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**ERNEST ORLANDO LAWRENCE
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**Interactions between Energy Efficiency
Programs funded under the Recovery
Act and Utility Customer-Funded
Energy Efficiency Programs**

**Charles A. Goldman, Elizabeth Stuart, Ian Hoffman,
Merrian C. Fuller and Megan A. Billingsley**

**Environmental Energy
Technologies Division**

March 2011

The work described in this report was funded by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Program and the Permitting, Siting and Analysis Division of the Office of Electricity Delivery and Energy Reliability under Contract No. DE-AC02-05CH11231.

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Prepared for the
U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy and
Office of Electricity Delivery and Energy Reliability

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Acronyms and Abbreviations

| | |
|---------|---|
| ARRA | American Recovery and Reinvestment Act |
| ACEEE | American Council for an Energy Efficient Economy |
| Btu | British thermal unit |
| CEE | Consortium for Energy Efficiency |
| DOE | Department of Energy |
| EE | energy efficiency |
| EECBG | Energy Efficiency and Conservation Block Grants |
| EERE | (DOE Office of) Energy Efficiency and Renewable Energy |
| EIA | Energy Information Administration |
| HVAC | heating, ventilation, air conditioning |
| LBNL | Lawrence Berkeley National Laboratory |
| NYSERDA | New York Energy Research and Development Authority |
| OE | (DOE Office of) Electricity Delivery and Energy Reliability |
| PSC | Public Services Commission |
| PUC | Public Utilities Commission |
| RAP | Regulatory Assistance Project |
| RESNET | Residential Energy Services Network (RESNET) |
| SEEARP | State Energy Efficient Appliance Rebate Program |
| SEO | State Energy Office |
| SEP | State Energy Program |
| WAP | Weatherization Assistance Program |

Executive Summary

Since the spring of 2009, billions of federal dollars have been allocated to state and local governments as grants for energy efficiency and renewable energy projects and programs. The scale of this American Reinvestment and Recovery Act (ARRA) funding, focused on “shovel-ready” projects to create and retain jobs, is unprecedented. Thousands of newly funded players – cities, counties, states, and tribes – and thousands of programs and projects are entering the existing landscape of energy efficiency programs for the first time or expanding their reach. The nation’s experience base with energy efficiency is growing enormously, fed by federal dollars and driven by broader objectives than saving energy alone.

State and local officials made countless choices in developing portfolios of ARRA-funded energy efficiency programs and deciding how their programs would relate to existing efficiency programs funded by utility customers. Those choices are worth examining as bellwethers of a future world where there may be multiple program administrators and funding sources in many states. What are the opportunities and challenges of this new environment? What short- and long-term impacts will this large, infusion of funds have on utility customer-funded programs; for example, on infrastructure for delivering energy efficiency services or on customer willingness to invest in energy efficiency? To what extent has the attribution of energy savings been a critical issue, especially where administrators of utility customer-funded energy efficiency programs have performance or shareholder incentives? Do the new ARRA-funded energy efficiency programs provide insights on roles or activities that are particularly well-suited to state and local program administrators vs. administrators or implementers of utility customer-funded programs? The answers could have important implications for the future of U.S. energy efficiency.

This report focuses on a selected set of ARRA-funded energy efficiency programs administered by state energy offices: the State Energy Program (SEP) formula grants, the portion of Energy Efficiency and Conservation Block Grant (EECBG) formula funds administered directly by states, and the State Energy Efficient Appliance Rebate Program (SEEARP). Since these ARRA programs devote significant monies to energy efficiency and serve similar markets as utility customer-funded programs, there are frequent interactions between programs. We exclude the DOE low-income weatherization program and EECBG funding awarded directly to the over 2,200 cities, counties and tribes from our study to keep its scope manageable.

We summarize the energy efficiency program design and funding choices made by the 50 state energy offices, 5 territories and the District of Columbia. We then focus on the specific choices made in 12 case study states.¹ These states were selected based on the level of utility customer program funding, diversity of program administrator models, and geographic diversity (see section 2 for details). Based on interviews with more than 80 energy efficiency actors² in those

¹ The twelve case study states are California, Colorado, Florida, Hawaii, Maine, Massachusetts, Michigan, Minnesota, New York, North Carolina, Oregon and Wisconsin. Interactions and coordination between state energy offices and program administrators of utility funded energy efficiency programs is not really an issue in the ~15-20 states that do not offer significant utility customer-funded energy efficiency programs.

² Primary interviewees included commissioners and staff at state energy offices and regulatory commissions, program administrators, and energy efficiency industry experts.

12 states, we draw observations about states' strategies for use of Recovery Act funds. We examine interactions between ARRA programs and utility customer-funded energy efficiency programs in terms of program planning, program design and implementation, policy issues, and potential long-term impacts. We consider how the existing regulatory policy framework and energy efficiency programs in these 12 states may have impacted development of these selected ARRA programs. Finally, we summarize key trends and highlight issues that evaluators of these ARRA programs may want to examine in more depth in their process and impact evaluations.

Design choices and priorities of state energy offices for selected ARRA programs

A multitude of factors figured in state decision making. Two powerful influences – federal legislative requirements and the Recovery Act's use-it-or-lose-it mandate – tended to drive grantees towards expedient choices of markets and instruments for investment. State energy offices were also confronted by unique economic and political circumstances that drove a diversity of approaches. Autonomy was a consideration. Through the Recovery Act, state energy offices could design and fund a broader menu of programs than their pre-ARRA budgets allowed and had an increased opportunity to translate state policy objectives into energy efficiency and renewable energy programs. Given these factors, states tended toward decisions that were more idiosyncratic than uniform. However, we were able to observe the following trends:

- **Hedging risk and spreading the funds widely** – Most state energy offices (SEO) opted for a diverse portfolio of programs and activities covering most or all market sectors, although a minority of SEOs invested all of their money in two or three programs that targeted one or two sectors.
- **Energy efficiency over renewable energy** – State energy offices in the 50 states typically budgeted a larger share of their ARRA SEP grant funds to energy efficiency programs vs. renewable energy projects (50% vs. 31% respectively overall), although allocations vary significantly by region. Western states allocated about 66% of SEP funds to energy efficiency programs and 20% on renewable energy projects (see Figure ES- 1). In contrast, southern states allocated about 51% to energy efficiency programs and 35% of their program funds to renewable energy projects.

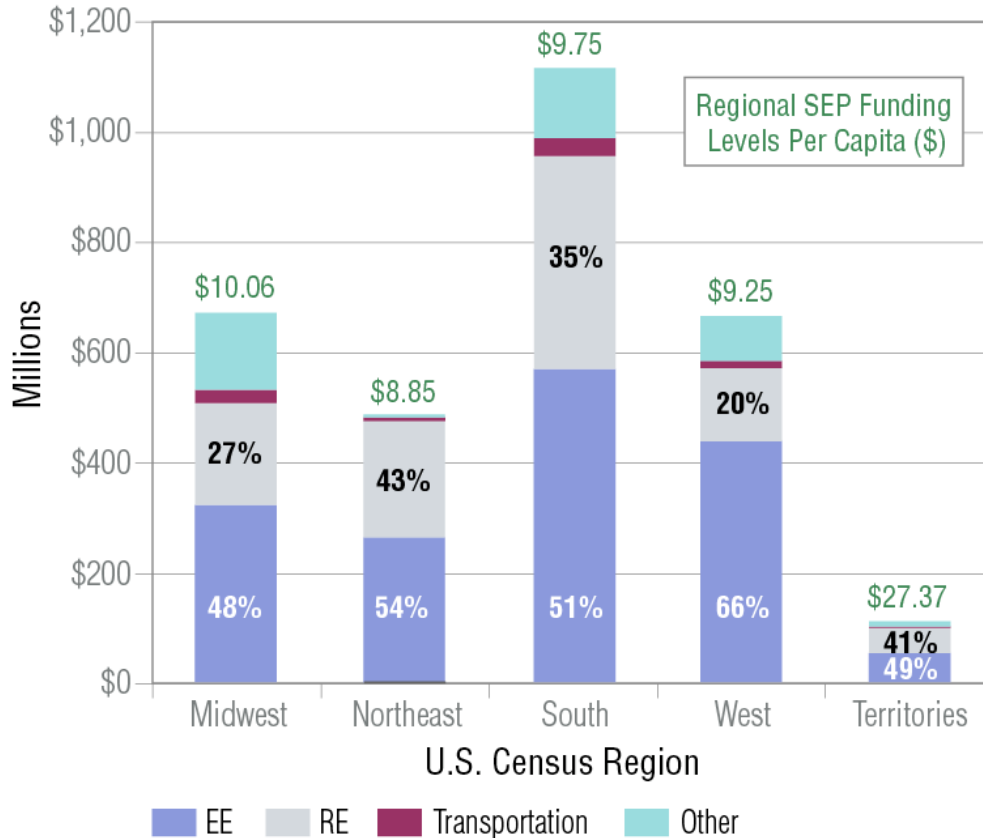


Figure ES- 1. ARRA State Energy Program budgets by region

- Building efficiency** – More money went to building retrofits, including equipment installations (over \$1.5 billion of the nearly \$3.1 billion State Energy Program grants, and most of the EECBG funds) than for any other purpose.
- Public/Institutional Sector buildings** – In the SEP program, about \$776 million (or 50%) of the \$1.53 billion investment in energy efficiency in the buildings sector was allocated to programs specifically for the public/institutional sector – town halls, schools and colleges, jails, street lights, and other state and local government or public facilities. Historically, many state energy offices have concentrated their efforts in public/institutional markets and that pattern continued in their choice of Recovery Act investments. Grant spending deadlines, the opportunity to generate long-term energy bill savings, and a backlog of energy efficiency projects in government buildings provided additional drivers for targeting this market segment. Public/institutional sector buildings were perceived to be “shovel-ready” investments that reduce ongoing costs to taxpayers through utility bill savings (see Figure ES- 2). The proportion of SEP funds (25%) targeted at public/institutional sector buildings is large relative to their share of national energy use (<5% of total U.S. energy consumption).

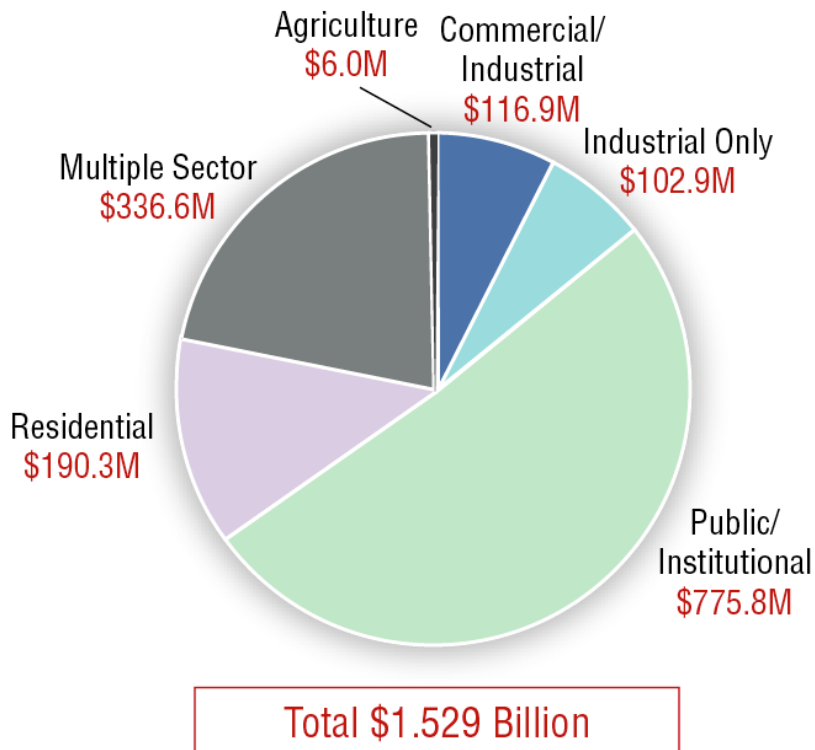


Figure ES- 2. State Energy Program ARRA funding for buildings energy efficiency by market sector

- **Less emphasis on residential markets** – State energy offices allocated only about 6% of total SEP energy efficiency budgets to residential programs, including a few low-income programs (see Figure ES-2).³ In contrast, administrators of utility customer-funded energy efficiency programs budgeted about 30% of total 2009 funds for residential sector programs on average and another 15% for low-income residential programs (CEE 2009). Some observers cited uncertainty of the application of federal prevailing-wage requirements as one reason for modest investment in the residential sector.
- **Reinvigorating and retooling industry for a clean tech economy** – A number of states that lost significant manufacturing employment invested in revolving loan funds and grants targeted at manufacturers of energy efficiency or renewable energy products or components. These choices satisfied several objectives of the Recovery Act: retaining and creating jobs, and supporting the development of the “clean energy” sector of the economy.
- **Workforce training and development** – Eighteen states invested over \$54 million in workforce development and training for the energy efficiency services sector and renewable energy industry. This investment in workforce development and training may have some spillover benefits for utility customer-funded energy efficiency programs.

³ This finding is applicable to the selected ARRA programs that are the focus of this paper--SEP, SEEARP and EECBG funds administered directly by state energy offices. The overall portfolio of ARRA programs provided significant funding for residential energy efficiency (e.g., local programs of EECBG entitled communities) and significant additional funding (\$5 billion) for the low-income weatherization program. A comprehensive examination of residential efficiency programs across all ARRA energy grants was beyond the scope of this study.

- Financing programs: leverage, longevity and flexibility** – Thirty-five states have established 51 revolving loan funds (RLFs) with ~\$650 million in ARRA funds. Revolving loan funds (RLFs) were quick to set up, which met federal requirements for commitment of Recovery Act funds by 2010. About 37% of these funds are targeted toward public buildings and 41% to commercial/industrial markets. About 7% of the funds are targeted to residential energy upgrades, including multi-family buildings. Many of these revolving loan fund programs offer ample opportunity for coordination with utility customer-funded programs, filling a financing need that utilities and third party administrators have been wary of shouldering themselves. We created a spreadsheet model to analyze the potential long-term impacts of RLFs and conducted various sensitivity analyses. For our base case results, we found that state energy offices that administer and manage RLFs could be able to finance \$150-200 million per year of energy efficiency projects over the next 20 years (see Figure ES- 3 and chapter 7). At least seven states and local governments also created loan loss reserves (LLRs) totaling more than \$20 million to support lending for energy efficiency projects, which can dramatically expand funds available to lend.⁴ Loan loss reserve funds will not have the longevity of RLFs, but if LLR programs prove attractive to private sector financial institutions and experience reasonable loss rates, administrators of utility customer-funded energy efficiency programs may want to consider augmenting their program portfolios with similar financing programs.

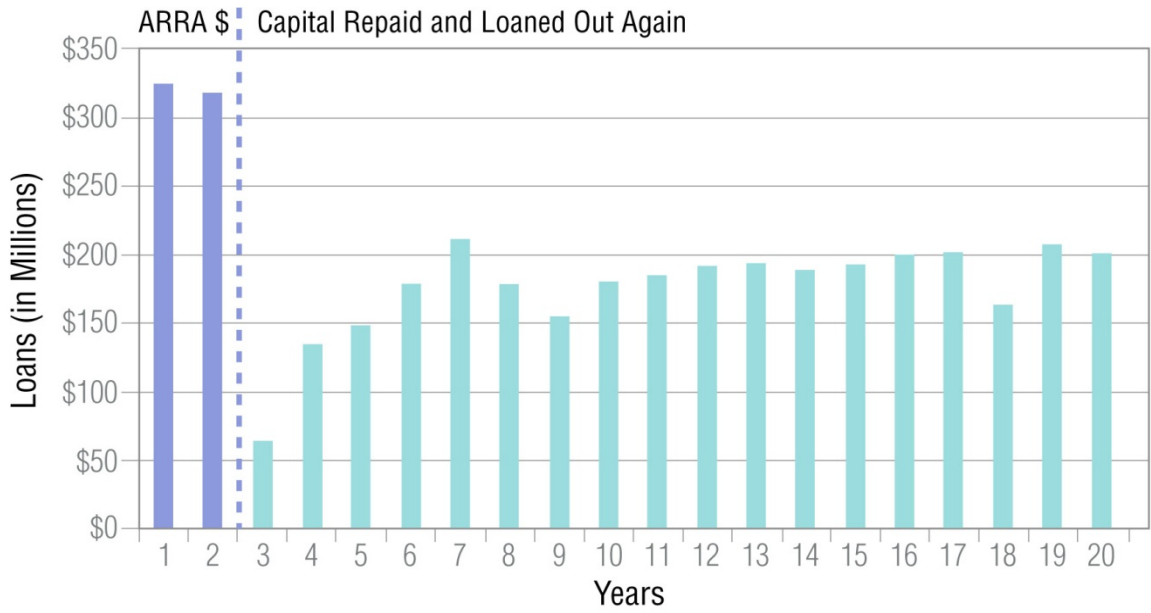


Figure ES- 3. Annual loans issued by Revolving Loan Funds over 20 years: Base case assumptions
Innovation and experimentation among the states

The Recovery Act provided an opportunity for state and local governments to explore new approaches, markets and territories unexplored or underserved by administrators of utility

⁴ For example, if a lender agrees to participate in a program with a 5% LLR, then there are 20 times the initial ARRA funds available to lend on projects using private capital.

customer-funded energy efficiency programs due to various considerations and constraints (e.g., regulatory guidelines, application of cost-effectiveness tests, risk to shareholders). State energy offices had an opportunity to design programs that did not face these constraints. Examples of innovative program efforts that are being implemented by state energy offices include multi-fuel programs that fund improvements to the building envelope in oil-heated buildings (e.g., MA, MI, ME), consumer behavior feedback experiments (e.g., HI); loan loss reserve funds, and transit-centric planning (e.g., HI, ME) (see Table ES- 1).

Several state energy offices also targeted efficiency programs toward underserved markets and geographic regions – non-profit institutions (e.g., NY, NC), agricultural customers (e.g., FL, ME, OR), and small towns and rural areas that had little or no efficiency programs (e.g., CO, CA). A number of states formed partnerships with cities and counties that had not run efficiency programs before (e.g., CA, NY, WI), dramatically increasing the number of EE program actors. Should these pilots prove successful, they may warrant consideration for utility customer-funded support or adoption by municipal utilities and/or rural electric cooperatives. While the success of these efforts remains to be seen, state and local governments may prove valuable for testing and incubating new program concepts in selected target markets that could later be supported by utility customer-funded programs.

Table ES- 1. Examples of innovative SEP activities in the 12 case study states

| New Sectors | New Geographic Areas | New Program Actors ⁵ | New Technologies & Policies |
|---|--|--|--|
| <ul style="list-style-type: none"> • HI (hospitality) • NY, NC (nonprofits) | <ul style="list-style-type: none"> • CO, CA (rural areas) • HI (non-IOU territory) | <ul style="list-style-type: none"> • CA (regional entities, counties) • MI (local governments) • MN (cities, local government authority) • NC (local nonprofits) • NY(cities) • WI (small towns) | <ul style="list-style-type: none"> • HI (deep seawater air conditioning) • ME, MA, MI (multi-fuel retrofits) • NY (reprogramming utility software for on-bill financing) • HI, ME (transit-centric planning) |

Interaction and coordination among program administrators

State energy offices also had to weigh choices regarding program autonomy vs. opportunities to leverage resources by working with administrators of utility customer-funded energy efficiency programs. Those decisions turned on many factors: the size and history of utility customer-funded programs, institutional capacity of state energy offices, the type of entity that administers utility customer-funded energy efficiency programs (e.g., utility, state agency, nonprofit or for-profit firm), and historic relationships among agencies. In practice, many state energy offices developed some programs unilaterally, while other SEOs coordinated program development with administrators of utility customer-funded energy efficiency programs, regulatory commissions, and other stakeholders.

⁵ Most states had new program actors; these are just a few examples.

We found numerous examples of coordination among SEO and utility customer program administrators. State energy offices offered multiple programs and states therefore could engage in multiple forms of coordination. Coordination between ARRA- and utility customer-program administrators offered potential benefits:

- **Leverage** – Joint or co-designed programs can draw in other funding, expertise, experience, and delivery infrastructure, and such programs can produce mutually reinforcing messages that move consumers to more efficient choices;
- **Minimize confusion among customers and vendors** – Both types of program administrators can influence program targeting, design and implementation issues such as setting incentive levels, messaging and branding to avoid or mitigate market disruption and consumer confusion;
- **Division of labor** – Different administrators and fund sources can serve complementary purposes and scope, suited to their skills and objectives;
- **Longevity** – Joint programs can have a broader support base than either taxpayer or utility customer programs on their own and may persist beyond the end of the Recovery Act funds.

The spectrum of coordination across case study states

Our 12 case study states reflected a full range of coordination. Coordination approaches ranged from communications among program administrators during the initial design of ARRA-funded programs to efforts by program administrators to design complementary programs that would enhance, extend or expand existing utility customer-funded programs to full collaboration on program design. Several SEOs formally consulted with utility customer program administrators – affording an opportunity for exchanging information and learning and then independently developed programs that targeted similar market segments with other incentive opportunities.

- The Florida SEO completed its own \$15 million residential HVAC program with consultation and input from utility program managers.
- In Colorado, the SEO consulted with utility program administrators, identified places where existing modest rebates could be augmented to boost the market, and developed an independent residential appliance rebate program under SEP in which customers could combine both ARRA and utility rebates. The program implemented a rebate cap and adjusted the ARRA portion to account for varying utility rebate levels across the state so that even with combined incentives, customers would still be required to pay a certain portion of the cost.
- In Wisconsin, the state Office of Energy Independence wanted to invest in clean energy for business, particularly to gear more of the state's manufacturing base toward a clean economy. Focus on Energy, the third-party administrator of efficiency programs for most of the state, has a robust industrial efficiency program, but economic development and the size of projects contemplated by the state energy office were beyond Focus's charter. The Office of Energy Independence put nearly all of its SEP money into revolving loan funds for industry, administered by a state economic development agency.

Most energy offices in our 12 case study states created one or more complementary programs and tools for enabling, extending or expanding the market reach of utility customer-funded programs. These interactions occurred in two ways – with and without formal coordination.

- The Michigan SEO did not formally coordinate with utility customer-funded program administrators but created complementary “fuel-neutral” programs that included improvements in the efficiency of oil furnaces or thermal measures for oil-heated buildings. These improvements are beyond the reach of the existing utility customer-funded programs because state regulators have adopted policies that preclude electricity and natural gas consumers from paying for energy efficiency programs that produce energy savings in oil-heated buildings.
- In Colorado, the state energy office launched a statewide marketing effort called “Recharge Colorado” that was a “one-stop shop” website for residents and businesses to learn about both ARRA- and utility customer-funded rebates, other incentives, contractors, and other energy efficiency information. If tools such as Colorado’s web portal prove useful to utility customer program administrators, those tools may provide benefit beyond the Recovery Act performance period.
- In North Carolina, the SEO formally coordinated with utilities and developed programs that reach into market segments not previously covered by existing utility energy efficiency programs (e.g., new construction of multifamily and manufactured housing).

A few states – California, Hawaii, Maine, Massachusetts, and Minnesota provide examples of full collaboration among program administrators (or state regulators). Full collaboration is marked by comingling or coordination on the utilization of funding sources, and development of a unified program, often with a single name or brand. Coordination among administrators is routine and sustained and both program administrators have some say in the design and implementation of the program.

- In Minnesota’s Trillion BTU program, the SEO delegated ARRA money to a port authority with more experience in economic development for a revolving loan fund targeting the commercial and industrial sectors. The state’s largest utility is adding rebates and engineering assistance for participants. The combined effort is intended to offset nearly all upfront costs for industrial energy efficiency projects.
- In Hawaii, the third-party administrator of ratepayer-funded programs has a solar hot-water heater program that is very popular but expensive on a cost-per-kilowatt hour basis. The state energy office delegated ARRA funds to the program administrators at Hawaii Energy to assume the rebate costs under ARRA and buy down interest rates so that initial system cost to participants is very low.
- The Massachusetts SEO is establishing a new, ARRA-seeded loan-loss reserve fund. Utilities in Massachusetts are supplying program dollars to buy down interest rates on the loans to 0% and supplying rebates to reduce the principal offered to participants. Implementation contractors that work under the utility program are promoting the new loan program.
- In California, the public utilities commission already had directed investor-owned utilities to set up a statewide residential retrofit program. With the Recovery Act money, the state energy office (California Energy Commission) was starting its own retrofit

programs, working through local and regional entities. There was a risk of two competing residential retrofit programs – one funded by utility customers and a second by the Recovery Act – operating with redundant infrastructures and different brands. The California Energy Commission (CEC), the California Public Utilities Commission and the investor-owned utilities committed instead to a single statewide, multi-agency, multi-sector retrofit program that targeted residential customers. State policy was also a driver in California as the CPUC Long-Term Strategic plan calls for ambitious transformations of the energy efficiency marketplace and a large scale, comprehensive and unified retrofit program is seen as key to achieving those goals. The CEC and several cities and counties had Recovery Act money and ideas for financing, but they had limited incentives and infrastructure for implementation. The local governments wanted utility partners with access to rebate delivery and processing and knowledge of energy use in their territories. The utilities saw an opportunity to outsource some outreach and workforce development functions to state and local government but wanted to receive credit for the energy savings attributable to their efforts. The CEC is uniquely suited as a clearing house for available incentives, financing and certified contractors and is contributing additional ARRA funding for a web-based portal to provide that information to consumers.

These kinds of collaborations appear to offer clear divisions of labor and investments based on competencies, capacities, and self interest. For utility customer-funded program administrators, outsourcing less cost-effective program elements and receiving credit for energy savings were key attractions in participating in coordinated joint Recovery Act and utility customer-funded programs. Likewise, the state and local grantees drew upon the expertise, delivery networks, and access to customer energy use data held by utility program administrators in order to establish partnerships and coordinated programs.

Coordination in the ARRA SEEARP program

Appliance rebate programs funded under the SEEARP offered the most obvious, straightforward opportunity for coordination between ARRA- and customer-funded program administrators because many administrators of utility-customer funded programs already offered appliance rebates. Coordination approaches utilized by state energy offices in the 12 case study states ranged from consultation to full collaboration. Nine states took a complementary approach – they added appliances to existing rebated products or they extended the rebates across a larger territory or they added to the rebate amounts.

After consulting with utility energy efficiency program administrators, the Colorado SEO developed an independent residential appliance rebate program in which customers could combine both ARRA and utility rebates. The program implemented a rebate cap and adjusted the ARRA portion to account for varying utility rebate levels across the state so that even with combined incentives, customers would still be required to pay some portion of the cost.

Hawaii provides an example of full collaboration; the SEO arranged with the third-party program administrator to incorporate ARRA funds to expand the list of rebated appliances, increase some rebates, and create a refrigerator recycling program.

Challenges

In some instances, coordination between utility customer and ARRA energy efficiency programs did not make sense in the 12 case study states. Recovery Act initiatives geared toward economic development or job creation were not always a good fit for administrators of utility-customer funded programs that were driven by savings targets or market transformation policy objectives. In some cases, existing program administrators saw more downsides and risks than benefits from new ARRA-funded programs. Among those potential downsides was uncertainty about four statutory federal requirements tied to the Recovery Act money. Projects conducted with ARRA funding had to offer prevailing wages (Davis Bacon Act), pass environmental (NEPA) and historic-preservation reviews, and feature U.S.-made goods and services to the greatest extent practicable. Utility programs in some states typically do not operate under all of these requirements.

A few of the challenges we observed include:

- **Funding fluctuations do not support long-term market transformation** – Many programs took months to launch and most programs will end with their Recovery Act funding. Program administrators and contractors indicated that a lack of continuity in program offerings and incentive levels undermines market confidence, orderly uptake in programs and entry of private investment. Some administrators of utility customer programs saw the burst of federal funding in state or local hands as an uncontrolled new influence on markets that those administrators had cultivated to promote energy efficiency. For example, Colorado utilities argued that customers would be confused by the ARRA-funded rebates and asked regulators to maintain current program incentive levels in order to “ride out” the ARRA rebates. The New York Energy Research and Development Authority (NYSERDA), combining the functions of state energy office and utility customer program administrator, decided the ARRA appliance funds would impair efforts at market transformation and sequestered those rebates from utility customer-funded programs. Customers had to choose between utility customer- and ARRA-funded rebates; NYSERDA and utilities kept running lists as insurance against customer double dipping.
- **Strain of time and capacity limits** – Tight deadlines and historic funding levels required unprecedented ramp-up from state and federal program administrators. A number of respondents indicated that the lack of comprehensive guidance at the program’s inception compelled some states and localities to change course after DOE issued updated guidance documents on various issues that arose during implementation. This meant that some states faced delays in finalizing their program designs, executing contracts and completing other activities needed to spend funds as quickly as they had planned.
- **Statutory requirements limited coordination** – After passage of ARRA, a number of SEOs indicated that they had initial discussions with utility program administrators about coordination of program design and delivery. However, some utilities were reluctant to fully integrate program offerings when they became aware that use of ARRA funds would mean that these “integrated” programs would be subject to meeting statutory requirements included

in the ARRA. Thus, some utilities determined that fully coordinated and integrated program delivery was not in the best interest of the success of their own programs.

- Varying program goals** – Some state energy offices designed their programs primarily to meet job retention and job creation objectives of the Recovery Act, which in some cases was not aligned with longer term market transformation and energy savings objectives of utility customer-funded programs. For example, with appliance rebates, most case study states set rebate levels for a quick hit in the market rather than a steady incremental enhancement to appliance sales. In the short term, that approach may have saved jobs and, anecdotally, kept some retailers in business. However, retailers in Wisconsin, New York and Hawaii reported a sag in sales before the ARRA-funded rebates were offered, apparently in anticipation of the rebates. The extent to which these rebate cycles may have affected existing appliance efficiency programs or resulted in additional net savings is an issue outside the scope of this report and may be taken up by program evaluators in the future.
- Savings Attribution and Reporting of Impacts** – The attribution and claiming of savings from projects that utilize both Recovery Act funds and rebates from utility customer-funded programs has been a subject of intense negotiations in several states. Not surprisingly, states have taken varying approaches on this issue (see Table ES- 2). Attribution is a critical issue for administrators of utility customer-funded programs with performance incentives or in states that have adopted Energy Efficiency Resource Standards with savings targets. Joint OMB/DOE guidance advises grant recipients to report the “full estimated impact” of ARRA-funded programs, including the impact of “leveraged” resources that, absent the ARRA investment, would not have been part of a program. Many states are reporting the full savings associated with joint programs. Some plan on reporting net energy savings; other states are reporting gross savings. Some utility customer program administrators engaged in ARRA-funded programs are taking full credit for savings from those programs; some are taking proportional credit (see Table ES- 2).

Table ES- 2. Approaches to crediting utility customer-funded energy efficiency programs with energy savings for projects incorporating both ARRA and utility customer (UC) funding in 12 case study states

| Full credit of savings to UC administrator | Proportional credit of savings to UC administrator | Strict separation of ARRA & UC program savings | Unresolved |
|--|--|--|------------|
| CA, FL, MA, MI, MN*, NC | HI, ME, WI** | NY | CO, OR |

- The Minnesota Office of Energy Security (OES), which reviews and approves the utilities’ cost-effectiveness filings and savings claims, indicated that it is taking a program-specific approach to attribution of savings. For example, the OES allows the utility to count all of the savings for measures installed in the ARRA residential rebate program in cases where a utility rebate is also leveraged.
- **Focus on Energy (Focus), the third-party program administrator in WI, received all energy savings credit for appliances that it already provided rebates for and still considered cost effective, but no savings credit for appliance rebates not already offered. For the other programs, several factors went into determining whether Focus or the SEO received savings credit.

Conclusions and Recommendations

The unique nature of the Recovery Act – a large infusion of funds with tight deadlines and objectives beyond energy efficiency – limits extrapolation of the ARRA experience to the future. Yet the experience provides some insights for state policymakers, regulators, and program administrators on strategies and approaches that may work in a future regulatory and market environment with more diverse energy efficiency funding sources and program actors. Diversification of energy efficiency funding already was under way before ARRA. Some states were utilizing regional cap-and-trade allowance revenues and payments from ISO/RTO forward capacity markets to supplement funds from utility customers. However, the regional cap-and-trade and forward capacity market payments are modest relative to the historic levels of Recovery Act funds.⁶ In states with significant utility customer-funded programs, the ARRA grants represent a significant impact; where utility energy efficiency programs are modest or nascent, the Recovery Act has provided substantial startup funding for statewide energy efficiency efforts.

Our case study states illustrate approaches that were utilized by SEOs in designing and implementing ARRA-funded programs and provide insights on pitfalls to avoid and ways that an expanded universe of players might orchestrate and coordinate their roles and responsibilities. The Recovery Act grants have enabled program administrators to begin exploring divisions of labor based on natural niches and test new roles and combinations that could work to maximize the impact of their respective funds and benefit taxpayers and utility customers. In light of these early findings, we make several recommendations and suggest areas of further inquiry that could be followed up by those entities that will be conducting formal evaluations of ARRA energy efficiency programs:

- **Coordination guidance** – Several state energy office and utility or third-party program administrator interviewees recommended that federal funds come with a coordination requirement. ARRA program evaluators might examine the pros and cons of explicit guidelines for state energy offices to formally consult and/or obtain input from utility customer program administrators and state public utility commissions if SEOs design and offer federally-funded energy efficiency programs in the future.
- **Grant issuance and administration** – The tight deadlines for Recovery Act grants tested every level of government and limited opportunities for resolution of difficult issues and coordination among state and local governments and utility customer-funded administrators. The design of future federally-funded energy efficiency programs should take into account the challenges involved in ramping up programs and allow sufficient time for DOE grant managers to establish necessary program guidance documents. However, guidance for the statutory regulations is now fairly well developed and should consume significantly less time in the implementation of future programs.
- **Appliance rebates** – States designed their Recovery Act appliance programs either for a quick economic boost or for slower, more sustained sales and energy savings. We

⁶ Our interviews with the 12 states did not include discussion of coordination with funding sources other than utility customer-funded programs.

recommend that evaluators of the SEEARP program examine program impacts across states and analyze approaches that deliver on both objectives.

- **Designing revolving loan funds to match objectives** – We suggest that evaluators explore the issue of whether DOE (or states) should provide more detailed guidance on objectives, target markets, and design of revolving loan funds. For example, the design and target markets of a revolving loan fund program would be significantly impacted depending on whether the program’s objectives included creating a long-term, ongoing source of financing or targeting less-qualified borrowers that could benefit from comprehensive home energy upgrades.
- **Tracking and sharing the impacts of revolving loan funds** – Most revolving loan funds programs will last well beyond the ARRA performance period. It is important for DOE (and states) to track and monitor the impact of these funds over time (10-15 years). Dissemination of data about default rates, program administration costs, and appropriate interest rates will be useful in evaluating program impacts and informing program administrators and financial institutions for future financing programs. Going forward, DOE should also consider providing technical assistance to state energy offices that want to modify their RLF terms or target markets in order to focus on under-served markets that most need project finance for energy efficiency projects (e.g., residential home energy improvements, small business).
- **Energy codes updates and compliance efforts** – State governors that received Recovery Act energy grants had some obligation to ensure that their state would take action to implement the latest residential and commercial energy codes, with 90% compliance, by 2017. However, based upon our review, it appears that about 18 states are spending a small share of their SEP funds on code development and enforcement and training.⁷ Most of the funds are being spent in states that already tend to keep their codes up to date (i.e., adopted the 2006 or 2009 International Energy Conservation Code (IECC) for homes and the ANSI/ASHRAE/IESNA Standard 90.1-2004 or 90.1-2007 for commercial buildings). Of the 18 states that either do not have building energy codes or whose codes are significantly outdated codes (pre-2006), only six of these states are spending SEP dollars on code advancement (Building Codes Assistance Project 2010).⁸ Because these states were the primary targets of the code requirement, evaluators might want to assess whether the level of investment and effort in states historically slow to update their codes is consistent with meeting the Recovery Act’s requirement to adopt the latest energy codes and achieve 90% enforcement by 2017.

⁷ Sixteen states are spending a total of \$17M of their SEP funds on code development, enforcement and training; two states (New Mexico and North Carolina) are spending an undetermined amount on building energy codes as part of their portfolio of programs, but separate budgets are not available.

⁸ It is important to note that states also received about \$9 million in additional ARRA funding for code adoption, training and compliance through program initiatives funded by DOE’s Building Technologies Program. For example, twenty-four states received a total of \$7.3 million for the Adoption, Training and Compliance Solicitation, 5 states received funding for compliance pilots (\$750,000 total) and 15 states received equal portions of \$1 million for BCAP’s Compliance Assessments. Five of the states with outdated energy codes are applying neither SEP or Building Technologies funds toward building codes programs.

- **Attribution and reporting of savings and assessment of program impacts** – Some of the 12 case study states have not settled on exactly what to report and how to attribute savings. An opportunity exists to inform those decisions. Evaluators may wish to examine whether more refined state and utility reporting guidance will produce consistent measures of energy savings. Moreover, some states used Recovery Act funds to help meet utility customer energy efficiency program savings targets and EERS requirements. Among our 12 case study states, it does not appear that any state regulatory commission decided to increase savings goals for their program administrators to account for the boost from Recovery Act funds. Seven of our case study states allowed the utility customer-funded programs to claim all savings from projects that combined ARRA and utility customer funds for at least one of the ARRA programs. As a result, savings goals are likely to be met more easily than anticipated. State regulators might examine the extent to which progress toward EERS compliance has been accelerated by federal taxpayer dollars.
- **Resource-efficient loading order** – On-site renewable energy systems can be significantly more costly than most energy efficiency measures. In utility customer-funded programs, a few states (e.g., CA) have adopted a “loading order” that encourages customers to implement cost-effective efficiency measures prior to installing renewable energy systems as a condition of providing incentives for renewable energy projects. They have decided that optimizing customer loads first and then sizing renewable systems delivers the most value for public dollars and can extend the program to more participants. Evaluators may want to examine implementation practices among those states that offered incentives to implement both onsite renewable energy and energy efficiency projects, highlight “best practices” in this area, and assess whether DOE or states should include guidance on the design of combined renewable energy/energy efficiency programs in the future.
- **Knowledge preservation** – Capacity, lessons learned and practical know-how are being developed quickly at the state and local level. Knowledge and relationships arising from Recovery Act programs are at risk of being lost as staff and contractors are reassigned or laid off at the end of the performance period. Government agencies and utility program administrators should look for ways to preserve new capacity and knowledge.⁹
- **More funding for innovation in EE program design** – The ARRA-funded SEP programs have been able to experiment and test new EE program designs, at least partially because they are not constrained by some requirements faced by administrators of utility customer-funded energy efficiency programs (e.g., cost-effectiveness screening tests). There is a need for continued support to encourage innovative program designs, workforce development, and market transformation initiatives after ARRA funds are expended.

The ARRA-funded efficiency programs are too young to speculate on program outcomes or quantify the value that coordination may offer over more independent approaches. However, the Recovery Act set in motion exploration nationwide with new markets, actors, and approaches, including new divisions of labor and additional resources for delivering energy savings. These

⁹ Institutionalizing knowledge obtained by SEO staff in designing ARRA-funded programs can be preserved (even in event of staff turnover) by creating program procedures manuals and documenting and disseminating program results.

activities generated new partnerships and perhaps a broader constituency for energy efficiency among governments, businesses, residents, utilities and others. The ARRA experience to date underscores the difficulties and potential benefits of a larger, more complex effort at saving energy nationwide. Many issues relating to application of existing and new statutory guidance have been resolved, opening up additional opportunities for administrators to offer fully coordinated and integrated programs in the future. This experience also suggests that the various recipients of ARRA funds (e.g. states, counties, cities) may have natural niches and roles to play in areas where utility customer energy efficiency program administrators have been constrained or reticent, such as workforce development, financing, and serving markets and end-uses not covered by utility customer programs. Some of the solutions that are emerging now will likely not continue past the Recovery Act performance period; however many may persist as important new elements to shape the future of U.S. energy efficiency initiatives.

Introduction

The energy efficiency landscape in the U.S. has largely been driven by programs paid for by utility customers (i.e. ratepayers)¹⁰, building codes, and appliance and equipment efficiency standards (Barbose et al 2009; Goldman et al. 2010). The comprehensiveness and maturity of utility customer-funded energy efficiency programs vary greatly by state. Spending on utility customer-funded energy efficiency programs is projected to increase to \$7.5-12 billion by 2020 compared to budgets totaling approximately 4.5 billion in 2009, driven by various state regulatory and legislative initiatives (e.g., Energy Efficiency Resource Standards, business models that overcome disincentives for utilities to pursue energy efficiency aggressively) and the attractiveness of energy efficiency as a resource compared to supply-side alternatives (Barbose et al. 2009).

The American Recovery and Reinvestment Act (ARRA) provided a huge, immediate influx of funding for energy efficiency and other clean energy programs. ARRA funding is largely funneled through state energy offices, which in almost all states is a different entity than the program administrator for utility customer-funded energy efficiency programs.¹¹ This study reviews how state energy offices utilized the ARRA funding for energy efficiency programs and analyzes the impact that this increased government funding has had on existing utility customer-funded energy efficiency programs. We examine program planning, program design and policy issues for both state energy offices and utility customer-funded programs that have arisen during the significant ramp-up of selected ARRA EE programs and consider how legislative guidelines and rules may have impacted program planning, design and implementation. We are particularly interested in the interactions and coordination efforts of administrators of ARRA-funded and utility customer-funded energy efficiency programs because they may provide some insights into issues that may arise in the future in an increasingly complex world of multiple program administrators and funding sources.

1.1 Audience and Report Structure

The report is intended to inform: (1) state and federal policymakers and regulators and program administrators interested in obtaining an overview of the potential impact of ARRA-funded energy efficiency programs and issues that arise in coordinating these programs with existing utility customer-funded energy efficiency programs and (2) state energy offices, implementation contractors, and trade allies who might benefit from our comparative review of strategies and approaches taken by state energy offices to develop and design a portfolio of energy efficiency programs and initiatives to utilize ARRA funds; lessons learned from this study may be helpful in designing future state/local government energy efficiency programs.

The study is organized as follows. In section 2, we provide an overview of our research approach and describe the process and factors used to select case study states. In section 3, we include a brief overview of the landscape of utility customer-funded energy efficiency programs across the nation. In section 4, we examine selected programs funded under ARRA that are administered by state energy offices with an overview of national trends in program design and allocation of funds for different types of eligible activities. In section 5, we provide an overview of the

¹⁰ Throughout this report we will refer to ratepayer-funded programs as programs funded by utility customers.

¹¹ Local governments, cities and tribes administer a portion of the Energy Efficiency Community Block Grant program funds.

administrative models, target markets and funding levels of existing utility customer-funded energy efficiency programs in our 12 case study states and describe the types of programs and market sectors that were targeted by state energy office with ARRA funds. In section 6, we focus on a comparative review and analysis of the 12 case study states that draws upon the case studies in Appendix A. We identify key trends and themes that emerge from our interviews with program administrators and state regulators in these states, including our observations on varying strategies and approaches taken by state energy offices in the design of their portfolio of programs and interactions between program administrators. In section 7, we examine the potential long term impact of ARRA funded programs, focusing on revolving loan funds, loan loss reserve programs, and workforce development programs. Section 8 includes general conclusions from the case studies and national trends, identification and brief discussion of several issues that evaluators of ARRA programs may want to explore in more depth, and recommendations for future programs. Appendix A includes case studies of the 12 states and Appendix B lists the organizations whose representatives were interviewed to inform the case studies.

2. Approach

This report focuses on a selected set of ARRA-funded programs administered by state energy offices: the State Energy Program (SEP) formula grants, the portion of Energy Efficiency and Conservation Block Grant (EECBG) funds administered directly by states, and the State Energy Efficient Appliance Rebate Program (SEEARP). These particular ARRA programs devote significant monies to energy efficiency and serve similar markets as utility customer-funded programs, thus creating significant potential for various types of interaction. Our study examines the choices made by state energy offices to invest Recovery Act funds and the interactions of those programs with utility customer-funded energy efficiency programs. The intent of this study is not to evaluate these specific ARRA programs; other entities will provide those analyses.¹² In terms of our scope, we exclude the ARRA funds provided to significantly ramp up the DOE low-income weatherization program, EECBG funds awarded directly to entitlement communities other than states by DOE, and the Better Buildings Program; these activities also often interact with utility customer-funded programs.¹³

Our approach consists of several steps. First we reviewed the 50 state energy offices' ARRA SEP plans as originally submitted to the DOE, gathered from state energy office and/or DOE websites. We provide a detailed report of SEP spending and analysis by program type (e.g., energy efficiency, renewable energy, transportation, other) and categorize energy efficiency program spending by market sector (e.g., residential, private commercial/industrial, public sector) [see Chapter 3 for detailed categorization information]. The 50-state program data for the SEP formula grant plans is current as of April 2010.

Second, we conducted interviews with approximately 18 national experts in February and March 2010 to identify research questions and provide an early indication of which states might provide useful examples of interactions. We asked about the extent to which these experts had been involved in advising state governments and/or program administrators in planning for the use of ARRA funds and obtained their views on interactions between program administrators. These interviews informed the development of our protocol for formal interviews with various actors in case study states.

Third, we developed a process and criteria to select states for more in-depth case studies. Using the typology and information developed in Barbose et al. (2009), we identified those states with mature utility customer-funded energy efficiency programs or states that were in the process of significantly expanding their programs (i.e., "leading" and "up and comer" states as defined in that report). For those ~32 states, we compiled information on 2009 budgets for energy efficiency and reviewed and categorized energy efficiency policies (e.g., performance incentives) and the institutional structure and arrangements for program administration. For these states, we

¹² The DOE plans to conduct evaluations of the SEP, EECBG, and Better Buildings program (KEMA 2010)

¹³ While ARRA funds significantly increased the size of the DOE low-income Weatherization Assistance Program (WAP), WAP has been in existence for more than 20 years so coordination with administrators of ratepayer-funded programs is not a new phenomenon. Moreover, other entities (e.g., Oak Ridge National Laboratory) are currently in the field conducting a comprehensive evaluation of the WAP. Finally, resource and budget constraints precluded LBNL from gathering extensive first-hand information about the over 2,200 EECBG direct entitlement grants to tribes, cities and counties.

created a matrix that included information on energy efficiency program funding levels and program administrator model (e.g., utility, state agency, 3rd party contractor, or hybrid approach). We ranked states by energy efficiency spending per capita and removed states that did not meet a minimum threshold. Ultimately, we chose 12 states for the case studies. In selecting states, we tried to accommodate geographic balance and include a diversity of program administrator models (see Table 1).

Table 1. Entity that administers utility customer-funded energy efficiency programs in the 12 case study states

| | Utility Program Administrator | | | | 3 rd -party Program Administrator | | | Hybrid (Utility and 3 rd -party Administrators) |
|----------------------|-------------------------------|-----------|--------|------|--|-----------|--------|--|
| | Midwest | Northeast | South | West | Midwest | Northeast | West | Northeast |
| Leaders | MN | MA | | CA | WI | ME | OR, HI | NY |
| Up and Comers | MI | | FL, NC | CO | | | | |

We then conducted interviews with over 70 representatives of state energy offices, program administrators, and regulatory commissions in the case study states between April and September 2010. We asked state energy offices about their objectives and process for developing ARRA plans, compiled detailed SEP and EECBG spending data and collected information on the extent and nature of their programs’ interaction with utility customer-funded programs, including synergies, successes and issues. We asked administrators of utility customer-funded energy efficiency programs about the extent to which they were consulted or involved in the development of ARRA programs, the extent and nature of interactions between their programs and selected ARRA programs, their expectations regarding impacts on their programs, and key issues that arose during the program planning, design or implementation phases of ARRA programs. We asked regulatory commissions about their involvement in providing input on ARRA programs, their perspective on the extent to which their program administrators were involved and how ARRA funded programs might impact program administrators in terms of achieving energy savings targets and/or affect shareholder or administrator performance incentives.

For the 12 case study states, we reviewed their SEP and EECBG applications and Appliance Rebate program information in order to develop an overview of budgets for programs and uncover additional potential areas of interaction. We also reviewed the states’ Recovery Act web pages, the SEO’s websites, DOE’s Performance and Accounting for Grants in Energy (PAGE) database of ARRA project reports and other sources of ARRA program information. Finally, we reviewed other secondary literature on the interaction of ARRA funds with utility customer-funded energy efficiency programs, including presentations and papers from state energy offices, NASEO, utilities, consultants and others to provide additional perspectives on the themes which emerged from our analysis of the interviews and data.

We prepared detailed case studies for each of the 12 states (see Appendix A) which summarizes interview results and other information, describes the interactions among administrators of state

energy office programs and utility customer-funded energy efficiency programs at various phases of the process (program planning, program design and implementation) and identifies key policy and program design issues that have emerged.

We also utilized information from the Consortium for Energy Efficiency (CEE), American Council for an Energy Efficient Economy (ACEEE), the Regulatory Assistance Project (RAP), utility commission websites, state energy office websites and other sources in preparing the case studies (see Appendix A).

3. Overview of Utility Customer-funded Energy Efficiency Programs

This section provides a brief overview of energy efficiency programs funded by utility customers, and typically administered by utilities or third party program administrators, for those readers that are not familiar with the evolution or current status of these utility sector initiatives.

A few utilities began offering energy efficiency programs in the early 1980s. Energy efficiency received an initial boost as some states adopted requirements for their utilities to conduct least cost or integrated resource planning (IRP). Utilities were required to assess the full range of supply-side and demand-side options for meeting loads (e.g., base load generation, gas-fired combined cycle plants, renewable energy projects, demand response and energy efficiency options); energy efficiency investments were often the least-cost resource. Over the years, in many states, energy efficiency has come to be treated and regarded as a “resource” available to meet utility needs (Blumstein et al 2003).¹⁴ With the advent of electricity restructuring and increased interest among policymakers in promoting wholesale (and in some cases, retail) competition, proponents of energy efficiency placed increasing emphasis on overcoming market barriers to energy efficiency and transforming end user markets. In those states that have adopted “market transformation” as a policy goal of their utility customer-funded energy efficiency programs, program administrators are encouraged to develop strategies that could reduce market barriers, foster the development of an energy efficiency services industry, and intervene and work with upstream market actors to transform product and services markets.

At present, nearly all states have at least one utility that offers energy efficiency programs (CEE 2009; ACEEE 2010). However, the level of commitment varies widely across states from utilities with negligible budgets used to test pilot projects or provide general information on energy efficiency opportunities to their customers to utilities (or other program administrators) that manage a mature portfolio of energy efficiency programs that have been offered for many years. In recent years, energy-efficiency spending has been on the rise, with overall spending on utility customer-funded programs projected to double, possibly quadruple over the next 10 years (Barbose et al. 2009).

In the last decade, 15 states consistently have spent more than 1% of annual revenues from retail electricity sales and achieved at least 0.5% savings per year on retail sales (Barbose et al. 2009). These energy-efficiency leaders – California, New York, Connecticut, Massachusetts, Wisconsin, Vermont, and others – generally have stringent efficiency targets in regulation, portfolio standards, or law. Ten of these states currently account for nearly 80% of national spending on utility customer-funded energy efficiency (CEE 2010).

In leading states, program administrators typically field a suite of efficiency programs in all market sectors (residential, commercial and industrial) and seek to influence all types of market interventions and activity (i.e. retrofits, new construction, building renovations and remodeling, equipment or appliance replacements). Program administrators might combine technical assistance or education, financial incentives (e.g., rebates), financing and strategies for marketing, outreach and intervention (e.g., working with retailers to promote high efficiency HVAC equipment to consumers with aged or failing equipment). The menu of programs can be

¹⁴ The Energy Policy Act of 1992 accelerated this trend by encouraging utilities to engage in integrated resource planning or IRP.

exceedingly broad and often includes offerings that are targeted to niche markets (e.g., federal customers, supermarkets). In the residential market, retrofit programs can range from single-measure installations or upgrades to the thermal envelope (e.g., floor insulation, high-efficiency windows) to “whole-house” refurbishments with envelope improvements and major equipment replacement.

A number of states concentrated in the Midwest and Mid-Atlantic recently have launched efficiency programs or adopted energy efficiency resource standards (EERS) or targets that explicitly or implicitly will require substantial investments in efficiency. Some of these states (e.g., Pennsylvania, Maryland, and Illinois) had significant utility customer-funded programs in the 1980s and/or early 1990s but regulatory support for these activities waned during electricity restructuring. In the last several years, legislative and political support for energy efficiency has increased. In some cases, energy-savings targets in several of these up-and-coming states will nearly match efforts in leading states by 2020. Efficiency spending among these states is projected to rise faster than spending by leading states, accounting for the largest share of projected increases over the next decade (Barbose et al. 2009).

In the remaining 18-20 states, the commitment of regulators and legislatures to utility customer-funded energy efficiency programs is either uncertain or quite limited and program administrators in these states have small budgets, often limited to education and information campaigns.

Several models have evolved for administering utility customer-funded energy efficiency programs. The most common model is for the utility to administer these programs. A number of regulatory commissions or legislatures have decided that utility customer-funded efficiency programs should be administered by a state agency (e.g. NYSERDA) or by third-party contractors, both for-profit and not-for-profit (e.g. Vermont, Wisconsin, Oregon, Maine, Hawaii, and Delaware). These latter models have emerged in part from concerns that under traditional regulation, utility management is unlikely to aggressively pursue energy efficiency due to financial disincentives or develop consistent statewide programs that can take advantage of administrative efficiencies.

In most states, administrators of utility customer-funded programs are required to screen energy efficiency programs for cost-effectiveness during the planning process (i.e., benefits must exceed the costs). Practices vary across states as to how “cost effectiveness” screening is conducted (NAPEE 2008). Issues include the level of disaggregation of the screening analysis (e.g., the individual measure level, program-level, or the entire portfolio of programs), whether gross or net energy savings are used in estimating benefits, elements and methods used to estimate avoided costs of new generation, transmission & distribution, energy, and whether to include environmental externalities in estimating benefits. Methods and values used in cost-effectiveness screening significantly influences the extent and diversity of utility customer-funded energy efficiency program offerings (e.g. types of measures and programs that can be offered), which is an issue that some state energy offices considered in the design of their ARRA-funded programs.

4. Recovery Act Funding for Selected Energy Efficiency Programs

4.1 Overview

This section provides a brief overview of selected energy-efficiency related program initiatives funded under the American Reinvestment and Recovery Act (ARRA) for those readers that are not familiar with the program scope, eligible activities and guidelines, and implementation strategies proposed by state energy offices for the State Energy Program (SEP), Energy Efficiency and Conservation Block Grant (EECBG) and the State Energy Efficient Appliance Rebate Program (SEEARP). We present a ‘snapshot’ of the information contained in the SEP plans submitted to DOE as of July 2010 by all state energy offices plus additional information obtained from our interviews with state energy offices and review of EECBG and SEEARP plans in our 12 case study states which is current as of October 2010 (see Appendix A).¹⁵

In February 2009, the American Reinvestment and Recovery Act (ARRA) was signed into law and allocated \$36.7 billion to the Department of Energy (DOE) to fund a range of energy-related initiatives: energy efficiency, renewable energy, electric grid modernization, carbon capture and storage, transportation efficiency, alternative fuels, environmental management and other energy-related programs. The primary goals for DOE under ARRA include rapid job creation, job retention, and a reduction in energy use and the associated greenhouse gas emissions; deadlines for fund expenditures were set to ensure that funds were spent within several years to maximize short-term economic impact.¹⁶ DOE guidance also emphasized its desire for state energy offices to coordinate with administrators of utility customer-funded programs and other stakeholders and to create programs that would result in long-term impacts and market transformation (U.S. DOE 2009).

The DOE’s Office of Energy Efficiency and Renewable Energy (EERE) are charged with overseeing and distributing Recovery Act funds for the following programmatic efforts:

- \$3.069 billion for DOE’s existing State Energy Program, distributed as formula grants;¹⁷
- \$3.2 billion for the new Energy Efficiency and Conservation Block Grants (EECBG) program which comprises \$2.73 billion for formula grants to states, counties, cities and tribes and \$486 million for competitive grants, also known as the Better Buildings program;
- \$300 million for the new State Energy Efficient Appliance Rebate Program (SEEARP);
- \$5 billion for DOE’s existing low-income Weatherization Assistance Program (WAP); and

¹⁵ Program plan data for the 12 case study states is current as of August 2010, while the SEP formula grant plans filed by the remaining 38 states is current through April 2010. Note that states have the option of submitting updated program and spending plans.

¹⁶ The SEP project completion deadline is April 2012. EECBG funds must be “obligated” within 18 months of effective date of award and expended within 36 months of award; in all cases, funds must be expended no later than September 30, 2015. SEEARP funds must be expended by February 2012.

¹⁷ Formula grants are non-competitive awards which are distributed to entitled entities based on a pre-determined formula.

- \$5.2 billion for clean energy technology research and development and energy infrastructure modernization, and innovation grants in such areas as biomass, wind, fuel cells, batteries, industrial and vehicles technologies.

This study focuses on the SEP, EECBG and SEEARP programs.

4.2 State Energy Program (SEP)

The State Energy Program (SEP) is an ongoing partnership between the DOE and state energy offices (states, territories, and the District of Columbia).¹⁸ The program supports states' efforts to align with national energy policy objectives and has articulated four broad goals (U.S. DOE 2009):

1. Increase energy efficiency to reduce energy costs for consumers, businesses, and government;
2. Reduce reliance on imported energy;
3. Improve the reliability of electricity and fuel supply, and the delivery of energy services; and
4. Reduce the impacts of energy production and use on the environment.

While DOE allows SEP ARRA funds to be expended in any way that meets the objectives of the legislation, DOE encourages states to consider a short list of programs and projects that have historically been shown to have the greatest potential to achieve the overall goals of SEP and ARRA:

- Establishment and enforcement of energy efficient building codes and standards;
- Voluntary programs that impact new building design;
- Loans, grants and incentives for energy efficiency and renewable energy measures;
- Building retrofits;
- Traffic signal synchronization and replacement with LEDs; and
- Industrial retrofits (DOE 2009).

Historically, the SEP has provided annual funding for 50 states and the territories through formula grants, with a smaller annual set-aside for competitive grants to fund innovative projects. State energy offices were typically required to contribute a minimum of 20% of their annual award, and also leverage private financing for energy projects, which resulted in \$3.54 in leveraged funds to every \$1 in SEP funding for the 2001 program year (Schweitzer et al. 2003).

The 2009 Recovery Act resulted in a more than 20-fold increase in annual funding for states relative to funding levels in recent years, and for the first time, did not require states to provide

¹⁸ Congress created the SEP in 1996 by consolidating the State Energy Conservation Program (SECP) and the Institutional Conservation Program (ICP), which were both established in 1975. Several pieces of legislation form the framework for SEP including the Energy Policy and Conservation Acts of 1975 and 1992, and the Warner Amendment of 1983. The Warner Amendment of 1983 (P.L. 95-105) allocated oil overcharge funds—called Petroleum Violation Escrow (PVE) funds—to state energy programs. In 1986, PVE funds increased substantially when the Exxon and Stripper Well settlements added more than \$4 billion into the mix, which were spent over many years (WIP: U.S. DOE).

matching funds. The formula used to allocate these SEP funds to the 50 states is 1/3 equally among all states and territories, 1/3 according to population, and 1/3 according to energy consumption.¹⁹

Budget Categories

Under both the SEP and EECBG programs, DOE asks applicants to assign one of six market categories to each program: 1) transportation; 2) policy, planning and energy security; 3) industry; 4) energy education; 5) electric power and renewable energy; 6) buildings. We choose to categorize ARRA funding in a way that facilitates quantitative comparisons with the markets traditionally served by utility customer-funded energy efficiency programs by using the following five primary programmatic areas: 1) Energy efficiency (EE) measures and equipment in buildings; 2) energy efficiency cross-cutting activities (e.g., codes and standards, workforce development); 3) renewable energy; 4) transportation; and 5) other programs (e.g., energy strategy planning, clean tech sector development). Across the 50 states, five territories and the District of Columbia we observe that programs which provide energy efficiency equipment and building measures comprise half of the \$3.06 billion in SEP program budgets under ARRA. Cross-cutting energy efficiency measures and transportation comprise 4% and 3% of total SEP budgets respectively. Renewable energy programs make up 31% of total SEP budgets, while other programs comprise 12% (see Figure 1).

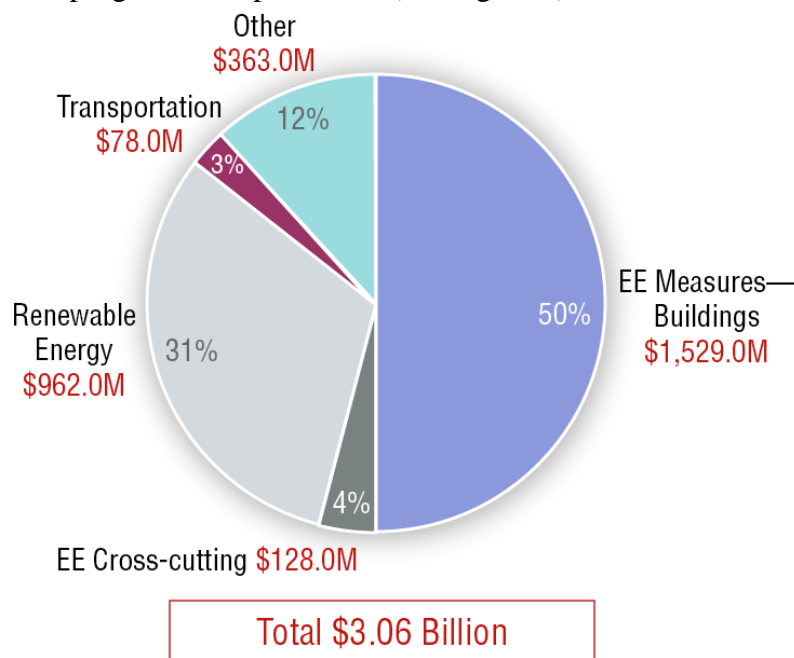


Figure 1. ARRA SEP funding by programmatic area*

* Most data current as of July 2010; data for 12 case study states current as of October 2010

We group energy efficiency programs into direct measures implemented in buildings vs. cross-cutting activity. For energy efficiency programs that target the buildings sector, we attempted to identify and group programmatic activities and budgets proposed by state energy offices into

¹⁹ The 2010 SEP formula grants are expected to total \$25 million for 50 states, the District of Columbia and five territories, which is about 75% of the SEP allocation of \$33 million in 2008 (Grants.gov 2010).

market segment categories that are often used in reporting by administrators of utility customer-funded energy efficiency programs (e.g., residential, new construction, commercial/industrial), further dividing commercial/industrial into public buildings, private buildings and industrial-only, for programs that specified those markets (see Table 2).

Table 2. ARRA State Energy Program funding in various programmatic areas (July 2010)

| Group | Sub-grouping | Market Sector | Examples of programs and activities | SEP Budgets (\$ Million) |
|--|--------------------------------|-----------------------|--|--------------------------|
| 1. Energy Efficiency | Measures & equip. in buildings | | Audits, retrofits, retro-commissioning, industrial processes, technical assistance for performance contracting, revolving loan funds for energy efficiency projects | \$ 1,529 * |
| | | Residential | Audit and retrofit programs targeting residential and multifamily residential buildings, including appliance rebate programs | |
| | | C/I - Private | Audit and retrofit programs targeting private business, commercial and industrial facilities | |
| | | C/I - Public | Audit, retrofit and technical assistance programs exclusively for public facilities (e.g., government buildings and facilities, schools, colleges) | |
| | | C/I - Industrial only | Energy efficiency programs specifically for industrial facilities that may include building retrofits and industrial process efficiency measures | |
| | Cross-cutting | | Building codes, energy efficiency workforce development, education and outreach, general technical assistance, marketing, databases, best practices sharing | \$ 128 |
| 2. Renewable Energy | | | Installations of onsite renewable technologies in buildings and technology demonstrations; solar, geothermal, hydro, biogas, biomass, waste to fuel, CHP, fuel cells projects | \$ 962 |
| 3. Transportation | | | Traffic flow management, fleet efficiency, alternative fuel vehicles and stations, behavioral (e.g., carpooling and bike commuting programs), mass transit | \$ 78 |
| 4. Other | | | Development and support for clean tech manufacturing sector, climate strategy development, recycling and environmentally preferable purchasing programs, utility rate design, SEP program administration | \$ 363 |
| Total (50 states, 5 territories and District of Columbia) | | | | \$3,060 * |

*We include programs that indicated support for both energy efficiency and renewable energy projects but that did not disaggregate the uses of the funds (i.e., programs from 17 states, totaling ~289 million). Most of these programs are allocating significantly more to energy efficiency than renewable energy projects.

The SEP program plans prepared by many SEOs included various programmatic activities that encompassed multiple programmatic areas or included unique program elements that made it difficult to disaggregate and categorize funding precisely. Nearly all states had some portion of SEP program funding which did not break neatly into one of our desired categories. Thus, we had to develop some decision rules and make judgments in order to apportion budgets into our various categories. For example, for programs that states identified as potentially supporting both EE and RE projects, we classified the entire proposed budget for the program in the “energy

efficiency” category if the SEO did not provide a breakdown by technology (renewable or energy efficiency or both) and if based on our research, the majority of projects funded are EE. Conversely, if we verify that the majority of a program’s funding is going to renewable energy projects, we classify the entire program budget into the renewable category if state energy offices do not provide a breakdown by technology. In cases where we can not verify project activity by technology (e.g., energy efficiency and/or renewable projects), we classify program budgets into the energy efficiency category. Thus, our disaggregation of SEP budgets by category may suggest somewhat more EE project activity than was actually funded.²⁰

State Energy Program (SEP) Budgets

The SEP plans include grants, rebates, revolving loan funds, loan loss reserve funds, and direct funding or services provided by the state energy office or other designated agency. Taking a look at SEP program budgets for the 50 states, five territories and the District of Columbia on a regional basis, we observe that across all regions, the majority of funding is allocated toward energy efficiency: 51% of SEP funds in the South, 54% in the Northeast, 48% in the Midwest, 66% in the West and 49% in the territories. We also observe regional trends in regard to the proportion of investment for renewable energy: 43% of SEP funds in the Northeast, 35% in the South, 27% in the Midwest, 20% in the Western states and 41% in the territories (see Figure 2).

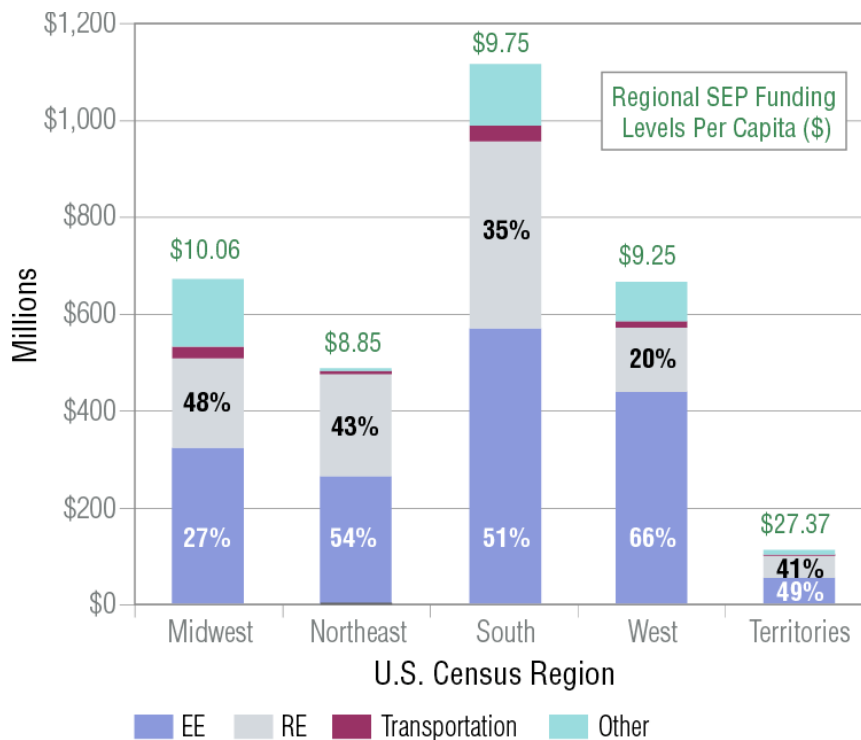


Figure 2. ARRA State Energy Program budgets by region

²⁰ We took this approach because for states that offered programs that would provide incentives for both energy efficiency and/or renewable energy projects, we found that most states typically award or have allocated a majority of funding for energy efficiency projects based on our research.

Energy Efficiency in Buildings

We also categorize energy efficiency funding into two main areas: direct funding, financing or assistance for energy efficiency measures and equipment installations in buildings, which comprises about 92% of SEP energy efficiency activity, and cross-cutting energy efficiency activities (e.g., energy codes development or enforcement, energy efficiency workforce development, education and outreach). SEP programs targeting energy efficiency in buildings include grants, rebates, loan programs and direct funding and comprise about 54% of the total national ARRA budget for SEP (\$3.06 billion). When we disaggregate SEP energy efficiency budgets by market segment, we find that about half of this ~\$1.5B is allocated to programs specifically for retrofits of public buildings. These projects, often called “lead-by-example,” are within the control of the SEOs and are “shovel-ready.” In many cases, those retrofits are allocated for projects that had been previously identified through energy audits as part of work managed by state energy offices prior to the Recovery Act. State energy offices reported that ARRA represented an unprecedented opportunity to do significant public infrastructure retrofits – from lighting to more comprehensive building retrofits – that would otherwise not have occurred. These improvements will result in long-term energy savings that will reduce energy costs for cash-strapped local governments.

ARRA SEP funds are also allowing many states to boost commercial and industrial-sector energy efficiency by funding individual measures and portions of large projects not served by existing utility customer-funded programs. Some multiple sector programs are open to the full spectrum of C/I customers (i.e., small commercial, large commercial, industrial, nonprofit and public/institutional buildings) while others are offered across all sectors (i.e., residential, commercial, institutional) [see Figure 3].

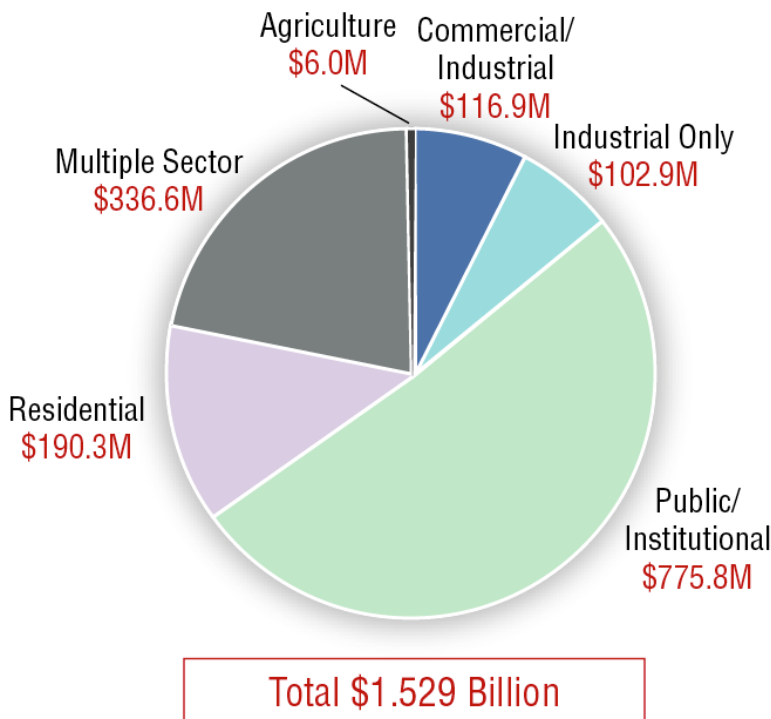


Figure 3. SEP funding for building energy efficiency by market sector

Public Sector Energy Efficiency

Thirty-six states have created programs that specifically target energy efficiency and technical assistance in public buildings (i.e., state and municipal facilities, colleges and K-12 schools), including energy efficiency programs that target multiple market sectors, including public/institutional facilities. Eight states chose not to create any SEP ARRA programs that support retrofits in public sector markets.

Many of the public sector energy efficiency programs are continuations of existing SEP programs and apply ARRA funds to address a backlog of previously identified and/or shovel-ready projects at state, municipal or educational facilities. Some states (e.g., Alaska, Colorado) are using funds to provide additional staff for technical assistance or other support for expanding or accelerating existing state facility project pipelines.

Development of the Clean Tech Manufacturing Sector

Fifteen states are funding programs that provide grants or loans (including 6 revolving loan programs) to increase availability of clean technology components and strengthen the state's manufacturing base by supporting development and diversification (e.g., retooling) of the state's businesses into the energy efficiency and renewable energy manufacturing and services sector. Six states are in the South (FL, GA, MD, NC, SC, VA), six are in the Midwest (IL, IN, MI, MN, OH, WI) and three are in the West (CO, ID, NV).

Financing Programs – Revolving Loan Funds

About 35 states have created new revolving loan funds (RLF) or augmented existing RLF to finance energy efficiency and renewable energy projects across all sectors. In aggregate, over \$650 million of SEP funding has been budgeted for revolving loan funds (see Figure 4).²¹ State energy offices typically implement revolving loan fund programs utilizing third party program implementers, or through partnership with existing organizations (e.g., the state's housing finance agency). Most revolving loan funds for energy projects are designed to be used in conjunction with other ARRA grants and rebates and/or financial incentives offered in utility customer-funded energy efficiency programs.

Among this group of states, six states have established revolving loan funds which support development of the clean tech manufacturing and services sector, as mentioned above. At least one of the programs is seeding a loan loss reserve fund (Colorado) with the intention of leveraging private financing to develop large self-sustaining loan programs. Wisconsin allocated its entire SEP budget into three revolving loan programs, all of which support either energy efficiency upgrades or development in the clean manufacturing sector. The final number of loan programs funded by SEP may ultimately be different from the number stated here, as several

²¹ The bulk of these funds are typically included as part of the overall budget for buildings energy efficiency, while some programs also fund renewable energy projects and some are slated for clean tech sector economic development

states' loan and other financing mechanisms were still evolving as of September 2010 (see Figure 4).²²

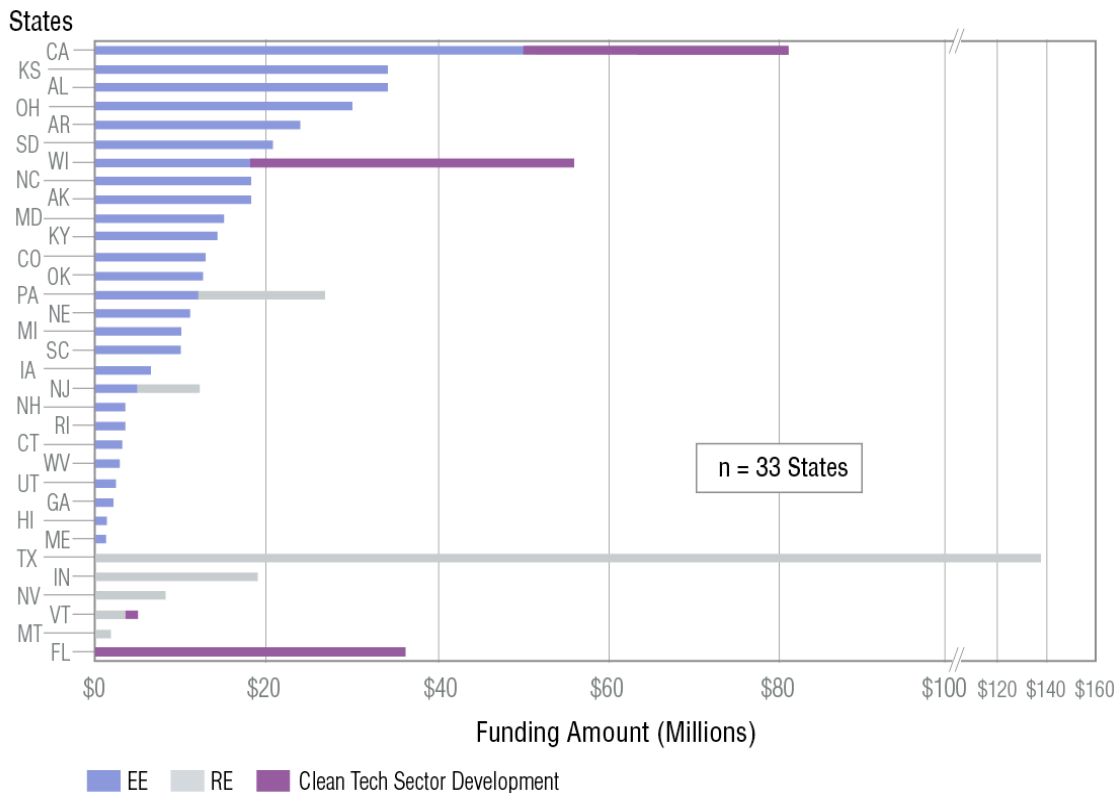


Figure 4. State Energy Program Revolving Loan Fund Programs funded under ARRA
 *EE totals for AL, CO, MD, OH and PA include programs that fund both EE and RE projects.

Workforce Development

Approximately 18 states created energy efficiency and/or renewable energy workforce development programs with SEP funds. In aggregate, SEP program funding for workforce development under ARRA is about \$54.5 million. Many of these programs involve partnerships with entities including other state agencies, community colleges, industry, labor, utilities and workforce development boards. Activities include contractor training in residential energy audits and retrofits, scholarships for RESNET training, development of new Centers of Excellence (AR, MS), funding of equipment used in energy audits (e.g., blower doors, duct blasters) for training programs or for newly certified auditors, and energy efficiency education for architects and engineers (see Figure 5).²³

²² See section 7 for additional discussion of the potential impacts of financing programs.

²³ See Section 7 for additional discussion of potential long-term impacts of these workforce development programs.

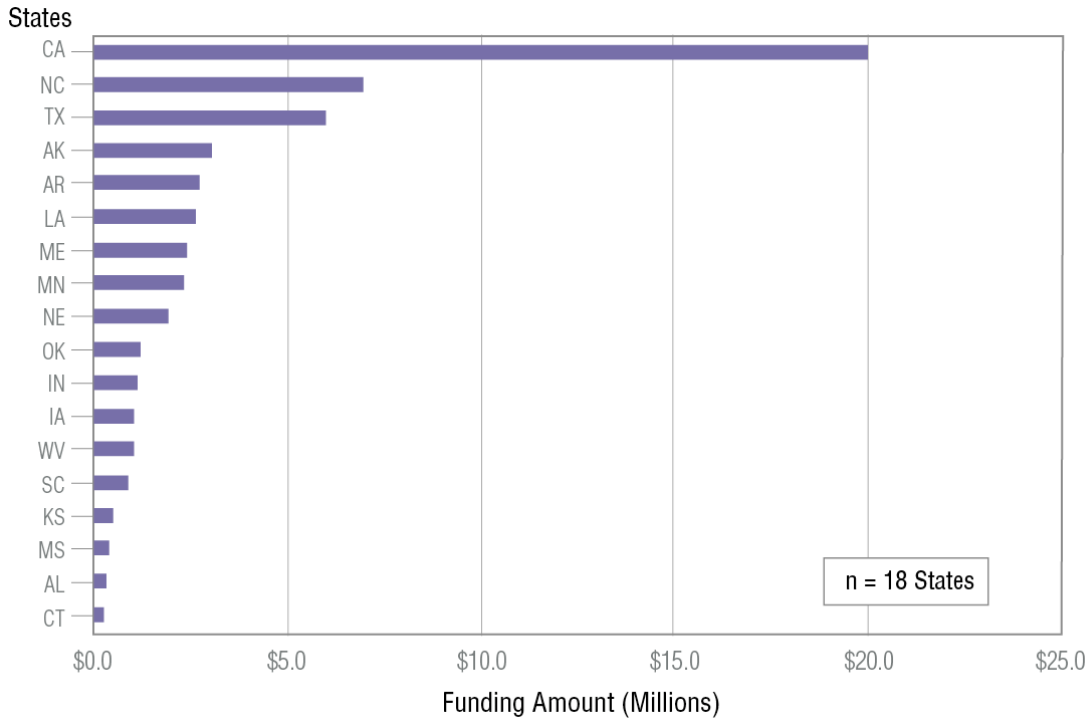


Figure 5. State Energy Program budgets for workforce development activities under ARRA

Renewable Energy

We estimate that 37 states created programs that fund renewable energy projects through grants, rebates or loans. Supported renewable technologies include PV, wind installations, wind study projects, solar thermal/hot water, hydro, waste-to-energy/biomass, landfill/biogas and geothermal energy. Thirty-eight states created programs that support both energy efficiency and renewable energy measures for public buildings and three states created programs solely for renewable energy projects in the public sector. At least three states (Illinois, Nevada, and New York) proposed programs for large-scale or utility-scale renewable energy projects.

Building Energy Codes

In response to requirements of the Recovery Act legislation (DOE 2009 p. 26), the governors of all 50 states have signed assurances that they would take action, within the authority of the governor’s office, to ensure implementation of the 2009 International Energy Conservation Code (IECC) or equivalent for residential buildings, and ANSI/ASHRAE/IESNA Standard 90.1-2007 for commercial buildings (U.S. DOE 2009). As part of complying with ARRA provisions, state governors also need to indicate that they will implement plans to achieve 90% compliance with the new codes by 2017.²⁴

²⁴ As of October 2010, 16 states have adopted Standard 90.1-2007 for commercial buildings and 12 states have adopted the 2009 IECC for residential buildings (BCAP 2010).

Sixteen states are spending a total of \$17M of their SEP funds to support energy codes development and enforcement, including analysis of codes and code conflicts, technical assistance and outreach, workshops on the benefits of energy codes, and training of local building inspection officers; two other states (New Mexico and North Carolina) are spending an undetermined amount on building energy codes as part of their portfolio of programs, but separate budgets are not available. Several of these states have proposed to use SEP program funds to support development and adoption of new codes. One state (New Hampshire) is specifically applying SEP funds to develop a plan to achieve the requisite 90% new code compliance by 2017.

Other Activities

Three states (Colorado, Kansas, Kentucky), funded programs to support the state energy office's work with utilities, including renewable resource integration, transmission planning, utility rate design, and smart grid development. At least three states are using SEP funding to provide technical assistance to local communities' efforts to create energy management or climate action plans.

4.3 Energy Efficiency and Conservation Block Grants (EECBG)

The Energy Efficiency and Conservation Block Grants program (EECBG) was authorized by the Energy Independence and Security Act (EISA) in 2007 and funded for the first time by the American Recovery and Reinvestment Act of 2009. EECBG was modeled after the long-running Community Development Block Grant program administered by the U.S. Department of Housing and Urban Development (HUD), which provides formula grants to entitled cities and counties over a certain size. The EECBG formula grants provide direct federal funding to over 2,200 U.S. states, counties, cities and tribal communities for developing and implementing energy efficiency and conservation programs to reduce total energy use and fossil fuel emissions, improve energy efficiency in building, transportation and other sectors, and to create and retain jobs. This is the first time for many state energy offices to create grant programs for the 60% of their EECBG funds that they are required to pass through to the smaller non-entitlement communities.

EECBG formula grants are divided among "entitlement" and "non-entitlement" entities:

- "Entitlement" communities are the over 2,200 states, U.S. territories, counties and cities with populations of more than 35,000 (based on 2007 U.S. Census figures) as well as all federally-recognized Indian tribes and Alaska regional corporations that receive EECBG formula grants directly from DOE; and
- "Non-entitlement" entities are communities with a population of less than 35,000 that received funds that were sub-granted through state energy offices. State energy offices were required to pass through at least 60% of their EECBG entitlement funds to non-entitlement communities, although state energy office had some discretion in deciding which eligible activities to target and how to award funding to non-entitlement communities.

DOE guidance for EECBG lists 13 specific eligible activities:

- Developing/implementing energy efficiency and conservation strategy;

- Retaining technical consultant services for strategy development;
- Conducting residential and commercial building and energy audits;
- Establishing financial incentive programs for energy efficiency improvements (e.g., rebates, loan programs, waiving permit fees);
- Grants to non-profit organizations to perform energy efficiency retrofits;
- Transportation energy efficiency programs;
- Developing and implementing building codes and inspection services to promote building energy efficiency;
- Implementing energy distribution technologies;
- Public education programs;
- Purchasing or implementing technologies to reduce and capture methane and other greenhouse gasses generated by landfill or similar sources;
- Installing LEDs;
- Developing, implementing and installing onsite renewable energy generation in or on government buildings; and
- Any other activity that meets program goals as determined by the Secretary of Energy in consultation with the Secretaries of Transportation, the Environmental Protection Agency and Housing and Urban Development.

\$2.73 billion in EECBG formula grants were allocated directly to more than 2,200 entitlement communities -- states, counties, cities, towns and tribes. Of this amount, about \$767 million is administered by state energy offices, at least 60% of which must be re-granted to “non-entitlement” communities.

State energy offices typically distributed the pass-through funds to non-entitlement communities through competitive grants. Some state energy offices specified certain uses for these re-granted funds (e.g., public building retrofits in many cases), while other states indicated that re-granted funds were available for any of the 13 eligible activities in the EECBG legislation. Some state energy offices required that local communities provide matching funds in their re-granting process. In other cases, EECBG grants funded up to 100% of project costs in public buildings in particularly economically challenged communities. Some states worked with non-entitlement communities in partnership. For example, the Colorado SEO provided matching funds and extensive technical assistance to develop and administer new local energy efficiency programs.

Most of the funds that states were not required to re-grant went to energy efficiency and renewable energy projects in public buildings (e.g., “Lead-by-example” projects in local municipal and other government buildings, schools, community colleges), with some funds also going to the full range of eligible activities including transportation, behavioral energy efficiency programs, renewable energy feasibility studies, workforce development and more.

In addition, the competitive portion of EECBG, known as the BetterBuildings program, awarded \$454 million in competitive grants to 35 regional and collaborative entities.

4.4 State Energy Efficient Appliance Rebate Program (SEEARP)

The DOE allocated \$300 million of ARRA funds to states and territories to provide rebates directly to residential consumers for the purchase of ENERGY STAR® qualified appliances to

replace used equipment. States had flexibility in regard to rebate levels, the types of qualifying equipment and their process for disseminating rebates; these program design elements impacted the programs' interactions with utility customer-funded energy efficiency programs. Eligible equipment included air conditioning, heat pumps, furnaces (oil and gas), water heaters and so-called "white goods" (e.g., clothes washers, dishwashers, refrigerators, freezers). State energy offices developed program designs that ranged from providing incentives for only 4 appliances to 10 or more appliances.

Overall, state energy offices states were able to get SEEARP up and running relatively quickly compared to SEP and EEBCG. Most states launched the program in spring of 2010. The bulk of the SEEARP funds were released at once and the SEEARP was relatively straightforward to administer with fewer restrictions and requirements than SEP and EEBCG (e.g., Davis-Bacon wage laws, environmental compliance). For many states, SEEARP was the first Recovery Act energy efficiency program to roll out and offers an early look at interactions between ARRA and utility customer-funded programs, as well as consumer reaction.

Not surprisingly, state energy offices chose varying approaches to designing their appliance efficiency rebate programs. Rebate levels varied significantly, from quite modest (\$25 for a dishwasher in Maine, \$50 for a refrigerator in Colorado) to generous (\$300 for a high-efficiency dishwasher and \$500 for a refrigerator in Alaska, \$700 for a high-efficiency refrigerator in Kansas). Rebate funds were fully reserved in less than 24 hours in some states (e.g., Arizona, Minnesota, Massachusetts, Texas), while programs in some states have lasted several months and are still underway, experiencing steady or somewhat modest uptake (NASEO 2010). Rebate levels and speed of uptake may have had a moderate to significant impact on utility customer-funded energy efficiency programs.

Some states designed appliance programs specifically to complement utility programs by targeting equipment and/or populations that were generally not served by existing utility customer-funded electric efficiency programs. For example, in Maine, SEEARP funds focused almost exclusively on gas and oil heating equipment which is used by nearly all households in the state, but which is not served by existing electric efficiency programs. Alternatively, many states intentionally allowed and even encouraged consumers to combine ARRA and utility customer-funded rebates to offset a higher portion of the cost of new appliances.

In order to ensure that new appliances were actually replacing old ones and producing energy savings, appliance efficiency programs in many states offered additional rebates for recycling of the old equipment or required customers to show proof that the old equipment had been recycled in order to receive their rebate. In Minnesota, the state energy office and utilities worked together to get new utility recycling programs launched earlier than originally planned in order to coincide with the ARRA program.

5. Case Study States: Overview of Energy Efficiency Policies and Programs

In this section, we provide an overview of energy efficiency policies and programs in the 12 states for which we conducted case studies: California, Colorado, Florida, Hawaii, Massachusetts, Maine, Michigan, Minnesota, North Carolina, New York, Oregon and Wisconsin. For each state, we discuss key energy efficiency policy drivers, review administrative models and budgets by market sector for utility customer-funded EE programs and summarize programs that state energy offices proposed with ARRA funds. Background information in this section provides context for our comparative review and analysis of ARRA- and utility customer-funded programs in the 12 case study states in which we examine the types of interactions and level of coordination between program administrators (see section 6).

5.1 Utility customer-funded Energy Efficiency Programs

Table 3 provides information on the 2010 budgets for energy efficiency programs funded by electric and gas utility customers in the 12 case study states and estimates energy efficiency program budgets as a percent of retail sales and per capita spending. Efficiency budgets are also disaggregated and reported by market sector as a percent of total budget. We also indicate the entity that is responsible for administration of these energy efficiency programs and whether the administrator is eligible for performance incentives.

Table 3. Overview of utility customer-funded energy efficiency programs in the 12 case study states

| State | Program Administrator | Administrator Performance Incentives | Utility Customer-funded Energy Efficiency Budget | | | 2010 Gas & Electric Energy Efficiency Budget (% of EE portfolio budget) | | | |
|-------|--|--------------------------------------|--|--|--|---|-------------------------|---------|------------|
| | | | 2010 Electric and Gas Program Budget Total (\$ million) [†] | 2010 Electric and Gas Program Budget Per Capita ^{††} (\$) | 2009 Electric Program Budget as % of 2009 Electric Retail Sales Revenue* | Residential | Commercial & Industrial | Other** | Low-Income |
| CA | Utilities | Yes | \$1,497 | \$40.18 | 2.9% | 21% | 41% | 16% | 21% |
| CO | Utilities | Yes | \$83 | \$16.52 | 1.1% | 33% | 50% | 8% | 9% |
| FL | Utilities | No | \$130 | \$6.90 | 0.5% | 52% | 23% | 22% | 2% |
| HI | Third Party | Yes | \$19 | \$14.19 | 1.7% | 45% | 47% | 6% | 2% |
| MA | Utilities | Yes | \$357 | \$54.54 | 2.1% | 38% | 48% | 0% | 14% |
| ME | Third Party | No | \$15 | \$10.99 | 1.4% | 17% | 49% | 16% | 18% |
| MI | Utilities | No | \$103 | \$10.42 | 0.5% | 26% | 20% | 42% | 12% |
| MN | Utilities | Yes | \$130 | \$24.55 | 1.1% | 31% | 54% | 9% | 6% |
| NC | Utilities | Yes | \$47 | \$4.88 | 0.6% | 40% | 35% | 15% | 10% |
| NY | Third Party and utilities with separate SBCs | Yes, utilities only | \$671 | \$34.64 | 1.8% | 24% | 61% | 8% | 8% |
| OR | Third Party and some local utility programs | No | \$118 | \$30.88 | 2.4% | 37% | 58% | 3% | 3% |
| WI | Third Party and some local utility programs | Yes, third party only | \$157 | \$27.62 | 1.6% | 18% | 30% | 21% | 30% |
| Total | | | \$3,327 | | | | | | |

[†] Source: Caracino, J. and M. Nevius. 2010. "State of the Efficiency Program Industry: 2009 Expenditures Impacts & 2010 Budgets." December. Boston MA: Consortium for Energy Efficiency. http://www.cee1.org/files/2010_State_of_the_Efficiency_Program_Industry.pdf

^{††} Source: U.S. Census Bureau, Population Division: Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01)

* Source: U.S. Energy Information Administration. 2010. State Historical Tables for 2009. http://www.eia.doe.gov/cneaf/electricity/epa/revenue_state.xls.

** "Other" includes items not allocated by sector, e.g. administration, planning, codes, R&D, education and training, agriculture; can also include program budgets and EM&V not allocable by sector.

Utility customer-funded energy efficiency programs are administered by utilities in seven states, by third party administrators (e.g. non-profit or for-profit corporations) in three states (OR, HI, WI), and state energy agencies in two states (NY, ME).

Utility customer-funded energy efficiency programs in these 12 states are shaped by various policy drivers that have a significant impact on funding levels, savings targets and programmatic objectives, which in turn influence the mix and design of programs. Some states have long standing utility customer-funded efficiency programs and others have recently ramped up their programs. For example, per capita 2010 budgets for energy efficiency range between \$11-40 per person in nine states, while budgets range from just under \$5 to just over \$10 per person in 3 states (NC, FL, and MI) where utilities are ramping up their programs.

Seven of the 12 case study states have enacted Energy Efficiency Resource Standards (EERS), either through state legislation or regulatory action. In Hawaii and North Carolina utilities can use energy efficiency savings to meet a portion of their Renewable Portfolio Standards (RPS) obligations. Nine of the 12 states also have requirements for utilities to complete an Integrated Resource Plan (IRP) or a Demand Side Management (DSM) plan that describes utility customer-funded programs. Utilities in Massachusetts and Maine are also members of ISO-NE which has a forward capacity market in which energy efficiency resources are eligible to participate and can be compensated for load reductions during peak periods. Michigan and North Carolina have small areas that fall within the PJM RTO and can take part in the Reliability Pricing Model (RPM) forward capacity auction.

These policy drivers have a significant impact on incentives (both “carrots and sticks”) faced by administrators of utility customer-funded energy efficiency programs and may influence their interest in coordinating and interacting with state energy offices administering Recovery Act programs.

Across the 12 states, utility customer-funded energy efficiency programs allocated about 46% of the total budget to the commercial and industrial sector and 41% to residential programs, including low-income programs that account for 15% of total funding (see Figure 6).²⁵

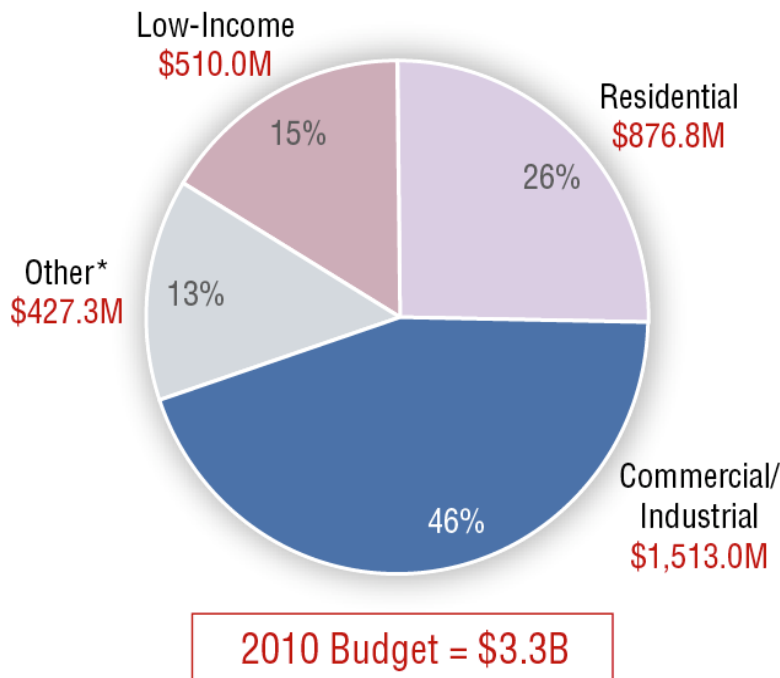


Figure 6. 2010 budget for utility customer-funded energy efficiency programs: 12 case study states

* "Other" includes items not allocated by sector, e.g. administration, planning, codes, R&D, education and training, agriculture; can also include program budgets and EM&V not allocable by sector.

²⁵ Our rationale for excluding low-income energy efficiency programs in our comparative review of ARRA programs is described in section 2.

5.2 ARRA-funded State Energy Efficiency Programs

The massive influx of ARRA funds was a “game changer” for state energy offices that historically were used to administering their state energy program with a limited amount of funds because the overall DOE budget for the State Energy Program has been in the ~\$30 to \$50 million range. ARRA funds administered by state energy offices in the 12 case study states for the SEP, EEBCG²⁶, and SEEARP total about \$1.3 billion, which is about 32% of the national total for these programs.²⁷ Figure 7 provides a breakdown by market sector (public sector, C/I, residential) and programmatic area (e.g., renewable energy, clean tech sector development) of ARRA funding administered by state energy offices in the 12 states.²⁸

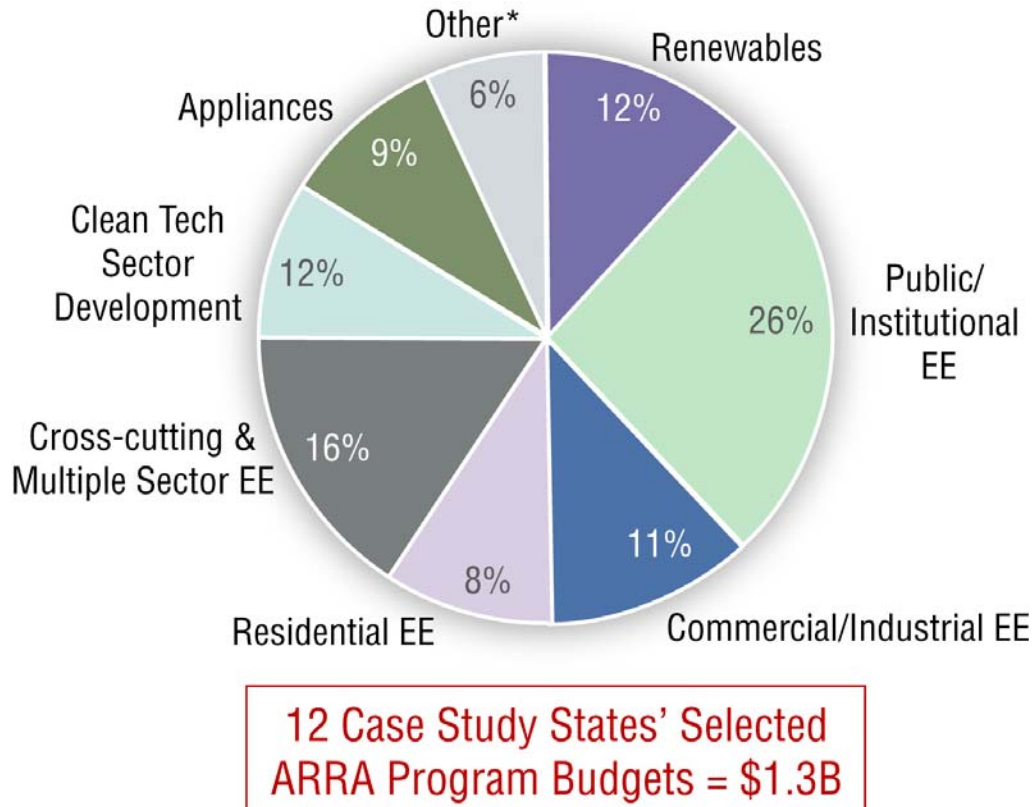


Figure 7. State energy office budgets for selected ARRA programs in 12 case study states

* “Other includes items not allocated by market sector (e.g., administration, evaluation, planning, transportation).

70% of the approximately \$1.3 billion administered by state energy offices in the 12 case study states is targeted to various energy efficiency programs: 26% of the total (~\$330M) to public buildings, 8% for residential energy efficiency programs, and 9% to appliance/equipment efficiency programs. Another 12% of the Recovery Act funding went towards renewable energy projects.

²⁶ Only includes funding directly administered by the state energy office, does not include BetterBuildings grants.

²⁷ For a complete discussion on the selected SEO-administered ARRA funds, see Chapter 4.

²⁸ To provide a relatively direct comparison with ratepayer-funded programs, we disaggregated renewable energy, transportation and other programs from other energy efficiency programs, which were then broken out by market sector (residential, commercial & industrial, public/institutional, multi-sector and cross-cutting programs).

Table 4 provides a more detailed programmatic breakdown for each state energy office (SEO).

Table 4. Selected ARRA funds administered by state energy offices: SEP, state-administered EECBG and SEEARP

| State | State Energy Office (Program Administrator) | Selected ARRA Funding ** (million \$) | Breakdown of ARRA Funding (% Program Funding) | | | | | | | |
|-------|--|---------------------------------------|---|-------------------|-------------------------|-------------|--------------------------------------|-------------------------------|------------|-------|
| | | | Renewables | Energy Efficiency | | | | Clean Tech Sector Development | Appliances | Other |
| | | | | Public Buildings | Commercial & Industrial | Residential | Cross-cutting and Multiple Sector EE | | | |
| CA | California Energy Commission (CEC) | \$ 310.9 | 0% | 22% | 10% | 15% | 23% | 11% | 11% | 8% |
| CO | Governor's Energy Office (GEO) | \$ 63.2 | 19% | 1% | 17% | 11% | 23% | 0% | 7% | 21% |
| FL | Florida Energy & Climate Commission (FECC) | \$ 172.3 | 22% | 0% | 22% | 5% | 18% | 21% | 10% | 3% |
| HI | Department of Business, Economic Development and Tourism (DBEDT) | \$ 36.9 | 28% | 11% | 1% | 13% | 22% | 0% | 3% | 22% |
| MA | Massachusetts Department of Energy Resources (DOER) | \$ 75.9 | 32% | 28% | 0% | 0% | 30% | 0% | 8% | 1% |
| ME | Efficiency Maine Trust | \$ 37.8 | 6% | 0% | 33% | 24% | 25% | 0% | 3% | 9% |
| MI | Department of Energy, Labor and Economic Growth | \$ 111.2 | 4% | 47% | 0% | 0% | 10% | 27% | 9% | 3% |
| MN | Minnesota Office of Energy Security (OES) | \$ 69.7 | 17% | 32% | 16% | 15% | 3% | 6% | 7% | 3% |
| NC | North Carolina State Energy Office (SEO) | \$ 103.3 | 6% | 22% | 13% | 6% | 22% | 10% | 9% | 13% |
| NY | New York State Energy Research and Development Authority (NYSERDA) | \$ 171.7 | 18% | 62% | 0% | 0% | 6% | 0% | 11% | 3% |
| OR | Oregon Department of Energy (ODOE) | \$ 50.1 | 30% | 44% | 11% | 8% | 0% | 0% | 7% | 0% |
| WI | Governor's Office of Energy Independence (OEI) | \$ 72.6 | 0% | 16% | 25% | 0% | 0% | 49% | 7% | 2% |
| | Totals* | \$ 1,275.6 | 12% | 26% | 11% | 8% | 16% | 12% | 9% | 6% |

* Total percentage is weighted by dollars.

** Only includes SEP, EECBG formula grants and Appliance funds administered by SEOs; excludes BetterBuildings grants.

Seven state energy offices budgeted ~18% or more of their total ARRA funds for renewable energy projects, with Massachusetts designating 34% of their funding for renewable energy. Their approach is quite different from other states that allocated more of their ARRA funds to energy efficiency programs and/or clean tech development.

Michigan and New York targeted a significant amount of their ARRA funding towards public buildings (47% and 62% respectively). California, Massachusetts, and Minnesota targeted more than 20% of their total ARRA funds to energy efficiency in public buildings while three other states allocated between 11-16% of total funds to this sector. Relative to their overall contribution to national energy use (1.4%) many states have allocated a disproportionate amount of their ARRA funds to the public/institutional market sector.²⁹ However, the ARRA focus on “shovel-ready” projects made these projects a natural choice, given the important role that lead-by-example programs play at the state level.

Residential energy efficiency programs in the case study states ranged from beefing up existing programs (Maine, Florida) to creating new programs like Michigan Saves, a one-stop shop for

²⁹ The Energy Information Administration (EIA) 2003 Commercial Buildings Energy Consumption Survey (CBECS) estimates that public building energy usage in the nation is 1.3 quads BTU annually. This represents approximately 23% of the commercial building use and approximately 1.4% of the national consumption.

residential energy efficiency upgrades. The SEEARP funding went primarily to Energy Star appliance rebates and several states targeted equipment (e.g., oil heated equipment) that are generally not covered by utility customer-funded electric efficiency programs.

State energy offices in Wisconsin, Maine, Florida and California allocated between 21-33% of their total funds to their commercial and industrial sector energy efficiency programs, while four other states budgeted between 5 and 18% of total ARRA funds in this sector. Massachusetts (30%) and Maine (25%) both spent a fairly large portion of their state energy office program budgets on multi-sector and cross-cutting efficiency programs.

Four state energy offices (Florida, Michigan, North Carolina, and Wisconsin) developed clean technology sector programs. These programs ranged from creating revolving loan funds for industry to retool their equipment to make clean tech products (WI) to creating programs like the Florida Opportunity Fund, a not-for-profit organization that provides leveraged funds to help emerging businesses in the state.

5.3 Comparing ARRA budgets for selected energy efficiency programs with utility customer program budgets

To get a sense of the relative magnitude of selected energy efficiency programs administered by SEOs compared to utility programs, we show the multi-year budgets for selected ARRA EE programs compared to the 2010 budget for utility customer-funded energy efficiency programs for the 12 case study states.³⁰ We observe that ARRA program funds that will be expended over three years range from about 22% to over 250% of the 2010 budget for utility customer-funded energy efficiency programs (see Table 5).

Nine of the states' single-year utility customer-funded budgets exceed multi-year funding for the selected ARRA programs. California, Massachusetts, Oregon and Wisconsin have particularly high levels of utility customer funding as compared to the selected ARRA program funds. For three states (NC, ME, and HI; see Table 5), ARRA funds for selected energy efficiency program exceed the 2010 budgets for programs funded by utility customers. Energy efficiency programs funded by utility customers in North Carolina and Hawaii are ramping up, driven in part by enabling legislation (e.g., EERS in HI, NC); budgets are expected to increase significantly over the next several years.

³⁰ Ideally, we would have compared 3 years of ARRA funding to three years of utility-customer funded budgets (2010-2012), but budgets for these years were not available for all twelve case study states. For comparison purposes to the selected ARRA programs, which exclude low-income weatherization, we also exclude low-income programs from the utility customer-funded data.

Table 5. Program budgets for selected ARRA EE programs and programs funded by utility customers

| State | Selected ARRA EE program budgets (2009-2012)* (\$ millions) | 2010 utility customer-funded EE program budgets** (\$ millions) | Selected ARRA EE budget as a percentage of one year of utility customer-funded EE |
|--------------|--|--|---|
| CA | \$250.7 | \$1,176.3 | 21.31% |
| CO | \$37.9 | \$75.8 | 50% |
| FL | \$94.49 | \$126.7 | 75% |
| HI | \$18.6 | \$18.9 | 98% |
| MA | \$50.4 | \$306.5 | 16% |
| ME | \$32.7 | \$12.0 | 272% |
| MI | \$72.9 | \$90.8 | 80% |
| MN | \$51.3 | \$122.9 | 42% |
| NC | \$73.5 | \$42.0 | 175% |
| NY | \$136.1 | \$620.8 | 22% |
| OR | \$35.0 | \$114.9 | 30% |
| WI | \$35.1 | \$109.5 | 32% |
| Total | \$888.6 | \$2,817.1 | 31.54% |

* Selected ARRA programs are: SEP, State Energy Efficient Appliance Rebates and EECBG funds administered by the state energy offices or their designees; excludes BetterBuildings grants. "EE budgets" from selected ARRA programs are comprised of programs involving implementation of EE in buildings and cross-cutting activities (e.g., energy codes, workforce development) as well as programs that provide funding for both renewable energy and energy efficiency projects and equipment that could not be disaggregated (see Table 4; Energy Efficiency and Appliances columns).

** Utility customer-funded budget data excludes low-income weatherization and load management programs.

6. Observations on ARRA and Utility Customer-funded Program Interactions and Implications for Managing Mixed Funding Sources for Energy Efficiency

States met the Recovery Act's imperatives – create jobs, foster a cleaner economy, and do it fast – in ways that defy easy labels. One reason is that states also confronted demands closer to home: legislative mandates, state energy policy objectives and vocal constituencies seeking technical and financial assistance to mitigate impacts of the economic recession (e.g., manufacturers, agricultural producers, retailers, educational institutions, local governments, hospitals, and nonprofits). Those seeking support included state government itself; 49 states were running budget deficits in state fiscal year 2010,³¹ and at least two-thirds of states were running deficits when the Recovery Act was passed.

Previously, state energy offices (SEOs) have not had funding on the scale of the Recovery Act grants. From 2008 to 2009, federal allocations for SEOs grew more than 30 fold on average with funding from ARRA. The grants provided an opportunity to devise their own solutions to energy and economic challenges. In most cases, states weighed trade-offs between autonomy, economic development and the realization of executive vision against opportunities for leveraging more resources and savings by working with utility customer program administrators. In practice, state energy officials made some decisions in isolation and others with varying degrees of consultation, coordination, and collaboration.

The Recovery Act's use-it-or-lose-it mandate alone tended to drive recipients toward certain common and expedient choices of markets and instruments for investment. But across states, no single set of circumstances fully explains the decisions that states made regarding interactions and coordination with existing utility customer-funded efficiency programs. Rather, those decisions turned on many factors: the size and history of utility customer-funded programs, institutional capacity of state energy offices, the type of entity that administers utility customer-funded energy efficiency programs (e.g., utility, state agency, non-profit or for-profit third party firm), and historic relationships among agencies.

The number and influence of those factors varied widely, and states tended to be more idiosyncratic than uniform in their decisions. We nonetheless see patterns in states' investment choices and how they arrived at those choices. We also offer insights into the interactions among new and existing efficiency programs and – preliminarily – what might be expected from those interactions.

6.1 Observations

6.1.1 Strategies and Choices in Portfolio Planning for ARRA Efficiency Programs

Speed and Focus vs. Spreading Investments over Multiple Sectors and Tools

States handled the influx of ARRA funding as individual investors might. A few states put all their money in two or three programs. These narrower portfolios often reflected a desire for expediency, safety and focus, as discussed in greater detail below. However, the majority of our case study states spread their investments over more purposes, instruments, and constituencies.

³¹ Personal communication Nov. 11, 2010, with Arturo Perez, National Conference of State Legislatures.

Often, state energy officials tried new ventures or markets in these broader portfolios then hedged those risks with surer bets. Portfolio diversity also tended to be richer in states that coordinated with utility customer programs. Broader portfolios enabled a dual track: coordinated utility customer and ARRA programs on one hand and more autonomous, state-only endeavors on the other (see Table 6).

Table 6. Typology of SEP program diversity in case study states³²

| High Diversity: Risk, Hedging & Broad Impact | Low Diversity: Focus, Speed |
|---|-----------------------------|
| CA, CO, FL, HI, ME, NC, MN, NY, OR | MA, WI, MI |

Safety, Speed, and Longevity in Common Portfolios and Mechanisms

Faced with constituent demands and federal deadlines, states moved toward programs and tools that could commit funds rapidly but were safe investments. Historically, state energy offices have been concerned with energy use in government buildings and have supported programs that target public/institutional sector buildings and “lead by example.” They were well attuned to backlogs in the maintenance and renovation of public-sector buildings. The SEOs quickly lined up “shovel-ready” energy improvements in public/institutional facilities. These ranged from town halls and ball field lighting to state capitals, jails and streetlights, most commonly involving more efficient lighting and HVAC replacements but also major retrofits and renewable generation.

The leading mechanism for these investments was grants to state entities and local governments, by formula, solicitation or competition. For state facilities and local governments, state energy officials also turned to revolving loan funds (RLFs). A number of states already had RLFs before the Recovery Act was passed, so many of those states simply added ARRA dollars to their existing loan pools. Given this track record, other states could adopt their designs and set up and fund new RLFs relatively easily. RLFs potentially provide longevity and flexibility. Designed and managed properly, a revolving loan fund can last indefinitely. Once the full RLF balance is loaned out, which is required by the end of March 2012, states can reprogram the money for any ARRA-defined purpose. Those purposes are at least as broad as the traditional missions of the SEOs. In section 7, we explore opportunities and issues associated with revolving loan funds in more detail.

Reinvigorating and Retooling Industry for a Clean Tech Economy

States that have lost significant manufacturing tended to invest a significant share of SEP money into RLFs for lending to makers of energy efficiency or renewable energy products or components to revitalize industry and encourage manufacturers into “clean tech” (CA, CO, MI, MN, WI). In several cases, detailed design and award of these funds was delegated to state

³² In this typology, our threshold criteria were diversity of markets served (e.g., industrial sector only vs. all customer classes).

commerce departments or other agencies with a primary mission of economic development. In this way, states ensured that some of their ARRA funding satisfied the twin objectives of the Recovery Act: retaining and creating jobs and investing in clean energy.

For example, Wisconsin put most of its SEP dollars into an industrial RLF aimed at clean tech, with a number of agribusiness recipients. A large goat-cheese maker is financing an anaerobic digester for its waste whey and water, with the methane captured to provide up to 80% of the cheese manufacturer's energy needs. Another firm is using a \$1.7 million SEP loan to build a \$7.6 million plant that turns cheese-processing byproducts into ethanol and dry yeast. One of the world's largest producers of frozen French fries and other frozen foods is borrowing \$1.1 million to finance \$2.2 million in new heat-recovery equipment.

6.1.2 Program Design and Early Implementation

Innovative Approaches and New Territory

The ARRA funds sparked innovation in energy efficiency policies and instruments. Some state energy officials carefully examined utility customer programs and designed complementary programs in workforce development, marketing and outreach that might not pass a cost-effectiveness test. Other states ventured into risky or unexplored terrain with new program types and new sector targets. In general, state energy offices kept their investments in risky or experimental areas small relative to overall ARRA program budgets. For example, a number of states used a small fraction of their ARRA funds to test new programs, emerging technologies or targeting funds to under-served geographic regions of their state. Utility customer program administrators and regulators find many of these ventures promising. If those ventures generate cost-effective savings, they will be candidates for utility customer support in several states and survive the sunset on ARRA funds.

For example, several state energy offices designed and implemented "fuel-neutral" retrofit rebate programs that target homes that heat with heating oil or kerosene. These programs promoted various high-efficiency measures and strategies (e.g. building envelope measures, high-efficiency equipment) for oil-heated homes because they were not constrained by policy guidelines and rules faced by administrators of utility customer programs (e.g. application of benefit-cost tests to savings of unregulated fuels) For example, Maine will likely use its new ARRA-funded fuel neutral program to evaluate the feasibility of implementing a new system benefit charge on heating oil to fund related building efficiency measures and help meet state goals to reduce dependency on fossil fuels. Some states also targeted programs for water savings, which can produce energy savings for water utilities and governments.

Other new and/or innovative approaches include:

- Transportation programs expanded from traditional conversions of government fleets to electric or natural gas vehicles to urban planning for higher-density or transit-centric growth;
- Targeting rural and agricultural energy consumers, as a complement to the U.S. Department of Agriculture's efficiency loans and technical assistance;

- Hawaii tackled its largest end-use sector – the hospitality industry – with an energy benchmarking program for hotels and a feasibility study of seawater air-conditioning loops;
- Two other projects in Hawaii, a consumer behavior feedback program run by OPOWER and an interest rate buy down for solar hot water heaters, have drawn the interest of regulators and the third-party administrator;
- New York is using ARRA funds to help a utility upgrade its billing systems for on-bill recovery of retrofit costs, which also would involve utility customer-funded rebates but present a new, consumer-specific source of funding as an alternative to utility customer programs in the future.

Several of those ventures could become new utility customer offerings and suggest a rich area for cooperation and coordination between administrators of energy efficiency programs at the state and local level and administrators or regulators of utility customer-funded efficiency programs.

The Spectrum of Coordination across Twelve Case Study States

State energy offices had to weigh choices regarding program autonomy vs. opportunities to leverage resources by working with administrators of utility customer-funded energy efficiency programs. Those decisions turned on many factors: the size and history of utility customer-funded programs, institutional capacity of state energy offices, the type of entity that administers utility customer-funded energy efficiency programs (e.g., utility, state agency, nonprofit or for-profit firm), and historic relationships among individuals and agencies. In practice, some state energy offices developed some of their own programs unilaterally, while other states coordinated program development with administrators of utility customer-funded energy efficiency programs, regulatory commissions, and other stakeholders.

In our 12 case study states, we observed a broad spectrum of coordination between program administrators usually, but not always, driven by the SEOs (see Table 7):

- On one end of the spectrum we observed two states in which the state energy office served a dual role as both the SEO and the administrator of utility-funded energy efficiency programs, so there was some degree of **inherent coordination** because of institutional structure alone;
- State energy offices engaged in **consultation** and communication with utility customer program administrators and exchanged information on current and planned programs but decided not to coordinate on programs and went separate ways, often because of different objectives or priorities. In some cases, this active exchange of information took the form of utility program administrators providing technical assistance to ARRA-program administrators.
- State energy offices explicitly coordinated with utility customer-program administrators and designed Recovery Act-funded programs as complements, enhancements, or extensions of utility customer programs, which we call **complementary** programs.

- State energy offices tried **full collaboration** in designing and implementing joint programs – sometimes with other local, regional and private-sector entities – by comingling and sharing funds, expertise, labor and other assets.

Table 7. Coordination approaches in SEP and EECEBG programs in 12 case study states*

| Inherent coordination | Communication or consultation on programs | Complementary programs | Full collaboration |
|-----------------------|---|--|--------------------|
| ME, NY | FL, MN, NC, NY, WI | CA, CO, FL, HI, MA, ME, MI, MN, NC, NY, OR | HI, CA, ME, MA, MN |

*Several state energy offices among our case study states utilized several coordination strategies across their portfolio of programs. Some states therefore appear in multiple categories. Table 8 summarizes coordination strategies observed for the SEEARP program.

Several states formally consulted with utility customer program administrators – affording an opportunity for exchanging information and learning – but then went their own way and developed programs that targeted similar market segments as the utility customer-funded offerings or occupied very similar programmatic space.

- The Florida SEO completed its own \$15 million residential HVAC program with extensive consultation and input from utility program managers.
- In Colorado, the SEO consulted with utility program administrators, identified places where existing modest rebates could be augmented to boost the market, and developed an independent residential appliance rebate program under SEP in which customers could combine both ARRA and utility rebates. The program implemented a rebate cap and adjusted the ARRA portion to account for varying utility rebate levels across the state so that even with combined incentives, customers would still be required to pay a certain portion of the cost.
- In Wisconsin, the state Office of Energy Independence wanted to invest in clean energy for business, particularly to gear more of the state’s manufacturing base toward a clean economy. Focus on Energy, the third-party administrator of efficiency programs for most of the state, has a robust industrial efficiency program, but economic development and the size of projects contemplated by the state energy office were beyond Focus’s charter. The Office of Energy Independence put nearly all of its SEP money into revolving loan funds for industry, administered by a state economic development agency.

Most state energy offices created one or more complementary programs and tools for enabling, extending or expanding the market reach of utility customer programs. These interactions occurred with and without formal coordination.

- The Michigan SEO did not formally coordinate with utility customer program administrators but created complementary “fuel-blind” programs that included improvements in the efficiency of oil furnaces or thermal measures for oil-heated buildings. These improvements are outside the purview of utility program administrators

because state regulators have adopted policies that avoid charging electricity and natural gas consumers for efficiency measures leading to energy savings from oil heating.

- In Colorado, the state energy office launched a statewide coordinated marketing effort called “Recharge Colorado” which is a “one-stop shop” website for residents and businesses to learn about both ARRA- and utility customer-funded rebates, other incentives, contractors, and other energy efficiency information. If tools such as Colorado’s web portal, which may not have been possible without ARRA funding and implementation by an entity with statewide reach, prove useful to utility program administrators, those tools may provide infrastructure that outlasts Recovery Act funding.
- In North Carolina, the SEO developed programs that reach into market segments not previously covered by existing utility energy efficiency programs (e.g., new construction of multifamily and manufactured housing), while other programs added incentives to new utility rebates with the aim of garnering more consumer interest.

A few states – California, Hawaii, Maine, Massachusetts, and Minnesota provide examples of complete collaboration. Full collaboration is marked by comingling or coordination on the utilization of funding sources, and development of a unified program, often with a single name or brand. Coordination is routine and sustained, and both program administrators have some say in the design and implementation of the program. Examples include:

- In Minnesota’s Trillion BTU program, the SEO delegated ARRA money to a port authority with more experience in economic development for a revolving loan fund targeting the commercial and industrial sectors. The state’s largest utility is adding rebates and engineering assistance for participants. The combined effort is intended to offset nearly all upfront costs for industrial energy efficiency projects.
- In Hawaii, the third-party utility customer program administrator has a solar hot-water heater program that is very popular but expensive for the program on a cost-per-kilowatt hour basis. The state energy office delegated ARRA funds to the program administrators at Hawaii Energy to assume the rebate costs under ARRA and buy down interest rates so that initial system cost to participants is very low.
- The Massachusetts SEO is establishing a new, ARRA-seeded loan-loss reserve fund. Utilities are supplying utility customer dollars to buy down interest rates on the loans to 0% and supplying rebates to reduce the principal offered to participants. Contractors that implement utility customer programs are promoters of the new loan program.
- In California, the public utilities commission already had directed investor-owned utilities to set up a statewide residential retrofit program. With the Recovery Act money, the state energy office was starting its own retrofit program. There was a risk of two competing residential retrofit programs – one funded by utility customers and a second by the Recovery Act – operating with redundant infrastructures and different brands. The California Energy Commission (CEC), the California Public Utilities Commission and the investor-owned utilities committed instead to a single statewide, multi-agency, multi-sector retrofit program. The CEC and several cities and counties had Recovery Act money and ideas for financing, but limited incentives and infrastructure for implementation. The local governments wanted utility partners with access to rebate delivery and processing and knowledge of energy use in their territories. The utilities saw an opportunity to outsource some outreach and workforce development functions to state

and local government but wanted to receive credit for the energy savings attributable to their efforts. The CEC and CPUC saw a large scale, comprehensive and unified retrofit program as key to achieving the state’s strategic efficiency goals of transforming energy efficiency markets into more self-sustaining enterprises.

Coordination in the SEEARP program

States also engaged in various coordination approaches in the State Energy Efficient Appliance Rebate Program (SEEARP). SEEARP potentially offered the most straightforward opportunity for collaboration because many utility customer-funded energy efficiency programs already offered similar appliance rebates.

- The Minnesota SEO ran a separate appliance rebate program that served the same market as the utility programs. However the SEO set ARRA rebate levels much higher than the utility rebates and allowed customers to combine its rebates and the utility rebates in order to encourage trading up to the most efficient models possible. In terms of program design, consumers received 50% of the rebate for the new equipment and 50% of the rebate for recycling the old appliances (through a utility, solid waste recycler or retailer), which drove increased uptake in utility recycling and appliance rebate programs.
- Efficiency Maine used SEEARP funds to offer fossil fuel heating equipment rebates as a complement to the existing electric appliance rebate program. This approach provided opportunities for significant energy savings outside the scope of the electric utility customer-funded programs. Michigan allocated a third of its SEEARP funds similarly. Oregon’s first round of SEEARP exclusively targeted heat pumps and furnaces for low-income residents--a market not served by existing utility customer-funded programs.
- Hawaii provides an example of full collaboration; the SEO arranged with the third-party program administrator to integrate ARRA funds into its own program to expand the list of rebated appliances, increase some rebates, and stand up a refrigerator recycling program (see Table 8).

Table 8. Coordination approaches in the State Energy Efficiency Appliance Rebate Program in 12 case study states

| Rebates for similar appliances (with consultation) | Complementary rebates (mostly or exclusively different appliances) | Full integration (co-mingling or delegation of funds) |
|--|--|---|
| CA, FL, MN, MI, NC | FL, MA, ME, MI, NC, NY, OR | HI, WI |

Factors Driving Coordination Decisions

Many factors drove the coordination decisions that ARRA- and utility customer-funded program administrators made: institutional and staff relationships, capacity and time constraints, political intervention or pressure among others, and the structure of utility customer program administration. Coordination appeared easier in states with third-party administrators, at least

partly because SEOs could find expertise and negotiate with a single partner, rather than multiple utilities. In some cases, it appears that legislative and administrative requirements associated with using ARRA funds also played a significant role. Uncertainty over the application of those requirements gradually narrowed the opportunities for coordination. Some prospective utility partners ultimately shied away from implementing joint programs with SEOs because they were unwilling to be subject to all of the requirements included in ARRA legislation.

The most influential drivers for the degree of coordination in a given state or program were coincidence of interest and divergence of capabilities. If ARRA- and utility customer program administrators lacked common objectives and could execute programs entirely on their own, coordination was unlikely to occur. Coordination tended to occur where the interests of the SEO and utility customer program administrators overlapped. The tightest collaborations tended to occur where interests coincided yet each party needed something from the other. Administrators of taxpayer-funded programs often needed utility customer-funded rebates and delivery channels. Administrators of utility customer-funded programs saw the Recovery Act funds as an opportunity to share marketing, outreach or other activities with less easily quantifiable connection to energy savings.

The results of these partnerships remain to be seen. Preliminarily, they appear to be producing new, synergistic relationships between the state energy offices, state utility commissions, program administrators, utilities, local governments and implementation contractors. These partnerships have not been without friction. But where they appear to be working, the partnerships suggest new divisions of labor based on knowledge, and core competencies, access to retailer and contractor networks, familiarity with ideas and messages that resonate with local residents, access to energy usage data, and skill at assembling financing. The experience with designing and implementing ARRA energy efficiency programs has opened possibilities for joining new and old parties in delivery of energy efficiency services.

Rebates and Attribution as Linchpins in Joint Utility Customer/ARRA Programs

Across multiple ARRA-funded programs, rebates for appliances and equipment were in high demand for packaging with new financing and other program elements (e.g., marketing and outreach). However, utilities and third-party administrators often did not have clear incentive to direct utility customer-funded rebates to ARRA-funded efforts. Most utility program administrators already had existing programs and were leery of a midstream redesign to accommodate larger rebates or other inducements that could disrupt the efficiency marketplace. Some program administrators reasoned that the ARRA appliance rebate funds were a fleeting feature on the efficiency landscape and potentially not worth the extra effort. Partnership also meant losing a degree of message control and branding; consumers might be confused about where to turn for rebates.

Partnerships brought uncertainty to estimation and attribution of energy savings. For administrators of utility customer programs, achieving savings goals are a primary objective because of legislatively-mandated savings targets (e.g. EERS) and/or performance incentives. Partnering with SEOs could mean sharing credit but was not without risks. On the one hand, state energy offices had to use the ARRA appliance rebate money; the funds were going to enter

the marketplace in some fashion. If state officials proceeded on their own, utility program administrators risked lost control, cannibalization of their slower-paced rebate programs, and consumer confusion. If they partnered or coordinated explicitly with SEOs, utility program administrators could potentially influence program implementation and leverage taxpayer dollars so that they could more easily achieve their program savings goals (i.e., because the additional ARRA funds were available to help meet those savings goals).

Conceptually, there are a number of potential approaches that could be used to address and resolve issues related to attribution of savings from programs:

- Option 1: Allow administrators of utility-funded programs to receive credit for energy savings if they partner with state energy offices on ARRA-funded program and increase their overall savings targets to reflect this new situation;
- Option 2: Keep utility customer- and ARRA-funded rebate programs separate and distinct, avoiding attribution questions entirely;
- Option 3: Allow administrators of utility-customer funded programs to claim credit for energy savings from coordinated or joint programs;
- Option 4: Negotiate partial or proportional credit for energy savings achieved by both program administrators.

In the 12 case study states, regulatory agencies did not alter or increase overall savings targets (Option 1). At least one state (NY) kept energy savings associated with ARRA- and customer-funded programs separate (Option 2).³³ Several states (WI, HI, ME) either decided on or were leaning toward proportional attribution where administrators of utility customer-funded programs received credit for savings associated with their efforts and contributions (Option 4). Regulatory agencies in at least five states (CA, FL, MA, MI, NC) have allowed utility program administrators to report all energy savings achieved by joint programs (Option 3) where utilities are playing a significant role (e.g., offering financial incentives to customers).

Table 9. Approaches to crediting utility customer-funded energy efficiency programs with energy savings for projects incorporating both ARRA and utility customer funding in 12 case study states

| Full credit of savings to RP administrator | Proportional credit of savings to RP administrator | Strict separation of ARRA & RP savings | Unresolved |
|--|--|--|------------|
| CA, FL, MA, MI, NC | WI, HI, ME | NY | CO, OR |

³³ In New York, NYSERDA segregated its appliance rebate program from utility programs in order to keep attribution unambiguous.

7. Potential Longer Term Impacts of the Recovery Act on Utility customer-Funded Energy Efficiency Programs

While much of the ARRA funds will be spent relatively quickly on one-time projects, creating the economic stimulus intended by the legislation, several programmatic activities potentially have longer term impacts. In this section, we focus on financing programs and workforce training as two examples of activities that will have impact beyond the ARRA funding time frame, and have implications for utility customer-funded programs.

7.1 Financing Programs

More than 30 states and dozens of local governments used ARRA grants as seed money for revolving loan funds (RLFs) or loan loss reserves (LLRs). An RLF is a pool of capital that is loaned out, and when the capital is returned by the borrower it is loaned out again for a new project. Interest and principle payments replenish the fund, which is depleted only by non-payment of loans by customers and administrative expenses of the RLF. LLRs are funds that are set aside to protect direct loan capital from a stipulated level of losses, in order to attract additional (usually private) capital to make loans for energy efficiency and renewable energy projects. For example, a 5% LLR would cover the loss of up to 5% of a portfolio of loans made by a designated lender. Program administrators of ARRA grants expect that assuming a share of the repayment risk which lenders otherwise might bear with energy efficiency or renewable projects will result in broader access to capital and/or more affordable interest rates. An LLR would be depleted if losses occur, which would be covered by the loan loss reserve fund. Both of these financing mechanisms – if well designed and managed – could last beyond the ARRA funding period.

Revolving Loan Funds

We estimate that 35 states have established 51 revolving loan funds with over \$650 million in ARRA funds (NASEO 2010b, U.S. DOE 2010). These RLFs are often targeted at designated end user markets or customer groups: public buildings, commercial sector buildings, industrial facilities, and the residential market including multifamily buildings. Figure 8 shows the intended distribution of RLFs by target market. The largest single category is public buildings, with 37% of funds designated. Revolving loan funds that target commercial and industrial markets account for about 41% of the dollars set aside for RLFs, with 21% in combined market funds, 11% in commercial-only funds and 9% in industrial-only funds. About 3% of the dollars in RLFs are targeted at small business, which means that about 44% of the total funds in RLFs are designated to private sector commercial/industrial/small business markets. Residential programs, including multifamily, account for 7% of the funds. It is important to note that states are allowed to move dollars in RLFs between various market sectors as long as the use of funds fit the ARRA guidelines.

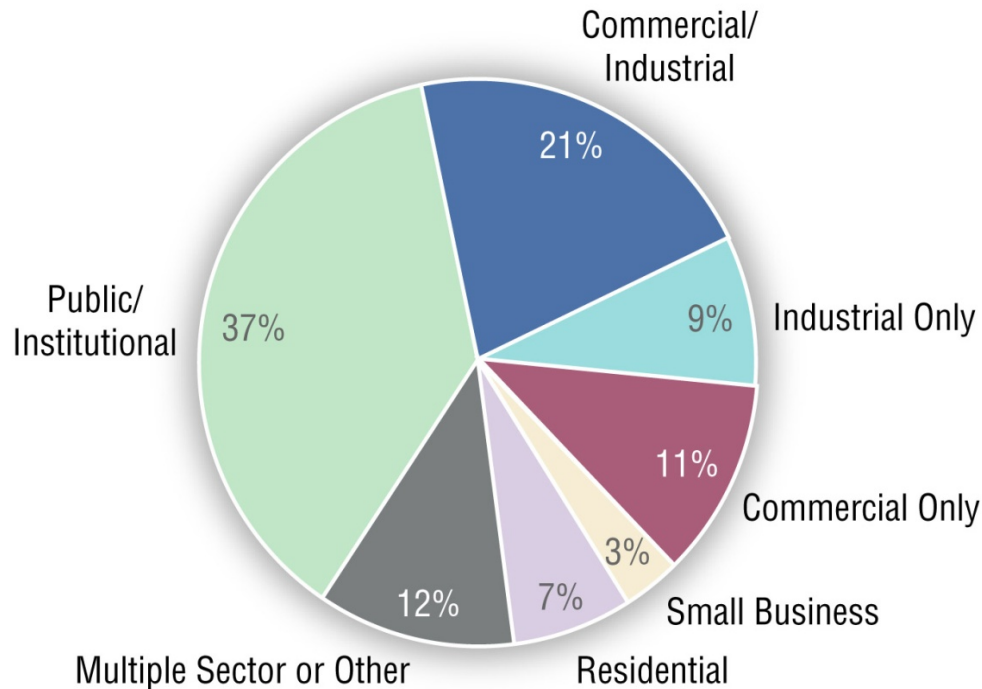


Figure 8. Target markets for SEP-funded revolving loan funds

We created a spreadsheet model to analyze the potential long-term impact of RLFs over 20 years. In our “base case” we treated the \$650 million in RLF capital as a single fund and made the following assumptions based on what we know about existing RLFs in order to develop a rough estimate of capital that could be loaned out for future energy efficiency projects:

- An interest rate of 5% (paid annually to simplify the model);
- Average loan term of five years;
- A total loss rate of 5% of the interest and principle payments due each year;
- Annual administrative costs of 1% of the initial fund amount (i.e. 1% of \$650 million annually or \$6.5M);
- Initial loans from RLFs created with ARRA funds are made over a two year period with 50% of the loan dollars committed in the first year and 50% in the second year
- Loans are not pre-paid; and
- Capital returned is immediately loaned out for new projects.

With these assumptions, over \$3.8 billion would be loaned out over 20 years – 5.9 times the initial investment of \$650 million in nominal terms (not present value). State energy offices that administer and manage these RLF would be able to finance \$150 to 200 million per year of energy efficiency projects over the next 20 years (see Figure 9). RLFs would continue to exist after 20 years, although we limit our analysis to the first 20 years

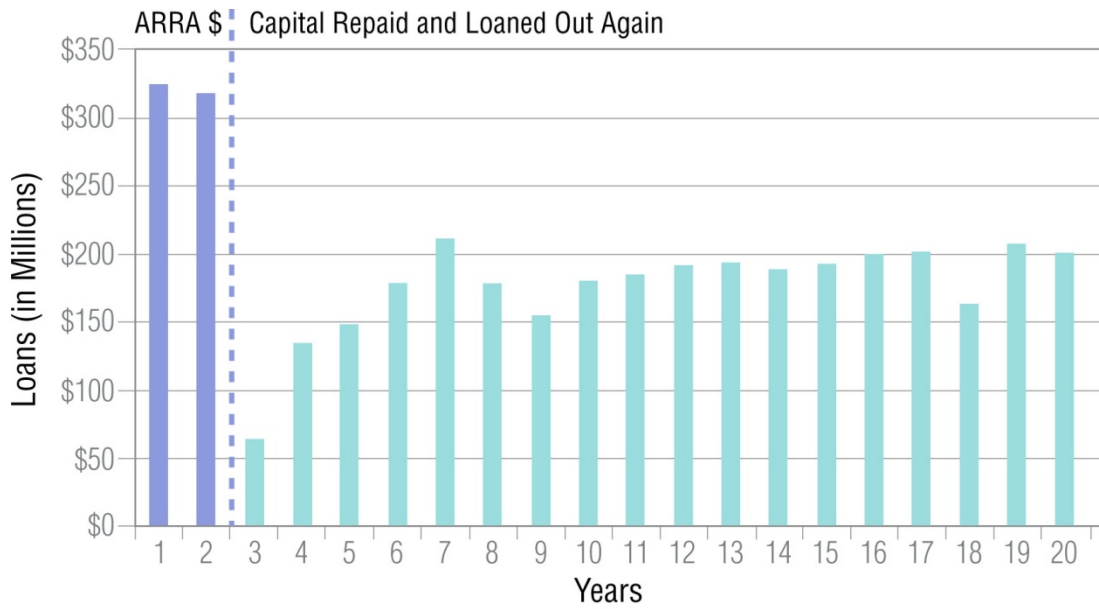


Figure 9. Annual loans issued by RLFs over 20 years with base case assumptions

Assumptions regarding average loan term, interest rate, loss rate, and administrative expense will have a significant effect on the availability of funds over time that could be used to finance new energy efficiency projects. Thus, we also conducted a sensitivity analysis of these variables in order to estimate the impact on the amount of funds available (see Tables 8 and 9). We express the results as a multiple of the initial \$650M budget for RLFs proposed by ARRA grantees over 20 years, which can be compared to the 5.9 funds multiplier using our base case assumptions.

Table 8. Total loans issued over 20 years with varying loan terms and interest rates as a multiple of the original \$650 million

| Loan Term/ Interest rate | 3 years | 5 years | 10 years | 15 years |
|-----------------------------|---------|---------|----------|----------|
| 0% | 5.1x | 4.2x | 2.9x | 2.3x |
| 2% | 5.7x | 4.8x | 3.4x | 2.7x |
| 4% | 6.5x | 5.5x | 4.0x | 3.2x |
| 5% | 6.9x | 5.9x | 4.3x | 3.5x |
| 6% | 7.3x | 6.3x | 4.7x | 3.9x |
| 8% | 8.2x | 7.3x | 5.6x | 4.7x |
| 10% | 9.3x | 8.5x | 6.7x | 5.7x |

Assume: 5% loss rate and 1% annual admin costs

Table 9. Total loans issued over 20 years with varying administration costs and loss rates as a multiple of the original \$650 million

| Admin rate/ Loss rate | 0.5% | 1% | 2% | 3% |
|--------------------------|------|------|------|------|
| 0% | 7.1x | 6.7x | 6.0x | 5.4x |
| 2% | 6.7x | 6.4x | 5.7x | 5.1x |
| 5% | 6.2x | 5.9x | 5.3x | 4.6x |
| 7% | 5.9x | 5.6x | 5.0x | 4.4x |
| 10% | 5.4x | 5.1x | 4.6x | 4.0x |
| 15% | 4.8x | 4.5x | 4.0x | 3.4x |

Assume: 5% interest rate and 5 year term

The amount of loan capital available over 20 years is most sensitive to the loan term – the funds revolve fewer times when there is a longer term (see Table 8). For example, increasing the average loan term to 15 years from five years reduces the multiplier to 2.3 times the original RLF fund level available to finance new projects. There is a trade off, as a longer loan term can make comprehensive energy efficiency projects that install more capital-intensive equipment and/or measures (e.g. new HVAC equipment) more affordable by spreading out payments to better match the savings over the project’s economic lifetime. However, this means that the capital in an RLF revolves more slowly and funds fewer projects. The loan capital available is somewhat sensitive to the interest rate and the loss rate. For example, reducing interest rates from 5% to 0% with a five year average loan term reduces the multiplier from 5.9 to 4.2 times the original RLF fund level (see Table 8). Similarly, increasing the loan loss rate from 5% to 15% reduces the multiplier from 5.9 to 4.5 times the original RLF fund level available to finance new projects (see Table 9). In all of the cases we tested in our sensitivity analysis, the fund is able to lend over the 20 years (and beyond), providing a long term resource to eligible applicants and a long term benefit to the states and local economies served by these revolving loan funds.

Loan Loss Reserves

The amount of ARRA program funds used to create Loan Loss Reserves (LLRs) is far less certain than the amount of funds designated for RLFs. A number of state energy offices and local governments are considering LLR programs, but have not yet made a final decision to establish an LLR fund. Other state energy offices and local governments are committed to establishing an LLR fund but have not yet decided on the size and terms of the LLR. As of October 2010, based on our review, we estimate that at least seven states and local governments are investing approximately \$20 million in LLRs. These funds will likely be available to most of the sectors targeted by RLFs, though a much higher percentage (>25%) will almost certainly fund improvements in the residential market.

Like RLFs, LLRs offer a way to extend the benefit of an initial investment of ARRA funds, but in a very different way than RLFs. LLRs immediately, and often dramatically, expand the funds available to lend. For example, if a lender agrees to participate in a program with a 10% LLR, then there are immediately 10 times the initial ARRA funds available to lend on projects (e.g., an LLR of \$1 million would support \$10 million in lending of private capital). An LLR of 5% would leverage 20 times the initial ARRA funding. This leverage significantly increases the near

term impact of the ARRA funds. However, the impact of the LLR over the longer term is less certain. For example, if there is a 5% LLR and a 5% loss is experienced by this fund, the LLR would be wiped out in the first round of loans. If there is only a 2% loss rate, the fund can cycle a few times, which could extend the life of the LLR program.

Given the certainty about the size and terms of ARRA-funded LLRs, and uncertainty about the actual loss rates, it is hard to estimate the total amount of funds that will be available for lending. These calculations will be most sensitive to the percent coverage provided by the LLR and the loss rate. If we assume a 10% LLR and a loss rate of 5%, you could get 10x the original ARRA funding loaned out immediately and then at least another 5 times the original ARRA funding loaned out again after the LLR is reduced by half due to the 5% losses from the first round of funding. With these assumptions, this is more than a 15x multiple in lending – a much higher multiple than an RLF due to the leverage provided by the private capital. However, the funds may cycle through only several times, depending on the terms of the LLR and the loss rate.

Both RLFs and LLRs provide customers with additional access to attractive financing, which can support utility customer-funded energy efficiency programs that often provide financial incentives that cover a portion of the incremental cost of energy efficiency projects. Availability of attractive financing may increase the uptake of energy efficiency improvements for utility customer programs. Administrators of utility customer-funded EE programs may want to design their programs to take advantage of these new funding sources (e.g., marketing the financing options offered by state and local governments along with their incentives to encourage increased EE activity for capital-intensive equipment and measures). LLRs will likely not have the longevity of RFLs, but they will provide a significant surge of funds over the next five to 10 years (depending on the programs' terms). If well-designed and managed, LLR funds can leverage relatively large amounts of private sources of capital with relatively small investments of utility customer funds. Additionally, if these LLR programs are in high demand and experience reasonable loss rates, administrators of utility customer-funded energy efficiency programs may want to consider directing funds toward similar programs once they have been “tested” with ARRA funds.

An interesting element of these longer-lasting funds is that the terms and target markets can change over time, as long as the funds still meet all the ARRA restrictions. This gives the program administrator the flexibility to change priorities as they learn more about what is needed. For example, public buildings often have access to lower cost capital and there are a relatively limited number of these buildings. If administrators decide that the financing needs of public/institutional market buildings are largely being met, then they may choose to focus lending in harder-to-reach markets such as small business or residential. The terms of the program can also change. For example, there may be a need for capital among “riskier” residential customers who cannot access other financing – administrators could choose to re-focus their lending on this segment and accept higher loss rates and longer terms in order to reach underserved markets. The longevity of these funds also implies that coordination with utility customer programs can occur over time, and the terms and target markets can be adapted to best complement the programs offered by utility customer program administrators.

Performance Contracting

At least 11 states and territories allocated a total of approximately \$150 million to programs that include support for leveraging performance contracting, largely in the public sector. Because of the typically lengthy time frame for approval and completion of large and complex projects (sometimes over multiple years), some states (e.g., Colorado) opted to use SEP funds for staff and/or consultants to provide technical assistance to accelerate completion of the existing pipeline of performance contracting projects and implementation of new projects. Thus, these programs may build lasting capability and institutional knowledge at the state and local levels, while expending the ARRA project funds within the requisite performance period.

7.2 Workforce Development

Investment in workforce development is another area that has potential for longer term impacts on utility customer-funded EE programs. Eighteen states used over \$54 million in SEP funds to create energy efficiency and/or renewable energy workforce development programs of various types. Four states comprised over 65% of this spending: CA (\$20 million), NC (\$8 million), TX (\$6 million), and AK (\$3 million). Many of these programs involve partnerships with entities including other state agencies, community colleges, industry, labor, utilities and workforce development boards. Activities include contractor training in residential energy assessments and upgrades, scholarships for certifications, development of new educational Centers of Excellence, funding of assessment equipment (e.g. blower doors, duct blasters) for training programs or for newly certified auditors, and energy efficiency education for architects and engineers. Several states that are newcomers to energy efficiency are spending notable amounts. For example, Arkansas is spending almost \$3 million to build Training Centers of Excellence and Nebraska is spending almost \$2 million to develop renewable energy curriculum at community colleges.

Administrators of utility customer-funded programs have indicated that workforce development and training activities that target implementation contractors are an integral aspect of quality control/quality assurance of successful programs. However, in some states, administrators are not able to devote significant resources towards workforce development and training because the impacts and benefits are often difficult to measure. Given different policy objectives (e.g. job creation, retention), some states have used a small portion of their ARRA funds to target workforce development and training for the energy efficiency services sector in order to accelerate training of implementation contractors and in some cases establish new workforce development institutions or programs. These efforts can support the goals of utility customer-funded EE programs beyond the ARRA funding period. In those states that are ramping up utility customer-funded energy efficiency programs, this early support for training professionals and contractors to design and install high-quality, energy efficiency projects may allow a more seamless expansion of programmatic efforts.

7.3 Additional Longer Term Impacts

Other infrastructure, policies, and practices related to energy efficiency and renewable energy program planning and delivery also are expected to last beyond the Recovery Act funding period. These activities include appliance recycling centers, support for building code development and enforcement and improved working relationships and coordination among local

and state governments and utilities that could make future coordination easier and more effective. If successful, these efforts could have a positive impact on utility customer-funded energy efficiency program efforts in the future (e.g., improved coordination). Some outcomes of ARRA, such as RLFs and LLRs, will continue to provide a longer term benefit regardless of utility customer program interaction, but utility customer administrators should actively leverage these to increase the impact of their own programs. Other resources such as trained workers need to be considered in utility customer planning so that new programs continue to benefit from the skills and experience available. Utility customer programs should assess the range of activities funded by ARRA and incorporate these resources into their own planning process, and/or increase the funding for the ARRA investments that show strong results.

8. Conclusions and Recommendations

Until recently, the scale of state energy efficiency funding and program activity has been dwarfed by electricity and natural-gas utility customer funding and programs. The Recovery Act grants brought unprecedented funding to bear on state-administered energy efficiency and renewable energy programs. Our study examines this altered clean energy landscape primarily through the lens of interactions among program administrators in the planning, design, and implementation of programs. We suggest that the nature and extent of those interactions provides insights and lessons relevant to an emerging, more complex clean energy arena, one with more actors, funding sources, and urgency.

With the influx of Recovery Act funds, state energy offices that traditionally operated on small budgets had to establish or expand programs rapidly to meet program requirements. DOE guidance encouraged state energy offices to coordinate with administrators of utility customer-funded programs and other stakeholders to create programs that leveraged the expertise and resources of existing program administrators in those states with long-standing efficiency programs.

As seen through 12 case studies and more generally nationwide, each state approached program design and funding choices driven by a unique collection of state policy objectives, institutional and staff relationships, delivery infrastructure, and models for program administration. It is possible nonetheless to draw some conclusions and offer several recommendations and suggestions.

8.1 Key Trends & Implications for the Future

The ways that states reacted to the ARRA legislative mandates and funding have significant implications for the future, both from the perspective of the states and that of a utility customer program administrator.

8.1.1 Interaction and Coordination among Program Administrators

Recovery Act funding offered an opportunity to create a culture of energy efficiency at every level of government, from local towns and municipalities to the states themselves. Program coordination between state energy offices and utility customer-funded program administrators played out in a variety of ways. Some states worked very closely with their utility customer program administrators, and in a few cases, the utility customer and ARRA program administrators were either the same entities (e.g., NY) or state agencies were directly involved in overseeing utility customer-funded programs and in administering ARRA EE programs (e.g., MA, MN). Other states had minimal interaction with administrators of utility customer-funded programs and state regulatory commissions. In most cases, the degree of alignment of program objectives determined the degree of coordination between ARRA and utility customer programs. The experience obtained by program administrators, state regulators and other stakeholders have also provided insights and in some cases laid the foundation for future collaborations among program administrators.

Conceptually, coordination between ARRA- and utility customer program administrators offered several potential benefits:

- **Leverage** – Joint or co-designed programs can draw in other funding, expertise, experience, and delivery infrastructure, and such programs can produce mutually reinforcing messages that move consumers to more efficient choices;
- **Conflict mitigation** – Both types of program administrators can influence program targeting, design and implementation issues such as setting incentive levels, messaging and branding to avoid or mitigate market disruption and consumer confusion;
- **Division of labor** – Different administrators and fund sources can serve complementary purposes, suited to their skills and objectives; and
- **Longevity** – Joint programs can have a broader support base than either taxpayer or utility customer programs on their own and may persist beyond the end of the Recovery Act funds.

8.1.2 Program Innovation and Experimentation

Many SEOs in the 12 case study states used ARRA funding to try innovative program designs and concepts, new technologies, and market development strategies that would not likely have been feasible for administrators of utility customer programs due to cost-effectiveness and other constraints. The ability to leverage programs and funding sources with differing objectives to mutual benefit, suggest approaches to effective division of labor between state energy offices and other government entities and utility customer-funded energy efficiency program administrators in regard to program planning and implementation. If these more innovative ARRA-funded energy efficiency program designs and concepts are successful, this may provide insights and highlight the need for additional non-utility customer funding sources in the future that are not as constrained.

8.1.3 Lasting Impacts

Due to short timelines, program administrators chose to invest in financing options that allowed for program flexibility and frequently offered opportunities for leveraging other funding sources. Thirty-three states and numerous local entities chose to use ARRA funding to seed revolving loan funds totaling over \$650 million. RLFs satisfy several of the ARRA programmatic goals and are expected to have a significant long term impact. Importantly, it is possible to re-designate these funds towards future programs that meet the approved ARRA goals. Depending on loan interest and default rates, administrative costs for these programs could be covered by earned interest. Under the right conditions, RLFs can effectively be self-sustaining programs providing a significant source of financing for future energy efficiency projects that are developed as part of either state government or utility customer program initiatives.

States that lost significant manufacturing employment during the economic downturn tended to invest in revolving loan funds for makers of energy efficiency or renewable energy products or components. These choices satisfied the twin objectives of the Recovery Act: retaining and creating jobs and investing in clean energy, and will help strategically position state economies for a transition into the next phase of green energy development.

Loan loss reserves meet more of the immediate goals of ARRA by leveraging significant private capital. These programs are expected to provide a shorter-term surge in funding, though will not last as long as most RLFs. They will also help establish default rates for energy efficiency loans and, hopefully, instill confidence among lenders to create their own efficiency lending programs.

Eighteen states invested \$66 million in workforce development, with 72% coming from 5 states. Workforce development and training is another area that is difficult for administrators of utility customer-funded programs to justify significant spending, but has a significant impact on quality control/quality assurance for all energy efficiency programs. The influx of skilled labor in these states will have a lasting impact not only in terms of job creation, but also in the future success of utility customer- and ARRA-funded programs.

8.2 Challenges

Coordination between utility customer and ARRA energy efficiency programs was not always feasible. Recovery Act initiatives geared toward economic development or job creation were not always a good fit with utility customer-funded programs whose primary objectives were acquiring cost-effective energy efficiency resources or transforming product and services markets. In some cases, existing program administrators saw more downsides and risks than benefits from new ARRA-funded programs. Among those downsides were legislative or administrative requirements tied to the Recovery Act money. Projects conducted with ARRA funding were required to utilize prevailing wage laws, pass environmental and historic preservation reviews and feature U.S.-made goods and services to the greatest extent practicable. Utility programs in some states typically do not operate under all of these requirements.

A few of the challenges we observed include:

- **Funding fluctuations do not support long-term market transformation** – Many programs took months to launch and most programs will end with their Recovery Act funding. Program administrators and contractors indicated that a lack of continuity in program offerings and incentive levels undermines market confidence, orderly uptake in programs and entry of private investment. Some administrators of utility customer programs saw the burst of federal funding in state or local hands as an uncontrolled new influence on markets that those administrators had cultivated to promote energy efficiency.
- **Strain of time and capacity limits** – Tight deadlines and historic funding levels required unprecedented ramp-up from state and federal program administrators. A number of respondents indicated that the lack of comprehensive guidance at the program's inception compelled some states and localities to change course after DOE issued guidance documents on various issues that arose during implementation.
- **Varying program goals** – Some state energy offices designed their programs primarily to meet job retention and job creation objectives of the Recovery Act, which in some cases was not aligned with longer term market transformation and energy savings

objectives of utility customer-funded programs. For example, with appliance rebates, most case study states set rebate levels for a quick hit in the market rather than a steady incremental enhancement to appliance sales. In the short term, that approach may have saved jobs and, anecdotally, kept some retailers in business. However, retailers in Wisconsin, New York and Hawaii reported a sag in sales before the ARRA-funded rebates were offered, apparently in anticipation of the rebates. The extent to which these rebate cycles may have affected existing appliance efficiency programs or resulted in additional net savings is an issue outside the scope of this report and may be taken up by program evaluators in the future.

- **Attribution of savings and impacts** – The attribution and claiming of savings from projects that utilize both Recovery Act funds and rebates from utility customer-funded programs has been a subject of intense negotiations in several states. Not surprisingly, states have taken varying approaches on this issue. Attribution is a critical issue for administrators of utility customer-funded programs with performance incentives or in states that have adopted Energy Efficiency Resource Standards with savings targets. Joint OMB/DOE guidance advises grant recipients to report the “full estimated impact” of ARRA-funded programs, including the impact of “leveraged” resources that, absent the ARRA investment, would not have been part of a program. Many states are reporting the full savings associated with joint programs. Some plan on reporting net energy savings; others are reporting gross savings. Further, some utility customer program administrators engaged in ARRA-funded programs are taking full credit for savings from those programs; some are taking proportional credit.

8.3 Recommendations

The unique nature of the Recovery Act – a large infusion of funds with tight deadlines and objectives beyond energy efficiency – limits extrapolation of the ARRA experience to the future. Yet the experience provides some insights for state policymakers, regulators, and program administrators on strategies and approaches that may work in a future regulatory and market environment with more diverse energy efficiency funding sources and program actors.

Recovery Act funds came with different strictures and a broader directive than transforming efficiency markets and reaping cost-effective energy savings. Our case studies illustrate the approaches utilized by SEOs in designing and implementing ARRA-funded programs and provide insights on pitfalls to avoid and ways that an expanded universe of players might orchestrate and coordinate their roles and responsibilities. The Recovery Act grants have enabled program administrators to begin exploring divisions of labor based on natural niches and test new roles and combinations that could work to maximize the impact of their respective funds and benefit taxpayers and utility customers.

In light of these early findings, we make several recommendations and suggest areas of further inquiry that could be followed up by those entities that will be conducting formal evaluations of ARRA energy efficiency programs. The recommendations are organized by relevance to existing programs, both utility customer and taxpayer-funded, and for the future programs that infuse new sources of funding into the EE program landscape.

Our recommendations for existing programs include:

- **Tracking and sharing the impacts of revolving loan funds** – Most revolving loan funds programs will last well beyond the ARRA performance period. It is important for DOE (and states) to track and monitor the impact of these funds over time (10-15 years). Dissemination of data about default rates, program administration costs, and appropriate interest rates will be useful in evaluating program impacts and informing program administrators and financial institutions for future financing programs. Going forward, DOE should also consider providing technical assistance to state energy offices that want to modify their RLF terms or target markets in order to focus on underserved markets that most need project finance for energy efficiency projects (e.g., residential home energy improvements, small business).
- **Attribution and reporting of savings and assessment of program impacts** – Some of the 12 case study states have not settled on exactly what to report and how to attribute savings. An opportunity exists to inform those decisions. Evaluators may wish to examine whether more refined state and utility reporting guidance will produce consistent measures of energy savings. Moreover, some states used Recovery Act funds to help meet utility customer program savings targets and EERS requirements. Among our 12 case study states, it does not appear that any state regulatory commission decided to increase overall savings goals for their program administrators to account for the boost from Recovery Act funds. As a result, savings goals are likely to be met more easily than anticipated. State regulators might examine the extent to which progress toward EERS compliance has been accelerated by federal taxpayer dollars.
- **Energy codes updates and compliance efforts** – State governors that received Recovery Act energy grants had some obligation to ensure that their state would take action to implement the latest residential and commercial energy codes, with 90% compliance, by 2017. Evaluators might want to assess whether the level of investment and effort in states to update their codes is consistent with meeting the Recovery Act's requirement to adopt the latest energy codes and achieve 90% enforcement by 2017. As part of this assessment, evaluators will need to examine other building energy code-related initiatives that utilized ARRA funds.³⁴
- **Knowledge preservation** – Capacity, lessons learned and practical know-how are being developed quickly at the state and local level. Knowledge and relationships arising from Recovery Act programs are at risk of being lost as staff and contractors are reassigned or laid off at the end of the ARRA performance period. Program administrators should look for ways to preserve new capacity and knowledge.³⁵

³⁴ See the DOE Building Technologies Program solicitation on Building Energy Code Compliance Adoption, Compliance and Training.

³⁵ Institutionalizing knowledge obtained by SEO staff in designing ARRA-funded programs can be preserved (even in event of staff turnover) by creating program procedures manuals and documenting and disseminating program results.

Our recommendations for future programs include:

- **More funding for innovation in EE program design** – The ARRA-funded SEP programs have been able to experiment and test new EE program designs, at least partially because they are not constrained by some requirements (e.g., cost-effectiveness screens) faced by administrators of utility customer-funded energy efficiency programs (e.g., programs that reduce usage for unregulated heating fuels). There is a need for continued support to encourage innovative program designs, workforce development, and market transformation initiatives after ARRA funds are expended.
- **Coordination guidance** – Several state energy office and utility customer program administrator interviewees recommended that federal funds come with a coordination requirement. ARRA Program evaluators might examine the pros and cons of a mandate for formal consultation and reporting on rationales when coordination does not occur.
- **Grant issuance and administration** – The tight deadlines for Recovery Act grants tested every level of government and limited opportunities for resolution of difficult issues and coordination among state and local governments and utility customer-funded administrators. The design of future federally-funded energy efficiency programs should take into account the challenges involved in ramping up programs and allow sufficient time for DOE grant managers to establish necessary program guidance documents. However, federal guidance for the statutory regulations and understanding of their application at the state level is fairly well developed now and should open up more opportunities for coordination in the future.
- **Resource-efficient loading order** – On-site renewable energy systems can be significantly more costly than most energy efficiency measures. In utility customer-funded programs, a few states (e.g., CA and WI) have adopted a “loading order” that encourages customers to implement cost-effective efficiency measures prior to installing renewable energy systems as a condition of providing incentives for renewable energy projects. Evaluators may want to examine implementation practices among those states that offered incentives to implement both onsite renewable energy and energy efficiency projects, highlight “best practices” in this area, and assess whether DOE or states should include guidance on the design of combined renewable energy/energy efficiency programs in the future.

The ARRA-funded efficiency programs are too young to speculate on program outcomes or quantify the value that coordination may offer over more solitary approaches. However, the Recovery Act set in motion exploration nationwide with new markets, actors, and approaches, including new divisions of labor and additional resources for delivering energy savings. These activities generated new partnerships and perhaps a broader constituency for energy efficiency among governments, businesses, residents, utilities and others. The ARRA experience to date underscores the difficulties and potential benefits of a larger, more complex effort at saving energy nationwide. This experience also suggests that the various recipients of ARRA funds (e.g. states, counties, cities) may have natural niches and roles to play in areas where utility customer program administrators have been constrained or reticent (e.g., workforce

development, financing, and targeting market segments and customer end uses that are not easily included in utility customer programs). Some of the solutions that are emerging now will not continue past the Recovery Act funding; however many may persist as important new elements to shape the future of U.S. energy efficiency initiatives.

References

- American Council for an Energy Efficiency Economy (ACEEE) 2010. "2010 State Energy Efficiency Scorecard Ranking." <http://www.aceee.org/energy-efficiency-sector/state-policy/aceee-state-scorecard-ranking>
- Barbose, G., C. Goldman, and J. Schlegel 2009. "The Shifting Landscape of Ratepayer-Funded Energy Efficiency in the U.S." *The Electricity Journal*, LBNL-2258E. October. <http://eande.lbl.gov/EA/EMP/reports/lbnl-2258e.pdf>
- Blumstein, C., C. Goldman, G. Barbose. 2003. Who should administer energy efficiency programs? *Energy Policy*. 33(8) 1053-1067. doi: 10.1016/j.enpol.2003.11.006
- Building Codes Assistance Project 2010. "Residential State Energy Code Status as of October 1, 2010." <http://bcap-ocean.org/code-status>
- Caracino, J. and M. Nevius 2010. "The State of the Efficiency Program Industry: 2009 Expenditures, Impacts & 2010 budgets." December. Boston MA: Consortium for Energy Efficiency (CEE). [http://www.cee1.org/files/2010 State of the Efficiency Program Industry.pdf](http://www.cee1.org/files/2010%20State%20of%20the%20Efficiency%20Program%20Industry.pdf)
- Goldman, C., M. Fuller, E. Stuart, J. Peters, M. McRae, N. Albers, S. Lutzenhiser and M. Spahic 2010. "Energy Efficiency Services Sector: Workforce Size and Expectations for Growth," Lawrence Berkeley National Laboratory, LBNL-3162E, Berkeley, CA.
- KEMA 2010. "Evaluation Tasks and Timeline: State Energy Program National Evaluation," presentation for NASEO annual meeting given by Kathleen Gaffney and Tim Pettit. October.
- National Action Plan for Energy Efficiency 2008. "Understanding Cost-Effectiveness of Energy Efficiency Programs: Best Practices, Technical Methods, and Emerging Issues for Policymakers." Energy and Environmental Economics and Regulatory Assistance Project, November.
- National Association of State Energy Officials (NASEO) 2010a. State Energy Loan Fund Database. <http://www.naseo.org/resources/selfs/>
- NASEO 2010b. "Appliance Rebate Program: An ARRA Success Story." October. http://www.naseo.org/rlf/Appliance_Rebates.pdf
- Nevius, M., Eldridge, R., and J. Krouk 2010. "The State of the Efficiency Program Industry: Budgets, Expenditures, and Impacts 2009." March. Boston MA: Consortium for Energy Efficiency (CEE). <http://www.cee1.org/files/StateofEEIndustry2009.pdf>
- Schweitzer, M., D. W. Jones, L. G. Berry, B. E. Tonn 2003. "Estimating Energy and Cost Savings and Emissions Reductions for the State Energy Program Based on Enumeration

- Indicators Data.” January. Oak Ridge TN: Oak Ridge National Laboratory, ORNL/CON-487. http://weatherization.ornl.gov/pdfs/ORNL_CON-487.pdf
- U.S. Census Bureau, Population Division: Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01).<http://www.census.gov/popest/states/NST-ann-est.html>
- U.S. Department of Energy (DOE) 2010. Weatherization & Intergovernmental Program. Projects. http://www1.eere.energy.gov/wip/project_map/
- U.S. Department of Energy (DOE) 2009. “State Energy Program Formula Grants American Recovery and Reinvestment Act (ARRA) Funding Opportunity Number: DE-FOA-0000052. http://www1.eere.energy.gov/wip/pdfs/sep_arra_foa.pdf
- U.S. Energy Information Administration (EIA) 2010. State Historical Tables for 2009. November. http://www.eia.doe.gov/cneaf/electricity/epa/revenue_state.xls.
- U.S. Energy Information Administration (EIA) 2010. Electric Power Annual 2008 - State Data Tables. Revenue from Retail Sales of Electricity by State by Provider, 1990-2008. Retrieved from http://www.eia.doe.gov/cneaf/electricity/epa/revenue_state.xls
- Weatherization and Intergovernmental Program (WIP). “History of the State Energy Program.” Washington D.C.: Department of Energy. http://www1.eere.energy.gov/wip/sep_history.html