A National Review of Community Based Energy Efficiency Program Designs: Finding Transferable Insights From 25 Unique Programs

Ann Speers, Opinion Dynamics, Waltham, MA
Aimee Powelka, Eversource, Westwood, MA
Jayden Wilson, Opinion Dynamics, Waltham, MA

ABSTRACT

Community-based programs (CBP) weave bottom-up elements (e.g., community targeting and local partnerships) into traditional energy efficiency programs to overcome persistent barriers to energy efficiency adoption. Aside from sharing a core design element—the community—piloted CBPs represent a variety of contexts, have deployed numerous engagement approaches, and have achieved variable success. Across CBPs and program administrators (PAs), it has been challenging to disentangle the effectiveness of design elements from community context because of the design's inherent use of community-specific tailoring. This poses a challenge to both the evaluation of an individual CBP and to the transfer of thematic findings across contexts.

In this paper, we present a review of 25 CBPs representing 20 PAs in ten states to catalog the use and relative success of community designs since 2010. Further, we discuss results of nine in-depth interviews with CBP administrators to explore the types of values that community-based design elements add to traditional programs. We then develop a 12-point program classification system that highlights similarities and differences across CBPs to aid administrators and evaluators in applying best-practices for their specific context (e.g., customer barriers, community capacity, existing portfolios, regulations). We also present evidence that CBPs' most-cited benefits— utility-community relationship-building and local energy capacity growth—are rarely captured in standard CBP evaluations. As with other types of programs that generate non-resource or hard-to-measure benefits, studying CBP "success" calls for an expanded set of metrics relative to traditional residential EM&V frameworks.

Introduction

The Massachusetts Energy Efficiency Program Administrators (MA PAs) have delivered more than ten community-based programs (CBPs) in as many years. Community strategies—such as those used widely in recent years to promote grassroots community clean energy (Klein and Coffey 2016)—afford utilities and other ratepayer-funded program administrators (PAs) unique access to advantageous community features, such as community pride or sense of place; geographic clustering to cost-effectively reach target customers; locally-trusted organizers, authorities, and messengers; and others. Despite these benefits, partnering with communities can be relatively costly compared to mass-market program outreach and delivery. Over the years, impact and process evaluations of CBPs from Massachusetts and elsewhere have found mixed evidence of the community-based design's value relative to existing programs (Brandt 2011; Jones and Vine 2015; Mackres et al. 2012; MIT Community Energy Efficiency Practicum 2009). Where evaluations do show that community approach "lifted" participation, energy savings, and/or demand reduction, results suggest varying conclusions about which program elements offered the biggest bang-for-the-buck (Jones and Vine 2015; Brandt 2011; McEwen 2012; Carmalt, Justus, and Schulte 2010; Dethman and Schaffer 2010). When it comes to understanding why CBPs and community-centric tactics have found mixed success, the local tailoring inherent to the CBP design poses an evaluation challenge. Broadly, the highly-tailored nature of many CBPs implies that the tactical results of one individual program iteration may depend as much on context specifics as they do on inherent properties of a given tactic; in other words, it is challenging to disentangle the effectiveness of design elements from community context.

To reflect on the viability and value of the CBP design, the MA PAs commissioned a retrospective review of CBPs developed in Massachusetts and throughout the United States. Our goals were to (1) document the breadth of CBP designs and attributes, (2) explore the relative effectiveness of various community engagement strategies and (3) explore what factors help to explain why community strategies have been variably effective across contexts. To make this information useful for program planning and evaluation, we present findings by program attribute and benefit classifications.

What is a "Community-Based Program"?

Energy efficiency program administrators may tailor their programs to a variety of "communities," including socioeconomic, cultural, or linguistic communities; specific municipalities or geographic communities; communities based on propensity to participate in a program; or even the general population of all customers in their service area. Moreover, administrators may partner with a variety of community groups, including municipal leaders, cultural or religious groups, non-profit advocacy groups, and others. This paper includes a variety of the types of communities and community groups engaged in CBPs. For purpose of this synthesis study, we developed a working definition of CBPs as, "*a clean energy partnership with stated goals that leverages community attributes or institutions to tailor delivery of energy efficiency or renewable energy services to a target community*." Given that many programs meet the broad definition, our study specifically focused on programs that: a) were implemented during the last seven years (2010 to 2017), b) actively involved an electric or gas utility energy efficiency PA, c) were used to drive increased participation and/or savings in a PA program, and d) included a substantial residential component.

Methods

We used two methods in this study: a community-based program literature review and in-depth interviews with a sample of CBP stakeholders. The literature review was designed to gain broad insights about CBP design, implementation, and outcomes. We completed in-depth interviews with nine selected CBP administrators to further explore community barriers to energy efficiency, CBP origins, and lessons-learned by the CBP administrators. All research was completed between June 2016 and April 2017.

Literature Review

We searched for CBPs by reviewing the energy efficiency program evaluation literature, including evaluation reports, program implementation plans, informal summary materials (e.g., fact sheets and websites), published literature, and white papers. We reviewed materials provided by the Massachusetts PAs and completed keyword-based web searches of conference proceedings, state public utility commissions, energy efficiency industry groups and others. The review identified 25 programs meeting our selection criteria. Given our initial focus on Massachusetts programs, the review included an emphasis on New England programs. Review methods tended to identify programs based in other regions that were larger and longer-running and less-often represented highly local and/or shorter-lived initiatives. We catalogued reported program attributes in an Excel database, including: administrator, origins, funding source(s), integration with ratepayer-funded energy efficiency portfolios, customer type, target outcome, program design and implementation, community partners, success relative to stated goals, and others.

In-Depth Interviews

We conducted in-depth interviews with representatives from the entities most knowledgeable about the nine programs' historical decision-making, design, and evolution over time. CBP administrators interviewed represented electric and gas utilities (6), ratepayer-funded non-utility administrators (2), and independent

organizations who led the CBP (1). Geographically, these programs were located in California (2), Connecticut (2), Massachusetts (4), and Vermont (1).[1] Interviews confirmed program design elements reported in program documentation, elicited administrator-rated significance of participation barriers identified in the literature review, explored the rationale and context for the program, discussed the relative effectiveness of program activities, discussed the added-value of community-based elements relative to traditional residential offerings, and gathered input about lessons learned and suggestions for future research. All interviews were conducted between February 2017 and April 2017, and were audio taped and transcribed.

Results

Table 1 presents the distribution of the 25 identified ratepayer-supported CBPs[2] based on customer segment of interest, major end uses promoted, and high-level design attributes. These programs were implemented in a range of geographies: 40% were implemented in Massachusetts (10) and the remaining 60% were implemented throughout the United States representing Connecticut (3), Washington (3), California (2), Oregon (2), Vermont (2), Kansas (1), New Jersey (1), and Rhode Island (1). Given the geographic concentration of reviewed programs in New England, we recommend taking policy, market, and energy usage attributes into account when interpreting this study's results.
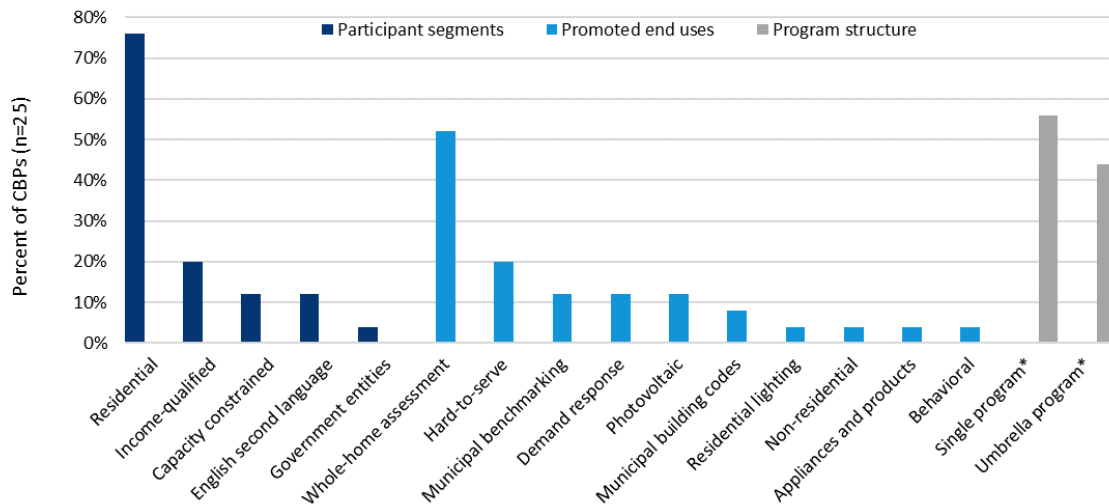

Figure 1. Participant, End Use, and Program Design of Included Community Based Programs. Unless where indicated with (*), programs were classified by multiple variables.

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[1] Interviewees included personnel representing these PAs and programs: BayRen (one of two RENs) (CA), PG&E's Local Government Partnerships (CA), Neighbor 2 Neighbor Energy Challenge(CT), Eversource's Clean Energy Communities (CT), Eversource's/National Grid's Renew Boston (MA), NSTAR's Community Energy Challenge (MA), National Grid's Community Initiatives (MA), the MA Program Administrators' Efficient Neighborhoods+ (MA), Efficiency Vermont's Vermont Home Energy Challenge (VT).

[2] The 25 programs and program administrators are: Local Government Partnerships (4 CA Investor-Owned Utilities), Regional Energy Network Programs (2 CA RENs), CT Clean Energy Communities (Eversource), Neighbor 2 Neighbor (Eversource, CT Clean Energy Fund, N2N), Solarize CT (CT Green Bank), Take Charge Challenge (4 KS utilities), Renew Boston Residential (Eversource, National Grid), Boston Community Mobilization Initiatives (NSTAR, National Grid), Efficient Neighborhoods+ (4 MA PAs), Energy Efficiency 2020 (Serrafix; 4 MA PAs), Fall River Energy contest (4 MA PAs), Marshfield Energy Challenge (NSTAR), Community Initiatives (National Grid), New Bedford Community Mobilization Initiative/ New Bedford Energy Now (NSTAR), Community Energy Challenge (NSTAR) ,Western Mass Saves Challenge (WMECo), Vermont Home Energy Challenge (Efficiency VT), NeighborWorks® H.E.A.T. Squad (Efficiency VT, NWWVT), Sustainable Jersey (NJ BPU; College of New Jersey), Clean Energy Works Oregon (CEWO)/ Enhabit (ETO, Enhabit), Clean Energy Works Portland (CEWP) (ETO, local utilities), System Reliability Procurement Pilot: EnergyWise (National Grid), Project Energy Savings (Clark PUD), Energy Efficient Communities (PSE), RePower (Bainbridge, Bremerton, Kitsap) (PSE).

In addition to their geographic dispersion, the 25 CBPs varied widely across administrators in terms of their origins, program design, and implementation strategies. Below, we discuss variations in origins, administration and funding, position within the PA's existing portfolio of energy efficiency programs, target customers, geographic scope, programmatic infrastructure, and community based marketing approaches.

Origins. Although often evaluated in context of their energy savings or capacity to enhance marketing and outreach, CBPs originate in a broad variety of contexts. Programs have sprung from a need to meet a regulatory mandate, a stakeholder's desire to capitalize on one-time funding, a utility's interest in creating community goodwill, a community's interest in working with a utility, an interest in reaching hard-to-serve customers, and others. In Massachusetts, for example, the PAs have a general mandate to achieve cost-effective energy efficiency projects; their 2016-2018 three-year plans include the use of CBPs to achieve that goal. Other administrators may face more specific mandates for predefined types of programming. For instance, the Oregon Legislature passed the Energy Efficiency and Sustainable Technology Act (EEAST) in 2009, which directed the Energy Trust of Oregon to initiate and evaluate pilots in investor-owned utility (IOU) service territories with the goal of providing easy-to-use energy efficiency financing for residential and businesses customers. The Clean Energy Works Portland (CEWP) pilot satisfied the EEAST Act requirements—although CEWP predated the passage of the Act, highlighting the often-intertwined nature of social and community movements and the creation of public policy.

Administration and funding. While all reviewed CBPs were built on an existing ratepayer-funded energy efficiency program by design of the review, utility administrators did not lead all of the efforts. The reviewed CBPs included utility-driven efforts in which the administrator developed the program framework with relatively little community input (44%), as well as more-collaborative efforts in which the administrator and community were both involved in planning (40%), or, less often, community-driven initiatives in which a CBO developed the framework and then sought utility partnership (16%). Further, while all reviewed CBPs launched with some amount of ratepayer funding (100%), it is largely due to the influx of federal capital following the great recession that such a breadth of program strategies, engagement tactics, and program evaluations are available to us to learn from today. Notably, 48% of programs received federal funding, such as from the U.S. Department of Energy's Energy Efficiency and Conservation Block Grants (EECBG) funded by the 2009 American Recovery and Reinvestment Act.[3] Additional program funding included local taxpayer funds (32%), private grant support (24%), or funding or in-kind resources from universities (12%).

Portfolio position. CBPs leveraged existing programs to various extents, ranging from not at all (e.g., developing an entirely new offering) to extensive (e.g., starting with an existing multifamily program and adding community-based approaches). The design choice seems tied to administrator goals. Unsurprisingly, those whose main goal was to boost participation in an existing program leveraged the existing program's structures (PG&E Local Government Partnerships and others). Programs involving contests and competition (e.g., Kansas Take Charge Challenge), or which community partners initiated (e.g. NWWVT HEAT Squad), tended to create a more novel administrative and delivery structure.

In speaking with administrators we found that not all CBPs are treated as stand-alone programs. Specifically, some administrators—particularly in Massachusetts—consider their CBPs as part of portfolio-wide marketing efforts. These CBPs-as-marketing-tactics still involve working closely with local stakeholders (mayors, nonprofits, citizens) but focus solely on customizing marketing efforts to channel local participation in existing programs. In Massachusetts, at least, these marketing CBPs are not subject to formal program evaluation standards. Thus, the review uncovered even greater diversity than we had originally assumed there would be in the way CBPs are planned, implemented, and evaluated.

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[3] The EECBG program was part of the 2009 American Recovery and Reinvestment Act, and provided funding for local governments, states, and territories to fund a range of energy efficiency and renewable energy projects. The DOE Better Buildings Neighborhood program was also used to distribute both EECBG and State Energy Program funds through a competitive selection process.

Customer segment of interest. Traditionally, administrators have offered efficiency programs to all eligible customers, aiming to achieve participation territory-wide. Of the 25 CBPs we reviewed, many were delivered to the general population (72%), although others catered to the moderate-income sector (28%), high-potential savers (28%), non-native English speakers (20%), single-family or multi-family housing (16%), or renters (8%).[4] Some programs catering to specific groups delivered the offering to any customer living in a geographic region with a high density of target participants. For example, demand-reduction CBPs often focused on towns containing constrained circuits (NSTAR's Marshfield Energy Challenge) or neighborhoods defined specifically by circuit geography (National Grid Rhode Island's System Reliability Procurement Pilot). Geographic clustering can also minimize "search costs" associated with recruiting participants from hard-to-serve customer segments such as moderate-income households who do not meet low-income program eligibility criteria but may still have trouble accessing market-rate programs (Clark PUD's Community Energy Efficiency Program, Efficient Neighborhoods+) or non-English-speaking households (Boston CMIs). Among the income-qualified CBPs, the approach of providing the same tailored design (e.g., waiving income history requirements) to all members of a community is thought to be effective because it avoids placing a stigma around income that could pose a barrier to participation. One administrator advised that CBPs add value because the program can highlight several programs for a community, but present them within a holistic framework that allows customers to self-select into the most appropriate offering for their needs. The administrator noted, "*We found that if you go into a community and you say, 'Who's limited income? Who's unemployed?'* [it doesn't work, because] … *customers don't want to be identified that way. They'd rather just note the suite of programs that exist, and self-identify or go through the processes that get them enrolled into what is best for them*."

Geographic scope. Reviewed CBPs defined their "community" geography differently, including the Census block (e.g., MA PAs' Efficient Neighborhoods+), town (e.g., Neighbor 2 Neighbor Energy Challenge), county (i.e., CA Regional Energy Networks), and service area (e.g., CA IOUs' Local Government Partnerships). Most programs (80%) entailed implementation at the level of a municipality or smaller. As shown in Figure 1, we classified a slight majority of CBPs (59%) as stand-alone offerings available for one community. We classified remaining programs (41%) as umbrella programs, or those which developed a core program infrastructure and applied it with relatively little tailoring to multiple communities.

Planning resources relative to scale. Just as administrators ran the CBPs at a variety of scales, so too have they utilized a range of administrative and implementation resources and processes. Localized programs tended to use existing program and marketing staff across multiple projects (e.g., one marketing staffer who spent 50% of their time supporting CBP outreach) while larger programs commanded more resources (e.g., a team of several staff who spent 100% of their time supporting CBP administration, plus additional outreach contractors). The California Regional Energy Networks (RENs), for example, are stand-alone community-based administrators of ratepayer-funded programs. A board of local county governments leads each REN, which are designed to function at a multi-county scale; according to BayREN, this human capital drives the network's ability to work at scale. In contrast, smaller offerings (e.g., National Grid Community Initiatives, CT Clean Energy Communities) or those which relied on grant funding (CT Neighbor 2 Neighbor, Kansas Take Charge Challenge, Energy Efficiency 2020) had fewer dedicated staff on hand and provided marketing support to a selected set of towns per year. Administrators facing staffing constraints have occasionally leveraged interns, AmeriCorps volunteers, citizens, and municipal officials to shoulder some implementation and delivery costs. Still, all of the reviewed CBPs that persisted over multiple years have had dedicated staff. Not surprisingly, for a program design heavily reliant on making in-person connections, administrator staffing constraints—in the short and long term—appear to determine CBPs scalability.

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[4] Totals do not sum to 100% because some administrators used some CBPs to reach multiple segments.

Community marketing approaches. CBPs add particular value over traditional ratepayer-funded energy efficiency programs by using community expertise and attributes to help overcome key barriers to customer participation in energy efficiency programs. Compared to programs in which either a utility or the community works in isolation, community partnerships enable both the PA and the community to offer more comprehensive customer services then would otherwise be possible (Carmalt, Justus, and Schulte 2010). Based on the review, we identified ten main program tactics of CBPs. The tactics are: enhanced marketing, education and outreach (ME&O),[5] technical assistance for community partners to support outreach and implementation, concierge service for customers to support enrollment and participation, trainings and workforce development for contractors, participant incentives, community incentives, energy champions to incite local spirit, contests and competition, financing, and translation services. Reviewed CBPs used a mean of four of these ten community tactics (range: 1 to 9).

All reviewed programs used some form of community-enhanced marketing and outreach (Table 1). Thereafter, however, any individual tactic is present in no more than 60% of all programs (Table 1); this spread appears to evidence the varied program contexts surrounding reviewed CBPs. For example, translation services are present only in programs seeking to reach non-English-speaking customers (e.g., Renew Boston, MA PAs' Community Mobilization Initiatives, PG&E Local Government Partnerships, RENs, and others), and inter-town contests can only be leveraged in umbrella programs available to multiple towns at one time (e.g., KS Take Charge Challenge, CT N2N, NWWVT HEAT Squad). Differences also appear regionally. In Massachusetts, for example, CBPs generally focused on removing customer-level barriers to participation, as revealed by offering additional concierge services, enhancing marketing, and supplementing participant incentives. In contrast, CBPs in other states more frequently took 'community' level approaches like workforce development programs, community incentives, and technical assistance.

Table 1. Customer and community engagement tactics tailored to community context

Tactic	Prevalence among reviewed CBPs		Programs in which tactic was evaluated[a]	… and found effective
Enhanced ME&O	25	100%	60%	93%
Technical assistance	14	56%	36%	80%
Energy champion	12	48%	25%	100%
Concierge service	11	44%	55%	50%
Trainings / workforce development	11	44%	64%	100%
Participant incentive	11	44%	55%	100%
Organization incentive	11	44%	30%	33%
Contests and competition	8	32%	50%	75%
Financing	7	28%	71%	60%
Translation services	6	24%	50%	33%

a: This is the share of programs using a strategy and that formally evaluated the strategy's effectiveness, in the sense of using an EM&V report to present evidence that the strategy was effective, ineffective, or had uncertain effectiveness.

Table 1 also shows that evaluators and administrators have found most tactics to be variably successful. Workforce trainings, additional participant incentives, energy champions, enhanced marketing, technical assistance for communities, and motivational contests were effective community engagement tactics. Tactics less-frequently found to be effective included financing, concierge services, incentives for CBOs, and translation.

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[5] Enhanced marketing, for purposes of this review, means marketing that leverages local geography (e.g., sending marketing materials to customers in demand-constrained areas), community institutions (e.g., using municipal government letterhead or partnering with a local non-profit, placing messages inside water bills; tabling at town events), and/or local community interactions (e.g., local messengers).

Interviewed administrators generally felt that outreach positioning a CBP as a local effort (one type of enhanced ME&O) benefitted customer engagement because it re-framed the program in terms more familiar to customers (i.e., co-branded materials with utility and CBO logos, municipal letterhead, cross-promotions in water or sewer bills).[6] Most administrators who had used co-branding (7 of 9), for example, noted that it was one of the more-valuable aspects of their CBPs. Additional administrators who used local messengers to market the program recruited locally well-known citizens, CBO representatives, or volunteers (e.g., AmeriCorps, youth organizations) to plan and deliver in-person outreach. Those who had used local messengers (7 of 7) noted that they were valuable; one commented that "*The primary benefit is the additional communication with people and really just the relationships that are being built [between the administrator, CBOs, and customers]. … Cobranding… is helpful for a customer to see that their utility is working with the city government or working with a trusted organization to deliver a service.*"

Supporting initial hypotheses that CBPs are hard to compare because implementation is so locally-tailored, administrators who had used local messengers to deliver CBP marketing affirmed that this tactic's effectiveness depends critically on finding a messenger who has social capital (5 of 9). One administrator likened the process of finding the right local messenger –someone who was trusted and well connected to other town members—to be like "*finding that needle in a haystack; it's sometimes very difficult.*" Other administrators likened good messengers to "*connective tissue of the community, that know everybody.*" Administrators who find the "right" messenger, either an individual or an organization, have found that the messenger serves as the administrators' surrogate in the community, and adds value because the local partner can shoulder some costs of "navigating" the best marketing outlets. An administrator reported, "*They [the partner] have a lot of legitimacy within that community. We've been leveraging them to essentially open doors for us. We kind of relied on them to help us determine what communities should we go into, what existing outreach is already happening that we can piggyback on. They've really done that navigating for us. So I would say finding the right either local or regional partner is key in being successful.*" Still, despite plentiful sentiments that community elements add to a program's ability to engage with customers, few administrators could offer measurable evidence that the same benefits would not have been achieved without the community outreach elements.

Evaluation methods. Our review focused on programs designed and evaluated within the EM&V framework mandated by utilities' regulatory commissions. Program evaluations studied topics familiar to the evaluation community, including participation and evaluated *ex post* savings (e.g., participant counts, measure diversity, savings per-participant, program savings goal achievement), stakeholder experiences (e.g., administrator, implementer, participants), and process evaluation (e.g., whether the program is functioning well as-designed, or whether a pilot could be scaled up). CBP value has been most often demonstrated using process evaluation, drawing on sources like materials review, stakeholder in-depth interviews, and participant surveys. Success metrics have included determining whether participants have positive sentiment about the program or administrator, documenting the program's ability to reach target segments, and assessing whether the design is replicable or scalable. Notably, impact and process evaluations also usually showed "gross" outcomes, and did not always complete a robust attribution analysis that allocated a share of the outcomes to the community-focused intervention (e.g., relative to a baseline program).

Table 1 shows this gap in the literature as it pertains to tactic effectiveness. As can be the case in energy efficiency program evaluations more generally, the CBP evaluations we reviewed did not often focus on understanding the relative role that different program interventions played in achieving program savings. Each tactic's effectiveness was formally explored in at most 70% of cases. For example, just three of 12 reviewed CBPs incorporating local energy champions to promote community engagement studied the effectiveness of this tactic in meeting program goals. While all three program reports presented evidence that the tactic was successful, the

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[6] Interestingly, the administrators we spoke with rarely reported that "lack of customer trust in the utility" was an important barrier to energy efficiency in their service area. Administrators were asked to rate the significance of 8 possible barriers to energy efficiency program participation in their area, on a scale of 0 to 10 where 0 is "not at all significant" and 10 is "significant." Administrators rated lack of customer trust in their utility at 3.0 on this scale.

low coverage rate (33%) suggests that there may be publication bias (i.e., favorable results tend to be highlighted more so than less-favorable results).

Where completed, evaluation methods studying tactic effectiveness tended to rely on post-program participant surveys (e.g., marketing recall or motivations to participate in the program), process interviews with program administrators, and triangulation.[7] If suitable comparison groups (and data) existed, some evaluations completed matched comparisons between participating and non-participating towns or other quasi-experimental techniques to estimate the share of savings attributable to the CBP intervention as a whole. Good examples included Efficient Neighborhoods+, Rhode Island SRP, WMS, and CEWP/CEWO. Additionally, a few CBPs were set up with an experimental design (4 of 25) and were able to formally evaluate the comparative effectiveness across component engagement tactics (CT Neighbor 2 Neighbor, Efficient Neighborhoods+, Rhode Island SRP, Marshfield Energy Challenge). Finally, some evaluations triangulated multiple sources of information to draw conclusions about probable drivers of program success. [8]

Benefits of community-based programs: warm, fuzzy, and hard to measure

Overall, the literature review and in-depth interview findings suggest that five criteria mark the CBP design's value and viability (Table 2).

Table 2. Community-based program success metrics indicating program viability and value

Indicator of design viability and value	Description
Program savings goal achievement	Programs tracked achievements like customer participation, energy savings, and goal realization, but should be set up to tie these achievements to community outputs/outcomes (e.g., participant tracking per event or mailers sent). (*Short-term metric*)
Customer reach, awareness, actions	Some CBPs tracked changes in participation, measure mix and savings per participant, or hard-to-reach population participation. Fewer evaluations examined changes in community engagement relative to changes achieved in a territory-wide program. (*Short term metric*)
Process outcomes	Programs could be considered viable if process-based signals show the program works as designed. Areas to explore would include the extent to which the PA and community based organizations worked well together, that tracking systems capture relevant information and met community needs (e.g., benchmarking), or that activities and outcomes are consistent with a community-based theory of change (*Short-, medium- or long- term metric*)
Community capacity/ structural change in the utility-	While not explored/documented consistently across CBP evaluations, administrators reported higher-level benefits including: increased community capacity, administrator's improved understanding of customer needs, improved administrator-

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[7] The NWWVT Heat Squad evaluation asked participants to rate the influence of different factors on their decision to participate, including Energy Advisors. The Marshfield Energy challenge evaluation asked participants to indicate how they learned about the program; results showed that participants more frequently learned about the program from friends and family compared to non-participants who were aware of the program, suggesting trusted messengers boosted conversion rates.

[8] The Efficient Neighborhoods+ evaluation could not determine what share of the initiative's success was due to increased marketing versus enhanced incentives. Still, participant survey results showed that cost was a major barrier to making energy efficiency improvements, and cross-community comparisons showed that towns offering increased incentives had a higher assessment-to-project conversion rate. Together, the evaluators suggested that the enhanced incentives may have made a difference.

community interface	community relations, and spillover benefits like readiness to participate in future programs. (*Medium or long- term metric*)
Program longevity	Program longevity or evolution to a fully-funded/full-scale program, expansion to additional towns, adding to or refining features of a basic design, etc. show that CBPs are valuable and may have a longer-term place in the administrator's portfolio. (*Long-term metric*)

Interviewed administrators expressed concerns about how to measure the more intangible among the benefits in Table 2, expressing some consternation that the biggest CBP benefits – community capacity and goodwill—are even harder to measure than incremental changes in participation or savings. CBPs may boost local goodwill, trust, and other outcomes secondary to energy saving/demand reduction goals, but few CBPs have tracked these outcomes in a way that establishes a link between program outputs and non-resource outcomes. Rather, evaluation methods for these longer-term structural changes are under-developed, and we found that results are generally discussed anecdotally rather than via a formal research design. As one administrator noted, the utility has "*a sense of goodwill that's been created with participation or partnering with these communities, but I don't know if there is any type of measuring stick for that [type of outcome].*"

Respondents recalled that they have faced measurement challenges within the traditional evaluation framework because the framework focuses on a specific, and typically relatively short, timeframe. Some of the evaluation gap appears tied to the general challenges of measuring non-energy benefits, energy savings from behavioral changes, or benefits that take some time to accrue. Namely, CBP evaluation has been a challenge in the absence of data needed to tie indirect impacts to program activity, issues developing the right baseline in a complex market, and timing issues (benefits that accrue years after costs). Another part of the challenge appears tied to capturing behavioral or institutional spillover.[9] Finally, others struggled to attribute savings to community activities because programs were run as experimental designs.

Altogether, this suggests that the main benefits of CBPs have fallen off the balance sheet. Some administrators noted that CBPs do not often appear cost-effective within a regulatory framework focused only on savings, as with the one who noted that, "*…if your goal is numbers [of participants or savings]—I don't think community based outreach is the way to go. If your goal is building a long-term relationship with less-measurable outcomes then I think that there is a case to be made about how it can really benefit the community.*" Some programs, including National Grid's Community Initiatives, have addressed this concern by funding and assessing CBPs as primarily a marketing technique. Tracking participation rates and customer awareness over time —and in addition, CBO or partner satisfaction over time— would enable CBPs to demonstrate these benefits more rigorously. More broadly speaking, to adequately represent the true value of CBPs as a program, it may be that evaluators can consider applying evaluation methods used to address other programs, such as market effects studies, codes and standards efforts, or social marketing.

Community-Based Energy Efficiency Program Classification System

In compiling 25 CBPs, exploring the relative effectiveness of community-based tactics (Table 1), and assessing their values (Table 2), we recognized the need for a classification system to organize the breadth of program designs, with particular regard to understanding how administrators conceptualize community-based elements relative to any existing mass-marketed energy efficiency programs. Unlike some standard energy efficiency offerings that administrators implement with relatively little variation from state to state,[10] CBPs vary

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[9] For example, one administrator noted that participating community had hired a sustainability coordinator based on their experiences with the CBP. This outcome is indirect to the CBP's energy-saving goals, but accrued over the longer-term and may produce spillover savings.

[10] For example, upstream lighting programs, multifamily direct install, Home Performance with Energy Star, and other designs are planned, implemented, and evaluated in relatively similar fashion from state-to-state.

widely across administrators in terms of implementation strategy.[11] We present a classification system that organizes programs on the basis of 12 design elements, and show the range of approaches seen during the review and discussed during in-depth interviews. The classification system shows the range of operating contexts (e.g., resources and constraints) and program design choices administrators have made. Many programs' attributes fall somewhere in the middle of the range endpoints.

Administrators and evaluators can use this classification to determine which best-practices are sensitive to context and applicable to their CBP. When transferring findings across studies, we suggest that evaluators consider, at minimum, similarities and differences between their program and past programs in terms of program origins (mandates/regulatory environment), the mix of ratepayer and other funder resources used to support a program (e.g., federal, NGO, municipal), basic program structure (nature of utility-community partnership, measures, delivery; i.e., program ties and design in Table 3) and program goals (savings, target participants, non-resource, other). Additionally, evaluators should consider whether the CBP is working with communities that have an intrinsically-high level of bandwidth and preparedness, or whether the program was designed to build capacity where there was none before.

Table 3. A proposed community based program classification system

Program Element	Range	
Origins	Regulatory mandate	Voluntary
Administration	EE administrator only	Community only
Funders	Ratepayer only	Federal/state/municipal/private
Goals	Non-specific (*e.g., enhanced relationships, community capacity-building, participation "lift"*)	Specific (*e.g., # new energy efficiency jobs, kWh/kW savings*)
Portfolio position	CBP is a cross-cutting marketing activity promoting existing programs	CBP is an original (new) stand-alone program
Design	Umbrella program offered to multiple communities with no customization	Program developed for and customized to one specific community
Customer type	Non-specific/general population	Specific customer segment(s)
Participation goal(s)	Customer-level measures (*e.g., home audit*)	Community-level measures (*% participation; municipal retrofits*)
Geographic scale	U.S. Census block	Utility territory
Program messenger	Administrator materials only	Community materials only
Non-resource/ non-energy benefits	Incidental to resource/energy goals, but not tracked or claimed	Part of formal goals (see above) and tracked
Longevity	Limited engagement (e.g., 1 program year)	Extended/multi-year partnership process

Discussion

Our review captured 25 CBPs, among which we documented a great diversity of goals, approaches, activities, and outcomes. Synthesizing the review and in-depth interviews supports several original hypotheses about CBPs, highlights new understanding about why results have been variable, and illuminates areas for future research. Key findings and areas for future work are discussed in the following paragraphs.

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[11] An exception is made for programs which have evolved from prior iterations over time, e.g., programs that evolved from ARRA-funded trials may retain some elements as it evolves.

CBPs are not a one-size-fits-all program design, yet appear to have converged on a similar set of strategies to address a core set of barriers. CBPs can either enhance existing energy efficiency programs or serve as novel offerings, and are generally designed to offer multi-touch approaches that each address multiple barriers to energy efficiency. The community-based design is a customizable approach to achieving program savings that allows administrators to better leverage local flavor in working through persistent barriers to energy efficiency in their service area. Commonly, CBPs attempted to overcome barriers related to cost, awareness, capacity, customer trust, excitement, commitment to completing complex program structures and the general challenge of reaching and serving customers that have historically not participated in traditional energy efficiency offerings. "Traditional" ratepayer-funded energy efficiency programs also address many of these barriers, but CBPs often place greater focus on overcoming non-monetary barriers and consider community institutions as trusted partners in this attempt. While a utility may be able to implement these strategies without a community partner, process evaluation findings suggest that the approaches are likely to come "alive" in the eyes of the customer when community-based organizations are involved.

CBP benefits may ultimately depend on "the eye of the beholder." Our review covered 25 programs tied to ten energy efficiency program administrators' existing ratepayer-funded offerings over the past 10 years, although we encountered numerous additional programs that fell slightly outside of this scope (e.g., Klein and Coffey 2016). While our review establishes that CBPs are not rare, it does suggest that their value is in the eye of the beholder. Administrators, evaluators, communities, and regulators are likely to perceive their value differently from one another; thus, conclusions about CBP value and viability are sensitive to the frame of reference. Non-resource benefits (e.g., local sustainability capacity, community relations) were some of the most-often-noted values of CBPs, but not all regulatory commissions count these types of outcomes toward program benefits.

Existing EM&V frameworks encourage evaluation methods that fall short of capturing CBP benefits. Common lore among program administrators is that community partnerships are not as cost-effective as top-down programs because they garner only marginally-more participation (e.g., 70 audits when an existing program would have achieved 65). Still, we found that not all programs had been evaluated in ways that fully captured program benefits, including marginal gains in participation and savings, as well as non-resource benefits. Speaking with administrators revealed that few CBPs were designed or tracked in ways that would facilitate these analyses. Administrators in areas where non-resource benefits are not highly valued due to regulatory frameworks face a risk in running programs that offer moderate energy-saving benefits, at higher cost, and whose primary non-resource benefits are hard-to-measure. Fully answering questions of CBP viability and tactic effectiveness calls for program designs that better facilitate structured evaluation and attempts to better capture non-energy benefits.

New evaluation methods may be needed to explore long-term outcomes, such as spillover and benefits associated with structural changes in the way utilities and communities interact with respect to energy efficiency. Part of the perception that CBPs are a poor value seems to stem from the eye of the beholder. In contrast to an administrator examining benefits through the lens of a regulated EM&V framework, community stakeholders may perceive CBPs as producing bountiful (albeit slow-to-develop) outcomes such as growing capacity, connections, and equitability. In the broader view, CPBs that achieve a wider reach (PG&E LGPs, RENs, CT Clean Energy Challenge) do appear to be valued (by administrators and regulators) as a tool for community building, and in some cases (e.g., Sustainable Jersey) these community benefits are counted in equal measure to their use as a tool for achieving savings. Many utilities, however, perceive that there are plenty of other, possibly less-costly, ways to build community relationships.

We challenge CBP administrators and evaluators to explore systems that can better capture CBP benefits by borrowing unique approaches from other types of programs facing similar measurement challenges. The strict measurement requirements set by many utility commissions for administrators miss the opportunity to measure long-term savings and non-energy benefits. Additional process measurements to show non-energy

benefits include tracking participant diversity, participation rates among harder-to-reach segments, and others. Additional impact evaluation methods may be able to capture some of the longer-term or harder-to-measure outcomes, such as those used in behavioral programs, codes and standards initiatives, and retrospective market transformation evaluations (Opinion Dynamics 2015; NMR 2015). These offerings face similar measurement challenges due to their multi-year pathway to energy savings, questions of persistence, and measurement challenges.

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A complete list of the 70+ references consulted for this research is available from the authors on request

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