CHAPTER 14. EMPLOYMENT IMPACT ANALYSIS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 14. EMPLOYMENT IMPACT ANALYSIS

14.1 INTRODUCTION

DOE conducted an employment impact analysis for the NOPR. 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 residential heating products.

14.2 ASSUMPTIONS

DOE expects heating product 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 heating products, including the retail price plus sales tax, and increase installation costs.

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' facilities in the manufacturer impact analysis (see Chapter 12).

14.3 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.

14.4 RESULTS

The results in this section refer to impacts of heating products standards relative to the base case for each appliance. DOE disaggregated the impact of heating product standards on employment into three component effects: increased capital investment costs, decreased energy and water costs, and changes in operations and maintenance costs. These component effects and a summary impact are presented for residential water heaters, direct heating equipment, and pool heaters.

Figures 14.4.1-14.4.3 summarize the employment impacts of the increased investment and spending on higher-efficiency equipment. Because appliance manufacturing is relatively capital-intensive compared to other sectors of the economy, the net result is a small loss of employment.

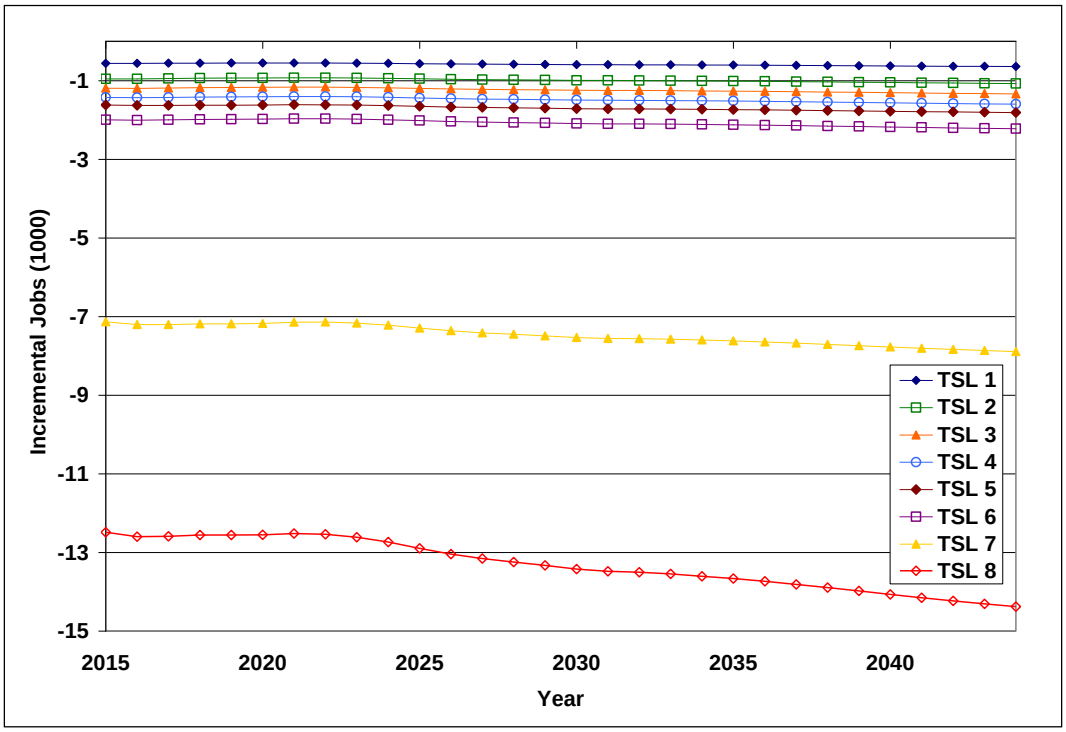

Figure 14.4.1 **Residential Water Heater Employment Impact of Increased Equipment Cost**

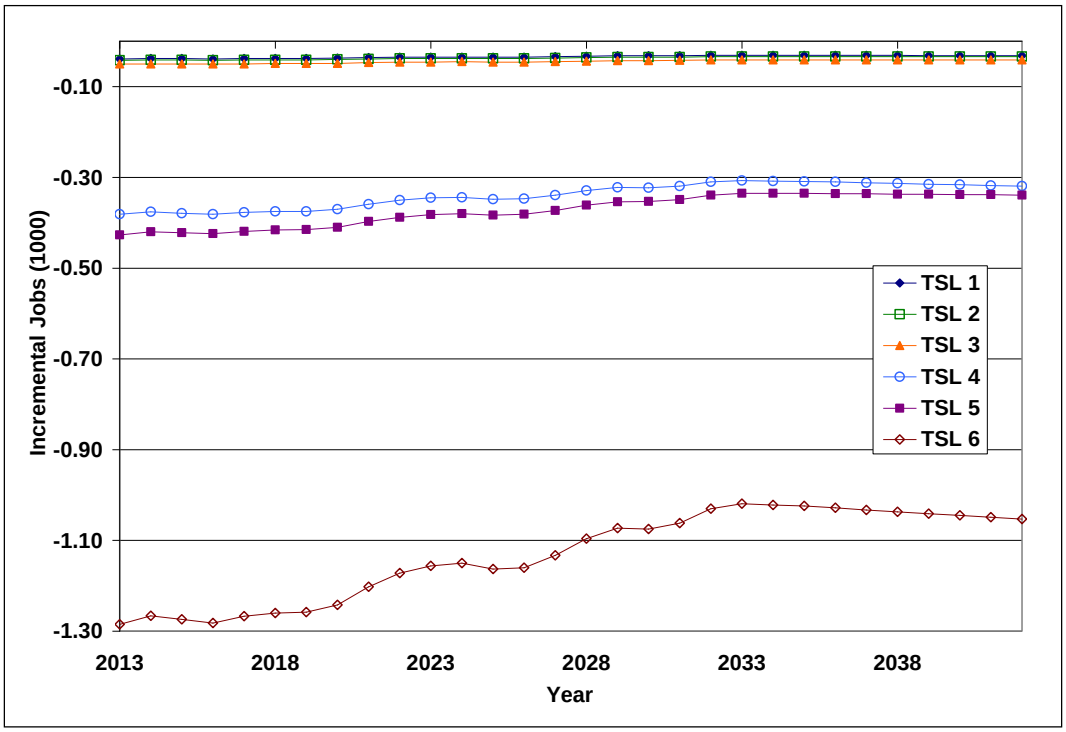

Figure 14.4.2 **Direct Heating Equipment Employment Impact of Increased Equipment Cost**

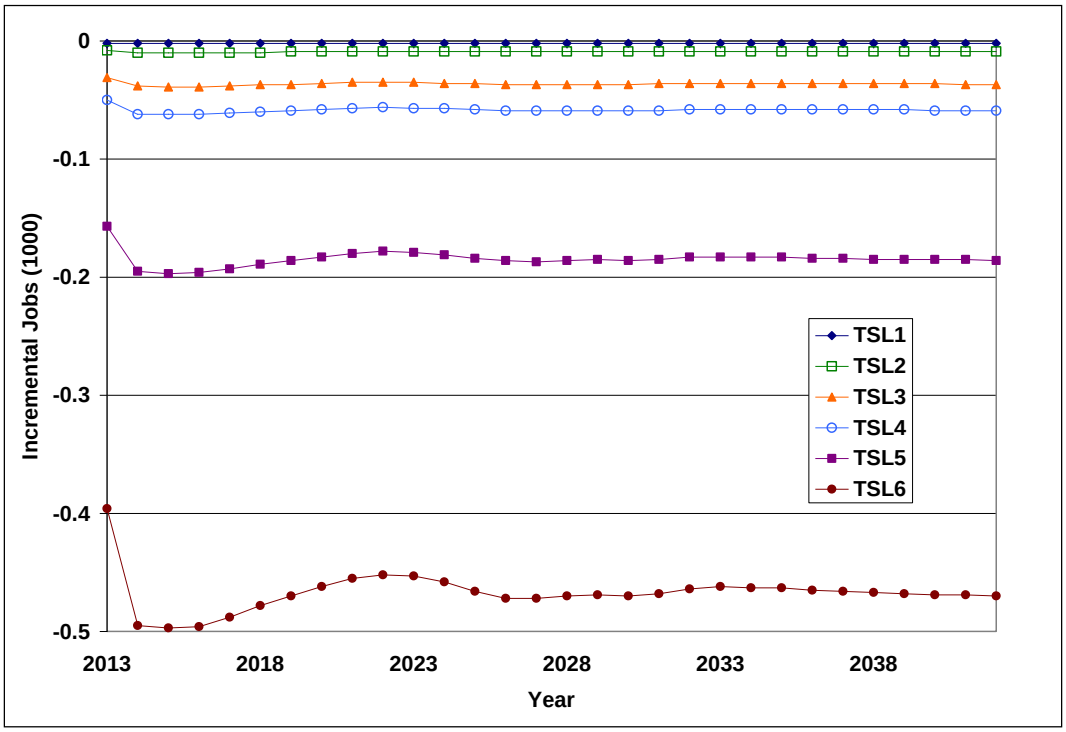

Figure 14.4.3 **Pool Heater Employment Impact of Increased Equipment Cost**

Figures 14.4.4-14.4.6 show the employment impact of redirected spending made possible by appliance energy savings. In this case, the employment impact is strongly positive.

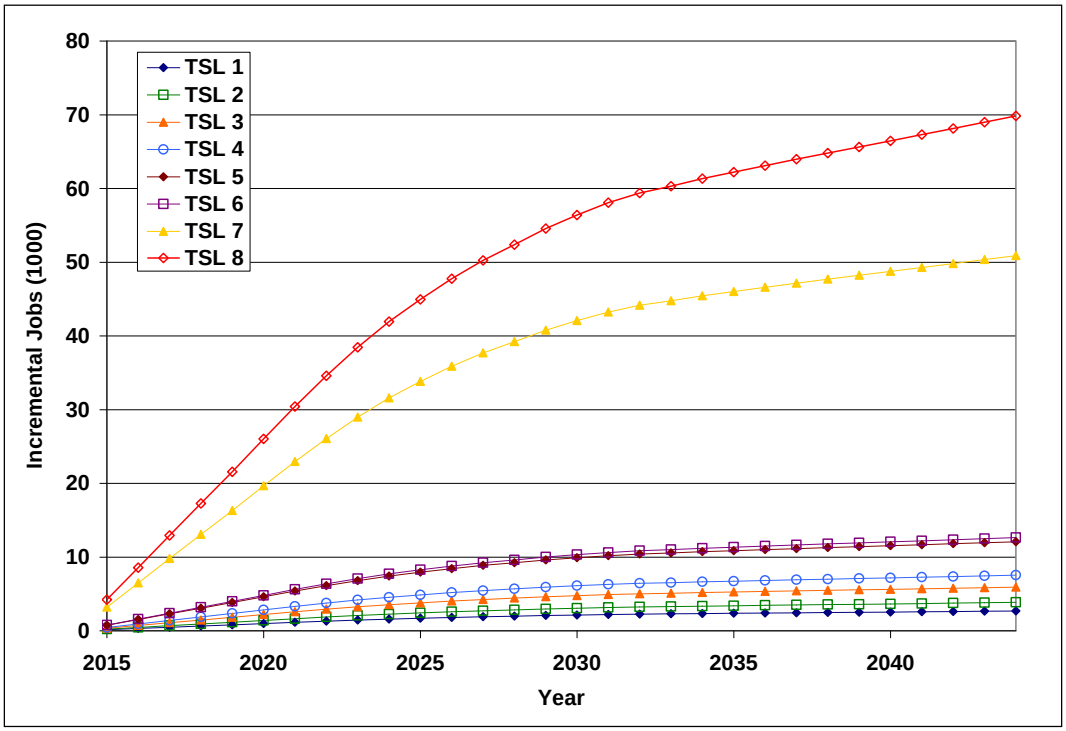

Figure 14.4.4 **Residential Water Heater Employment Impact of Energy Savings**

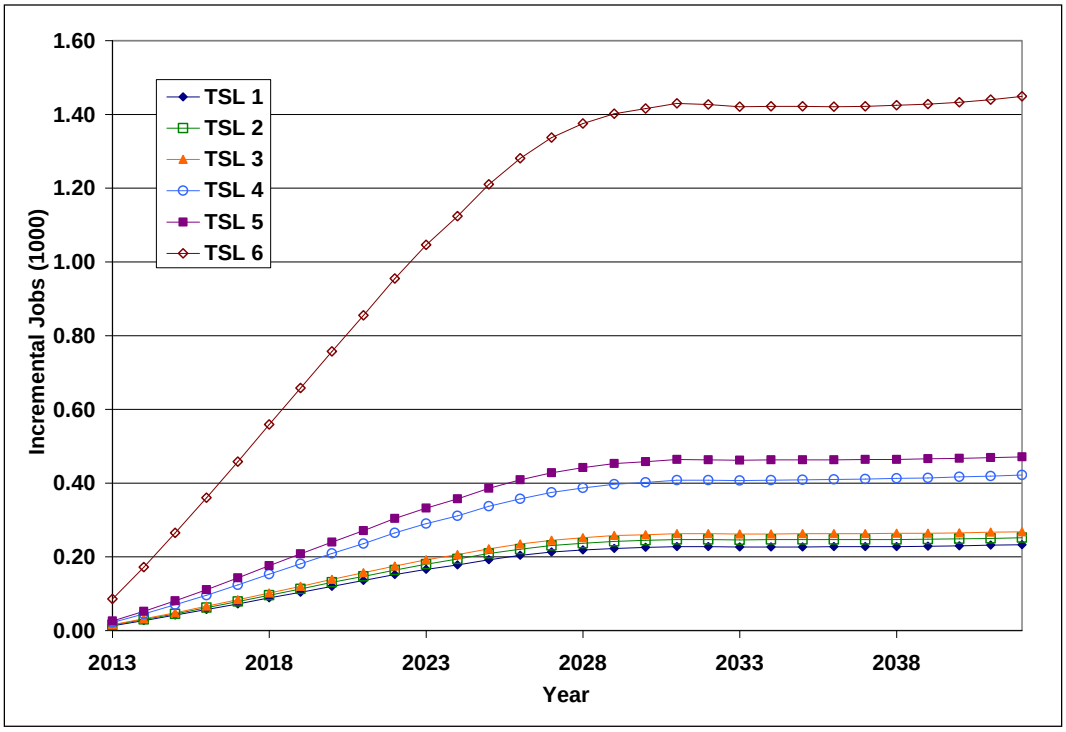

Figure 14.4.5 **Direct Heating Equipment Employment Impact of Energy Savings**

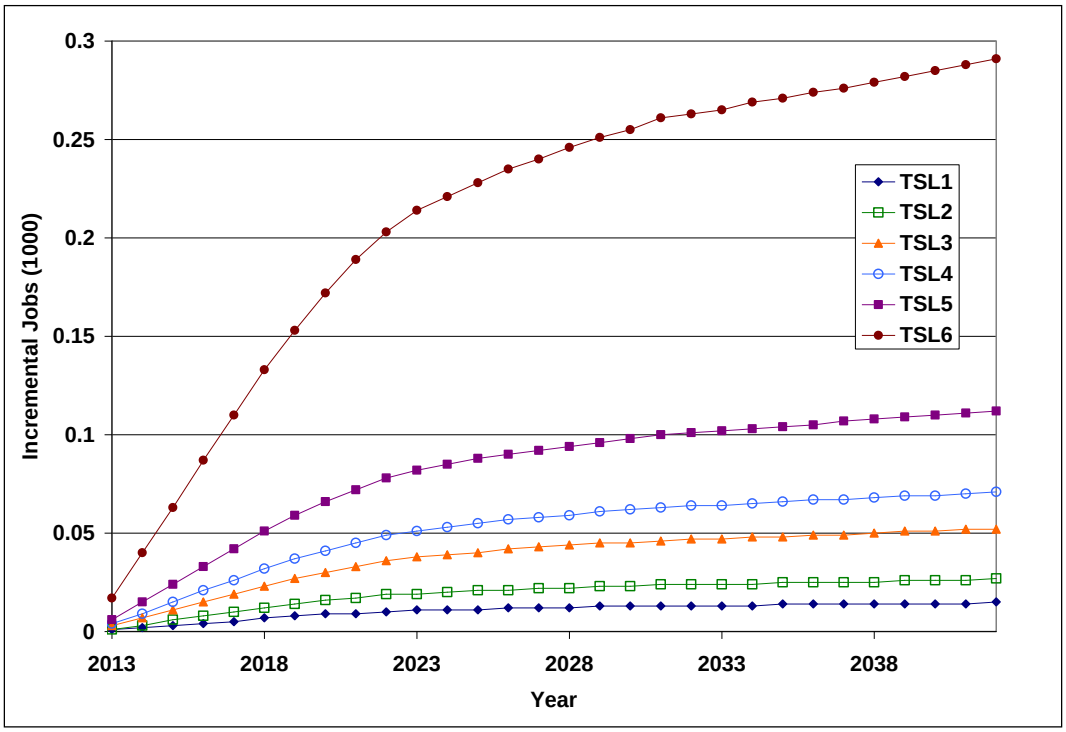

Figure 14.4.6 **Pool Heater Employment Impact of Energy Savings**

Figures 14.4.7 – 14.4.9 show the employment impacts of non-energy operations and maintenance cost increases for residential water heaters, direct heating equipment, and pool heaters. Repair and maintenance is comparatively labor-intensive, so the net result is a small increase in employment. For pool heater TSLs 1 and 2 no changes in repair and maintenance costs are anticipated.

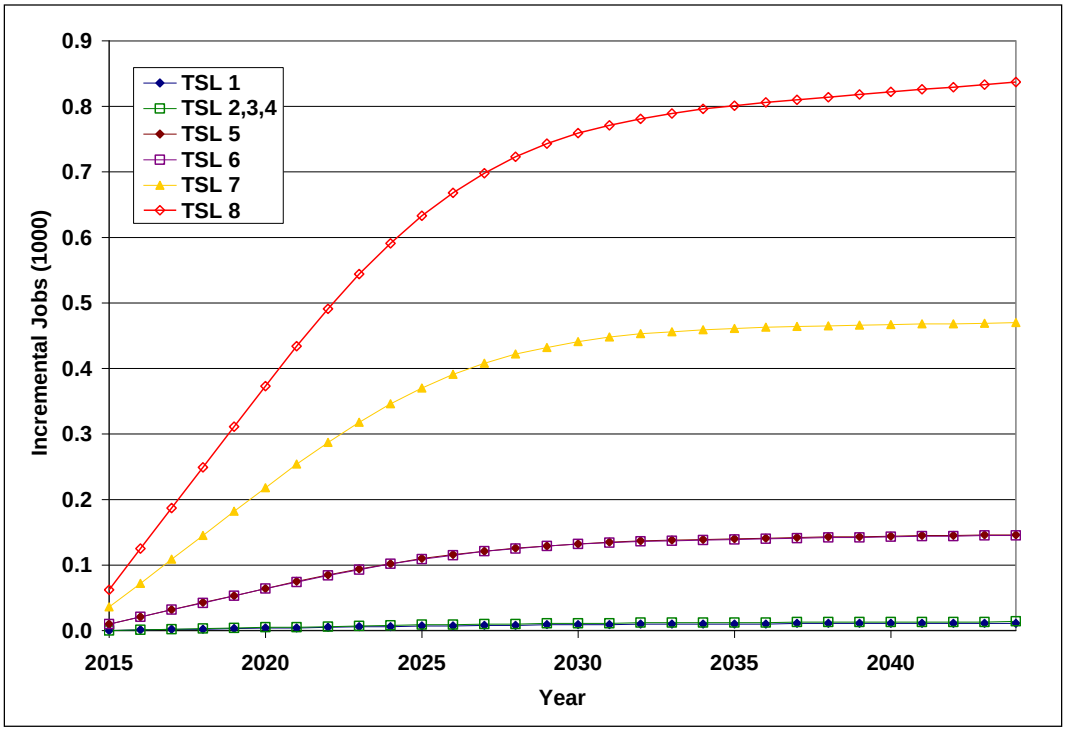

Figure 14.4.7 **Residential Water Heater Employment Impact of Operations and Maintenance Cost Increase**

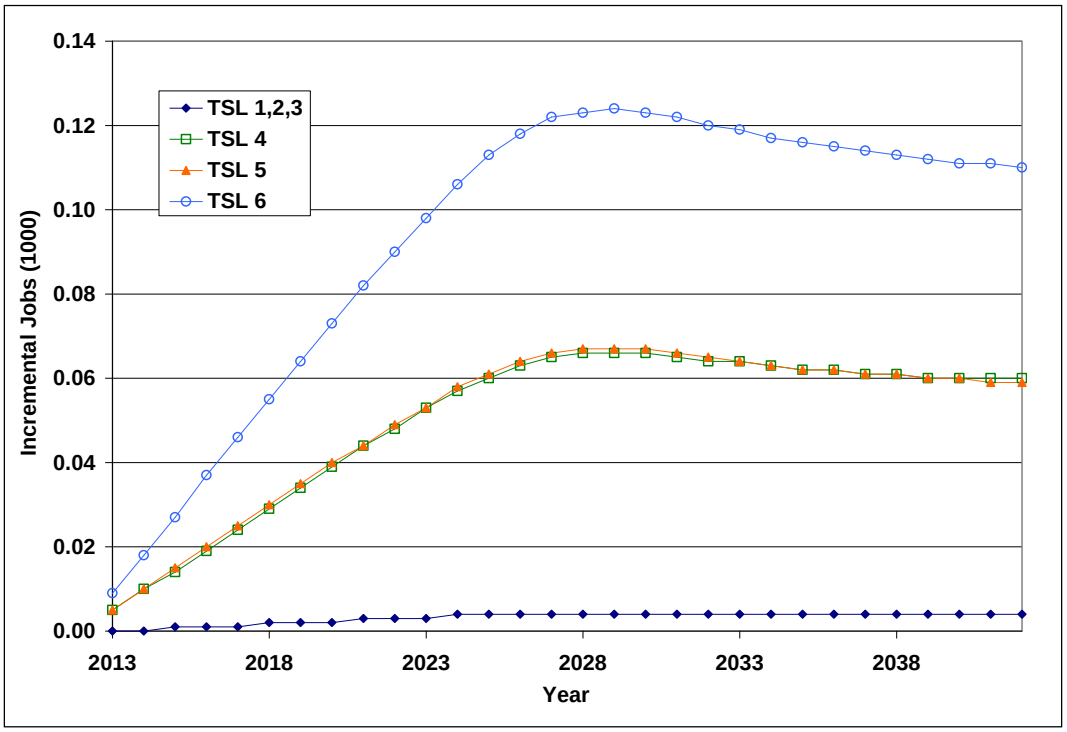

Figure 14.4.8 **Direct Heating Equipment Employment Impact of Operations and Maintenance Cost Increase**

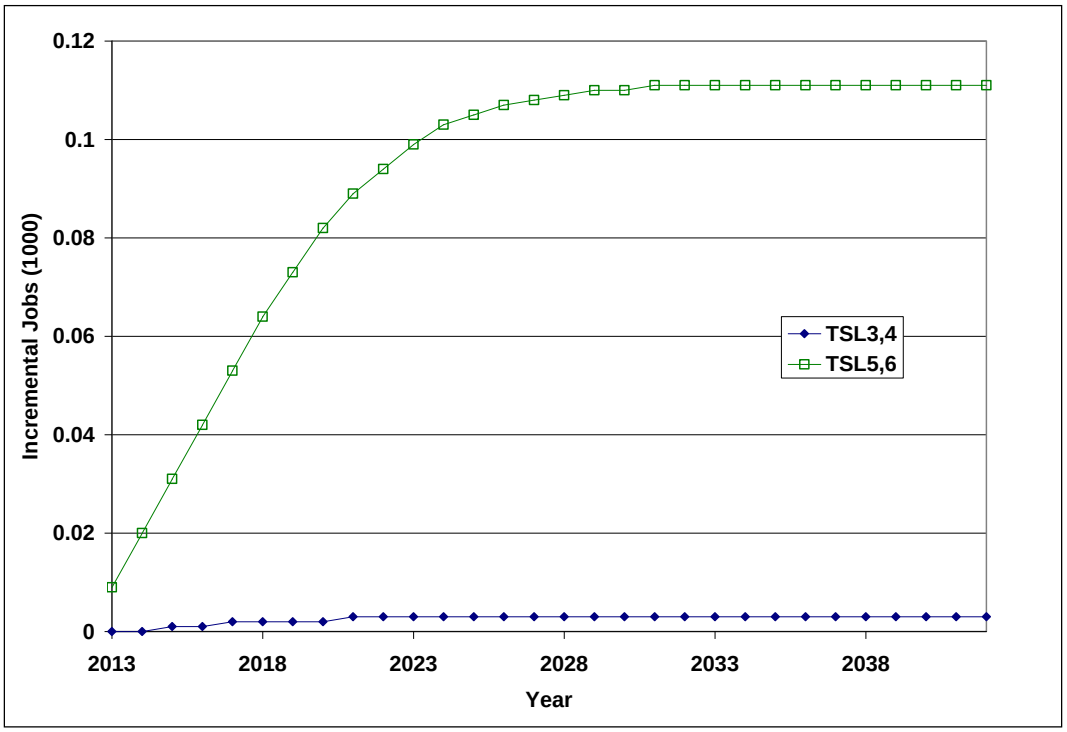

Figure 14.4.9 **Pool Heater Employment Impact of Operations and Maintenance Cost Increase**

Figures 14.4.10-14.4.12 show the estimated net national employment impacts of the residential water heater, direct heating equipment, and pool heater trial standard levels. 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). These figures show the combined effects of equipment cost, operations and maintenance cost, and energy use changes due to standards.

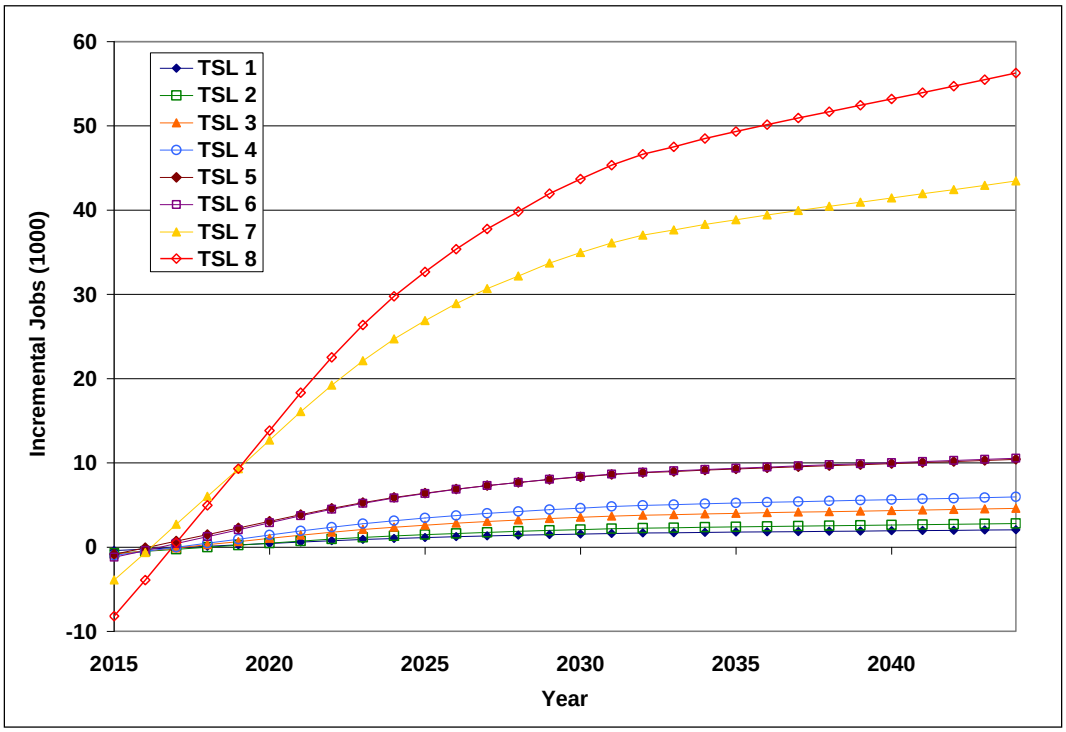

Figure 14.4.10 **Residential Water Heater Net National Change in Employment**

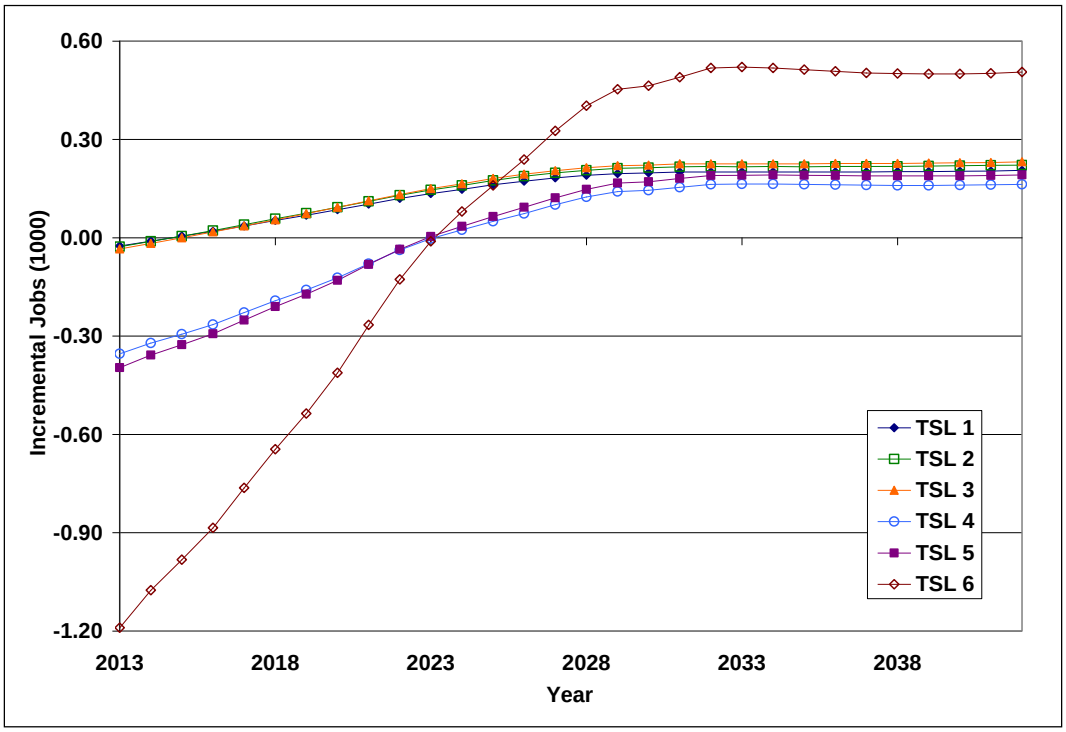

Figure 14.4.11 **Direct Heating Equipment Net National Change in Employment**

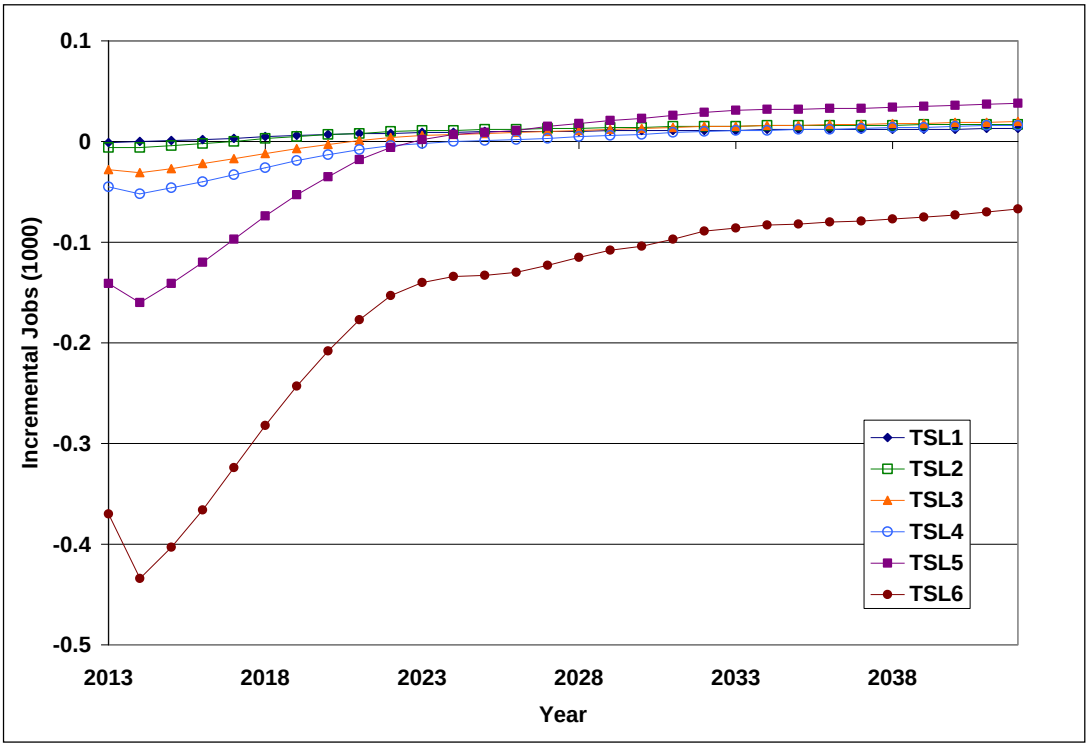

Figure 14.4.12 **Pool Heater Net National Change in Employment**

Tables 14.4.1-14.4.3 show the net national employment impact in specific years. The initial decrease in net employment is caused by the dominance of capital costs in early years, while the impacts of energy savings build up slowly over time, resulting in a net positive impact on employment in later years.

Table 14.4.1 Residential Water Heater Net National Change in Employment

Trial Standard Level	2015 (thousands)	2020 (thousands)	2030 (thousands)	2044 (thousands)
1	-0.40	0.44	1.56	2.06
2	-0.72	0.48	2.08	2.80
3	-0.83	1.04	3.54	4.60
4	-0.97	1.43	4.63	5.96
5	-0.85	3.07	8.34	10.41
6	-1.20	2.89	8.37	10.56
7	-3.89	12.70	34.97	43.46
8	-8.21	13.82	43.69	56.26

Table 14.4.2 Direct Heating Equipment Net National Change in Employment

Trial Standard Level	2013 (thousands)	2020 (thousands)	2030 (thousands)	2042 (thousands)
1	-0.03	0.09	0.20	0.21
2	-0.03	0.09	0.21	0.22
3	-0.03	0.09	0.22	0.23
4	-0.35	-0.12	0.15	0.16
5	-0.40	-0.13	0.17	0.19
6	-1.19	-0.41	0.46	0.51

Table 14.4.3 Pool Heater Net National Change in Employment

Trial Standard Level	2013 (thousands)	2020 (thousands)	2030 (thousands)	2042 (thousands)
1	0.00	0.01	0.01	0.01
2	-0.01	0.01	0.01	0.02
3	-0.03	0.00	0.01	0.02
4	-0.05	-0.01	0.01	0.02
5	-0.14	-0.04	0.02	0.04
6	-0.37	-0.21	-0.10	-0.07

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.