

Energy Efficiency Program Job Creation Metric Review

Purpose: to determine a reasonable and well-supported metric for estimating job creation from energy efficiency programs.

EE Jobs Multipliers and Estimates – what we know now:

1. There is no single correct number – multiplier estimates are dependent on assumptions and projections.
2. No widely used national multiplier available.
3. Jobs numbers are hard to “equate” because of differing definitions and assumptions.
4. Clear communication of jobs estimate is challenging but crucial.

Findings:

1. Estimates for job creation for program spending range from 8 to over 200 jobs created per \$1 million in program spending. Excluding studies published before 2010, estimates range from 43 to over 200 jobs created.
2. Estimates for job creation for energy efficiency investments alone range from 12 to 20 jobs created per \$1 million in energy efficiency investment.

Terms Used: From the literature review, studies are categorized by:

1. Type of spending
 - a. Program spending – Dollars spent by funding agency on program implementation, rebates, etc., which can lead to direct implementation of energy efficiency upgrades and services.
 - b. Energy Efficiency investment – Dollars spent directly on energy efficiency upgrades and services (e.g. lighting upgrades, retro-commissioning services, etc.) by program implementers.
2. Types of jobs quantified
 - a. Direct jobs – jobs created or sustained from direct spending on the program (e.g. administration staff, program implementers, etc) or direct spending on energy efficiency equipment and services or jobs created or sustained as a result of program recommendations (e.g. program energy audit identifies capital upgrades, which were purchased and implemented)
 - b. Indirect jobs – jobs created or sustained from indirect spending on the program (e.g. program recommendations led to design services, manufacture of energy efficiency products, etc) or indirect spending on energy efficiency equipment and services (eg. Program implementers who received direct funding spend money on other goods and services).
 - c. Induced jobs – jobs created or sustained as a result of spending by residents and businesses due to reduced energy costs.

***Note: Some studies can slightly differ in definition and scope of types of jobs*

Jobs created per \$1M	Type of spending	Source	Year	Study period	Types of Jobs Quantified (Direct, Indirect, Induced)	Includes Non-Energy Benefits (NEB)?	Reference	Page #	Study Details
66	Program spending	SEDAC, based on ACEEE calculations, IO model, and SEDAC program data on jobs, investments, and energy savings as reported by SEDAC clients	2015	1	Direct, Indirect, Induced		http://smartenergy.illinois.edu/pdf/1EN_jobs.pdf	1	\$1 million in program funds supports 66 jobs. Number is higher than investment in energy efficiency alone, because program dollars (1) create direct jobs; (2) trigger investments in energy efficiency; and (3) achieve energy cost savings; all of which contribute to the total jobs created and retained.
43	Program spending	Bower, Steve, Sam Huntington, Tyler Comings, Walter "TJ" Poor. Economic Impacts of Energy Spending in Vermont. Creating an Efficient Economy and Jobs for the Future. ¹	2011	20 years	Direct, Indirect, Induced	Yes	http://aceee.org/files/proceedings/2012/data/papers/0193-000157.pdf	5-58	Every \$1 million dollar in program spending creates a net gain of 43 jobs (job/years). The study incorporated a multitude of economic drivers of efficiency programs, including sources and spending of funds (by economic industry), reduced utility bills, rate impacts due to reduced energy demand, and reduced obligations to the New England Independent System Operator.
75-257	Program spending	PA Consulting and Economic Development Research Group. Focus on Energy Evaluation, Economic Development Benefits: CY09 Economic Impacts. Prepared for State of Wisconsin Public Service Commission	2010	25 years	Direct, Indirect, Induced	Yes	https://focusonenergy.com/sites/default/files/cy09economicimpactsreport_evaluationreport.pdf	1-2	For every \$1 million invested in energy efficiency, 75-257 jobs (job/years) are created or sustained. Range is between energy efficiency jobs created or sustained from residential programs vs. business program. In the first 10 years of the Focus on Energy Program, study estimated the program created or sustained a total of 24,679 jobs (job/years). In 2026, study estimated the program will support a total of 91,741 jobs (job/years). Total also includes renewable jobs from Focus on Energy program.
81	Program spending	The Cadmus Group. Focus on Energy Calendar Year 2012 Economic Impacts Report. November 2013	2013	1 year	Direct, indirect, induced	Yes	https://focusonenergy.com/sites/default/files/FOE_XC_CY12_EconomicImpacts-Final_26NOV2013.pdf	23	For every \$1 million invested in energy efficiency, 81 jobs (job/years) are created or sustained. This analysis is different than the 2009 Focus on Energy jobs study as this study's time period is just for one year (2012), opposed to 25 years. Additionally, this study included as part of its economic modeling the amount of funding ratepayers contribute to the program.

¹ Note: ACEEE no longer recommends using program spending and a single multiplier to estimate jobs (MEEA communication with ACEEE, June 2015).

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8-16	Program spending	Gardner, John and Lisa A. Skumatz. Economic Impacts from Energy Efficiency Programs-Variations in Multiplier Effects by Program Type and Region.” In Proceedings for the 2007 European Council for an Energy Efficient Economy (ECEEE).	2007	Multiple period	Direct, indirect, and induced	Yes	http://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2007/Panel_3/3.315	21-22	Modeling economic impacts of weatherization and appliance rebate programs in two states, study estimates for every 1 million invested between 8-16 jobs are created.
12-17	Program spending	Geller, H. and M. Goldberg. Energy Efficiency and Job Creation in Colorado. Prepared for the Southwest Energy Efficiency Project.	2009	19 years	Direct, indirect, induced	No	http://www.swenergy.org/publications/documents/EE_and_Jobs_Creation_in_Colorado-April_2009.pdf	21-22	Study analyzed economic impact of increasing energy efficiency standards and programs. For every 1 million invested in electric efficiency programs, 17 jobs would be created. For every 1 million invested in gas efficiency programs, 12 jobs would be created. By 2025, study estimated a net increase of 11,600 jobs in the state from implemented policies and programming.
46-66	Program spending	Howland, Jamie, D. Murrow, L Petraglia, T. Comings. 2009. Energy Efficiency: Engine of Economic Growth. Prepared for Environment Northeast.	2009	15 years	Direct, indirect, induced	No	http://www.ctenergy.org/pdf/DSM_ESERPT.pdf	4	Every 1 million in energy efficiency, creates 46-66 jobs. Range of jobs differs per program (electric, natural gas, and unregulated fuels energy efficiency programs).
16	Program spending	Imbierowicz, Karen and Lisa Skumatz. The Most Volatile Non-Energy Benefits (NEBs) New Research Results: “Homing In” on Environmental and Economic Impacts.” In Proceedings of the ACCEE 1988 Summer Study on Energy Efficiency in Buildings. 8:156-167. Washington, D.C.: American Council for an Energy-Efficient Economy	2004	1 year	Direct, indirect, induced	Yes	http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel8_Paper14.pdf	8-161	Analyzed low-income weatherization programs and estimates every 1 million in energy efficiency, creates 16 jobs.

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216	Program spending	Oppenheim, Jerrold and Theo MacGregor. Energy Efficiency Equals Economic Development: The Economics of Public Utility System Benefit Funds. Prepared for Entergy.	2008	1 year	Direct, indirect, induced	Yes	http://www.energy.com/global/our_community/advocate/Poverty_book.pdf	4	Low income weatherization programs across their five states, created 216 jobs per \$1 million invested
17.4	EE investment	Garrett-Peltier, Heidi. Employment Estimates for Energy Efficiency Retrofits of Commercial Buildings. Political Economy Research Institute, University of Massachusetts, Amherst.	2011	1 year	Direct, indirect, induced	No	http://www.peri.umass.edu/236/hash/294809398e497bee9c8abef6ac7df2bdc/publication/466/	4	Every 1 million invested in energy efficiency retrofits will create 17.4 jobs
20	EE investment	American Council for an Energy-Efficient Economy ²	2011	1 year	Direct, indirect, induced	No	How does energy efficiency create jobs? http://www.aceee.org/files/pdf/fact-sheet/ee-job-creation.pdf	1	Energy efficiency creates 20 jobs + per million invested
11.5	EE investment	Natural Resources Defense Council (NRDC)	2002	N/A	N/A	N/A	http://www.rurdev.usda.gov/rd/farmbill/2002/9006/NRDC-comments.pdf *Link is now broken. Can no longer find document.	2	Based off the results of New York Energy Smart Program. Study concluded for each \$1 million investment results in over \$ 3 million in direct and indirect benefits. Additionally, for every \$1 million invested in energy efficiency, 11.5 jobs are created
16.7	Green investment	Robert Pollin, Professor of Economics and Co-Director of Political Economy Research Institute (PERI), University of Massachusetts-Amherst citing 2005 U.S. Commerce Department data.	2008	1 year	Direct, indirect, induced	No	2008-10-24-RobertPollin.pdf Testimony before House Committee on Education and Labor Hearing on “Building an Economic Recovery Package: Creating and Preserving Jobs in America” http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/pollin_testimony.pdf	4	\$1 million invested in “Green investments” generates 16.7 jobs. Note: Green investment includes energy efficiency, renewables, public transportation and smart growth.

² Id.

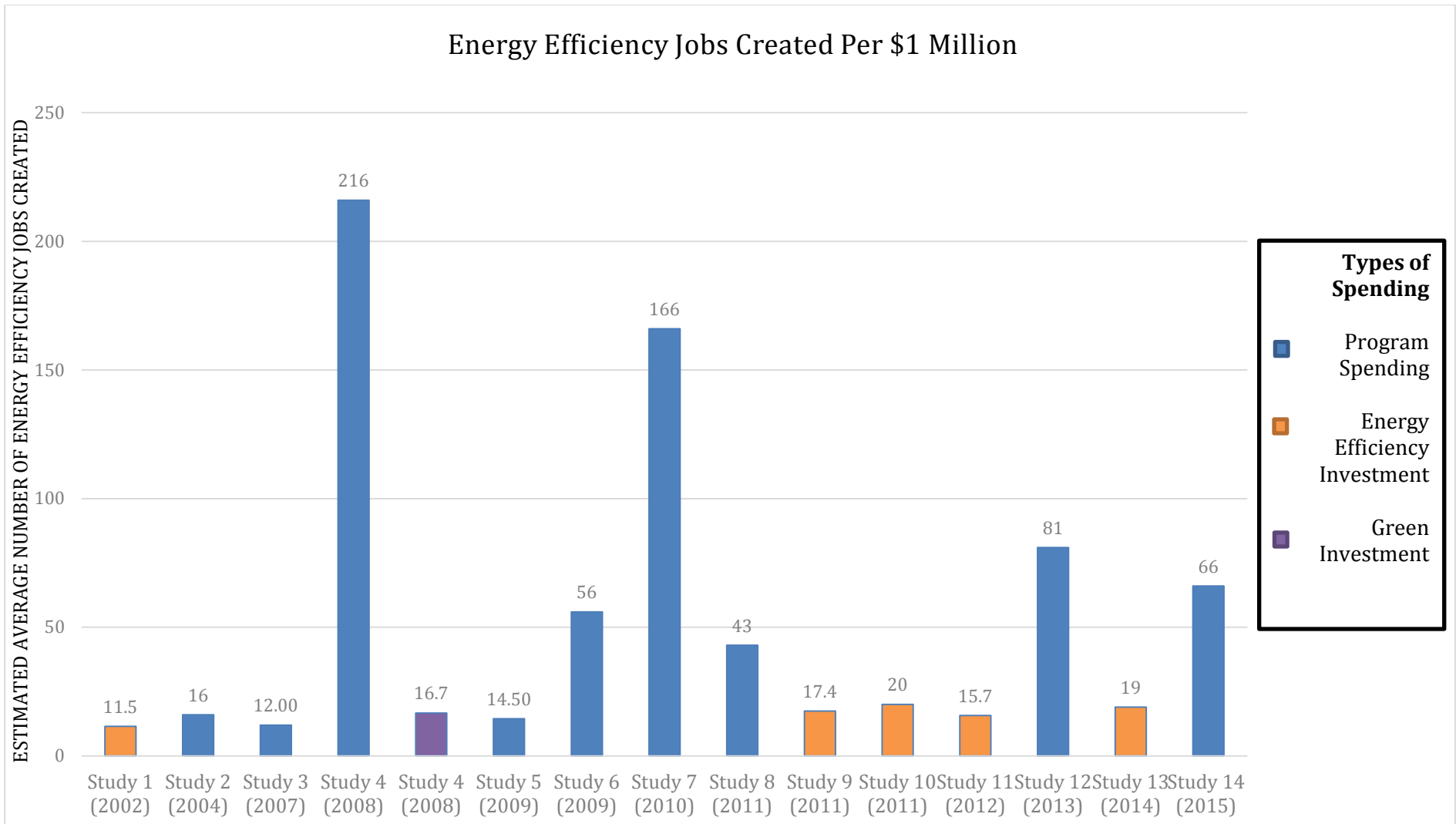
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19	EE investment	Anderson, DM, OV Livingston, DB Belzer, MJ Scott. Accessing National Employment Impacts of Investment in Residential and Commercial Sector Energy Efficiency: Review and Example Analysis. Pacific Northwest National Laboratory. Prepared for the US Department of Energy.	2014	1 year	Direct, indirect, induced	No	http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-23402.pdf	ii	Literature review shows that initial investments in energy efficiency generate about 11 jobs per million dollars of investment. Additionally, spending money made available by reducing energy expenditures generates a net gain of about 8 jobs per million dollars of consumer bill savings.
15.7	EE investment	Burr, A. C Majersik, S Stellberg, H Garrett-Peltier. Analysis of Job Creation and Energy Cost Savings from Building Energy Rating and Disclosure Policy. Institute for Market Transformation, Washington, DC.	2012	20 years	Direct, indirect, induced	No	http://www.peri.umass.edu/fileadmin/pdf/other_publication_types/PERI-IMT-2012-Analysis_Job_Creation.pdf	11	For every \$1 million in energy efficiency, 15.74 jobs are created. Study also separates jobs by direct, indirect, and induced. Additionally, the study provides employment estimates for type of upgrade.
40	EE investment	Nicor Gas (internal study)	2014	?	Direct, indirect, induced	No	N/A	N/A	For every \$1 million in energy efficiency, 40 jobs are created. Multiplier takes into account a reduction in jobs.
\$1 EE spend = \$0.80 output	Economic impacts ³	Center for Strategic Economic Research (CSER). Economic Contributions of Pacific Gas and Electric Company. Prepared for Pacific Gas and Electric Company. ⁴	2014	2012	Direct, indirect, induced (4,600 direct jobs in 2012, 3,100 indirect and induced jobs – totaling 7,700 jobs)	No	http://www.pgecurrents.com/wp-content/uploads/2014/02/pge-impacts-report_final.pdf	7-10	PG&E's customer energy efficiency programs in 2012 led to a total annual economic impact of close to 7,700 jobs, \$452.4 million of labor income, \$1.1 billion of output, and \$53.8 million of state and local tax revenue. Every dollar associated with PG&E's customer energy efficiency programs supported another 80 cents of output in the economy according to the multiplier effect which accounts for the full range of economic impacts resulting from program spending and the insertion of bill savings from avoided energy use back into the economy.

³ The CSER report includes general operations impacts, customer energy efficiency programs impacts, and community investment program impacts. CSER Report at i.

⁴ "CSER utilized the IMPLAN input-output model (2011 Coefficients) to conduct the economic impact analysis and calibrated the model to reflect the Service Area, four PG&E regions within the Service Area, and California economies as well as specific PG&E activities based on information provided directly by the company for the year 2012. § The analysis accounted for direct spending leakages out of the geographic areas as well as captured indirect and induced effects." CSER Report at 14.

Additional examples of job quantification:

Jobs created per \$1M	Type of spending	Source	Year	Study period	Types of Jobs Quantified (Direct, Indirect, Induced)	Includes Non-Energy Benefits (NEB)?	Reference	Page #	Study Details
N/A	Green Economy	Muro, M.; Rothwell, J., and Saha, D. 2011. Sizing the Clean Economy: A National and Regional Green Jobs Assessment. Washington, DC: Brookings. Brookings Insitute	2011	2003-2010	Direct	No	http://www.brookings.edu/research/reports/2011/07/13-clean-economy	N/A	This is a retrospective analysis of actual employment data, covering a broad spectrum of the green economy. The EE-related job classifications are a subset of the study.
N/A	N/A – job survey	Clean Jobs Illinois Report. Clean Energy Trust in collaboration with BW Research Partnership, ELPC, NRDC, E2, Energy Foundation, and The Joyce Foundation.	2015	2015	Actual jobs	No	http://www.cleanjobsillinois.com/2015/#ch/top		This is a survey to count the number of jobs that exist and factors in new job growth, including renewables, EE, etc. Employers were screened on whether they do work on clean energy; how many employees work there; etc. Survey completed by BW Research Partnership. Total jobs = 104,449; of those jobs, 66% are in the EE industry.



Note: For studies with a range of jobs identified, average jobs created is used for graphing purposes.