APPENDIX 12-B: RESIDENTIAL DISHWASHER RULEMAKING DIRECT FINAL RULE TECHNICAL SUPPORT DOCUMENT

Government Regulatory Impact Model

12-B.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 manufacturers(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 products.

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, access to the complete cash flow calculation.

12-B.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-B.3).

Revenues: Annual revenues - computed by multiplying equipment unit price at each efficiency level by the appropriate manufacturer markup;

Materials: The portion of COGS that includes materials;

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;

Depreciation: Annual depreciation computed as a percentage of COGS. While included in overhead, the depreciation is shown as a separate line item;

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;

Standard SG&A: Selling, general, and administrative costs are computed as a percentage of Revenues;

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

Product Conversion Costs: Product conversion costs are one-time investments in research, development, testing, and marketing focused on making product designs comply with the amended energy conservation standard. GRIM allocates these costs over the period between the standard's announcement and effective dates;

Stranded Assets: In the year the standard becomes effective, a onetime write-off of stranded assets is accounted for;

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

EBIT as a Percentage of Revenues: GRIM calculates EBIT as a percentage of revenues to compare with the industry's average reported in financial statements;

Taxes: Taxes on EBIT are calculated by multiplying the tax rate contained in Major Assumptions by EBIT.

Net Operating Profits After Taxes (NOPAT): Computed by subtracting Cost of Goods Sold, SG&A, R&D, Product Conversion Cost, and Taxes from Revenues.

NOPAT repeated: NOPAT is repeated in the Statement of Cash Flows;

Depreciation repeated: Depreciation is added back in the Statement of Cash Flows including stranded assets because both are non-cash expenses;

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.

Cash Flow From Operations: Calculated by taking NOPAT, adding back non-cash items such as a Depreciation, and subtracting out Change in Working Capital;

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

Capital Conversion Costs: Capital conversion costs 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;

Free Cash Flow: Annual cash flow from operations and investments; computed by subtracting Capital Investment from Cash Flow from Operations;

Terminal Value: Estimate of the continuing value of the industry after 2047. Computed by growing the Free Cash Flow in year 2047 at a constant rate in perpetuity;

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

Discounted Cash Flow: Free Cash Flows multiplied by the Present Value Factor. For 2047 the discounted cash flow includes the discounted Terminal Value; and

Industry Value thru 2047: The sum of Discounted Cash Flows.

12-B.3 Model Industry Income Statement and Cash Flow Statement

Industry Income Statement	2011 (Ancmt Yr)	2012	2013	2014	2015	2016	2017	2018 (Std Yr)	2019	2020	2021	2022
Revenues	$ 1,975.4	$ 2,119.0	$ 2,024.0	$ 1,974.9	$ 2,021.2	$ 2,030.0	$ 2,026.3	$ 2,023.6	$ 2,017.2	$ 2,006.6	$ 2,000.6	$ 2,014.2
- Materials	$ 1,058.3	$ 1,135.2	$ 1,084.3	$ 1,058.3	$ 1,083.4	$ 1,088.4	$ 1,086.7	$ 1,085.6	$ 1,082.1	$ 1,076.5	$ 1,073.2	$ 1,080.5
- Labor	$ 256.7	$ 275.3	$ 263.0	$ 256.4	$ 262.1	$ 263.0	$ 262.3	$ 261.8	$ 261.0	$ 259.6	$ 258.8	$ 260.6
- Depreciation	$ 98.8	$ 105.9	$ 101.2	$ 98.7	$ 101.1	$ 101.5	$ 101.3	$ 101.2	$ 100.9	$ 100.3	$ 100.0	$ 100.7
- Overhead	$ 179.3	$ 192.4	$ 183.7	$ 179.3	$ 183.4	$ 184.2	$ 183.7	$ 183.4	$ 182.8	$ 181.9	$ 181.3	$ 182.5
- Standard SG&A	$ 262.7	$ 281.8	$ 269.2	$ 262.7	$ 268.8	$ 270.0	$ 269.5	$ 269.1	$ 268.3	$ 266.9	$ 266.1	$ 267.9
- R&D	$ 45.4	$ 48.7	$ 46.6	$ 45.4	$ 46.5	$ 46.7	$ 46.6	$ 46.5	$ 46.4	$ 46.2	$ 46.0	$ 46.3
- Product Conversion Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
- Stranded Assets	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Earnings Before Interest and Taxes (EBIT)	$ 74.2	$ 79.6	$ 76.0	$ 74.2	$ 75.9	$ 76.2	$ 76.1	$ 76.0	$ 75.7	$ 75.3	$ 75.1	$ 75.6
EBIT/Revenues	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*	*3.8%*
- Taxes	$ 25.2	$ 27.1	$ 25.8	$ 25.2	$ 25.8	$ 25.9	$ 25.9	$ 25.8	$ 25.8	$ 25.6	$ 25.5	$ 25.7
Net Operating Profit after Taxes (NOPAT)	**$ 49.0**	**$ 52.5**	**$ 50.2**	**$ 48.9**	**$ 50.1**	**$ 50.3**	**$ 50.2**	**$ 50.1**	**$ 50.0**	**$ 49.7**	**$ 49.6**	**$ 49.9**
Cash Flow Statement												
NOPAT	$ 49.0	$ 52.5	$ 50.2	$ 48.9	$ 50.1	$ 50.3	$ 50.2	$ 50.1	$ 50.0	$ 49.7	$ 49.6	$ 49.9
+ Depreciation	$ 98.8	$ 105.9	$ 101.2	$ 98.7	$ 101.1	$ 101.5	$ 101.3	$ 101.2	$ 100.9	$ 100.3	$ 100.0	$ 100.7
+ Change in Working Capital	$ (138.3)	$ (10.1)	$ 6.6	$ 3.4	$ (3.2)	$ (0.6)	$ 0.3	$ 0.2	$ 0.4	$ 0.7	$ 0.4	$ (1.0)
Cash Flows from Operations	$ 9.4	$ 148.4	$ 158.0	$ 151.1	$ 147.9	$ 151.2	$ 151.8	$ 151.5	$ 151.3	$ 150.8	$ 150.0	$ 149.7
- Ordinary Capital Expenditures	$ 98.8	$ 105.9	$ 101.2	$ 98.7	$ 101.1	$ 101.5	$ 101.3	$ 101.2	$ 100.9	$ 100.3	$ 100.0	$ 100.7
- Capital Conversion Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Free Cash Flow	**$ (89.3)**	**$ 42.5**	**$ 56.8**	**$ 52.4**	**$ 46.9**	**$ 49.7**	**$ 50.5**	**$ 50.3**	**$ 50.4**	**$ 50.5**	**$ 50.0**	**$ 49.0**
Discounted Cash Flow												
Free Cash Flow	$ (89.3)	$ 42.5	$ 56.8	$ 52.4	$ 46.9	$ 49.7	$ 50.5	$ 50.3	$ 50.4	$ 50.5	$ 50.0	$ 49.0
Terminal Value	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Present Value Factor	*0.000*	*1.000*	*0.922*	*0.849*	*0.783*	*0.722*	*0.665*	*0.613*	*0.565*	*0.521*	*0.480*	*0.442*
Discounted Cash Flow	**$ -**	**$ 42.46**	**$ 52.4**	**$ 44.5**	**$ 36.7**	**$ 35.9**	**$ 33.6**	**$ 30.9**	**$ 28.5**	**$ 26.3**	**$ 24.0**	**$ 21.7**
INPV at Baseline $ 637.5												
Net PPE	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9	$ 329.9
Net PPE as % of Sales	16.7%	15.6%	16.3%	16.7%	16.3%	16.3%	16.3%	16.3%	16.4%	16.4%	16.5%	16.4%
Net Working Capital	$ 138.3	$ 148.3	$ 141.7	$ 138.2	$ 141.5	$ 142.1	$ 141.8	$ 141.6	$ 141.2	$ 140.5	$ 140.0	$ 141.0
Return on Invested Capital (ROIC)	10.46%	10.98%	10.64%	10.45%	10.63%	10.66%	10.64%	10.63%	10.61%	10.57%	10.55%	10.60%
Weighted Average Cost of Capital (WACC)	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%	8.50%
Return on Sales (EBIT/Sales)	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%	3.75%

This tab computes key parameters from an income statement based on unit sales, revenues and COGS, and initial financial inputs (parameters as a % of revenue). It also computes an INPV based on a discou