the price cap mechanism, but may not be sufficient depending on depreciation profile and capital additions profile
  - Growth in ratebase that is 'unfunded' results in potential loss of capital carrying costs and potential for deteriorating ROE, despite utilities' best efforts for cost cuts, may delay capital expenditures
- Growth in ratebase can outpace price cap <u>even if</u> annual capital expenditures stay at the same level over term of IR

Growth in rate base of 2% can be material

- Rate Base Growth in excess of 2% likely unfunded without incremental capital module
- Price cap for 2007 was 0.9%
  - Assuming 60% of revenue requirement is related to capital, 0.54% of 2007 price cap was available for capital related costs
  - In contrast, 2% increase in rate base would result in roughly 1.2% increase in revenue requirement if rebasing
- Given that the 2007 price cap was short by 0.68%, incremental amount would be unfunded resulting in reduced ROE
  - Many LDCs chose to rebase in 2008 because of this issue
- Board is concerned with sustainable IRM principles
  - The incremental capital module will be useful only to the extent that it provides sufficient opportunity for capital investment funding and reasonable and just rates – the trigger is a key component of the module

‘Capex – depreciation’ measure is in fact linked to ratebase growth

Let us define:

- **NRB = new rate base**
- **ORB = original rate base at time of rebasing**
- **DR = depreciation rate**
- **D_0 = original depreciation expense at time of rebasing**
- **CAPEX = annual capital expenditure**

then NRB = ORB + CAPEX – (NRB * DR) ***(equation 1)***

If DR = D_0 /ORB

then NRB – ORB = CAPEX – NRB * (D_0/ORB) ***(equation 2)***

Note that NRB – ORB = annual change in ratebase

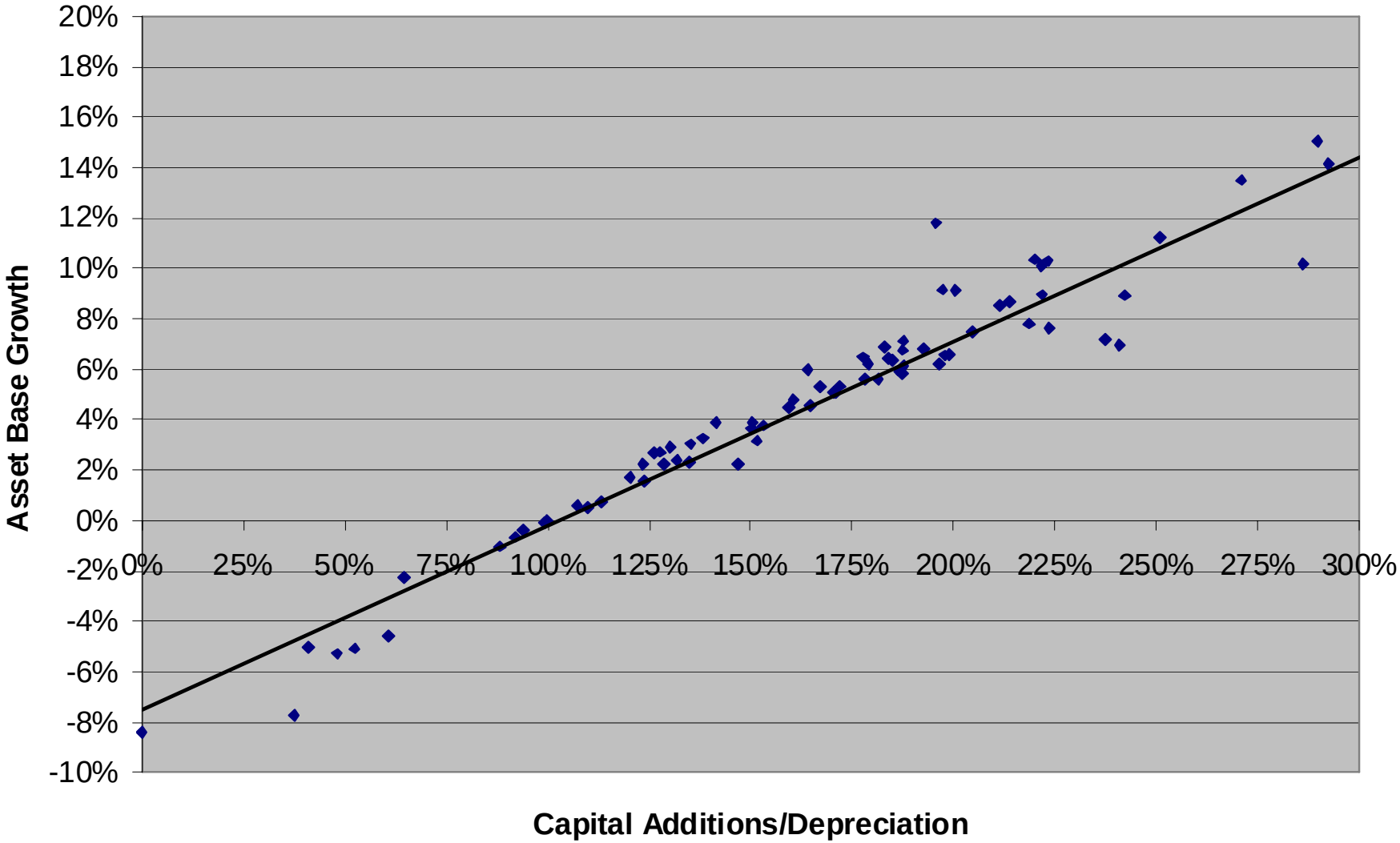
then Change in RB = CAPEX – [NRB * (D_0/ORB)] ***(equation 3)***

If we express CAPEX as a multiple of D_0 (Y = CAPEX/ D_0, the threshold metric)

then Change in RB = (Y * D_0) – [NRB * (D_0/ORB)] ***(equation 4)***

Change in RB = D_0 * (Y – NRB/ORB) ***(equation 5)***

125% capex/depreciation materiality threshold is correlated with 2% or higher growth in asset base



How would materiality threshold trigger work with capital investment module?

- A capex/depreciation trigger is more easily implementable than a ratebase growth measure, although some implementation questions remain
  - depreciation expense should be based on the Board approved base year level
  - capex should be based on forward budget projection
- A utility also needs to justify need for capital investment module and calculate the incremental revenue requirements
  - need for module must consider growth in revenue due to load growth and impact of productivity target on revenue requirement
  - consideration of discretionary versus non-discretionary is problematic over a three year term as it may lead to delayed capital investment;
  - the rate adder should be calculated on the basis of the additional revenue requirement generated by increases in rate base for the test year
  - calculation of revenue requirement must consider a full year of capital spending

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We recommend a 0.58% industry-wide productivity factor

- Use of Ontario data and TFP analysis best meets the spirit of the Board criteria
- TFP models should be crafted to the best approximation of the service that LDCs produce and the inputs that they use, given the quality of Ontario data
- With some conjectures about TFP in the missing gaps, we can calculate a twenty year average (1988-2007)
  - Midpoint estimate of twenty-year average TFP, based on different model assumptions, is 0.58% p.a.
- Board intends that productivity level be such that "all firms" can reasonably be "expected to achieve" --- 0.58% is reasonable and effective productivity target for the longer term
  - Ratepayers benefit from declining rates in real terms
  - Utilities are motivated to produce efficiency gains consistent with long term trend, although unlikely that recent negative TFP trends will quickly reverse themselves
- A higher productivity factor may unreasonably put LDCs under financial pressure, compromising longer term sustainability

The Board should apply up to a maximum of 0.15% in stretch factors

- We agree with Board's philosophical approach to stretch factors
  - stretch factors are meant to "recognize, promote, and reward distributors"
  - assignment of stretch factors will "depend on the efficiency of a given company at the outset of the IR plan"
- Empirical support for proper stretch factors requires analysis of TFP levels and growth rates at the firm level
  - Existing OM&A cost comparison study cannot be employed confidently to determine relative rankings of firms, let alone stretch factor levels
  - Using OM&A results only, mis-classification of firms is very likely
- Until a more robust benchmarking analysis is complete, we recommend a cautious approach, with stretch factor levels set on the basis of our confidence level around the productivity factor estimate
  - We prefer stretch factors centered around the twenty-year average annual TFP estimates, therefore ranging from +0.15% (for less efficient firms) and -0.15% (for superior performers) around the mid-point of 0.58%, or
  - For non-negative stretch factors, we urge Board to observe the upper bound, with 0%, 0.075%, and 0.15% stretch factors on top of 0.58% productivity factor

The materiality threshold should be set as a percentage of growth in rate base in recognition of ratebase growth in excess of price cap

- Funding gap can occur even if capex is same as base year
- Based on reported data, a 125% 'funding gap' is correlated with annual growth in ratebase in excess of 2%
- Analysis of 125% versus 150% suggests that 125% may be more effective at capturing substantial 'funding gap' cases with potentially high ROE deterioration and funding risks
- The Board should allow LDCs to consider their entire capital expenditure program in their applications for the capital investment module
  - consideration of discretionary versus non-discretionary is not relevant for a longer term period of an IRM cycle – the timing of maintenance capex is discretionary only in the short term
  - the rate adder should be calculated on the basis of the additional revenue requirement generated by the documented capital expenditures in excess of what is embedded in the test year revenue requirement and should include full year capital spending

Supplemental Materials

We have Ontario data (or TFP growth measures) for periods spanning 20 years

Cronin and King Studies for 1GIRM (1988-1997)

	Cronin 1GIRM TFP Index	*Implied Annual Growth Rate*
1988	1.000	
1989	0.999	*-0.10%*
1990	0.998	*-0.10%*
1991	0.997	*-0.10%*
1992	0.996	*-0.10%*
1993	0.995	*-0.10%*
1994	1.016	*2.11%*
1995	1.037	*2.07%*
1996	1.059	*2.12%*
1997	1.080	*1.98%*

Source: February 28, 2008 PEG Report, pg. 28-29

"Missing years/No Consistent Data (1998-2002)" - conjectures by PEG based on US trends

	PEG TFP Estimate Model 2	*Implied Annual Growth Rate*	PEG TFP Estimate Model 3	*Implied Annual Growth Rate*
1998	1.092	*1.11%*	1.099	*1.76%*
1999	1.104	*1.10%*	1.117	*1.64%*
2000	1.116	*1.09%*	1.136	*1.70%*
2001	1.129	*1.16%*	1.156	*1.76%*
2002	1.141	*1.06%*	1.175	*1.64%*

Source: February 28, 2008 PEG Report, pg.57

CCM Data (2002-2007) – LEI's Independent Analysis

	LEI TFP Estimate - Two Outputs	*Implied Annual Growth Rate*	LEI TFP Estimate - Three Outputs	*Implied Annual Growth Rate*
2003	1.141	*-0.04%*	1.127	*-1.26%*
2004	1.162	*1.90%*	1.127	*0.06%*
2005	1.160	*-0.20%*	1.128	*0.03%*
2006	1.125	*-2.98%*	1.111	*-1.48%*
2007	1.112	*-1.15%*	1.082	*-2.58%*

Source: London Economics International LLC, based on CCM data revised July 10, 2008

We calculated the ideal Fischer index of TFP using the *latest* CCM data released by Board

Inputs

- Input measures should reflect the quantity and underlying operating profile of the inputs
- OM&A input quantity can be approximated by annual OM&A expenditures normalized by price of labour and materials
- We deliberately chose to measure capital input quantity based on physical length of distribution lines because of physical depreciation profile (carrying capacity does not decline consistent with accounting depreciation standards)
  - distribution lines represent the primary capital asset for electricity
  - voltage information currently unavailable but would be helpful - we can then include data on transformers

Outputs

- Output measure in the TFP calculation should reflect the functional services that the distributors provide, not what they happen to charge for on the grounds of convenience or historical accident
- LDCs provide their customers access to network (proxied by MW of carrying capacity and number of connections) so they can deliver their electricity (proxied by MWh of throughput)
- Standard approach to use multiple output proxies to represent electricity distribution service - weighted output index

Since March 2008, CCM database has been revised slightly and we have further refined data inconsistencies in the output measures

Ontario Electric Distribution Industry - Inputs

Year	OM&A Costs	OM&A Price index
	$ mio	
2002	975.32	1.0000
2003	1,006.75	1.0168
2004	996.34	1.0215
2005	1,041.54	1.0345
2006	1,121.84	1.0568
2007	1,217.16	1.0933

Year	Total line length	Total Billed Distribution Revenues	Capital Costs
	km	*$ mio*	*$ mio*
2002	194,118	2,518.91	1,543.60
2003	198,073	2,110.89	1,104.15
2004	198,870	2,109.63	1,113.29
2005	200,424	2,295.43	1,253.89
2006	201,704	2,423.34	1,301.49
2007	203,019	2,562.69	1,345.53

Ontario Electric Distribution Industry - Outputs

Year	Throughput	Customer numbers	Peak demand
	kWh		*kW*
2002	119,962,267,508	4,303,716	24,328,044
2003	121,681,010,167	4,388,660	23,553,093
2004	122,841,740,686	4,460,842	22,187,674
2005	125,089,269,806	4,533,426	22,776,263
2006	121,690,690,693	4,592,124	23,996,250
2007	124,427,939,517	4,634,862	22,936,473

Throughput based on sum of each LDC's reported retail kWh or billed kWh

Peak demand based on sum of each LDC's non-coincident metered peak load

Comparison of the input and output index trends: LEI versus PEG

- **LEI's updated 2002-2007 analysis**

Year	Throughput (output)		Customer numbers (output)		Peak demand (output)		OM&A (input)		Physical Capital (input)	
2002	1.000		1.000		1.000		1.000		1.000	
2003	1.014	*1.4%*	1.020	*2.0%*	0.968	*-3.2%*	1.015	*1.5%*	1.020	*2.0%*
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2007	1.037	*2.3%*	1.077	*1.0%*	0.943	*-4.4%*	1.141	*5.3%*	1.046	*0.7%*
Trend 2002-2006		**1.4%**		**6.7%**		**-1.4%**		**8.8%**		**3.9%**
Trend 2002-2007		**3.7%**		**7.7%**		**-5.7%**		**14.1%**		**4.6%**

- **PEG's analysis, 2002-2006, from May 2008 workshop slides**

Year	Throughput (output)		Customers (output)		OM&A (input)		Capital (input)	
2002	1.00000		1.00000		1.00000		1.00000	
2003	1.04883	4.77%	1.01996	1.98%	1.01181	1.17%	1.01065	1.06%
2004	1.05035	0.14%	1.03657	1.62%	0.98394	-2.79%	1.02535	1.44%
2005	1.10048	4.66%	1.05081	1.36%	1.03910	5.45%	1.04189	1.60%
2006	1.06795	-3.00%	1.06398	1.25%	1.05646	1.66%	1.07049	2.71%
Trend 2002-2006		**6.8%**		**6.4%**		**5.7%**		**7.1%**

Various weighting schemes for output produced similar overall trends: negative TFP growth

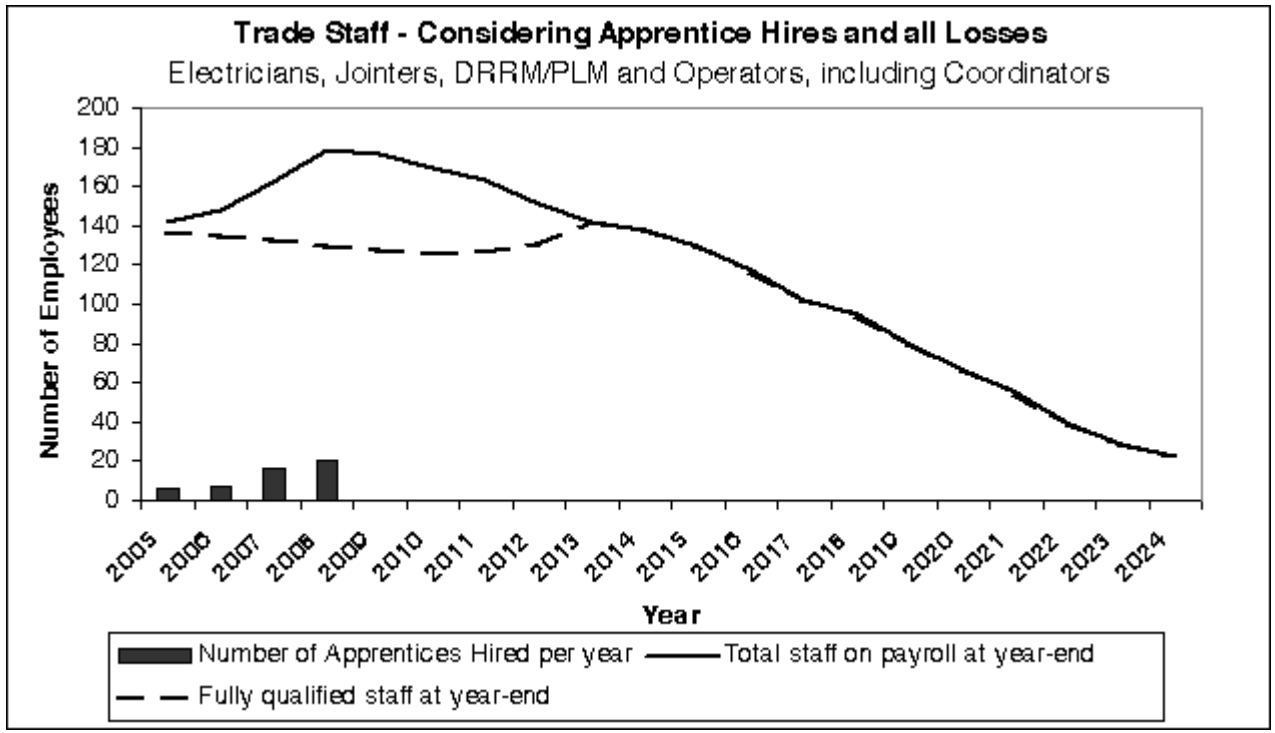
- Drivers of TFP declines likely to persist for some time
- Labour Costs rising without commensurate increase in output – demographics, apprenticeships
- Growing materials costs – such as regulatory costs due to expanding role of intervenors, new requirements and legislation
- Capital investments may not be timed to result in immediate increases in system capacity or throughput

	Scenario 1: 33% (throughput), 33% (customer numbers), 33% (peak demand)				Scenario 2: 25% (throughput), 50% (customer numbers), 25% (peak demand)			
Year	Output index	Input index	TFP index	% Change	Output index	Input index	TFP index	% Change
2002	1.000	1.000	1.000		1.000	1.000	1.000	
2003	1.000	1.018	0.983	**-1.7%**	1.005	1.018	0.987	**-1.3%**
2004	0.989	1.013	0.976	**-0.6%**	1.001	1.013	0.988	**0.1%**
2005	1.009	1.032	0.978	**0.1%**	1.020	1.032	0.988	**0.0%**
2006	1.022	1.061	0.963	**-1.5%**	1.033	1.061	0.973	**-1.5%**
2007	1.017	1.089	0.934	**-2.9%**	1.032	1.089	0.948	**-2.6%**
			average of 6 years	**-1.3%**			average of 6 years	**-1.0%**

	Scenario 3: 25% (throughput), 25% (customer numbers), 50% (peak demand)				Scenario 4: 10% (throughput), 45% (customer numbers), 45% (peak demand)			
Year	Output index	Input index	TFP index	% Change	Output index	Input index	TFP index	% Change
2002	1.000	1.000	1.000		1.000	1.000	1.000	
2003	0.992	1.018	0.975	**-2.5%**	0.996	1.018	0.978	**-2.2%**
2004	0.969	1.013	0.957	**-1.8%**	0.977	1.013	0.965	**-1.3%**
2005	0.991	1.032	0.960	**0.3%**	0.998	1.032	0.967	**0.2%**
2006	1.013	1.061	0.954	**-0.5%**	1.025	1.061	0.966	**-0.1%**
2007	0.998	1.089	0.917	**-3.8%**	1.011	1.089	0.928	**-3.8%**
			average of 6 years	**-1.7%**			average of 6 years	**-1.4%**

OM&A cost increase due to demographical labour changes have already been presented to Board

For example, Hydro Ottawa, in its recent rate case, showed that it will be experiencing a sharp increase in labour costs in order to prepare for upcoming demographic shift – labour costs will stabilize only in 2013-2014 period



We also ran a two-output model specification for Ontario electricity distributors' TFP

- A three-output model is the 'standard' in the industry (PEG in fact used it in Australia), but US data does not accommodate this and so PEG ignored peak demand information for Ontario LDCs
- Relative to the three-output model including the peak demand measure, a two-output model may overstate TFP growth for Ontario

Test (without Peak Demand; PEG weights)				
Year	Output index	Input index	TFP index	% Change
2002	1.000	1.000	1.000	
2003	1.018	1.018	1.000	-0.04%
2004	1.032	1.013	1.019	1.90%
2005	1.049	1.032	1.017	-0.20%
2006	1.047	1.061	0.987	-2.98%
2007	1.062	1.089	0.975	-1.15%
			average of 6 years	-0.50%

PEG weightings: 63% for customer number and 37% for throughput

- Nevertheless, inputs are growing at a faster pace than customers and volume of electric throughput, so TFP has decline on average 0.50% per annum from 2002-2007
- This slowdown in TFP needs to recognized and reflected in the productivity target

Long term productivity growth estimates spanning different periods and model specifications

Number of Years	Time-frame	Average Annual TFP				
		Cronin, PEG 2, LEI Sce. 5	Cronin, PEG 2, LEI Sce. 2	Cronin, PEG 3, LEI Sce. 5	Cronin, PEG 3, LEI Sce. 2	Median
20	1988-2007	0.57%	0.42%	0.73%	0.58%	**0.58%**
19	1989-2007	0.61%	0.45%	0.77%	0.62%	**0.61%**
18	1990-2007	0.65%	0.49%	0.82%	0.66%	**0.66%**
17	1991-2007	0.70%	0.52%	0.88%	0.71%	**0.70%**
16	1992-2007	0.75%	0.56%	0.95%	0.76%	**0.76%**
15	1993-2007	0.81%	0.61%	1.02%	0.82%	**0.82%**
14	1994-2007	0.71%	0.50%	0.94%	0.73%	**0.72%**
13	1995-2007	0.60%	0.37%	0.84%	0.61%	**0.61%**
12	1996-2007	0.46%	0.21%	0.73%	0.48%	**0.47%**
11	1997-2007	0.30%	0.03%	0.60%	0.33%	**0.32%**
10	1998-2007	0.22%	-0.09%	0.47%	0.17%	**0.19%**
9	1999-2007	0.10%	-0.24%	0.33%	-0.02%	**0.04%**
8	2000-2007	-0.04%	-0.43%	0.13%	-0.26%	**-0.15%**
7	2001-2007	-0.24%	-0.70%	-0.14%	-0.60%	**-0.42%**
6	2002-2007	-0.50%	-1.05%	-0.50%	-1.05%	**-0.77%**

A 20-year productivity factor of 0.58% is consistent with Stretch Factors of +/-0.15%

Number of Years	Timeframe	Average Annual TFP Growth			+/- Range in TFP Growth
		Median	Max	Min	Around Median
20	1988-2007	0.58%	0.73%	0.42%	0.15%
19	1989-2007	0.61%	0.77%	0.45%	0.16%
18	1990-2007	0.66%	0.82%	0.49%	0.17%
17	1991-2007	0.70%	0.88%	0.52%	0.18%
16	1992-2007	0.76%	0.95%	0.56%	0.19%
15	1993-2007	0.82%	1.02%	0.61%	0.21%
14	1994-2007	0.72%	0.94%	0.50%	0.22%
13	1995-2007	0.61%	0.84%	0.37%	0.24%
12	1996-2007	0.47%	0.73%	0.21%	0.26%
11	1997-2007	0.32%	0.60%	0.03%	0.29%
10	1998-2007	0.19%	0.47%	-0.09%	0.28%
9	1999-2007	0.04%	0.33%	-0.24%	0.28%
8	2000-2007	-0.15%	0.13%	-0.43%	0.28%
7	2001-2007	-0.42%	-0.14%	-0.70%	0.28%
6	2002-2007	-0.77%	-0.50%	-1.05%	0.28%