**Constructing Individual TFP trends from the PEG Working Papers**

It is possible to construct TFP trends for individual companies based on the information provided in the working papers. The growth in TFP is equal to the growth in output quantity minus the growth of input quantity. Instructions for obtaining each of these is provided below:

**Setup**

1. On a new worksheet, copy over the company names and years for all companies. Rows 2-751 in columns C and D of the BM database worksheet will work for this. Put company names in Column A and years in Column B. Title this new worksheet “Company TFP Calc”

**Growth in Output Quantity**

1. Create columns for the three types of output and create formulas to reference the data
	* Total Customers from Column E of the sheet “Output Indexes.” Put this into Column C of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2002 the formula is: =**'Output Indexes'!E3.** This formula is now the entry in Column C, Row 2 of the new sheet.

* + Total Deliveries from Column L of the sheet “Output Indexes.” Put this into Column D of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2002 the formula is: **='Output Indexes'!L3/1000.** This formula is now the entry in Column D, Row 2 of the new sheet.

* + System Capacity Proxy from Column AB of the sheet “BM Database.” Put this into Column E of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2002 the formula is: **=** **'BM Database'!AB2.** This formula is now the entry in Column E, Row 2 of the new sheet.

1. Create columns for the annual growth rates for each output for each year 2003-2011 as follows:
	* For Total Customers: Natural Log(Total Customers in year T/ Total Customers in year T-1). This will be Column F of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2003 the formula is: =**LN(C3/C2).** This formula is now the entry in Column F, Row 3 of the new sheet.

* + For Total Deliveries: Natural Log(Total Deliveries in year T/ Total Deliveries in year T-1). This will be Column G of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2003 the formula is: =**LN(D3/D2).** This formula is now the entry in Column G, Row 3 of the new sheet.

* + For System Capacity Proxy: Natural Log(Total Deliveries in year T/ Total Deliveries in year T-1). This will be Column H of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2003 the formula is: =**LN(E3/E2).** This formula is now the entry in Column H, Row 3 of the new sheet.

1. Create a column to hold the growth in output quantity. For each company for each year, the growth in output quantity is equal to 0.626 x growth in customers + 0.071 x growth in deliveries + 0.303 x growth in capacity. This will be Column I of the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2003 the formula is =.**626\*(F3)+ .071\*(G3)+ .303\*(H3)**. This formula is now the entry in Column I, Row 3 of the new sheet.

**Growth in Input Quantity**

1. Create column for OM&A cost and Capital cost.
	* OM&A cost is from Column D of the sheet “OM&A Calculation.” Make this Column J on the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2002 the formula is: =**'OM&A Calculation'!D2**. This formula is now the entry in Column J, Row 2 of the new sheet.

* + Capital cost is from Column AE of the sheet “Capital Calculations for TFP.” Make this Column K on the new sheet.

EXAMPLE: For ALGOMA POWER INC. year 2002 the formula is: **=SUMIFS('Capital Calculations for TFP'!$AE$19:$AE$1730,'Capital Calculations for TFP'!$A$19:$A$1730,'Company TFP Calc'!$A2,'Capital Calculations for TFP'!$B$19:$B$1730,'Company TFP Calc'!$B2).** This formula is now the entry in Column K, Row 2 of the new sheet. Please note that the use of the sumif command is complicated but necessary because the capital calculation worksheet has more rows than the current sheet. This command effectively grabs the value for the specified year and company out of the larger worksheet.

1. Create columns for the quantity of OM&A and the quantity of capital.
	* OM&A quantity for each company in each year is quotient of Column J of the new sheet and Column M of the sheet “OM&A Price” for the corresponding company and year. Make this Column L in the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2002 the formula is: =**J2/(SUMIF('OM&A Price'!$C$9:$C$18,'Company TFP Calc'!B2,'OM&A Price'!$M$9:$M$18)).** This formula is now the entry in Column L, Row 2 of the new sheet.

* + Capital quantity is from Column AB of the sheet “Capital Calculations for TFP.” Make this Column M in the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2002 the formula is: **=SUMIFS('Capital Calculations for TFP'!$AB$19:$AB$1730,'Capital Calculations for TFP'!$A$19:$A$1730,'Company TFP Calc'!$A2,'Capital Calculations for TFP'!$B$19:$B$1730,$B2).** This formula is now the entry in Column M, Row 2 of the new sheet.

1. Create columns to hold the annual growth in OM&A and capital quantity for years 2003-2011 using the following formulas:
	* For OM&A quantity growth we have: Growth rate in year T= Natural Log( OM&A quantity in year T/ OM&A quantity in year T-1). Make this Column N in the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2003 the formula is: =**LN(L3/L2).** This formula is now the entry in Column N, Row 3 of the new sheet.

* + For Capital quantity growth we have: Growth rate in year T= Natural Log( Capital quantity in year T/ Capital quantity in year T-1). Make this Column O in the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2003 the formula is: =**LN(M3/M2).** This formula is now the entry in Column O, Row 3 of the new sheet.

1. Create a column (Column P) and add capital to OM&A cost to obtain total cost.

EXAMPLE: For AlGOMA POWER INC. year 2002 the formula is: =**J2+K2.** This formula is now the entry in Column P, Row 2 of the new sheet.

1. Calculate the percentage of total cost that is OM&A for each company and year (OMA share). Make this Column Q in the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2002 the formula is: =**J2/P2.** This formula is now the entry in Column Q, Row 2 of the new sheet.

1. Create the percentage of total cost that is capital as 1 – the percent that is OM&A (capital share). Make this Column R of the new sheet.

EXAMPLE: For AlGOMA POWER INC. year 2002 the formula is: =**1-Q2.** This formula is now the entry in Column R, Row 2 of the new sheet.

1. In a new column (Column S), for each company, for each year 2003-2011, calculate the average the current and previous year OM&A share (average OM&A share). In another column (Column T) create the average capital share as 1 – the average OM&A share

EXAMPLE (average OM&A share): For AlGOMA POWER INC. year 2003 the formula is: =**AVERAGE(Q3,Q2).** This formula is now the entry in Column S, Row 3 of the new sheet.

EXAMPLE (average capital share): For AlGOMA POWER INC. year 2003 the formula is: =**1-S3.** This formula is now the entry in Column T, Row 3 of the new sheet

1. In a new column (Column U), calculate the growth in input quantity as:
	* Average OMA share x growth in OM&A quantity + average capital share x growth in capital quantity.

EXAMPLE: For AlGOMA POWER INC. year 2003 the formula is: =**S3\*N3+T3\*O3.** This formula is now the entry in Column U, Row 3 of the new sheet

* + Do this for each company and each year 2003-2011

**Growth in TFP**

1. Create a column (Column V) to hold the growth in TFP. The growth in TFP is equal to the growth in output quantity minus growth in input quantity as described above.

EXAMPLE: For AlGOMA POWER INC. year 2003 the formula is: =**I3-U3.** This formula is now the entry in Column V, Row 3 of the new sheet.

1. Two companies were not used in the analysis and their results need to be eliminated at this points. They are Five Nations and Hydro One remote communities. Erase all data and results for these companies

**Sample Averages**

1. Create a new row to hold the sample average values
2. Take the average of the TFP growth column and any other items that are of interest