# A Toolkit for Community CLEAN ENERGY PROGRAMS

WESTERN RESOURCE ADVOCATES

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# EXECUTIVE SUMMARY

The nation has, at least temporarily, reduced the rate at which electricity production adds to greenhouse gases in the atmosphere. However, a lot more can be done. Individuals and businesses can make clean energy decisions that reduce the amount of carbon dioxide released into the atmosphere by being more energy efficient and, where feasible, by using on-site renewable energy such as solar energy.

To be enduring and widespread, clean energy decisions must become customary and routine rather than be just the result of special efforts of government programs. Community organizations can be key players in moving clean energy into the mainstream. This report provides a practical toolkit for community organizations to work collaboratively to advance local clean energy programs. These organizations can use this report to select specific tools to prepare proposals for funding and to carry out energy efficiency and on-site renewable energy projects.

Community organizations are typically nonprofits that work in a local area, such as a county, neighborhood, or parish, with a mission of economic, civic, social, or environmental improvement. They design and implement programs to help utilities meet renewable energy and energy efficiency requirements, and they pursue clean energy programs for individuals and businesses beyond those sponsored by utilities.

Considering the experience of community organizations in Arizona and elsewhere, there are several basic activities central to successful clean energy programs:

1. Take stock of the strengths, weaknesses, opportunities, and threats facing clean energy in their communities and facing their organizations.
2. Develop program or organizational objectives. The objectives may be incremental extensions of ongoing activities or the result of discussion and development of new organizational strategies.
3. Understand barriers to clean energy deployment and review how to overcome those barriers. Barriers include high up-front costs for some measures; lack of good information about clean energy costs, benefits, and performance; people's inefficient habits and behavior; and needlessly complex program requirements.
4. Figure out what markets to operate in and what clean energy services to promote.
5. Capitalize on synergies among organizations to accelerate early adoption of clean energy resources and to find additional opportunities for clean energy projects. A diversity of organizations with different perspectives may help to better define problems facing clean energy and devise more effective solutions to those problems.
6. Develop ways to educate citizens, consumers, and contractors by:
    a. Identifying the most effective messages to advance clean energy.
    b. Considering the extent that behavioral barriers to energy efficiency can be overcome and designing programs accordingly.

c. Eliciting potential participants' concerns about clean energy and addressing those concerns through personalized assistance.

d. Working with and designing programs to help contractors who sell and install clean energy measures, and ensuring that the contractors are proficient in making quality installations.

7. Use social networks to recruit participants. These networks include word of mouth, existing events like neighborhood association meetings or church meetings, and social media such as Facebook and Twitter.

8. Strengthen community relationships by:

   a. Empowering community members, giving them some control over the program, and getting buy-in from local leaders and respected organizations at the beginning of the clean energy program.

   b. Establishing trust within the community to be served. Trust encompasses technical expertise, reputation within the community, integrity and objectivity, and shared norms or commitments.

9. Look for big opportunities for small incentives to increase program participation and raise visibility.

10. Scale up. As clean energy programs grow, community organizations need to maintain an efficient program, expand their capabilities, match supply with demand, and handle large numbers of participants.

11. Monitor and evaluate program progress, costs, and results. These activities should be used to:

    a. Identify delivery problems and ways to fix them.

    b. Demonstrate results, including:

       i. Levels of participation.

       ii. Costs incurred.

       iii. The amount of clean energy measures installed and behavioral changes made.

       iv. Energy savings or renewable energy produced. Savings may be estimated by adapting estimates from other studies, by employing commercially available energy use models, and by undertaking statistical analyses of savings. If budgets allow, a community organization may engage an expert to conduct energy savings studies specifically for its programs.

12. Diversify funding sources. Potential sources include contracts for designing and implementing utility programs, foundation and government grants, donations, sales of measures or nominal workshop fees, and possibly "crowdfunding."

# INTRODUCTION

The nation has, at least temporarily, reduced the rate at which electricity production adds to greenhouse gases in the atmosphere. However, a lot more can be done. Individuals and businesses can make clean energy decisions that reduce the amount of carbon dioxide released into the atmosphere by being more energy efficient and, where feasible, by using on-site renewable energy such as solar energy.

To be enduring and widespread, clean energy decisions must become customary and routine rather than be just the result of special efforts of government programs. Community organizations can be key players in moving clean energy into the mainstream.

This report provides a practical toolkit for community organizations to advance energy efficiency and on-site renewable energy programs, especially in collaborative situations. Community organizations can select and use specific tools to prepare proposals for funding and to design and implement clean energy projects. The report does not address political advocacy to advance clean energy.

## BACKGROUND

Portions of the nation are at the beginning stages of a transformation toward greater energy efficiency and greater use of on-site renewable energy. So far, this transformation has been initiated primarily through state energy policies, especially renewable energy standards and energy efficiency standards for electric utilities. Federal programs such as ENERGY STAR® and various financial incentives have also helped accelerate the transformation. Table 1 shows the leading states in energy efficiency programs and in additions to on-site photovoltaic (PV) installations at residential and other nonutility sites during 2012.[1]

Community organizations design and implement programs to help utilities meet renewable energy and energy efficiency requirements, and they implement programs that go beyond utility-sponsored programs. They often work informally with each other and, in some cases, they collaborate more formally.

[1] Energy efficiency data from American Council for an Energy-Efficient Economy, *The 2012 State Energy Efficiency Scorecard, Washington*, DC, 2012, Report No. 12C, Table ES-1, http://aceee.org/research-report/e12c. PV data pertain to grid-connected distributed photovoltaics located at the consumer's home or business and do not include utility-scale projects. MW represent DC generation capacity. PV data refer to installations during 2012, not cumulative installations. PV data from Larry Sherwood, *U.S. Solar Market Trends 2012* (Latham, N.Y.: Interstate Renewable Energy Council, July 2013), Appendix C, http://www.irecusa.org/wp-content/uploads/2013/07/Solar-Report-Final-July-2013-1.pdf. Population data from U.S. Census Bureau, "Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico, April 1, 2010 to July 1, 2012."

**Table 1.** *Leading States in Energy Efficiency Programs and On-Site PV Installations (2012)*

| **ENERGY EFFICIENCY:** Top 15 States on ACEEE 2012 Scorecard (in rank order) | | **ON-SITE SOLAR ENERGY:** Top 15 States on MW of Distributed PV Installed During 2012 per Person (in rank order) | |
|---|---|---|---|
| **Massachusetts*** | **Maryland*** | **Hawaii** | **Delaware** |
| **California*** | **Minnesota** | **New Jersey** | **New Mexico** |
| **New York*** | **Iowa** | **Arizona*** | **Nevada** |
| **Oregon*** | **Arizona*** | **Massachusetts*** | **Ohio** |
| **Vermont*** | **Michigan** | **California*** | **New York*** |
| **Connecticut** | **Colorado*** | **Vermont*** | **Missouri** |
| **Rhode Island** | **Illinois** | **Maryland*** | **Oregon*** |
| **Washington** | | **Colorado*** | |

* Indicates state appears on both lists. MW = megawatts.

There are two large benefits of working collaboratively. First, community organizations have developed expertise in specific clean energy programs and have established credibility within the neighborhoods or other communities where they operate. By working together, they can expand their capabilities so that the resulting projects save more energy or produce more on-site renewable energy. Second, many foundations who fund clean energy programs tend to favor collaborative approaches.

This report overlaps previous studies on program design,[2] but takes the perspective of clean energy programs designed and implemented by community organizations. This report also differs from some previous reports in that it considers collaborative approaches and focuses on managerial activities and decision making.

Before turning to the toolkit itself, it is useful to provide some context for community clean energy programs. The remainder of this introductory section defines clean energy, describes typical community organizations and the people they serve, reviews the economic and business aspects of a transformation of the electric industry through disruptive technologies and creative destruction, and summarizes regulatory uncertainties that currently confront utility clean energy programs.

## CLEAN ENERGY

In this report, we focus on clean energy actions that can be taken by individuals and businesses, i.e., energy efficiency and on-site renewable energy. Many people use more energy than needed for efficient space heating or cooling, lighting, refrigeration, water heating, and running various appliances and devices. Excess energy consumption can be reduced by using more efficient measures and practices without degrading the quality of services provided. As a consequence, energy-efficient consumers pay lower energy bills.

[2] These studies include: (1) Merrian Fuller, Cathy Kunkel, Mark Zimring, Ian Hoffman, Katie Lindgren Soroye, and Charles Goldman, *Driving Demand for Home Energy Improvements* (Berkeley, Calif. Lawrence Berkeley National Laboratory, September 2010), Report LBNL-3960E, http://drivingdemand.lbl.gov/. (2) Doug McKenzie-Mohr, *Fostering Sustainable Behavior: Community-Based Social Marketing*, http://www.cbsm.com/pages/guide/preface/. (3) Mark Zimring, Merrian Goggio Borgeson, Ian Hoffman, Charles Goldman, Elizabeth Stuart, Annika Todd, and Megan Billingsley, *Delivering Energy Efficiency to Middle Income Single Family Households* (Berkeley, Calif.: Lawrence Berkeley National Laboratory, December 2011), Report LBNL-5244E, http://middleincome.lbl.gov/.

On-site renewable energy includes photovoltaic systems that produce electricity, solar hot water systems, and wind energy facilities.[3] PV projects are often installed on rooftops, but they may also be ground-mounted projects at airports, located within the water supply system for pumping, and installed on shade structures and shelters, for example.[4] On-site renewable energy displaces electricity that would have been provided by the utility serving the consumer. If installed at energy-efficient homes or businesses, on-site renewable energy projects can be downsized (and less costly) because less electricity is consumed.

Clean energy provides environmental and health benefits. Neither renewable energy nor energy efficiency emits pollutants into the atmosphere. The utility-provided electricity that is saved by energy efficiency or displaced by on-site renewable energy would have been generated using natural gas or coal as a fuel. Combustion of fossil fuels produces carbon dioxide, a major contributor to greenhouse gases that alter long-term climate. Burning coal also emits sulfur dioxide, nitrogen oxides, and mercury into the atmosphere, thereby impairing visibility and causing adverse health effects, such as premature mortality, respiratory diseases, asthma attacks, and heart attacks.

## COMMUNITY ORGANIZATIONS

Community organizations typically are nonprofits that work in a local area, such as a county, neighborhood, or parish, with a mission of economic, civic, social, or environmental improvement. Community organizations that advance clean energy measures may be specifically focused on clean energy, but many have broader purposes, such as promoting a range of environmental activities, assisting low-income households, assisting seniors, applying religious principles to daily life, or promoting general community improvement.[5] Clean energy programs can be one component of an organization's broader mission.

In Arizona, community organizations have implemented or administered several clean energy programs, including the following:

- Shade tree programs that provide shade for sun-struck portions of a building and reduce air conditioning demand
- Contractor training to achieve quality installations of efficiency measures
- Home Performance with ENERGY STAR® (a whole-house approach to energy efficiency)
- Educational programs regarding on-site solar energy, including use of solar coaches and solar ambassadors
- Deployment of on-site solar energy and energy efficiency measures in churches and other buildings belonging to religious organizations

[3] For a review of recent solar installations, see Larry Sherwood, *U.S. Solar Market Trends 2012* (Latham, N.Y: Interstate Renewable Energy Council, July 2013), http://www.irecusa.org/wp-content/uploads/2013/07/Solar-Report-Final-July-2013-1.pdf.

[4] Western Resource Advocates, *Solar Solutions: Incorporating Photovoltaics into Public Infrastructure*, Boulder, Colo., 2011, http://www.westernresourceadvocates.org/energy/solarsol/pvreport.pdf.

[5] For more detail on community clean energy programs, see (1) David Berry, "Delivering Energy Savings through Community-Based Organizations," *The Electricity Journal* 23 (November 2010): 65-74. (2) David Berry, "Community Clean Energy Programs: Proficiencies and Practices," *Environmental Practice* 15 (June 2013): 97-107. (3) Eric Mackres, Elena Altschuler, Amy Stitely, and Erin Brandt, *The Role of Local Government and Community Organizations as Energy Efficiency Implementation Partners: Case Studies and a Review of Trends*. Washington, DC, and Cambridge, Mass., American Council for an Energy-Efficient Economy and Energy Efficiency Strategy Project, 2012, http://aceee.org/files/pdf/white-paper/Local-EE-Implementation.pdf. (4) Brendan McEwen, "Community Based Outreach Strategies in Residential Energy Upgrade Programs," (master's thesis, Massachusetts Institute of Technology, 2012), http://dspace.mit.edu/handle/1721.1/73819. (5) Shayna Hirshfield and PJ Iyer, "The Community Energy Champions Grant: Building Local Organizational Capacity to Catalyze Community Energy Behavior Change" (paper presented at 2012 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, CA, August 12-17, 2013), pp. 6-105 to 6-120, http://www.aceee.org/files/proceedings/2012/data/papers/0193-000205.pdf. A study of the role of public gardens also presents useful lessons for community programs: Meghan Gough, John Accordino, Jay Lindsey, and Jordan Snelling. *The Role of Public Gardens in Sustainable Community Development* (Kennett Square, Penn.: American Public Gardens Association. 2011), http://www.publicgardens.org/files/files/Sustainable_Communities_11_26_2012_final.pdf.

Successful community organizations have credibility within their service areas. An evaluation of a community-based energy efficiency program in Australia found that one of the strengths of the program was that the community organizations had good knowledge of the needs of the target population.[6] Developing and maintaining good community relationships is a major feature of community clean energy programs, as will be discussed throughout this report.

Another common feature of successful community organizations is entrepreneurial leadership.[7] Entrepreneurial leaders:

- See opportunities for clean energy
- Operate in a new way that changes social and economic conditions by altering the rate or type of deployment of clean energy resources
- Are proactive
- Create value for society
- Innovate with regard to diffusion of clean energy
- Manage risk

People served by community organizations are both citizens and consumers. As consumers, they make economic decisions and personally benefit from energy bill savings, improved indoor air quality, greater comfort, greater control over energy production and use, etc. As citizens, people are members of society, interacting with others in the community, engaging in activities intended to improve their communities, and responding to social norms. Information about clean energy is often obtained through social networks, including social media and word of mouth. For clean energy programs to be successful, citizens need to be empowered to take ownership of the programs as opposed to having programs imposed upon them. These factors are discussed in the section on strengthening community relationships. Both citizenship and consumer dimensions of behavior are critical in developing effective clean energy programs.

## CLEAN ENERGY AS A DISRUPTIVE TECHNOLOGY

Clean energy resources located at the consumer's home or business are disruptive technologies in the sense that they deviate from the historical business model of central station power generation and delivery of electricity over a transmission and distribution system. Initially, disruptive technologies occupy a niche market because they may cost more and they may not have all the features of mainstream goods or services that consumers desire. They do, however, have features that appeal to early adopters — in this case, reduced air pollution, lower utility costs, more control over energy use and production, better indoor air quality, and so forth. If they are successful in niche markets, the new technologies may make greater inroads into the broader market as costs fall and performance improves. In some circumstances, the disruptive technology may displace much of the older technology.[8]

[6] John Spoehr, Kathryn Davidson, and Lou Wilson, *An Evaluation of the Energy Efficiency Program for Low Income Households* (Adelaide, South Australia: Australian Institute for Social Research, University of Adelaide, 2006), Report to Energy Division, Department for Transport, Energy and Infrastructure, South Australia, http://www.efslearninghub.net.au/Portals/0/Resources/Publications/Files/645/SA%20eval_EEP_low%20income.pdf. The program was implemented by several community organizations: Anglicare, Lutheran Community Care, the Salvation Army, and UnitingCare Wesley. A private contractor also provided some of the services.

[7] On entrepreneurship, see: (1) Joseph Schumpeter, "The Creative Response in Economic History," *Journal of Economic History* 7 (1947): 149-159. (2) J. Barton Cunningham and Joe Lischeron, "Defining Entrepreneurship," *Journal of Small Business Management* 29 (1991): 4-61. (3) Filipe Santos, "A Positive Theory of Social Entrepreneurship" (Fountainbleau, France: INSEAD Social Innovation Centre, 2009), Faculty & Research Working Paper 2009/23/EFE/ISIC, http://evpa.eu.com/wp-content/uploads/2010/09/INSEAD-A-positive-theory-of-Social-Entrepreneurship.pdf. (4) Jay Weerawardena and Gillian Sullivan Mort, "Investigating Social Entrepreneurship: A Multidimensional Model," *Journal of World Business* 41 (2006): 21-35.

[8] Joseph Bower and Clayton Christensen, "Disruptive Technologies: Catching the Wave," *Harvard Business Review* 73 (January-February 1995): 43–53. Stuart Hart and Clayton Christensen, "The Great Leap: Driving Innovation from the Base of the Pyramid," *MIT Sloan Management Review* 44 (Fall 2002): 51–56.

Clean energy entrepreneurs may drive a process of creative destruction.[9] Creative destruction is the relentless entry of new technologies, new forms of organization, and other innovations into the economy, resulting in a break from previous business operations. These changes are not incremental but are, instead, severe and disruptive to incumbent firms and established processes and technologies.

Introduction of disruptive technologies and innovations may be accelerated through strategic niche management.[10] This process entails development and early adoption of promising new technologies through regulation, incentives, funding of demonstration projects, policies to commercialize new technologies, consumer education, and the like. It is intended to create a temporary "incubator" for these technologies and provide opportunities for learning and improving the technologies. Implementation of the renewable energy and energy-efficiency standards adopted in many states is a form of strategic niche management.

## REGULATORY UNCERTAINTY

Clean energy deployment has been accelerated by state programs that require electric utilities to implement energy efficiency programs and to acquire a portion of their electric generation from renewable resources. However, after some highly successful starts, the future of utility-sponsored clean energy programs is now somewhat murky. There are multiple issues and debates causing utility regulators and legislators to consider modifying programs that promote energy efficiency and on-site renewable energy. Uncertainty about the resolution of these issues makes it difficult to plan clean energy programs. These pressures are playing out with regard to:

- The dollar savings that can be obtained by customers with on-site renewable energy projects. If these savings are reduced by changes in the components of electric rates, renewable energy projects will become less attractive economically, and the rate of adoption of on-site renewable energy will decrease. Savings can be reduced by:
  - Lowering the amount paid by a utility or credited by a utility to the customer for excess renewable energy produced by on-site projects and delivered to the utility.
  - Changing rate designs to increase utilities' fixed-cost recovery from customers who have installed on-site renewable energy projects.
- Impacts of energy efficiency on nonparticipants in efficiency programs. As electricity sales decrease due to more efficient energy use, regulated utilities will seek to recover their fixed costs through higher rates on both participants and nonparticipants in utility efficiency programs. In some states, regulators have permitted "lost" fixed-cost recovery through special charges. Increasing charges on nonparticipants may become difficult for regulators to support, however.
- Selection of analytical procedures for calculating the costs and benefits of energy efficiency so that fewer measures pass the regulator's cost-effectiveness test.
- Concerns associated with smart meters. Smart meters provide detailed information that can be used by consumers and utilities to improve energy efficiency. Regulators have been asked to determine whether smart meters create privacy issues for customers and whether the meters create any health hazards. The resolution of these issues may affect the degree to which smart meters can be used to support greater energy efficiency.

[9] Joseph Schumpeter, *Capitalism, Socialism and Democracy*, New York: Harper & Row, 1950.

[10] René Kemp, Johan Schot, and Remco Hoogma, "Regime Shifts to Sustainability through Processes of Niche Formation: The Approach of Strategic Niche Management," *Technology Analysis & Strategic Management* 10 (1998): 175–195.

# TOOLKIT

There are several practices central to successful clean energy programs. These practices make up the toolkit (Table 2). The toolkit is designed so that community organizations can select and use specific elements to prepare proposals for funding and to create and implement clean energy projects. Each element is described in the remainder of this section.

The elements of the toolkit are intended to enable community organizations to be flexible, evolve, fit multiple proficiencies together coherently, work collaboratively, expand their capabilities, create opportunities to accelerate adoption of clean energy, and promote innovation. Ideally, multiple approaches to advancing clean energy will emerge so that community organizations, municipalities, utilities, and others can adopt and adapt best practices and modify those practices as conditions change.

**Table 2.** *Tools in the Toolkit*

## TOOLS IN THE TOOLKIT

1. Assessing the organization's strengths, weaknesses, opportunities, and threats (SWOT analysis)
2. Determining program objectives
3. Identifying barriers to clean energy
4. Identifying services and markets
5. Developing synergies among organizations
6. Creating education programs
7. Recruiting participants
8. Strengthening community relationships
9. Determining the role of incentives
10. Scaling up
11. Monitoring and evaluation
12. Diversifying funding

## A PLACE TO START: SWOT ASSESSMENT

A useful starting point for developing a new community clean energy program or evaluating existing clean energy programs is an assessment of strengths, weaknesses, opportunities, and threats (SWOT). Going through a SWOT exercise can provide a basis for more detailed discussions of the other elements in the toolkit. A SWOT assessment is especially useful if it is based on input from multiple organizations and experts who can bring different perspectives. Table 3 presents a SWOT assessment for Arizona in 2013.

**Table 3.** *SWOT Assessment of Arizona Community Clean Energy Programs, 2013*

| | INTERNAL FACTORS | EXTERNAL FACTORS |
|---|---|---|
| POSITIVE FACTORS | **STRENGTHS:**<br>• Established and successful community clean energy programs<br>• Entrepreneurial leadership<br>• Trusted organizations<br>• Practical experience in readily identifying significant sources of inefficient energy uses (e.g., leaky ducts, poor attic insulation, poor quality installations of HVAC equipment, absence of shade) | **OPPORTUNITIES:**<br>• Widespread inefficiencies in energy use<br>• Excellent solar resource<br>• Under-served market segments (e.g., low-income neighborhoods)<br>• Early adopters/niche markets<br>• Potential for partnerships among community organizations and with municipalities<br>• Potential availability of detailed consumption data from smart meters<br>• Potential adoption of property assessed clean energy (PACE) programs[11]<br>• Media coverage of solar energy |
| NEGATIVE FACTORS | **WEAKNESSES:**<br>• Uncertain funding<br>• Lack of readily available, reliable data on energy savings for some efficiency measures | **THREATS:**<br>• Regulatory discontinuation of utility programs or reduction in funding of utility programs<br>• Sources of energy inefficiency not apparent to public (e.g., leaky ductwork)<br>• Changes in utility rate designs to recover more fixed costs through fixed charges and demand (kilowatt) charges with lower energy (kilowatt-hour) rates, thereby reducing the value to the consumer of energy savings or solar energy production<br>• High costs of some clean energy measures |

[11] PACE programs allow local governments to offer clean energy project loans to eligible property owners. The property owners can thus obtain financing for clean energy projects. The loan is paid back through an assessment on participants' property tax bills.

## OBJECTIVES

In setting goals or objectives, a fundamental question for community organizations is whether to aim for well-defined incremental changes — modifications of existing practices and proficiencies — or to establish big, general goals that will put the organization on a different and perhaps ambitious path. The former extends past success and remedies current problems. The latter could move the organization out of its comfort zone and will require extensive discussion and commitment by its leaders.[12]

Big goals might be to increase energy efficiency savings attributable to the organization's program by four times that of recent levels within 10 years or to encourage installation of 20 megawatts (MW) of on-site renewable energy in a specific community within five years, for example. Incremental objectives might be shorter-term, more modest goals such as specified improvements in service delivery features for the next year or two. Examples of incremental or big changes, depending on how ambitious they are, include:

- Improving education of consumers/citizens about clean energy
- Expanding existing programs to serve additional consumers/citizens
- Adding new efficiency and renewable energy programs
- Improving the quality of installation of efficient space cooling measures
- Combining energy efficiency and renewable energy programs
- Obtaining more secure sources of funding
- Measuring results (energy savings, renewable energy production) more accurately

## BARRIERS TO CLEAN ENERGY

When deciding what programs to pursue and how to structure those programs, organizations will need to consider the barriers to clean energy in their target markets.[13] Some barriers can be effectively addressed by community organizations, while overcoming other barriers may require actions by government, utility regulators, or others. Additionally, some barriers may result from the design of the program itself, making participation inconvenient, complicated, or pestered by paperwork.

Table 4 summarizes common barriers to clean energy and assesses whether the barriers could be readily addressed by community organization programs. Overcoming barriers may involve education programs, including personalized assistance to program participants, strengthening relationships with the community, developing partnerships with other organizations who can offer needed services, and simplifying program processes. These types of techniques are discussed in subsequent sections.

[12] Bill Shore, Darell Hammond, and Amy Celep, "When Good is Not Good Enough," *Stanford Social Innovation Review* 12 (Fall 2013): 40-47, http://www.ssireview.org/articles/entry/when_good_is_not_good_enough#bio-footer.

[13] There is a large literature on barriers to energy efficiency. For example, see: (1) Marilyn Brown, "Market Failures and Barriers as a Basis for Clean Energy Policies," *Energy Policy* 29 (2001): 1197–1207. (2) Tom Tietenberg, "Reflections — Energy Efficiency Policy: Pipe Dream or Pipeline to the Future?" *Review of Environmental Economics and Policy* 3 (2009): 304-320. (3) Doug McKenzie-Mohr, "Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing," *Journal of Social Issues* 56(2000): 543–554.

**Table 4.** *Common Barriers to Clean Energy*

| BARRIERS | BARRIERS THAT MAY BE ADDRESSED BY COMMUNITY PROGRAMS | | BARRIERS NOT EASILY ADDRESSED BY COMMUNITY PROGRAMS |
|---|---|---|---|
| | **BARRIER DETAILS** | **COMMUNITY PROGRAM ACTIVITY** | **BARRIER DETAILS** |
| **High up-front cost of measures** | • Lack of access to capital or financing | • Partnering with banks or credit unions that can lend money for clean energy projects | • Short payback period (high implicit discount rate) |
| **Lack of information about measures** | • Lack of consumer awareness of inefficiencies<br>• Misinformation<br>• Confusing processes for acquiring measures<br>• Uncertainty about who to trust concerning measures<br>• Uncertainty about performance or cost of measures | • Education and coaching<br>• Personalized assistance<br>• Strengthening relationships with community (building trust, empowering citizens, using social networks, partnering with local organizations) | |
| **Habit and behavior** | • No pressure to examine energy use<br>• Failure to follow through on recommended measures | • Education and coaching<br>• Personalized assistance<br>• Comparison to mainstream behavior or best practices | |
| **Complicated programs** | • Inconvenient processes<br>• Excessive steps required of participant | • Simplifying program processes so they are easy to implement | |
| **Contractor issues** | • Poor-quality installations<br>• Failure to sell recommended measures<br>• Failure to explain to findings and options to customers | • Contractor training | |
| **Other** | • Split incentives for rental units (renter pays energy bill but landlord determines what measures, if any, are installed) | • Education of landlords | • Environmental costs not included in energy price<br>• Energy pricing distortions |

## SERVICES AND MARKETS

Clean energy programs offer specific services and operate in specific markets. Table 5 lists common services that could be offered in the existing home market in Arizona (as opposed to new construction). In addition to the existing home market, some community organizations emphasize improved energy efficiency and deployment of solar energy in churches and other religious buildings. Members of Arizona Interfaith Power & Light have, for example, installed PV systems on covered parking structures and on church rooftops.

An example of nonprofit activity in the commercial new construction market is the Green Schoolhouse Series.[14] This program constructs new standardized school buildings to replace old “temporary” portable classrooms with a focus on improved indoor air quality, energy efficiency, and reduced water consumption. The school construction is funded by partner corporations, many of which are design and construction firms, engineering firms, and suppliers of building components.

[14] Green Schoolhouse Series website, http://www.greenschoolhouseseries.org/index.html.

**Table 5.** *Common Services for the Existing Home Market in Arizona*

| SERVICES | REMARKS |
|---|---|
| Energy assessment | · *May be done quickly by experts knowledgeable in local construction practices* |
| Efficient lighting | · *Typically CFLs and LED lighting* |
| Faucet aerators and low-flow showerheads | · *Reduce consumption of hot water and thus reduce energy use* |
| Space cooling upgrade | · *Emphasizes quality installation* |
| Air sealing, duct sealing, insulation | · *Quality of installation extremely important* |
| Shade screens, efficient windows | |
| Variable speed pool pumps | |
| Second refrigerator recycling | · *Applies to old, inefficient second refrigerators*<br>· *Properly recycles or disposes of second refrigerator components* |
| Shade trees | · *For shading the west, east, or south sides of houses; especially effective if shading windows* |
| Power strips | · *Turn off devices that are not in active use* |
| Solar energy | · *PV or solar hot water is located at consumer's site*<br>· *Smaller PV system possible if building is more energy efficient*<br>· *Utility demand (kW) charges can be reduced if building is more energy efficient* |
| Behavior changes | · *May be more effective if linked to current information on energy prices and energy usage through smart meter technology*<br>· *Should be linked to education efforts to overcome misinformation*<br>· *May be reinforced by comparing a customer's usage to other customers' usage* |

Community organizations could also consider "solar gardens" or community solar energy projects. There are several possible models, including: [15]

- **A special purpose entity.** A moderate-size PV system (for example, 30 kilowatts to perhaps 2 MW) would be constructed and would sell the energy to a utility or to a specific consumer (if legally permitted to do so). These types of projects could be ground-mounted or located on a rooftop or other structure. The special purpose entity sells shares of the PV panels to individual subscribers. The subscribers may receive revenues from their net share of the sale of electricity or, if the utility agrees, may see a credit on their electric bills representing their share of the value of electricity sales to the utility.
- **A nonprofit organization.** A nonprofit organization would seek donations and grants to install a specific PV system, such as a facility on a school rooftop. In this example, the school would benefit from the PV system.

These types of business models should be considered only after reviewing legal, tax, regulatory, securities, and financial issues.

[15] Jason Coughlin, Jennifer Grove, Linda Irvine, Janet F. Jacobs, Sarah Johnson Phillips, Alexandra Sawyer, and Joseph Wiedman, *A Guide to Community Shared Solar: Utility, Private, and Non-Profit Project Developmen*t (Washington, DC: U.S. Department of Energy, Energy Efficiency & Renewable Energy, 2010), http://www1.eere.energy.gov/solar/pdfs/54570.pdf. For locations of specific community solar power projects, see Solar Gardens Institute website, http://www.solargardens.org/. Utilities may provide community solar service — in Arizona, Salt River Project and Tucson Electric Power offer solar energy service from utility-owned community solar projects.

Western ranch-style house with solar panels. PHOTO: Shutterstock

## PARTNERSHIPS: SYNERGIES AMONG ORGANIZATIONS

Partnerships among two or more organizations can serve several purposes. One purpose is to obtain greater energy savings or more installations of on-site renewable energy facilities as compared to what could be achieved if organizations acted independently. In particular, a partnership can expand the joint capabilities of the individual organizations, gain access to and credibility within additional markets or neighborhoods, increase program participation by reaching more people, and obtain additional funding.

Partnerships can also stimulate innovation in the delivery of clean energy by bringing together a variety of viewpoints. Debating and criticizing ideas can lead to new ideas, and considering unfamiliar perspectives can augment an organization's own experience.[16]

Satish Nambisan identified three types of collaboration "platforms."[17] The exploration platform is concerned with figuring out what the problem is and with connecting with other organizations that can help solve the problem. A key to exploration is bringing together a diversity of organizations with different perspectives that will work toward defining and solving the problem. In the experimentation platform, the partners focus on developing and testing solution prototypes. And in the execution platform, partners disseminate templates for applying the solutions and help adopters use the solutions.

[16] Jonah Lehrer, "Groupthink: The Brainstorming Myth," *The New Yorker*, January 30, 2012, http://www.newyorker.com/reporting/2012/01/30/120130fa_fact_lehrer?currentPage=all.

[17] Satish Nambisan, "Platforms for Collaboration," *Stanford Social Innovation Review*, Summer 2009: 44-49, http://gallery.mailchimp.com/10ad13776f37fd579549ddc33/files/platforms_for_collaboration.pdf.

Potential partners should bring value to a coalition. Francie Ostrower[18] concluded that partners should have complementary missions and resources. She pointed out that partnerships may also be beneficial when goals cannot be achieved without coordinated action and when the partners are dedicated to those goals. The value of adding another partner to the coalition should, therefore, be reviewed before the partnership is formed and then again at intermediate times during the partnership to see if it is worth the effort to create and maintain the partnership.

For a partnership to be beneficial over the long run, the partners need to carefully plan how they will each contribute, come to an understanding about which organization is responsible for which activities and who bears the costs of those activities, and agree on implicit or explicit incentives inherent in the relationship so as to advance the partnership's goals. [19]

In the case of community clean energy partnerships, collaborating organizations can achieve synergies by offering complementary services or by working in complementary markets. Here are some examples of partnerships:

- Deploying clean energy resources in a neighborhood may be part of a larger strategy to provide jobs and stabilize communities. Partnerships between clean energy programs and programs to upgrade substandard housing could both enhance energy efficiency and restore the value of the houses or generally improve welfare in the community.[20] For instance, a program to help residents stay in their homes may be combined with an energy efficiency program to make those homes safer, more comfortable, and less expensive to maintain. Or a shade tree program to promote energy efficiency could be combined with a job training program for young adults.[21]
- Energize Phoenix is a collaborative program involving the City of Phoenix, Arizona State University, and Arizona Public Service Company (APS). The project is intended to create a sustainable, large-scale model of urban energy efficiency along the light rail line in Phoenix by improving the energy efficiency of residential, office, and industrial buildings.[22] Arizona State University provides analytical capabilities beyond those usually found at community organizations. APS provides program management skills.
- Partnering with financial institutions (e.g., banks and credit unions) may increase the scope of services available to program participants.[23] The financial institutions could provide loans for efficiency projects recommended through the community program, thus helping to overcome high up-front cost barriers. For example, the National Bank of Arizona offers financing for qualified customers installing energy efficiency measures.[24]

[18] Francie Ostrower, "The Reality Underneath the Buzz of Partnerships: The Potentials and Pitfalls of Partnering," *Stanford Social Innovation Review* 3 (Spring 2005): 34–41, http://creativecity.smallboxcms.com/database/files/library/realityunderneaththebuzzofpartnerships.pdf.

[19] Ibid. See also Francie Ostrower, *Cultural Collaborations: Building Partnerships for Arts Participation*, Washington, DC: Urban Institute, 2003, http://www.urban.org/UploadedPDF/310616_CulturalCollaborations.pdf.

[20] For example, see John Spoehr, Kathryn Davidson, and Lou Wilson, An Evaluation of the Energy Efficiency Program for Low Income Households (Adelaide, South Australia: Australian Institute for Social Research, University of Adelaide, 2006), Report to Energy Division, Department for Transport, Energy and Infrastructure, South Australia, http://www.efslearninghub.net.au/Portals/0/Resources/Publications/Files/645/SA%20eval_EEP_low%20income.pdf.

[21] "Youth and Young Adults (14–24)," Minnesota Tree Trust website, accessed November 20, 2013, http://treetrust.org/jobs/youth-young-adults/.

[22] Mick Dalrymple, Drew Bryck, Rob Melnick, and Rick Heffernon, *Energize Phoenix: Energy Efficiency on an Urban Scale, Year 2 Report, Preliminary Findings* (Tempe, Ariz.: Arizona State University Global Institute of Sustainability, 2012), http://energize.asu.edu/docs/gios/energize/2012year2/EnergizePhoenixYear2Report.pdf.

[23] Brendan McEwen, "Community Based Outreach Strategies in Residential Energy Upgrade Programs" (master's thesis, Massachusetts Institute of Technology, 2012), http://dspace.mit.edu/handle/1721.1/73819.

[24] "Green Returns Banking & Financing," National Bank of Arizona website, accessed November 20, 2013, https://www.nbarizona.com/Specialty-Green-Returns.jsp.

- Partnering with a local architect who specializes in green building may reveal additional opportunities for energy savings and renewable energy projects.
- A community organization working with a specific constituency, such as a neighborhood association, may provide credibility for an energy efficiency program offered by another group. A partnership between the two could increase participation in the efficiency program in a specific neighborhood.

# EDUCATION

There are several aspects to education: using effective messages, changing behavior and overcoming habit, providing personalized assistance to participants, and training contractors.

## EFFECTIVE MESSAGES

As emphasized by Fuller et al., clean energy programs must go beyond providing information to offer services that consumers and citizens want.[25] Thus, messages must focus on attributes that people value. The Arizona community organizations that contributed to this report identified three major messages that are widely applicable, as well as several other messages that may be effective with some audiences (Table 6). Determining what messages are effective depends on the audience; knowledge of local conditions is essential in identifying the best messages.

**Table 6.** *Effective Messages*

| WIDELY APPLICABLE MESSAGES | OTHER POTENTIALLY EFFECTIVE MESSAGES (DEPENDING ON AUDIENCE) |
|---|---|
| • Saving money (or reducing energy service bills)<br>• Improving comfort<br>• Improving indoor air quality or occupants' health or productivity | • Restoring the value of one's home<br>• Controlling energy use (self-reliance)<br>• Environmental improvement<br>• Social norms (what should be done; what the mainstream does)<br>• Responsibility as a steward of God's creation |

One effective message is to focus on the health benefits or productivity of building occupants resulting from efficiency upgrades. For example, efficiency upgrades such as improved ventilation may lead to a reduction in respiratory disease, or improved lighting quality may increase worker productivity.[26]

Messages should generally be simple and straightforward — people are not going to respond to complicated explanations. Nonetheless, for whole-house improvements, contractors or community organization staff are going to have

[25] Merrian Fuller, Cathy Kunkel, Mark Zimring, Ian Hoffman, Katie Lindgren Soroye, and Charles Goldman, *Driving Demand for Home Energy Improvements* (Berkeley, Calif.: Lawrence Berkeley National Laboratory, September 2010), Report LBNL-3960E, http://drivingdemand.lbl.gov/.

[26] William Fisk, "Health and Productivity Gains from Better Indoor Environments and their Relationship with Building Energy Efficiency," *Annual Review of Energy and the Environment* 25 (2000): 537–566, http://ourplanetgbs.com/Our_Planet_GBS/Why_green_files/FiskAnnualReviewEE2000.pdf.

to explain how all the parts fit together and why a system approach is beneficial.[27] For example, installing a more efficient air conditioner may not save as much energy as expected unless leaks in the ductwork are also fixed.

## CHANGING BEHAVIOR/OVERCOMING HABIT

Education programs are often aimed at changing behavior and habits. Doug McKenzie-Mohr identifies several behavioral barriers, including lack of motivation, forgetting to act, lack of social pressure, and lack of knowledge. These barriers can be overcome by making commitments (such as written commitments to follow through on clean energy recommendations), referring to social norms (what should be done, what the mainstream does), using clear prompts such as signage (turn out the lights), communicating clean energy messages by trusted sources and personal contact, making desired behavior visible, and making it easy to be energy efficient.[28]

Some effective behavior changes include lowering the thermostat setting in the winter and raising it in the summer, reducing water heater temperature, and turning off devices when they are not in use.[29]

Another approach to changing behavior is to use peer comparisons — utilities inform customers whether their electricity usage is lower or higher than the usage of similarly situated customers. The idea is to indicate to high-usage customers that mainstream customers use less energy and thereby encourage high-usage customers to become more efficient. Some studies indicate that these types of messages cause high-usage customers to reduce their consumption about 1% to 2% during the first year, although the messages may also induce low-usage customers to increase electricity use.[30]

## PERSONALIZED ASSISTANCE

The Foundation for Senior Living noted that the fundamental question to ask program participants or potential participants is “What are your concerns?” Addressing those concerns is a central purpose of community organizations’ educational efforts. It is accomplished by offering personalized assistance to program participants.

Having a person who has installed a renewable energy system on his or her house available to answer questions gives potential participants some assurance that taking on a similar project is achievable. In-home visits may also be a way to provide personalized assistance for energy efficiency measures. In addition, especially with complex measures like renewable energy or expensive efficiency measures, it is advantageous if the community organization provides an objective coach who can assist potential participants through the steps of evaluating options, shopping around, obtaining permits, and so forth.

[27] Brendan McEwen, “Community Based Outreach Strategies in Residential Energy Upgrade Programs” (master’s thesis, Massachusetts Institute of Technology, 2012), p. 53, http://dspace.mit.edu/bitstream/handle/1721.1/73819/811342156.pdf?sequence=1.

[28] Doug McKenzie-Mohr, *Fostering Sustainable Behavior: Community-Based Social Marketing*, 2011, http://www.cbsm.com/pages/guide/preface/.

[29] Michael Vandenbergh, Jack Barkenbus, and Jonathan Gilligan, “Individual Carbon Emissions: The Low Hanging Fruit,” *UCLA Law Review* 55 (2008): 1701-1758.

[30] Ian Ayres, Sophie Raseman, and Alice Shih, *Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage* (Cambridge, Mass.: National Bureau of Economic Research, September 2009), NBER Working Paper No. 15386, http://www.nber.org/papers/w15386. Summit Blue Consulting LLC, *Impact Evaluation of OPower SMUD Pilot Study*, Boulder, Colo., September 24, 2009.

A Wisconsin energy efficiency program engaged energy advocates to provide personalized assistance to participants.[31] The advocates received training and were able to explain energy efficiency benefits; assist with paperwork; provide and sometimes install compact fluorescent lamps, faucet aerators, and low-flow showerheads; explain behavioral changes to save energy (e.g., turning off lights); and explain technical information and measure costs. Program staff and program participants viewed the energy advocates as central to the success of an energy efficiency program.

An Arizona shade tree program also uses experts to provide personalized assistance. Experts are available to answer questions at or after an instructional workshop on tree benefits, selection, siting, and care. Arizona Public Service Company found that "The workshops provided tree care and maintenance tips that most customers did not know prior to attending. Many customers exiting the workshops commented about how the Program would help them maintain their current trees as well as the new, Program trees.... An Ask the Expert station is available at each event where customers may receive additional expert advice on any number of landscape topics. This station stays open with tree and garden experts available until all customers have had their questions answered." [32]

## TRAINING CONTRACTORS

Contractors are often the key to deployment of clean energy measures since they install many of the efficiency and renewable energy measures, and they are often the principal point of contact with participants. Community organizations want those contractors to do a good job so that the measures will save energy or produce hot water or electricity reliably. Therefore, it is important that contractors have adequate training and are able to make quality installations.

For those organizations that train contractors to make quality installations of clean energy measures, there are several effective steps to improve installations. First, if the training is mandatory for participation in utility-sponsored clean energy programs, contractors are motivated to enroll in and to pass the training program. Second, whether the training is mandatory or not, the trainer has to make his or her expectations clear using specific work standards for each type of project; in that way, passing the training course requires mastery of concrete principles and methods. Successful instruction may rely on pictorial guides to diagnose and correct inefficiencies. Contractor training may also address ways to convince consumers to actually adopt recommended efficiency measures.[33]

A horticulturist and certified arborist conducts a workshop on siting, planting, and care of shade trees to save energy.
PHOTO: Valley Permaculture Alliance

[31] PA Consulting Group, *Together We Save: Process Evaluation Report*, Madison, Wis., 2010, prepared for the Public Service Commission of Wisconsin.

[32] Arizona Public Service Company, *Demand Side Management Shade Tree Pilot Program, Measurement, Evaluation and Research Report*, Phoenix, Ariz., May 2012, p. 13, http://images.edocket.azcc.gov/docketpdf/0000136453.pdf.

[33] Elizabeth Stuart and Megan Billingsley, "'But I'm Not a Salesman': Energy Efficiency Contractor Sales Training Success Stories" (paper presented at Behavior, Energy & Climate Change Conference, Sacramento, Calif., November 14, 2012), http://beccconference.org/wp-content/uploads/2012/11/Stuart_BECC2012_Contractor_SalesV3.pdf.

## RECRUITING PARTICIPANTS THROUGH SOCIAL NETWORKS

Social networks are central to participant recruitment. They can be effective means of spreading the word about clean energy and may give greater credibility to the message because of existing relationships among senders and receivers of information. These networks include:

- **Word of mouth**. One church member tells another about a successful energy efficiency project or one neighbor tells another about his photovoltaic project.[34] This form of recruitment can reach many potential participants through cascading effects — Clean Energy Durham reported that individuals who attended its Basic Energy Education programs and Hands On Workshops taught neighbors about energy efficiency and some of them, in turn, taught more neighbors.[35]
- **Social media and online networks**. Information can be widely conveyed through social networking sites, such as Facebook.
- **Inclusion in another event**. A clean energy program can be part of another activity, such as a neighborhood open house, school meeting, or church event. Given the constraints on people's time, it is often best not to set up separate clean energy events but instead insert clean energy messages into an existing forum.[36] Further, by working through an established event, the clean energy program is making use of an existing social network.

Participant recruitment should be sensitive to cultural and language differences. Otherwise, clean energy messages are likely to be ignored or misunderstood.

## STRENGTHENING COMMUNITY RELATIONSHIPS

Community clean energy programs work within communities, such as neighborhoods or churches. In this context, community members should be viewed more as citizens rather than as consumers. There are several key ingredients that improve citizen participation in clean energy programs within these communities: empowerment, use of social networks, and establishing trust (Figure 1).

Programs that are perceived to impose solutions on a community are likely to be ineffective. People need to be empowered to pursue community improvement and to create and control changes within their community.[37] That is, the community must take ownership of the clean energy program and, to enable this, a community organization needs buy-in from stakeholders at the beginning of the program development process.

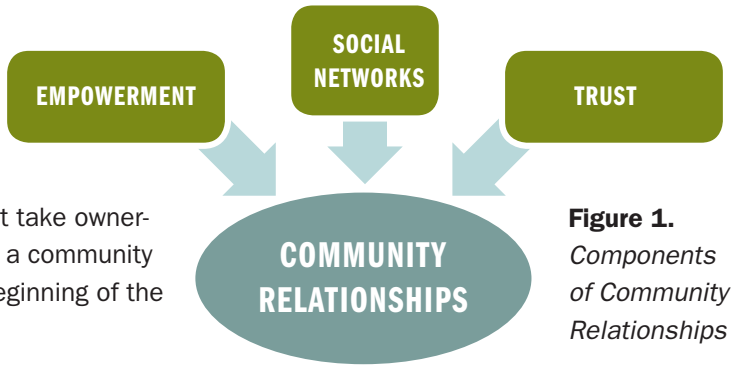


**Figure 1.** *Components of Community Relationships*

[34] Some contractors also rely on word of mouth from satisfied customers to bring in new business. These referrals can include clean energy projects.

[35] Clean Energy Durham, 2011 *Annual Report: Saving Energy, Building Community*, Durham, N.C., http://www.cleanenergydurham.org/images/stories/annual_report/2011_clean_energy_durham_annual_report.pdf.

[36] Daniel Lawse, "Phase I Report — Morton Meadows Neighborhood Energy Savings Program: A Pilot Program To Reduce Residential Energy Consumption Neighborhood-Wide" (project for masters in Community and Regional Planning, University of Nebraska, Lincoln, 2008), pp. 34–35.

[37] A good example can be found in Richard Ames, "The Sociology of Urban Tree Planting," *Journal of Arboriculture* 6 (May 1980): 120–123, http://auf.isa-arbor.com/request.asp?JournalID=1&ArticleID=1652&Type=2. See also Connecticut Clean Energy Finance and Investment Authority and Smartpower, *Let's Solarize: Solarize Connecticut Phase 1 Report*, September 2013, http://www.smartpower.org/our-research/reports.

When a program or organization does not have strong community relationships, it may sputter along. In several California programs that had difficulty attracting participants, Hirshfield and Ayer found that attempts to apply a program model without local input or an understanding of local needs were unsuccessful; it was necessary to fit the program to the community, not the other way around.[38]

As discussed in the section on recruitment, above, social networks convey information about clean energy measures and suppliers. Thus, social networks are essential for recruiting participants for the clean energy program and, if volunteers are used by the community organization, for recruiting volunteers. Previous program participants can serve as credible messengers about a program and recruit new participants.

To get people to act on clean energy, it is also necessary to establish trust with the community. Otherwise, clean energy messages will be met with indifference. Trust encompasses several interrelated factors:

- **Demonstrated technical expertise**, such as successful shade tree planting and care, or quality installation of air conditioning equipment and ductwork. Contractor training programs are one way to gain and certify technical expertise. Developing a list of qualified contractors can be very helpful to potential participants.[39]
- **Reputation within the community**. Having an established, positive reputation with people in the community will likely increase participation in clean energy programs. This reputation may come from having worked in the community for a long time or through a partnership with other organizations that have established local reputations. Also, if respected local leaders adopt some clean energy measures and that experience is publicized, clean energy will be more visible and may appear more sensible to citizens and consumers.
- **Integrity and objectivity** to guide potential participants through complex processes to learn about, shop for, obtain permits for, and correctly use clean energy measures. This kind of personalized assistance can be offered by coaches and ambassadors who do not have a financial stake in making a sale.
- **Shared norms**. This applies in a variety of situations, such as general agreement on the need for neighborhood improvement or agreement in faith-based communities that being good stewards of the earth is important. Through these types of norms or commitments, a clean energy program provides ways to channel general objectives into concrete actions.

## ROLE OF INCENTIVES

Utility-sponsored clean energy programs have initiated large-scale efforts to adopt clean energy measures. These programs have relied on providing incentives to consumers or contractors. Incentives to consumers can offset high up-front costs and attract participants. And incentives to contractors can be important in getting them to expand their expertise, take mandatory courses on proper installation techniques, and take on additional administrative responsibilities as part of a clean energy program, for example. Incentives may constitute the majority of the program budget.

For community organizations with limited financial resources, offering large incentives is generally impractical. Community organizations' programs typically emphasize educational efforts aimed at barriers stemming from lack of information, habit and behavior, and at contractor issues (see Table 4). Their programs also focus on strengthening

[38] Shayna Hirshfield and PJ Iyer, "The Community Energy Champions Grant: Building Local Organizational Capacity to Catalyze Community Energy Behavior Change" (paper presented at 2012 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, Calif., August 12–17, 2012), pp. 6-105 to 6-120, http://www.aceee.org/files/proceedings/2012/data/papers/0193-000205.pdf.

[39] See "Choose Your Provider," Arizona Home Performance website, accessed November 20, 2013, http://azhomeperformance.com/find_a_contractor.html.

community relationships. However, small incentives may increase program visibility and increase participation and enthusiasm for clean energy. Opportunities for using limited incentives include:

- Giving away or installing free, low-cost measures, such as CFLs, faucet aerators, and low-flow showerheads if the participant agrees to an in-home visit.
- Setting up challenge programs, in which individuals, municipalities, neighborhoods, or other communities compete with each other to meet clean energy goals and offering prizes to those individuals or communities who perform best. For example, the Climate and Energy Project operates Take Charge Energy Challenges in the Midwest, and the Tallahassee Council of Neighborhood Associations challenged neighborhoods to see which could save the most energy using behavioral changes or inexpensive efficiency measures.[40]
- Presenting awards to participants and partners who have made significant advances in deployment of clean energy. These awards also give the program more visibility in the community.

[40] Climate and Energy Project, "Take Charge Challenge," *MPower, Monthly Power News from CEP*, August 2013, http://www.climateandenergy.org/resources/CEPAug2013NewsletterFINAL.pdf. "The Tallahassee Neighborhood Energy Challenge," Tallahassee, Leon County Council of Neighborhood Associations website, accessed November 20, 2013, http://www.econa.org/econa/page.html?page_id=34.

## SCALING UP

As community organizations expand their programs, they will also need to scale up their activities. Scaling up entails both the ability to serve more participants effectively and the ability to be self-sustaining. Peter Uvin and David Miller listed general aspects of scaling up, including the following factors (as applied to community clean energy programs): [41]

- Increasing the number of program participants
- Replicating successful programs
- Encouraging other local organizations with related missions
- Integrating the organization with other governmental, private sector, and nongovernmental organizations' activities
- Adding new functions to the organization
- Mobilizing more people to support or participate in the organization's activities
- Expanding networking opportunities
- Diversifying funding sources
- Improving the skills of the organization's staff
- Maintaining organizational accountability

Table 7 summarizes common components of the process of scaling up community clean energy programs — maintaining an efficient program, expanding capabilities, matching supply with demand, and handling large numbers of participants.

**Table 7.** *Components of Scaling Up*

| MAINTAINING AN EFFICIENT PROGRAM | EXPANDING CAPABILITIES | MATCHING SUPPLY WITH DEMAND | HANDLING LARGE VOLUMES OF PARTICIPANTS |
|---|---|---|---|
| • Develop an operating manual that includes processes setting out how activities are supposed to happen<br>• Select a crew that matches the complexity of the measures needed at a given site<br>• Focus on quality installations | • Partner with contractors and other organizations<br>• Add programs<br>• Add staff and volunteers<br>• Diversify and increase funding<br>• Promote learning by staff<br>• Improve business skills<br>• Improve technical skills | • Improve forecasts<br>• Maintain flexible relationships with suppliers and contractors<br>• Do not get ahead of contractors' ability to provide measures | • Use web-based enrollment<br>• Use online satellite images of homes (e.g., for siting shade trees)<br>• Use phone banks<br>• Manage large quantities of data with software to track and record participation, costs, savings, etc. [42]<br>• Characterize likely problems based on experience (as opposed to conducting individual detailed diagnostics) [43] |

[41] Peter Uvin and David Miller, "Paths to Scaling-Up: Alternative Strategies for Local Nongovernmental Organizations," *Human Organization* 55 (1996): 344–354.

[42] See Jill Feblowitz, *Making Energy Efficiency Even More Efficient* (Framingham, Mass.: IDC Energy Insights, June 2010), Report #EI223581, http://www.cgi.com/sites/cgi.com/files/white-papers/idc-energy-insights-white-paper.pdf.

[43] Based on Arizona experience, extensive diagnostic testing for efficiency measures adds little value as knowledgeable contractors will know from the age of the house and inspection of the premises where likely problems exist (e.g., leaky ductwork, inadequate shade).

Where programs are successful in recruiting lots of participants, it is necessary to match demand with the supply of measures, including the availability of contractors. If the program gets ahead of contractors' ability to take on new projects, participants may become frustrated with delays in installation.

Obtaining and retaining the staff necessary to add clean energy programs can be a critical issue. Staff turnover at a California organization resulted in termination of its energy efficiency program because of loss of management support and because the efficiency program did not mesh with the organization's basic mission.[44] The same issues apply to volunteers if the organization uses volunteers. Volunteers may be willing to commit only limited time to a project, and the organization must continually search for replacements.

## MONITORING AND EVALUATION

Monitoring program progress and evaluating program processes are important for a successful operation. These activities identify successes and shortcomings, and let program managers know when to make adjustments. They enable the organization to identify and manage risks. In addition, reliable monitoring and evaluation results demonstrate program progress to funders, the clean energy industry, and the public.

Most programs record participation levels, the volume and types of measures installed, and program costs. Evaluation of program processes may be less formal; nonetheless, problems in maintaining an efficient program, containing costs, expanding capabilities, matching supply with demand, handling large volumes of participants, and other program elements should be continuously reviewed, and changes should be made as needed.[45]

Typically, the most difficult aspect of monitoring is estimating energy savings. Some programs have relied on utilities to conduct these analyses. But if utility programs go away or if community organizations' programs are not sponsored by utilities, ready access to relevant data and models may be curtailed.

Making valid inferences about energy savings can be tricky. One approach is to use commercially available software to estimate savings or hire a consultant with expertise in using these models. Unfortunately, these models may not capture the effect of behavior of building occupants on energy use or may not be applicable in a given locality. Alternately, one could pursue a statistical analysis of the impact of efficiency measures, using electric consumption data from participants and nonparticipants or from participants before and after energy efficiency measures are installed. In addition, data on building characteristics, clean energy measure characteristics, occupant

[44] Shayna Hirshfield and PJ Iyer, "The Community Energy Champions Grant: Building Local Organizational Capacity to Catalyze Community Energy Behavior Change," (paper presented at 2012 ACEEE Summer Study on Energy Efficiency in Buildings, Pacific Grove, Calif., August 12–17, 2012), pp. 6-105 to 6-120, http://www.aceee.org/files/proceedings/2012/data/papers/0193-000205.pdf.

[45] Examples of program evaluations are (1) John Spoehr, Kathryn Davidson, and Lou Wilson, *An Evaluation of the Energy Efficiency Program for Low Income Households* (Adelaide, South Australia: Australian Institute for Social Research, University of Adelaide, 2006), Report to Energy Division, Department for Transport, Energy and Infrastructure, South Australia, http://www.efslearninghub.net.au/Portals/0/Resources/Publications/Files/645/SA%20eval_EEP_low%20income.pdf. (2) Efficiency Vermont, *Vermont Community Energy Mobilization Pilot Project, Final Report*, October 2009, http://webapps.cee1.org/sites/default/files/library/8683/CEE_Eval_2009_VermontCommunityEnergyMobilizationPilotProject_1Oct2009.pdf. (3) PA Consulting Group, *Together We Save: Process Evaluation Report*, Madison, Wis., 2010, prepared for the Public Service Commission of Wisconsin. (4) Arizona Public Service Company, *Demand Side Management Shade Tree Pilot Program, Measurement, Evaluation and Research Report*, Phoenix, Ariz., May 2012, http://images.edocket.azcc.gov/docketpdf/0000136453.pdf.

characteristics, weather, and other explanatory factors are needed. Assuming the data could be acquired, conducting statistical or other analyses of the data requires specialized skills that would have to be obtained by contracting with consulting firms or university faculty. [46]

The prevalence of smart meters may be helpful in obtaining electricity usage data. Utilities generally do not make their data available, in part to protect their customers' privacy. If customers could access their own smart meter data, however, those data could be used to help determine energy savings. For example, Salt River Project in Arizona enables customers to observe and download their daily and hourly electricity use via the utility's website.

In the absence of good primary data, community organizations may try to adapt and adopt findings from well-crafted studies prepared by others. However, there may not be any recent studies of relevant measures in a similar climate.

If reliable inferences about energy savings are critical for a particular program, a collaborative arrangement with a local university may be appropriate. University faculty or graduate students could help design the project so as to obtain needed data and analyze the results to estimate savings.

## FUNDING STRATEGIES

Much of the revenue for community organizations' clean energy programs has come from utilities that engage the organizations to implement portions of the utilities' clean energy programs. This source may continue to be one of the most important. However, utility programs could be cut back or eliminated by utility regulators. In addition, utility programs do not address every opportunity for energy efficiency or on-site renewable energy. Thus, community organizations need to look for other sources of funding.

A major source of funding is grants from foundations seeking to foster environmental improvement, assist low-income families, promote civic engagement, and pursue similar goals. Government grants may also be available. These could include federal grants for training contractors, weatherization program funding, and state and municipal grants to implement various programs. Grants are often difficult to obtain, however, as there are many organizations competing for limited amounts of money or because the requirements of the granting organization do not match clean energy program features.

Another source of funding is donations from members of the organization or the general public or local businesses. Faith-based programs may rely primarily on donations from members of the church, temple, or mosque. Inviting donors to special fund-raising events is a widely used technique — for instance Trees for Houston has an annual "Root Ball" with music and an auction to raise money. [47] Also, for specific projects like a neighborhood energy challenge, it may be possible to get local businesses to provide in-kind services or funding to support the project.

It may also be possible to obtain some revenues from sales of measures or from nominal workshop fees. For example, an organization promoting shade trees could charge a small fee to each participant who attends a workshop on

[46] Examples of these kinds of studies are (1) Grant Jacobsen and Matthew Kotchen, "Are Building Codes Effective at Saving Energy? Evidence from Residential Billing Data in Florida," *Review of Economics and Statistics* 95 (March 2013): 34–49. (2) Geoffrey Donovan and David Butry, "The Value of Shade: Estimating the Effect of Urban Trees on Summertime Electricity Use," *Energy and Buildings* 41 (2009): 662–668. (3) Ram Pandit and David Laband, "Energy Savings from Tree Shade," *Ecological Economics* 69 (April 2010): 1324–1329. (4) Ram Pandit and David Laband, "A Hedonic Analysis of the Impact of Tree Shade on Summertime Residential Energy Consumption," *Arboriculture and Urban Forestry* 36 (March 2010): 73–80. (5) Kim Clark and David Berry, "House Characteristics and the Effectiveness of Energy Conservation Measures," *Journal of the American Planning Association*, 61 (Summer 1995): 386–395.

[47] "Root Ball 2013: Club Coco," Trees for Houston website, accessed November 20, 2013, http://www.treesforhouston.org/news-and-events/root-ball.html.

tree selection, planting, and care. The organization could also purchase trees from growers and resell the trees to participants at a mark-up.

"Crowdfunding" for specific projects or programs may also be a revenue source.[48] This method raises money for a project or program from a large number of people who each contribute a small amount; the fund-raising is conducted online on sites such as Kickstarter or Indiegogo. Crowdfunding should be carefully considered as there are drawbacks — for example, fees on some sites may be too high for the community organization, access to data may be limited, control over branding and presentation may not be possible, and access to the money raised could be rejected if the organization does not meet the full fund-raising goal. Moreover, some crowdfunding sources essentially offer investors a security that is then subject to securities regulations.


Drought-tolerant desert willows ready for distribution to homeowners to plant for shade to save energy. PHOTO: Valley Permaculture Alliance

[48] Devin Thorpe, "Eight Crowdfunding Sites for Social Entrepreneurs," *Forbes*, September 10, 2012, http://www.forbes.com/sites/devinthorpe/2012/09/10/eight-crowdfunding-sites-for-social-entrepreneurs/. "Grow Your Money with Solar," Mosaic website, accessed November 20, 2013, https://joinmosaic.com/.

# SUMMARY

Community organizations play a major and meaningful role in the delivery of clean energy to consumers and citizens. Over the past several years, they have designed and implemented a variety of energy efficiency and on-site renewable energy programs.

Considering the experience of community organizations in Arizona and elsewhere, there are several basic activities central to successful clean energy programs:

1. Take stock of the strengths, weaknesses, opportunities, and threats facing clean energy in their communities and facing their organizations.
2. Develop program or organizational objectives. The objectives may be incremental extensions of ongoing activities or the result of discussion and development of new organizational strategies.
3. Understand barriers to clean energy deployment and review how to overcome those barriers. Barriers include high up-front costs for some measures; lack of good information about clean energy costs, benefits, and performance; people's inefficient habits and behavior; and needlessly complex program requirements.
4. Figure out what markets to operate in and what clean energy services to promote.
5. Capitalize on synergies among organizations to accelerate early adoption of clean energy resources and to find additional opportunities for clean energy projects. A diversity of organizations with different perspectives may help to better define problems facing clean energy and devise more effective solutions to those problems.
6. Develop ways to educate citizens, consumers, and contractors by:
    a. Identifying the most effective messages to advance clean energy.
    b. Considering the extent that behavioral barriers to energy efficiency can be overcome and designing programs accordingly.
    c. Eliciting potential participants' concerns about clean energy and addressing those concerns through personalized assistance.
    d. Working with and designing programs to help contractors who sell and install clean energy measures, and ensuring that the contractors are proficient in making quality installations.
7. Use social networks to recruit participants. These networks include word of mouth, existing events, like neighborhood association meetings or church meetings, and social media, such as Facebook and Twitter.
8. Strengthen community relationships by:
    a. Empowering community members, giving them some control over the program, and getting buy-in from local leaders and respected organizations at the beginning of the clean energy program.
    b. Establishing trust within the community to be served. Trust encompasses technical expertise, reputation within the community, integrity and objectivity, and shared norms or commitments.

9. Look for big opportunities for small incentives to increase program participation and raise visibility.
10. Scale up. As clean energy programs grow, community organizations need to maintain an efficient program, expand their capabilities, match supply with demand, and handle large volumes of participants.
11. Monitor and evaluate program progress, costs, and results. These activities should be used to:
    a. Identify delivery problems and ways to fix them.
    b. Demonstrate results, including:
        i. Levels of participation.
        ii. Costs incurred.
        iii. The amount of clean energy measures installed and behavioral changes made.
        iv. Energy savings or renewable energy produced. Savings may be estimated by adapting estimates from other studies, by employing commercially available energy use models, and by undertaking statistical analyses of savings. If budgets allow, a community organization may engage an expert to conduct energy savings studies specifically for its programs.
12. Diversify funding sources. Potential sources include contracts for designing and implementing utility programs, foundation and government grants, donations, sales of measures or nominal workshop fees, and possibly crowdfunding.