

APPENDIX H-2. GRIM OPERATING PRINCIPLES

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APPENDIX H-2. GRIM OPERATING PRINCIPLES **(Tailored to conduct Water Heater Manufacturers' Cash-Flow Analysis)**

H-2.1 INTRODUCTION AND PURPOSE

The purpose of the Government Regulatory Impact Model (GRIM) is to help identify the effects of various efficiency regulations and other regulations on manufacturers. The basic mode of analysis is to determine the change in value of the 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 value is defined, for the purposes of this analysis as the present value of cash flows for the manufacturer(s) in question. Cash flow is calculated by the user entering shipment volumes and manufacturer prices (i.e., prices from manufacturers to the first customer, such as a wholesaler) and then selecting user-defined regulatory levels. The model calculates the actual cash flows by year and then determines the present value of those cash flows both without regulations (the pre-regulation base case) and with regulations (the post-regulation standards case).

Output comes from the model in terms of summary statistics, graphs of major variables, and, when appropriate, access to the complete cash flow calculation.

H-2.2 MODEL DESCRIPTION

The basic structure of the GRIM is a standard annual cash flow analysis which uses price and volume information as an input, builds on fundamental base cost information, 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 the profit after taxes but before financial charges. The cash flow calculation converts 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 3.0)

- (1) **Income Statement:** Overall calculation of **Net Income Before Financing** (17) using revenue and cost items subject to income tax effects as described in (2) through (17).
- (2) **Unit Sales:** Annual shipments; entered as an input variable by user.
- (3) **Revenues:** Annual revenues; computed by multiplying **Price/Unit** (2) by **Unit Sales** (3).
- (4) **Base Costs:** Costs per unit prior to regulations entered as input
(Labor, Material, Overhead) variables by the user.

- (5) **New Costs:** Costs per unit following regulations; entered as **(Labor, Material, Overhead)** input variables by the user.
- (6) **Labor:** Factory direct labor and fringe benefit costs; entered as an input variable by the user.
- (7) **Material:** Purchased materials and components; entered as an input variable by the user.
- (8) **Overhead:** Factory overhead excluding depreciation; entered as an input variable by the user.
- (9) **Depreciation:** Annual depreciation on pre-regulation assets; computed as a percentage of **Revenues** (4). Annual depreciation on post-regulation assets is computed by dividing **Capital Expenditures** (24) by a useful life from Major Assumptions. For post-regulation years, **Depreciation** is the sum of depreciation on pre- and post-regulation assets.
- (10) **Cost of Sales:** Total cost of sales, computed by adding **Labor** (7), **Material** (8), **Overhead** (9) and **Depreciation** (10).
- (11) **R&D:** Research and development costs unrelated to regulations; computed as a percentage of **Revenues** (4). From Major Assumptions.
- (12) **Product Conversion:** Expensable costs related to meeting a regulation, often including product redesign costs and expensable factory conversion expenses. Also includes costs incurred for new product literature and catalogs, product obsolescence, and various related marketing expenses. GRIM computation based on regulatory level selected by user.
- (13) **SG&A:** Selling, general and administrative costs are computed as a percentage of **Revenues** (4).
- (14) **Profit Before Tax:** Profit before taxes and any financing costs; computed by subtracting the **Cost of Sales** (11) and **SG&A** (14) from **Revenues** (4).
- (15) **Taxes:** Taxes on **Profits Before Tax**; computed by multiplying the tax rate contained in Major Assumptions by **Profit Before Tax** (15).
- (16) **Net Income:** Profits after taxes; computed by subtracting **Taxes** (16) from **Profit before Tax** (15).
- (17) **Cash Flow Statement:** Overall assessment including net income, other cash related items and adjustments and investments.
- (18) **Cash Flow:** Determination of cash flow generated from operations.
- (19) **Net Income:** Net income; identical to **Net Income** (17).

(20) Depreciation: Depreciation is a non-cash cost and is added back into *Net Income* (20) as part of the cash flow calculation; identical to *Depreciation* (10).

(21) Change in Working Capital: Additional accounts receivable, inventory, and other cash investments necessary to support increased revenues; computed by multiplying a percentage from Major Assumptions by the change in *Revenues* (4).

(22) Cash Flow from Operations: The cash flow from operating activities; computed by adding *Net Income* (20), *Depreciation* (21) and subtracting *Change in Working Capital* (22).

(23) Capital Expenditures: Investment to maintain and replace existing production assets; computed as a percentage of base year *Revenues* (4) using a percentage contained in Major Assumptions. Post-regulation capital expenditures equal pre-regulation expenditures plus depreciation on *Conversion Expenditures* (25).

(24) Conversion Expenditures: Depreciation costs for meeting regulations, typically including plant, equipment, tooling and the like; GRIM computation based on regulatory level selected by user.

(25) Cash Used in Investments: Cash required for assets; computed by adding *Capital Expenditures* (24) and *Conversion Expenditures* (25).

(26) Net Cash Flow: Annual cash flow from operations and investments; computed by subtracting *Cash Used in Investments* (26) from *Cash Flow from Operations* (23).

H-2.3 INCOME STATEMENT (1)

Table H-2.1 Calculation of Net Income Before Financing

	1998	1999	2000	2001	2002	2003	2004	2005	2006
Unit Sales (2)	9.56	9.71	9.90	10.08	10.29	10.51	10.75	11.00	11.28
Revenues (3)	1494	1517	1547	1577	1609	1950	1994	2041	2093
(10) Cost of Sales									
(6) Labor	102.56	104.12	106.10	108.08	110.28	125.01	127.85	130.85	134.22
(7) Material	660.12	670.37	683.55	696.62	711.14	922.51	943.90	966.05	990.74
(8) Overhead	462.27	469.60	478.84	487.99	498.09	550.95	563.30	576.41	591.16
(9) Depreciation	46.3	47.1	48.0	48.9	49.9	76.8	78.5	80.3	82.3
(13) SG&A	134.5	136.6	139.3	141.9	144.9	175.5	179.5	183.7	188.4
(11) R&D	14.9	15.2	15.5	15.8	16.1	19.5	19.9	20.4	20.9
(12) Product Conversion	-	-	6.6	9.3	10.6	0.5	-	-	-
(14) Profit Before Tax	73.7	74.9	69.7	68.5	68.8	79.3	81.8	83.7	85.8
(15) Taxes	28.0	28.4	26.5	26.0	26.2	30.2	31.1	31.8	32.6
(16) Net Income	45.7	46.4	43.2	42.5	42.7	49.2	50.7	51.9	53.2
(17) (18) Cash Flow									
(19) Net Income	45.7	46.4	43.2	42.5	42.7	49.2	50.7	51.9	53.2
(20) Depreciation	46.3	47.1	48.0	48.9	49.9	76.8	78.5	80.3	82.3

Table H-2.1 Calculation of Net Income Before Financing (continued)

	1998	1999	2000	2001	2002	2003	2004	2005	2006
(21) Change in Work Capital	-	(3.7)	(4.7)	(4.6)	(5.1)	(53.3)	(7.0)	(7.3)	(8.2)
(22) Cash Flow from Operations	92.0	89.8	86.5	86.8	87.5	72.7	122.2	124.9	127.4
(23) Capital Expenditures	(67.2)	(68.3)	(69.6)	(71.0)	(72.4)	(99.9)	(102.2)	(104.6)	(107.2)
(24) Conversion Expenditure	-	-	(28.9)	(40.4)	(46.2)	-	-	-	-
(25) Cash Used in Investments	(67.2)	(68.3)	(98.5)	(111.4)	(118.6)	(99.9)	(102.2)	(104.6)	(107.2)
(26) Net Cash Flow	24.8	21.5	(12.0)	(24.6)	(31.2)	(27.3)	20.0	20.3	20.1