New Energy Cities

Energizing Cities:

New Models for Driving Clean Energy Investment



MAY 2010

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Table of Contents

Table of Contents (continued)

Energizing Cities:
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Executive Summary

Climate Solutions, a Northwest-based nonprofit organization whose mission is to accelerate practical and profitable solutions to global warming, launched the **New Energy Cities** program in 2009 to catalyze the transition to a clean, renewable, super-efficient energy system in medium-sized cities in Washington, Oregon, Montana, and Idaho.

New Energy Cities works with pioneering local civic and elected leaders who are willing to embrace the clean energy economy in order to spur economic development, reduce vulnerability to energy price swings, and harness investment in an integrated clean energy system.

Financing is critical to the success of any clean energy strategy; hence, Climate Solutions made the development of a paper on clean energy financing its first priority in 2010. We asked Jules Bailey, founder of Pareto Global and author of Oregon State's Energy Efficiency and Sustainable Technology Act (EEAST) legislation; Tom Osdoba, Managing Director of the University of Oregon Business School's Center on Sustainable Business Practices; Ann Grodnik, Assistant Vice President at Seattle-Northwest Securities; and Sue Taoka, Executive Vice President of ShoreBank Enterprise Cascadia, to collaborate on the creation of this document. Mr. Bailey is its primary author.

BACKGROUND

Local jurisdictions throughout the United States are experimenting with clean energy programs with the aim of creating a large-scale financing model that can attract multiple forms of investment capital and contribute a substantial level of new economic activity in our communities.

Shifting to a large-scale clean energy financing model requires a platform on which efficiency, infrastructure, and clean technologies can be directly financed—a tall order that requires political foresight and courage, extensive institutional innovation, and a willingness to engage energy users in a very different way than is currently the norm.

While each community has its own set of circumstances that will dictate how it creates programs that will work, mastering the financing strategies for an integrated, long-term energy strategy is a critical ingredient to success.

Energizing Cities: New Models for Driving Clean Energy Investment is a guide for local elected officials, county and city staff, energy utility managers, and community stakeholders to the steps that must be taken in designing and financing clean energy programs. This document describes how to develop, implement, and finance a clean energy program and offers examples of existing innovative clean energy financing models and useful resources to consult when developing a clean energy strategy.

KEY TAKEAWAY POINTS

Efficiency is key. The cheapest, most productive unit of energy is the one we don't use. With the right programs and investments, energy efficiency alone can reduce national energy consumption by as much as 30%.

Efficiency savings can be used for clean energy investments. Deployed together, efficiency measures that reduce consumption by 30% can be combined with clean energy that costs 30% per unit of production at no incremental cost to the end user. Investing a portion of energy efficiency cost savings into local clean energy generation facilitates a cost-neutral or reduced-cost shift towards a cleaner, more efficient system overall. If emerging efforts simply pick off the easy efficiency gains and pass immediate benefits on to the efficiency investor, they take away one tool for accelerating direct investment in an integrated clean energy system and job creation strategy for the local community.

Simplifying and streamlining for the consumer. Any clean energy program must provide easy access and support to engage the community and lead people through the financing and clean energy process. Programs that rely on the consumer to find financing and hire contractors will not be successful.

Catalytic projects. The best implementation aligns governance, financing, and outreach structures, and begins with catalytic projects that provide valuable learning to inform future projects of increasing scale. The effort needed to create these early projects is significant, and a specific project governance structure is more often than not the critical first step.

Hiring a point person. Coordination of an ambitious clean energy program requires a full-time, technically-oriented person or organization to be the project lead responsible for the vast amount of coordination that these programs demand. It is nearly impossible for people who have existing jobs and responsibilities to drive the adoption of a large-scale clean energy program.

Financing strategies must be flexible. It can take more than a year to get a program from concept to initial implementation and another year or more to prove concepts and begin to scale. Due to the constantly evolving landscape of municipal clean energy programs and resources, financing approaches will need to remain flexible.

Financing strategies must be adaptable. Interest rates, market conditions, the price of energy, and the cost of construction are among the variables that can affect a financing strategy. Strategies must be able to adapt to changes in these variables.

Customization. Local variations will determine the financing mechanism that works best for each jurisdiction. Customization will be key, depending on particular circumstances, including utility governance and regulatory environment, bonding and infrastructure programs, state and local jurisdictional issues, and property tax limitations.

Local financing options. Localized financing options should be explored, such as special excise taxes (SPET), special assessments, carbon taxes, or other localized revenue sources that can be used to capitalize the lending pool that then kick-starts the local clean energy investment program.

Third-party financing. Innovative financing models have emerged for clean energy technologies, such as solar photovoltaics (PV), that can access capital in a way that traditional equipment sales to host-owners do not. These models can greatly accelerate deployment of clean energy systems in a community and confer psychic and financial benefits to a large number of local energy users.

Identifying capital. Finding sources of capital and leveraging seed funding will no doubt be significant hurdles for a nascent clean energy program. Relying on diverse capital sources, matching capital sources with borrowers' needs, and leveraging capital are all important aspects of a financing program. Equity contributions are often necessary as the base of a fund that can serve a wide range of borrowers.

Portfolio approach. Most clean energy financing models rely on a loan to the property owner that must be repaid, but these do not operate at scale because of administrative costs and the variability of return on individual structures. The next generation of financing models will need to assemble a portfolio of retrofits that can be delivered as a package to one or more third-party entities to finance and manage.

Role of utilities. Utilities are the obvious entity to aggregate demand and drive systemic clean energy adoption. They already have the customers; they are developing the ability to gather data about energy use through power meters; they already institute demand-side management. They could make investments in a portfolio of buildings and manage the investment in a way that yields attractive return to the utility while improving performance for the customer. But there are disincentives to a concerted investment in clean energy, given the way that utilities are currently structured and regulated in the United States. Overlapping service territories, lack of capacity at smaller utilities, and variations in regulations between states also make this type of model difficult to implement, although some jurisdictions have overcome these barriers and are partnering with utilities.

Leveraging one-time dollars. The urge to simply use one-time dollars on a pilot project is hard to resist. It requires limited political risk, doesn't take a great deal of innovation, and could happen quickly. But a pilot built on a foundation of one-time funds that does not test any elements of an ongoing, long-term strategy will not be a stable platform for creating scale and leveraging other streams of capital.

Furthermore, revolving loan funds and capital pools that are based on one-time grants or investments can quickly run out of money to lend and languish as loans are gradually repaid. Strategies to leverage initial seed capital to attract additional private and public investment allow jurisdictions to sustain and expand their programs to meet ongoing demands for financing.

Scalability. Scalability is the critical driver for any approach to financing clean energy initiatives. The financing structure should support different lending options for consumers, leverage one-time dollars, and be able to document the benefits in terms of energy and economic metrics to demonstrate return on investment—whether the investor is the local taxpayer, a local financial investor, a private equity or third party investor, or the Federal government.

GOING FORWARD

We recognize that clean energy financing models are fast-moving targets, and we intend to stay on top of the trends and advances that will be made as the many experiments currently underway gain traction and produce results. We will publish our findings on our website, www.newenergycities.org, and we invite interested readers to join the New Energy Cities community and share your experiences with clean energy financing strategies.

Introduction

Creating jobs, growing local economies, achieving energy independence, cleaning up the air and water, and leaving a lasting legacy are among the significant challenges that forward-looking community leaders are wrestling with during these challenging economic times.

New Energy Cities was launched in 2009 by Climate Solutions, a Northwest-based nonprofit organization whose mission is to accelerate practical and profitable solutions to global warming. The program partners with pioneering local civic and elected leaders to embrace the clean energy economy, powering America in the future and creating jobs now to combat the worst economic downturn in decades.

The New Energy Cities program aims to accelerate the transition to a clean, renewable, super-efficient energy system in order to spur economic development, reduce vulnerability to energy price swings, and harness large-scale investment to upgrade our nation’s energy infrastructure and built environment.

States, cities, and counties throughout the United States are experimenting with clean energy measures that encourage or finance retrofits from tax incentives to public-purpose benefit charges to utility-based programs. The primary aim of these experiments is to move beyond piecemeal and ineffective activity, and shift to a much larger scale, one that would be attractive to multiple forms of investment capital and contribute to a substantial level of new economic activity in our communities.

Without creating a platform on which efficiency, infrastructure, and clean technologies can be directly financed, this shift will not occur. The shift is a difficult one, requiring political foresight and courage, extensive institutional innovation, and a real willingness to engage energy users in a very different way than is currently the case.

Each community has its own set of circumstances that will shape how it creates programs that will work, and the steps needed to get to scale will emerge only through experimentation. In all cases, however, these steps must identify the path for financing a much larger scale of enterprise. **Mastering the financing strategies for an integrated, long-term energy strategy is a critical ingredient to its success.**

Energizing Cities: New Models for Driving Clean Energy Investment is a guide for local elected officials, county and city staff, energy utility managers, and community stakeholders that elucidates the steps that must be taken to design and finance clean energy programs. This document:

- Provides an overview of the choices, strategies, and processes involved in implementing a clean energy program.
- Points to examples of innovative clean energy financing programs and deconstructs the models that have been developed to date.
- Describes the steps to take to develop and finance a clean energy program.
- Offers resources in the way of relevant literature and websites that are the foundation of clean energy strategies.

This document is written to help local jurisdictions assess how best to build a successful clean energy program that achieves the scale, depth, and speed necessary to realize the potential economic benefits of clean energy investment, while also creating market-transforming strategies that provide a compelling case for Federal and private sector investment.

This document is divided into three parts. Part One discusses why and how to create a clean energy strategy, and offers examples of different models to consider. Part Two gets into the technical aspects of creating a clean energy financing structure. Part Three contains reference material.

Climate Solutions partnered with the following experts in new models for energy efficiency and clean energy investment to produce **Energizing Cities: New Models for Driving Clean Energy Investment:**

> **Pareto Global**. A Portland, Oregon-based consulting firm specializing in economic development strategies that bring together energy solutions, land use and transportation planning, urban and rural development, and the stakeholder work that ties it all together. (http://paretoglobal.com/)
>
> **University of Oregon, Center for Sustainable Business Practices.** A center of excellence in new best practices for training the next generation of sustainable business pioneers. (http://www2.lcb.uoregon.edu/)
>
> **Seattle-Northwest Securities**. A Northwest investment bank and broker-dealer with a 40-year history in municipal bond underwriting and trading and sales of taxable and tax-exempt fixed income securities. (http://www.snwsc.com/)
>
> **ShoreBank Enterprise Cascadia**. A certified nonprofit Community Development Financial Institution making credit accessible for economic opportunity, social equity, and environmental sustainability in the Pacific Northwest. (http://www.sbpac.com/bins/site/templates/splash.asp)
>
> **Hat Trick Energy and Environmental Consulting**. A Portland, Oregon-based consulting firm specializing in analysis and advice on issues related to renewable energy project development and evaluation, commercial issues related to greenhouse gases, and clean energy market intelligence.

In creating this document, we incorporate content from a number of leading organizations and national resources in the field of clean energy financing. Throughout this document, as well as in Appendix B, we offer links to the various resources and financing opportunities available for innovative states and localities to pursue.

Clean energy financing models are evolving rapidly and to stay on top of the constant evolution, we intend to issue updates to this document on our website, NewEnergyCities.org. We encourage our readers to join the New Energy Cities community by signing up on our website so you may contribute to the ongoing dialogue about clean energy financing. You may also contact the New Energy Cities team or any of the organizations and resources we list in Appendix B directly for support.

Part One

1 Why a Clean Energy Strategy?

As we look to our energy future and strategies to develop clean energy, we know that the cheapest, most productive unit of energy is the one we don't use. With the right programs and investments, energy efficiency alone can reduce national energy consumption by as much as 30%. Clean energy strategies are investments with returns that can help leverage the development of renewable technologies to achieve reductions in greenhouse gases at little cost over time.

Financing a package of energy measures that have quick payback with other measures that have a longer payback offers an opportunity for deeper efficiencies and cost-effective investment in an integrated clean energy system. Rather than maximizing profit from quick return investments, integrated portfolio programs can engage larger scale investment in the local community, maximizing economic and job creation benefits while accelerating the transition to an integrated clean energy system

A clean energy strategy that considers all aspects of the energy system–from contractors to developers to utilities to homeowners–opens doors to economic development built on clean energy solutions.

Many organizations have done extensive work to quantify and demonstrate the enormous opportunity that retrofits and clean energy provide for energy productivity and economic recovery. Perhaps the most comprehensive report was produced by Karen Ehrhardt-Martinez and John A. "Skip" Laitner at the American Council for an Energy-Efficient Economy (ACEEE, www.aceee.org) titled "The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture."

According to that report, in 2004 alone the United States saved almost $20 billion in energy costs from efficiency-related investments. The ACEEE concludes that over **1.63 million jobs** are supported by energy efficiency nationwide, and that the market can produce a total of **$7 trillion** in cost-effective energy investment through 2030.

The following table shows the breakdown of investments and savings in that year:

Table 1: Investments in and savings from energy efficiency, 2004

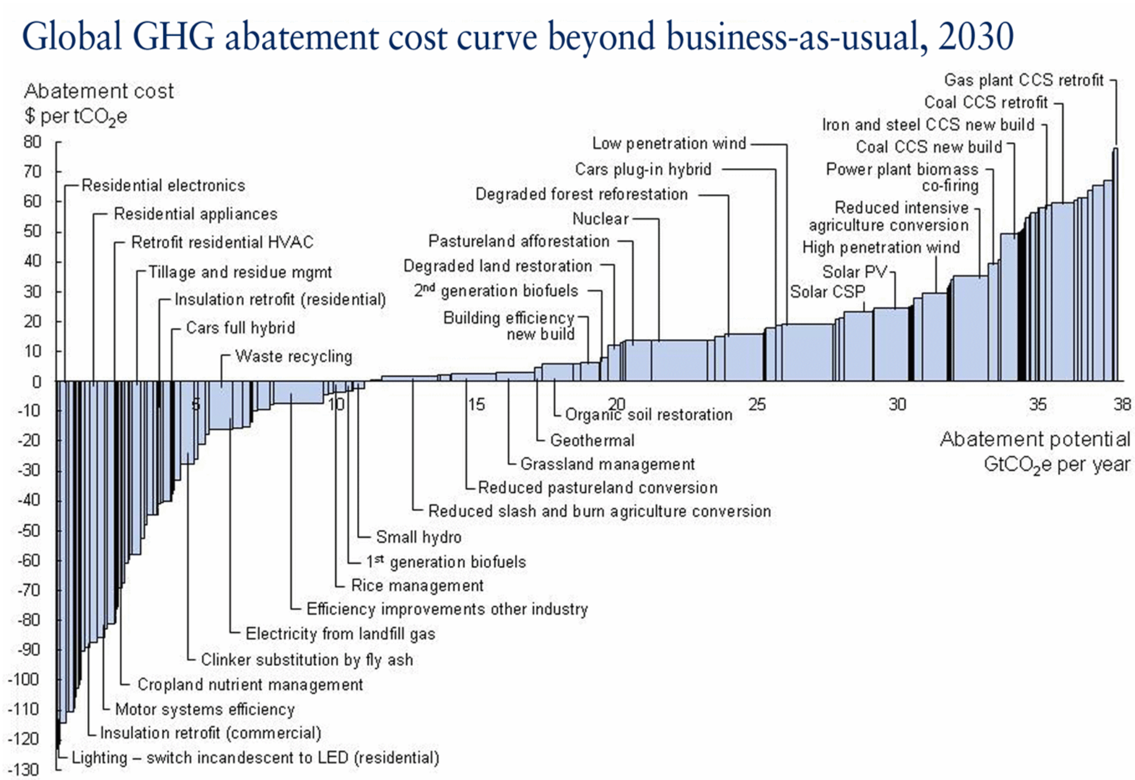
	Buildings	Industrial	Transportation	Utilities	Total
Total Energy Use (quads)	38.9 (39%)	33.6 (33%)	27.9 (28%)		100.4 (100%)
Total Efficiency-Related Investments ($billion)	178	75	33	15.7	300
Premium Investments ($billion)	24	11	5	2	43
Investment- Related Employment (000)	990	351	151	139	1,630
Energy Savings (quads)	.72	.66	.08	.19	1.7
Energy Savings ($billion)	12.2	5.6	1.1	0.5	19.5

Source: "The Size of the U.S. Energy Efficiency Market: Generating a More Complete Picture," www.aceee.org

Cost-effective energy efficiency measures create jobs and improve the productivity of energy in the economy. Energy efficiency is also the most cost-effective path to greenhouse gas reductions and can leverage other, more costly clean tech investments. McKinsey and Company has developed the McKinsey Greenhouse Gas Abatement Cost Curve to show the relative cost and value of various greenhouse gas reduction strategies (Figure 1 below).

Figure 1 clearly shows that energy efficiency retrofits on existing commercial and residential buildings are not only the most cost-effective way to reduce carbon dioxide emissions, they also have a positive payback and generate net returns on investment over time. Moreover, savings associated with measures below the line can be used to pay for measures above the line to create packages of investments that achieve deep greenhouse gas (GHG) reductions and are cost-neutral.

Figure 1: McKinsey and Company Greenhouse Gas Abatement Cost Curve



Source: McKinsey and Company, as found at www.climateprogress.org

By highlighting and then integrating all building energy use measures, retrofits can create a large impact in terms of emission reductions. Theoretically, the combined economic performance of a leveraged package of investments would allow for direct financing, because the total return pays for itself.[1]

While the aggregated economic performance is less than that of the best-performing measures alone, the combined approach offers a much greater impact on GHG emissions. More importantly, the combined approach, pursued as a strategy, may open the door to the policy and institutional steps needed to dramatically accelerate implementation of clean energy programs and, thus, to achieve the objective of

[1] This theoretical exercise is based on the assumption that each of the individual measures would be done and performed in the same fashion as described by McKinsey and Company, and that no other barriers to finance exist. That assumption has not been tested, and further work is needed to illustrate a greater level of precision with regard to measuring performance through an integrated implementation strategy. The data underlying McKinsey's analysis are not readily accessible to the authors of this paper to create that level of precision. This precision can only be attained by conducting the analysis in a real, applied context, which would require scaled implementation driven by new policies and investment capital organized for such a purpose.

meaningful clean energy cluster development and job creation. Part of the role of public policy is to manage costs and returns across the sectors to which they accrue.

Accessing the benefits of a clean energy strategy requires an up-front investment of capital. This capital is likely to come from a variety of sources, ranging from private equity to pension funds to municipal bonds. While local governments are uniquely positioned to help fund clean energy programs, governments are more effective as catalysts for two reasons:

- There is insufficient public capital, whether liquid or in bonding capacity, to access all of the cost-effective clean energy investments in the market.
- There is little reason for governments to bear the entire financing burden when clean energy packages, as demonstrated above, can be so profitable.

The role of effective community clean energy strategies is to bring together the resources necessary to allow private investors to invest in energy efficiency and clean energy at scale, depth, and speed. Done right, these programs leverage enormous return out of a small public investment.

Energy efficiency retrofits and clean energy generate productivity now, offer significant return on investment over time, and mitigate price risks associated with fossil fuels. By creating jobs, saving money, and confronting climate change, clean energy strategies are a smart strategy for any state or locality.

2 Creating a Clean Energy Program

Any clean energy program must provide a simple access point to engage the community and lead it through the financing and clean energy process. Programs that rely on the consumer to find financing and hire contractors will not be successful.

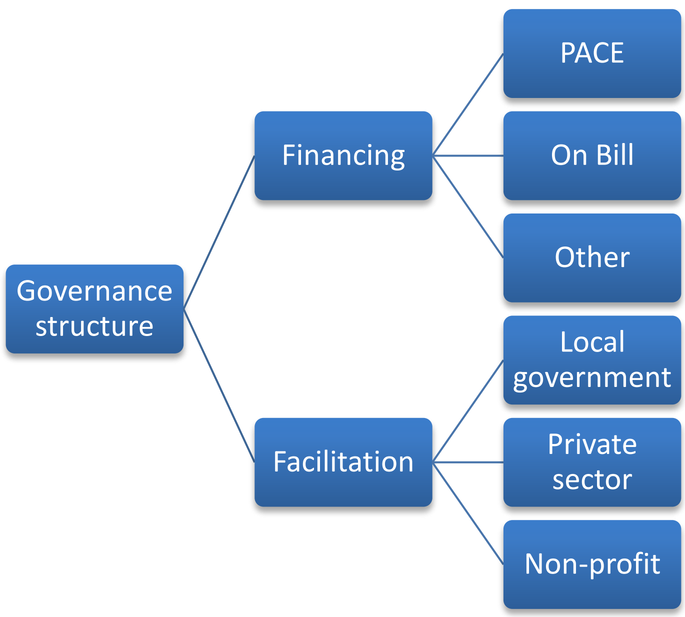
The first step to building an implementation plan for a clean energy program is to bring together the public and private entities that will make the program successful. That process most likely begins with a new governance structure that **aligns governance, financing, and outreach structures, starting with catalytic projects that inform future projects of increasing scale.** The effort needed to create these early projects is significant, and a specific, project governance structure is more often than not a critical step.

Whether it's an ad hoc working group of partners or a formalized board of multiple jurisdictions and partners, the governance structure will shape the possibilities for financing. Creating a governance structure that can access and manage a wide array of financing options allows jurisdictions to respond to a wide array of financing opportunities.

Rather than deciding on a financing structure at the outset, successful programs often bring together a flexible structure that identifies the best opportunity for all partners and ties back to the capacity and authority of the governance structure.

Both facilitation and financing should flow from the same program and governance structure, whether through public sector engagement or through designated project managers. After the governance structure is formed, the rest of the decisions for designing a clean energy program extend from choices made by that structure, so local leaders must be deliberate and thoughtful about how they create that governance structure.

Figure 2: Linking structural decisions back to governance



STAKEHOLDERS

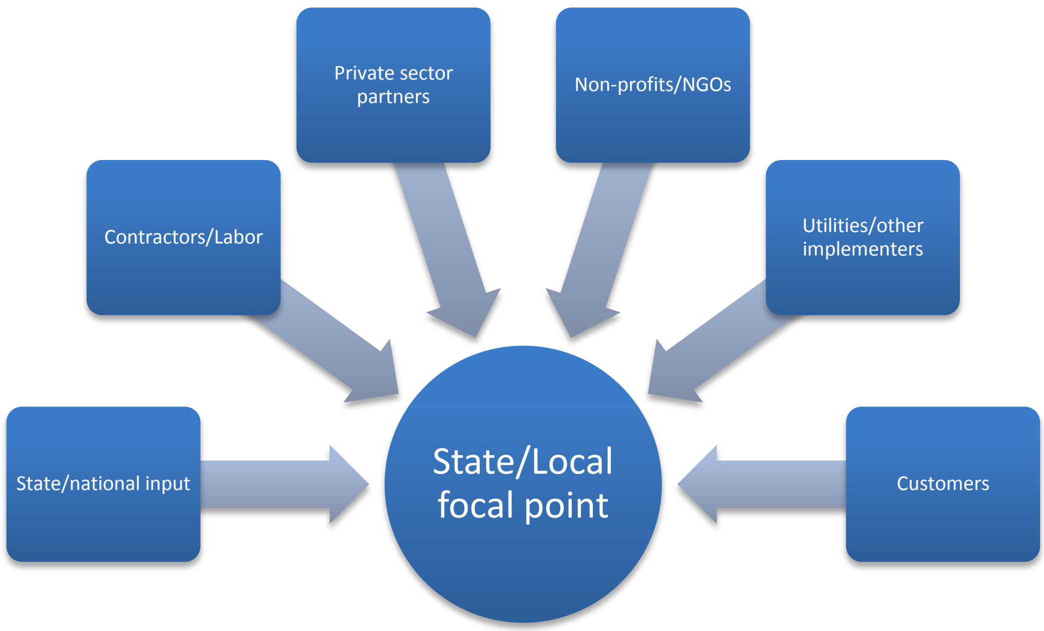
Once state and local leadership have brought together a governance structure, integrating stakeholders into the program design is critical to both the development and successful operation of a clean energy program. Appendix C provides a list of relevant stakeholders.

FOCAL POINT OF CONTACT

It is nearly impossible for people who have existing jobs and work-related responsibilities to drive the innovative clean energy programs that are needed. It is crucial that jurisdictions create dedicated capacity to focus on implementing the clean energy program.

Regardless of the final governance structure or partnership, any program will need a technically oriented person or organization to be the focal point for the vast amount of coordination required for bringing together the clean energy program. Wherever possible, coordinating this kind of program should be at least one technical person's full time job.

Figure 3. Creating a local focal point for stakeholder input



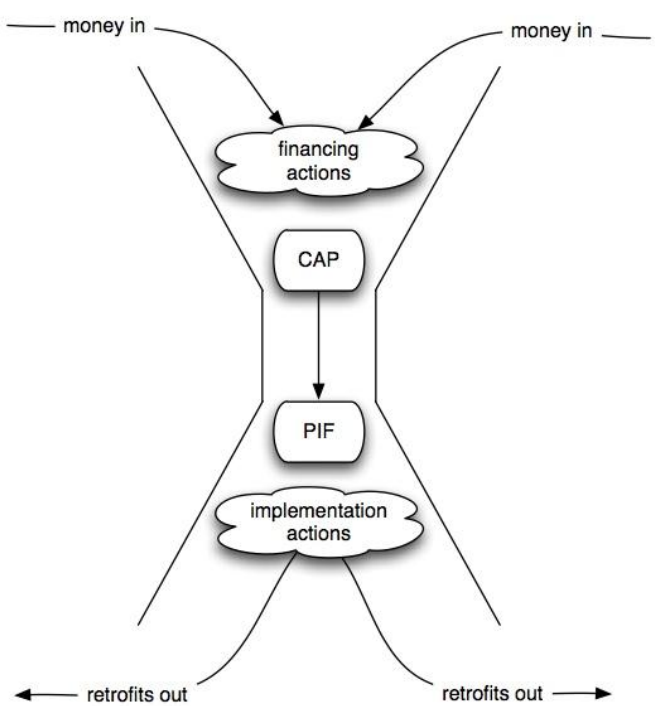
IMPLEMENTATION STEPS

To implement a successful clean energy strategy, the project leadership must address several key steps systematically.

- **Identify the barriers to investment.** Barriers may include, but are not limited to, facilitation and consumer information, access to capital, variability in return on investment, difficulty in assembling an energy portfolio that enables long-term investments, and difficulty in identifying and quantifying the extent and value of the clean energy resource.
- **Select sources of capital and leverage.** The appropriate financing strategy will be the one with the lowest cost of capital, the best scalability, sustainability, and the best chance to overcome the barriers identified in the first step.
- **Design a facilitation program.** A facilitation program is the interface between clean energy financing and on-the-ground implementation. It assists consumers of clean energy in accessing and using available programs. The facilitation program needs to accomplish more than just marketing and outreach. It must be part of a system that ensures that a good job is done the first time on every retrofit. Contractor and certification standards will be critical to a facilitation program to give confidence both to property owners and to investors. Appendix D provides a discussion of contracting standards.

- **Match funding to investments.** Different sources of capital will be more or less suited to different kinds of projects. Low or no cost capital is scarcer than higher cost capital. Programs should match projects and investments to the highest tolerable cost of capital.
- **Appeal to investors.** An effective clean energy strategy will use policy and outreach to aggregate activity to a point that enables direct financing and is attractive to multiple streams of capital, based on the anticipated returns given associated risks. Ideally, this would entail mobilizing some public capital as the first piece of leverage, and using it to bring private capital to the project. Private investors will take the time to understand the potential and satisfy risk concerns, so the effort should be undertaken with full understanding that the first projects will build the case for larger private capital participation.
- **Integrate with existing programs.** To achieve the greatest possible market penetration and to ensure equity goals are met, the program should leverage the outreach work of existing programs and work closely with community action organizations and affordable housing groups.
- **Get the workforce ready to work.** Ramping up clean energy efforts requires ramping up workforce development so that there is a sufficient supply of skilled workers necessary to build to scale as fast as the financing and facilitation will allow. Workforce shortages should not be the barrier to scale. Any program should plan to integrate worker training into apprenticeships and community colleges.

Figure 4. Financing is aggregated and pooled in a capital assembly platform (CAP) that is connected to a program implementation function (PIF), which connects capital to the clean energy implementation action.



We know from experience that it can take more than a year to get a program from concept to initial implementation. Once the program begins implementation, it can take another year or more to prove concepts and begin to scale. Due to the high degree of innovation that is already underway and will continue for the next several years, a strategic approach to financing will need to remain adaptable and patient.

SOLUTIONS FOR LOW-INCOME HOUSEHOLDS & NEIGHBORHOODS

Low-income households are least able to afford weatherization measures, probably live in homes with the greatest need for weatherization, and have the least access to capital. Equity is addressed by developing financing programs that provide for the continuum of income levels.

The Low Income Home Energy Assistance Program (LIHEAP) is a Federal low-income weatherization program that provides weatherization assistance to qualified low-income homeowners. In order to qualify, a household must have an income less than 200% of area poverty (about $44,000 annual income for a family of four). Unfortunately, many households do not meet LIHEAP's income restrictions and cannot afford and/or do not qualify for home equity loans to weatherize or upgrade their homes to an acceptable level of efficiency.

If a loan program is committed to meeting regional efficiency needs, it must be designed to lend to lower income households in low-income neighborhoods. One method would be to have a set-aside of funds for low-income borrowers that are subsidized to allow more favorable terms.

Another option would be using a sliding scale to create an internal subsidy–higher interest rates (closer to market) to offset the lower interest loans. Often the public partner will provide some level of subsidy to ensure that loans are available to and attainable by lower income households.

COMMUNITY OUTREACH

Implementing a clean energy strategy is complex and requires strong leadership to shape new policies and programs, a willingness to align activity with capital, and a commitment to the long term, since it will take years to finish the job. An equally important factor is the need for a concerted effort around meaningful community engagement.

Those who are in the clean energy field may assume that energy efficiency should sell itself, but it does not. The primary reason for this is that building owners lack the information and time to understand what they could do, and the impact energy efficiency work can have on their property and finances. Without that information, owners are generally unwilling to invest.

In the work that the New Energy Cities team is doing throughout communities in the Northwest, we see a keen interest in exploring various clean energy technologies and solutions that is matched by the confusion people feel when trying to understand all that is available to them to explore.

A well thought-out communications strategy that clearly explains the financial, environmental, and health benefits of clean energy solutions is essential. Some models include neighborhood-based recruitment approaches pioneered by programs like The DC Project (www.weatherizedc.org), the Center for Energy and the Environment in Minnesota (www.mncee.org), and Sustainable Works (www.sustainableworks.org).

3 Keys to Successful Programs

No matter the governance structure, the source of capital, the mechanism of financing, or the facilitation method, there are several themes that cut across successful programs.

- **Sequencing/phasing/pilot programs.** Even the best-structured programs will need to build out to scale, and part of that process is managing implementation timelines and testing concepts. However, building to scale is also important to demonstrate the viability of the model. Initial financing will likely be mostly public capital. As the program builds to scale and establishes a track record of a safe return on investment, private investors will step in to replace or augment the public capital to achieve scale. Moreover, programs are unlikely to be able to access Federal funds without demonstrated success, commitment, and leverage.
- **Cross-jurisdictional collaboration.** Achieving scale, depth, and speed is not possible across uncoordinated or competing jurisdictions. Collaboration among urban and rural counties and municipalities, state and local partnerships, and coordinated investor- and consumer-owned utility service territories, and integration with public purpose and community action organizations is critical to focus financial, technical, and political resources towards the same goal.
- **Efficient programs and low costs.** Achieving maximum scale and depth from a clean energy program requires that resources be directed to actual investments rather than to overhead. Economies of scale from standardization of energy audits, better performance modeling, and large-scale implementation contracts help keep costs low. Effective security mechanisms such as loan loss reserves and guarantees not only bring down the cost of capital, they may also reduce the administrative burden of credit checks and due diligence, saving valuable program resources. The smoother the process for the implementing agency, the better the experience for the customer as well.
- **Innovation catalysts.** Clean energy programs have the opportunity to include mechanisms that provide a pathway for deploying emerging technology. Leveraging retrofits to include testing of experimental technology and designing retrofit packages so that they change with the price of energy and technology provide another avenue for private capital to support retrofits.
- **Clear success criteria and metric development.** Clean energy programs will generate an enormous amount of data. Tracking, measuring, and reporting that data, and linking it to clear success criteria will not only lead to greater public confidence, but also

continual refinement and improvement of the program. Success criteria around energy saved, jobs created, penetration rates, and private capital leveraged, etc., will provide basic benchmarks. Tracking this data is not always easy. Often, explicit partnerships with utilities and smart meter systems are necessary for robust information-gathering.

- **Integration with non-retrofit programs.** Retrofit programs provide an access point to other state and local programs that enhance energy performance. Key among these programs is a system for energy performance scores for buildings, which provide the perfect outreach mechanism and performance tracking system to complement a retrofit. In addition, feed-in tariff systems, tax credits, and other renewable financing mechanisms can help bring down the cost of renewable energy and incorporate it into a retrofit.
- **Steps towards next generation financing.** As utility incentives align and broad-scale clean energy investment on a portfolio basis becomes more profitable, it is important to create a clean energy program today that tracks data and builds the structural and political relationships for next-generation models.
- **Quality assurance and certified contractors.** A quality product is key to generating demand and subsequent leveraging of a high-performing portfolio. Successful programs organize and certify contractors and link to robust workforce training to implement standardized quality control measures that verify savings.

4 Types of Clean Energy Financing Programs

A variety of models are emerging to provide the up-front funding, capital sources, financing mechanisms, and collection measures to drive clean energy programs. In this section, we list the models currently in practice with a pro and con analysis for each.

4.1 Property Tax-Based Financing

One of the first community-scale, publicly-facilitated and -financed funding models to emerge for renewable energy and energy efficiency was the BerkeleyFIRST model (www.berkeleyfirst.renewfund.com). Created by Cisco deVries to finance solar installations with repayment mechanisms on the property tax bill, BerkeleyFIRST was the first example of a larger category of repayment mechanisms known now as Property Assessed Clean Energy (PACE) financing (www.pacenow.org or www.renewfund.com).

PACE allows local jurisdictions to issue bonds for clean energy, the proceeds from which are then loaned to property owners for installation of clean energy measures and paid back through an assessment on the property tax bill. Primarily a local financing tool, PACE often requires specific state authorization.

A variant of the PACE financing model would be for the voters of a jurisdiction to place an assessment on all properties for a bond issue upfront, which would create an incentive for each property owner to access the resulting capital. Under this variation, all property owners are paying into the community financing pool via their property tax bills, whether they have accessed the benefits of the retrofit program or not. Because property owners are paying in regardless of whether they use the program, they have an incentive to sign up. This variation usually requires a public vote, which can be politically challenging.

ADVANTAGES OF PACE FINANCING

- Offers financing at a low cost of capital due to the security of the property tax mechanism and low overhead costs.
- Allows local governments to finance retrofits directly, without direct involvement in financing or collection from utilities.
- Provides long-term loans that are easily transferable on the property tax bill.
- Simplifies the repayment process for both lender jurisdiction and property owner.

CHALLENGES WITH PACE FINANCING

- Creates a discrepancy between property tax payments and utility bill savings, which can lead to behavioral regression in energy savings (i.e., without a regular, visible payment tied to energy savings to remind property owners of their investment, owners may leave lights on longer, run the furnace more often, etc.).
- Does not address the misalignment of incentives for rental structures (i.e., the owner pays the cost, but the tenant sees the benefit).
- Requires homeowners to agree to a lien on their property in exchange for a loan. Unsecured financing is much easier and may be more attractive to homeowners for smaller measures, depending on interest rates.
- Is based on a traditional local government financing mechanism and requires an upfront process by local governments in order to create a program. It depends on the willingness of the consumer to opt in to higher property tax rates, and is not scalable beyond what marketing and outreach can achieve.
- In most cases where it has been implemented, PACE places much of the risk for poor energy performance and savings on the property owner, who bears a higher cost if he doesn't get the savings and the improvements don't perform well enough.
- Experience with BerkeleyFIRST has shown that PACE financing can carry transaction costs that generate non-competitive interest rates if the size of the PACE bond is small.
- Programs that cover multiple taxing jurisdictions (i.e., counties) will need to develop collection and remittance relationships with more than one government entity.
- Fannie Mae recently issued a Lender Letter stating that the terms of Fannie Mae/Freddie Mac loans prohibit additional loans that have senior status to mortgages. Where PACE loans

have a property tax repayment that is superior to the mortgage, demand for PACE financing may be suppressed due to the risk to the mortgage market.

4.2 Hybrid On-Bill Financing

In contrast to the PACE model, which is dependent on a local government to implement, on-bill financing has existed for decades as a mostly utility-driven model for financing retrofits. At its simplest, on-bill financing is a loan from a utility to a property owner for qualified improvements that is paid back over time on the utility bill.

Experience with direct utility financing has been mixed. Many utilities reported large losses from their programs, and progress in implementing retrofits has lagged. Part of the challenge in direct utility-administered financing programs is the lack of incentives for investor-owned utilities (IOUs) to achieve aggressive scale and depth with clean energy financing. Many IOUs still earn a return on the volume of electricity sold based on capital expenditures. Even for decoupled IOUs, few, if any, have the ability to profit from efficiency investments in the same way that they profit from capital expenditures.

Recently, however, models have begun to emerge that use public, or a blend of public and private, capital to finance retrofits through third-party entities that partner with utilities to use the energy bill as a collection mechanism. Clean Energy Works Portland, a city-led partnership in Portland, Oregon, that will also serve as the pilot for the state's Energy Efficiency and Sustainable Technology Act implementation, uses Federal stimulus money to leverage a blend of public and private capital for long-term, low interest loans for retrofits to residences (www.cleanenergyworksportland.org).

The broader EEAST program, which at the time of writing is still in the rulemaking phase, would blend state general obligation bonds used to fund the state's Small Scale Energy Loan Program with private capital investment and revenue bonds to create a loan program that is administered through the public utilities or the state's public-purpose organization, the Energy Trust of Oregon (www.energytrust.org).

Critical to the functioning of this program is a platform that can use one-time dollars to lower borrowing costs and stretch those one-time dollars as far as possible. The blended capital and leverage within this model provides for more scalability and deeper retrofits than any one capital source might allow.

ADVANTAGES OF HYBRID ON-BILL FINANCING

- Enables blending of multiple types of public and private capital because the financing and repayment mechanisms are separated.
- Creates the potential for a "one-stop-shop" for clean energy financing.
- Allows participating consumers to see both the benefits and the costs of the retrofit on their utility bill.

- Aligns incentives to allow for many types of non-owner-occupied structures to participate (i.e., the owner sees the value of the upgrade, and the tenant typically sees both the costs and the savings of the retrofit on the utility bill).
- Adapts better to low-income residences because of the ability to combine with utility assistance programs. (PACE assessments are on the property tax bill and are unrelated to energy bills. The on-bill program works with utility energy bill assistance programs to combine different benefits.)
- Leverages one-time dollars efficiently while mapping financing to portions of the retrofit with positive paybacks.
- Allows more options to integrate financing for any structural improvements or pre-weatherization measures necessary before the retrofit (e.g., knob and tube wiring, wall/roof upgrades, etc.).
- Allows for low-risk utility involvement and the ability to capture energy use data on a project by project basis. Utility participation should result in the lender having access to the borrowers' utility payment history, which is key to evaluating credit risk.

CHALLENGES WITH HYBRID ON-BILL FINANCING

- Creates uncertain and variable security for the loans, from standard liens to utility shut-off for non-payment to super-priority liens.
- Leads potentially to higher interest rates or lack of underwriting, as security on the loan is lower than with PACE models.
- Operates across a patchwork of utilities and regulatory environments, often including multiple types of investor- and consumer-owned utilities, and must function for each one.
- Operates in structures that may be served by more than one utility, which increases the complexity of the program.
- Blends capital and implementation in ways that are frequently more complex than other models.
- Requires consumers to opt in and places the most risk on the consumer (e.g., if the consumer does not maintain repayments, the utility may elect to cut off service, or there may be foreclosure via a lien.)

4.3 Consumer- and Mortgage-Based Loans

Some financial institutions see the potential to profit from energy efficiency and clean energy through standard commercial loans or loans that piggyback on the mortgage. Consumer loans often carry too much overhead cost and are too complex to be scalable. If the loan is made at the time of sale, however, piggybacking on the existing transaction costs can mean an efficient loan.

Energy Efficient Mortgages (EEM)[2] are a class of mortgages that credit borrowers with retrofit incomes in their debt-income ratio by reducing the cost of their monthly payment. EEMs allow for "stretch mortgages," where borrows are able to finance additional improvements to the house without violating underwriting standards.

A potentially powerful innovation on the EEM model is the Green Energy Mortgage (GEM). The GEM program, pioneered by Portland, Oregon, developer Brian Wannamaker, works like the EEM, but leverages a relatively small public investment into large amounts of capital for retrofits.

The GEM program uses one-time dollars to offer credit enhancements and loan guarantees on mortgages that include energy efficiency upgrades. These credit enhancements lower the effective interest rate that the lender is willing to accept. The interest difference between the mortgage with and without the GEM enhancement is refunded to the property owner to pay for qualified retrofits.

ADVANTAGES OF CONSUMER/MORTGAGE LOANS

- Based on well-established financing and loan models.
- Accomplishes the lending and capital assembly almost entirely in the private sector.
- Piggybacks on existing transactions to reduce transaction costs.
- Stimulates the housing market and leverages private capital for a small public investment (GEM only).
- Allows for the Federal government, or a state, to directly affect mortgages across all jurisdictions.
- Provides much more financing to the property owner than on-bill programs.
- Makes financing available regardless of projected returns.
- Removes most risk from borrowing for energy efficiency.

CHALLENGES WITH CONSUMER/MORTGAGE LOANS

- Shallow retrofits due to high interest rates.
- Difficult to blend with other kinds of capital.
- Requires the public sector to bear some risk in the mortgage market (GEM only).
- Requires a level of capital funding that may be beyond the reach of local or even state governments (GEM only).
- Only available to property owners.

[2] http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.energy_efficient_mortgage

4.4 Energy Performance Contracting

Energy performance contracting is often done by energy services companies (ESCOs, www.naesco.org). ESCOs typically work with large buildings and install, maintain, and manage energy efficiency projects on a contract basis. ESCOs are paid out of a portion of the savings they generate. To maximize profit, ESCOs sign complex agreements with property owners that specify in detail exactly how the efficiency measures and the structure will be used and maintained. ESCOs can operate as an implementation method with other financing structures, or, via private capital, can be a stand-alone financing model.

These contracts give an ESCO the ability to project savings in a large structure and to minimize volatility in that savings. ESCOs are good models for large investments, particularly institutional facilities that will have consistent ownership over the life of the ESCO contract. However, the agreements that allow for precise energy management are much more difficult for smaller structures and for multiple structures.

ADVANTAGES OF ENERGY PERFORMANCE CONTRACTING

- Private sector-driven and financed, with all risk on the ESCO.
- Investments limited only by the length of the payback.
- Built-in incentives to maximize energy performance and productivity.
- Brings enough capital to finance retrofits of large structures.

CHALLENGES WITH ENERGY PERFORMANCE CONTRACTING

- Requires detailed contracts and monitoring of savings and performance.
- Not feasible for smaller buildings and residences.
- Long-term contracts limit applicability in many commercial structures.

4.5 Energy Portfolio Strategies

Most of the models of clean energy financing rely on a loan to the property owner that must be repaid. The exception is the energy performance contracting model, in which a third-party entity assumes the responsibility for the capital, risk, and benefits from efficiency investments.

This model does not operate at scale because of administrative costs and the variability of return on individual structures. **The next generation of financing models will need to assemble a group of retrofits that can be delivered as a package to one or more third-party entities to finance and manage.**

Having a portfolio of investments aggregates the efficiency resource and the return on investment that comes with the ability to spread risk and return across many structures. A portfolio strategy creates more stable and predictable returns, which attracts investors and lowers the cost of capital.

The natural type of entity to accomplish this portfolio strategy is a utility. Utilities have existing relationships with customers and, with the roll-out of smart meter systems, the ability to gather and model complex information about energy use. In combination with electric car charging stations, real-time pricing of electricity, feed-in tariff models, and demand-side management, utilities could make investments in a portfolio of buildings and manage the investment in a way that maximizes return to the utility while improving efficiency for the customer.

Unfortunately, neither the regulatory model nor the financial model exists yet to allow utilities to profit from this kind of energy management. Moreover, overlapping service territories, lack of capacity at smaller utilities, and variations in regulations between states make this type of model currently unworkable, although innovative utilities are increasingly pursuing partnering strategies with local jurisdictions.

4.6 Other Existing and Potential Models

Some models, like the Sustainable Energy Utility (SEU) pioneered in Delaware, work across several of the types of models listed above. These models create public-private entities that use bonding and public capital in conjunction with ESCO-type contracts to manage investments across a range of efficiency resources. Other models focus more on the implementation and consumer outreach side of efficiency, and provide credit enhancements and interest buy-down with one-time dollars to accelerate private lending.

This document has so far described models with broad applicability. More localized options exist as well, especially when a less common source of capital is available. Special excise taxes, carbon taxes, or other localized revenue source may be implemented to provide the capital needed to fund one of these models. Several examples of this kind of financing exist already.

BABYLON, NEW YORK

The town of Babylon, New York, has implemented a clean energy financing model (www.thebabylonproject.org) based on a revolving loan fund capitalized by a solid-waste reserve fund the town is required to keep in order to operate an energy-from-waste facility.

By linking the fund to the carbon in energy, the town was able to access the fund to provide loans for energy efficiency. After considering an on-bill repayment mechanism, the town opted instead to use a benefit assessment that reverts to the property tax.

BOULDER, COLORADO

In 2006, Boulder, Colorado, became the first city in the nation to implement a local carbon tax (www.bouldercolorado.gov). The carbon tax, which evolved from an earlier trash tax, is estimated to cost the average household around $1.33 per month. The revenue from this tax has been used to fund the Boulder Climate Action Plan, which includes investments beyond energy efficiency. Boulder is now in the process of converting some of that revenue into a clean energy program, in combination with an aggressive smart meter roll-out program already being implemented by the local utility, Xcel Energy.

DELAWARE

The Delaware Sustainable Energy Utility (www.energizedelaware.org) is the first SEU model in the nation. A creation of the Delaware Legislature and State Senator Harris McDowell, the SEU is a nonprofit entity that is a one-stop-shop providing clean energy and energy efficiency. The SEU works directly with local utilities and communities to fund energy efficiency programs. In concept, it resembles a public purpose organization, although it is funded by proceeds from the Regional Greenhouse Gas Initiative, portions of the sales of Renewable Energy Credits, and tax-exempt bonds.

PENNSYLVANIA

The Keystone Home Energy Loan Program (www.keystonehelp.com) provides financing for energy efficiency improvements in homes and was initially capitalized by a $20 million investment by the Pennsylvania State Treasurer. A private lender, AFC First, administers the loan program and services the loans. AFC First sells aggregated loans on a periodic basis to the State Treasurer and guarantees them with its own credit. In turn, AFC First has access to a $1 million loan loss reserve, established by the state's utilities and the Pennsylvania Energy Development Authority. The financing is marketed to customers through a network of qualified contractors.

OTHER

Appendix A provides a chart of different financing tools from Merrian Fuller's report on Efficiency Vermont that is worth reviewing to see the wide range of options for energy efficiency and renewable energy financing. For a list of studies and additional resources, please see Appendix B.

4.7 Third-Party Financing

Innovative financing models have emerged for solar photovoltaics (PV) that access capital in a way that traditional equipment sales to host-owners (i.e., the owners of the property with the PV installation) do not, and confer the benefits of solar energy to a large number of customers. The model is not restricted to PV if other technologies earn similar tax benefits and are flexible in sizing the installations.

The third-party financing model entails a structure in which a tax equity investor other than the host-owner owns the PV system. Equity holders can include the project developer, the utility, or another party. A tax equity investor will own the system in the first several years to collect Federal and state tax incentives (including accelerated depreciation) from the project. After the tax incentives have expired, ownership of the system flips to the non-tax equity investor (or even the host), at a lower price. (With the Federal investment tax credit set at 30% of a system's costs, monetizing the tax benefits greatly improves a project's economics.)

The host typically enters into a contract with the supplier to buy power pegged to the project's output at a predictable rate, with predetermined annual price increases that shield the host from utility rates. In addition to the tax incentives and host energy payments, income streams for the non-tax equity owner can come from state rebates, power sales to the local utility under a net metering tariff, and sale of renewable energy credits to the voluntary market or to a utility that must comply with a state's renewable energy portfolio standard.

A similar model of third-party ownership is emerging in the energy efficiency arena. In this scenario, a third-party entity develops and owns energy efficiency systems within a commercial building. The economic benefit of owning energy efficiency systems does not include the tax incentives associated with PV. Thus, the owner charges the host a monthly conservation fee that is less than the cost of the power would have been had the measures not been installed. The owner also charges a local utility for the conservation.

ADVANTAGES OF THIRD-PARTY FINANCING:

- Allows hosts to benefit from PV's predictable generation through a power-purchase agreement, and not through an outright purchase of the equipment and its high up-front capital costs.
- Allows governments and nonprofits to benefit indirectly from tax incentives.
- Accesses capital from many investors, rather than just from the host, thereby creating more opportunities to finance projects.

CHALLENGES OF THIRD-PARTY FINANCING:

- Owners of the system, although not necessarily the same as the host, still must have sufficient financial resources to cover high initial capital costs, rather than rely on "Year 1" payment from the customer for all costs.
- In the current recession, finding tax equity investors with sufficient Federal and/or state tax appetite is a challenge.
- The model is complex and therefore entails costs to structure financing, compared to a "build and sell" model involving just the supplier and the host.

4.8 Community Aggregation

Community aggregation for PV can take on numerous forms, although they all feature retail customers investing in a portion of a large-scale renewable energy project, with the project located away from the customer's property.

"Virtual aggregation," pioneered by the Sacramento Municipal Utility District (SMUD), involves the utility financing a PV project by entering into a long-term power purchase arrangement or by purchasing the project outright. Virtual "shares" confer the economic benefits of the PV system to the customer, akin to the customer having a net-metered system on his roof. The supplier sets a predictable power rate for the portion of the customer's utility bill covered by his share of the PV system's output.

Aggregation can also involve the actual sale of shares to customers, as in the case of a PV project in Ellensburg, Washington. Customers can invest in a portion of a PV system and receive a tradable share in the project that earns monthly revenues from the project's generation. Customers have contributed from $250 to $10,000, and businesses and corporations have invested up to $500,000 in the project. Unlike SMUD's approach, the Ellensburg project ties a customer to a share for a multi-year period. If a customer chooses to divest, she will have to sell or retire her share.

ADVANTAGES OF COMMUNITY AGGREGATION

- Allows renters or customers who plan to move from their home to another area of a utility's service territory to benefit directly from PV, without the need to install a PV system on their dwelling.

CHALLENGES OF COMMUNITY AGGREGATION

- Aggregation still requires a central entity (usually the local utility) to complete the project with its own financing, and then offer the completed project to customers. Sufficient up-front financing for the project is required prior to customer participation.
- The entry and exit of customers must be managed to cover the project's costs over time. Cancellation fees, tying customers to shares, or requiring customers to cover the full cost (including capital) of their portion of the project are several ways to mitigate this risk.
- Customers usually do not get a short-term financial benefit, due to PV's higher costs relative to grid power. However, the expectation is that the customer will benefit over time, either due to steady increases in the price of grid power relative to PV, or to higher revenues from PV generation due to increasing power market prices.

Part Two

1 Customizing Financing

Utility governance and regulatory environments, bonding and infrastructure programs, state and local jurisdictional issues, and property tax limitations are some of the local variations that need to be mapped for any clean energy program financing strategy. The following sections outline the considerations to take into account in building a clean energy financing strategy.

1.1 State/Local/Private Financial Capacity

Many proposed programs rely on one-time dollars to either purchase efficiency upgrades or seed a revolving loan fund for energy efficiency and clean energy loans. Even if sufficient dollars exist for a pilot program, it is critical to leverage these dollars to bring in additional public or private resources.

One emerging model is for local governments to use one-time dollars to establish a precedent that validates the concept for broader statewide legislation or structural realignment of public or private sector energy financing. Local programs with one-time dollars build the program to a scale where private investors begin to see the reason to invest. For any program, a detailed understanding of financial capacity is an important first step. Questions to answer to arrive at that clear understanding include:

- What types of state and local bonds can be issued for clean energy? Are there limitations on the amount of debt that could be issued (debt coverage ratios, debt ceilings or other policy- or bond covenant-related restrictions)?
- Are there constitutional or other restrictions against using public bonding or funds for private benefit? Can finance mechanisms, such as local improvement districts, be used for energy efficiency in privately owned properties?
- Are there restrictions on revenue sources for repaying revenue bonds? Can property taxes, sales taxes, income taxes, or other kinds of revenue be pledged for bond payments? Do collecting entities have the capacity to segregate and track payment streams?
- How can private funds, nonprofit donations and public sector grants be used to maximum advantage in the financing structure?
- What role is appropriate for each participant to play in the financing? Where will accountability for each part of the effort reside? Are there sufficient controls in place to ensure that dollars will be accounted for precisely and accurately?
- What kinds of restrictions/drivers exist for private financial institutions to finance energy efficiency, whether through consumer loans, mortgages, or other mechanisms?
- Are there unique financing/revenue opportunities available in a jurisdiction (e.g., special excise taxes, state or corporate credit enhancements, one-time dollars from settlements, lottery funds, etc.)?
- Given the identified structure and its inherent credit quality, what interest rates are likely to be achieved on a loan program or secondary market bond offering (e.g., these rates will fluctuate over time based on market conditions)?

For a community that is beginning to design and test new approaches to clean energy financing, the strategies that simply use one-time dollars (especially Energy Efficiency Conservation Block Grant funds) on a pilot project often are the fastest path to implementation and job creation.

However, such strategies generally do not foster institutional change or long-term sustainability.

The best application of one-time dollars is to a program that tests the elements of an ongoing, long-term strategy, in order to start building a platform for future scale and leverage. The pilot phase offers an opportunity to test new concepts, innovate in a way that can help contain political and institutional risks, and signal to potential capital partners that jurisdictions are willing to find a way for them to participate.

1.2 Utility Structure

Utility participation and commitment, with rare exceptions, are critical to almost any clean energy program. In many cases, utilities will already have investments in conservation and energy efficiency in place. Partnering with a utility on a business investment in energy efficiency, whether directly or through a third-party entity, can greatly accelerate the development of a clean energy program.

If done right, motivating utilities to make a business investment in energy efficiency, whether directly or through a third-party entity, is a powerful driver for any program.

Even in jurisdictions where utilities are not directly involved in energy efficiency, utilities often play a facilitation role or, at the very least, a political role in ensuring that the necessary incentives are aligned for utility involvement.

Key variables include:

- Are utilities consumer- or investor-owned? Do service territories for consumer- and investor-owned utilities overlap?
- Do utilities provide both electricity and gas? Does one or more operate in multiple states?
- For investor-owned utilities, under what regulatory framework do they operate? How much discretion do they have over rate-making?
- For consumer-owned utilities, is it a public utility district (PUD), a municipal utility, or a co-op? How much financial and personnel capacity does it have?
- Is there a public benefits charge? On what services and in what area does it apply?
- Are there plans for a smart metering system for any of the electric utilities?
- Does the regulatory framework encourage utility investment in energy efficiency and conservation?
- Does the utility currently offer an energy efficiency financing programs of its own?
- Is there a method for cost recovery for energy efficiency investments for regulated utilities?

1.3 Integrating or Re-Inventing Existing Programs

Many initiatives already exist for encouraging efficiency or investing in clean forms of energy. These programs are fragmented and have been created over several decades of incremental program development. Successful efforts to scale clean energy programs would take a more systemic approach, which may mean that existing programs become integrated into or replaced with new financing tools.

Examples of existing public programs may include:

- State, local, or utility loan programs
- Feed-in tariffs
- Local loan programs from lending institutions
- Tax credits, tax exemptions, grants, and rebates
- District scale financing programs
- Low-income and affordable housing weatherization programs
- Permit streamlining programs and other administrative incentives

1.4 Inter-Jurisdictional Cooperation

Part of the challenge of setting up a clean energy program is sequencing the build-out of the program from pilot phases to statewide implementation. Often, there are few barriers to action at the local level, but full scaling requires state buy-in and financing support.

Any successful clean energy program will require champions at multiple levels of government. Engaging leaders—whether mayors, city/county commissioners, legislators, governors, state or local agency leaders, or others outside government—early in the crafting process is necessary to build a scalable program.

Are there formalized governance structures for cooperation already in place? Are the political incentives of state and local elected leadership aligned? What is the history of and prospect for inter-jurisdictional cooperation? These kinds of questions will have mostly subjective answers, but they are important to answer at the outset.

2 Building the Financial Structure

Scalability is the critical driver for any approach to financing clean energy initiatives in the built environment. The financing structure should support scaled lending options for consumers, leverage one-time dollars, and document progress in terms of energy and economic metrics. Components to consider when building a financial structure include the following:

- **Loan structure.** Loan structure will depend on the measures being financed and the target borrowers. The most significant variables for loan structure are interest rate and duration, or term.
    - In loan programs across the country, **interest rates** vary from 0.00% to 9.00%, depending on the borrower, lender, and measures being financed. While lower rates do not necessarily translate into more participation by property owners, they do make it easier to achieve debt repayment, for example, with energy cost savings.
    - **Duration of loans** varies widely as well, depending on the type and security of a loan. Unsecured loans relying on property owner credit generally have terms of three to six years. On-bill financing provides a more secure repayment stream than unsecured lending, and loan terms can be extended to 10 years or more. The longest terms are associated with programs that rely on a lien on a property, and can be as long as 20 years.
- **Loan administration and management**. Streamlining the process reduces costs and should be user-friendly. The use of technology to streamline the application for and underwriting, servicing, and management of the loans is particularly important because the majority of loans will be small and the administrative costs could be sizable compared to loan size. The technology must be able to accommodate exponential growth in participation and lending.
- **Standardization.** The goal is to deliver a highly customized financing tool to a broad customer base, making a single financing platform available to all customers. Parties that deliver the financial solutions in the normal course of their business and constitute a one-stop-shop can provide easy accessibility to financing tools for consumers.
- **Liquidity.** In order to create liquidity for a loan program, loans can be aggregated and sold into secondary markets and used to leverage additional supplies of appropriate capital after early stage subsidies are applied. While this is undeniably a complex process, given the unfamiliarity of secondary markets with energy efficiency and clean energy lending, the concept is building momentum. As programs develop and markets become familiar with the low default rates associated with aggregated portfolios of energy efficiency loans, demand from investors in the secondary market is likely to increase and drive down interest rates.

Clean energy financing models have not yet realized their full economic potential because the industry and the resource base are fragmented. Many small initiatives and resource pots exist in isolation from each other. There are jurisdictional, statutory, regulatory, customer segment, utility, and delivery channel silos. Each plays a small part individually rather than working together as a whole.

Any credible aspiration for scaled impact must first offer the promise of being influential enough to consolidate and aggregate the system over time as opportunities arise. Any single jurisdictional response, even if metropolitan in nature, cannot attract and sustain the constituency or standing required to accelerate this process. However, diversity in individual program policies and ownership (e.g., different political jurisdictions) is not a fatal flaw. Rather, the programs must ultimately deliver loan assets that can be "processed" to create a conforming asset pool that is attractive to investors.

3 Capital

Identifying sources of capital and leveraging seed funding pose significant hurdles in the clean energy financing program development process. Relying on diverse capital sources that are matched with borrowers' needs and leveraging capital are important aspects of a financing program.

3.1 Sources of Capital

Generally, revolving loan funds and clean energy financing programs will be capitalized with a combination of capital sources, from bonds and loans to grants and utility funds.

FEDERAL FUNDS AND INCENTIVES

Federal **American Recovery and Reinvestment Act (ARRA) funds** are being widely used to seed fund clean energy financing programs. Portland, Oregon, Seattle, Washington, Spokane, Washington, and Whatcom County, Washington, are using Energy Efficiency and Conservation Block Grants to launch residential energy efficiency loan programs. State Energy Program (SEP) funds are also available as loans and grants for clean energy programs; Kansas and Arizona relied upon SEP funds for their Efficiency Kansas Loan Program and Energy Loan Program, respectively.

In addition to ARRA funds, existing Federal programs used in concert with clean energy financing programs can leverage additional support for projects.

- **New Market Tax Credits** (NMTC, www.cdfifund.gov), for example, encourage equity investments in Community Development Entities, which in turn invest in low-income communities in projects that may include retrofits and clean energy. The tax credit – totaling 39% of an investment, claimed over seven years – improves returns associated with energy efficiency retrofits and may make an investment more attractive. However, NMTC are generally not appropriate for residential programs.
- **Small Business Administration 504 Loans** are also used to help finance energy efficiency programs. The SBA administers a loan program that provides low-cost financing to small and mid-sized businesses for the purchase and/or improvement of equipment and commercial property, including energy efficiency improvements.
- **US Department of Agriculture grants and loans** can provide support to clean energy financing programs, especially in rural areas. Conservation innovation grants and the

Rural Energy for America Program (which includes energy audits and renewable energy development assistance) are just two of the resources that are available.

STATE AND TREASURY FUNDS

State treasuries have the capacity to provide capital for local loan programs. In addition to capital, states could offer a guarantee on bonds used to finance clean energy programs, much like state school bond guarantee programs. This credit enhancement would bring down the interest rate cost associated with financing.

BONDS

Municipal and state bonds can be used to access low-cost patient capital to put towards clean energy programs.

- **General Obligation (GO) Bonds** are backed by the taxing authority of an issuer. GO bonds for clean energy programs may be taxable or tax-exempt, depending on the specific use of proceeds and state law.
- **Revenue Bonds** are repaid with an issuer's revenues. Like GO bonds, revenue bonds may be taxable or tax-exempt, depending on the use of proceeds and state law. Given the nature of the security, revenue bonds are generally sold with higher interest rates than GO bonds because the repayment stream is tied to system revenues, which are considered less reliable than taxes.
- **Private Activity Bonds (PABs)** are municipal bonds whose proceeds are used by private entities or by governments for private purposes. They may be considered "qualified PABs" and receive tax-exemption (and lower interest rates) if certain qualifications are met. Each state has an annual "volume cap" allocation, determining the amount of PABs that can be issued in a given year. Washington, for example, has a volume cap of $600 million. If qualified, PABs offer relatively low tax-exempt rates (usually reserved for tax-exempt entities) for borrowers that otherwise would have borrowed at taxable rates.
- **Recovery Zone Facility Bonds (RZFBs**) represent an additional $15 billion of PAB volume cap, allocated to cities and counties with populations of over 100,000 people, for use within designated "economic recovery zones."
- **Tax Credit Bonds** offer bondholders a Federal tax credit in lieu of partial or full interest payments and result in interest rates for issuers that are lower than tax-exempt rates. In March 2010, all tax credit bonds were converted to direct-subsidy bonds, which means the tax credit has been replaced by a cash rebate for issuers for a portion of the interest costs associated with the bonds that they pay. The direct-subsidy structure increases the pool of investors for and significantly lowers the interest rates associated with these bonds. Most relevant to clean energy programs are Qualified Energy Conservation Bonds (QECBs), Clean Renewable Energy Bonds (CREBs)and Build America Bonds (BABs). QECBs must be used to fund GHG-reduction programs (including efficiency improvements, public transit, and renewable energy), CREBs are focused on publicly-

owned renewable energy projects, and BABs can be used for any governmental purpose.

PUBLIC BENEFIT FUND OR UTILITY FUNDS

Clean energy funds may be comprised of other taxes or charges. As mentioned in Part One, Babylon, New York, capitalized its clean energy financing program with an existing solid waste reserve fund, and Boulder, Colorado, relied on a carbon tax to finance its Climate Action Plan. Public purpose charges provide capital for several statewide clean energy programs, including the Energy Trust of Oregon and the Connecticut Clean Energy Fund, which invest their funds in statewide energy conservation and renewable resources.

Creating innovative, integrated utilities that can engage in partnership beyond the conservation, clean energy, and energy efficiency investments utilities already engage in can make energy efficiency and energy services a business model with a profit motive. Partnering utilities with public purpose and nonprofit organizations is the next challenge for policymakers.

PRIVATE LOANS

Partnerships with private lenders create channels for bank loans to support clean energy programs. These loans may be subsidized by utility rebates or city, county or state funds, in order to drive down interest rates and expand the pool of potential borrowers.

PROGRAM-RELATED INVESTMENTS

Foundations and philanthropically-minded individuals willing to accept concessionary returns on their investments can provide critical support for clean energy financing programs, especially when there is a focus on low-income outreach and financing.

PRIVATE CAPITAL

Wall Street is slowly acknowledging the returns associated with clean energy financing programs. Living Cities (www.livingcities.org/investment), a philanthropic collaboration of foundations and financial institutions, has begun to corral foundations, banks, and investors with the intent of driving investment towards energy efficiency and clean energy financing.

3.2 Leveraging Capital

Liquidity–readily available capital–is a primary challenge for clean energy financing programs. Often based on one-time grants or investments, revolving loan funds and capital pools can quickly run out of money to lend and languish as loans are repaid. Strategies to leverage seed capital to attract additional private and public investment can allow jurisdictions to expand their programs and meet demands for financing.

SECONDARY MARKET DEVELOPMENT

Lenders depend on the secondary market to unload their portfolios of loans and to replenish their capital, enabling them to continue lending. In the case of energy efficiency lending, tapping and developing a secondary market for low-cost capital holds the promise of nearly limitless capital. A secondary market for energy efficiency loans would allow lenders (as well as states, cities, and other entities) to go beyond a revolving loan fund that is capped at a certain amount and paid back as loans amortize, to a pool of capital that could provide upfront financing as long as there is demand for it.

Currently, Fannie Mae purchases unsecured residential energy efficiency loan portfolios at interest rates of approximately 12%. This pricing does not reflect the historically low default rates associated with the loans (usually in the 0.25% to 2.0% range). States that use this program have to use their own funds to buy down the interest rate for consumers, lowering it to between 4.00% and 6.99%. Unsurprisingly, this program has been under-utilized historically.

In an effort to increase access to patient capital in secondary markets for energy efficiency, several states are working to take advantage of and improve the current market for energy efficiency loan portfolios. Howard Banker, at the Energy Programs Consortium (www.energyprograms.org), is coordinating states' efforts to buy and sell standardized loans together, to increase market volume and bring down rates.

Currently, this nascent initiative focuses on unsecured residential energy efficiency loan portfolios and relies on cash and/or credit enhancements offered by participating states to drive down the exorbitant interest rates currently being charged by Fannie Mae. Securities are being sold as verified "Energy Star" portfolios and are intended to build a market for energy efficiency loans.

Similarly, on the Energy Savings Performance Contracting (ESPC) front, Hannon Armstrong has created the Hannon Armstrong Multi-Asset Infrastructure Trust ("Hannie Mae Trust"). This trust is a securitization vehicle, established to aggregate and finance Federal ESPC contracts to create economies of scale and reduce the transaction costs of the many small ESPC transactions. The trust initially invested $150 million in these aggregated contracts in 2000 and ultimately completed over $1 billion in securitization and sales of the resulting notes to institutional investors seeking long-term returns.

CREDIT ENHANCEMENT

Many new public programs are underway in the Northwest and elsewhere to stimulate lending and capital flows for energy efficiency projects. Publicly-sponsored credit enhancement is providing a pathway to attract and leverage private capital to finance energy efficiency projects. This strategy has an established track record – for example, many states support school bonds with a state government obligation pledge. On a Federal level, the concept of a Federal Energy Efficiency Financing Facility that would provide credit enhancement to energy efficiency bonds has been widely discussed.

The State of Washington devoted $5 million of State Energy Program funding to credit enhancement for energy efficiency lending. The $500,000 to $1 million grants made as part of the initiative will allow Washington cities to partner with utilities, lenders, and quasi-state agencies to access capital for energy efficiency lending programs. The USDA Rural Energy for America Program and the SBA 7(a) Loan Guarantee Program also provide credit enhancement for energy efficiency initiatives. These guarantees facilitate access to capital that otherwise may not have been available.

4 Conclusion

Climate Solutions produced **Energizing Cities: New Models for Driving Clean Energy Investment** to help local elected officials, county and city staff, energy utility managers, and community stakeholders learn from the numerous clean energy financing experiments throughout the United States.

We focused on explaining the factors that go into building scale, depth, and speed into comprehensive clean energy programs. We recognize that clean energy financing models are fast-moving targets, and we intend to stay on top of the trends and advances that will be made as the many experiments currently underway gain traction and produce results. We will continue to publish our findings on our website: www.newenergycities.org.

Part Three

Appendix A—Options for Financing Energy Efficiency and Renewable Energy

Below is a table from a report by Merrian Fuller of the Lawrence Berkeley National Laboratory on Efficiency Vermont, which outlined the variety of choices for energy efficiency and renewable energy financing. The effectiveness of each strategy listed in the chart below depends upon the goals of the program and local circumstances.

Table 2: Options for financing energy efficiency and renewable energy

Sources of Capital	Financing Mechanism	Collection Mechanism	Enhancements	Eligible Measures	Underwriting Criteria	Security Interests
Banks	Personal loan (secured or unsecured)	Amortized payment bill	Reduced interest rates	Energy efficiency	Debt to income ratio	Unsecured
Public benefit charge or added to rate base	Mortgage / home equity (secured to real estate)	Lease payment	Stretched underwriting criteria	Renewables	FICO score	UCC fixture filing
Utility general funds	Line of credit (secured or unsecured)	On utility bill	Guarantees & reserves	Other home improvement	Utility bill payment history	Mechanics lien
State / municipal general funds	Lease	On property tax bill	Rebates		Tax payment history	Other lien on real estate
Municipal bonds	Retail installment contract	Performance contract bills	Subsidized transaction costs		Other	Lien on other property (car, boat, etc)
Manufacturers	Special municipal tax or fee levied	Buy kWh or therms	Aggregation			Disconnection for nonpayment
Pension funds	Tariffed installation program		Environmental or carbon credits			
Housing or economic dev finance agency	Performance contract					
Settlement revolving fund	Power purchase agreement					
Other 3rd party						

Source: Efficiency Vermont, August 2008

Appendix B—Publications and Resources

There are a number of publications that outline the financing options for a clean energy program. A couple of the more comprehensive ones are:

- Merrian Fuller at Lawrence Berkeley National Laboratory, including a report for Efficiency Vermont (available at http://www.veic.org/FileLib/Energy_Efficiency_Financing_Report-Merrian_Fuller_2008.pdf).
- Matthew H. Brown and Beth Conover authored a report on financing strategies for clean energy for the Southwest Energy Efficiency Project in October 2009 that includes comprehensive research on financing programs throughout the country. The report can be accessed at: http://www.swenergy.org/publications/documents/Recent_Innovations_in_Financing_for_Clean_Energy.pdf

The following is a list of resources for further information on the technical details of clean energy financing and implementation models.

American Council for an Energy Efficiency Economy: www.aceee.org

Apollo Alliance: www.apolloalliance.org

Babylon, New York: www.thebabylonproject.org

BerkeleyFIRST: www.berkeleyfirst.renewfund.com

Blue Green Alliance: www.bluegreenalliance.org

Center for American Progress: http://www.americanprogress.org/issues/energy

Center for State Innovation: www.stateinnovation.org

Center on Wisconsin Strategy: www.cows.org

Change to Win: http://www.changetowin.org/fileadmin/pdf/greenjobsreport.pdf

Clean Economy Network: www.cleaneconomy.net

Clean Energy Works Portland: www.cleanenergyworksportland.org

Conservation Services Group: www.csgrp.com

Delaware Sustainable Energy Utility: www.energizedelaware.org

Efficiency First: www.efficiencyfirst.org

Efficiency Vermont: www.efficiencyvermont.com

Emerald Cities: www.emeraldcities.org

Energy Future Coalition: www.energyfuturecoalition.org

Energy Star, including information on EEMs: www.energystar.gov

Energy Trust of Oregon: www.energytrust.org

Green for All: www.greenforall.org

Lawrence Berkeley National Labs: www.lbl.gov/LBL-Programs/sp_energy.html

National Association of Energy Service Companies: www.naesco.org

NC Solar Center, Database on State Incentives For Renewables and Efficiency: www.dsireusa.org

PACE: www.pacenow.org

Renewable Funding, LLC: www.renewfund.com

Sierra Club: http://www.sierraclub.org/energy/efficiency/

The Alliance to Save Energy: www.ase.org

The Consortium for Energy Efficiency : www.cee1.org

US Department of Energy: www.eere.energy.gov

We Can Lead: www.wecanlead.org

White House "Recovery Through Retrofit:" http://www.whitehouse.gov/assets/documents/Recovery_Through_Retrofit_Final_Report.pdf

Online databases, such as the North Carolina Solar Center Database of State Incentives for Energy Efficiency (www.dsireusa.org), catalog existing programs.

Appendix C—Potential Stakeholders

The following is a list of potential stakeholders who should be engaged when constructing a clean energy program. This list is not comprehensive, but it offers an overview of the types of stakeholders many states and localities have included in the process of developing a clean energy program. Working with groups that will do the installation work is particularly important in developing a quality assurance regime that will provide investors with certainty.

- Affordable housing programs
- Architects
- Bankers and mortgage broker associations
- Building owner associations
- Business and industry organizations
- Community action organizations
- Consumer-owned utilities
- Developers
- Energy efficiency contractors
- Energy efficiency financiers
- Environmental advocacy groups
- Homebuilders
- Investor-owned utilities
- Legislators
- Local and national expert consultants
- Local and national organized labor
- Local and state bonding agencies
- Local development commissions
- Manufacturers
- Municipalities and counties
- Neighborhood groups
- Non-governmental and nonprofit organizations and foundations
- Private capital investors
- Public purpose entities
- Public utility commissions
- Ratepayer advocates
- Renewable energy industry associations
- State agencies involved in labor and contracting
- Workforce development experts and training facilities

Appendix D—Developing a Contractor/Lender/Auditor Network

In order for an energy efficiency loan program to be successful, it must be part of a comprehensive delivery system. The partners in this system include:

- An entity that can provide outreach, marketing, and organizing of sub-entities. Such an entity might be a local jurisdiction, such as Portland Clean Energy Works, or a community-based organization, such as an NGO or a public-benefits entity. It could also be a utility or some other implementing entity.
- An "energy concierge" or "energy advocate"–a third-party entity that can provide trusted advice and assistance to walk consumers through the program, the loan, and the retrofit process.
- Workforce development and community development partners who can provide the training in audits and retrofit work. These partners may include labor apprenticeship training programs, community colleges, or other training groups.

A single entity like a utility or public purpose organization might provide some or all of these roles, or there can be a network of partners.

LABOR STANDARDS/CONTRACTOR CERTIFICATION

To ensure a quality job and to deliver confidence to both consumers and investors, contractors should be certified to participate in any clean energy program. Certification should also be accompanied by required labor standards and practices that ensure the program creates good jobs for the community and provides wages and benefits that are a race to the top, not the bottom.

The recently signed Portland Clean Energy Works (CEWP) Community Workforce Agreement (CWA, www.cleanenergyworksportland.org/news.php) is one example. The CWA is reinforced by strong labor standards built into the state EEAST legislation that requires paying the prevailing wage on commercial projects, and directs the implementing agency to provide incentives to contractors that offer health care benefits.

The 12-page CWA includes, among many other principles, the following goals and targets:

- ***Local Hire*****.** At least 80% of employees used in the CEWP pilot program must be hired from the local work force.
- ***Family-Supporting Jobs*****.** Workers participating in CEWP pilot project retrofits will earn not less than 180% of state minimum wage.
- ***Health Insurance*****.** CEWP pilot project workers should have access to adequate and affordable health insurance, and the project should work to mitigate the burdens on small contractors associated with providing health insurance.

- ***Diverse Workforce.***
    - Historically disadvantaged or under-represented people, including people of color, women, and low-income residents of the city, perform not less than 30% of the total trades and technical project hours in the pilot. As practical, contractors should have a first source hiring agreement with qualified training programs to meet this goal.
    - Formerly incarcerated individuals seeking new opportunities for responsible citizenship and economic self-sufficiency are presented with employment opportunities leading to a career in weatherization and/or construction.
- ***Diverse Business Participation***. Businesses owned by historically disadvantaged or under-represented people, including minority- and women-owned businesses, make up not less than 20% of all dollars in the CEWP pilot project.
- ***Highly Skilled Workforce***. Resources for continuing education and certification are available for those coming into the industry, as well as those wanting to increase their opportunities for upward mobility within the industry through registered apprenticeship and other career pathways trainings in the region.

In addition to these standards, many groups, including Green For All (http://www.greenforall.org/), assist jurisdictions in developing a pipeline of workforce development to assist under-privileged communities. Keeping workers trained and ensuring that the jobs in a clean energy economy are aimed at those who need them most underscores the case for a public role in catalyzing clean energy programs.

Appendix E—Glossary

ACEEE: American Council for and Energy-Efficient Economy

Capital assembly: The ability to bring together different kinds of capital with different returns.

Energy performance scores: Like miles-per-gallon ratings on cars, these scores measure the energy efficiency of a building.

ESCO: Energy services company

Feed-in tariff: A model that allows for a utility to pay above-market rates to owners of clean energy systems (usually solar) that put electricity back on to the grid.

First-source hiring: An agreement that stipulates that every effort will be made to hire first from a pool of local, often disadvantaged workers. Some agreements stipulate that hiring will come through the state workforce development program.

IOU: Investor-owned utility

Low and moderate income homeowners: These homeowners fall between the very low income individuals, who are eligible for Federal weatherization assistance, and those who have enough income to support additional debt service. A structure that includes low and moderate income homeowners will make energy efficiency available to the entire continuum of homeowners.

Net zero goal: A loan program structured with the goal of ensuring the annual debt service paid will be less than or equal to the energy dollars saved.

Opt-in program: A program that relies on consumers choosing to participate.

PACE: Property Assessed Clean Energy

Photovoltaic (PV) host-owners or site host: The buildings/roofs and building owners that "host" solar photovoltaic panels.

Public benefits charge: a charge to rate-payers on a utility bill that is segregated and used for "public benefits," most often an investment in cost-effective energy efficiency.

Renewable Portfolio Standard (RPS): A state-based mandate that a certain percentage of electricity sold in-state is generated from renewable resources. RPS mandates work by allowing companies to buy and sell credits from renewable energy generation.

Revolving loan fund: A self-replenishing pool of money with public and/or private dollars that uses interest and principal payments on old loans to issue new ones.

Smart metering system: A system that uses advanced "smart" meters to measure consumption of electricity and deliver information about price. Such meters communicate directly with the utility to measure real-time data that informs on peak load use and other detailed variables not available with traditional meters.

Super-priority liens: Liens against real property that create a legal right above any other encumbrance (such as a mortgage).