CHAPTER 13. EMPLOYMENT IMPACT ANALYSIS

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13.1 INTRODUCTION

The U.S. Department of Energy's (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 dishwashers.

13.2 ASSUMPTIONS

DOE expects energy conservation 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 appliances, including the retail price plus sales tax, and increase installation costs.

Using ImSET, an input/output econometric model of the U.S. economy, this analysis estimated the short-term 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).

DOE notes that ImSET is not a general equilibrium forecasting model and acknowledges the uncertainties involved in projecting employment impacts, especially changes in the later years of the analysis.[1] Because ImSET does not incorporate price changes, the employment effects predicted by ImSET would overestimate the magnitude of actual job impacts over the long run for this rule. Since input/output models do not allow prices to bring markets into equilibrium, they are best used for a short-run analysis. We therefore include a qualitative discussion of how labor markets are likely to respond in the longer term. In future rulemakings, DOE may consider the use of other modeling approaches for examining long-run employment impacts.

13.3 METHODOLOGY

DOE 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 3.1.1[2] (Impact of Sector Energy Technologies) as a successor to ImBuild,[3] a special-purpose version of the IMPLAN[4] 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 a 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 187-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 lead to reductions in utility sector investment and employment.

DOE also notes that the employment impacts estimated with ImSET for the entire economy differ from the employment impacts in the dishwasher manufacturing sector estimated in chapter 12 using the Government Regulatory Impact Model (GRIM). The methodologies used and the sectors analyzed in the ImSET and GRIM models are different.

13.4 SHORT-TERM RESULTS

The results in this section refer to impacts of dishwasher standards relative to the base case. DOE disaggregated the impact of standards on employment into three component effects: increased capital investment costs, decreased energy and water costs, and changes in operations and maintenance costs. DOE anticipates no change in operations and maintenance costs for dishwashers. DOE presents the summary impact.

Conceptually, one can consider the impact of the rule in its first year on three aggregate sectors: the dishwasher production sector, the energy generation sector, and the general

consumer goods sector. (As mentioned previously, ImSET's calculations are made at a much more disaggregated level.) By raising energy efficiency, the rule increases the purchase price of dishwashers; this increase in expenditures causes an increase in employment in this sector. At the same time, the improvements in energy efficiency reduce consumer expenditures on electricity. The reduction in electricity demand causes a reduction in employment in that sector. Finally, based on the net impact of increased expenditures on dishwashers and reduced expenditures on electricity and gas, consumer expenditures on everything else are either positively or negatively affected, increasing or reducing jobs in those sectors accordingly. The model also captures any indirect jobs created or lost by changes in consumption due to changes in employment. (As more workers are hired, they consume more goods, generating more employment, and the converse is true for workers who are laid off.)

Table 13.4.1 presents the modeled net employment impact from the rule in 2015. Approximately 95 percent of dishwashers are produced domestically and 5 percent are imported. The net employment impact estimate is sensitive to assumptions regarding the return to the U.S. economy of money spent on imported dishwashers. The two scenarios bounding the ranges presented in Table 13.4.1 represent situations in which none of the money spent on imported dishwashers returns to the U.S. economy and all of the money spent on imported dishwashers returns to the U.S. economy. The U.S. trade deficit in recent years suggests that between 50 percent and 75 percent of the money spent on imported dishwashers is likely to return, with employment impacts falling within the ranges presented below. Short-term changes in employment are minimal as evidenced by Table 13.4.1.

Table 13.4.1 Net National Short-term Change in Employment (1,000 jobs)

Trial Standard Level	2013	2018	2020
1	--	-0.03 to 0.03	-0.03 to 0.04
2*	-0.34 to -0.28	-0.12 to -0.08	-0.06 to -0.02
3	--	-1.44 to -1.12	-1.14 to -0.80
4	--	-1.87 to -1.46	-1.38 to -0.94

* The compliance date for trial standard levels (TSLs) 1, 3, and 4 is 2018; for TSL 2, the compliance date is 2013.

For context, OMB currently assumes that the unemployment rate may decline to 6.9 percent in 2014 and drop further to 5 percent in 2017.[5] The unemployment rate in 2017 is projected to be close to "full employment." When an economy is at full employment any effects on net employment are likely to be transitory as workers change jobs, rather than enter or exit longer-term employment.

13.5 LONG-TERM RESULTS

Due to the short payback period of energy efficiency improvements mandated by this rule, over the long term we expect the energy savings to consumers to increasingly dominate the increase in appliance costs, resulting in increased aggregate savings to consumers. As a result,

we expect demand for electricity to decline over time and demand for other goods to increase. Since the electricity generation sector is relatively capital intensive compared to the consumer goods sector, the net effect will be an increase in labor demand. In equilibrium, this should lead to upward pressure on wages and a shift in employment away from electricity generation towards consumer goods. Note that, in a long-run equilibrium, there is no net effect on total employment, because wages adjust to bring the labor market into equilibrium. Nonetheless, even to the extent that markets are slow to adjust, we anticipate that net labor market impacts will be negligible over time due to the small magnitude of the short-term effects presented in Table 13.4.1. The ImSET model projections, assuming no price or wage effects until 2020, are also included in Table 13.4.1.

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