American Council for an Energy-Efficient Economy
529 14th Street, N. W., Suite 600 Washington, D.C. 20045 202.507.4000 202.429.2248 www.aceee.org

THE ACEEE STIMULUS JOBS CALCULATOR USER'S GUIDE

John A. "Skip" Laitner, Director of Economic and Social Analysis
Chris P. Knight, Research Assistant

July 2009

This document is a guide to using the *Spreadsheet Tool to Estimate National Employment Impacts Given Overall Cost-Effectiveness of Stimulus Efficiency Investments* Microsoft Excel worksheet created by the American Council for an Energy-Efficient Economy. This worksheet can be used to estimate the typical net employment impacts in the United States as a result of stimulus-funded projects that are primarily intended to promote energy efficiency investments. The Jobs Calculator uses an input-output framework to evaluate the net jobs of a project based on five user inputs data: investment, energy savings, stimulus period, federal cost share, and out-of-pocket dollar share. The calculator uses these fields to evaluate the annual net job impacts that result from your project.

THE CURRENT DESIGN OF THE JOBS CALCULATOR

The calculator can be applied to energy efficiency investment projects in any sector, and for any fuel or energy form, whether within the industrial, commercial, or residential sectors. The reason for this flexibility is that the employment multipliers used in the spreadsheet tool are drawn from aggregate sectors that interact with all industries, businesses, and households within the U.S. economy.[1] The calculator necessarily sacrifices some detail in its estimates in order to make them broadly applicable. This underscores the fact that this methodology is not a fine-grained forecasting model, but rather a practical tool to help states and communities more easily "score" or evaluate the net job impacts that are likely to result from energy-efficient investments.

Because the Jobs Calculator was designed to score employment benefits of proposals funded by the *American Recovery and Reinvestment Act* (henceforth referred to as "stimulus"), it has been calibrated to predict nationwide job creation. Using this calculator for state, regional, and local analysis may result in an overstatement of employment impacts because it will account for jobs beyond any given region's borders.[2]

The calculator estimates net annual job creation impacts for Years 1, 2, 3, 5, and 10 as a result of a set of energy efficiency investments made available by a stimulus project. Year 1 starts when spending, not necessarily construction or use, begins on a project.[3] The calculator can be used to calculate employment impacts in any of these years, but no years in between, and no years further out than a decade. The net employment impacts are annual effects resulting from investment or energy bill savings made in a given year. Thus, the employment impact in Year 3 is the net change in jobs that result from any investments actually made in Year 3, as well as any energy bill savings that result from all efficiency improvements made in Years 1 and 2. Similarly, the listed employment impact in Year 10 is the aggregate of all prior efficiency improvements made in Years 1 through 10.

---

[1] The input-output data are taken from the 2007 economic accounts of the U.S economy as published by the Minnesota Implan Group (Stillwater, MN). For further information on their data and their services, go to: http://www.implan.com.

[2] We might note, however, that with state-specific economic profile data also available from the Minnesota Implan Group, with a reasonably simple redesign, this tool could be adapted for state or local planning purposes.

[3] We incorporate a lag into our model—described in the "savings" section of this guide—to account for the fact that energy savings will most likely lag stimulus spending.

USING THE JOBS CALCULATOR

To use the calculator, type your own values into the "Financial and Product Variables" space in Column C, Rows 5 through 10 on the "Jobs Calculator" worksheet. (The "Job Factors" worksheet shows some of the assumptions used in the calculator, but contains no variable cells.) The values in Column C, Rows 5 through 10 are the only values in the calculator that you can change. The current data in boldfaced blue font are placeholder values. These should be changed to appropriate values based on your project estimates. After entering the values in this section, job creation estimates for Years 1, 2, 3, 5, and 10 will instantaneously appear in boldfaced green font in Row 20, Columns F through N.

In the following section, we further explain how to interpret the Financial Project Variables.

DESCRIPTION OF THE FINANCIAL AND PROJECT (INPUT) VARIABLES

Investment: This refers to the total level of capital spending that results from any project targeted at improving energy efficiency. This should be the total expected capital expenditure financed through all sources of funds, including federal share, local out-of-pocket money, and borrowing.

All data should be entered as millions of dollars. Policy details such as whether your stimulus project is in code enforcement, efficient housing subsidies, or tax incentives for compact fluorescent light bulbs will not affect the calculator's overall estimate of net job benefits. It is a generic calculator that relies only on total project spending and the energy savings that result from that spending.

Savings: The projected dollar amount of annual energy savings that occurs after the project is complete. This should be the annual savings after the stimulus period is over and all projects are completed. Again the data is to be entered as millions of dollars. While individual projects have different levels of savings, ACEEE studies typically find that energy efficiency projects have a 3 to 8 year payback, implying an annual energy bill savings that is between 12 and 34 percent of your capital investment.[4]

Energy bill savings should be based on the average retail prices of energy saved in 2009. In other words, the user should not try to anticipate changes in future energy prices. The reason for this is that the Jobs Calculator requires the use of constant dollars. If users have any questions in this regard, feel free to contact ACEEE (contact information is at the bottom of this guide) to sort through this issue.

The Jobs Calculator assumes that energy bill savings will begin halfway through the first year of stimulus spending, taking account of the lag between stimulus spending and actual more efficient use. Savings increase over the stimulus period as the entire stimulus investment is made, reaching its peak value in the year immediately following the completion of spending. While realistic, this assumption does increase the complexity of our calculator, as we explain below.

For example, assume that your stimulus project is expected to result in $3 million in annual energy savings when complete, and that you are spending your stimulus money over a 3-year period. If the savings resulted immediately following spending, each of the 3 years would result in $1 million in incremental savings. That is, savings would be $1 million in Year 1, $2 million in Year 2, and $3 million in Year 3.

However, accounting for the lag between the beginning of spending and the final use of the project, the Year 1 savings will be half of the level above, or $0.5 million. The Year 2 savings will then be half

[4] ACEEE has conducted a variety of state studies that estimate state-specific cost effective energy savings from efficiency investments, available free at aceee.org/energy/state/resources.htm. State-specific and measure-specific energy savings estimates from these studies could greatly inform your inputs to our calculator.

at the Year 1 level, and half at the Year 2 level, or $0.5 million + $1 million = $1.5 million. Year 3 savings will be half at the second year level and half at the third, or $1 million + $1.5 million = $2.5 million. Savings will not reach its peak until year 4, when savings will have maxed out at the third year level of $3 million.

Stimulus Period: The period of time in years over which the investment will be made. In the current version of the Jobs Calculator, this can vary between 1 and 3 years. This is a reflection of the *American Recovery and Reinvestment Act* requirement that all stimulus dollars be spent by December 30, 2011. For simplicity, the calculator assumes that the investment is spread equally among the years. For example, if you are planning a $10 million dollar project that will be completed over 2 years, the stimulus period would be 2 years, and the calculator would calculate spending of $5 million each year.

DEFINITION AND DESCRIPTION OF FINANCING SHARES CATEGORIES

A subset of the Financial and Project Variables, Cells C8, C9, and C10 correspond to the financing shares provided by federal funds, local cash, and local borrowing. These are the only three sources of financing allowed in the model, and they must add up to 100%. This means that the following equation should hold:

% Federal Funds + % Out-of-Pocket Local + % Borrowed Local = 100%

As a safeguard, cell C11 contains the sum of cells C8, C9, and C10. If the value of C11 is anything other than 100%, the font becomes red and you are instructed to "Please adjust percent shares so that they add up to 100%". The financing share categories are defined below.

Percent Federal Funds: The percentage of total funds provided by the federal government through ARRA. This entry allows the calculator to be tailored to different levels of cost-sharing with the federal government. To calculate the percentage of federal funds, simply divide the federal share by the total investment and multiply by 100 percent. For example, assume you are applying for a 50 percent federal matching grant for a $10 million project, or $5 million total in federal dollars. Also, you have $3 million in local cash to contribute, and the remaining $2 million of the local share will be borrowed. The percent Federal Funds would be:

$$\frac{\text{Federal Funds (\$)}}{\text{Total Investment (\$)}} \times 100\% = \frac{\$5{,}000{,}000}{\$10{,}000{,}000} \times 100\% = 50\%$$

Percent Out-of-Pocket Local: The percentage of total funds that are provided by local cash on hand, as opposed to borrowing. In effect, this variable is also equal to the percentage down payment on a loan. While some changes in net jobs impacts will occur under the assumption of other financial arrangements, for simplicity of use and calculation, we assume that any funds that are borrowed are paid back annually over a 10-year loan term with a fixed, 6 percent rate of interest. The percent Out-of-Pocket Local is simple to calculate. Using the previous example of a $10 million investment:

$$\frac{\text{Out of Pocket Local Funds (\$)}}{\text{Total Investment (\$)}} \times 100\% = \frac{\$3{,}000{,}000}{\$10{,}000{,}000} \times 100\% = 30\%$$

Percent Borrowed Local: The percentage of total funds invested in energy efficiency that is borrowed as opposed to provided upfront through cash or federal funds. Because the total local contribution is made up only of local funds borrowed and out-of-pocket local funds, any local funds that are not provided by cash on hand must be borrowed, and vice versa. Using the example immediately above, the percent Borrowed Local would be:

$$\frac{\text{Borrowed Local Funds (\$)}}{\text{Total Investment (\$)}} \times 100\% = \frac{\$2{,}000{,}000}{\$10{,}000{,}000} \times 100\% = 20\%$$

OTHER ITEMS OF INTEREST

There are perhaps two other aspects of the Jobs Calculator that should be mentioned. One item refers to the actual set of four job multipliers used by the calculator to provide estimates of net employment benefits. These refer to the direct and indirect jobs that are supported for every one million dollars of revenue received or lost by a particular sector of the U.S. economy.[5]

The reader might note immediately that the reason for a small but net positive job benefit is that the energy-related sectors of the economy are not especially labor-intensive. As suggested in footnote one, the numbers reflect actual values taken from a variety of publicly available economic data and made available by the Minnesota Implan Group.[6] Hence, as we make productive investments in those projects or technologies that save energy for businesses and consumers and as that money is spent on other goods and services within the U.S. economy, those differences in job multipliers suggest that a small net gain in total jobs should result from that more productive investment.

Secondly, the Jobs Calculator uses the assumption that further gains in labor productivity will also impact the total job gains—especially in the later years of the analysis. In this respect, the calculator draws on data published by the Bureau of Labor Statistics and provides specific annual rates of changes in total job requirements over time.[7] As an example, over the next 10 years it appears that the average annual improvement in labor productivity is about 1.9 percent. So if one million dollars today will support about 17 total jobs, in 10 years that same one million dollars will support only 14 jobs.

With all of these assumptions and notes we hope the ACEEE Jobs Calculator will help you understand both how and why your project might lead to small but net positive gains in employment. We also hope that it will help you design a fully funded stimulus proposal that will benefit you, your state or community, and the U.S. economy as a whole. If you have any questions about this Jobs Calculator, please contact:

John A. "Skip" Laitner
jslaitner@aceee.org
202-507-4029

or

Chris P. Knight
cknight@aceee.org
202-507-4042

Thanks and good luck with your policy analysis

[5] For users who might want a little more background on the use of input-output analysis, see: Laitner, Skip, Stephen Bernow, and John DeCicco. 1998. "Employment and Other Macroeconomic Benefits of an Innovation-Led Climate Strategy for the United States." *Energy Policy* 26:425-433. Though dated, the explanation of this analytical technique should still prove helpful.
[6] For further information on the IMPLAN data and their services, go to: http://www.implan.com.
[7] See: "BLS Employment Projections, 2006-2016," U.S. Bureau of Labor Statistics, Washington, DC.