CHAPTER 14. EMPLOYMENT IMPACT ANALYSIS

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CHAPTER 14. EMPLOYMENT IMPACT ANALYSIS

14.1 INTRODUCTION

DOE's employment impact analysis is designed to estimate indirect national job creation or elimination resulting from possible standards, due to reallocation of the associated expenditures for purchasing and operating small electric motors.

DOE expects small electric motor standards to decrease energy consumption, and therefore to reduce energy expenditures. The savings in energy expenditures may be spent on new investment or not at all (i.e., they may remain "saved"). The standards may increase the purchase price of general purpose small electric motors, including the retail price plus sales tax. Using an input/output econometric model of the U.S. economy, this analysis estimated the year-to-year effect of these expenditure impacts on net economic output and employment.

DOE intends this analysis to quantify the indirect employment impacts of these expenditure changes. It evaluated direct employment impacts at manufacturers of small electric motors in the manufacturer impact analysis (see chapter 12).

14.2 METHODOLOGY

The Department based its analysis on an input/output model of the U.S. economy that estimates the effects of standards on major sectors of the economy related to buildings and the net impact of standards on jobs. The Pacific Northwest National Laboratory developed the model, ImSET[1] (Impact of Sector Energy Technologies) as a successor to ImBuild[2], a special-purpose version of the IMPLAN[3] national input/output model. ImSET estimates the employment and income effects of building energy technologies. In comparison with simple economic multiplier approaches, ImSET allows for more complete and automated analysis of the economic impacts of energy-efficiency investments in buildings.

In an input/output model, the level of employment in an economy is determined by the relationship of different sectors of the economy and the spending flows among them. Different sectors have different levels of labor intensity and so changes in the level of spending (e.g., due to the effects of an efficiency standard) in one sector of the economy will affect flows in other sectors, which affects the overall level of employment.

ImSET uses a 188-sector model of the national economy to predict the economic effects of residential and commercial buildings technologies. ImSET collects estimates of initial investments, energy savings, and economic activity associated with spending the savings resulting from standards (e.g., changes in final demand in personal consumption, business investment and spending, and government spending). It provides overall estimates of the change in national output for each input-output sector. The model applies estimates of employment and wage income per dollar of economic output for each sector and calculates impacts on national employment and wage income.

Energy-efficiency technology primarily affects the U.S. economy along three spending pathways. First, general investment funds are diverted to sectors that manufacture, install, and maintain energy-efficient appliances. The increased cost of appliances leads to higher employment in the appliance manufacturing sectors and lower employment in other economic sectors. Second, commercial firm and residential spending are redirected from utilities toward firms that supply production inputs. Third, electric utility sector investment funds are released for use in other sectors of the economy. When consumers use less energy, electric utilities experience relative reductions in demand which leads to reductions in utility sector investment and employment.

14.3 RESULTS

The results in this section refer to impacts of small electric motor standards relative to the base case for each appliance. DOE disaggregated the impact of small electric motor standards on employment into two component effects: increased capital investment costs and decreased energy costs. DOE does not project that repair or maintenance costs will vary with motor efficiency. Therefore, these costs are unchanged by the proposed standard, and have no employment impacts. These component effects and a summary impact are presented for polyphase and capacitor-start motors at each trial standard level.

In calculating employment impacts of capacitor-start TSLs, DOE used its CSCR/CSIR market share model with a ten-year market share shift time which models a market transition from current CSIR market share in 2015 to the final modeled market share in 2025, and with a zero-year market share shift time (market share shift complete by 2015). The figures presented in this section correspond only to the ten-year market share shift time, but Table 14.3.2 shows the ranges of these employment impact estimates derived from the two market share models. The employment impacts predicted by the two models differ most during the 2015 to 2025 time period and for TSLs with large market share changes, as expected.

Figures 14.4.1 and 14.4.2 summarize the employment impacts of the increased investment and spending on higher-efficiency equipment. Equipment manufacturing is relatively capital-intensive compared to other sectors of the economy, but the increased costs of efficiency add to the income of distributors and retail businesses, which are (on average) more labor-intensive than other sectors. Therefore, the department projects that the capital expenditures on more expensive motors will result in a net increase of jobs.

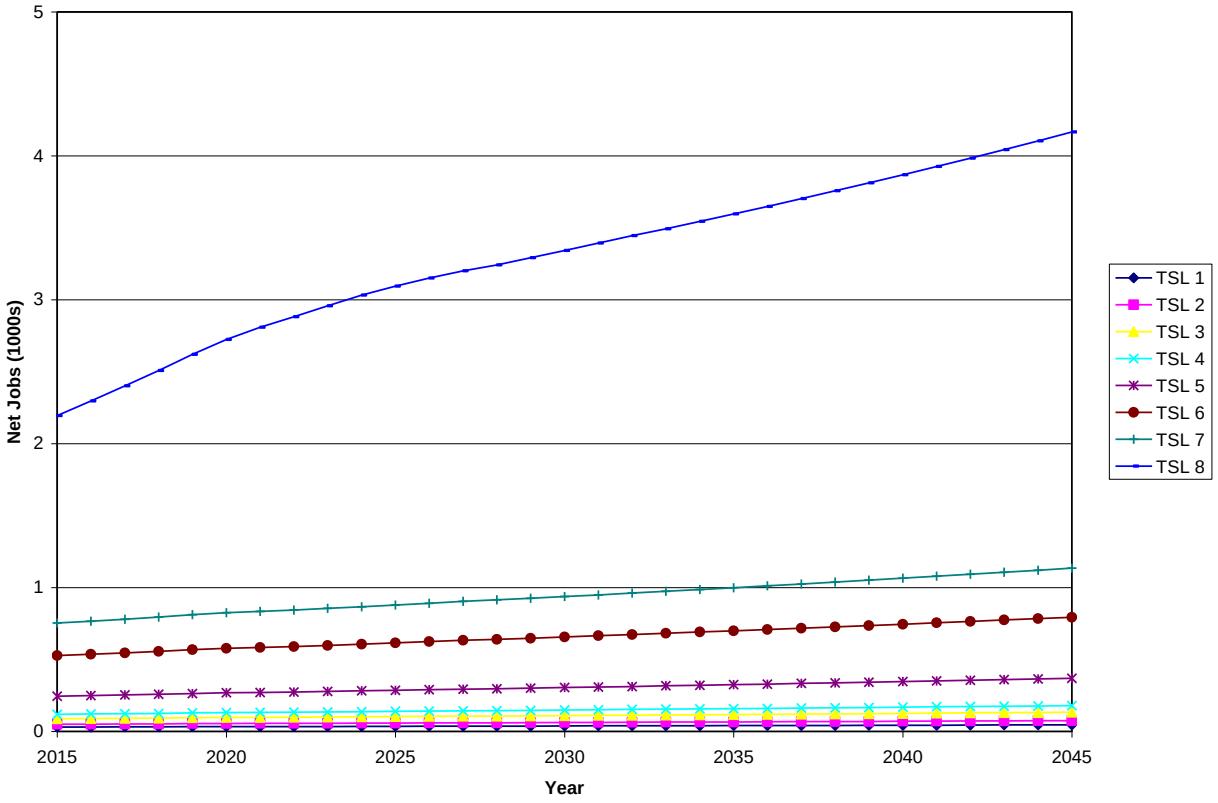

Figure 14.3.1 Polyphase Small Electric Motors: Employment Impact of Increased Equipment Costs

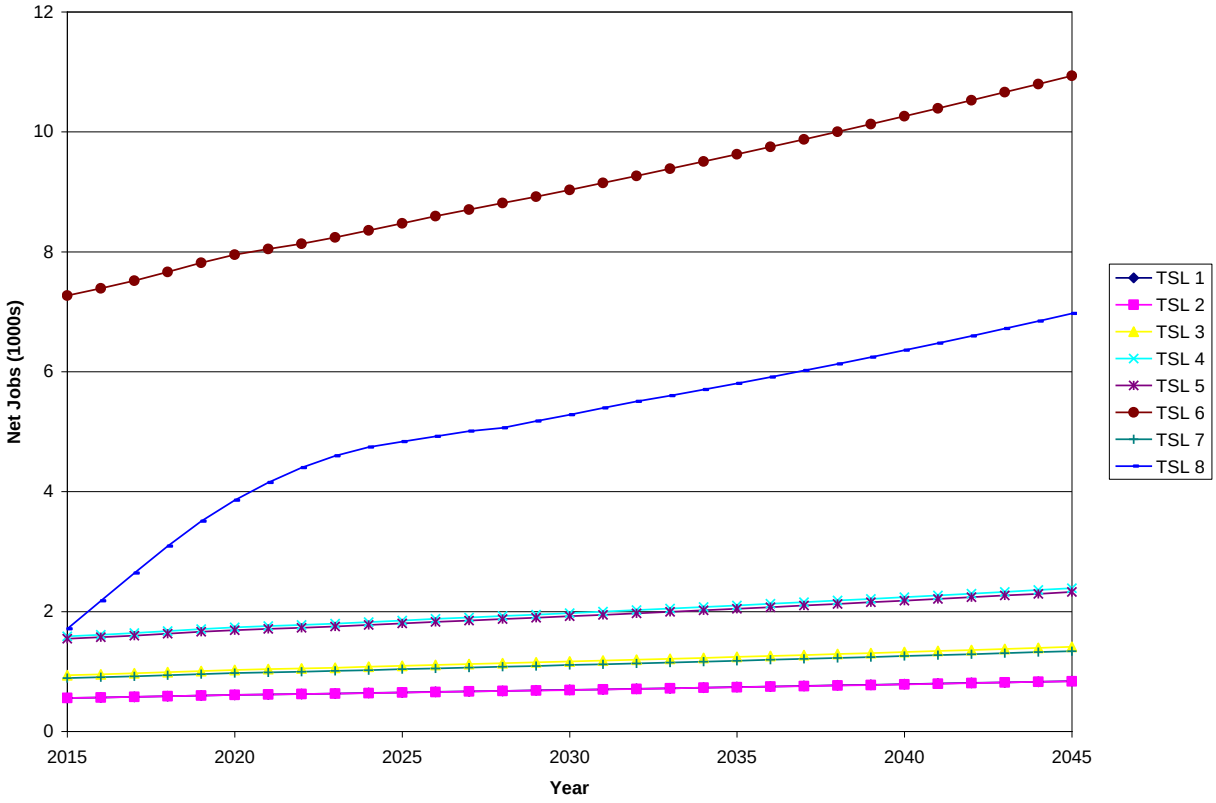

Figure 14.3.2 Capacitor-Start Small Electric Motors: Employment Impact of Increased Equipment Costs

Figures 14.4.3 and 14.4.4 show the employment impact of redirected spending made possible by equipment energy savings. For all products, the employment impact is strongly positive.

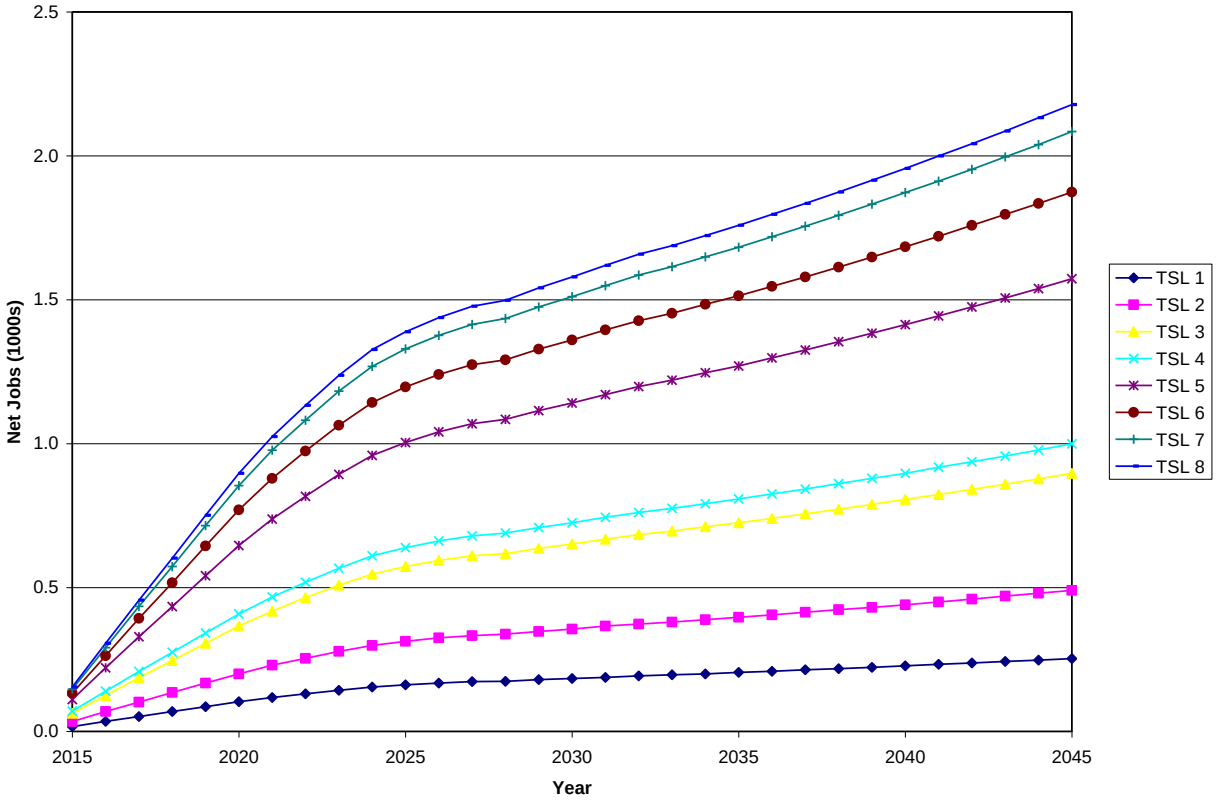

Figure 14.3.3 Polyphase Small Electric Motors: Employment Impact of Energy Savings

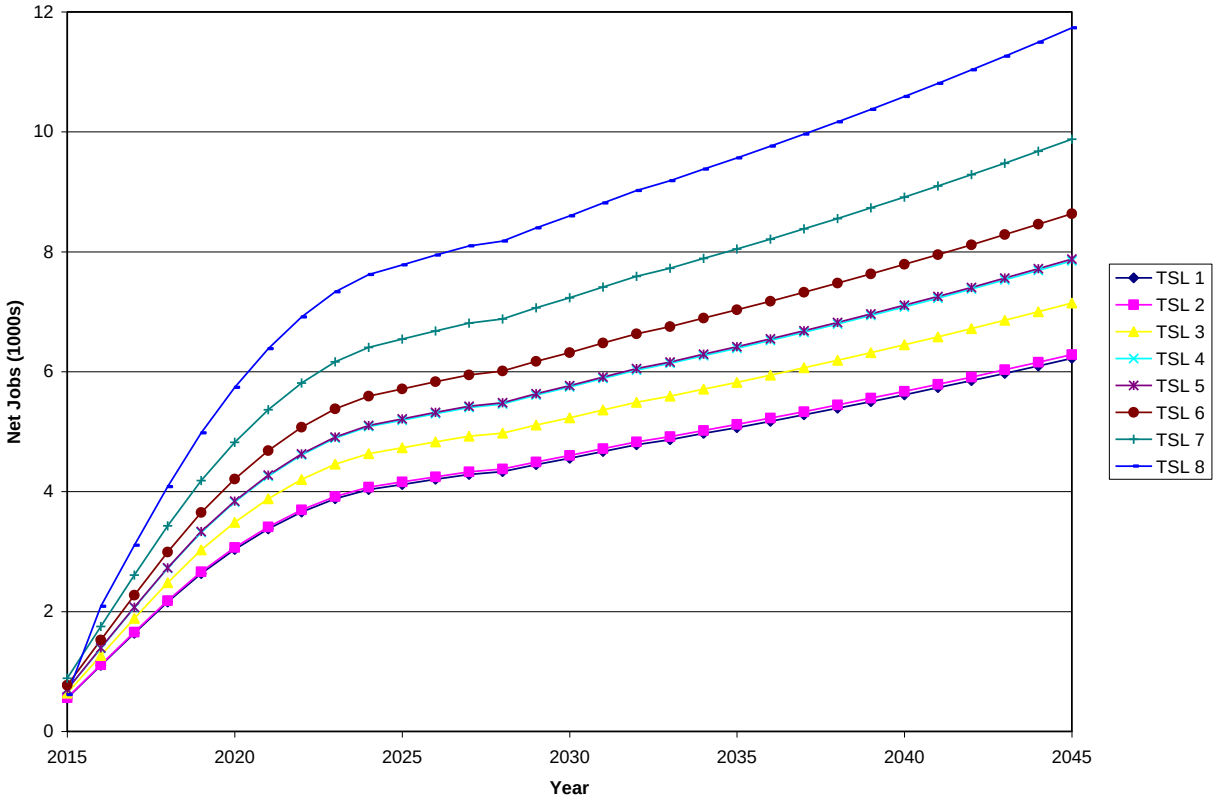

Figure 14.3.4 Capacitor-Start Small Electric Motors: Employment Impact of Energy Savings

14.3.2 Net National Employment Impact Summary

Figures 14.3.5 and 14.3.6 show the estimated net national employment impacts of the polyphase and capacitor-start small electric motor trial standard levels. Figure 14.3.6 corresponds to the case in which the CSIR/CSCR market shares adjust over the period from 2015 to 2025. For any given year, these figures show the net change in the number of jobs in the economy relative to if there were no change in standards (and thus no resulting change in spending and cash flow patterns throughout the economy). Tables 14.3.1 and 14.3.2 show the net national employment impact in specific years.

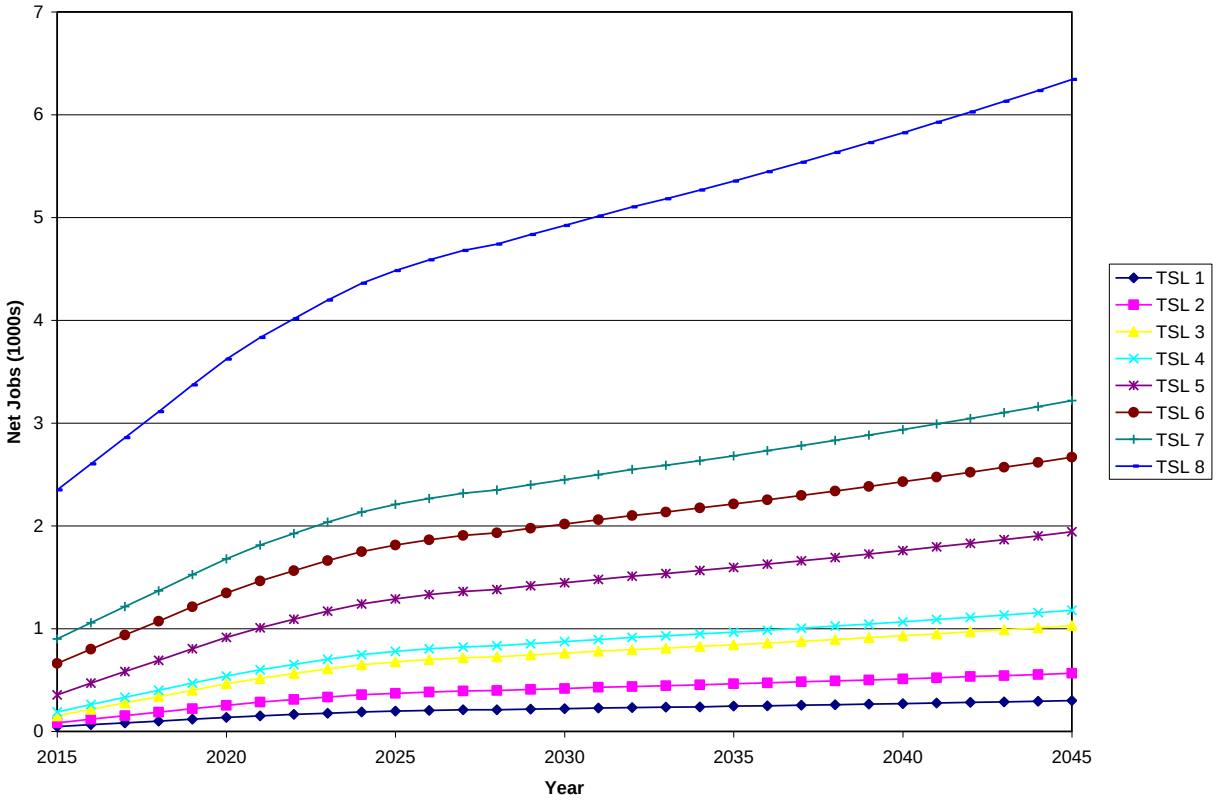

Figure 14.3.5 Polyphase Small Electric Motors: Net National Change in Employment

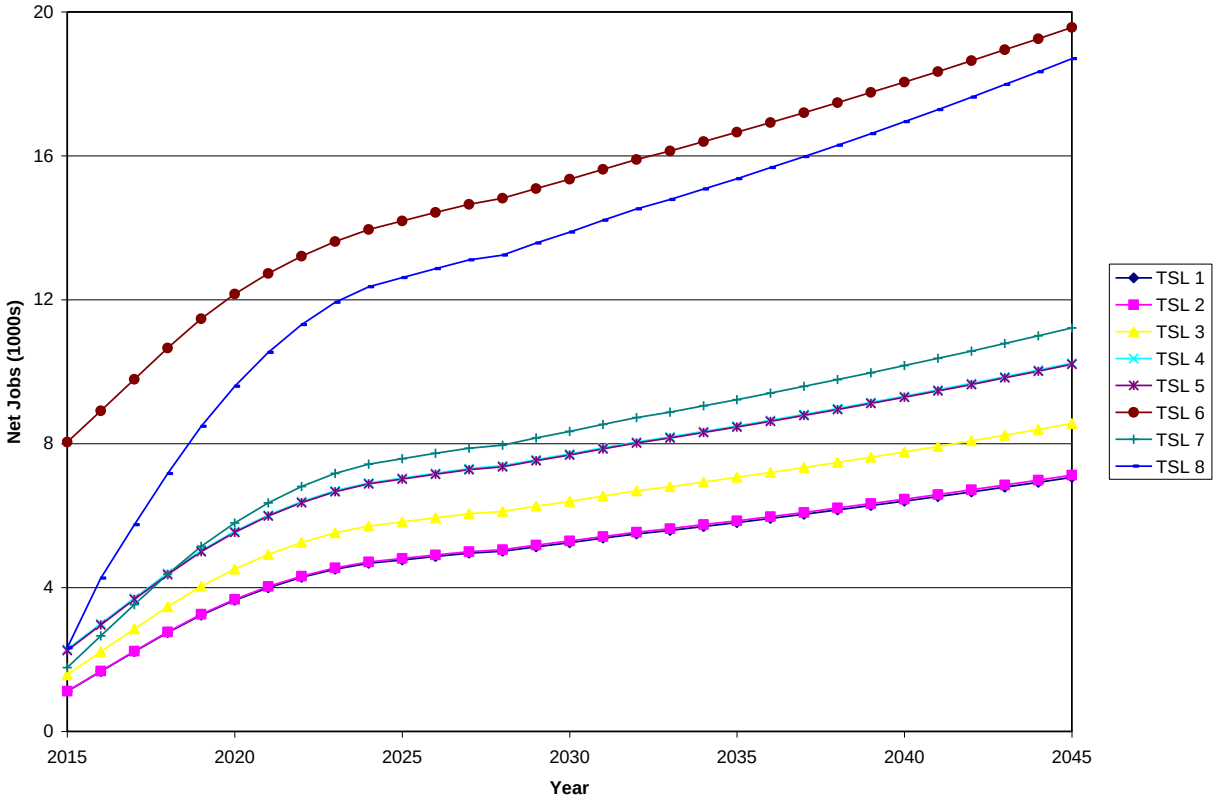

Figure 14.3.6 Capacitor-Start Small Electric Motors: Net National Change in Employment

Table 14.3.1 Polyphase Small Electric Motors: Net National Change in Employment

Trial Standard Level	2015 (thousands)	2025 (thousands)	2035 (thousands)	2045 (thousands)
1	0.05	0.14	0.22	0.30
2	0.08	0.25	0.42	0.57
3	0.15	0.46	0.76	1.03
4	0.19	0.54	0.87	1.18
4b	0.36	0.92	1.45	1.94
5	0.66	1.35	2.02	2.67
6	0.90	1.68	2.45	3.22
7	2.35	3.62	4.92	6.34

Table 14.3.2 Capacitor-Start Small Electric Motors: Net National Change in Employment

Trial Standard Level	2015 (thousands)	2025 (thousands)	2035 (thousands)	2045 (thousands)
1	1.11	3.65	5.25	7.06
2	1.12	3.67	5.29	7.12
3	1.58	4.51	6.40	8.56

4	2.29	5.56	7.72	10.24
5	2.25	5.53	7.69	10.20
6	8.04	12.16	15.35	19.57
7	1.78	5.80	8.34	11.22
8	2.32	9.59	13.88	18.70

REFERENCES

[1] Roop, J.M., M. J. Scott, and R. W. Schultz. *ImSET: Impact of Sector Energy Technologies*. Pacific Northwest National Laboratory. July 2005.

[2] Scott, M. J., D. J. Hostick, and D. B. Belzer, *ImBuild: Impact of Building Energy Efficiency Programs*, April, 1998. Pacific Northwest National Laboratory. Richland, WA. Report No. PNNL-11884. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

[3] Minnesota IMPLAN Group, Inc., *IMPLAN Professional: User's Guide, Analysis Guide, Data Guide*, 1997. Stillwater, MN.