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Pacific Northwest
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U.S. Department of Energy

Impact of 2004 Office of Energy Efficiency and Renewable Energy Buildings-Related Projects on United States Employment and Earned Income

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Abstract

The Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) is interested in assessing the potential economic impacts of its portfolio of projects on national employment and income. A special purpose version of the IMPLAN input-output model called ImBuild II is used in this study of all 37 buildings-related projects reported to the Office of Management and Budget on February 3, 2003 for inclusion in the revised fiscal year (FY) 2004 budget request. Energy savings, investments, and impacts on U.S. national employment and earned income are reported by project for selected years to the year 2030. Energy savings and investments from these projects have the potential of creating a total of 297,000 jobs and about $ 4.16 billion in earned income (2002$) by the year 2030.

Summary

As part of measuring the impact of government projects for improving the energy efficiency of the nation's building stock, the Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) is interested in assessing the economic impacts of its portfolio of projects, specifically the potential impact on national employment and income. This assessment was done for the first time in FY 1999 as a supplement to the Government Performance and Results Act (GPRA—formerly, Quality Metrics) analysis for EERE. The GPRA analysis provides estimates of primary energy savings and environmental and direct financial benefits of the 37 EERE projects related to the buildings sector. The current analysis performs this assessment on the FY2004 budget request from EERE.

The programmatic needs of EERE suggest that a simple, flexible, user-friendly method is needed to derive national employment and income impacts of individual EERE projects. Therefore, EERE funded Pacific Northwest National Laboratory (PNNL) to develop a special-purpose national input-output model called ImBuild, the latest version of which is ImBuild II (Scott et al. 2002). In this report, we use the ImBuild II model to calculate the impact of all 37 EERE projects related to the buildings sector, based on the final Weatherization and Integovernmental Activities budget and Building Technologies Program budget submitted February 3, 2003.

EERE projects affect the economy through three primary mechanisms. First, if the incremental capital costs of the new technology per installed unit are different from those of the conventional technology, the level of purchases will change in the sectors involved in manufacturing, distribution, and installation for both technologies, changing the level of overall economic activity. Second, the efficiency investment may crowd out other domestic saving, investments, and consumer spending, offsetting some positive impact on the economy caused by the new efficiency investment. Third, energy and non-energy expenditures are reduced. On the one hand, this saving reduces final sales in the electric and gas utility sectors, as well as in the trade and services sectors that provide related maintenance, parts, and services. But, on the other hand, it increases net disposable income of households and businesses and increases general consumer and business spending in all sectors (including some increases in expenditures for electric and gas utility services and retail trade and services).

Energy efficient technology is expected to have a measurable effect on the activity level of the U.S. economy. EERE projects are characterized by significant investment requirements and delivered energy cost savings. Due to reorganization of the Office of Energy Efficiency and Renewable Energy that occurred during the year 2002, the EERE projects related to buildings have been gathered into two groupings. The first, the Weatherization and Intergovernmental Program, is a group of projects mostly focused on implementing currently available efficient technology and overcoming market barriers. It consists of three decision units: Weatherization Assistance, all State Formula Grants projects, and Gateway Deployment. The latter consists of Energy Star (which is actually a group of seven specific technology projects), Rebuild America, Information Outreach, and Training and Technical Assistance. The impacts of the Weatherization and Intergovernmental Program are summarized in Figure S.1 and

Table S.1.[(a)] Figure S.1 and Table S.1 show the energy savings expected to be created by market penetration of these projects have the potential of creating nearly 133,000 jobs and about $1.61 billion in earned income (2002$) by the year 2030. However, the net gains would be affected by the intensive investment in new energy technology and new building practices would be required during the first 30 years of the 21st century. These effects are incorporated in the full investment scenario shown in the lower half of Table S.1. Because the Weatherization and Intergovernmental Program investment tends to be concentrated in capital-intensive, high-wage industries, there is a slight net negative impact on employment and positive impact on earnings from this group of investments. Many of the capital investments required to achieve these savings begin early in the 30-year period.

To be in concert with a recent analysis of the Department of Energy's Energy Research and Development program by the National Research Council (NRC) of the National Academy of Sciences, the analysis in some cases only takes credit for the first three to ten years of market impact. The NRC used a simplifying assumption that government R&D programs do no more than accelerate the technology; bringing it to market five years before the private sector would have without government intervention. The net effect of this assumption is that incremental investments due to the EERE projects are overtaken by "normal" investments, which would limit both the savings and investments due to the EERE projects. However, the more complete analysis of EERE projects performed for this report shows that the impacts on investment and energy savings result from the interaction of four factors: 1) the size of the (usually growing) market at each point in time, 2) the penetration rate for the EERE technologies and practices, based on lifetime cost savings vis-à-vis conventional technology and the associated payback period for the investment, 3) increases in the efficiency of dollar of incremental investment, based in turn on the sales-volume based rate of decline in the price of the technology and the higher durability of the EERE technology, and 4) the market-transformation, crowding-out effects of one technology on market prospects of all of its potential competitors. This results in a "hill-like" pattern of project-related efficiency investments shown in the upper left-hand panel of Figure S.1, and in Table S.1

(a) In this analysis, we used project information from Anderson et al. (2003) that PNNL prepared with DOE/EERE project managers. Delivered energy is used to calculate potential savings resulting from reduced demand for electrical generating capacity and natural gas pipeline capacity. See Scott et al. (2002).

Table S.1. Impact of the Weatherization and Intergovernmental Program on the U.S. Economy

Incremental Investment Cost (Million 2002$)		Delivered Energy Saved (10^{12} Btu)	Potential Jobs Created (Thousand)	Impact on National Earnings (Million 2002$)
Impact of Energy Savings Alone				
2004	0	30	5	$49
2005	0	55	6	$68
2006	0	83	9	$105
2007	0	105	11	$134
2008	0	132	15	$171
2010	0	198	24	$272
2015	0	412	56	$667
2020	0	629	94	$1,133
2025	0	764	118	$1,425
2030	0	862	133	$1,607
Impact of Full Investment Scenario				
2004	$1,967	30	3	$154
2005	$2,372	55	4	$193
2006	$2,637	83	7	$245
2007	$2,919	105	10	$291
2008	$3,031	132	13	$334
2010	$3,689	198	22	$474
2015	$3,565	412	54	$857
2020	$3,026	629	93	$1,296
2025	$2,083	764	117	$1,542
2030	$1,272	862	133	$1,687

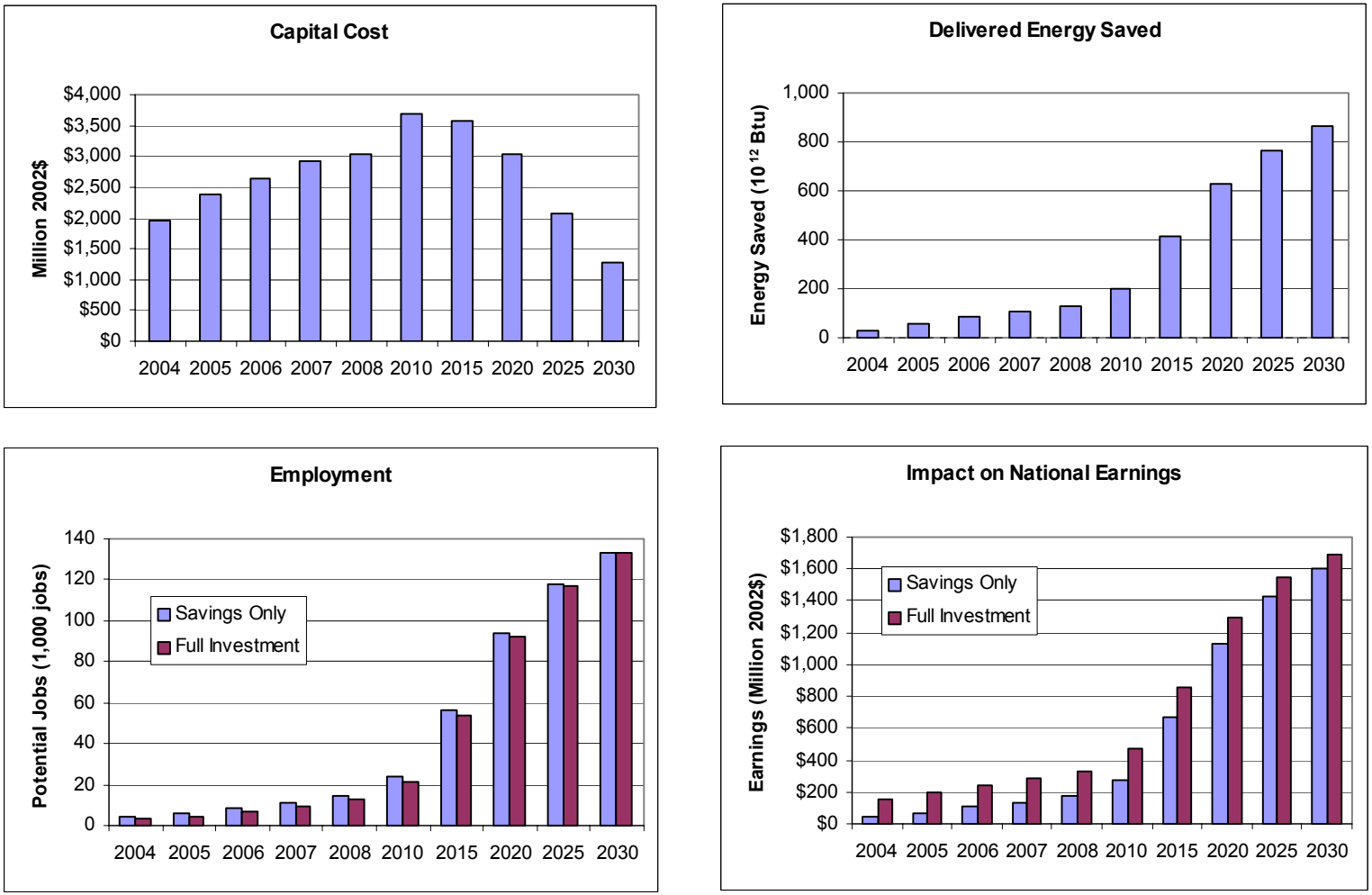

Figure S.1. Impact of the Weatherization and Intergovernmental Program on the U.S. Economy

The rest of the EERE buildings-related projects are grouped together under the Building Technologies Program. As the name suggests, this is a group of projects that is focused on advancing the development of new technologies and analysis techniques for the building sector. It comprises Residential Buildings Integration, Commercial Buildings Integration, Emerging Technologies (in lighting, refrigeration, appliances, windows, and insulation), and Equipment Standards and Analysis decision units. The impacts of the Building Technologies Program are summarized in Figure S.2 and Table S.2. The energy savings associated with these projects have the potential of creating nearly 172,000 jobs and about $2.18 billion in earned income (2002$) by the year 2030. Not all of the gains would be immediately apparent because intensive investment in new energy technology and new building practices would be required during the first 30 years of the 21st century. Because the Buildings Technologies project investments tend to be concentrated in capital-intensive, high-wage industries, there is a slight net negative impact on employment and positive impact on earnings from this group of investments.

Table S.2. Impact of the Building Technologies Program on the U.S. Economy

Incremental Investment Cost (Million 2002$)		Delivered Energy Saved (10^{12} Btu)	Potential Jobs Created (Thousands)	Impact on National Earnings (Million 2002$)
Impact of Energy Savings Alone				
2004	0	9	2	$21
2005	0	20	3	$33
2006	0	36	5	$55
2007	0	55	7	$82
2008	0	89	11	$140
2010	0	190	23	$282
2015	0	565	63	$773
2020	0	943	112	$1,424
2025	0	1,208	146	$1,855
2030	0	1,469	172	$2,182
Impact of Full Investment Scenario				
2004	$846	9	1	$63
2005	$1,260	20	1	$97
2006	$1,580	36	3	$136
2007	$1,891	55	5	$179
2008	$3,195	89	6	$283
2010	$4,389	190	17	$489

Incremental Investment Cost (Million 2002$)		Delivered Energy Saved (10^{12} Btu)	Potential Jobs Created (Thousands)	Impact on National Earnings (Million 2002$)
2015	$6,415	565	54	$1,083
2020	$5,737	943	103	$1,677
2025	$5,678	1,208	138	$2,127
2030	$6,094	1,469	164	$2,475

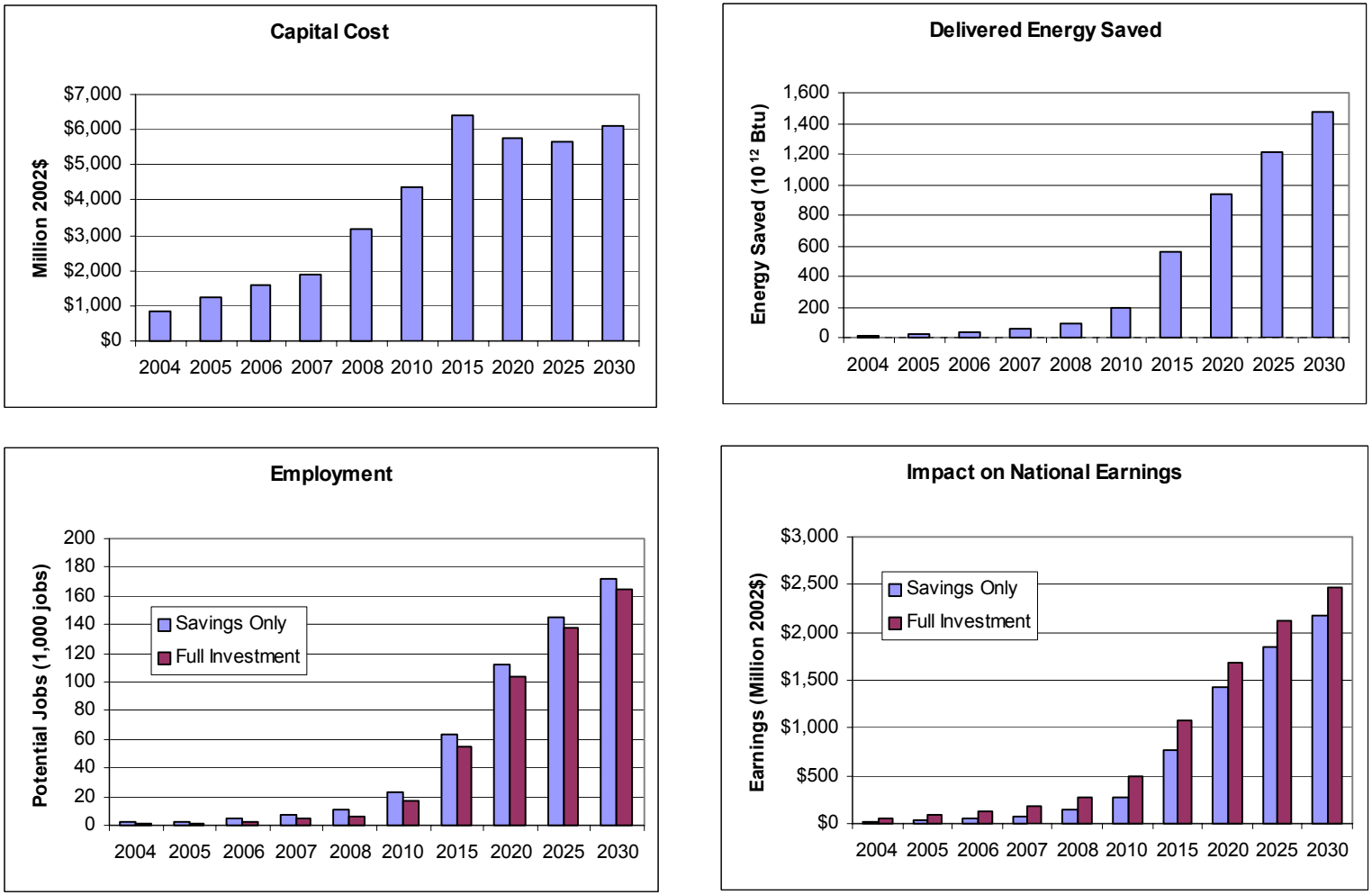

Figure S.2. Impact of the Building Technologies Program on the U.S. Economy

Figure S.3 and Table S.3 show that the energy savings expected to be created by market penetration of all of the EERE buildings-related projects, taken together, have the potential of creating nearly 305,000 jobs and about $4.16 billion in earned income (2002$) by the year 2030. Again, not all of the gains would be immediately apparent because intensive investment in new energy technology and new building practices would be required during the first 30 years of the 21st century. These effects are incorporated in the full investment scenario shown in the lower half of Table S.3. For the most part, this incremental investment in energy technology, contrary to its popular image, is likely to be more capital-intensive than the average consumption and investment in the economy. This difference is due to the fact that most of the increment to investment occurs in capital-intensive manufacturing processes. Because we assume the capital required to make the energy efficiency investments is diverted proportionately from all competing uses for money in the economy (a large proportion of which is personal and business consumption of labor-intensive goods and services such as groceries, clothing, travel services, or personal and business services), the investments reduce the employment level in the short run.

Only when the energy benefits of cumulative efficiency investments have grown large, relative to the costs of current investment, would the full impacts on employment and income become visible. Thus, in the full investment scenario, as the energy technologies and practices associated with the 37 EERE buildings-related projects penetrate the U.S. marketplace over the next 30 years, the required capital investments are significant and increasing over most of the period, reaching a peak of about $10 billion *per year* in 2015. These required investments divert national spending into capital-intensive sectors and initially reduce employment below what it otherwise would have been. However, the energy savings associated with these same investments (2 quads per year by the year 2030, worth over $38 billion) are true economic savings that provide new economic opportunities, generate ever-increasing numbers of jobs and higher income, and eventually become the dominant economic result of the EERE projects.

More than half of the net jobs (57%) and net earned income benefits (56%) of the 37 projects come from only six of the projects: Building Codes Training and Technical Assistance, Energy Star CFLs, Commercial Building Energy Codes, Next Generation Lighting Initiative, Window Technologies' Superwindows, and EPACT Standards. These six projects are large-scale, cost-effective projects that are expected to produce large energy savings relative to the investments required. By the year 2030, five out of six of these projects each will produce net annual savings to the U.S. economy (*after* investment costs) over $1.3 billion per year (about $18 billion together) and 183,000 net total jobs (after investment effects). If the Energy Star projects and Emerging Technologies projects are counted as single projects, they account for net savings impacts of $8.5 billion and $7.6 billion, respectively, and have a combined positive impact of 164,000 net total jobs. The impacts of most of the other EERE buildings-related projects are on a much smaller scale.

Table S.3. Impact of 37 EERE Buildings-Related Projects on the U.S. Economy

Incremental Investment Cost (Million 2002$)		Delivered Energy Saved (10^{12} Btu)	Potential Jobs Created (Thousands)	Impact on National Earnings (Million 2002$)
Impact of Energy Savings Alone				
2004	0	39	7	$70
2005	0	75	8	$101
2006	0	118	13	$160
2007	0	161	18	$216
2008	0	221	26	$311
2010	0	387	47	$555
2015	0	976	120	$1,441
2020	0	1,572	207	$2,557
2025	0	1,973	263	$3,280
2030	0	2,331	305	$3,789
Impact of Full Investment Scenario				
2004	$2,813	39	4	$217
2005	$3,632	75	5	$290
2006	$4,217	118	10	$381
2007	$4,810	161	14	$469
2008	$6,226	221	19	$616
2010	$8,077	387	38	$962
2015	$9,980	976	109	$1,940
2020	$8,763	1,572	196	$2,973
2025	$7,761	1,973	255	$3,669
2030	$7,366	2,331	297	$4,162

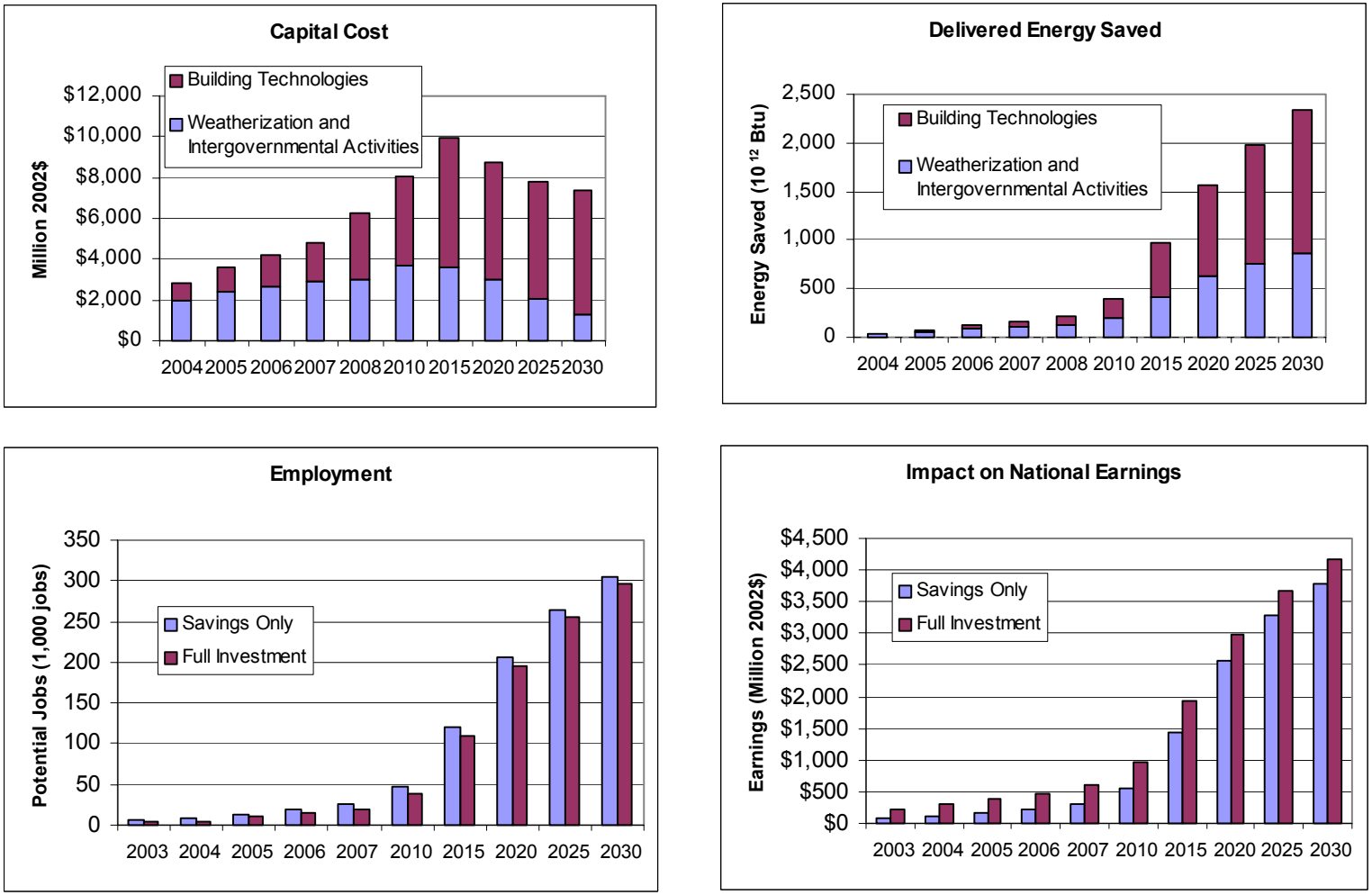

Figure S.3. Impact of 37 EERE Buildings-Related Projects on the U.S. Economy

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Acronyms

Term	Definition
AC	Air conditioning
CFL	Compact fluorescent lamp
DOE	Department of Energy
EERE	Office of Energy Efficiency and Renewable Energy
EIA	Energy Information Administration
FY	Fiscal year
GDP	Gross Domestic Product
GPRA	Government Performance and Results Act (formerly, Quality Metrics)
HVAC	Heating, Ventilating and Air Conditioning
ImBuild	Special purpose version of IMPLAN (PNNL)
IMPLAN	Impact Analysis for Planning
NAS	National Academy of Sciences
NRC	National Research Council
PNNL	Pacific Northwest National Laboratory
R&D	Research and Development
RIMS II	Regional Input-Output Modeling System
SIC	Standard Industrial Classification

Contents

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Tables

1.0 Methods

1.1 Introduction

A primary goal of the Department of Energy (DOE) Office of Energy Efficiency and Renewable Energy (EERE) is to save energy. However, EERE projects also have economic impacts as energy investments, and the resultant energy savings, play out in the national economy. As part of measuring the impact of government projects on improving the energy efficiency of the nation's building stock, EERE is interested in assessing the economic impacts of these projects, specifically the impact on national employment and earned income. As a consequence, EERE funded Pacific Northwest National Laboratory (PNNL) to develop a simple-to-use method that could be used in-house to estimate economic impacts of individual projects.

Three fundamental methods are available to estimate employment and earned income impacts for selected energy efficiency improvements in the U.S. economy: multipliers, input-output models, and macroeconomic simulation models. PNNL staff reviewed the EERE programmatic needs and available methods and, based on this assessment and on realistic resource constraints, designed and developed a special-purpose version of the IMpact Analysis for PLANning (IMPLAN) national input-output model (Minnesota IMPLAN Group, Inc. 1997) specifically to estimate the employment and income effects of building energy technologies. IMPLAN was developed originally by the U.S. Forest Service in cooperation with the Federal Emergency Management Agency and the Bureau of Land Management to assist the Forest Service in land and resource management planning. Since 1979, it has been used by a wide variety of government and private agencies to assess economic impacts. The special-purpose version of the IMPLAN model developed by PNNL was called ImBuild. The version used in this study is called ImBuild II. Extensive documentation and a user's guide are provided in Scott et al. (2002), which discusses the methods, structure of the ImBuild II model, its testing and performance. For a detailed discussion of the methodology used in this study, refer to that report. Compared with simple economic multiplier approaches, such as the published multipliers from the Department of Commerce Regional Input-Output Modeling System (RIMS II) (Bureau of Economic Analysis 1992), ImBuild II allows for more complete and automated analysis of the economic impacts of energy efficiency investments in buildings. ImBuild II is also easier to use than existing macroeconomic simulation models.

In comparison with simple multipliers, ImBuild II allows for more complete and automated analysis of essential features of energy efficiency investments in buildings. ImBuild II is also easier to use than extant macroeconomic simulation models. It does not include the ability to model certain dynamic features of markets for labor and other factors of production featured in these more complex models, but for most purposes these excluded features are not critical. Such impacts can be handled well by an input-output model and the analysis should be credible, as long as the assumption can be made that relative prices in the economy would not be substantially affected by energy efficiency investments. The expected scale of these investments is small enough in most cases that neither labor markets nor production cost relationships will seriously affect national prices as the investments are made. The exact timing of impacts on gross product, employment, and national earned income from energy efficiency

investments is not well enough understood that much special insight can be gained from the additional dynamic sophistication of a macroeconomic simulation model. Thus, ImBuild II is a cost-effective compromise.

1.2 Calculation of Impact Using ImBuild

As cost-effective, energy-efficient technologies penetrate the marketplace, EERE buildings-related projects will affect national employment and earned income. To analyze these effects, the ImBuild II model requires certain information on the projects: the size of the incremental investment in the technology over time compared with the conventional technology it replaces, corresponding energy savings by fuel in physical and monetary terms (which may include additional use of some fuels when one type of fuel replaces another), and non-energy operations savings (if any) in comparison with the current technology (Figure 1.1).

ImBuild II calculates changes in the use of energy, labor, and materials due to incremental investments and economic savings associated with EERE-supported technologies and practices, as shown in Figure 1.1. As the figure illustrates, new investments in these technologies affect the level of employment and earned income in the economy by multiple pathways. First, the procurement of equipment and installation services creates jobs and income in some industries, while diverting funds that otherwise would have been spent for other goods and services by businesses and consumers. At the same time, the investment in energy-efficient technologies or practices may make other investments in energy supply technologies (for example, power plants) unnecessary, directly and indirectly affecting jobs and income.

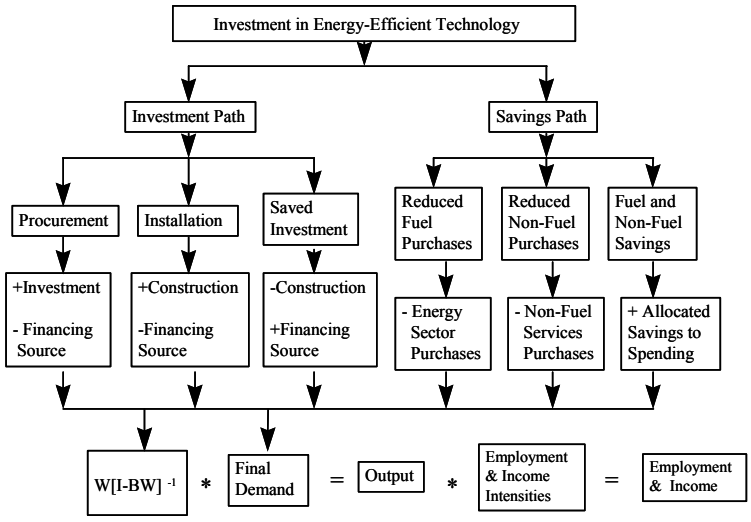

Figure 1.1. Detailed Calculations of the ImBuild II Model

The issue is discussed in more detail in Scott et al. (2002).[b] For this report, we assumed that financing for the energy-efficient investments is drawn proportionately from the rest of the U.S. economy.[c] Figure 1.1 also shows that an investment in energy-efficient technology reduces the amount of energy needed. Reducing energy consumption reduces energy purchases (which in turn reduces employment and income in the energy-supplying sectors) and produces dollar savings that can be spent on any good or service, including energy (which creates employment and income). In addition, some energy efficiency investments may save the purchaser other costs such as maintenance services, and these savings also have impacts.

All of these pathways in Figure 1.1 either affect the interindustry intermediate procurement (the matrix $W[I-BW]^{-1}$ in Figure 1.1) or the final demand (the set of goods and services in the economy purchased for final consumption or new investment, as distinguished from those purchased merely as intermediate inputs to current production). In residential applications, the necessary model calculations are relatively straightforward, because residential savings are assumed to be entirely recycled into personal consumption and investment (that is, final demand). For commercial building applications, the process is more complicated because the interindustry relationships between specific sectors are affected, not just final demand. For savings in the commercial sector, the interindustry portion of the input-output table is automatically recomputed; then the model is run with the recomputed table. Because the energy and maintenance intensity of the commercial sector changes, the coefficients of the input-output structure are automatically recalculated at each time step. The financial impacts of energy and non-energy cost savings (for example, savings in building maintenance) are computed by the model. These savings are treated like "free" income, available to be saved or invested by the sector collecting the income.

A brief hypothetical example from Scott et al. (2002) illustrates the concepts and functioning of the ImBuild II model. It is assumed that consumers spend a premium of $100 million on more-efficient residential heating and air-conditioning equipment in the year 2000, which each year thereafter saves them $15 million in electricity, $30 million in natural gas, and $5 million in building maintenance expenditures, for annual savings of $50 million. This $50 million annual savings yields a simple payback period of 2 years. The first two cases in Figure 1.2 show the employment effects of the $50 million savings alone. In the first case, the savings are confined to the residential sector. The second case shows how the impacts would change if these energy savings had instead been experienced in the commercial sector, where the savings are initially experienced as an increase in the profitability of those businesses saving the energy.

(b) For this report, we estimated electric power plant construction savings at about $590/kW of delivered electric energy, based on data in EIA (2002) and the equivalent value for natural gas, about $1.20/cubic foot/day capacity, based on EIA (1996) and EIA (1999). These values have not changes significantly in recent years.

(c) It is assumed that personal (household) consumption represents 70% of spending; gross private fixed investment, 10%; federal defense spending 2%; federal non-defense spending, 6%; and state and local government spending, about 12%. These percentages are close to the actual distribution of final demand among these sectors in the U.S. economy.

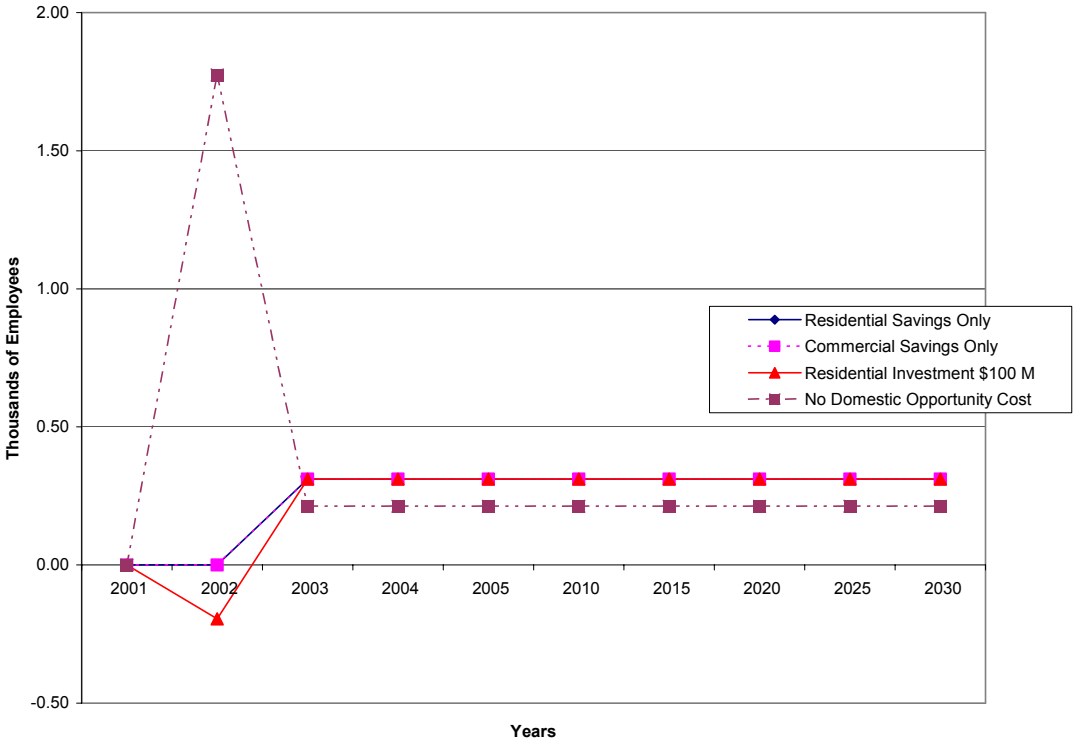

Figure 1.2. Impact on National Employment of a Hypothetical Once-only $100 Million Investment in Appliance Efficiency

These profits are assumed to be *recycled* in the economy as spending by workers, spending by the firms themselves, and by governments experiencing increases in tax collections. In the first case, the energy savings in the residential sector of $50 million have a net impact on the U.S. economy of about 310 jobs, or about 0.6 additional jobs per $100 thousand dollars of direct energy savings. The impact is virtually identical if the energy savings occur in the commercial sector, because the employment intensity of the spending mix of businesses, their workers, and government associated with commercial savings is only slightly different from the spending intensity of the household sector alone, which is associated with residential saving. Next, Figure 1.2 adds a third and fourth case to show the employment impacts of the $100 million investment itself. The third case shows the impact of the investment premium. In this case, even though investment in the technology itself generates employment, the short run net employment impact is negative (*minus* 200 jobs) because the opportunity cost of the investment premium is the dollar amount the investment would have produced elsewhere in the U.S. economy, which on average is more labor-intensive than the manufacturing sector that makes the new technology.[(d)] Typically, efficiency projects are considered relatively labor-intensive, but this is not always the case. Heating and air conditioning manufacture, for example, is quite capital-intensive. The strength and direction of the

(d) Strictly speaking, the labor intensity that counts is the employment, direct *and indirect*, that is created by each dollar of spending. Thus, it is theoretically possible for a capital-intensive industry to buy lots of labor-intensive inputs from other industries and the total effect to be labor intensive as a result.

investment effect depends on the size of the investment premium and its combined domestic U.S. direct and indirect labor intensity, relative to that of other domestic spending (the opportunity cost of the investment). For the employment impact of the investment to be positive, the sectors supplying the new technology must on average create more domestic jobs per dollar of spending than does other domestic spending. An extreme form of this positive investment effect would occur, if the investment were financed internationally (that is, no domestic opportunity cost is included). This is the fourth case in Figure 1.2, which shows a short-run jobs impact of more than 1770 and a long-run jobs impact of 210. The fourth case also corresponds to many regional analyses that have been made of energy conservation impacts, where the investment funds are assumed to come from *somewhere else* and have no opportunity cost in the region.

The energy and non-energy savings from installation of efficient technology do not affect employment in the national economy until reinvested or spent. For purposes of the analysis conducted for this report, we assume that any increments to the economic value-added in each sector as a result of the investment (that is, the energy and non-energy savings) are allocated to compensation of labor, capital, and business taxes in the same proportions as all other value-added[(e)] in that sector. The income of each sector then is assumed to be spent on investment and consumption of goods and services (final demand) in the same proportions as existing compensation of labor, capital, and government. That is, if a given sector captures 1% of all personal consumption expenditures in the economy and a 0.7% share of all business fixed investment, it will receive these same percentage shares of the efficiency-related increase in spending. Similarly, if labor compensation represents 70% of the baseline total value added in an industry, it will receive 70% of any energy savings in that industry. Finally, labor compensation, business profits and taxes are allocated to consumption, investment, and government spending, according to current proportions.

ImBuild accumulates the energy and non-energy savings in the residential buildings sector and the changes in economic value-added associated with energy and non-energy savings within the commercial buildings sector. The model then calculates spending impacts associated with these savings by proportionately increasing final demand across all sectors as noted previously, while at the same time reducing final demand in the sectors supplying the resources that are saved. This step accounts for the spending associated with the monetary savings and improvements in technological efficiency and for the associated shift from energy to non-energy spending. It also accounts for changes in the patterns of activity in the economy due to technological change caused by the EERE projects (that is, less electricity is used per dollar of output in retailing because of more efficient lighting).[(f)]

(e) Economic value-added is the value of output of the sector, less the cost of purchased materials and services. The sum of value-added in all sectors is Gross Domestic Product (GDP).

(f) ImBuild does not account for all of the long-term run impacts of the technological change. The change in energy-using capital in the commercial sector would alter the marginal value of all of the factors of production (including both labor and capital) and would induce a rearrangement of capital and labor that would ultimately result in an increase in output and in final demand. We show the multiplier effect created by spending of the energy and non-energy savings, but not the productivity effect of increased capital stock that would be created by the investment portion of the spending. Most economic models, including many dynamic simulation models, do not completely reflect the effect of capital accumulation and growth in capacity on final output and employment.

ImBuild collects the estimates of the initial investments, energy and non-energy savings, and economic activity associated with spending of the savings (increases in final demand in personal consumption, business investment, and government spending), and provides overall estimates of the increase in national output for each economic sector using the adjusted input-output matrix. Finally, the model applies estimates of employment and earned income per dollar of economic output for each sector and calculates impacts on national employment and earned income.

2.0 Analysis

2.1 EERE Buildings-Related Projects

This analysis encompasses the EERE buildings-related projects that were evaluated for FY 2004 in response to the Government Performance and Results Act (GPRA). Table 2.1 shows the level of incremental residential and commercial investments and net energy savings in the selected years 2004, 2005, 2010, 2020, and 2030 for the buildings-related projects that were evaluated. Each project is designated with a numerical project code or "Projcode" to ensure ease in numerical modeling and for tracing a given project as it undergoes periodic name changes. It is important to note that the values in Table 2.1 represent levels of *current* investment and energy and non-energy savings in the year shown, because it is *current* investment and *current* energy and non-energy savings that determine the impact on employment and earned income. Reported in this way, the values in Table 2.1 cannot be used to determine a rate of return on any particular investment because an investment in a given year provides a stream of savings over several years, and the energy savings experienced in any particular year are a function of the cumulative previous investment in energy efficiency. The investment and energy savings levels in a given year affect the level of gross domestic product (GDP) in that year, in turn affecting the level of national employment and earned income. Although the projects differ from each other in size and timing, for the most part the annual investment exceeds the annual savings early in the period, and savings tend to dominate later on. In a few cases, the early investments are expected to be so durable and to fall so much in cost that the later years show investment savings vis-à-vis conventional technology.

The differences in investment reflect differences identified by the analysis as the size of the potential market opportunity or market niche for each project, differences in the expected rate of market penetration into each niche, and differences concerning the incremental cost of the new technologies and practices penetrating the market, compared to the more conventional technologies or practices that they replace. By 2030, about eight percent of the total value of energy savings occurs in projects like Commercial Building R&D or Analysis Tools and Design that are not projected to require any incremental investment over and above standard practice. Current savings do not necessarily correlate well with current investments. Some technologies and practices are expected to be extremely cost-effective and require relatively little incremental investment, while others require relatively more incremental investment or may be less cost-effective. Savings are also sensitive to timing. For example, some projects like Energy Star Water Heaters are expected to be still in the midst of their intensive incremental investment phase in the year 2030, while others like Rebuild America are largely completed and are enjoying pure savings by that date. For Weatherization and Intergovernmental Program details and Building Technologies Program project details, refer to the GPRA documentation report (Anderson et al. 2003).

Many of the EERE buildings-related projects have increasing market penetration and investment levels through the year 2030. Thus, the energy savings levels for many of the projects are expected to increase far beyond 2030. By the end of the period shown in Table 2.1, total annual savings have substantially exceeded total annual investments, and are continuing to accelerate. Investments as a group have begun to flatten out by 2015. Some of the incremental adoption of the technologies and the energy investments

due to the projects accelerates an adoption process that would have occurred later, anyway. Incremental investments due to these EERE projects are overtaken by "normal" investments in the space of three to ten years, depending on the project. In other cases, it can be argued that the technology or practice never would have been developed without the EERE project; therefore, the investment and savings would not have been overtaken in the marketplace. For details, see Anderson et al. (2003).

Table 2.1. Levels of Investment Cost and Savings from EERE Buildings-Related Projects in Fiscal Years 2004, 2005, 2010, 2020, and 2030

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	**2005**	**2010**	**2020**	**2030**
1. Weatherization Assistance					
901 Weatherization Assistance					
Investment	$535.7	$531.6	$569.5	$577.6	$577.6
Savings	$68.2	$133.1	$469.1	$1,045.5	$1,076.3
2. State Energy Program					
903 State Energy Program					
Investment	$164.0	$164.0	$164.0	$164.0	$164.0
Savings	$54.3	$54.3	$180.0	$401.8	$418.5
3. Gateway Deployment					
1332 Rebuild America					
Investment	$209.9	$209.9	$514.1	$41.2	$38.4
Savings	$22.0	$22.0	$129.3	$176.2	$182.3
1336 Energy Efficiency Information Outreach					
Investment	$173.3	$173.3	$168.2	$175.7	$176.7
Savings	$199.5	$199.5	$282.2	$291.0	$299.9
1338 Building Codes Training and Assistance					
Investment	$210.7	$210.7	$806.2	$1,016.2	$930.6
Savings	$82.8	$82.8	$580.8	$2,933.5	$4,908.2

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	2005	2010	2020	2030
422 Energy Star Details in 4221-4228					
4221 Energy Star: Clothes Washers					
Investment	$342.0	$342.0	$356.9	$450.7	$496.8
Savings	$141.5	$141.5	$325.0	$591.4	$883.2
4223 Energy Star: Refrigerators					
Investment	$193.9	$193.9	$386.4	$432.0	$465.5
Savings	$7.7	$7.7	$54.9	$142.4	$238.6
4226 Energy Star: Electric Water Heaters					
Investment	$17.5	$17.5	$164.1	$153.2	$157.3
Savings	$4.0	$4.0	$122.0	$606.1	$1,276.5
4225 Energy Star: Gas Water Heaters					
Investment	$10.6	$10.6	$50.4	$113.3	$131.2
Savings	$0.5	$0.5	$11.0	$78.1	$185.1
4224 Energy Star: Room Air Conditioners					
Investment	$375.6	$375.6	$363.9	$448.2	$485.2
Savings	$4.5	$4.5	$14.0	$34.4	$58.9
4228 Energy Star: CFLs					
Investment	$29.2	$29.2	$26.3	-$683.4	-$2,502.6
Savings	$80.2	$80.2	$784.1	$4,929.5	$6,266.9
4222 Energy Star: Dishwashers					
Investment	$113.2	$113.2	$118.6	$137.4	$151.7
Savings	$3.0	$3.0	$13.2	$38.4	$72.3
4. Residential Buildings Integration					
115 Research & Development (Building America)					
Investment	$48.2	$48.2	$128.0	$26.7	$26.7

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	2005	2010	2020	2030
Savings	$7.0	$7.0	$76.3	$189.6	$231.6
506 Residential Building Energy Codes					
Investment	$0.0	$0.0	$18.2	$138.1	$158.0
Savings	$0.0	$0.0	$6.7	$227.3	$560.5
116 Zero Energy Buildings					
Investment	$31.5	$46.8	$158.0	$414.1	$746.3
Savings	$2.3	$6.0	$72.9	$692.2	$2,084.9
5. Commercial Buildings Integration					
124 Research & Development					
Investment	$0.0	$0.0	$0.0	$0.0	$0.0
Savings	$3.6	$3.6	$82.1	$1,187.8	$1,879.2
507 Commercial Building Energy Codes					
Investment	$0.0	$0.0	$22.3	$305.5	$435.9
Savings	$0.0	$0.0	$6.6	$405.5	$1,209.6
6. Emerging Technologies					
430 Lighting R&D Details in 4304-440					
4304 Lighting R&D: Controls					
Investment	$35.3	$28.8	$93.7	$58.2	$66.2
Savings	$9.9	$17.9	$111.9	$355.6	$550.7
440 Next Generation Lighting Initiative					
Investment	$0.0	$0.0	$0.0	$31.6	$103.8
Savings	$0.0	$0.0	$0.0	$398.9	$1,484.4
380 Space Conditioning & Refrigeration R&D Details in 3801-3804					
3801 Refrigeration R&D: Res. HVAC Dist. System					
Investment	$104.9	$152.1	$540.5	$248.0	$313.9

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	2005	2010	2020	2030
Savings	$30.3	$56.3	$300.2	$1,007.7	$358.5
3802 Refrigeration R&D: Adv. Elec. HPWH					
Investment	$1.6	$3.8	$26.8	$179.8	$27.3
Savings	$0.8	$2.7	$33.4	$586.1	$478.3
3803 Refrigeration R&D: Commercial Refrigeration					
Investment	$10.4	$15.1	$57.2	-$22.1	-$33.3
Savings	$6.6	$12.3	$68.9	$302.8	$28.3
3804 Refrigeration R&D: Refrigerant Meter					
Investment	$4.9	$12.0	$84.8	$497.8	$56.3
Savings	$2.1	$7.2	$88.5	$1,389.1	$1,017.7
381 Appliances & Emerging Technologies R&D Details in 3811-3817					
3811 Appliances & Emerging Tech R&D: HPWH					
Investment	$22.8	$35.0	$137.5	$93.7	$99.6
Savings	$27.2	$44.8	$232.1	$713.5	$1,048.1
3813 Appliances & Emerging Tech R&D: Roof Top AC					
Investment	$13.9	$11.6	$8.8	$8.6	$7.8
Savings	$4.7	$8.5	$17.7	$30.2	$41.8
3815 Emerging Tech R&D: Gas Condensing WH					
Investment	$2.9	$4.8	$22.6	$0.0	$3.3
Savings	$1.7	$4.4	$52.4	$189.3	$263.8
3816 Appliances & Emerging Tech R&D: Recessed Can Lights					
Investment	$7.5	$17.7	$83.2	-$43.0	-$49.1

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	2005	2010	2020	2030
Savings	$2.3	$7.1	$91.8	$370.2	$375.9
3817 Appliances & Emerging Tech R&D: R-Lamp					
Investment	$12.9	$11.1	-$26.0	-$78.9	-$81.7
Savings	$53.1	$102.5	$316.4	$0.0	$0.0
2111 Building Envelope R&D: Window Technologies Details in 2114-2115					
2114 Window Technologies: Electrochromic Windows					
Investment	$159.6	$193.3	$264.7	$349.7	$434.3
Savings	$63.4	$85.1	$184.9	$511.2	$950.5
2115 Window Technologies: Superwindows					
Investment	$567.6	$691.0	$1,593.8	$1,870.7	$2,919.3
Savings	$75.3	$114.0	$386.8	$1,701.2	$3,231.3
2112 Building Envelope R&D: Thermal Insulation & Building Materials Details in 2116-2118					
2116 Thermal Insulation: Quick Fill Walls					
Investment	$1.5	$0.4	$3.5	$13.8	$16.0
Savings	$0.6	$0.8	$4.3	$41.5	$97.2
2117 Thermal Insulation: R30 Insulation/30 Year Life Roofs					
Investment	$0.0	$0.0	$0.0	$0.0	$0.0
Savings	$0.0	$0.0	$2.0	$97.1	$247.9
2118 Thermal Insulation: Moisture/Wet Insulation					
Investment	$24.3	$34.9	$89.2	$187.9	$225.7
Savings	$6.2	$12.2	$62.4	$339.6	$736.9
145 Analysis Tools and Design					
Investment	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Investment Costs and Savings (Million 2002$)				
	2004	2005	2010	2020	2030
Savings	$2.4	$4.6	$27.6	$344.9	$824.3
7. Equipment Standards and Analysis					
603 Equipment Standards and Analysis Details in 6039-6044					
6043 Standards: Res. Gas Furnaces/Boilers					
Investment	$0.0	$0.0	$25.9	$5.7	-$0.4
Savings	$0.0	$0.0	$35.0	$230.1	$464.6
6044 Standards: EPAct Standards					
Investment	$201.9	$209.3	$1,055.7	$1,451.2	$618.2
Savings	$24.6	$50.0	$454.5	$2,128.5	$2,842.8
6039 Standards: Distribution Transformers					
Investment	$0.0	$0.0	$595.0	$798.3	$235.8
Savings	$0.0	$0.0	$202.1	$992.2	$1,233.0
Weatherization and Intergovernmental Program (DU 1-3)					
Investment	$1,966.7	$2,371.7	$3,688.7	$3,025.9	$1,272.3
Savings	$392.0	$733.2	$2,965.7	$11,268.2	$15,866.8
Building Technologies Program (DU 4-7)					
Investment	$846.4	$1,260.5	$4,388.6	$5,737.1	$6,094.1
Savings	$159.1	$335.9	$2,917.7	$14,432.1	$22,241.9
Total					
Investment	$2,813.1	$4,216.6	$8,077.3	$8,763.1	$7,366.5
Savings	$551.1	$1,703.2	$5,883.5	$25,700.3	$38,108.7

2.2 Results

The investments and energy savings attributable to the penetration of EERE buildings-related projects in the marketplace will result in substantial macroeconomic effects. The following tables summarize these effects. Table 2.2 shows the impact of the energy savings alone on potential national employment on a year-by-year and project-by project basis. The employment effects are called potential here because this estimate is really of the change in demand for workers. Actual employment effects could include changes in wage rates and also would be affected by changes in labor supply conditions. Table 2.3 shows the comparable effects on national earned income. Before accounting for investment costs, the effects of savings alone in the year 2030 are an increase of about 305,000 potential jobs and about $3.79 billion in national earned income.

As was previously discussed, obtaining these energy savings benefits requires a substantial national investment in energy efficient technologies and practices. For the most part, this incremental national investment will be made in manufacturing sectors that are relatively capital intensive to produce new or better equipment. We assume the source of the investment capital will be the U.S. economy as a whole, which is less capital intensive on average than is manufacturing. Just as in the example in Figure 1.2, most of the energy efficiency investments will tend to reduce national employment while they are occurring, because they divert investment into capital-intensive sectors. Therefore, Table 2.4, which combines the employment effects of the required energy efficiency investments and the employment effects of the required savings, shows lower employment impacts than does Table 2.2, which includes only the effects of the energy and non-energy savings and ignores the investment effects. By 2030, Table 2.4 shows potential net employment increases of about 297,000 jobs, over 97% of level in Table 2.2. Comparing the effects on national earned income in Tables 2.3 and 2.5 presents a similar, but slightly more mixed picture. The net effect on earned income of the required investment, combined with the effect of resulting energy and non-energy savings, is a mixed effect because many of the jobs created in the capital-intensive manufacturing sectors as a result of energy-efficiency investments are also high-wage jobs. This tends to compensate to some degree for the reduction in overall employment levels associated with the diversion of national spending into capital-intensive manufacturing activity. By 2030, Table 2.5 shows a potential net positive impact on national earned income of about $4.16 billion, about ten percent higher than the level in Table 2.3.

The individual EERE projects differ significantly from each other in scale, timing, and impact. Taking investment effects into account, more than half of the positive job and earnings impacts come from only six projects: Building Codes Training and Technical Assistance, Energy Star CFLs, Zero Energy Buildings, Next Generation Lighting Initiative, Window Technologies' Superwindows, and EPACT Standards. Together, they account for 55% of the annual savings in 2030, 59% of the net savings, 57% of the net jobs, and 56% of the net earned income effects. These projects are large-scale, cost-effective projects that are expected to produce large energy savings relative to the investments required. By the year 2030, five out of the six projects each will be producing net annual economic savings to the U.S. economy of over $1.3 billion per year (Superwindows is still undergoing significant investment, so it nets $300 million). The combined net annual savings from the six projects is projected at about $18 billion, even after investment costs in 2030 are subtracted. The savings alone from these projects generate an

estimated 173,000 potential jobs (169,000 after investment effects). If the Energy Star and Lighting and Emerging Technologies projects are counted as single projects, they account for net savings impacts of $8.5 billion and $7.6 billion, respectively, in 2030. They have a combined positive net impact of 169,000 jobs (164,000 after investment effects). The impacts of most of the other buildings-related projects are on a much smaller scale.

The initial effect of the required investment is a short-run reduction in jobs and income in the economy, but the net effect is small. By the year 2004, the effects of energy savings already more than compensate for the effects of investment. Many of the EERE buildings-related projects will have achieved only part of their ultimate market penetration at the end of the period. However, the overall positive net impact on positive employment (297,000 jobs) and earned income ($4.16 billion) in the year 2030 still is a significant boost to the economy, an effect that would continue to grow after 2030 as savings increase and investments are completed.

2.2.1 Weatherization and Intergovernmental Program

The Weatherization and Intergovernmental Program is a group of projects mostly focused on implementing currently available efficient technology and overcoming market barriers. It consists of three decision units: Weatherization Assistance, all State Formula Grants projects, and Gateway Deployment. The latter consists of Energy Star (which is actually a group of seven specific technology projects), Rebuild America, Information Outreach, and Training and Technical Assistance. Tables 2.2 and 2.3 show that the energy savings created by market penetration of these EERE projects have the potential of creating nearly 133,000 jobs and about $1.61 billion in earned income (2002$) by the year 2030. However, not all of the gains would be immediately apparent because intensive investment in new energy technology and new building practices would be required during the first 30 years of the 21st century. These effects are incorporated in the full investment scenario shown in Tables 2.4 and 2.5. Because the Weatherization and Intergovernmental Program incremental investment tends to be concentrated high-wage industries compared with the rest of the economy, there is a slight net negative impact on employment and positive impact on earnings from this group of investments. Many of the capital investments required to achieve these savings begin early in the 30-year period. An example of a front-end loaded project is Rebuild America, for which investment is larger than savings in Table 2.1 in the first few years. However, because the employment intensities in the industries affected by investment related to this project are so similar to the U.S. economy as a whole, there is almost no net effect on employment from the investment.

To be in concert with a recent analysis of the Department of Energy's Energy Research and Development project by the National Research Council of National Academy of Sciences (NRC 2001), EERE in many cases only takes credit for the first few years of market impact. The National Research Council used a simplifying assumption that government R&D programs do no more than accelerate the technology, bringing it to market five years before the private sector would have without government intervention. For the six EERE projects to which this approach applies, the net effect is that incremental investments and savings due to the EERE projects are overtaken by "normal" investments toward the end of the period, which results in lower project-related efficiency investments and (eventually) savings than otherwise would occur (Anderson et al. 2003). The only project treated this way in the Weatherization and Intergovernmental Program is Information Outreach, and the market penetration of this technology

continues throughout the period, as new building stock is added. Therefore, even though the market impact of a given installation is limited to three years, the overall impact of the project continues to increase. Net energy savings rise to $123 million in 2030, slightly less than 1% of the net savings produced by all of the Weatherization and Intergovernmental Program in that year.

More generally, the more complete analysis of EERE projects performed for this report showed that the impacts on investment and energy savings result from the interaction of four factors: 1) the size of the (usually growing) market at each point in time, which results in increasing investment and savings, 2) the increasing penetration rate for the EERE technologies and practices, based on lifetime cost savings vis-à-vis conventional technology and the associated payback period for the investment, which results in increasing investments and savings, 3) increases in the efficiency of a dollar of incremental investment, based in turn on the sales-volume-based rate of decline in the price of the technology and the higher durability of the EERE technology, which can considerably reduce investment even as the savings hold constant or increase, and 4) the market-transformation, crowding-out effects of one technology on market prospects of all of its potential competitors, which increases investment and savings due to the EERE project. Even in those cases where the EERE project mainly accelerates market adoption of efficient technologies, it is usually assumed that the adoption is accelerated by ten years, rather than the five years assumed by NRC. Combined with the long lead times required to introduce commercial versions of technologies to the marketplace and generally slow turnover rates of building stock, the result is that many technologies are still in the rapidly increasing market penetration phase of adoption in 2030. See Anderson et al. (2003) for assumptions concerning individual programs.

The largest net impacts come from the Energy Star projects. As shown in Table 2.4 and Table 2.5, these impacts sum to over 79,000 jobs and $882 million in earned income in 2030, about 60% of the net job impacts and 52% of the net income impacts produced by all of the Weatherization and Intergovernmental Program.

2.2.2 Building Technologies Program

The rest of EERE buildings-related projects are grouped together under the heading Building Technologies Program. As the name suggests, this is a group of projects that is focused on advancing the development of new technologies and analysis techniques for the building sector. It comprises four decision units: Residential Buildings Integration, Commercial Buildings Integration, Emerging Technologies (in lighting, refrigeration, appliances, windows, and insulation), and Equipment Standards and Analysis. Tables 2.2 and 2.3 show that the energy savings associated with these EERE projects have the potential of creating nearly 172,000 jobs and about $2.18 billion in earned income (2002$) by the year 2030. Not all of the gains would be immediately apparent because intensive investment in new energy technology and new building practices would be required during the first 30 years of the 21st century. Also, because the Buildings Technologies projects investments tend to be concentrated in capital-intensive, high-wage industries, there is a slight net negative impact on employment and positive impact on earnings from this group of investments. The net impacts of the Building Technologies projects on national employment and earned income are shown in Table 2.4 and Table 2.5, respectively.

Timing of incremental investments and savings within Buildings Technology follows several different patterns. A few projects accelerate by about ten years the development and market penetration of

technologies that might have been developed and deployed anyway. These include 3803 Refrigeration R&D: Commercial Refrigeration, 3811 Appliances and Emerging Technologies R&D: Heat Pump Water Heater, 3815 Appliances and Emerging Technologies R&D: Gas Condensing Water Heater, 3816 Appliances and Emerging Technologies R&D: Recessed Can Lights, 2114 Window Technologies: Electrochromic Windows, and 2115 Window Technologies: Superwindows. The actual pattern of investment and savings for any technology in Table 2.1 depends on four factors: 1) the size of the (usually growing) market at each point in time, 2) the penetration rate for the EERE technologies and practices, based on lifetime cost savings vis-à-vis conventional technology and the associated payback period for the investment, 3) increases in the efficiency of a dollar of incremental investment, based in turn on the sales-volume-based rate of decline in the price of the technology and the higher durability of the EERE technology, and 4) the market-transformation, crowding-out effects of one technology on market prospects of all of its potential competitors. Durability and price effects radically reduce replacement costs for a given amount of lighting services, leading to overall net investment savings after 2015, even as the market size and penetration (and energy savings) continue to grow.

The largest of the Building Technologies decision units is Emerging Technologies, a group comprising 17 individual projects with net savings (that is, allowing for ongoing investment) of $7.6 billion by 2030, about 47% of the total in all of the Building Technologies Program in that year. Emerging Technologies would generate a net 85,000 potential jobs and $1.24 billion in earned income in 2030, which are 52% of the jobs and 50% of the earned income generated by the Building Technologies Program as a whole.

Table 2.2. Effect of Energy Savings from EERE Buildings-Related Programs on Potential National Employment

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
1. Weatherization Assistance Program											
901	Weatherization Assistance	0.6	0.8	1.2	1.6	2.0	2.9	5.0	6.3	6.5	6.6
2. State Energy Program											
903	State Formula Grants	0.3	0.4	0.7	0.9	1.1	1.5	2.6	3.3	3.3	3.4
3. Gateway Deployment											
1332	Rebuild America	0.1	0.2	0.3	0.4	0.6	0.9	1.2	1.2	1.3	1.3
1336	Information Outreach	1.3	1.5	2.3	2.2	2.2	2.1	2.2	2.2	2.2	2.3
1338	Training and Technical Assistance	0.5	0.7	1.3	1.9	2.6	5.0	14.7	24.7	33.0	40.9
422	Energy Star	Details in 4221-4228									
4221	Energy Star: Clothes Washers	1.2	1.0	1.3	1.5	1.8	2.3	3.3	4.2	5.2	6.3
4223	Energy Star: Refrigerators	0.0	0.1	0.1	0.2	0.3	0.5	0.9	1.3	1.7	2.1
4226	Energy Star: Electric Water Heaters	0.0	0.0	0.1	0.2	0.4	1.1	3.1	5.5	8.3	11.5
4225	Energy Star: Gas Water Heaters	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.8
4224	Energy Star: Room Air Cond	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.4	0.5
4228	Energy Star: CFLs	0.4	0.7	1.4	2.4	3.7	7.1	22.8	44.6	55.1	56.8
4222	Energy Star: Dishwashers	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.3	0.5	0.7
4. Residential Buildings Integration											
115	Res. Technology Research & Development	0.0	0.0	0.1	0.2	0.3	0.5	1.0	1.3	1.4	1.6

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
506	Residential Building Codes	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.4	2.3	3.4
116	Zero Energy Buildings	0.0	0.0	0.1	0.2	0.2	0.6	2.2	5.3	9.8	15.9
5. Commercial Buildings Integration											
124	Com. Technology Development	0.0	0.0	0.0	0.1	0.1	0.4	3.8	6.6	9.0	11.4
507	Commercial Building Codes	0.0	0.0	0.0	0.0	0.0	0.1	1.1	3.7	7.3	11.1
6. Emerging Technologies											
430	Lighting R&D	Details in 4304-440									
4304	Lighting R&D: Controls	0.1	0.2	0.3	0.4	0.6	1.0	2.3	3.2	4.1	5.0
440	Next Generation Lighting Initiative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	8.0	13.4
380	Space Conditioning and Refrigeration R&D	Details in 3801-3804									
3801	Refrigeration R&D: Res. HVAC Dist. System	0.1	0.2	0.4	0.6	0.9	2.0	5.9	6.7	3.7	2.5
3802	Refrigeration R&D: Adv. Elec HPWH	0.0	0.0	0.0	0.1	0.1	0.3	1.9	4.9	6.2	4.0
3803	Refrigeration R&D: Commercial Refrigeration	0.0	0.1	0.1	0.2	0.3	0.6	2.1	2.7	1.3	0.2
3804	Refrigeration R&D: Refrigerant Meter	0.0	0.0	0.1	0.1	0.3	0.8	4.8	12.5	15.5	9.2
381	Appliances & Emerging Technologies R&D	Details in 3811-3817									
3811	Appliances & Emerging Tech R&D: HPWH	0.2	0.2	0.4	0.6	1.0	2.1	5.2	6.4	7.8	9.4
3813	Appliances & Emerging Tech R&D: Roof Top AC	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4
3815	Appliances & Emerging Tech R&D: Gas Condensing WH	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.8	0.9	1.1
3816	Appliances & Emerging Tech R&D: Recessed Can Lights	0.0	0.0	0.1	0.1	0.3	0.8	2.6	3.3	3.4	3.4

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
3817	Appliances & Emerging Tech R&D: R-Lamp	0.3	0.5	0.9	1.5	2.0	2.8	0.3	0.0	0.0	0.0
2111	Building Envelope R&D: Window Technologies	Details in 2114-2115									
2114	Window Technologies: Electrochromic Windows	0.7	0.6	0.8	1.0	1.2	1.8	3.0	4.7	6.6	8.7
2115	Window Technologies: Superwindows	0.4	0.5	0.7	1.0	1.4	2.4	6.6	10.9	15.7	21.0
2112	Building Envelope R&D: Thermal Insulation & Building Materials	Details in 2116-2118, 145									
2116	Thermal Insulation: Quick Fill Walls	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.5
2117	Thermal Insulation: R30 Insulation/30 Year Life Roofs	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.9	1.3
2118	Thermal Insulation: Moisture/Wet Insulation	0.0	0.0	0.1	0.1	0.1	0.3	0.8	1.7	2.8	3.9
145	Analysis Tools and Design	0.0	0.0	0.0	0.1	0.1	0.2	1.2	2.8	4.7	6.7
7. Equipment Standards and Analysis											
603	Equipment Standards and Analysis	Details in 6039-6044									
6043	Standards: Res Gas Furnaces/Boilers	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	1.4	1.9
6044	Standards: EPACT Standards	0.0	0.2	0.5	0.7	1.7	4.0	11.2	18.8	21.9	25.0
6039	Standards: Distribution Transformers	0.0	0.0	0.0	0.0	0.6	1.8	5.1	9.0	10.0	11.2
Weatherization and Intergovernmental Program (DU 1-3)		4.5	5.6	8.7	11.4	14.8	23.6	56.3	94.3	118.0	133.0
Building Technologies Program (DU 4-7)		2.0	2.7	4.6	7.0	11.5	23.2	63.4	112.3	145.5	172.2
Total		6.5	8.3	13.3	18.4	26.3	46.8	119.7	206.6	263.5	305.2

Table 2.3. Effect of Energy Savings from EERE Buildings-Related Programs on Potential National Earned Income

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
1. Weatherization Assistance											
901	Weatherization Assistance	7.1	6.4	7.3	8.1	9.0	10.9	16.0	18.8	19.5	20.0
2. State Energy Program											
903	State Formula Grants	4.6	7.2	10.6	13.7	17.0	23.4	40.6	52.0	52.9	53.9
3. Gateway Deployment											
1332	Rebuild America	1.1	1.4	2.4	3.6	4.8	7.7	10.8	11.2	11.7	12.3
1336	Information Outreach	15.6	23.2	34.0	32.8	32.4	31.6	31.8	32.5	32.9	33.4
1338	Training and Technical Assistance	6.1	11.7	20.5	29.8	40.0	75.0	215.3	358.4	473.5	580.0
422	Energy Star	Details in 4221-4228									
4221	Energy Star: Clothes Washers	8.6	7.1	9.0	10.7	12.4	16.0	22.6	27.8	33.8	40.5
4223	Energy Star: Refrigerators	0.4	0.8	1.7	2.8	3.8	6.0	11.3	15.6	20.4	26.1
4226	Energy Star: Electric Water Heaters	0.1	0.4	1.0	2.2	4.5	13.3	37.3	66.3	100.3	139.7
4225	Energy Star: Gas Water Heaters	0.0	0.0	-0.1	-0.2	-0.3	-0.6	-1.6	-3.9	-6.5	-9.3
4224	Energy Star: Room Air Cond	0.4	0.5	0.7	0.9	1.1	1.5	2.7	3.8	5.0	6.4
4228	Energy Star: CFLs	4.4	8.8	17.1	28.7	44.9	85.9	278.0	546.2	675.5	696.1
4222	Energy Star: Dishwashers	0.2	0.3	0.6	0.8	1.0	1.4	2.7	4.2	6.0	7.9
4. Residential Buildings Integration											
115	Res. Technology Research & Development	0.1	0.2	0.5	0.8	1.3	2.4	5.2	7.0	7.8	8.6
506	Residential Building Codes	0.0	0.0	0.0	0.0	0.0	0.0	0.8	2.3	4.5	7.3

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
116	Zero Energy Buildings	0.2	0.4	0.8	1.3	2.1	4.7	18.8	44.4	82.8	134.1
5. Commercial Buildings Integration											
124	Com. Technology Development	0.0	0.3	0.6	0.9	1.7	6.6	58.4	104.5	143.9	183.9
507	Commercial Building Codes	0.0	0.0	0.0	0.0	0.0	1.1	19.9	67.7	133.9	202.4
6. Emerging Technologies											
430	Lighting R&D	Details in 4304-440									
4304	Lighting R&D: Controls	2.0	2.9	4.8	7.1	10.2	18.3	42.1	58.2	74.7	90.2
440	Next Generation Lighting Initiative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.3	145.2	243.0
380	Space Conditioning and Refrigeration R&D	Details in 3801-3804									
3801	Refrigeration R&D: Res. HVAC Dist. System	0.7	0.8	1.5	2.5	3.9	8.2	25.8	29.8	18.8	15.0
3802	Refrigeration R&D: Adv. Elec HPWH	0.0	0.1	0.3	0.6	1.2	3.5	22.6	59.6	75.7	48.4
3803	Refrigeration R&D: Commercial Refrigeration	0.5	1.0	1.9	3.1	4.9	10.7	37.6	46.8	22.2	4.4
3804	Refrigeration R&D: Refrigerant Meter	0.0	0.3	0.9	2.0	3.8	10.6	63.6	167.9	207.4	123.1
381	Appliances & Emerging Technologies R&D	Details in 3811-3817									
3811	Appliances & Emerging Tech R&D: HPWH	2.5	3.0	4.9	7.7	11.7	25.4	63.0	78.1	95.2	114.7
3813	Appliances & Emerging Tech R&D: Roof Top AC	0.0	0.8	1.4	1.9	2.3	2.9	4.1	4.9	5.9	6.8

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
3815	Appliances & Emerging Tech R&D: Gas Condensing WH	0.0	-0.1	-0.2	-0.4	-0.8	-2.6	-7.8	-9.6	-11.4	-13.3
3816	Appliances & Emerging Tech R&D: Recessed Can Lights	0.1	0.3	0.8	1.8	3.6	10.1	31.8	40.6	40.9	41.2
3817	Appliances & Emerging Tech R&D: R-Lamp	2.9	5.8	11.2	17.9	24.2	34.6	3.6	0.0	0.0	0.0
2111	Building Envelope R&D: Window Technologies	Details in 2114-2115									
2114	Window Technologies: Electrochromic Windows	10.3	11.7	15.5	19.2	23.3	33.0	56.6	87.0	120.7	158.9
2115	Window Technologies: Superwindows	1.7	1.4	2.3	3.3	4.7	8.5	24.5	41.2	61.9	86.8
2112	Building Envelope R&D: Thermal Insulation & Building Materials	Details in 2116-2118, 145									
2116	Thermal Insulation: Quick Fill Walls	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	-0.3	-0.4	-0.5
2117	Thermal Insulation: R30 Insulation/30 Year Life Roofs	0.0	0.0	0.0	0.0	0.0	0.1	1.2	3.3	5.7	8.4
2118	Thermal Insulation: Moisture/Wet Insulation	-0.1	-0.2	-0.5	-0.9	-1.3	-2.3	-4.4	-6.6	-8.6	-10.6
145	Analysis Tools and Design	0.2	0.4	0.7	1.1	1.6	3.9	19.9	46.3	77.7	109.7
7. Equipment Standards and Analysis											
603	Equipment Standards and Analysis	Details in 6039-6044									
6043	Standards: Res Gas Furnaces/Boilers	0.0	0.0	0.0	0.0	0.0	-1.8	-6.6	-11.8	-17.6	-24.0
6044	Standards: EPACT Standards	0.0	4.0	8.2	12.0	30.8	71.5	199.7	334.8	387.3	441.9

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
6039	Standards: Distribution Transformers	0.0	0.0	0.0	0.0	11.1	33.1	93.1	162.4	181.0	201.8
Weatherization and Intergovernmental Program (DU 1-3)		48.6	67.9	104.7	133.9	170.7	272.3	667.4	1,132.7	1,424.9	1,606.9
Building Technologies Program (DU 4-7)		21.2	33.0	55.5	81.9	140.4	282.5	773.4	1,424.0	1,855.2	2,182.2
Total		69.8	100.9	160.2	215.8	311.1	554.8	1,440.8	2,556.8	3,280.1	3,789.1

Table 2.4. Effect of the Full Investment Scenario on Potential National Employment

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
1. Weatherization Assistance Program											
901	Weatherization Assistance	0.5	0.8	1.2	1.6	2.0	2.8	4.9	6.3	6.4	6.5
2. State Energy Program											
903	State Formula Grants	0.2	0.3	0.5	0.7	0.9	1.3	2.4	3.1	3.2	3.3
3. Gateway Deployment											
1332	Rebuild America	0.1	0.1	0.2	0.3	0.5	0.8	1.2	1.2	1.2	1.3
1336	Information Outreach	1.2	1.5	2.2	2.2	2.1	2.1	2.1	2.2	2.2	2.2
1338	Training and Technical Assistance	0.4	0.7	1.2	1.8	2.5	4.8	14.5	24.4	32.8	40.6
422	Energy Star	Details in 4221-4228									
4221	Energy Star: Clothes Washers	0.6	0.4	0.7	0.9	1.2	1.7	2.5	3.4	4.3	5.4
4223	Energy Star: Refrigerators	0.0	-0.1	-0.1	-0.1	0.0	0.1	0.6	0.9	1.3	1.7
4226	Energy Star: Electric Water Heaters	0.0	0.0	0.1	0.2	0.3	1.0	3.0	5.4	8.2	11.4
4225	Energy Star: Gas Water Heaters	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.5	0.7
4224	Energy Star: Room Air Cond	-0.1	-0.1	-0.1	-0.1	0.0	0.0	0.1	0.2	0.2	0.4
4228	Energy Star: CFLs	0.4	0.7	1.4	2.3	3.7	7.0	22.9	45.2	56.5	59.1
4222	Energy Star: Dishwashers	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.3	0.4	0.6
4. Residential Buildings Integration											
115	Res. Technology Research & Development	0.0	0.0	0.0	0.1	0.2	0.4	1.0	1.3	1.4	1.6
506	Residential Building Codes	0.0	0.0	0.0	0.0	0.0	0.0	0.4	1.2	2.2	3.2

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
116	Zero Energy Buildings	0.0	0.0	0.0	0.1	0.2	0.4	2.0	5.0	9.4	15.4
5. Commercial Buildings Integration											
124	Com. Technology Development	0.0	0.0	0.0	0.1	0.1	0.4	3.8	6.6	9.0	11.4
507	Commercial Building Codes	0.0	0.0	0.0	0.0	0.0	0.0	1.0	3.5	7.0	10.7
6. Emerging Technologies											
430	Lighting R&D	Details in 4304-440									
4304	Lighting R&D: Controls	0.0	0.1	0.2	0.2	0.4	0.7	2.1	3.1	3.9	4.8
440	Next Generation Lighting Initiative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	8.0	13.3
380	Space Conditioning and Refrigeration R&D	Details in 3801-3804									
3801	Refrigeration R&D: Res. HVAC Dist. System	0.2	0.3	0.5	0.8	1.2	2.4	6.5	6.8	4.0	2.7
3802	Refrigeration R&D: Adv. Elec HPWH	0.0	0.0	0.0	0.0	0.1	0.3	1.8	4.8	6.2	4.0
3803	Refrigeration R&D: Commercial Refrigeration	0.0	0.0	0.1	0.2	0.2	0.5	2.0	2.7	1.4	0.3
3804	Refrigeration R&D: Refrigerant Meter	0.0	0.0	0.0	0.1	0.2	0.7	4.3	11.8	15.1	9.1
381	Appliances & Emerging Technologies R&D	Details in 3811-3817									
3811	Appliances & Emerging Tech R&D: HPWH	0.2	0.2	0.4	0.6	0.9	2.0	5.1	6.4	7.8	9.4
3813	Appliances & Emerging Tech R&D: Roof Top AC	0.0	0.0	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.4
3815	Appliances & Emerging Tech R&D: Gas Condensing WH	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.8	0.9	1.1
3816	Appliances & Emerging Tech R&D: Recessed Can Lights	0.0	0.0	0.0	0.1	0.2	0.7	2.5	3.4	3.4	3.4
3817	Appliances & Emerging Tech R&D: R-Lamp	0.3	0.5	0.9	1.5	2.0	2.9	0.4	0.1	0.1	0.1

Projcode	Descriptor	Effect on Total National Employment (Thousands of Jobs)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
2111	Building Envelope R&D: Window Technologies	Details in 2114-2115									
2114	Window Technologies: Electrochromic Windows	0.4	0.3	0.5	0.7	0.8	1.3	2.6	4.1	5.9	7.9
2115	Window Technologies: Superwindows	-0.3	-0.4	-0.3	-0.3	-0.2	0.1	2.9	8.1	11.7	16.6
2112	Building Envelope R&D: Thermal Insulation & Building Materials	Details in 2116-2118, 145									
2116	Thermal Insulation: Quick Fill Walls	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.4	0.6
2117	Thermal Insulation: R30 Insulation/30 Year Life Roofs	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5	0.9	1.3
2118	Thermal Insulation: Moisture/Wet Insulation	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.4	2.4	3.5
145	Analysis Tools and Design	0.0	0.0	0.0	0.1	0.1	0.2	1.2	2.8	4.7	6.7
7. Equipment Standards and Analysis											
603	Equipment Standards and Analysis	Details in 6039-6044									
6043	Standards: Res Gas Furnaces/Boilers	0.0	0.0	0.0	0.0	0.0	0.1	0.5	1.0	1.4	1.9
6044	Standards: EPACT Standards	0.0	0.0	0.2	0.4	0.6	2.8	9.7	17.2	21.2	24.3
6039	Standards: Distribution Transformers	0.0	0.0	0.0	0.0	-1.2	0.0	3.1	6.5	9.3	10.4
Weatherization and Intergovernmental Program (DU 1-3)		3.3	4.0	6.9	9.5	12.9	21.5	54.2	92.6	117.1	132.9
Building Technologies Program (DU 4-7)		0.9	1.2	2.7	4.8	6.0	16.7	54.4	103.1	138.1	164.2
Total		4.2	5.2	9.7	14.4	18.9	38.2	108.6	195.7	255.1	297.1

Table 2.5. Effect of the Full Investment Scenario on Potential National Earned Income

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
1. Weatherization Assistance Program											
901	Weatherization Assistance	39.7	38.7	40.0	41.3	42.6	45.5	51.0	53.9	54.5	55.1
2. State Energy Program											
903	State Formula Grants	9.6	12.2	15.6	18.7	22.0	28.4	45.6	56.9	57.9	58.9
3. Gateway Deployment											
1332	Rebuild America	15.2	15.3	23.0	30.8	31.7	41.8	13.7	13.9	14.3	14.9
1336	Information Outreach	26.1	33.2	43.8	42.8	42.2	41.3	41.4	42.6	43.2	43.6
1338	Training and Technical Assistance	15.3	23.9	35.5	47.3	61.6	121.6	278.4	417.1	523.7	633.8
422	Energy Star	Details in 4221-4228									
4221	Energy Star: Clothes Washers	20.7	21.2	23.2	25.0	26.9	30.7	40.2	46.3	53.2	60.9
4223	Energy Star: Refrigerators	5.1	11.8	17.4	23.9	25.1	27.9	34.9	40.1	45.9	52.5
4226	Energy Star: Electric Water Heaters	0.6	1.3	2.6	4.8	9.0	21.5	44.7	73.9	108.0	147.4
4225	Energy Star: Gas Water Heaters	0.0	0.5	0.8	1.1	1.6	1.9	3.6	1.7	-0.5	-2.9
4224	Energy Star: Room Air Cond	12.4	19.1	19.4	19.6	19.5	19.5	24.0	25.9	28.0	30.4
4228	Energy Star: CFLs	5.5	10.2	18.6	30.1	46.0	87.2	271.2	513.9	602.1	577.9
4222	Energy Star: Dishwashers	3.2	5.9	6.2	6.3	6.6	7.3	9.2	11.0	13.1	15.4
4. Residential Buildings Integration											
115	Res. Technology Research & Development	1.5	2.6	4.6	5.1	6.8	8.7	8.8	8.3	9.1	9.9

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
506	Residential Building Codes	0.0	0.0	0.0	0.0	0.1	0.8	5.1	8.1	10.7	14.0
116	Zero Energy Buildings	0.8	1.2	1.9	2.8	4.0	7.4	23.4	51.6	93.2	147.2
5. Commercial Buildings Integration											
124	Com. Technology Development	0.0	0.3	0.6	0.9	1.7	6.6	58.4	104.5	143.9	183.9
507	Commercial Building Codes	0.0	0.0	0.0	0.0	0.0	2.6	31.8	88.7	158.6	232.3
6. Emerging Technologies											
430	Lighting R&D	Details in 4304-440									
4304	Lighting R&D: Controls	0.9	2.1	3.6	5.6	8.2	15.5	39.3	56.5	72.6	88.2
440	Next Generation Lighting Initiative	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.8	148.4	247.9
380	Space Conditioning and Refrigeration R&D	Details in 3801-3804									
3801	Refrigeration R&D: Res. HVAC Dist. System	6.3	9.4	14.1	20.2	28.9	52.7	85.5	50.2	43.4	40.8
3802	Refrigeration R&D: Adv. Elec HPWH	0.0	0.2	0.5	1.0	1.8	4.8	28.8	68.5	81.5	49.8
3803	Refrigeration R&D: Commercial Refrigeration	0.9	1.6	2.7	4.2	6.5	13.6	42.3	45.7	17.0	2.7
3804	Refrigeration R&D: Refrigerant Meter	0.0	0.4	1.3	2.8	5.1	13.7	76.3	185.8	216.9	125.1
381	Appliances & Emerging Technologies R&D	Details in 3811-3817									
3811	Appliances & Emerging Tech R&D: HPWH	4.2	4.1	6.6	10.2	15.1	32.2	67.5	82.7	100.0	119.6

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
3813	Appliances & Emerging Tech R&D: Roof Top AC	0.0	1.5	2.0	2.4	2.8	3.3	4.6	5.4	6.3	7.2
3815	Appliances & Emerging Tech R&D: Gas Condensing WH	0.0	0.1	0.0	-0.1	-0.2	-1.5	-7.8	-9.6	-11.3	-13.2
3816	Appliances & Emerging Tech R&D: Recessed Can Lights	0.1	0.6	1.6	3.4	6.2	14.0	35.4	38.6	38.7	38.9
3817	Appliances & Emerging Tech R&D: R-Lamp	3.5	6.5	11.8	18.1	24.5	33.2	-0.1	-4.2	-4.4	-4.4
2111	Building Envelope R&D: Window Technologies	Details in 2114-2115									
2114	Window Technologies: Electrochromic Windows	17.3	19.4	24.9	27.9	33.5	45.8	68.2	104.0	139.5	179.9
2115	Window Technologies: Superwindows	26.6	31.4	38.8	49.4	62.7	92.6	157.9	140.0	202.1	240.9
2112	Building Envelope R&D: Thermal Insulation & Building Materials	Details in 2116-2118, 145									
2116	Thermal Insulation: Quick Fill Walls	0.0	0.2	0.0	0.1	0.2	0.3	0.9	1.1	1.1	1.1
2117	Thermal Insulation: R30 Insulation/30 Year Life Roofs	0.0	0.0	0.0	0.0	0.0	0.1	1.2	3.3	5.7	8.4
2118	Thermal Insulation: Moisture/Wet Insulation	0.7	1.1	1.4	2.0	2.5	2.7	5.0	4.0	3.1	2.1
145	Analysis Tools and Design	0.2	0.4	0.7	1.1	1.6	3.9	19.9	46.3	77.7	109.7
7. Equipment Standards and Analysis											
603	Equipment Standards and Analysis	Details in 6039-6044									

Projcode	Descriptor	Effect on Total National Earned Income (Million 2002$)									
		2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
6043	Standards: Res Gas Furnaces/Boilers	0.0	0.0	0.0	0.0	0.0	-1.3	-6.4	-11.7	-17.5	-24.0
6044	Standards: EPACT Standards	0.0	14.3	18.8	21.8	81.1	125.1	268.6	408.6	417.1	473.3
6039	Standards: Distribution Transformers	0.0	0.0	0.0	0.0	-10.4	12.0	68.9	134.1	173.4	193.5
Weatherization and Intergovernmental Program (DU 1-3)		153.9	192.9	244.7	290.8	333.8	473.6	857.0	1,296.2	1,542.3	1,686.8
Building Technologies Program (DU 4-7)		63.1	97.2	135.8	178.6	282.5	488.9	1,083.5	1,677.1	2,126.8	2,474.8
Total		217.0	290.1	380.6	469.5	616.3	962.5	1,940.4	2,973.3	3,669.2	4,161.6

2.3 Summary of Impacts

The improvements in energy efficiency expected from EERE's buildings-related programs require a significant capital expense of just under $3 billion to over $9 billion per year to achieve, as shown in Table 2.1. (The peak investment year is actually 2015, with an expenditure of almost $10 billion, as shown in appendix table A.1.) Initially, this annual investment is larger than the annual savings. However, because the stock of energy efficient equipment and practices continues to grow, the annual savings eventually outstrip the investment. By 2030 the energy savings alone, as shown in Table 2.1, are $38 billion per year, a significant national benefit. This does not count other obvious benefits, such as operational savings due to improved durability and efficiency of equipment, improved environmental quality from reduced burning of fossil fuels, and improved livability and increased value of structures. The impacts presented in Tables 2.2 through 2.5 illustrate the growing importance of energy efficiency through time to the U.S. economy as a result of these savings. Before 2010, the positive impacts are about 19,000 jobs and $600 million in earnings, but by 2030 the impacts grow to around 300,000 jobs and over $4 billion, roughly an order of magnitude larger.

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Appendix

Detailed Calculations on EERE Buildings-Related Projects

Appendix

Detailed Calculations on EERE Buildings-Related Projects

Table Notes

Table A.1: This table shows the effects of individual EERE buildings-related projects (identified by their 2004 GPRA project codes and titles) on national incremental investment in energy-efficient technology or practices in individual years. Current investment spending is reported each year because current investment spending affects current employment and earned income. Also shown for each year and project are the effects of the accumulated investments on current expenditures for oil, natural gas, and electricity. (Impacts on non-energy expenditures for items such as maintenance services generally have not been estimated and are not shown.) Current spending affects current employment and earned income. In some cases (such as the 124-Commercial Buildings Research and Development), the project is not expected to require any investment over and above current conventional practice, so the net effect on investment spending (and employment and income) is shown as zero. In most cases, the investment is expected to reduce net fuel expenditure, but sometimes consumption of one fuel will be altered by the change in consumption of another, resulting in an increased expenditure for that fuel. Thus, for example, for Project Code 6043, Standards for Residential Gas Furnaces and Boilers, Table A.1 shows the nation spending $468 million less for gas for the residential sector, but spending slightly more for residential oil and electricity in the year 2030 than it otherwise would have; because it is adopting some oil and electric equipment in place of the increasingly-costly gas equipment. Project 2114, Electrochromic Windows, shows significant electricity savings in commercial buildings for cooling, but additional natural gas and oil is required to provide heating during the winter. Project 4228, Energy Star CFLs, reduces consumption of electricity for building lighting and cooling, but increases natural gas and oil for heating.

Table A.2: Purchases from different industrial sectors of the economy are associated with different inter-industry sales of goods and services and different requirements for labor (e.g., an increase in purchases of plastic-framed efficient windows will not have an identical impact to increased purchases of more efficient refrigerators; because the production processes and materials used are different). Therefore, to estimate the impact of a given investment, the investment must be allocated to the sectors from which the investing business or household buys equipment and services. This table shows how the incremental investment premium associated with each EERE buildings-related project is assumed to be distributed among industrial sectors. The assumed allocation in each case was made in consultation with the GPRA researchers, based on project information provided by DOE project managers, as well as the characteristics of the technologies that are expected to be adopted as a result of the project. For example, the Weatherization Assistance Program is expected to result in incremental investments, divided one-half for incremental residential construction equipment costs, and one-half for a variety of sectors that produce the building materials that would be used in weatherization. The latter are allocated 8.3% for each sector. A different kind of example is Energy Star Clothes Washers, where the entire incremental investment is allocated to Household Laundry Equipment (the industrial sector that builds clothes washing machines). Because no incremental installation cost or retail markup is expected on these units, the entire premium results from the fact that these units are expected to be more expensive to manufacture than with the conventional technology.

Table A.1. EERE Buildings-Related Project Investment Costs and Energy Savings, by Year (Million $2002)

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
1. Weatherization Assistance										
901 Weatherization Assistance										
Investment	$535.7	$531.6	$538.8	$546.2	$553.8	$569.5	$577.6	$577.6	$577.6	$577.6
Expenditures on Oil, Residential	-$16.0	-$31.5	-$46.8	-$63.4	-$79.9	-$114.0	-$205.3	-$264.7	-$275.1	-$283.8
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$34.7	-$68.1	-$101.8	-$135.6	-$169.5	-$236.8	-$405.1	-$519.1	-$524.2	-$525.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$17.6	-$33.5	-$50.6	-$67.2	-$83.9	-$118.3	-$206.1	-$261.7	-$265.8	-$267.5
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$68.2	-$133.1	-$199.2	-$266.1	-$333.2	-$469.1	-$816.5	-$1,045.5	-$1,065.0	-$1,076.3
2. State Energy Program										
903 State Energy Program										
Investment	$164.0	$164.0	$164.0	$164.0	$164.0	$164.0	$164.0	$164.0	$164.0	$164.0
Expenditures on Oil, Residential	-$0.9	-$1.8	-$2.8	-$3.8	-$4.7	-$6.7	-$11.9	-$15.3	-$15.8	-$16.3
Expenditures on Oil, Commercial	-$5.2	-$10.4	-$15.4	-$20.9	-$26.4	-$37.6	-$67.7	-$87.7	-$91.6	-$95.7
Expenditures on Natural Gas, Residential	-$0.2	-$0.5	-$0.6	-$0.8	-$1.0	-$1.5	-$2.5	-$3.1	-$3.1	-$3.1
Expenditures on Natural Gas, Commercial	-$1.3	-$2.7	-$4.1	-$5.5	-$6.9	-$9.8	-$16.8	-$21.7	-$22.1	-$22.5
Expenditures on Electricity, Residential	-$2.5	-$4.7	-$7.3	-$9.5	-$12.0	-$16.7	-$28.9	-$36.4	-$36.7	-$36.9
Expenditures on Electricity, Commercial	-$17.9	-$34.2	-$50.0	-$64.2	-$79.2	-$107.8	-$185.7	-$237.5	-$240.6	-$244.0
Change in Energy Expenditures	-$28.1	-$54.3	-$80.3	-$104.7	-$130.3	-$180.0	-$313.6	-$401.8	-$409.9	-$418.5

Project and Category	Fiscal Year									
	2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
3. Gateway Deployment										
1332 Rebuild America										
Investment	$212.0	$209.9	$311.0	$409.5	$404.7	$514.1	$44.1	$41.2	$40.0	$38.4
Expenditures on Oil, Residential	-$0.2	-$0.4	-$0.6	-$1.0	-$1.4	-$2.2	-$3.1	-$3.1	-$3.1	-$3.2
Expenditures on Oil, Commercial	-$0.2	-$0.4	-$0.7	-$1.0	-$1.4	-$2.2	-$2.9	-$2.6	-$2.5	-$2.4
Expenditures on Natural Gas, Residential	-$3.6	-$6.2	-$10.9	-$17.9	-$23.9	-$37.8	-$50.7	-$49.0	-$48.2	-$47.5
Expenditures on Natural Gas, Commercial	-$1.5	-$3.0	-$5.2	-$8.2	-$11.1	-$18.0	-$24.0	-$23.9	-$24.2	-$25.1
Expenditures on Electricity, Residential	-$3.7	-$6.4	-$11.2	-$18.1	-$24.2	-$38.6	-$52.8	-$51.4	-$51.6	-$51.8
Expenditures on Electricity, Commercial	-$2.9	-$5.6	-$9.6	-$14.4	-$19.3	-$30.3	-$43.2	-$46.1	-$48.8	-$52.3
Change in Energy Expenditures	-$12.2	-$22.0	-$38.2	-$60.7	-$81.2	-$129.3	-$176.7	-$176.2	-$178.5	-$182.3
1336 Energy Efficiency Information Outreach										
Investment	$183.1	$173.3	$170.1	$172.2	$169.4	$168.2	$167.6	$175.7	$176.9	$176.7
Expenditures on Oil, Residential	-$0.2	-$0.3	-$0.5	-$0.5	-$0.5	-$0.5	-$0.6	-$0.6	-$0.6	-$0.6
Expenditures on Oil, Commercial	-$2.2	-$4.4	-$6.5	-$6.6	-$6.6	-$6.8	-$7.1	-$7.4	-$7.7	-$8.0
Expenditures on Natural Gas, Residential	-$1.7	-$3.4	-$5.1	-$5.1	-$5.1	-$5.1	-$5.0	-$5.1	-$5.1	-$5.1
Expenditures on Natural Gas, Commercial	-$24.7	-$49.8	-$75.2	-$75.9	-$76.3	-$77.3	-$77.3	-$80.3	-$81.7	-$83.2
Expenditures on Electricity, Residential	-$4.2	-$8.2	-$12.4	-$12.3	-$12.3	-$12.3	-$12.4	-$12.5	-$12.5	-$12.6
Expenditures on Electricity, Commercial	-$69.5	-$133.4	-$195.0	-$188.1	-$185.5	-$180.2	-$181.2	-$185.3	-$187.7	-$190.4
Change in Energy Expenditures	-$102.5	-$199.5	-$294.7	-$288.5	-$286.4	-$282.2	-$283.5	-$291.0	-$295.3	-$299.9
1338 Building Codes Training and Assistance										
Investment	$159.4	$210.7	$259.7	$302.7	$374.3	$806.2	$1,092.6	$1,016.2	$868.4	$930.6
Expenditures on Oil, Residential	-$0.9	-$2.0	-$3.2	-$5.2	-$8.4	-$17.1	-$48.3	-$77.0	-$106.8	-$137.5

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$3.6	-$8.2	-$13.8	-$23.0	-$37.1	-$78.8	-$230.2	-$378.9	-$521.8	-$664.3
Expenditures on Natural Gas, Commercial	$1.5	$5.6	$12.1	$19.4	$26.1	$36.6	$40.7	$35.9	$26.0	$16.3
Expenditures on Electricity, Residential	-$6.4	-$13.5	-$21.6	-$35.5	-$57.7	-$127.8	-$402.9	-$681.7	-$957.4	-$1,233.2
Expenditures on Electricity, Commercial	-$26.3	-$64.8	-$114.4	-$164.5	-$215.6	-$393.7	-$1,105.1	-$1,831.8	-$2,387.1	-$2,889.6
Change in Energy Expenditures	-$35.7	-$82.8	-$141.0	-$208.8	-$292.6	-$580.8	-$1,745.7	-$2,933.5	-$3,947.1	-$4,908.2
422 Energy Star	Details in 4221-4228									
4221 Energy Star: Clothes Washers										
Investment	$295.3	$342.0	$346.7	$350.8	$351.4	$356.9	$429.3	$450.7	$473.2	$496.8
Expenditures on Oil, Residential	-$6.5	-$8.8	-$10.9	-$13.3	-$15.5	-$20.0	-$27.8	-$34.4	-$41.1	-$47.9
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$35.8	-$48.5	-$61.4	-$74.6	-$88.0	-$113.9	-$162.4	-$216.4	-$271.8	-$331.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$64.9	-$84.2	-$106.0	-$126.6	-$148.3	-$191.1	-$270.6	-$340.6	-$418.0	-$504.3
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$107.3	-$141.5	-$178.3	-$214.6	-$251.9	-$325.0	-$460.8	-$591.4	-$730.9	-$883.2
4223 Energy Star: Refrigerators										
Investment	$81.4	$193.9	$276.7	$372.3	$375.7	$386.4	$416.0	$432.0	$448.5	$465.5
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Electricity, Residential	-$3.1	-$7.7	-$15.4	-$25.2	-$35.0	-$54.9	-$103.7	-$142.4	-$186.8	-$238.6
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$3.1	-$7.7	-$15.4	-$25.2	-$35.0	-$54.9	-$103.7	-$142.4	-$186.8	-$238.6
4226 Energy Star: Electric Water Heaters										
Investment	$9.2	$17.5	$31.8	$54.1	$91.7	$164.1	$151.1	$153.2	$155.2	$157.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$0.8	-$4.0	-$9.3	-$19.7	-$40.7	-$122.0	-$340.6	-$606.1	-$917.2	-$1,276.5
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$0.8	-$4.0	-$9.3	-$19.7	-$40.7	-$122.0	-$340.6	-$606.1	-$917.2	-$1,276.5
4225 Energy Star: Gas Water Heaters										
Investment	$0.0	$10.6	$17.8	$26.5	$37.1	$50.4	$104.9	$113.3	$122.0	$131.2
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	-$0.5	-$1.7	-$3.2	-$5.3	-$11.0	-$31.4	-$78.1	-$129.2	-$185.1
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Change in Energy Expenditures	$0.0	-$0.5	-$1.7	-$3.2	-$5.3	-$11.0	-$31.4	-$78.1	-$129.2	-$185.1
4224 Energy Star: Room Air Conditioners										
Investment	$243.3	$375.6	$377.1	$379.2	$372.3	$363.9	$430.7	$448.2	$466.4	$485.2
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$2.5	-$4.5	-$6.8	-$8.2	-$10.5	-$14.0	-$24.3	-$34.4	-$45.6	-$58.9
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$2.5	-$4.5	-$6.8	-$8.2	-$10.5	-$14.0	-$24.3	-$34.4	-$45.6	-$58.9
4228 Energy Star: CFLs										
Investment	$23.2	$29.2	$30.5	$29.5	$23.8	$26.3	-$143.7	-$683.4	-$1,553.5	-$2,502.6
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.4	$1.4	$2.1	$2.2
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.1	$0.3	$1.0	$10.4	$39.7	$58.9	$59.9
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$30.1	-$80.2	-$156.4	-$262.6	-$410.0	-$785.2	-$2,536.1	-$4,970.6	-$6,141.5	-$6,329.1
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$30.1	-$80.2	-$156.4	-$262.4	-$409.7	-$784.1	-$2,525.3	-$4,929.5	-$6,080.5	-$6,266.9
4222 Energy Star: Dishwashers										
Investment	$60.1	$113.2	$112.3	$112.2	$113.1	$118.6	$130.7	$137.4	$144.4	$151.7
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$1.5	-$3.0	-$5.5	-$7.0	-$9.0	-$13.2	-$24.9	-$38.4	-$54.5	-$72.3
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$1.5	-$3.0	-$5.5	-$7.0	-$9.0	-$13.2	-$24.9	-$38.4	-$54.5	-$72.3
Weatherization and Intergovernmental Program (DU 1-3)										
Investment	$1,966.7	$2,371.7	$2,636.5	$2,919.1	$3,031.4	$3,688.7	$3,564.8	$3,025.9	$2,083.1	$1,272.3
Expenditures on Oil, Residential	-$24.8	-$44.9	-$64.9	-$87.2	-$110.4	-$160.5	-$296.6	-$393.6	-$440.4	-$487.1
Expenditures on Oil, Commercial	-$7.6	-$15.2	-$22.5	-$28.5	-$34.4	-$46.6	-$77.7	-$97.8	-$101.7	-$106.1
Expenditures on Natural Gas, Residential	-$79.7	-$135.4	-$195.3	-$260.1	-$329.6	-$483.9	-$876.8	-$1,210.0	-$1,444.6	-$1,701.0
Expenditures on Natural Gas, Commercial	-$26.0	-$50.0	-$72.4	-$70.2	-$68.2	-$68.6	-$77.4	-$90.0	-$102.0	-$114.6
Expenditures on Electricity, Residential	-$137.4	-$249.9	-$402.5	-$592.0	-$843.5	-$1,494.2	-$4,003.2	-$7,176.1	-$9,087.5	-$10,081.7
Expenditures on Electricity, Commercial	-$116.6	-$237.9	-$369.0	-$431.3	-$499.6	-$712.1	-$1,515.2	-$2,300.7	-$2,864.2	-$3,376.3
Change in Energy Expenditures	-$392.0	-$733.2	-$1,126.7	-$1,469.3	-$1,885.7	-$2,965.7	-$6,846.9	-$11,268.2	-$14,040.5	-$15,866.8
4. Residential Buildings Integration										
115 Research & Development (Building America)										
Investment	$27.3	$48.2	$83.6	$87.4	$112.8	$128.0	$74.5	$26.7	$26.7	$26.7
Expenditures on Oil, Residential	-$0.1	-$0.2	-$0.4	-$0.7	-$1.1	-$2.1	-$4.3	-$5.5	-$6.2	-$7.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$1.1	-$3.4	-$7.5	-$12.4	-$19.3	-$36.1	-$67.9	-$83.8	-$92.7	-$101.6
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Electricity, Residential	-$1.2	-$3.4	-$7.9	-$13.0	-$20.2	-$38.1	-$77.3	-$100.4	-$111.7	-$123.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$2.4	-$7.0	-$15.9	-$26.1	-$40.6	-$76.3	-$149.5	-$189.6	-$210.6	-$231.6
506 Residential Building Energy Codes										
Investment	$0.0	$0.0	$0.0	$0.3	$2.8	$18.2	$101.4	$138.1	$148.0	$158.0
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	-$1.2	-$13.6	-$34.6	-$57.3	-$81.1
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	-$0.1	-$0.4	-$3.8	-$45.5	-$126.7	-$213.5	-$303.8
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	-$0.3	-$1.7	-$23.1	-$66.0	-$117.1	-$175.5
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	$0.0	$0.0	$0.0	-$0.1	-$0.7	-$6.7	-$82.2	-$227.3	-$387.8	-$560.5
116 Zero Energy Buildings										
Investment	$31.5	$46.8	$64.4	$84.0	$109.8	$158.0	$262.0	$414.1	$596.6	$746.3
Expenditures on Oil, Residential	-$0.2	-$0.5	-$1.0	-$1.7	-$2.6	-$6.1	-$25.2	-$60.3	-$115.0	-$190.5
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$0.6	-$1.5	-$3.0	-$5.0	-$8.1	-$18.2	-$71.7	-$170.9	-$316.2	-$508.6
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$1.5	-$4.0	-$8.1	-$13.5	-$21.5	-$48.7	-$195.3	-$460.9	-$857.4	-$1,385.9
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$2.3	-$6.0	-$12.1	-$20.2	-$32.2	-$72.9	-$292.1	-$692.2	-$1,288.6	-$2,084.9

Project and Category	Fiscal Year									
	2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
5. Commercial Buildings Integration										
124 Research & Development										
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	-$0.1	-$0.1	-$0.4	-$3.8	-$6.0	-$7.0	-$7.9
Expenditures on Oil, Commercial	$0.0	-$0.1	-$0.2	-$0.3	-$0.6	-$2.5	-$21.0	-$30.7	-$34.3	-$38.1
Expenditures on Natural Gas, Residential	$0.0	-$0.4	-$0.8	-$1.2	-$2.4	-$9.8	-$80.2	-$120.8	-$134.8	-$146.1
Expenditures on Natural Gas, Commercial	$0.0	-$0.6	-$1.2	-$1.8	-$3.6	-$14.8	-$124.2	-$199.8	-$246.9	-$295.2
Expenditures on Electricity, Residential	$0.0	-$0.7	-$1.3	-$2.0	-$3.9	-$15.9	-$135.2	-$214.9	-$258.7	-$298.2
Expenditures on Electricity, Commercial	-$0.1	-$1.8	-$3.4	-$5.1	-$9.8	-$38.7	-$341.2	-$615.6	-$853.1	-$1,093.6
Change in Energy Expenditures	-$0.1	-$3.6	-$7.0	-$10.5	-$20.5	-$82.1	-$705.6	-$1,187.8	-$1,534.7	-$1,879.2
507 Commercial Building Energy Codes										
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$22.3	$172.2	$305.5	$360.6	$435.9
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$1.4	$8.3	$18.0	$27.2
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	-$6.6	-$121.9	-$413.7	-$818.1	-$1,236.8
Change in Energy Expenditures	$0.0	$0.0	$0.0	$0.0	$0.0	-$6.6	-$120.5	-$405.5	-$800.1	-$1,209.6
6. Emerging Technologies										
430 Lighting R&D	Details in 4304-440									
4304 Lighting R&D: Controls										

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Investment	$35.3	$28.8	$40.1	$51.3	$68.2	$93.7	$91.0	$58.2	$68.9	$66.2
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	-$9.9	-$17.9	-$29.2	-$43.5	-$62.6	-$111.9	-$257.1	-$355.6	-$456.1	-$550.7
Change in Energy Expenditures	-$9.9	-$17.9	-$29.2	-$43.5	-$62.6	-$111.9	-$257.1	-$355.6	-$456.1	-$550.7
440 Next Generation Lighting Initiative										
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.5	$31.6	$65.9	$103.8
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	-$398.9	-$887.2	-$1,484.4
Change in Energy Expenditures	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	-$398.9	-$887.2	-$1,484.4
380 Space Conditioning & Refrigeration R&D	Details in 3801-3804									
3801 Refrigeration R&D: Res. HVAC Dist. System										
Investment	$69.1	$104.9	$152.1	$214.9	$304.0	$540.5	$726.4	$248.0	$299.8	$313.9
Expenditures on Oil, Residential	-$0.3	-$0.7	-$1.2	-$2.0	-$3.2	-$6.8	-$21.1	-$24.0	-$13.4	-$8.7

Project and Category	Fiscal Year									
	2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$6.2	-$15.4	-$28.4	-$46.7	-$72.2	-$151.0	-$444.0	-$493.5	-$256.9	-$147.9
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$5.8	-$14.2	-$26.7	-$43.6	-$67.7	-$142.4	-$432.1	-$490.3	-$285.0	-$201.9
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$12.3	-$30.3	-$56.3	-$92.3	-$143.1	-$300.2	-$897.1	-$1,007.7	-$555.3	-$358.5
3802 Refrigeration R&D: Adv. Elec HPWH										
Investment	$0.0	$1.6	$3.8	$7.0	$11.6	$26.8	$126.3	$179.8	$118.9	$27.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	-$0.7	-$2.5	-$5.7	-$11.1	-$31.6	-$206.4	-$545.2	-$691.7	-$442.6
Expenditures on Electricity, Commercial	$0.0	$0.0	-$0.1	-$0.3	-$0.7	-$1.8	-$13.7	-$40.8	-$54.2	-$35.7
Change in Energy Expenditures	$0.0	-$0.8	-$2.7	-$6.1	-$11.8	-$33.4	-$220.1	-$586.1	-$745.9	-$478.3
3803 Refrigeration R&D: Commercial Refrig.										
Investment	$7.3	$10.4	$15.1	$21.0	$30.8	$57.2	$93.3	-$22.1	-$102.0	-$33.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	-$0.1	-$0.3	-$0.6	-$1.1	-$1.7	-$3.9	-$13.6	-$17.2	-$8.2	-$1.6
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Electricity, Commercial	-$2.6	-$6.3	-$11.6	-$19.0	-$29.9	-$65.1	-$229.3	-$285.6	-$135.3	-$26.7
Change in Energy Expenditures	-$2.7	-$6.6	-$12.3	-$20.1	-$31.6	-$68.9	-$242.9	-$302.8	-$143.5	-$28.3
3804 Refrigeration R&D: Refrigerant Meter										
Investment	$0.0	$4.9	$12.0	$22.3	$36.8	$84.8	$353.3	$497.8	$263.2	$56.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	-$1.6	-$5.6	-$12.9	-$24.8	-$70.8	-$419.2	-$1,095.9	-$1,355.3	-$801.6
Expenditures on Electricity, Commercial	$0.0	-$0.5	-$1.5	-$3.4	-$6.4	-$17.7	-$108.3	-$293.2	-$361.3	-$216.0
Change in Energy Expenditures	$0.0	-$2.1	-$7.2	-$16.3	-$31.3	-$88.5	-$527.5	-$1,389.1	-$1,716.6	-$1,017.7
381 Appliances & Emerging Technologies R&D	Details in 3811-3817									
3811 Appliances & Emerging Tech R&D: HPWH										
Investment	$34.6	$22.8	$35.0	$50.8	$69.5	$137.5	$90.9	$93.7	$96.6	$99.6
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$17.1	-$27.2	-$44.8	-$70.2	-$106.6	-$232.1	-$575.6	-$713.5	-$870.1	-$1,048.1
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$17.1	-$27.2	-$44.8	-$70.2	-$106.6	-$232.1	-$575.6	-$713.5	-$870.1	-$1,048.1

Project and Category	Fiscal Year									
	2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
3813 Appl. & Emerg. Tech R&D: Roof Top AC										
Investment	$0.0	$13.9	$11.6	$9.9	$9.9	$8.8	$9.0	$8.6	$8.2	$7.8
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	-$4.7	-$8.5	-$11.3	-$14.1	-$17.7	-$25.1	-$30.2	-$35.8	-$41.8
Change in Energy Expenditures	$0.0	-$4.7	-$8.5	-$11.3	-$14.1	-$17.7	-$25.1	-$30.2	-$35.8	-$41.8
3815 Appl. & Emerg. Tech R&D: Gas Condensing WH										
Investment	$0.0	$2.9	$4.8	$7.6	$11.8	$22.6	-$1.5	$0.0	$1.6	$3.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	-$1.7	-$4.4	-$8.8	-$16.1	-$52.4	-$153.9	-$189.3	-$225.0	-$263.8
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	$0.0	-$1.7	-$4.4	-$8.8	-$16.1	-$52.4	-$153.9	-$189.3	-$225.0	-$263.8
3816 Appl. & Emerg. Tech R&D: Recessed Can Lights										
Investment	$1.8	$7.5	$17.7	$33.0	$54.1	$83.2	$76.4	-$43.0	-$46.5	-$49.1

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.2	$0.9	$1.0	$0.7	$0.6
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$0.4	-$2.3	-$7.1	-$16.6	-$33.3	-$91.9	-$290.3	-$371.2	-$373.9	-$376.5
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$0.4	-$2.3	-$7.1	-$16.5	-$33.3	-$91.8	-$289.3	-$370.2	-$373.1	-$375.9
3817 Appl. & Emerging Tech R&D: R-Lamp										
Investment	$11.1	$12.9	$11.1	$3.5	$5.6	-$26.0	-$69.0	-$78.9	-$81.4	-$81.7
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.1	$0.2	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$20.1	-$53.1	-$102.5	-$163.7	-$221.0	-$316.5	-$32.7	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$20.1	-$53.1	-$102.5	-$163.6	-$221.0	-$316.4	-$32.7	$0.0	$0.0	$0.0
2111 Bldg Envelope R&D: Window Technologies	Details in 2114-2115									
2114 Window Tech: Electrochromic Windows										
Investment	$143.5	$159.6	$193.3	$180.1	$210.1	$264.7	$239.0	$349.7	$387.8	$434.3
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.2	$0.1	$0.2	$0.4	$0.5	$0.7	$1.1	$1.8	$2.6	$3.4
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Natural Gas, Commercial	$6.1	$8.1	$9.9	$12.1	$13.9	$16.7	$20.1	$20.1	$19.7	$19.1
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	-$51.8	-$71.7	-$95.3	-$117.7	-$143.2	-$202.3	-$346.8	-$533.2	-$739.4	-$973.0
Change in Energy Expenditures	-$45.6	-$63.4	-$85.1	-$105.2	-$128.8	-$184.9	-$325.7	-$511.2	-$717.1	-$950.5
2115 Window Technologies: Superwindows										
Investment	$471.4	$567.6	$691.0	$873.5	$1,098.1	$1,593.8	$2,527.0	$1,870.7	$2,654.6	$2,919.3
Expenditures on Oil, Residential	-$9.0	-$15.4	-$22.5	-$31.6	-$42.6	-$70.1	-$170.5	-$241.8	-$314.1	-$386.3
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$20.9	-$36.1	-$54.2	-$77.6	-$106.6	-$182.5	-$485.9	-$805.8	-$1,143.3	-$1,507.8
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	-$13.5	-$23.7	-$37.2	-$53.7	-$75.4	-$134.2	-$381.3	-$653.6	-$970.4	-$1,337.2
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$43.5	-$75.3	-$114.0	-$163.0	-$224.6	-$386.8	-$1,037.7	-$1,701.2	-$2,427.7	-$3,231.3
2112 Building Envelope R&D: Thermal Insulation & Building Materials	Details in 2116-2118									
2116 Thermal Insulation: Quick Fill Walls										
Investment	$0.2	$1.5	$0.4	$1.2	$2.3	$3.5	$9.8	$13.8	$14.7	$16.0
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	-$0.1	-$0.2	-$0.3	-$0.9	-$2.0	-$3.2	-$4.3
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$0.1	-$0.4	-$0.5	-$0.9	-$1.4	-$3.1	-$12.6	-$29.4	-$47.8	-$68.1
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	-$0.3	-$0.3	-$0.3	-$0.5	-$1.0	-$4.5	-$10.1	-$17.1	-$24.9

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$0.1	-$0.6	-$0.8	-$1.2	-$2.1	-$4.3	-$18.0	-$41.5	-$68.1	-$97.2
2117 Thermal Insulation: R30 Insulation/30 Year Life Roofs										
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	-$0.1	-$2.3	-$7.4	-$12.5	-$17.7
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	-$1.5	-$21.4	-$75.7	-$133.0	-$194.1
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	-$0.4	-$5.5	-$14.1	-$24.1	-$36.1
Change in Energy Expenditures	$0.0	$0.0	$0.0	$0.0	$0.0	-$2.0	-$29.2	-$97.1	-$169.5	-$247.9
2118 Thermal Insulation: Moisture/Wet Insulation										
Investment	$13.4	$24.3	$34.9	$50.5	$67.0	$89.2	$167.4	$187.9	$207.8	$225.7
Expenditures on Oil, Residential	$0.0	-$0.1	-$0.1	-$0.3	-$0.3	-$0.9	-$3.8	-$9.6	-$16.0	-$22.8
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	-$1.7	-$5.7	-$11.6	-$19.7	-$30.2	-$56.8	-$142.5	-$269.6	-$408.1	-$561.2
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	-$0.5	-$0.5	-$1.0	-$2.0	-$4.7	-$24.3	-$60.4	-$103.6	-$153.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	-$1.7	-$6.2	-$12.2	-$21.0	-$32.5	-$62.4	-$170.7	-$339.6	-$527.7	-$736.9
145 Analysis Tools and Design										

Project and Category	Fiscal Year									
	2004	2005	2006	2007	2008	2010	2015	2020	2025	2030
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	-$0.1	-$0.3	-$2.2	-$5.8	-$10.4	-$15.3
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	-$0.1	-$0.2	-$0.4	-$0.8	-$1.2	-$3.6	-$24.7	-$61.3	-$105.7	-$151.3
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	-$0.9	-$2.2	-$4.2	-$6.6	-$9.9	-$23.8	-$119.8	-$277.8	-$466.0	-$657.7
Change in Energy Expenditures	-$0.9	-$2.4	-$4.6	-$7.4	-$11.2	-$27.6	-$146.7	-$344.9	-$582.1	-$824.3
7. Equipment Standards and Analysis										
603 Equipment Standards and Analysis	Details in 6039-6044									
6043 Standards: Res Gas Furnaces/Boilers										
Investment	$0.0	$0.0	$0.0	$0.0	$0.0	$25.9	$8.5	$5.7	$2.7	-$0.4
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.1	$0.1	$0.2
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	-$35.2	-$128.3	-$231.5	-$343.7	-$467.9
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.3	$0.8	$1.3	$2.0	$3.1
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Change in Energy Expenditures	$0.0	$0.0	$0.0	$0.0	$0.0	-$35.0	-$127.6	-$230.1	-$341.6	-$464.6
6044 Standards: EPAct Standards										
Investment	$0.0	$201.9	$209.3	$192.5	$989.5	$1,055.7	$1,357.0	$1,451.2	$585.6	$618.2
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	-$5.6	-$18.2	-$49.6	-$84.7	-$114.6	-$145.8
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	-$24.6	-$50.0	-$73.4	-$188.3	-$436.3	-$1,218.6	-$2,043.9	-$2,364.1	-$2,697.0
Change in Energy Expenditures	$0.0	-$24.6	-$50.0	-$73.4	-$193.8	-$454.5	-$1,268.2	-$2,128.5	-$2,478.7	-$2,842.8
6039 Standards: Distribution Transformers										
Investment	$0.0	$0.0	$0.0	$0.0	$608.1	$595.0	$682.0	$798.3	$213.5	$235.8
Expenditures on Oil, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Oil, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Natural Gas, Commercial	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Residential	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
Expenditures on Electricity, Commercial	$0.0	$0.0	$0.0	$0.0	-$68.1	-$202.1	-$568.5	-$992.2	-$1,105.6	-$1,233.0
Change in Energy Expenditures	$0.0	$0.0	$0.0	$0.0	-$68.1	-$202.1	-$568.5	-$992.2	-$1,105.6	-$1,233.0
Building Technologies Program (DU 4-7)										
Investment	$846.4	$1,260.5	$1,580.1	$1,890.7	$3,194.7	$4,388.6	$6,415.4	$5,737.1	$5,678.1	$6,094.1
Expenditures on Oil, Residential	-$9.5	-$16.9	-$25.3	-$36.5	-$50.1	-$87.9	-$243.2	-$383.6	-$531.9	-$708.3
Expenditures on Oil, Commercial	$0.2	$0.0	$0.0	$0.1	-$0.2	-$2.2	-$24.5	-$42.1	-$54.6	-$67.7
Expenditures on Natural Gas, Residential	-$30.6	-$64.6	-$110.5	-$172.4	-$256.7	-$548.5	-$1,631.5	-$2,520.3	-$3,181.3	-$4,076.1
Expenditures on Natural Gas, Commercial	$5.9	$7.0	$7.7	$8.4	$1.8	-$25.3	-$212.0	-$410.3	-$570.7	-$741.7
Expenditures on Electricity, Residential	-$59.7	-$131.8	-$244.5	-$396.0	-$588.3	-$1,129.5	-$2,796.6	-$4,781.2	-$6,009.8	-$6,365.5

Project and Category	Fiscal Year									
	2004	**2005**	**2006**	**2007**	**2008**	**2010**	**2015**	**2020**	**2025**	**2030**
Expenditures on Electricity, Commercial	-$65.2	-$129.6	-$203.9	-$280.5	-$532.8	-$1,124.4	-$3,355.6	-$6,294.6	-$8,300.3	-$10,282.6
Change in Energy Expenditures	-$159.1	-$335.9	-$576.5	-$876.9	-$1,426.4	-$2,917.7	-$8,263.4	-$14,432.1	-$18,648.5	-$22,241.9
Total										
Investment	$2,813.1	$3,632.2	$4,216.6	$4,809.8	$6,226.1	$8,077.3	$9,980.2	$8,763.1	$7,761.2	$7,366.5
Expenditures on Oil, Residential	-$34.3	-$61.7	-$90.2	-$123.7	-$160.5	-$248.4	-$539.8	-$777.2	-$972.3	-$1,195.4
Expenditures on Oil, Commercial	-$7.4	-$15.2	-$22.5	-$28.5	-$34.6	-$48.8	-$102.2	-$139.9	-$156.3	-$173.8
Expenditures on Natural Gas, Residential	-$110.3	-$200.0	-$305.8	-$432.5	-$586.3	-$1,032.3	-$2,508.3	-$3,730.3	-$4,625.9	-$5,777.1
Expenditures on Natural Gas, Commercial	-$20.2	-$43.0	-$64.7	-$61.8	-$66.4	-$93.8	-$289.4	-$500.3	-$672.7	-$856.3
Expenditures on Electricity, Residential	-$197.0	-$381.6	-$647.1	-$988.0	-$1,431.8	-$2,623.6	-$6,799.8	-$11,957.4	-$15,097.3	-$16,447.2
Expenditures on Electricity, Commercial	-$181.8	-$367.5	-$572.8	-$711.8	-$1,032.4	-$1,836.5	-$4,870.8	-$8,595.3	-$11,164.5	-$13,658.8
Change in Energy Expenditures	-$551.1	-$1,069.1	-$1,703.2	-$2,346.2	-$3,312.1	-$5,883.5	-$15,110.3	-$25,700.3	-$32,689.0	-$38,108.7

Table A.2. Allocation of EERE Buildings-Related Project Investment Costs by Sector

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
1. Weatherization Assistance				
901	Weatherization Assistance	$577.6	Residential Construction 50%; 8.3% each to Millwork, Paint and Allied Products,Rubber and Plastic Products,Other Glass Products, Mineral Wool, Metal Doors	Weatherization mostly involves incremental expenditures on residential construction, plus increases in costs of window and door components and insulation.
2. State Energy Program				
903	State Energy Program	$164.0	Complex	Same proportions as in all U.S. investment
3. Gateway Deployment				
1332	Rebuild America	$514.1	Commercial Construction 32.5%; Other Non-residential Construction 11.4%;Machinery and Equipment 11.5%; Commercial Refrigeration and Heating Equipment 10%; Wholesale and Retail Trade 7.6%, "Other" Manufacturing 5.5%; Other Structural Metal Products 5.4%; Sheet Metal Work 5.1%; Computer and Office Equipment 4.4%; Communications Equipment 3%; Measuring and Control Devices 1.3%; and Less than 0.5% each on Other Service Equipment, Power Equipment, Motors and Generators, Relays and Industrial Controls, Other Electrical Equipment, Other Fabricated Metal Products, Engines and Turbines, Misc. Electric Supplies.	Approximately the same proportions as for U.S. capital investment as a whole, except that household and transportation equipment are excluded and the extra investment is put into non-residential construction.

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
1336	Energy Efficiency Information Outreach	$183.1	Residential Construction 10.4%; Commercial Construction 22.1%; all others same as for Rebuild America	Information Outreach is a residential and commercial Program. It is assumed that 2/3 of the building construction cost increment will be commercial
1338	Building Codes Training and Assistance	$1,092.6	Same as Information Outreach	Same as Information Outreach
4221	Energy Star: Clothes Washers	$496.8	Household Laundry Equipment 100%	This sector is the manufacturing sector for the advanced equipment
4223	Energy Star: Refrigerators	$465.5	Household Refrigerators and Freezers 100%	This sector is the manufacturing sector for the advanced equipment
4226	Energy Star: Electric Water Heaters	$164.1	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
4225	Energy Star: Gas Water Heaters	$131.2	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
4224	Energy Star: Room Air Conditioners	$485.2	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
4228	Energy Star: CFLs	$30.5	Lighting Bulbs and Tubes 50%; Other Lighting and Wiring 50%	These sectors are the manufacturing sectors for the advanced equipment
4222	Energy Star: Dishwashers	$151.7	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
4. Residential Buildings Integration				
115	Research & Development (Building America)	$128.0	10% each for Heating Equipment, Lighting Bulbs and Tubes, and Electronic Components; 5% each for Residential Construction, Metal Doors etc., Household Cooking, Household Refrig and Freezers, Household Laundry, Electric Housewares and Fans, Household Vacuum Cleaners, House Appliances Not Elsewhere Classified, Other Lighting and Wiring, Rubber and Plastic Prodts, Other Glass Products, Cement, Lime and Gypsum, and Mineral Wool.	Incremental investment as a result of the program would be expected in residential construction and in the manufacturing sectors making the equipment and materials that would achieve energy savings
506	Residential Building Energy Codes	$158.0	Residential Construction 30%; Heating Equipment 30%; Other Glass Products (windows) 20%; Electronic Components 10%; Lighting Bulbs and Tubes 5%; Other Lighting and Wiring 5%.	Incremental investment as a result of the program would be expected in residential construction and in the manufacturing sectors making the equipment and materials that would be required by codes--mostly better windows and improved lighting and climate and lighting control.
116	Zero Energy Buildings	$746.3	Electric Utilities 25%; Photovoltaics (SIC 3674) 25%; Other electronic components 15%; Windows 5%; Lighting Bulbs and Tubes 5%; Residential Construction 25%	This program primarily promotes the diffusion of Photovoltaics (SIC 3674) into the residential construction sector in the near term (2010-2020), with commercial coming on after 2020. It also promotes online, real-time load monitoring by utilities. This requires significant investment in instrumentation and automation, PV technologies and instrumentation, advanced construction materials, and advanced appliances.

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
5. Commercial Buildings Integration				
124	Research & Development	$0.0	Commercial Construction 10%; Electronic Components 50%; 15% each for Commercial Refrigeration and Heating, Service Equipment; Lighting Bulbs and Tubes 5%; Other Lighting and Wiring 5%.	Incremental investment as a result of the program would be expected in commercial construction and in the manufacturing sectors making the equipment and materials that would achieve energy savings. Much of the improvement would be expected in climate control electronics.
507	Commercial Building Energy Codes	$435.9	Commercial Construction 30%; 20% Other Glass Products (windows); Electronic Components 10%; 15% each for Commercial Refrigeration and Heating, Service Equipment; Lighting Bulbs and Tubes 5%; Other Lighting and Wiring 5%.	Incremental investment as a result of the program would be expected in commercial construction and in the manufacturing sectors making the equipment and materials that would be required by codes--mostly better windows and improved lighting and climate and lighting control.
6. Emerging Technologies				
4304	Lighting R&D: Controls	$93.7	Electronic Components 100%	This sector is the manufacturing sector for the advanced equipment
440	Next Generation Lighting Initiative	$103.8	Lighting Bulbs and Tubes 50%; Other Lighting and Wiring 50%	These sectors are the manufacturing sectors for the advanced (mostly solid-state) lighting equipment
3801	Refrigeration R&D: Res. HVAC Dist. System	$726.4	Residential Construction 100%	This program is mostly focused on improvements in the construction of residential buildings, including appropriate equipment purchases by contractors

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
3802	Refrigeration R&D: Adv. Elec HPWH	$179.8	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
3803	Refrigeration R&D: Commercial Refrigeration	$93.3	Commercial Refrigeration and Heating Equipment 100%	This sector is the manufacturing sector for the advanced equipment
3804	Refrigeration R&D: Refrigerant Meter	$497.8	Commercial Refrigeration and Heating Equipment 50%; Heating Equipment 50%	These sectors are the manufacturing sectors for the advanced equipment
3811	Appliances & Emerging Tech R&D: HPWH	$137.5	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
3813	Appliances & Emerging Tech R&D: Roof Top AC	$13.9	Commercial Refrigeration and Heating Equipment 100%	This sector is the manufacturing sector for the advanced equipment
3815	Emerging Tech R&D: Gas Condensing WH	$22.6	Household Appliances, Not Elsewhere Classified 100%	This sector is the manufacturing sector for the advanced equipment
3816	Appliances & Emerging Tech R&D: Recessed Can Lights	$83.2	Lighting Bulbs and Tubes 50%; Other Lighting and Wiring 50%	These sectors are the manufacturing sectors for the advanced equipment
3817	Appliances & Emerging Tech R&D: R-Lamp	$12.9	Lighting Bulbs and Tubes 100%	This sector is the manufacturing sector for the advanced equipment
2114	Window Technologies: Electrochromic Windows	$434.3	Other Glass Products 90%; Measuring and Control Devices 10%	These sectors are the manufacturing sectors for the advanced equipment. Most of the additional cost is expected in the glass and coatings.

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
2115	Window Technologies: Superwindows	$2,919.3	Other Glass Products 80%; Other Wood Products 5%;Plastics 5%; Metal Doors, etc.5%, Other Fabricated Metal Products 5%	These sectors are the manufacturing sectors for the advanced equipment. Most of the additional cost is expected in the glass and coatings, but some additional cost is expected in the frames.
2116	Thermal Insulation: Quick Fill Walls	$16.0	Residential Construction 75%; Commercial Construction 25%	The cost is expected to be the additional cost of constructing these walls. About 75% of the market is thought to be residential.
2117	Thermal Insulation: R30 Insulation/30 Year Life Roofs	$0.0	Commercial Construction 75%; Synthetic Materials 25%	Commercial applications. Additional cost (if any) is expected to be the additional construction costs, plus some advanced materials.
2118	Thermal Insulation: Moisture/Wet Insulation	$225.7	Synthetic Materials 100%	All of the cost increment is expected to be in advanced materials.
145	Analysis Tools and Design	$0.0	Residential Construction 20%; Heating Equipment 30%; 10% each for Lighting Bulbs and Tubes and Other Lighting and Wiring; 5% each for Household Cooking, Household Refrig and Freezers, Household Laundry, Electric Housewares and Fans, Household Vacuum Cleaners, and Household Appliances Not Elsewhere Classified.	A broad array of sectors involved in residential construction and equipment is expected to be affected, with most of the impact on construction, heating plant, and lighting.

Proj Code	Name	Maximum Incremental Investment (2002$/year)	Percent Distribution	Comments
7. Equipment Standards and Analysis				
6043	Standards: Res Gas Furnaces/Boilers	$25.9	Heating Equipment 100%	This sector is the manufacturing sector for the advanced equipment
6044	Standards: EPAct Standards	$1,451.2	Commercial Refrigeration and Heating Equipment 100%	This sector is the manufacturing sector for the advanced equipment
6039	Standards: Distribution Transformers	$798.3	Other Electrical Equipment 100%	This sector is the manufacturing sector for the advanced equipment

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