

**APPENDIX 12C. GOVERNMENT REGULATORY IMPACT MODEL (GRIM)
SUPPORTING DOCUMENTATION**

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APPENDIX 12C. GOVERNMENT REGULATORY IMPACT MODEL (GRIM) SUPPORTING DOCUMENTATION

12C.1 INTRODUCTION AND PURPOSE

The purpose of the Government Regulatory Impact Model (GRIM) is to help quantify the impacts of energy conservation standards and other regulations on manufacturers. The basic mode of analysis is to estimate the change in value of the industry or manufacturer(s) following a regulation or a series of regulations. The model structure also allows an analysis of multiple products with regulations taking effect over a period of time, and of multiple regulations on the same product.

Industry net present value is defined, for the purpose of this analysis, as the discounted sum of industry free cash flows plus a discounted terminal value. The model calculates the actual cash flows by year and then determines the present value of those cash flows both without an energy conservation standard (i.e., the base case) and under different trial standard levels (TSLs).

Output from the model consists of summary financial metrics, graphs of major variables, and, when appropriate, the complete cash flow calculation.

12C.2 MODEL DESCRIPTION

The basic structure of the GRIM is a standard annual cash flow analysis that uses manufacturer selling prices, manufacturing costs, a shipments forecast, and financial parameters as inputs and accepts a set of regulatory conditions as changes in costs and investments. The cash flow analysis is separated into two major blocks: income and cash flow. The income calculation determines net operating profit after taxes. The cash flow calculation converts net operating profit after taxes into an annual cash flow by including investment and non-cash items. Below are definitions of listed items on the printout of the output sheet (see Section 12.C.3).

- (1) **Unit Sales:** Total annual shipments for the industry were obtained from the National Impact Analysis Spreadsheet;
- (2) **Revenues:** Annual revenues; computed by multiplying manufacturer selling price at each kilovolt-ampere (kVA) rating by the annual shipments at the same kVA rating, summed over all kVA ratings;
- (3) **Labor:** The portion of cost of goods sold (COGS) that includes direct labor, commissions, dismissal pay, bonuses, vacation, sick leave, social security contributions, fringe, and assembly labor up-time;
- (4) **Material:** The portion of COGS that includes materials;

(5) Overhead: The portion of COGS that includes indirect labor, indirect material, energy use, maintenance, depreciation, property taxes, and insurance related to assets. While included in overhead, the depreciation is shown as a separate line item;

(6) Depreciation: Annual depreciation computed as a percentage of **Revenues (2)**. While included in overhead, the depreciation is shown as a separate line item;

(7) Standard SG&A: Selling, general, and administrative costs are computed as a percentage of **Revenues (2)**;

(8) R&D: GRIM separately accounts for ordinary research and development (R&D) as a percentage of **Revenues (2)**;

(9) Product Conversion Expense: Product conversion expenses are one-time investments in research, development, testing, and marketing focused on making product designs comply with the new efficiency standard. GRIM allocates these costs over the period between the standard's announcement and effective dates;

(10) Stranded Asset Writeoff: In the year the standard becomes effective, a one time write-off of stranded assets is accounted for;

(11) Earnings Before Interest and Taxes (EBIT): Includes profits before deductions for interest paid and taxes;

(12) EBIT as a Percentage of Sales: GRIM calculates EBIT as a percentage of sales to compare with the industry's average reported in financial statements;

(13) Taxes: Taxes on **EBIT (11)** are calculated by multiplying the tax rate contained in Major Assumptions by **EBIT (11)**.

(14) Net Operating Profits After Taxes (NOPAT): Computed by subtracting **Cost of Goods Sold ((3) to (6))**, **SG&A (7)**, **R&D (8)**, **Product Conversion Expense (9)**, **Stranded Asset Writeoff (10)**, and **Taxes (13)** from **Revenues (2)**.

(15) NOPAT repeated: NOPAT is repeated in the Statement of Cash Flows;

(16) Depreciation repeated: Depreciation is added back in the Statement of Cash Flows because it is a non-cash expense;

(17) Change in Working Capital: Change in cash tied up in accounts receivable, inventory, and other cash investments necessary to support operations is calculated by multiplying working capital (as a percentage of revenues) by the change in annual revenues.

(18) Cash Flow From Operations: Calculated by taking **NOPAT (15)**, adding back non-cash

items such as a ***Depreciation (16)***, and subtracting out ***Change in Working Capital (17)***;

(19) Ordinary Capital Expenditures: Ordinary investments in property, plant, and equipment to maintain and replace existing production assets, computed as a percentage of ***Revenues (2)***;

(20) Conversion Capital Expenditures: Conversion capital expenditures are one-time investments in property, plant, and equipment to adapt or change existing production facilities so that new product designs can be fabricated and assembled under the new regulation;

(21) Cash Used in Investment: Total investments in property, plant, and equipment are computed by adding ***Ordinary Capital Expenditures (19)*** and ***Conversion Capital Expenditures (20)***;

(22) Free Cash Flow: Annual cash flow from operations and investments; computed by subtracting ***Cash Used in Investment (21)*** from ***Cash Flow from Operations (18)***;

(23) Terminal Value: Estimate of the continuing value of the industry after 2038. Computed by growing the Free Cash Flow in year 2038 at a constant rate in perpetuity;

(24) Present Value Factor: Factor used to calculate an estimate of the present value of an amount to be received in the future;

(25) Discounted Cash Flow: ***Free Cash Flows (22)*** multiplied by the ***Present Value Factor (24)***. For 2038 the discounted cash flow includes the discounted ***Terminal Value (23)***; and

(26) Industry Net Present Value: The sum of ***Discounted Cash Flows (25)***.

12C.3 DETAILED CASH FLOW EXAMPLE

Std	TSL1	Base Year		Announcement Year		Standard Year				
		2004	2005	2006	2007	2008	2009	2010	2011	2012
Superclass	Liquid									
Income Statement (Million U.S.\$)										
Unit Sales		1.096	1.128	1.150	1.178	1.209	1.234	1.256	1.278	1.302
Revenues		1,269.59	1,307.38	1,332.92	1,365.19	1,400.50	1,429.72	1,502.51	1,529.65	1,557.34
<i>Cost of Goods Sold</i>										
Labor		116.59	120.06	122.41	125.37	128.61	131.30	137.86	140.35	142.89
Material		747.54	769.79	784.83	803.83	824.62	841.83	884.82	900.81	917.11
Overhead		130.72	134.61	137.24	140.56	144.20	147.21	154.68	157.48	160.33
Depreciation		20.82	21.44	21.86	22.39	22.97	23.45	24.64	25.09	25.54
	[Rev / COGS]	1.2500	1.2500	1.2500	1.2500	1.2500	1.2500	1.2500	1.2500	1.2500
<i>Selling, General and Administrative</i>										
Standard SG&A		171.39	176.50	179.94	184.30	189.07	193.01	202.84	206.50	210.24
R&D		19.72	20.31	20.71	21.21	21.76	22.21	23.34	23.76	24.19
Product Conversion Expense		-	-	-	-	-	-	-	-	-
Compliance Costs		-	-	-	-	-	-	-	-	-
<i>Stranded Asset Writeoff</i>										
Earnings Before Interest and Taxes		62.80	64.67	65.93	67.53	69.28	70.72	74.33	75.67	77.04
	[EBIT / Rev]	4.9%	4.9%	4.9%	4.947%	4.9%	4.9%	4.9%	4.9%	4.9%
Taxes		18.82	19.38	19.76	20.23	20.76	21.19	22.27	22.67	23.08
Net Operating Profit After Taxes (NOPAT)		43.98	45.29	46.18	47.30	48.52	49.53	52.06	53.00	53.96
	[non-prod costs / COGS]	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Cash Flow Statement										
NOPAT		43.98	45.29	46.18	47.30	48.52	49.53	52.06	53.00	53.96
Depreciation		20.82	21.44	21.86	22.39	22.97	23.45	24.64	25.09	25.54
Change in Working Capital		-	(5.82)	(3.93)	(4.97)	(5.44)	(4.50)	(11.21)	(4.18)	(4.26)
Cash Flows from Operations		64.81	60.91	64.10	64.71	66.05	68.48	65.49	73.90	75.23
Ordinary Capital Expenditures		(24.40)	(25.13)	(25.62)	(26.24)	(26.92)	(27.48)	(28.88)	(29.40)	(29.93)
Conversion Capital Expenditures		-	-	-	(0.63)	(0.88)	(1.01)	-	-	-
Cash Used In Investment		(24.40)	(25.13)	(25.62)	(26.87)	(27.80)	(28.49)	(28.88)	(29.40)	(29.93)
Free Cash Flow		40.40	35.78	38.48	37.84	38.25	39.99	36.61	44.50	45.30
Terminal Value		-	-	-	-	-	-	-	-	-
Present Value Factor		0.92	0.84	0.78	0.71	0.65	0.60	0.55	0.51	0.47
Discounted Cash Flow		37.12	30.20	29.84	26.96	25.03	24.04	20.22	22.58	21.11
Industry Value (Net Present Value)										
	Millions \$	<u>532</u>								
	NPV base year:	2004								
<i>Real dollars are in year for Eng Analysis (2004\$)</i>										
Terminal Values (depends on TV calc option)		520	460	495	487	492	514	471	572	583
	perpetual growth TV									

12C.4 GOVERNMENT REGULATORY IMPACT MODEL INSTRUCTIONS

The following user-instructions are contained on the “Welcome” sheet of the distribution transformer GRIM:

1. The red-tabbed sheets pertain to overview information. The pink-tabbed sheets refer to input information. The green-tabbed sheets represent calculations. The blue-tabbed sheets contain numerical and graphical output.
2. Pink cells designate input information. Green cells designate intermediate calculations.
3. By clicking on sheet names in column B of the "Index" sheet, the workbook can be quickly navigated.
4. Use the "Major Assumptions" sheet to choose the desired scenario. Cell B3 is used to choose the superclass. Cell B6 is used to choose the trial standard level (TSL). Cell B7 allows toggling between TSL5 and TSL6. Row 33 is used to select the markup scenarios. Within each superclass (LV dry-type, MV dry-type, and Liquid-Immersed), the markup scenario should be chosen consistently. Markup Scenario 1 is the "Preservation of Gross Margin Percentage Scenario." Markup Scenario 2 is the "Preservation of Operating Profit Scenario." See Chapter 12 of the Technical Support Document for more information.
5. After selecting the desired scenario, go to the blue-tabbed sheet entitled "Summary Report." Rows 16-18 summarize the impact on Industry Net Present Value (INPV).
6. Other blue-tabbed sheets provide graphical information summarizing the scenario.
Note, on some computers, the workbook may need to be closed and re-opened before the graphical information will completely update.