# CHAPTER 12: NET NATIONAL EMPLOYMENT IMPACT ANALYSIS

Net national employment impacts from central air conditioner efficiency standards are defined as net jobs created or eliminated in the general economy as a consequence of: (1) reduced spending by end users on energy; (2) reduced spending on new investment or capacity by energy companies; (3) increased spending on the purchase of new central air conditioners; (4) increased spending on the installation of new central air conditioners; and (5) the associated indirect effects of those four factors throughout the national economy.

Figure 12.1 shows the estimated net national employment impacts of five different trial standard levels. These trial standard levels are discussed in greater detail in the analyses of Shipments (Chapter 6) and National Energy Savings and Net Preset Value (Chapter 7). Figure 12.1 shows, for any given year, the change in the number of jobs in the economy relative to the number of jobs if there were no change in standards (and thus no resulting change in spending and cash flow patterns throughout the economy). Table 12.1 shows the net national employment impact in specific years.

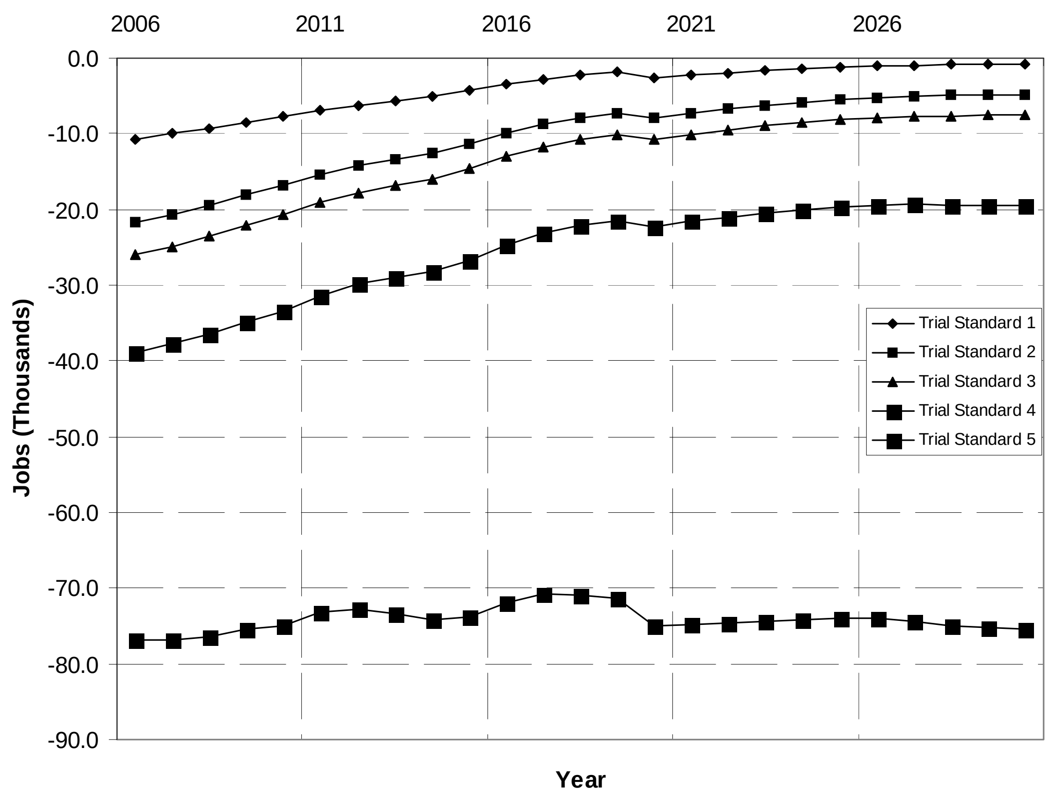


**Figure 12.1 Net National Employment Impacts**

**Table 12.1 Net National Change in Jobs**

| Trial Standard Level | 2010 (thousands) | 2020 (thousands) | 2030 (thousands) |
|---|---|---|---|
| 1 | -7.8 | -2.7 | -0.7 |
| 2 | -16.9 | -7.9 | -4.7 |
| 3 | -20.7 | -10.8 | -7.5 |
| 4 | -33.4 | -22.3 | -19.4 |
| 5 | -75.0 | -74.9 | -75.4 |

These results are based 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 model, ImBuild, was developed for DOE's Office of Building Technology, State and Community Programs.[1] ImBuild (which stands for Impact of Building Energy Efficiency Programs) was created by the Pacific Northwest National Laboratory as a special-purpose version of the IMPLAN national input-output model.[2] It was developed to estimate the employment and income effects of building energy technologies. In comparison with simple economic multiplier approaches, ImBuild allows for more complete and automated analysis of the economic impacts of energy-efficiency investments in buildings.

Energy-efficiency technology affects the U.S. economy primarily through three mechanisms. First, if the incremental costs of the new technology per installed unit are different from those of the conventional technology, changes in purchases will occur in the sectors involved in manufacturing, distribution, and installation for both technologies, which will change the overall mix of economic activity. Second, depending on how the efficiency investment is financed, it may "crowd out" other domestic savings, investments, and consumer spending, somewhat reducing overall economic activity. Third, energy expenditures will be reduced. On one hand, this reduction lowers final demand in the electric and gas utility sectors (and the fuel oil production and distribution sector) as well as in the trade and services sectors that provide maintenance, parts, and services for the utility and fuel sectors. On the other hand, it increases net disposable household income and increases general consumer spending in all sectors (including some increases in expenditures for electric and gas utility services and retail trade and services).

ImBuild is written in Visual Basic and Excel. It uses a 35-sector model of the national economy to predict the economic effects of residential and commercial buildings technologies. It has a user-friendly, menu-driven front end to facilitate input. ImBuild collects user-supplied estimates of initial investments, energy savings, and economic activity associated with spending of the savings resulting from standards (changes in final demand in personal consumption, business investment, and government spending) and provides overall estimates of the change in national output for each input-output sector. Then, 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.

ImBuild calculates the total effect of standards on employment, including job creation or deletion in the manufacturing sector. Direct employment impacts, i.e., those that would occur at central air conditioner manufacturing plants, are discussed in the Manufacturer Impact Analysis (Chapter 8).

Figure 12.1 shows the cumulative net increase or decrease in jobs resulting from central air conditioner efficiency standards for each year to the year 2030. The least number of jobs lost is for Trial Standard Level 1.

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., such as the effects of an efficiency standard) in one sector of the economy will affect flows in others, which affects the overall level of employment.

Jobs are created when the net change in spending flows into more job-intensive sectors relative to the base case; jobs are lost when the net change in spending flows into less job-intensive sectors relative to the base case. An energy-efficiency standard for central air conditioners will create such changes in the spending flows of the economy. Standards will reduce central air conditioner operating costs, which will in turn increase the amount of disposable income to consumers. There are two basic reasons why energy cost savings (driving job creation) increase after a standard is implemented: (1) households buy higher-efficiency central air conditioners compared to the base-case scenario and (2) the total number of central air conditioners in the country increases over time, generating a greater potential for energy savings. These central air conditioners are bought by consumers who would have bought a lower-efficiency central air conditioner if a higher-efficiency standard were not implemented.

A standard may also increase purchase price (reducing disposable income to consumers) and increase the demand for capital in the central air conditioner manufacturing industry. The central air conditioner manufacturing industry is more capital-intensive than average, so an increase in spending flows to it will initially tend to reduce the employment level in the overall economy.

The impact on jobs has been disaggregated into the component effects. Figure 12.2 shows the impact on jobs of consumer energy savings. While consumers save money by using more efficient central air conditioners thereby giving them more money to spend in other more labor-intensive sectors of the economy; the trial standards entail large increases in purchase price which reduces their spending in other parts of the economy. The final result is a net decrease in jobs throughout the economy.

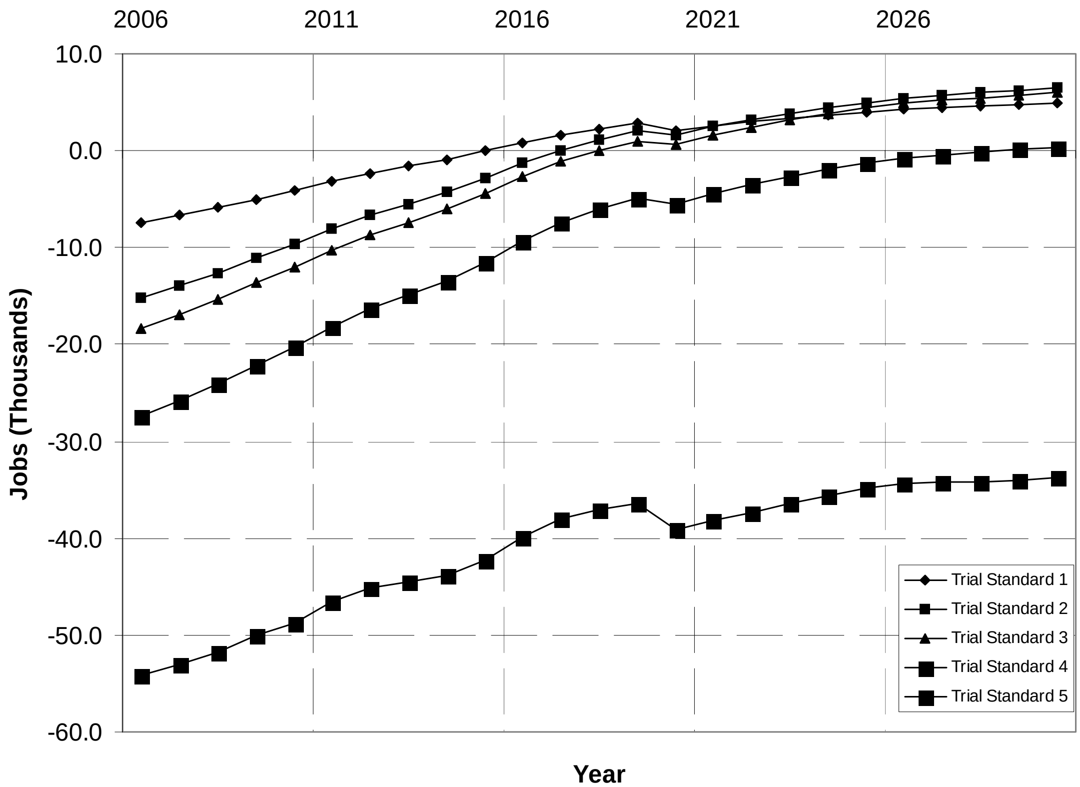


**Figure 12.2 Employment Impacts of Consumer Savings**

Figure 12.3 shows the employment impacts of the increased first cost of more efficient central air conditioners. This higher first cost is reflected in the decrease in jobs shown in the figure. Because manufacturing is capital-intensive, less investment capital is available for other purposes

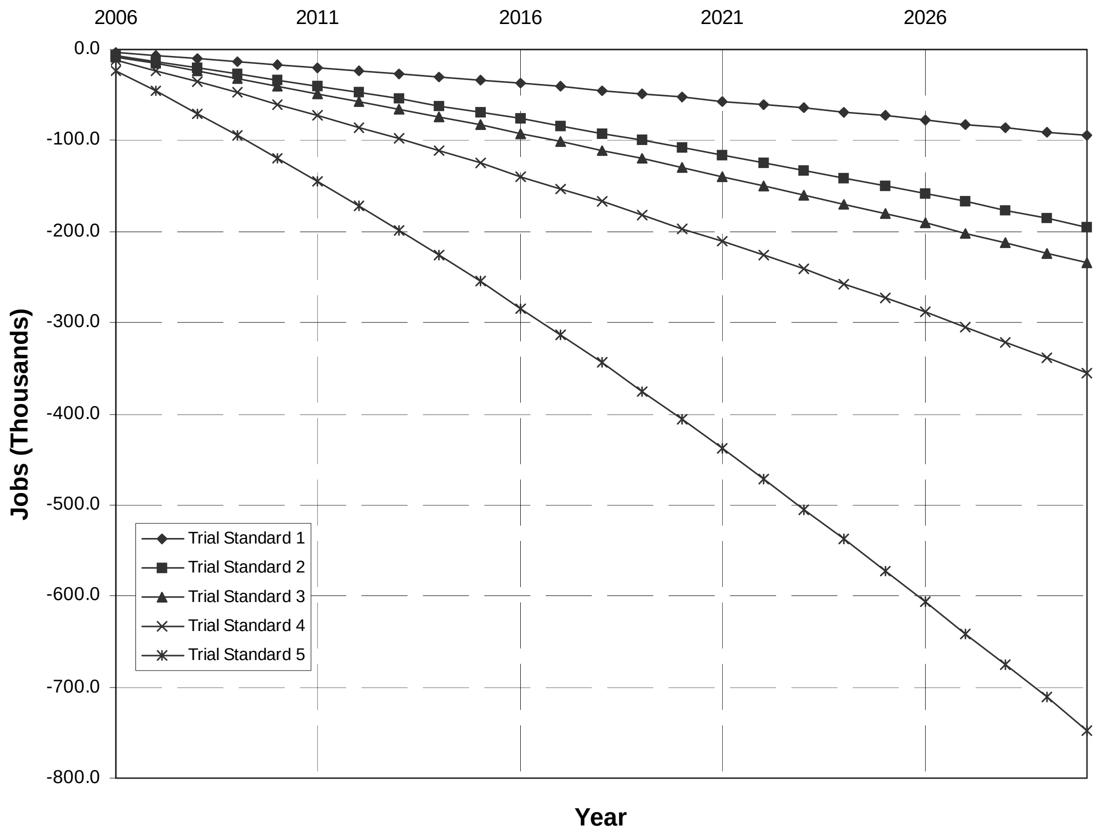


**Figure 12.3 Employment Impacts of Changes in Equipment Cost**

Figure 12.4 shows the change in employment resulting from energy savings. When consumers use less energy, electric utilities experience relative reductions in demand. Reduced demand results in less investment in new capacity and hence lower employment in these sectors. The effect on jobs because of the impact on utilities is also small. The energy savings for each of the fuel sources are shown in the National Energy Savings and Net Present Value Analysis (Chapter 7).

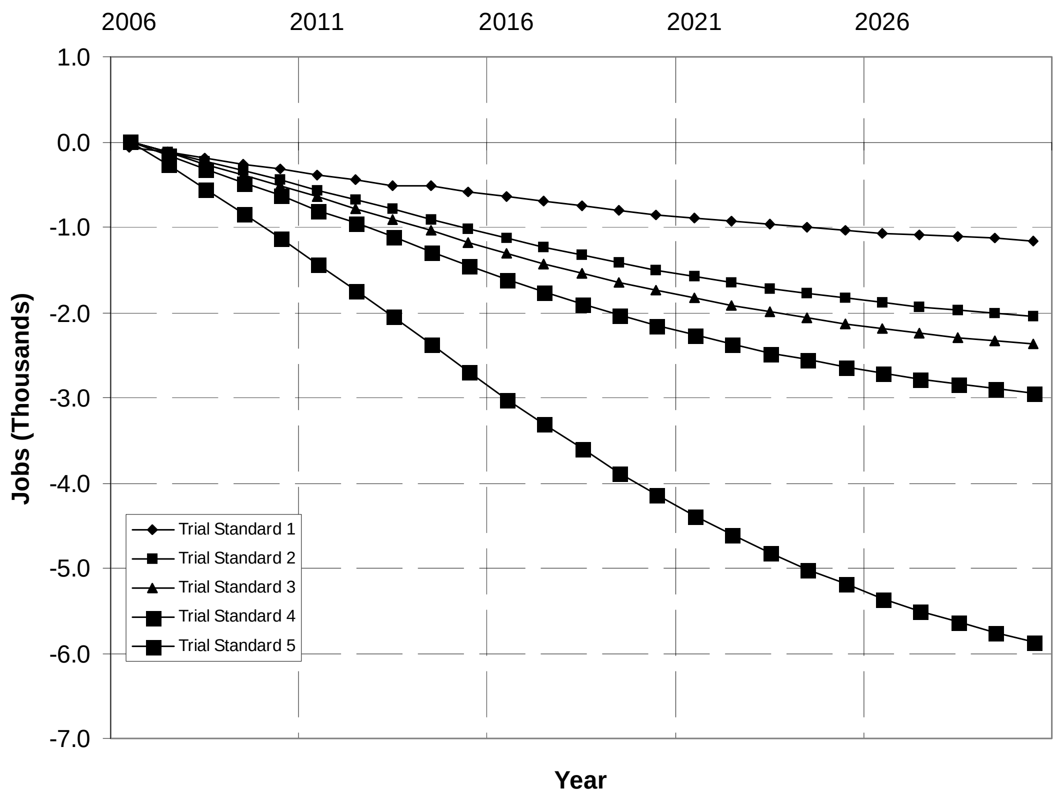


**Figure 12.4 Employment Impacts of Utility Savings**

**REFERENCES**

1. Pacific Northwest National Laboratory, *ImBuild: Impact of Building Energy Efficiency Programs*, 1998. Richland, WA. Prepared for the U.S. Department of Energy under Contract DE-AC06-76RLO 1830.

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