



Economic Impacts from the Boulder County, Colorado, ClimateSmart Loan Program: Using Property-Assessed Clean Energy Financing

Marshall Goldberg and Jill K. Cliburn
MRG & Associates

Jason Coughlin
National Renewable Energy Laboratory

Acknowledgements

This publication was developed for the National Renewable Energy Laboratory by MRG & Associates under Subcontract No. AGG-0-40291-01. The document is not legal or tax advice or a legal opinion on specific facts or circumstances. The contents are intended for informational purposes only. The authors are solely responsible for errors and omissions.

Sponsors

This report was made possible through funding from the U.S. Department of Energy's Solar America Communities program. To learn more, please visit:

www.solaramericacommunities.energy.gov

Authors

Marshall Goldberg and Jill K. Cliburn
MRG & Associates

Jason Coughlin
National Renewable Energy Laboratory

List of Acronyms

CSLP	ClimateSmart Loan Program (Boulder County, Colo.)
DOE	U.S. Department of Energy
FHFA	Federal Housing Finance Agency
IMPLAN	Impact Analysis for Planning Model
HELOC	home equity line of credit
I-O	input-output (economic analysis)
PV	photovoltaic (rooftop solar electric system)
TAA	Trade Adjustment Assistance Program

Executive Summary

This report examines the economic impacts (including job creation) from the Boulder County, Colorado, ClimateSmart Loan Program (CSLP), an example of Property-Assessed Clean Energy (PACE) financing. The CSLP was the first test of PACE financing on a multi-jurisdictional level (involving individual cities as well as the county government). It was also the first PACE program to comprehensively address energy efficiency measures and renewable energy, and it was the first funded by a public offering of both taxable and tax-exempt bonds. The first phase of the residential CSLP financed about \$9.8 million in residential energy retrofits, most of which were completed in 2009. This report focuses on 598 project invoices and \$9.0 million in project spending.

The report provides a program overview and economic impact analysis of program spending and energy savings using an input-output (I-O) model. The report also provides a qualitative assessment of factors that affected the resulting economic impacts, and profiles some program participants and contractors. The analysis focuses on Boulder County benefits but also includes an assessment of associated statewide economic benefits.

Results of the analysis indicate that:

- CSLP spending in Boulder County alone contributed to 85 short-term jobs, more than \$5 million in earnings, and almost \$14 million in economic activity in the county.
- CSLP spending supported another 41 short-term jobs throughout the state but outside of Boulder County, \$2 million in additional earnings, and almost \$6 million in additional economic activity statewide.
- Assuming the program were extended with the same annual funding and participation, the 5- and 10-year trajectory of economic impacts would forecast additional benefits and sustained job opportunities.
- Reduced energy use saved participants about \$125,000 during the first year on their electric and gas utility bills.

Total CSLP costs for Phase 1, including the development of a risk-management reserve fund, loan fees, loans, and other costs, totaled about \$13 million. Short-term in-county benefits alone exceed this investment. Statewide economic benefits enhance the program value.

From a qualitative perspective, there are indications that declining program implementation costs (including interest rates and costs related to the reserve fund, as well as marketing and administrative fine-tuning) would improve economic results in future CSLP funding cycles.

Program design decisions, including one that brought in a high percentage of out-of-town contractors, resulted in many of the economic benefits leaking from the local economy. Yet the program had a variety of objectives, including not only creating local jobs but also reducing greenhouse gas emissions from a range of measures. Some products and skill sets needed to meet these objectives were not readily available in the county. Further, the CSLP aimed to prime the pump for green jobs development in the county and statewide.

By far, the greatest number of jobs gained (57% of in-county jobs) were related to solar photovoltaic (PV) projects. However, the first-year energy savings from PV are relatively small

compared to the upfront cost of a PV installation, which is designed for long-term (30-year), fuel-free operation.

The qualitative assessment reveals that the CSLP spurred significant energy retrofit spending beyond that reflected on loan applications. Many residents attended CSLP informational sessions to learn more about potential home improvements, but then ended up financing those improvements through channels other than the CSLP, such as home equity lines of credit (HELOC), cash, or in the case of PV systems, leasing the system from a solar company. Cash spending and alternatively financed spending probably increased the total of all program-related spending by 20% or more. Most of this spending escaped documentation because it encompasses many possibilities, from the PV system that was purchased using home-equity lending to the replacement of leaky windows with those of a better quality, that did not meet loan qualification standards. Additionally, there were expenditures for retrofit-related paint jobs and cosmetic improvements, as well as major home remodels inspired by the availability of low-interest financing for at least part of the job. The relationship of these expenditures to the CSLP program was confirmed by surveys of CSLP workshop registrants and energy project contractors. CSLP program participants profiled in this report shed extra light on how the availability of PACE financing spurred the market for energy efficiency and renewables.

The Boulder County ClimateSmart program is one of only a handful of local PACE financing programs that reached implementation before the Federal Housing Finance Agency (FHFA) effectively placed a moratorium on such programs in July 2010. The CSLP proceeded with implementation of a commercial PACE program, but it suspended the residential program, which was poised for Phase 2 implementation. The findings of this study show that continuing the CSLP would have additional benefits well beyond the increased cost-effectiveness from administrative and marketing lessons learned. These benefits include:

- Significant, long-term utility bill savings for participants
- Job creation for Boulder County every year, including more than 90 jobs in 2020 alone if the program were continued to that year
- An increase in overall economic activity in the county every year for the duration of the program. Countywide economic output in 2020 alone would increase by approximately \$15 million
- Expansion of statewide economic impacts and the likelihood that a growing market for energy efficiency and renewables could attract higher-value manufacturing and related job benefits to the state.

Arguably, programs like the CSLP “prime the pump” establish a market for energy efficiency and renewable energy products that could be manufactured profitably in-state, creating much greater job impacts and economic benefits.

Table of Contents

- List of Acronyms iii**
- Executive Summary iv**
- 1.0 The CSLP in Context..... 1**
 - 1.1 Introduction 1
 - 1.2 Assessing PACE Economic Benefits 4
 - 1.3 Program Attributes that Affected Outcomes..... 5
 - 1.4 CSLP Implementation Steps..... 7
- 2.0 Economic Analysis 10**
 - 2.1 Methodology 10
 - 2.2 Analyzing the Spending from the CSLP..... 10
 - 2.3 Macroeconomic Impacts..... 13
 - 2.4 Macroeconomic Impacts Projected Through 2020 17
 - 2.5 Section Conclusions 20
- 3.0 Qualitative Assessment of CSLP..... 22**
 - 3.1 Purpose and Approach 22
 - 3.2 Categorical Discussion of Trends 24
 - 3.3 Section Conclusions 29
- 4.0 Summary Conclusions and Observations..... 33**
 - 4.1 Results of I-O Analysis..... 33
 - 4.2 Qualitative Assessment 34
- Appendix 1 36**
 - Boulder County ClimateSmart Loan Program in Context 36

1.0 The CSLP in Context

1.1 Introduction

The Boulder County, Colorado, ClimateSmart Loan Program (CSLP) was the first test of Property-Assessed Clean Energy (PACE) financing on a multi-jurisdictional level (involving individual cities as well as the county government). It was also the first PACE program to comprehensively address energy efficiency measures and renewable energy, and it was the first funded by a public offering of both taxable and tax-exempt bonds. Initiated in 2009, the first phase of the CSLP included two rounds of residential project financing and resulted in about \$9.8 million in project loans. Associated program costs and fees and funding of a reserve account for the bonds added \$3.2 million, for a total of about \$13 million in Phase 1 program spending. This makes it the second largest PACE financing program in operation through mid-2010, second to Sonoma County, California (\$32.8 million).

The 2008 ballot measure that funded the CSLP authorized Boulder County to issue up to \$40 million in bonds, including \$14 million in tax-exempt bonds. The tax-exempt bonds were intended for low-income-qualified projects. Subsequently, the county sponsored two bond issues for Phase 1 residential financing. County administrators planned a second phase of the program to begin by mid-2010 for additional residential and commercial financing. However, due to a freeze on residential PACE programs nationwide that was imposed by federal mortgage agencies, Boulder County suspended residential CSLP financing indefinitely. As it was not directly affected by the freeze, the \$12 million commercial program moved forward. Boulder County's first commercial CSLP round closed in August 2010.

The CSLP is one of several programs under a countywide Sustainable Energy Plan, which has key goals in (1) reducing greenhouse gas emissions, (2) improving the environment, (3) saving energy, and (4) providing direct and indirect economic benefits. This study focuses on economic benefits, specifically those from Phase 1 of the residential CSLP. It looks at 598 energy home improvement loans that together comprise just over \$9 million in energy efficiency and renewable energy spending through program loans¹ and asks questions such as: How much money was spent in the county and in the state in order to meet home retrofit needs for materials and labor? What was the total related energy bill savings? How did direct and indirect investment in energy efficiency and renewable energy measures generate jobs? What kinds of jobs and where? How might the respending of energy bill savings and related business income result in additional economic benefits and jobs of all kinds?

Though it is specific to the Boulder County experience, this study also sheds light on how the PACE financing model creates economic benefits and how these benefits could be increased. It highlights the drivers of green jobs development locally, statewide, and nationally. It also spotlights common challenges, from the need for longer test periods that would allow administrators to work out program kinks, to the need for innovative ways to promote local contractors when PACE communities are part of large, interdependent metro areas.

¹ The economic analysis for this report drew upon available participant invoice data, which was available for just over \$9 million in CSLP lending. This analysis does not include spending on loan fees or required reserves. A small number of customers delayed spending their approved loan dollars, and their spending was not included in this analysis.

Although this study is not a process evaluation, some aspects of program implementation that bear on the economic impacts of the CSLP program are discussed. In this way, the study presents this ClimateSmart program as a useful model for future community-based, energy-related financing programs.

PACE Financing 2007-2010

Property-Assessed Clean Energy (PACE) financing, or the creation of energy financing districts, is a tool that local governments may use to give residents and business owners access to financing on terms that are well-suited to energy efficiency and renewable energy building improvements. Local governments—including cities, counties, and other entities with taxing authority—may issue bonds that generally have no recourse and provide financing with little or no money down, to be repaid through a 15- to 20-year assessment on each participant's property taxes. If a property owner sells a PACE-assessed home or business, the assessment stays with the property, with responsibility passing to the next owner until the debt is paid.

Thus, PACE addresses three major barriers to energy efficiency and renewable energy (solar PV) investment:

1. Lack of capital. PACE financing programs usually require low fees and no money down for qualified participants.
2. Lack of long-term commitment. Because homeowners in the United States tend to move every seven years or less, they like the fact that PACE assessments are transferable to new property owners.²
3. Lack of quality assurance. PACE programs typically address this barrier by offering energy audits or workshops to educate consumers, and they typically place some requirements for quality assurance on participating contractors.

The idea of land-secured financing districts is not new. Such districts support a myriad of local improvements. As with PACE districts, some of these assess costs only upon the beneficiaries. For example, assessments may finance individual hook-ups to city water, to replace individual wells. Property-assessed financing is not legally a loan, though many PACE programs (including Boulder County's) use the term "loan" because it is widely recognized shorthand for debt financing.

The first PACE program in the United States was proposed by the City of Berkeley, California, in 2007 and pilot-tested in 2008 as a way to finance residential solar projects. The concept caught on quickly. By mid-year 2010, 22 states and the District of Columbia had legislation in place to enable PACE programs. About a dozen local programs had started, from Annapolis, Maryland, to Milwaukee, Wisconsin, and Yucaipa, California. The U.S. Department of Energy (DOE) began providing technical assistance and outreach and announced the awards of Energy Efficiency Block Grant Funding to help fund 25 new and potentially innovative PACE programs.

However, federal housing regulators, including the Federal Housing Finance Agency (FHFA) and the Office of the Comptroller of the Currency, opposed the PACE concept. In July 2010, FHFA announced that federally backed lenders

² While the PACE lien legally transfers to the next homeowner, it may be subject to negotiation at the time of sale.

PACE Financing 2007-2010 (cont.)

Fannie Mae and Freddie Mac would no longer underwrite mortgages on PACE homes. The FHFA's primary complaint was that most PACE programs gave the energy-related property assessments primary lien status, meaning that the tax assessment would be repaid before the mortgage in the case of a foreclosure. The agency also expressed concern that the burden on homeowners of paying PACE assessments might increase foreclosures.

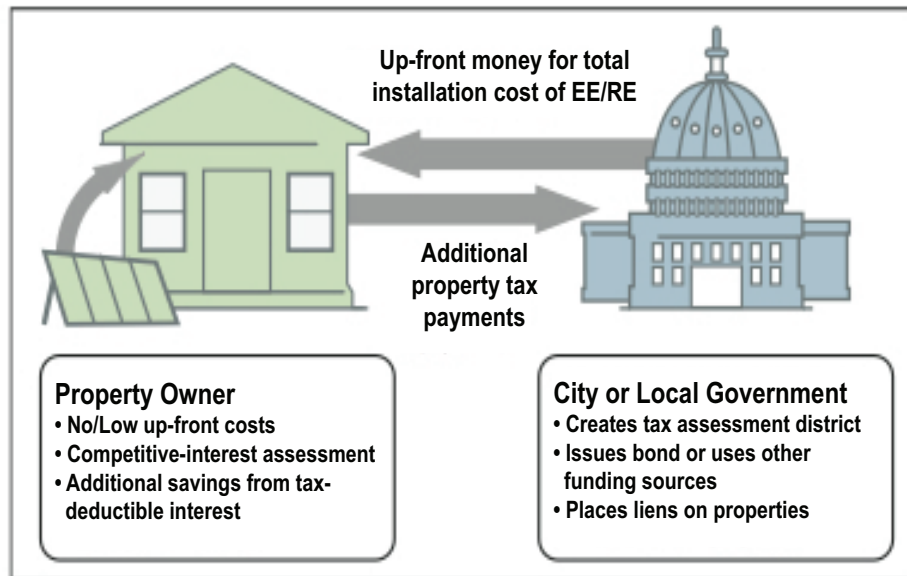


Figure 1. Basic PACE financing process. Source: NREL 2010.

The result of the FHFA decision was an indefinite moratorium on nearly all PACE programs nationwide. Only commercial PACE financing (including one in Boulder County) and programs (such as one in Maine) that prescribe secondary liens on PACE projects were in effect in Fall 2010. The option for secondary liens has not caught on, as there is no secondary market for bonds tied to this type of investment.

A federal legislative remedy stalled in Congress in Fall 2010. Several PACE program sponsors and advocacy groups have brought lawsuits, which are currently pending against FHFA. Some local energy program sponsors have announced plans to keep working on solutions, reviving PACE or working with alternative local financing strategies.

Sources:

B. Speer and R. Koenig, Property-Assessed Clean Energy (PACE) Financing of Renewables and Efficiency, NREL Energy Analysis Fact Sheet Series on Financing Renewable Energy Projects, National Renewable Energy Laboratory, July 2010. (www.nrel.gov).

M. Zimring, I. Hoffman, and M. Fuller, Pace Status Update, Clean Energy Financing Policy Brief, Lawrence Berkeley National Laboratory Environmental Energy Technologies Division, August 2010. (www.eetd.lbl.gov).

J. Farrell, New Rules Project, PACE Presentation: Overview, Update, and Future, for the Southwest Renewable Energy Conference, Santa Fe, New Mexico, September 2010. (www.newrules.org).

1.2 Assessing PACE Economic Benefits

The Boulder County ClimateSmart program made national news when voters passed the program's first bond measure. The implementation of the residential program in Spring through Fall 2009 also won national recognition for its speed to market and widespread reach, encompassing 40 residential measures and attracting participation from 300 contractors. When CSLP launched, Boulder County unemployment was rising. According to county economic development staff, the ratio of applicants to job openings—which for years never averaged more than 10 to 1—surged past 20 to 1 in early 2009. Local policymakers hoped the CSLP could address many goals, including job creation.

This economic analysis will be limited by a number of factors. First, this is by definition a study of early results from a first-time effort. The market for a first-time program typically includes many early adopters, and their behavior differs from that of all homeowners. In addition, the energy bill savings used in this analysis, which were based on usage during the first year after the improvements were made, are likely to differ from average savings over future years. This is because it takes some time for customers to perceive and respond (i.e., adjust habits) to changes such as increased comfort, lower bills, etc. Also by definition, this study is focused on the homeowners who followed through the entire program process and used program financing for specific home improvements. Yet the program spurred other improvements that ultimately used alternative financing or cash. Those program-inspired investments had economic impacts that were not specifically documented. This analysis does not quantify every economic impact, but it provides a framework for understanding the range of impacts and how they might occur.

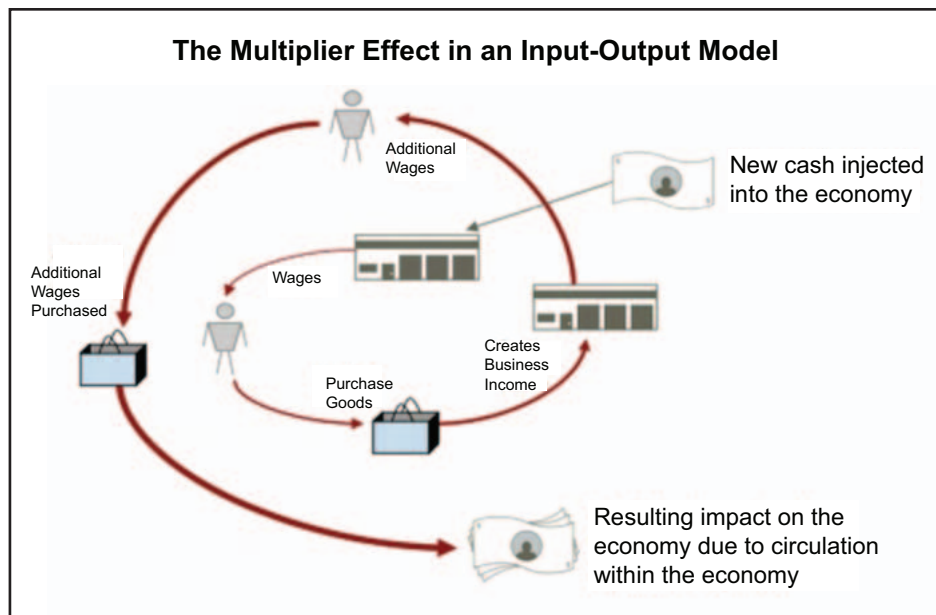


Figure 2. The recirculation of dollars spent on energy efficiency or renewable energy measures is known as the multiplier effect.

In short, jobs and growth in economic activity are related to spending and the circulation of money in the economy. The full impacts on jobs, earnings, and economic activity of investments in CSLP energy measures and the resulting energy bill savings are captured by evaluating the impacts for each change in spending. Note that dollars spent on energy efficiency-related home

improvements create much greater economic benefits and more local jobs than do dollars spent to pay utility bills and build power plants. Figure 2 summarizes the way these dollars circulate from local energy program spending and the resulting benefits. Additional background on economic modeling and specific inputs from the Boulder County CSLP will be discussed in Section 2 of this report, Economic Analysis.

1.3 Program Attributes that Affected Outcomes

Only a handful of PACE programs completed funding rounds by mid-2010, and each of these programs had different goals, target markets, and program implementation plans. The differences and similarities among these programs are discussed in the appendix of this report and summarized in Table A1. Readers of this report should bear in mind that each local PACE program or related financing program yields unique economic results, as well as more universally applicable lessons.

Boulder County’s program, conceived in 2008, was unique in its emphasis on climate protection. Economic development was only one of four goals:

- Reduced greenhouse gas emissions
- Reduced environmental impacts, such as air pollution and water use
- Energy savings, with accompanying bill savings in all sectors
- Economic benefits, including green jobs creation.

In Boulder, program planners wanted to encourage a broader range of measures, in part, to improve the average cost per unit of greenhouse gas reduction. The list of qualifying improvements included air sealing and ventilation; insulation, space heating and cooling; water heating; lighting and daylighting; energy efficient windows and doors; reflective roofs; pool equipment; landscaping (e.g., strategically planted trees), and installation of solar PV, solar water heating, small wind turbines, wood/pellet stoves, and much more. Program planners particularly wanted to balance interest in solar PV against low-cost/high-savings measures such as air sealing.

Boulder’s emphasis on public education affected the program outcome, as residents were presented with several options for achieving energy savings—besides using PACE financing. CSLP applicants were required to attend an introductory workshop. There, they learned about technologies, program procedures, and the availability of technical support. For example, Boulder County offered a subsidized energy audit, as well as free phone counseling to help customers prioritize investments.

The CSLP addressed the goal of local jobs development primarily by creating a market for energy efficiency and renewable energy measures that could spur local businesses of many types. Program administrators worked closely with contractors who volunteered their time to help promote the program and support educational workshops. The program paid workshop trainers, but there was mutual benefit for all contractors who pitched in. Press coverage for the program was strong in local newspapers, including photos and interviews with Boulder-area contractors. One paper named the loan program team their “People of the Year” for 2009, giving front-page coverage to the program and its jobs-development goals.¹

¹ White, Pamela, “2009 Boulder County People of the Year: Team ClimateSmart,” *Boulder Weekly*, December 24, 2009.

Yet in many ways, program designers opted for simplicity and speed to market, rather than fine-tuned jobs-development strategies. For example, the program only required that participating contractors be licensed in the communities they served. About 300 contractors from across the Denver area ultimately received at least one payment from the program, and of these, more than 40% were from outside of Boulder County. (A map showing Boulder in relation to the Denver metro area is included on page 35.) The number of out-of-county contractors was partly justified by the breadth of qualifying measures. It also was an indication of business appetite for this type of program. One Boulder County contractor who was interviewed (see sidebar below) suggested that contractors in the energy retrofit business need to go wherever the work is—in this case, anywhere within the Denver metro area. Nevertheless, the open invitation to contractors resulted in many energy retrofit dollars leaving Boulder County.

The involvement of many contractors (a simple ratio of about one contractor for every two homes served) spread the benefits of the CSLP thin, so that most companies would not see a big change in their volume of work. Some contractors reported that they appreciated the extra hours for their workers but did not feel justified in hiring new employees because of the CSLP. Other contractors, notably in solar businesses, reported a marked surge in business, which triggered new hires. These impacts are discussed in greater detail in Section 3 of this report, Qualitative Assessment.

The bottom line is that, Phase 1 of the CSLP produced significant jobs-development benefits. Section 2 of this report details how the program created more than 85 jobs from in-county spending alone and at least 126 jobs statewide. Boulder County leaders embraced a secondary goal to reach out beyond the county line and contribute to PACE start-ups statewide. County staff advised leaders in Eagle, Pitkin, and Gunnison counties in Colorado, as they approved their own PACE programs. In this light, the benefits that flowed out of Boulder County had far-reaching effects that could be widely shared.

The Long View

Debbie Weingardt, who owns and manages Bestway Insulation in Layfayette (Boulder County), said she has seen too many workers come and go since her business opened in 1976. “I was excited about the [CSLP], but I’d learned long ago to be cautious about growing my business too fast,” Weingardt said.

She estimated as much as a quarter of her \$2 million annual revenue in 2009 came from the CSLP, and she added employees to handle the work. Altogether, the business has 25 full-time employees. But Weingardt said that some of the job impact from CSLP might be hidden by two factors: first, her business is affected by the ebb and flow of several incentive programs in the region, and second, she prefers to add hours for existing employees before she commits to hiring anyone new.

Weingardt says she makes a commitment to her employees, including paying for training from the Building Performance Institute and counseling good workers on how to advance their careers from labor to sales and management jobs. She has promoted many employees over the years, she said. Weingardt has also struggled to keep workers on when the fates turn. “I’ve been known for trying

The Long View (cont.)

to keep employees on until it almost bankrupts me,” she said, recalling at least one time when she took out a loan in order to meet payroll. “It’s hard to not have consistency in this business,” she said.

She said the good news about the ClimateSmart program was that it promoted a greater awareness of the benefits of whole-house insulation—meaning not just more jobs, but bigger jobs. “If this program had kept up for a few years, we might have been able to point to a dramatic change in how people see their investments in insulation,” she said. For now, Weingardt would credit Boulder County’s program as a leader among energy efficiency programs that have taken off since 2005. Since then, the number of insulation businesses in the Denver area has boomed, and Bestway has quadrupled its revenues.



Credit: Dennis Schroeder, NREL. PIX# 17963

Boulder’s ClimateSmart loan program had the greatest single impact of any of these programs, she said. When the freeze on ClimateSmart started to take effect, Bestway let four workers go, Weingardt said. But following new leads, Bestway began sending trucks to Fort Collins (north of Boulder County), which has just launched a new energy efficiency rebate program.

According to Weingardt, the challenges of building the energy efficiency industry and a green-jobs economy are hard to meet when small companies like hers must keep changing their business plans in order to succeed. She said that she has participated on several state and local committees to advise on green jobs development, where her message has been to stress the need for multi-year programs, to open the pipeline from solid job training to secure employment.

1.4 CSLP Implementation Steps

Before analyzing its impacts, it is useful to review how Phase 1 of the Boulder County CSLP worked. Program guidelines allowed for:

- Fifteen- (15-) year loans
- Minimum borrowing: \$3,000 per home
- Maximum borrowing: For open loans (using taxable bonds), up to 20% of the actual value of the property, or \$50,000, whichever is less. For income-qualified loans (using tax-exempt bonds), up to \$15,000. For Phase 1 residential projects, interest rates ranged from 5.2% to 6.8% depending on the type of bond and the issue.

Because Boulder County intended to take its project-finance bonds to market, it had to prequalify projects and bundle them together. This led to a multi-step process:

1. Participant attends Home Energy 101 Workshop. The workshop reviews the process, the 40 qualified measures, and the costs and the benefits of making such improvements.
2. Participant obtains two or more bids and submits a preliminary online application.
3. County prequalifies the participant, who then completes a detailed application and submits it with a \$75 fee.
4. Participant awaits the aggregated bond issue and notification that the work may proceed.
5. Contractor or multiple contractors complete work on each home.
6. Contractor submits the final invoice, permit/inspection paperwork, and the participant's approval, for full payment from the county.
7. Participant receives notice of additional payment due on the next property tax bill, and will continue payments through property taxes for 15 years or until the property (and responsibility for tax payments) changes hands.

Program participants paid a \$75 application fee and other fees (approximately 4%) added to their principle. The fees covered the cost of issuing the bond, the cost for program and administration staff, and other program costs. The total budget for CSLP Phase 1 was about \$800,000, plus \$2.4 million was set aside as a reserve fund to help secure the bonds. Participant fees covered all these costs, so the program could be self-sustaining.

Program economic impacts depended most upon participants' bottom-line spending and on energy savings that could be respent. However, two surveys—one of program participants and one of program contractors—suggest that some aspects of the process and of program costs may have affected outcomes. For example, relatively strict program rules, such as the early application for the exact amount to be financed, and fees, which could be proportionally high on smaller jobs, led some applicants to seek alternative financing. It is also likely that CSLP program publicity and public education triggered community-wide energy efficiency improvements that are not reflected in this relatively short-term and narrowly focused study.



Susie Strife ran the day-to-day operation of the Boulder CSLP

A Practical Perspective

Megan Kram bought her first home in Boulder three years ago, knowing that it needed some work. Kramer is single, keeps a busy schedule, and asserts that she has “pretty basic” maintenance skills. She heard about the Boulder ClimateSmart loan program from a friend, who emailed her an invitation to a free workshop on the program.

Kram's furnace was overdue for replacement, and the workshop confirmed her thoughts about the benefits of wall insulation. The house had “practically no insulation to start with,” she said. Kram had wanted new energy-efficient windows, too, but the price tag was daunting. She made a spreadsheet with columns and rows listing the estimates that she'd gotten from different

A Practical Perspective (cont.)

contractors, plus estimates of what she expected in tax credits or as a rebate from the utility. Her headings were meaningful to her: “Stuff I’m for sure going to do,” “Windows...,” “Nicer windows,” and “Monthly Cost.”

“I decided I could pay about \$50 per month, though I understood it would all come through on the annual property tax bill,” Kram said. She liked the idea that she would not have to pay the investment off entirely if she decided to sell the house in less than 15 years. “I would say I’m very likely to move within that time,” she said. It seemed fair to her that the future owner would share in the costs and continuing benefits of the improvements.

She was a little disappointed by the ClimateSmart program-related fees, but the interest rate, at 6.75%, was attractive. She also liked the responsiveness of contractors who were in the program. “The job was easily done. It took half a day for the furnace and half a day for the insulation,” she recalled.

Her decision to keep the equivalent monthly payments low prompted Kram to chose replacement windows that were not qualified as high-efficiency. She used personal financing to have them installed. “My old windows were so leaky that even a normal window replacement is a huge improvement. I’m sure there will be energy savings there, too,” she said.

Other PACE programs around the country have also reported that PACE-related outreach may trigger improvements, whether or not PACE is the ultimate source for financing. In addition, non-qualifying improvements, made along with PACE improvements, affect the community economic impacts in ways that are difficult to track. Such effects are discussed in the Qualitative Analysis section of this report.



Megan Kram shares a simple spreadsheet she made to facilitate her home improvement projects.



Kram upgraded the look of her home at the same time as she financed invisible energy improvements.

2.0 Economic Analysis

The central goal of this study is to analyze employment and other economic impacts of the Boulder County residential ClimateSmart Loan Program (CSLP), an example of Property-Assessed Clean Energy (PACE) financing. The economic analysis used to achieve this goal focuses primarily on CSLP dollars spent. The analysis utilizes an analytic tool called an input-output (I-O) model, which identifies relevant interactions among all sectors of the local and statewide economies. For example, the model shows how homeowner spending on attic insulation or solar panels spurs business on the local level among vendors and contractors, as well as up the supply chain, among suppliers and manufacturers. To the extent that these products are installed by local contractors or purchased from local manufacturers or retail vendors, there is additional benefit to the local economy. The I-O model also identifies other impacts as described below.

Subsequently, Section 3 of this report will go beyond the quantitative analysis provided here. Section 3 includes an assessment of factors that could not be quantified but could affect the total long-term economic impacts of the CSLP or of similar PACE programs.

2.1 Methodology

To capture the full economic impacts of the Boulder County PACE program, the economic analysis evaluates three separate effects (i.e., direct, indirect, and induced) for each expenditure. The sum of these effects yields the total effect resulting from a single expenditure.

1. The direct effect refers to the onsite or immediate effect produced by expenditures. In the case of installing energy efficiency upgrades in a home, the direct effect is the on-site expenditures and jobs of the construction or trade contractors hired to carry out the work.
2. The indirect effect refers to the increase in economic activity that occurs when a contractor or vendor receives payment for goods or services delivered and he or she is able to pay others who support the business. This includes the equipment manufacturer or wholesaler who provides the products (solar panels, insulation, heating system, windows, etc.). It also includes the bank that provides financing to the contractor, the vendor's accountant, and the owner of the building where the contractor maintains its local offices, and so on.
3. The induced effect results from the spending of worker earnings associated with direct and indirect spending related to energy efficiency expenditures. This includes spending on food, clothing, housing, transportation, recreation, and other goods and services that workers typically purchase with their paychecks.

Moreover, the installation of energy efficiency measures usually reduces electricity and/or natural gas use in a home and enables the household to meet power, heating, cooling, and lighting needs at a lower total cost. This lower cost of home operation makes more money available for individuals and families to spend or invest in the local economy.

2.2 Analyzing the Spending from the CSLP

To analyze the spending on CSLP energy efficiency upgrades (including renewable energy technologies), actual expenditures are matched with appropriate Boulder County- and Colorado-specific industry multipliers.¹ The multipliers reflect the direct, indirect, and induced impacts

¹ In this study we have adapted industry multipliers derived from the 2008 IMPLAN model for the analysis. See Minnesota IMPLAN Group, Hudson, WI, www.implan.com.

supported by a \$1 million expenditure (change in final demand) for goods or services purchased from a given industry sector.

This analysis includes all changes in consumer and business spending that occur during the actual construction or installation for program measures as well as the ongoing spending of resulting energy bill savings. The impacts from the construction or installation are relatively short-term. That is, the impacts are limited primarily to the period of time during which the actual upgrades and spending occur. In this analysis, the initial construction-related impacts occur over approximately a one-year period from June - July 2009 through June - July 2010. The spending of energy bill savings and resulting reduction in utility revenues happens each year for the life of the measures, typically 20 to 30 years.

Much of the short-term job creation from energy efficiency programs is derived from payments made to in-county contractors and businesses versus out-of-county contractors and businesses. When in-county contractors or businesses receive money for goods and services, more of the money stays in the local economy. Local contractors usually hire more local residents to work for them, and they typically spend more money in the local area on goods and services (indirect effects). Out-of-county spending—paying contractors or purchasing goods or services from businesses outside the county—is commonly referred to as monetary leakage. A monetary leakage provides little benefit to the local area. One exception might be when local residents are employed by the out-of-county businesses or when some of their products are locally manufactured.

Ongoing job creation is derived in large part from the difference between jobs within the utility and fuel supply sectors and jobs that are supported by the spending of energy bill savings in other sectors of the economy. For example, when residents pay their utility bills, most of the money leaves the local area to purchase fuels, maintain power plants, and support utility operations in general. On the other hand, when residents have savings from lower utility bills, they are able to spend some of those savings in the local area by purchasing goods and services and supporting a variety of local businesses.

This analysis is based on a detailed assessment of CSLP-related customer spending, using data available for 598 residential energy retrofit projects. It includes not only those dollars loaned to Boulder County residents through property tax bond financing but also additional spending by program participants, as documented on the invoices. Table 2.1 shows the actual financing directly for measure expenditures (i.e., not related to loan fees, reserve accounts, or other costs) totaling just over \$9 million. These expenditures account for 71% of the \$12.7 million in total spending related to these measures. To the extent that information on energy-related rebates from the state and utility companies was documented, it is included in the analysis. Similarly, where information was available on participant spending that was alternatively financed (for example, project add-ons paid for with cash), it was also included in the analysis.

Additional residential projects were completed under the CSLP program (for a final loan total of about \$9.8 million), but documentation was not available in time to be included for this analysis.

**Table 2.1. Climate Smart Loan Program 2009-2010
Residential Summary Data**

Category	Boulder County	Outside Boulder County	Total
Program Participants (projects)	598		
Participant Loans (for measure costs only) ^a	\$9,007,868		
Total Measures Installed	1,207		
Total Expenditures (for measures installed) ^b	\$12,691,542		
Participating Contractors	171	124	295
Payments for Work Completed	\$10,072,036	\$2,619,506	\$12,691,542
Utility Bill Savings (first-year total) ^c	\$124,197		
Utility Bill Savings (average per participant)	\$208		

^a Loan amounts are for approved measure-related costs only. They do not include fees or other associated costs included in final loan amounts.

^b Total Investment includes all program participant spending (including rebates for PV) on energy measures and additional work (spending) completed but not covered by the loan or rebate. It also includes all sales tax paid to Boulder County.

^c Utility bill savings are based on average participant savings of 1,786 kWh for electricity and 74.9 therms for natural gas. The savings reflect analysis of participants' Xcel Energy electric and gas utility bills by Boulder-based Symbiotic Engineering. Dollar savings were derived by MRG & Associates using current Xcel rate schedules.

Just over \$10 million (79%) of the documented efficiency and renewable energy investments (i.e., payments to contractors and vendors) documented were spent within Boulder County.¹ Typically, 85% - 90% of energy efficiency and renewable energy installations are completed by local contractors and dealers. As discussed in Section 1, the profile of participating businesses for the Boulder County CSLP was much different. Only 171 (58%) of the 295 contractors studied for this analysis were located in Boulder County. The rest were from various locations throughout the Denver metro area.

Similarly, the I-O model would typically assume that all in-county contractors' employees would live in Boulder County. However, Boulder County data reveal that at least 30% of in-county contractors' employees live and spend most of their earnings elsewhere, possibly because the multi-county Denver area is so contiguous and offers many affordable housing options outside of Boulder County.² There are more local than non-local residents employed by local contractors, and all workers (local and non-local) spend money locally while working; these are mitigating conditions that would, on balance, increase local economic benefits associated with the program. However, quantifying such impacts is beyond the scope of this analysis. A qualitative assessment is offered in Section 3 of this report.

For purposes of estimating current and future energy bill savings, the analysis assumes that energy prices remain at 2010 levels. This is partly due to the difficulty of accurately predicting future energy prices, but also because it is simpler to match energy prices within an I-O model

¹ A detailed breakout of spending by measure is included in the next section of this report.

² This estimate is an average, based on responses to an online survey of program contractors conducted in August 2010. Anecdotal evidence from interviews with program contractors located in Boulder County in June and July 2010 suggests that in many instances the percentage of employees living in Boulder County is significantly higher.

based upon fixed price relationships. Many analyses would typically apply a 2%-5% annual energy cost escalation rate. The utility bill savings noted in Table 2.1 reflect average savings by all participants. Due to the limited amount of information available from the utility bill analysis,¹ no distinction has been made (nor were adjustments made) for the types of measures installed, measure cost, energy saving potential, or payback periods, or for participant homes that added square footage (or other measures)—all conditions that could result in net increased energy use.

Some participants had higher utility bills when compared with their previous bills, but most participants experienced significant reductions in energy use and utility bills.² An examination of possible reasons for this is included in Section 3 of this report, Qualitative Assessment. Considering historical price increases in electricity and natural gas, the utility bill savings expressed here are conservative estimates. There is little doubt that utility prices will continue to rise and that resulting energy bill savings will increase over time.

Finally, it should be noted that the full effects of the Boulder PACE program are not accounted for, due to the conditions and impacts discussed further in Section 3. For example, there is no documentation of county residents who did not receive CSLP financing but made alternatively financed energy improvements using information they received from the CSLP program, yet there is evidence that their spending was significant. As another example, the CSLP program staff spent time and budget on program design and first-year implementation, making notes for future-year improvements. Future program benefits would likely be greater than those reported here.

2.3 Macroeconomic Impacts

The economic analysis for the Boulder County CSLP was carried out by evaluating the net changes in energy expenditures brought about by the investments in energy efficiency and renewable energy (primarily solar PV). Section 1 of this report describes the types of program measures that would qualify for financing and the process for obtaining financing. Actual participant investments and utility bill savings data were used to estimate both local and statewide impacts. The change in spending generates a net impact for Boulder County and for the state as a whole.

Table 2.2 summarizes the investments for each measure during the 2009-2010 period of analysis, as well as the local contractor share and sales tax generated.

¹ Average electric and gas utility bill savings for Xcel customers who participated in the Boulder County CSLP was provided by Tim Hillman, senior energy engineer at Symbiotic Engineering, in December 2010. Symbiotic Engineering is currently analyzing participant utility bills for Boulder County from other utilities in the county.

² According to the preliminary analysis completed by Symbiotic, 20% of natural gas customers and 25% of electricity customers had increased energy consumption.

**Table 2.2. ClimateSmart Loan Program 2009-2010
Residential Summary Data by Measure**

Measure Category	CSLP Loans^a	Total Investment^b	Local Contractor Share^c	Local Sales Tax Generated^d
Photovoltaics	\$3,247,740	\$6,801,922	\$6,248,104	\$125,840
Windows/Doors	\$2,213,237	\$2,270,722	\$1,277,905	\$42,008
Insulation	\$883,702	\$897,644	\$517,104	\$16,606
Roofing	\$496,859	\$504,016	\$273,970	\$9,324
Air/Water Heaters	\$1,738,110	\$1,757,210	\$1,364,442	\$32,508
Solar Hot Water Heaters	\$411,558	\$442,829	\$374,833	\$8,192
Landscaping	\$16,663	\$17,198	\$15,678	\$318
Total	\$9,007,868	\$12,691,542	\$10,072,036	\$234,798

- ^a Loan amounts are for measure-related costs only. They do not include fees or other associated costs included in final loan amounts.
- ^b Total Investment includes all program participant spending (including rebates for PV) on energy measures and additional work (spending) completed but not covered by the loan or rebate. It also includes all sales tax paid. The values are based on a detailed review of program expenditure data supplied by the County of Boulder.
- ^c Local Contractor Share represents only the portion of Total Investment paid to Boulder County contractors.
- ^d Local Sales Tax is based on Total Investment and Boulder County sales/use tax rate.

As the table indicates, spending on PV systems totaled \$6.8 million. This was the single largest measure in terms of dollars spent, accounting for almost 54% of total investments. Windows and doors were second, accounting for about 18%, followed by air and water heaters at about 14%. Another four measure categories accounted for the remaining 15% of participant investments.

With this measure data, we were able to analyze the macroeconomic impacts. The first of the three impacts evaluated here is the net contribution to the employment base as measured by full-time equivalent jobs. The second impact is the net gain in wage and salary compensation, measured in millions of 2010 dollars. The final category of impact is the net contribution to output (i.e., economic activity), also measured in millions of 2010 dollars. In other words, once the gains and losses are sorted out for each measure, the analysis provides the net benefit of the measure in terms of the overall economy.

The following table summarizes the economic impacts of the investments by measure type. Unlike utility bill savings, which continue to provide benefits for the life of the energy efficiency measure, installation (or construction) impacts are considered one-time or short-term impacts. In other words, the installation-related impacts noted below occur when the actual work is being done and for a short time afterwards. Similarly, the impacts only account for spending that occurs in Boulder County or in the state as a whole. To the extent that equipment or products such as solar panels, roofing, or insulation are manufactured and/or purchased out of the county or state, the expenditures (or a portion of them) are treated as monetary leakages, providing no benefit to the region being analyzed.

**Table 2.3. Summary of Macroeconomic Impacts
for Installation by Measure**

Measure Category	Net Job Gain	Change in Wage and Salary Compensation (Millions)	Change in Output (Millions)
Boulder County – from in-county spending only			
Photovoltaics	49	\$2.7	\$8.3
Windows/Doors	12	\$0.8	\$1.8
Insulation	6	\$0.5	\$0.8
Roofing	3	\$0.2	\$0.4
Air/Water Heaters	12	\$0.8	\$1.9
Solar Hot Water Heaters	3	\$0.2	\$0.5
Misc. Landscaping	0	\$0.0	\$0.0
Total	85	\$5.1	\$13.7
State of Colorado – from in-state spending only			
Photovoltaics	61	\$3.2	\$10.0
Windows/Doors	25	\$1.4	\$3.7
Insulation	12	\$0.8	\$1.6
Roofing	6	\$0.4	\$0.8
Air/Water Heaters	18	\$1.1	\$2.7
Solar Hot Water Heaters	4	\$0.2	\$0.7
Misc. Landscaping	0	\$0.0	\$0.0
Total	126	\$7.1	\$19.5

Notes: Dollar figures are in millions of 2010 dollars. Net jobs represent actual full-time equivalent (for one year) job totals. All totals reflect direct, indirect, and induced impacts. Totals for the State of Colorado include the totals for Boulder County.

Some aspects of this table are worth noting before focusing on the overall impacts in more detail. The first is that impacts from the installation phase are all positive, resulting in \$13.7 million in economic activity in Boulder County and \$19.5 million for the state as a whole in 2009-2010. At the same time, the total investments by program participants supported 85 jobs in Boulder County, just under 7 jobs per million dollars of investment in 2009-2010. For the state as a whole, program investments supported 126 jobs, more than 9 jobs per million dollars of investment. Wage and salary earnings increased by \$5.1 million in Boulder County and \$7.1 million for the state as a whole during this time. These job impacts represent a small portion (less than 0.1%) of the county's total employment in 2009. Still, with the county in recession in 2009, every job—be it a new job, one that is retained, or extra hours added to keep a worker full-time—was a welcome addition.¹ The differences between county and state impacts are likely due

¹ According to the Bureau of Labor Statistics, employment was estimated at 152,804 in Boulder County at the end of 2009. Unemployment was 6.4%, which was historically high for the county. See U.S. Bureau of Labor Statistics News Release, U.S. Dept. of Labor, Oct. 19, 2010 and Bureau of Labor Statistics, U.S. Dept. of Labor, County Employment and Wages, Fourth Quarter 2009, July 20, 2010, www.bls.gov/cew/.

to the fact that (1) not all contractors were located in Boulder County, and (2) the larger share of each dollar spent leaves the county, but stays within the state.

The results in Tables 2.2 and 2.3 are not intended to be precise forecasts. The totals offer reasonable insights into the benefits of the energy efficiency and renewable energy investments, but due to the small level of spending relative to that studied in most I-O analyses, even modest changes in the assumptions could change the results in individual sectors.

Analysis of the annual utility bill savings alone for one year found that this level of spending (\$124,197) resulted in no net gain in jobs and a very slight gain in economic activity for both the county and the state as a whole. This is due primarily to the relatively low level of utility bill savings during the first year. It should be noted that some measures, such as solar PV, are long-term investments. Their savings accumulate over the full 30-year life of the investment. Similarly, the calculation of average utility bill savings used for this analysis was adversely impacted by participants who increased the square footage of their homes, enhanced living spaces, or made lifestyle changes. In some instances, the measures were installed to increase comfort (reduce drafts, provide better lighting, etc.) or to improve aesthetics. Also, first-year energy use may reflect a period of homeowner experimentation. Some might have tested different thermostat settings, for example, to find out for themselves how to balance newfound comfort against energy savings. A more detailed assessment of qualitative impacts is included in Section 3 of this report.

A Sustainable Career

Jeff Cope sat at the reception desk at Bella Energy, a Louisville (Boulder County) solar integrator, looking a little big for his chair. Cope, who held the title of Solar Advisor for Inside Sales, actually handled all kinds of tasks, from answering phones and receiving FedEx packages to providing sales help and sketching preliminary solar designs. At the time of this interview, Cope said he was happy to have a job in solar, as he was in fact a displaced semiconductor industry engineer.

He took the job in early 2010. Bella Energy had been growing, largely because of business from the CSLP. In Fall 2009, Bella sales activity, including onsite sales visits, had about doubled thanks to ClimateSmart. At least half of the company's residential projects and one-third of total gross revenues were coming from ClimateSmart program leads. Since the moratorium on residential PACE financing, Bella's residential sales have slowed, but the company is refocusing on the commercial solar market, for which Boulder County still has an active CSLP. Bella hired Cope in anticipation of work in that market.

Cope's career path supports the argument that solar jobs can make a difference. His former employer was an electronic chip manufacturer in Richmond, Virginia, which closed after foreign competitors applied questionable trade practices. Cope qualified for Trade Adjustment Assistance (TAA), including retraining, from the U.S. Department of Labor. "I wanted to move into a green tech industry, and solar fit the bill," he explained. He moved to Colorado at his own expense but received TAA support for retraining at Solar Energy International, a 20-year-old solar training center in Carbondale, Colorado.

A Sustainable Career (cont.)

Cope said he is never bored in his job, even though it would not seem to require a master's degree in engineering. "I don't expect to stay in my current role, though I am sure I will be in the solar industry," he said. He credits his after-hours role as a new parent for giving him the drive to make this career work. "I want to get this clean energy transition going for the next generation," he said.

Bella Solar looks for employees with good educations. Most of the employees have college degrees, and the average wage is about \$40,000 per year, according to John Shaw, commercial sales director. With supportive policies and local programs like CSLP, Cope and his solar employer see strong prospects for growth in coming years.



Jeff Cope took a solar job in Boulder County after his computer-industry job had been moved offshore.

2.4 Macroeconomic Impacts Projected Through 2020

The following tables provide an estimate of the net impacts from the CSLP program, assuming it were to continue for the next ten years through 2020 (or a similar ten-year period). This analysis assumes similar annual participation levels and investment patterns and the same level of per-participant utility bill savings (i.e., the same level of energy savings experienced by current participants and no increase in utility rates) for each year noted. The analysis looks at nine sectors.

The tables show how each of the industry sectors is affected in each of two benchmark years, 2015 and 2020. The impacts shown are not cumulative. The total impact, year on year, indicates that jobs created would be sustained, with some additional job growth as the program continues. For example, total annual jobs in Boulder County increase from a base of 85 in 2010 to 88 in 2015 and then to 93 in 2020. Although the impacts are small, relative to the larger economy, this is only because the scale of investment for the CSLP is small, relative to the entire county economy.¹

¹ In 2009, the gross domestic product (GDP) for the State of Colorado was estimated to be \$252.7 billion for all industries. See, Gross Domestic Product by State, Bureau of Economic Analysis, U.S. Dept. of Commerce, Regional Economic Accounts, www.bea.gov/regional/gsp/action.cfm.

**Table 2.4. Macroeconomic Impacts of the Boulder CSLP
by Sector in One Future Year (2015)**

Sector	Net Job Gain	Change in Wage and Salary Compensation (Millions)	Change in Output (Millions)
Boulder County – from in-county spending only			
Agriculture	0	\$0.0	\$0.0
Mining	0	\$0.0	\$0.0
Construction	33	\$3.1	\$5.7
Manufacturing	0	\$0.0	\$0.1
Retail and Wholesale Trade	45	\$1.6	\$6.8
Transportation, Communication, and Utilities	(0)	(\$0.0)	(\$0.0)
Finance, Insurance, and Real Estate	0	\$0.0	\$0.1
Services	5	\$0.2	\$0.8
Government	4	\$0.2	\$0.5
Total	88	\$5.3	\$14.0
State of Colorado – from in-state spending only			
Agriculture	0	\$0.0	\$0.0
Mining	0	\$0.0	\$0.0
Construction	52	\$4.5	\$8.7
Manufacturing	0	\$0.0	\$0.1
Retail and Wholesale Trade	63	\$2.2	\$8.9
Transportation, Communication, and Utilities	(3)	(\$0.1)	(\$0.5)
Finance, Insurance, and Real Estate	2	\$0.1	\$0.5
Services	9	\$0.4	\$1.4
Government	4	\$0.2	\$0.6
Total	128	\$7.2	\$19.8

Notes: Analysis assumes the CSLP program is up and running through 2015 or a similar five-year period. Dollar figures are in millions of 2010 dollars. The numbers in parentheses reflect losses that are projected to occur in that sector. Net jobs represent actual full-time equivalent (for one year) job totals in 2015 (noncumulative). All totals reflect direct, indirect, and induced impacts. Totals for the State of Colorado include the totals for Boulder County. Individual totals may not add up due to independent rounding.

**Table 2.5. Macroeconomic Impacts of the Boulder CSLP
by Sector in One Future Year (2020)**

Sector	Net Job Gain	Change in Wage and Salary Compensation (Millions)	Change in Output (Millions)
Boulder County – from in-county spending only			
Agriculture	0	\$0.0	\$0.0
Mining	0	\$0.0	\$0.0
Construction	33	\$3.1	\$5.7
Manufacturing	1	\$0.1	\$0.3
Retail and Wholesale Trade	47	\$1.7	\$7.0
Transportation, Communication, and Utilities	(1)	(\$0.1)	(\$0.3)
Finance, Insurance, and Real Estate	1	\$0.0	\$0.2
Services	9	\$0.4	\$1.3
Government	4	\$0.2	\$0.5
Total	93	\$5.5	\$14.7
State of Colorado – from in-state spending only			
Agriculture	0	\$0.0	\$0.0
Mining	0	\$0.0	\$0.0
Construction	52	\$4.5	\$8.7
Manufacturing	1	\$0.1	\$0.3
Retail and Wholesale Trade	64	\$2.2	\$9.1
Transportation, Communication, and Utilities	(6)	(\$0.3)	(\$1.3)
Finance, Insurance, and Real Estate	3	\$0.1	\$0.6
Services	13	\$0.5	\$2.0
Government	4	\$0.2	\$0.6
Total	132	\$7.3	\$20.1

Notes: Analysis assumes the CSLP program is up and running through 2020 or a similar 10-year period. Dollar figures are in millions of 2010 dollars. The numbers in parentheses reflect losses that are projected to occur in that sector. Net jobs represent actual full-time equivalent (for one year) job totals during 2020 (noncumulative). All totals reflect direct, indirect, and induced impacts. Totals for the State of Colorado include the totals for Boulder County. Individual totals may not add up due to independent rounding.

The analysis indicates that three industries in particular benefit the most from the program in each of the years noted. These are the retail and wholesale trade sectors, the construction sectors and the service sectors. The trade and service sectors are winners largely for two reasons. First, they benefit from the actual investments in the energy efficiency measures made in each of the years. Second, they benefit from the higher level of goods and services sold as program participants spend their energy bill savings elsewhere in the economy.

The construction sector benefits primarily because special trade contractors and others are involved in installing the new renewable systems and making the efficiency upgrades. The construction sector alone pulls in about one-third of the net job increases. Using the annual installation investments as a benchmark for evaluation, it might be noted that about 95% of the net job impacts are from the efficiency investments made in that year. The remaining impacts are the result of spending of utility bill savings by program participants.

As might be expected, the energy industries incur some overall losses in jobs, compensation, and output. But this result must be tempered somewhat as the industries themselves are undergoing internal restructuring. For example, as the electric and natural gas utilities engage in more energy efficiency services and other alternative energy investment activities, they will undoubtedly employ more people from the business services, engineering, and construction sectors. Therefore, the negative employment impacts should not necessarily be seen as job losses; they might rather be more appropriately seen as a redistribution of jobs in the overall economy and future occupational tradeoffs.

Explained differently, while the electric utilities may lose traditional jobs (due to selling less energy), they would gain many of those jobs back if they moved aggressively into the energy efficiency business, thereby absorbing some of the job gains realized in other sectors, such as the construction and service sectors. In effect, if they expand their participation in the energy efficiency market, their job totals can increase relative to the estimates based on a more conventional definition of an electric or natural utility as solely an energy supplier.

Electric and natural gas utilities are very capital-intensive (i.e., they require greater total assets for each dollar of revenue generated by the utility, relative to other industries). Thus, as the revenues of the utilities decrease under the CSLP and other efficiency programs, the amount of capital investment will also decrease (i.e., fewer new power plants and pipelines are built), lowering the industry's value added and output contribution to the larger economy. As the analysis indicates, this impact is tempered by the investments in efficiency and spending of energy bill savings. The full impact of these investments and the annual savings (in technologies such as PV noted earlier) are not realized until the investments are paid off.

2.5 Section Conclusions

Based on the analysis presented in this section, it is clear that Boulder County and the State of Colorado benefited from the residential ClimateSmart Loan Program (CSLP). The PACE financing mechanism set the stage for job growth, increased economic activity throughout the economy, and positioned both to reap even larger benefits in the future. In addition to the county and statewide benefits, the aggressive commitment to energy efficiency provided the opportunity for program participants to reduce their energy bills.

Participant spending in Boulder County alone contributed to 85 short-term jobs, over \$5 million

in earnings, and almost \$14 million in economic activity in Boulder County. Participant utility bill savings totaled about \$125,000 for the current year. For the state as a whole, program spending supported another 41 short-term jobs outside of Boulder County, \$2 million in earnings, and almost \$6 million in economic activity. Viewed in the long term, analysis of an ongoing CSLP program with similar participation levels results in significantly greater savings.

The economic impacts noted here and discussed in this section, above, occur in a context that is more fully described in Section 3, Qualitative Assessment. For overall CSLP conclusions and their more general implications for PACE programs, see the discussion in Section 4.

3.0 Qualitative Assessment of CSLP

3.1 Purpose and Approach

The economic analysis presented above tracks spending and jobs development that can clearly be traced to Boulder County ClimateSmart-financed spending. Anecdotal reports from this and other PACE programs suggest there are other influences that may be significant as well. For example, reports from PACE programs nationwide concur that economic activity inspired by a local PACE program, but ultimately using other forms of financing, may be significant.

Boulder CSLP administrators, including Ann Livingston, Boulder County Sustainability Coordinator, and Susie Strife, the ClimateSmart program manager, recognized many qualitative influences on the overall program outcome. Contractors and program participants who were interviewed for this report, as well as participants in two online surveys about CSLP, confirmed that there were influences and outcomes that a standard economic analysis would miss. It is beyond the scope of this study to draw detailed conclusions about such influences, but this section provides a qualitative assessment.

The research approach for the qualitative assessment of CSLP included:¹

- Interviews with CSLP administrators and Phase 1 program data
- Interview with Will Toor, County Commissioner and program policymaker
- Interviews with contractors and trade allies of two solar firms, two weatherization firms, and two green-building associations
- Interviews with five program participants
- Interview with Boulder Daily Camera news reporter and review of coverage from the Camera, the Boulder Weekly, and other media
- Review of results from a July 2009 survey of 325 CSLP workshop registrants, utilizing Survey Monkey online service
- Review of results from an August 2010 survey of about 120 program contractors, utilizing Survey Monkey online service. About 13% of those surveyed responded. This response, given the sample size, was of limited use, but it helped to confirm trends.

The subjects of interviews and participants in surveys represented locations throughout Boulder County. In addition, this assessment draws on observations from other PACE programs around the country, if they dramatically follow or differ from the trends observed here.

¹ Personal interviews occurred in Boulder County in July 2010.

A Vision for ClimateSmart Neighborhoods

When Boulder County and City leaders started planning a PACE financing program, Ron Flax, an architect at Rodwin Architecture in Boulder, started to think about how affordable financing for energy improvements might trigger a transformation for middle-class neighborhoods. He called Boulder's 1960s subdivisions "an energy disaster." Besides, the homes are small, so their prime locations on tree-lined streets close to parks, schools, shopping, and other Boulder attractions makes them ripe for investors who might just as soon tear them down and build mini-mansions instead.

Flax said he knew that risk well, because he has lived in one of those old 1,100 square-foot houses himself, with his wife and two school-aged kids. When the ClimateSmart Loan Program came along, he sharpened his pencil and prepared to make his place on Elm Avenue a model of small-home sustainability.

Flax's plan quickly grew to include a deluxe menu of energy-saving possibilities. Recognizing his passion for saving energy, Flax said, "At least I hoped this demonstration would inspire others to go beyond a typical window or furnace upgrade." He invested in a total of \$69,000 in energy improvements—and nearly as much again in non-qualifying remodeling. He used a home equity loan to finance non-energy measures. To finance the energy measures, he took Boulder's income-qualified low-interest financing to the maximum \$15,000 allowed. He also obtained a zero-interest loan from a non-profit, Partnership for Sustainability, to finance the PV system. Tax credits, including a \$1,500 tax credit for combined energy efficiency measures and a 30% tax credit for a PV system and ground source heat pump helped lower the total investment cost. In addition, Flax gave himself permission to use \$10,000 out of savings. "A personal energy education research grant," he explained.

From a design perspective, Flax intended the home to look like the kind of place a family might aspire to live, rather than a place that is "good enough." He opened up the living room, added a new study, and dressed up the front of the house with a welcoming porch. The addition added only a little floor space, but it changed the dynamic of the home, so Flax's wife could have a home office and so that the living space felt more relaxed.

The home includes many energy improvements, from state-of-the-art crawlspace insulation and a ground-source heat pump to super-E windows. Initially, the home scored an energy efficiency



The Flax home is a demonstration project, using the ClimateSmart program as a starting point for developing livable, sustainable smaller homes.

A Vision for ClimateSmart Neighborhoods (cont.)

(HERS) rating of 190; afterwards, it scored a 5. The estimated annual energy cost before improvements was \$2,100, and the estimated annual energy cost afterward is \$160.

Flax represents an example of a CSLP participant spending much more than the program loan application suggests. In his case, ClimateSmart financed \$15,000 of a \$114,000 project. Flax hired numerous contractors and completed some parts of the project himself.

Flax said, “After people make one investment in their homes, all kinds of good things can start to happen.” That includes adding more improvements, keeping up the property, and simply looking at one’s home in a different light. Flax hopes that a revived loan program might support widespread promotion of the idea that living simply in Boulder can mean living very well.

3.2 Categorical Discussion of Trends

Taken alone, none of the research approaches above would have been adequate to draw specific conclusions about program influences and outcomes. However, taken together, they indicate four consistent and significant trends:

- Spending on energy improvements inspired by CSLP, but financed differently
- Spending on non-qualifying improvements inspired by CSLP
- Impacts of the economic climate on participants and outcomes
- Impacts of program design and anticipated changes.

Each of these trends is discussed below.

A. Spending on Energy Improvements Inspired by CSLP, but Financed Differently

Data from contractor receipts (discussed in the Economic Analysis section above) indicated some spending on improvements that were concurrent with CSLP-financed improvements but were financed separately. The impact analysis model accounted for that spending and its direct and indirect impacts.

However, some CSLP participants used multiple contractors to complete different parts of their projects. It is difficult to quantify economic impacts from additional improvements that were not financed by the CSLP and were not completed by the same contractors. Some improvements might have been do-it-yourself jobs using materials from the local home store and pocket money. Others might have been major improvements financed through home equity loans and other means. The Boulder County PACE program gathered only clues about the magnitude and kinds of energy-related improvements the program inspired through its marketing but did not finance.

In July 2009, program administrators surveyed registrants for Phase 1 CSLP workshops and captured 325 responses from those who eventually obtained PACE financing and those who did not. This was an online survey through the Survey Monkey service. Due to its informal nature,

the survey has limited usefulness today. Still, it shed some light on customer response to PACE compared to financing alternatives. Respondents included about 106 individuals who reported that in the end, they did not use CSLP financing. Of these, about one-third (36) said they decided not to complete energy efficiency or renewable energy projects at that time. Another two-thirds (70) said they did proceed, but used alternative financing. Roughly two-thirds of those paid cash, and one third of them used different kinds of loans.

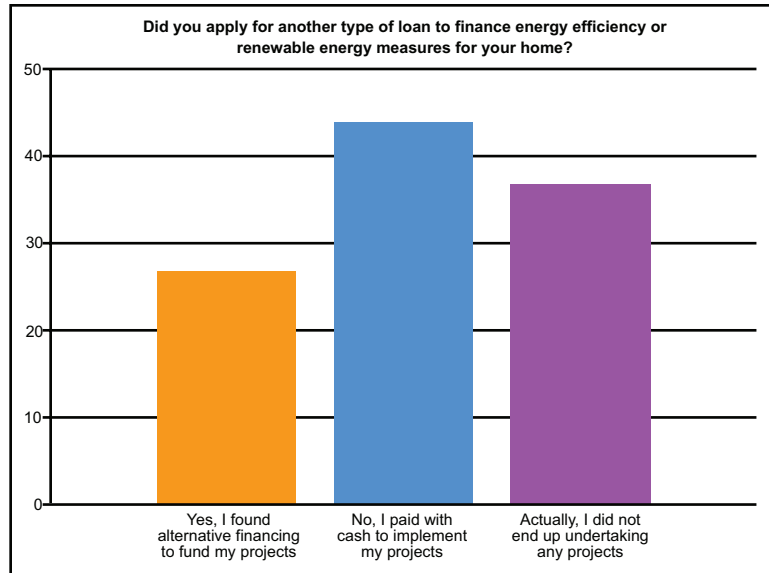


Figure 3. Responses to a survey question addressed to those who registered for a CSLP workshop, but ultimately did not use program financing.

The use of cash was significant, though it is fair to guess that cash spending was not nearly as great per job as spending that was supported by some type of loan. (The survey did not ask those who declined to use CSLP for spending figures.)

A follow-up question, aimed at those who used alternative loans, asked what type of loans these respondents used. The overwhelming response was the home equity line of credit (HELOC).

The evidence of extra spending through cash or home equity loans on energy upgrades matches observations by PACE program sponsors nationwide. Besides cash used for small jobs, the HELOC is the most common financing mechanism for energy home improvements.¹ This form of credit is extremely convenient—often as easy as writing a check. For customers who already had HELOC accounts, there were no additional fees, and that was appealing, as well. However, a HELOC by definition requires strong equity in the home, and it requires full repayment before the home could be sold. It is not a perfect substitute for PACE financing.

Some CSLP participants who were interviewed for this report used HELOC financing to expand their overall project list, hiring different contractors than those selected for CSLP-financed work. For two of them, the CSLP income-qualified rates were too attractive to pass up, but the

¹ For a discussion of pros and cons of many kinds of residential energy project financing, see M. Fuller, C. Kunkel, and D. Kammen, “Guide to Energy Efficiency and Renewable Energy Financing Districts for Local Governments,” Renewable and Appropriate Energy Laboratory, September 2009.

loan ceiling at \$15,000 left them with projects to finance. Two reported that HELOC covered window replacements and repairs that were likely to save energy, though they did not meet CSLP standards. In addition, solar contractors who were interviewed said some of their customers chose HELOC over the CSLP because CSLP-financed contracts had to be arranged to meet a short bond-issue deadline. The migration to HELOC financing was not necessarily a problem. If ClimateSmart outreach drove people to seek whatever financing for energy improvements suited them, then, in effect, it expanded the market and increased spending for energy efficiency and renewable energy improvements.

Another electronic survey completed in August 2010 was aimed at CSLP contractors. This survey also was informal and had a small response (13%). Despite its limitations, it confirmed several important trends, including the trend to use HELOC or other alternative financing for CSLP-inspired work. One question asked contractors what percentage of their revenues in 2009 was financed through CSLP lending and what percentage they thought was inspired by CSLP, though ultimately using alternative financing. Contractors indicated that about 16% of their 2009 revenues came from jobs financed by CSLP and 15% came from jobs inspired by CSLP, but using alternative financing. Given the small number of respondents, it would be wrong to assume that total spending related to CSLP was nearly double the value of program loans. However, this survey response, in addition to the other information discussed above, underscores the likelihood that CSLP triggered spending on energy-related home improvements to a much greater degree than the value of CSLP loans suggests.

B. Spending on Non-Qualifying Improvements Inspired Under CSLP

The discussion above suggests the likelihood that CSLP triggered significant spending on energy-related improvements beyond those financed by the program. In addition, some spending undoubtedly went to non-qualifying, non-energy home improvements. This spending also had economic impacts, and should be considered a benefit of green jobs development programs.

Examples of spending that escape documentation on CSLP invoices include, among others, project-related fix-up and spruce-up measures, such as roofing repairs needed before a solar PV installation, repainting a house after a window replacement job, new curtains or drapes, new flooring, or a utility room remodel after installation of a new furnace. All interviewed participants said they felt proud of their homes after CSLP work was done, and this showed in small ways, from adding a plant on the porch to partially finishing a garage. This type of spending is difficult to document, but it is real.

The case of Ron Flax (see sidebar above), who spent \$15,000 that was financed by ClimateSmart, plus energy and non-energy improvements to a total of more than \$114,000, is a rare one. Still, it illustrates how CSLP and similar PACE financing programs can trigger additional non-qualifying spending.

C. Impacts of the Economic Climate on Participants and Outcomes

This first phase of the Boulder County ClimateSmart Loan Program took place during the depths of a national and regional recession. This affected homeowner attitudes about spending, and it affected contractor response to CSLP financing opportunities.

How did the economy affect participant willingness to spend money on their homes? Did the prospect of financing home improvements through PACE (whereby the debt remains with the

house) increase or decrease interest in the CSLP program in 2009? It is beyond the scope of this research to answer these questions, but they are relevant questions. During 2009, average home prices in Boulder County fell for the first time since the late 1980s, but mid-range home value did not plummet. Any housing market slowdown triggers some investment in home improvements, as homeowners feel destined to stay in their homes longer. Conversely, recessionary times add to homeowner anxiety about taking on debt and increasing property tax bills.

When CSLP launched in Spring 2009, statewide unemployment (reflecting the job market where many Boulder residents worked) had risen to 8.5%.¹ According to the Boulder Economic Council, Colorado lost 100,000 jobs in 2009. County economic development staff said the ratio of applicants to job openings in Boulder County, which for years never averaged more than 10 to 1, surged past 20 applicants per job in early 2009. Unemployment rates in Boulder County remained below the national average, but they were high by local historical standards.

Even as bad economic news toughened the market, it made businesses that provide energy improvements hungrier. The fact that more than 300 contractors from throughout the Denver metro area participated in the CSLP indicates their eagerness to compete. Motivated contractors played an important role in driving energy-related investments in some 600 homes.

On the August 2010 contractor survey described above, respondents said they increased their workforce by an average of almost two employees between Fall 2008 and Fall 2009. A few respondents cut workers during that time, but others increased their workforces by 20%-50%. Interviews with contractors indicated that some were reluctant to hire new employees but added hours for their existing employees. This was in dramatic contrast to the general job scene in the area in 2009.

A study from Sonoma County, California, focused on the comparison of construction employment in Sonoma County, where a large PACE program was underway, to that in nearby counties in 2009. That study showed construction jobs increasing in Sonoma County by 8.4%, while construction jobs in nearby counties fell off or stayed about the same.²

Anecdotal information suggests a similar, though not as dramatic, trend for the Boulder County program. One difference was that a high proportion of the contractors participating in the Boulder County CSLP were from outside of the county, and that diluted the local economic impact.

D. Impacts of Program Design and Anticipated Changes

PACE financing programs nationwide have been much discussed, but, perhaps surprisingly, few have been implemented. Only about a dozen local programs were underway in 2010, and about half of them were suspended before they actually provided financing to home improvement projects. Boulder County's CSLP was one of only a handful of programs that reached full-scale implementation. Program administrators were incorporating their "lessons learned" from Phase 1 implementation into a new Phase 2 round of residential lending, but those improvements were never tested.

¹ Boulder Economic Council, Personal Communications, August 2010. See also, www.bouldereconomiccouncil.org.

² "Growth in Construction Economic Activity in Sonoma County and the Sonoma County Energy Independence Program," November 2009, www.sonomacountyenergy.org.

Several elements of Phase 1 program design affected economic outcomes. Comments on these, including how they affected future Phase 2 plans, include:

1. The decision to open contractor participation to all comers, so long as they were licensed within their resident and operating jurisdictions, had a strong impact on the program. More than 40% of participating contractors were from outside of Boulder County. CSLP administrators did not plan to restrict contractor participation in Phase 2, either, but they intended to refine promotional strategies, to support local contractors.
2. CSLP administrators could not predict exact interest rates and fees of future loans because they depended on bond sales that would occur during program implementation—yet the interest rates declined from the first to the second round in Phase 1, and were likely to decline again. Administrators said they hoped to see interest rates in the range of 4.5%, compared to a high of 6.8% in Phase 1 (unsubsidized). Fees were also expected to decline. This would improve marketing effectiveness and the cost-effectiveness of energy efficiency and renewable energy improvements.
3. One issue cited by many respondents to the July 2009 workshop registrant survey was that contractors had to “front” the cost of the work until completion. Reportedly, some small contractors could not carry this risk and withdrew their bids when they learned that they would not be paid until the job was fully completed. The program’s approach to aggregating projects, selling bonds, and then reimbursing contractors probably would not have changed in Phase 2. Most PACE programs nationwide have used a similar approach. However, this approach does favor larger companies that can cover front-end expenses for their work.
4. The August 2010 contractor survey strongly suggests that contractors would have to cut back on employee hours because this program, like all PACE-related programs, had been suspended. Eighty-eight percent (88%) of respondents said yes, they would experience lost revenues and lost jobs. Anecdotally, contractors who were interviewed roundly complained of the need to constantly adjust their marketing as well as employment plans in light of policy-driven program changes. Consistent implementation of the CSLP almost certainly would result in greater efficiencies within these contractor businesses. For example, the need for worker training related to program rules and paperwork would be reduced. Administrative procedures could be streamlined. Marketing approaches could be fine-tuned instead of abandoned.
5. CSLP administrators also anticipated improving program implementation efficiencies. They reported that their Phase 1 experience gave them many ideas for administrative and outreach improvements.

By improving efficiencies through Phase 2 CSLP evolution, administrators believed they could free resources for new efforts. For instance, the Boulder County Sustainability Program staff had designed a new program to spark interest in comprehensive energy home improvement projects, which could then be financed by CSLP. The program focused on creating a one-stop shop for energy home improvement services so as to shorten the time and frustration between the energy audit and completed measures. It was launched with modifications in Fall 2010, minus the PACE financing component.

A Savvy Solar Homeowner

Rick Schwolsky, who lives with his wife and teen in a newer subdivision on the edge of Boulder, enjoyed participating in the ClimateSmart Loan Program from two angles. First, he had always wanted to add solar PV to his home, but he worried that his family might not stay in their home long enough to enjoy the payback. PACE financing meant that if he did sell, the new owner would pay his or her share of the system cost. Second, Schwolsky wanted to satisfy his professional curiosity about how a PACE program works. As editor of the online EcoHome Magazine, Schwolsky is a professional in the green building business. He looked forward to sharing his experience, from the energy audit through the 4.2-kW PV system interconnection, with his readers.

“The reality was, ClimateSmart made it so easy. There was no down payment. We didn’t pay until the system was installed, and the contractor (Boulder-based Namaste Solar) handled most of the paperwork,” he said. The installation took a total of 10 days, including the interconnection, though there was a delay in scheduling the project, because the CSLP had to aggregate projects, so they tended to happen all at once. Schwolsky found that the \$26,000 project, minus utility incentives and tax credits, ended up adding about the same cost as it saves until the end of the 15-year term on the loan, after which the solar power will be practically free.

Schwolsky said the total loan cost covered some unexpected energy efficiency improvements, too. “We had some problems with door seals, air leaks—fortunately nothing big,” he said.

The experience reminded him of the difference between theoretical discussions of energy savings and really achieving them. “I found that I was nervous. I waited until the second round of financing, figuring they’d have worked out any kinks in the program.” Now Schwolsky hopes to see PACE programs nationwide renewed. “It takes a long time to get the word out and to gain homeowners’ trust,” he said.



Rick Schwolsky said his family sometimes stops to glimpse the new solar panels that are barely visible on their house.

3.3 Section Conclusions

The qualitative assessment of CSLP provides strong evidence that total spending on energy- and non-energy-related home improvements significantly exceeds that which was documented on homeowner invoices and analyzed in Section 2 of this report. Such undocumented spending likely includes qualifying measures that were not financed with PACE and non-qualifying measures. The latter includes, among other things, new windows that are not Energy Star-rated, roof improvements related to a PV installation and cosmetic improvements.

The home equity line of credit (HELOC) seemed especially popular as a non-PACE financing alternative. Other non-PACE financing reportedly used by those who participated or considered participating in CSLP includes bank or credit union financing, solar company in-house financing, and credit cards. Many home improvements inspired by the program were just paid for in cash.

While participants reported that they were happy to use PACE financing, many seemed reluctant to take on too much tax-assessed debt, concerned it could raise their property taxes too high. Alternative financing options helped them to diversify risks associated with this new PACE concept.

The total economic impact of alternatively financed, CSLP-related improvements is unknown. Going roughly by the number of CSLP survey participants who reported using alternative financing, the spending that was documented on CSLP invoices would have to be increased by 20% or more. Contractors who provided survey information estimated an even greater amount of non-PACE spending. Certainly, the economic impacts discussed in Section 2 are a low-end estimate of total PACE-related impacts from Boulder County's Phase 1 CSLP program.

Another conclusion involves the trajectory of the CSLP. The mortgage regulators' challenge stopped PACE residential financing early on. Boulder County's model had been field tested for about a year. It succeeded, but it almost certainly would have had even greater economic benefits after successive rounds. This is not to say that marketing might not have grown harder instead of easier. Phase 1 may have addressed a pent-up demand. Administrative staff and contractors who were interviewed reported that anticipation for Phase 2 workshops seemed less dramatic than it did for Phase 1, with fewer people signing up in advance. At the same time, it is clear that marketing and administrative improvements were in the works, and one of the strongest impediments to the program—high fees related to setting up a reserve fund—would have been reduced over time.

One program design decision stands out for its influence on local economic impacts. The relatively open invitation to contractors probably diluted the local jobs development impacts of this program.

One question for PACE program administrators in Boulder County and nationwide is how PACE—or similar financing programs—might be used more effectively to build a clean energy economy. Initially, some contractors and many of the materials they use are likely to come from outside the local area—but perhaps that is part of the process of building a green economy. For example, solar PV module and balance-of-system manufacturing is just beginning to be established in the United States. One assumes that these high-value elements in the economic model would establish in-state or locally more frequently as the market for them appears more stable. Certainly the track record for established PACE programs is too short to have affected the upstream end of the clean energy value chain so far.

Yet it is important to return to the observation that Phase 1 of the CSLP had significant impacts, not only from directly financing, but also from starting a local conversation about home energy retrofits. Homeowners may ultimately choose PACE financing, an alternative type of loan, or cash to pay for their energy improvements, but the headline in Boulder County was that they made their choices and installed improvements. CSLP provided information on how to make smart energy efficiency or renewable energy investments, including addressing the upfront cost barrier.

PACE proved itself in Boulder County through Phase 1 of the residential ClimateSmart Loan Program. The economic benefits that came, despite recessionary pressures throughout Colorado, were impressive and program administrators indicated willingness and strong capabilities to build the program through successive phases, thereby supporting even greater economic results.

Financing for Mainstream Solar Customers

For Steve Schoo, marketing and communications director for Boulder-based solar integrator Independent Power Systems (IPS), the loss of Boulder County's ClimateSmart residential loan program meant a return to old ways of doing business. "We've had a strong reputation in this community. We've had customers with name recognition, whose testimonials mean a lot," Schoo said. On that basis, the 14-year-old company, which has been in Boulder for about four years, built a business mostly with customers that Schoo calls "serious solar supporters."

The promise of ClimateSmart was that IPS could reach a wider audience. As the program started to pick up, IPS heard from more people who were not just scientists, architects, community leaders, and the like. A new tier of customers had started to call, Schoo said. ClimateSmart brought in homeowners of ordinary means who wanted to add a few solar panels along with other energy-based improvements. "On average, we started doing smaller jobs, but there were more and more of them," Schoo said.



Steven Schoo heads marketing for Boulder-based Independent Power Systems.

He also noticed a welcome change in his marketing pitch. "It was a very positive message... ClimateSmart marketing was geared to helping individual homeowners make improvements, which in turn make Boulder a better, more sustainable place to live," Schoo said.

IPS played a lead role in promoting the ClimateSmart loans. Schoo and other IPS staffers put in many volunteer hours to help pass the November 2008 bond measure that funded the program. They attended forums; they put up yard signs and answered phones. Then, when the first round of funding was announced, they donned ClimateSmart T-shirts and helped run the workshops that customers were required to attend. That experience was rewarding, Schoo said, because until that time, different kinds of contractors—whether heating system installers, insulation contractors or solar companies—seldom came together. ClimateSmart encouraged them to discuss among themselves how to define a complete home energy improvement plan, which would eventually benefit all energy-related contractors.

The news that federal mortgage policymakers had stopped PACE programs (including Boulder's ClimateSmart loans) came abruptly in June, when IPS was just gearing up to promote solar improvements through another round

Financing for Mainstream Solar Customers (cont.)

of financing. Schoo said he expected the continuing recession to have some effect on this next round, but that the effect could be countered by the marketing inertia—such as word of mouth advertising—from the earlier rounds of the program. At the time of this interview in July 2010, Schoo was rolling out an “old” marketing theme—promoting solar as a way to fight expected utility rate increases. Until that campaign took hold, he figured the company would stay busy through the summer converting “at least a dozen” remaining leads initiated during the CSLP into jobs using conventional financing. However, when asked for numbers, Schoo faced an awakening. He had not assessed his leads for a few weeks, so he called an assistant on the office phone. He waited for her to tally numbers, and then his face dropped. “Wow. It’s that bad?” he sighed. “So everyone else cancelled?” He confirmed that all but a few of his leads had already called to say they were reconsidering getting into solar, since the CSLP had been stalled.

When the loan program was in full swing, IPS hired an extra work crew and four more sales staff. In Summer 2010, IPS made no hires, and it has been tenuously resisting layoffs. Schoo said the company is refocused on solar early adopters and commercial projects (through a continuing commercial loan program), but he expressed hopes that residential PACE financing would return to Boulder County soon.



A solar subdivision in Boulder includes IPS solar installations.

4.0 Summary Conclusions and Observations

The preceding sections of this report, Economic Analysis and Qualitative Assessment, each offer conclusions. This section summarizes the conclusions and offers observations on overall program impacts and lessons learned.

Many aspects of the economic analysis described in this report also offer lessons for any local energy home-improvement campaign that spurs significant investments in energy efficiency and renewables. Strong interest in PACE financing, including Boulder County's choice of that model, is based on its appeal to a wide and diverse audience. The workshops that were required for applicants to the CSLP drew a total attendance of more than 3,000 Boulder County residents. Interviews with participating contractors confirmed that this level of public interest in saving energy and installing solar energy systems was previously unheard of in Boulder. Yet once a homeowner makes a decision to invest and secures the necessary financing, the spending creates economic benefits, whether financed through PACE or through another method of financing. For this reason, this study offers lessons for a range of local energy-retrofit programs.

4.1 Results of I-O Analysis

The analysis of economic impacts in this report is based on a detailed assessment of CSLP-related customer spending, using invoice data for 598 residential energy retrofits. The total CSLP-financed spending evaluated in this study added up to more than \$9.0 million. Additional residential projects valued at \$0.8 million were completed under the CSLP program, but documentation on these projects was not available, so they were not included in the analysis.

Additional program loan fees, substantial reserve account funding, and other costs were relatively high (approaching 30% of total program costs) in the first (start-up) phase of the program. Costs for the second round of Phase 1 financing were lower than costs for the first round, and CSLP staff believes that these costs would continue to decline. They were not included in the economic impact study.

Where documentation was available on participant spending that was alternatively financed (for example, project add-ons paid for with cash), it was included in the analysis. In addition, the CSLP triggered additional spending that was not well-documented. This spending was not included in the economic analysis, though a qualitative assessment of additional spending is discussed below.

The primary analytic tool used to evaluate the economic impacts was an input-output (I-O) model, which identifies relevant interactions among all sectors of the local and statewide economies. Results of the analysis indicate that CSLP spending in Boulder County alone contributed to 85 short-term jobs, more than \$5 million in earnings, and almost \$14 million in economic activity in Boulder County. These results alone more than justify the county's investment in the program. Program spending supported another 41 short-term jobs outside of Boulder County, \$2 million in additional earnings, and almost \$6 million in additional economic activity statewide. Viewed in the long term, analysis of an ongoing CSLP program with similar participation levels would result in mounting total savings and sustained job impacts.

In addition, participant utility bill savings totaled about \$125,000 for the current year. The long-term economic benefits of some measures—especially solar PV—are hardly reflected in this

first-year energy savings, as they accumulate over the 20- or 30-year life of the measure and increase if (and this is not assumed in this analysis) energy costs increase year after year.

The relative strength of economic benefits in the statewide market is rather unusual. This occurred because more than 40% of contractors participating in this program were located outside Boulder County. Further, many of the in-county contractors in this study had employees that live and spend most of their earnings outside the county.

This effect is explained largely by a program-design decision to welcome all contractors who were licensed to operate in the communities they served. This made implementation simpler, and it also helped to achieve some non-economic program goals. For example, it increased the likelihood that residents would install relatively uncommon measures for which there were limited numbers of in-county contractors. Administrators hoped this would help achieve greater greenhouse gas emissions reduction goals. They also hoped it would trigger new, competitive businesses, thereby gradually achieving local economic development goals, as well as spreading benefits throughout the Denver metro area and statewide.

For the state as a whole, program investments supported 126 jobs, more than 9 jobs per million dollars of investment. Wage and salary earnings increased by \$5.1 million in Boulder County and \$7.1 million for the state as a whole in the short term. If the CSLP were continued at the same level of participation and with the same profile of contractor participation for five or 10 years into the future, these benefits would clearly multiply.

A longer-term 10-year CSLP program could create a shift in the profile of participating contractors to yield more local benefits as well as a shift in the industry profile of the state to include more manufacturing related to energy efficiency and renewable energy retrofits. Currently, many of the high-value (and job-creating) products used in these retrofits, such as solar PV panels, are manufactured outside Boulder County—and, in fact, outside the state. Colorado is one of several states that has an economic and energy policy commitment to establishing in-state clean energy industries. Arguably, programs like the CSLP “prime the pump,” establishing a market for energy efficiency and renewable energy products that could be manufactured profitably in-state, creating much greater job impacts and economic benefits.

4.2 Qualitative Assessment

The qualitative assessment for this study examines how this specific PACE program design and local market environment affects the economic outcomes. It also characterizes the related economic impacts that cannot be quantified because they result from spending that does not show up on invoices for CSLP loan-supported retrofits. These types of spending include (1) spending on energy improvements inspired by CSLP, but financed differently, and (2) spending on non-qualifying improvements inspired by CSLP, ranging from windows that didn’t meet program standards, to roof improvements associated with solar installations, to painting and other cosmetic improvements.

The tools for qualitative assessment included interviews of program staff, contractors, participants, and others, as well as a review of program documentation, results of an existing survey of workshop registrants, and results of a new survey of program contractors. Despite a lack of specific details, such as dollar figures, several consistent and significant themes emerged from this assessment.

The most significant theme is that CSLP spurred considerably more spending than the loan-related project invoices suggest. As mentioned above, some invoices included charges for improvements that were not financed by CSLP. These were included in the economic analysis. However, those invoices missed work that was done on CSLP homes by other contractors or done by the homeowners themselves for qualifying and non-qualifying improvements.

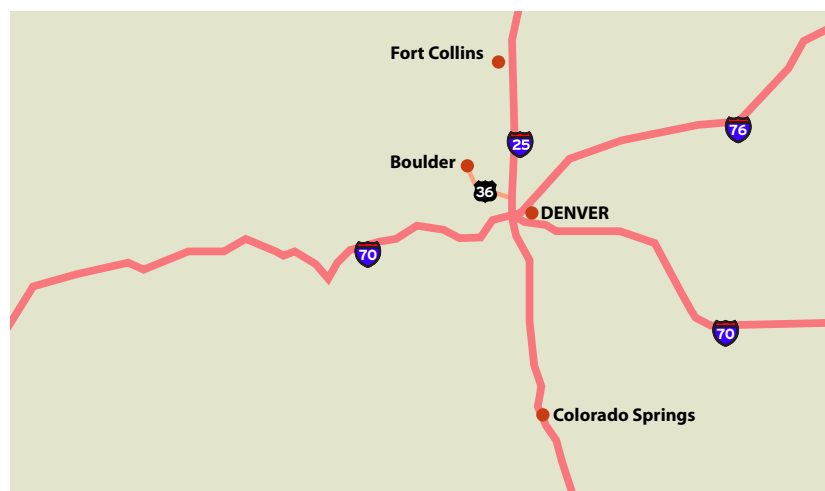
Additionally, some projects were inspired by effective program outreach, even though they used alternative financing. A survey of CSLP workshop registrants indicated that more than 20% did not use CSLP financing but went ahead with retrofit projects. They reported that they used cash and other types of financing, especially home equity lines of credit (HELOC). A separate survey of CSLP contractors suggested that even greater additional spending came from alternatively financed, CSLP-inspired projects. Based on information from both surveys and interviews, we conclude that additional CSLP-inspired spending would likely increase total documented spending by 20% or more. This would, in turn, increase program economic impacts.

The general finding of additional non-PACE spending was confirmed anecdotally by other PACE programs nationwide.¹ It may be a measure of success of the PACE model, as homeowners seem well aware of the need to choose the most appropriate financing for their needs, once PACE has triggered an initial, serious interest in making energy improvements.

Other useful observations are included in the qualitative assessment, many related to the aspects of program design that affected economic impacts. Primary among these was the guideline that led to a high percentage of out-of-county contractors (discussed above). It was also clear that the program was increasing in cost-effectiveness prior to its early suspension.

The benefits of continuing a program of this nature and building on its success were already clear to CSLP administrators, contractors, residents, and other supporters, when the program was suspended. This report finds strong evidence to support their belief. The Boulder County ClimateSmart program, based on the PACE financing model, yielded quantitative and qualitative economic benefits that would in all likelihood increase over time.

Colorado Map Showing Boulder and Denver



¹ “Jumping on the PACE Financing Train,” Panel Session at ASES National Solar Conference, May 2010, Phoenix, Ariz., moderated by A. Heinemann, DSIRE, NC Solar Center.

Appendix 1

Boulder County ClimateSmart Loan Program in Context

Of the first dozen PACE programs nationwide, six had funding rounds before federal mortgage regulators put all programs on hold. These were Babylon, N.Y., Berkeley, Calif., Boulder County, Colo., Milwaukee, Wis. (a small pilot), Palm Desert, Calif., and Sonoma County, Calif. Each of these offered a different program design that was suited to different goals and market conditions. As a result, the economic impacts of each program differ as well. Boulder County PACE administrators adapted some elements of other early PACE programs to their program design; they also created innovations to address their specific goals. It is important to consider program differences and similarities before attempting to apply economic-impact results from one program onto others, whether existing or planned.

Table A1 below summarizes some PACE programs and their innovations.

Table A1. Comparison of Four PACE Programs Underway by Spring 2010

	Berkeley, CA BerkeleyFirst solar.ci.berkeley.ca.us	Boulder County, CO ClimateSmart Loan bouldercountry.org/bocc/csip/	Babylon, NY Long Island Green Homes ligreenhomes.com	Sonoma County, CA Energy Independence sonomacountyenergy.org
Funding Mechanism	Micro-bonds Involving 3 rd -party investor.	Public tax and tax-exempt bond offerings. Bonding capacity dedicated by the cities of Boulder and Longmont, plus Boulder County; relatively low interest rates depend on bond market.	Initially Municipal Waste Revolving Fund for reducing CO ₂ (\$2 million); private funding thereafter; Very low (3%) interest rates initially.	County unallocated reserve funds from Treasury and Water Authority maximizes flexibility; future bonds may be sold to institutional investors 7% interest rate reported.
Eligible Properties for Implemented Round/s	Residential, Commercial	Residential (initial) Commercial	Residential	Residential, commercial, industrial
Eligible Measures	Solar PV	Energy efficiency Renewables, including solar PV, water heating, small wind, efficient woodstoves	Energy efficiency (PV if home meets Energy Star for new homes standard)	Energy efficiency, renewables, water conservation
Spending and Participants to Date	\$1.5 million allocated but not entirely spent 13 installations in pilot; total 38 projects through fall 2009	\$40 million authorized for residential and commercial About \$13 million dedicated to Phase 1 Residential (600+ homes)	\$3.19 million authorized through mid-2010; \$2 million from Solid Waste Fund (366 homes)	Provided \$32.8 million funding through mid-2010 for about 1050 projects; Commercial program currently active
Collection Mechanism	Property tax bill, senior lien	Property tax bill, senior lien	Separate monthly assessment, transfer to property tax bill if late	Property tax bill, senior lien
General Process	Application, construction, payment	Workshop, quotes, application, bond sale, construction, payment	Application, audit, construction, payment	Application, audit, construction, payment
Unique Attributes	Private funding does not affect local government balance sheet. Basic efficiency measures prerequisite.	Bonds secured by lien plus a moral obligation from local government. Does not affect local government balance sheet Special rates to low-income.	Had to relate energy waste to solid waste guidelines.	Aiming for 10% energy savings per home In litigation with FHMA to support PACE; Funding has little outside risk.


NOTICE

This report was prepared as an account of work sponsored by an agency of the United States government. Neither the United States government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States government or any agency thereof.

Available electronically at <http://www.osti.gov/bridge>

Available for a processing fee to U.S.
Department of Energy and its contractors, in
paper, from:
U.S. Department of Energy Office of Scientific
and Technical Information
P.O. Box 62 Oak Ridge, TN 37831-0062
phone: 865.576.8401 fax: 865.576.5728
email: <mailto:reports@adonis.osti.gov>

Available for sale to the public, in paper, from:
U.S. Department of Commerce
National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
phone: 800.553.6847
fax: 703.605.6900
email: orders@ntis.fedworld.gov
online ordering:
<http://www.ntis.gov/help/ordermethods.aspx>



**For more information contact:
EERE Information Center
1-877-EERE-INFO (1-877-337-3463)
www.eere.energy.gov/informationcenter**

DOE/GO-102011-3231 April 2011