The National Governors Association (NGA), founded in 1908, is the instrument through which the nation’s governors collectively influence the development and implementation of national policy and apply creative leadership to state issues. Its members are the governors of the 50 states, three territories and two commonwealths.

The NGA Center for Best Practices is the nation’s only dedicated consulting firm for governors and their key policy staff. The NGA Center’s mission is to develop and implement innovative solutions to public policy challenges. Through the staff of the NGA Center, governors and their policy advisors can:

- Quick learning about what works, what doesn’t and what lessons can be learned from other governors grappling with the same problems;
- Obtain specialized assistance in designing and implementing new programs or improving the effectiveness of current programs;
- Receive up-to-date, comprehensive information about what is happening in other state capitals and in Washington, D.C., so governors are aware of cutting-edge policies; and
- Learn about emerging national trends and their implications for states, so governors can prepare to meet future demands.

For more information about NGA and the Center for Best Practices, please visit www.nga.org.
This report was written by Devashree Saha, Sue Gander, and Greg Dierkers of the Environment, Energy & Transportation Division in the NGA Center. Initial research and drafting of this report was provided by Matthew Brown of Harcourt Brown Energy & Finance and John MacLean of Energy Efficiency Finance Corp., who also helped develop and execute a series of regional clean energy financing workshops that informed this report. Additional editorial and technical assistance was provided by Andrew Kambour and Katherine George of the Environment, Energy & Transportation Division in the NGA Center. NGA Center Director John Thomasian helped guide the report’s development. For their comments and input, the authors wish to thank Peter Adamczyk, Vermont Energy Investment Corporation; Donald Gilligan, National Association of Energy Services Companies; David Terry, National Association of State Energy Officials; and Adam Zimmerman, Enterprise Cascadia.

Editorial and editing assistance was provided by Erin Munley and Allison Carpenter at NGA. Editing was provided by Nancy Geltman, and the report was designed by Balmar/Ellipse Design.

This report is based upon work supported by the U.S. Department of Energy, under Award Number DE-FC26-08NT04390.

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

Executive Summary .........................................................................................................................................................................1

Chapter 1 – Introduction .................................................................................................................................................................5

Chapter 2 – Sources of Capital ......................................................................................................................................................7
  Bonds ......................................................................................................................................................................................7
  State Funds ........................................................................................................................................................................13
  Federal Resources ...............................................................................................................................................................13
  Private Capital .....................................................................................................................................................................15

Chapter 3 – Examples of State Clean Energy Financing Programs ..........................................................................................19
  Revolving Loan Funds .......................................................................................................................................................19
  Utility On-Bill Financing ..................................................................................................................................................20
  Loan Purchase Programs ................................................................................................................................................21
  Linked Deposit Programs ................................................................................................................................................22
  Energy Savings Performance Contracting .....................................................................................................................22
  Renewable Power Purchase Agreements .......................................................................................................................23
  Pooled Bond and Pooled Lease-Purchase Financing .................................................................................................24
  Property-Assessed Clean Energy Programs ................................................................................................................24

Chapter 4 – Selecting and Tailoring Programs to Target Markets ..........................................................................................29
  Identify a Target Market ...................................................................................................................................................29
  Select and Tailor Programs to Target Market(s) ..............................................................................................................31

Chapter 5 – Putting It All Together .......................................................................................................................................33
  Engage State Entities .........................................................................................................................................................33
  Consider the Impact of Existing Policies .........................................................................................................................35
  Enhance Contractor and Vendor Networks to Deliver Projects .......................................................................................36
  Develop an Outreach and Marketing Strategy ................................................................................................................36
  Identify and Meet Needs for Technical Assistance .........................................................................................................37
  Identify Funding for Program Administration ................................................................................................................37
  Support Program Monitoring and Evaluation ................................................................................................................37

Appendix A – Case Studies of State Clean Energy Financing Programs ..................................................................................39

Appendix B – Additional Considerations for Selecting and Tailoring Energy Financing Programs to Target Markets ........................................................................................................................................45

End Notes ......................................................................................................................................................................................48
Across the country, states are looking to increase the use of energy efficiency, renewable energy, and other clean energy resources as part of a diverse approach to meeting the country’s energy needs. However, the high initial cost of many clean energy projects is a barrier to reaping their longer-term energy, environmental, and economic development benefits. States are therefore developing new ways to finance such initiatives directly—and to encourage private financing for them—to spur greater deployment by households, businesses, industry, and state government itself. This guidebook helps states consider three key elements of a clean energy financing program: sources of capital, program selection and design, and implementation strategy.

Sources of Capital. State governments have several potential sources of capital for clean energy financing:

- **Bond options**, including general obligation, revenue, and industrial development bonds, as well as federal tax subsidy and tax exempt bonds that target clean energy.
- **State revenue sources**, including public benefit funds for clean energy, state treasury investment funds, proceeds from greenhouse gas emissions auctions, and federal grants.
- **Private sector capital** from commercial banks, credit unions, non-profit community banks, utilities, and foundations.

An important element of many programs is the ability to extend loan repayment periods to match the payback period of the investment, which may be as long as 10 or more years. Bonds, which often have terms of 10 to 20 years, are attractive from that standpoint, but other sources may also provide longer repayment periods. States can encourage private sector participation through credit enhancement mechanisms that reduce risk for investors and leverage 5 to 20 times the original investment. Such mechanisms include loan loss reserves, debt service funds, subordinated debt arrangements, and loan guarantees.

Program Design. There are a number of program designs that states may wish to replicate or adapt for their own use. Some of these, such as clean energy revolving loan funds and energy savings performance contracting, have been used for many years, most often to support efficiency improvements in state government buildings. Other approaches have emerged more recently, as states explore larger-scale programs involving multiple sectors and the opportunity to leverage private capital. Leading approaches include:

- Establishing energy revolving loan funds to recycle funds in the state’s economy;
- Developing utility on-bill financing programs to marry repayment with the source of savings;
- Creating linked deposit or loan purchase programs, which help leverage private capital;
- Pooling state building upgrades to support tax-exempt bond financing; and
- Using energy savings performance contracting or power purchase agreements for state buildings as a way to overcome the capital-versus-operating budget divide.

States must select and tailor their programs with consideration of state policy objectives and financing gaps, as well as the characteristics of the sector being addressed. Some programs are better suited to one sector than another (for example, the single-family residential sector, the multifamily residential sector, or the small commercial sector). They can be used alone or in parallel to address different sectors, or they can be combined to achieve more effective results. (See Table 1 on pages 3-4 for a summary of eight leading program designs, including their typical sources of capital, target markets, repayment mechanisms, and advantages and disadvantages).

Program Implementation. The clean energy financing programs that states are examining are more complicated than the typical grant and rebate programs that many have been operating successfully for years. They involve more players, are more financially complex, and are not yet widely understood by most consumers. To implement them successfully, states must consider how existing policies will affect a program. They must engage contractors and vendors to help publicize and explain the new financing options and be prepared to respond to needs for technical assistance. The more sophisticated programs also call for a broad mix of expertise among state players.
Although state energy offices have traditionally been the focal point for clean energy investments, a number of other state agencies are important participants. They include state-chartered bond authorities, state treasurers, utility regulators, economic development agencies, workforce agencies, state legislatures, industrial assessment programs at universities, and financial regulators. Collectively, state entities can provide sources of capital or conduits to capital, advice on structuring financial partnerships and access to financial networks, technical assistance on energy measures, outreach and program implementation support, and workforce training. As states work to develop more comprehensive clean energy financing programs, they are encouraged to create multidisciplinary teams.

Looking Ahead. The financing mechanisms discussed in this report are evolving, and many innovations and hybrids are being created. As states gain experience, the programs will continue to take shape and grow. The ultimate goal of many programs is a fully functioning private sector market that will serve many of the clean energy financing needs described here.
### Table 1. Overview of State Clean Energy Financing Programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Capital Source</th>
<th>Target Sector</th>
<th>Repayment Mechanism</th>
<th>Advantages</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revolving Loan Funds</td>
<td>Various, including Petroleum Violation Escrow (PVE) funds, direct appropriations from state legislatures, ratepayer funds, state bond proceeds, and federal grants.</td>
<td>Residential, commercial, institutional.</td>
<td>Investment costs are repaid through collections based on energy bills savings.</td>
<td>Relatively simple to establish; many states have experience in this area. Relatively simple to control and manage.</td>
<td>Often structured with very little leverage—a $5 million fund remains a $5 million fund because no private capital is brought into it. Structure in which state controls all aspects of lending may place state in competition with private lenders and may be beyond operational capacity of some state agencies.</td>
</tr>
<tr>
<td>Utility On-Bill Financing</td>
<td>Third-party loan (e.g., bank or credit union).</td>
<td>Residential, small commercial.</td>
<td>Repayment through monthly utility bill for electricity and/or gas services.</td>
<td>Secure repayment stream. Single payment mechanism for consumer. Potential for long amortization and small monthly payments.</td>
<td>Utility concerns about cost of billing system changes. Utility concerns about potential liability for loan defaults.</td>
</tr>
<tr>
<td>Loan Purchase Program</td>
<td>State treasury funds.</td>
<td>Residential, small commercial.</td>
<td>Borrower pays the financial institution, which periodically pays back the state treasurer.</td>
<td>Allows for on-lending at a lower-than-market rate. Potential to demonstrate the market to commercial financial institutions.</td>
<td>Treasurer’s willingness to invest capital limits the amount of funding available. State may be sacrificing a higher yield to invest in EE and RE markets.</td>
</tr>
<tr>
<td>Linked Deposit Program</td>
<td>State treasury funds.</td>
<td>Residential, small commercial, agricultural.</td>
<td>Borrower pays the financial institution, which periodically pays back the state treasurer.</td>
<td>Lowers the cost of capital for clean energy loans. State has limited administrative costs and oversight, with the financial institution responsible for credit underwriting, collections, and losses.</td>
<td>Requires participation of banks willing to make these types of loans. Active marketing of the program required among banks and borrowers.</td>
</tr>
<tr>
<td>PROGRAM</td>
<td>CAPITAL SOURCE</td>
<td>TARGET SECTOR</td>
<td>REPAYMENT MECHANISM</td>
<td>ADVANTAGES</td>
<td>CHALLENGES</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>---------------</td>
<td>---------------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Energy Savings Performance Contracting</td>
<td>Various, including state capital budget, state bonds, private sector loans, or tax-exempt lease-purchase financing.</td>
<td>Institutional</td>
<td>Energy services performance contract, whereby energy cost savings are used to repay the investment cost and financing charges.</td>
<td>Public facilities are major energy users with generally predictable loads and therefore good targets for ESCOs. Projects can be structured so that loan payments match the energy savings. Quality assurance is high due to the performance guarantee contract.</td>
<td>Arranging ESCO contracts can be a demanding task that requires states to conduct procurements, review project engineering, negotiate contracts, and establish effective project monitoring systems.</td>
</tr>
<tr>
<td>Power Purchase Agreements</td>
<td>Third-party financing arranged by project developer.</td>
<td>Institutional</td>
<td>Repayment facilitated through a power purchase agreement, so that investment costs are repaid through energy bill savings.</td>
<td>No or low up-front costs; no operating and maintenance responsibilities. Predictable cost of electricity over 20-25 years and minimal risk.</td>
<td>Site-specific negotiations that raise transaction costs and entail complex issues.</td>
</tr>
<tr>
<td>Pooled Bond and Pooled Lease-Purchase Financing</td>
<td>Financial institution; certificates of participation issued by the government.</td>
<td>Institutional</td>
<td>Repayment through energy bill savings to bondholders.</td>
<td>Pooling and aggregating the entities allow for an overall better credit rating, which enables access to lower-cost and longer-term financing.</td>
<td>Requires project development for several entities, adding complexity and the need to coordinate timing to prepare multiple projects/borrowers.</td>
</tr>
<tr>
<td>Property Assessed Clean Energy Programs</td>
<td>Local government–issued bonds, ARRA funding, concessionary funding from local governments.</td>
<td>Residential, large commercial (still being explored).</td>
<td>Repayment is linked to property and made via an assessment on the property.</td>
<td>Security and familiarity of repayment stream. Priority lien allows for more favorable bond terms. Investment and loan stay with the property (transfer to new owner), allowing for long amortization and small monthly payments.</td>
<td>State legislature must enact special assessment authority, and local government authorize use. Mortgage industry resistance to the first position lien on property. Some homeowners or businesses are reluctant to put lien on their property.</td>
</tr>
</tbody>
</table>

a Energy Savings Performance Contracting and Power Purchase Agreements are also used in the private sector, where the state does not play any role.

b Many PACE residential programs are on-hold, following a July 2010 determination by the Federal Housing Financing Administration (FHFA) that programs with priority liens run contrary to the Fannie Mae-Freddie Mac Uniform Security Instrument.
A cross the country, states are looking to increase the use of energy efficiency, renewable energy, and other clean energy resources as part of a diverse approach to meeting the country’s energy needs. Development of clean energy resources can help lower energy costs and advance goals of energy security, environmental protection, and economic development, but high initial cost is often a barrier to reaping the longer-term benefits. States are therefore seeking ways to finance clean energy investments that can spur greater deployment by households, businesses, industry, and state government itself.

Despite the interest in clean energy, lack of low-cost financing is a barrier for many homeowners, businesses, and industries. Clean energy investments often require a large initial investment in some sort of technology (such as insulation, solar panels, or a geothermal heat pump), with a payback period of anywhere from months, in the case of energy-efficient light bulbs, to many years for more extensive renewable energy systems. Financing has been available in some areas and for some sectors, but it is not widespread and is often expensive and not well tailored to the clean energy market. For instance, homeowners seeking to finance a $6,000 energy efficiency upgrade are most likely limited to their credit card or a relatively high-interest personal loan.

Traditional state investments in clean energy have focused almost exclusively on grants, tax incentives, and rebate programs, not financing. Although such efforts have advanced many projects, their impact has been limited. As states expand their clean energy goals and seek economies of scale, they are exploring a range of financing mechanisms to use both public and private capital sources. The influx of clean energy funding under the federal stimulus act has heightened states’ attention as well, as a way to begin to fill the clean energy financing gap.

**About This Report**

This report examines state-driven approaches to financing clean energy projects. It looks at the sources of capital available to states, describes the leading mechanisms currently being used, and identifies important implementation issues. Most of the mechanisms described relate to energy efficiency and small-scale, renewable energy applications. These are the technologies most in need of, and most amenable to, state financing interventions. Other, larger-scale clean energy projects, such as grid-connected renewable energy and biofuels, are already covered by the commercial financing sector.

Chapter 2 describes sources of capital that states may use to provide clean energy financing, including bonds, state revenue, and private funds. The chapter addresses questions about the issue, purchase, and backing of bonds for clean energy and how the money can be used; how state revenue may be invested in clean energy projects; and which sources of private capital, including banks, credit unions, and others, might be most suitable for state programs.

Chapter 3 provides an overview of eight leading state clean energy financing programs and some of the opportunities and challenges that they face. Its aim is to offer states examples of programs that they might replicate or modify for their own use. Appendix A provides case studies of five leading mechanisms.

Chapter 4 presents advice on selecting and identifying a target market or markets and selecting and tailoring a program to meet the needs of each. Appendix B contains additional information on the characteristics of the residential, commercial, industrial, agricultural, and institutional markets and appropriate tailoring options for programs.

Chapter 5 addresses the steps that states need to take to implement a robust financing program. It highlights the need to engage a variety of state players, to consider the impact of existing state policies, to form partnerships with contractors and vendors, to conduct outreach and marketing, to provide technical assistance to potential participants and financial partners, and to develop a plan for long-term sustainability that is based on the findings of program monitoring and evaluations.
States can use various sources of capital, individually or in combination, to support clean energy financing. These include several types of bonds and various state revenue streams, including federal funds. States can also leverage private sector capital from commercial and non-profit entities. The following potential sources of capital can be used individually or in combination:

- **Bonds.** Depending on the type of project, states can use general obligation, revenue, or industrial development bonds. New federal clean energy bonding authority, provided under the American Recovery and Reinvestment Act of 2009 (ARRA), expands the projects eligible and the amounts available for federally subsidized bonds. The majority of bond capital is used in public sector or non-profit settings.

- **State revenues, including federal funds.** States can use their own revenues from taxes, fees, and other charges. States can also use federal grants and leverage federal clean energy loan guarantees.

- **Private sector.** Funding can also come from the private sector, through financial institutions, utility companies, and foundations. In addition, states can use public funds to lower risk and encourage private sector investments through various credit enhancement mechanisms.

**Bonds**

States issue bonds to support a variety of long-term, capital intensive public purpose projects. The state issuer repays the bondholder the full principle at the maturity date and pays interest periodically (also known as a “coupon”). Purchasers include bond funds, mutual funds, insurance companies, pension systems, and individual investors. Over the past decade, as clean energy has increasingly become regarded as a public good, states have begun to issue bonds to fund projects such as energy efficiency upgrades and renewable energy installations.

Most state-issued bonds are **tax-exempt bonds.** The interest payments are not counted as federal taxable income to the bondholders and may also be exempt from state taxes. This tax reduction means that state bonds can carry a lower interest rate than comparable private sector bonds and still be attractive to investors.

State-issued tax-exempt bonds are classified as public purpose bonds, meaning that no more than 10 percent of the proceeds can be used by private entities. The proceeds from the sale of public purpose bonds can provide capital for clean energy projects. In addition to state bonds, recent federal legislation has authorized several new categories of federal bonds dedicated to clean energy. Bond options include the following:

- **General obligation bonds.** Tax-exempt debt issued by the state, secured by the full faith and credit of the state government, to fund infrastructure projects.

- **Revenue bonds.** Tax-exempt debt issued by state agencies to finance projects with a defined revenue or user base that is also security for repayment.

- **Industrial development bonds.** Tax-exempt debt issued and secured by the state agencies to provide capital for economic development, such as expanded factory operations or new equipment.

- **Federal bonds.** Issued by the state under authority granted by the U.S. Treasury, these include tax subsidy bonds (Clean Renewable Energy Bonds, or CREBs; Qualified Energy Conservation Bonds, or QECBs; and tax-exempt Recovery Zone Facility Bonds (RZFBs). Authority to issue CREBs expires in 2012.

The following discussion describes bonds that states may consider to fund clean energy and the role and responsibility of the state in issuing and repaying the bond, including payment of debt service (principal and interest) and how the funds may be used (See Table 2 on page 11 for a summary.)

**General Obligation Bonds**

General obligation (GO) bonds are tax-exempt bonds issued to finance infrastructure projects that provide longer-term public benefits. Some states include investments in clean energy in this category. GO bonds are secured by the full faith and credit of the state government. This means that the state pledges to use general revenues, or if needed, property or other taxes, to repay the bondholders. This security pledge means
that GO bonds pay relatively low interest rates, lowering the state’s borrowing costs. Most states have limits on the amount of GO bonds they can issue. In a number of states, GO bonds must be approved by the voters. In some, state debt may not exceed a certain percentage of state revenues.

**Massachusetts** is using GO bonds to pay for energy efficiency improvements to state buildings and facilities. Financing the work with GO bonds is estimated to lower the Commonwealth’s interest cost by about $800,000 over the life of the project, compared to other financing options. The Commonwealth Office of Administration and Finance reviews each project to determine if the energy savings generated will cover the cost of repayment of the bonds.

**Alaska** recently granted the state’s Housing Finance Corporation GO bonding power to create a $250 million revolving loan fund to help finance energy efficiency retrofits in public buildings across the state.

**Revenue Bonds**

States issue tax-exempt revenue bonds to finance projects with a defined revenue or user base, traditionally water and wastewater facilities, toll roads, airports, and power plants. Debt service on revenue bonds is paid out of the project’s revenues. Recently, some states have issued revenue bonds to upgrade state buildings, in which case the “revenue” is the savings in energy costs.

State entities that issue revenue bonds, typically agencies or regional authorities, must be granted legal authority to do so. Although revenue bonds are less secure than GO bonds (as projected revenues cannot be guaranteed), they are still considered a safe investment by bondholders and typically carry low interest rates. Bond issuance costs can be paid from the proceeds.

**New Mexico** authorized its state Finance Authority to issue $20 million in revenue bonds to fund energy efficiency upgrades at schools and state agencies. Eligible state entities are required to allocate 90 percent of the resulting savings to bond interest and principal until they are paid off. The state agency or school district partner receiving the energy upgrades pays back the bond’s debt service and also reimburses the Finance Authority for the cost of issuing the bond. The participating agency or school district can keep any remaining savings on energy costs, up to 10 percent, for its own activities, such as education programs. Before a revenue bond is issued, analysis by the Finance Authority to ensure captured savings are sufficient to cover all costs of debt service.

**Industrial Revenue Bonds**

States use tax-exempt industrial revenue bonds (IRB) to aid private sector economic development. IRBs support capital improvements, expansions, or facility enhancements. According to Internal Revenue Service guidelines, that includes refurbishing or expanding manufacturing facilities, updating operations, or adding new equipment as identified by the Internal Revenue Code. IRBs can cover renewable energy and energy efficiency upgrades, depending on state rules.

Federal law allows all states to authorize Industrial Finance Agencies or Industrial Development Agencies, which must repay all IRB debt service from project revenues, typically income from companies that receive bond funds. IRB bond proceeds may be used to pay up to 2 percent of issuance costs. IRBs issued by Industrial Finance Agencies are exempt from federal income tax and state property tax. However, states bear no financial responsibility for IRBs, so bank partners may be needed to secure them (e.g., by guaranteeing the bonds through a letter of credit or purchasing bonds directly).

Nearly all states issue IRBs through Industrial Finance Agencies, and most place no restrictions on the use of the proceeds within the context of federal tax guidelines. Eligible IRB activities typically include on-site renewable energy generation or energy efficiency enhancements as part of facility capital improvements. IRB law varies, and in some states, legislation may be needed to authorize IRBs for such energy upgrades.

**In Illinois**, the state Industrial Finance Authority was established to foster economic development by public and private institutions that create and retain jobs. It has authority to use tax-exempt IRBs to finance clean energy projects, including new construction, as well as retrofits of existing structures, if they result in quantifiable and verifiable reductions in energy use. A series of campus housing improvement projects have been undertaken at private universities, including a new Leadership in Energy and Environmental Design (LEED)–certified residence hall at Elmhurst College. The project has reduced energy and water costs and improved student living conditions. The $25 million IRB is being repaid through additional fees paid by students.
who select to live in the upgraded facility. Under the Industrial Finance Agency agreement, Elmhurst College will ensure that student occupancy (and related fees) in the LEED residence hall is sufficient to cover IRB debt service.

**Federal Tax Subsidy and Tax-Exempt Bonds**

Several types of tax subsidy bonds were authorized or extended under ARRA to support clean energy. Under a tax subsidy bond, the federal government makes a cash payment to the state bond-issuing entity to cover a portion of the interest that the state pays to bondholders. This reduces state borrowing costs. The subsidy is passed along to bondholders through a biannual, taxable payment from the state.

The advantage of this approach for bondholders is that they receive a payment faster than if they had to wait for compensation via an annual tax credit for a portion of their interest, as was the case under the tax credit bonds that were previously used for such purposes. This provides state issuers access to low financing rates and access to a larger taxable investor community. Tax subsidy bonds authorized under ARRA for infrastructure projects (which include clean energy) have saved states and localities $12 billion in avoided interest payments. (See textbox on page 10 for an example of how this works for CREBs and QECBs.)

The chief federal bonding authorities for clean energy financing include two tax subsidy bonds and one tax-exempt bond:

- **Clean Renewable Energy Bonds (CREBs).** Directly subsidized bonds, the interest on which is taxable, that can be used for energy conservation projects. CREBs expire in 2012.

- **Qualified Energy Conservation Bonds (QECBs).** Directly subsidized, taxable interest bonds that support renewable energy and energy efficiency projects. QECBs do not expire.

- **Recovery Zone Facility Bonds (RZFBs).** Tax-exempt bonds for a range of “qualified economic development purposes,” such as public infrastructure. RZFBs do not expire.

**Clean Renewable Energy Bonds (CREBs).** CREBs are tax subsidy bonds issued by federally authorized state entities. State issuers provide bondholders a taxable payment biannually to cover a portion of the interest obligation. In return, the state receives a cash rebate from the U.S. Treasury equal to the lesser of (1) taxable rate or (2) 70 percent of the U.S. Treasury’s daily tax credit rate on the bond sale date. Although the state issuing entities still must pay all principal and interest, the subsidy reduces the state’s interest costs while keeping its bonds attractive to investors.

The most recent allocation for CREBs was $2.4 billion, with each state receiving a share based on its population. Up to one-third of each state’s allocation can be issued by each of three entities: public power providers, government bodies, and electric cooperatives. Eligible projects include solar, wind, biomass, solid waste, and hydro energy activities. Two percent of the bond proceeds can be used toward the cost of issuance. CREBs expire on October 27, 2012.

CREBs were originally authorized by the U.S. Treasury under the Energy Policy Act of 2005 as “tax credit bonds,” in which the federal government provided a tax credit to the bondholders in lieu of interest payments from the state issuer. The program was amended and expanded under ARRA so that states now pay bondholders a direct subsidy in lieu of the tax credit and receive a rebate from the federal government.

In 2006, California sold $20 million in CREBs to pay for solar photovoltaic panels at 70 transit stations and other sites throughout the state. The bonds were issued by the California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA) on behalf of CalTrans, the state’s transportation department. CalTrans will pay the principal and interest on the bonds but will reap $24.7 million in net energy savings over the 15-year repayment period.

**Qualified Energy Conservation Bonds (QECBs)** are also tax subsidy bonds. Federally authorized state entities that issue QECBs pay taxable interest to bondholders biannually and receive a cash rebate from the U.S. Treasury. The rebate is the lesser of: (1) the taxable rate of the bonds or (2) 70 percent of the U.S. Treasury’s tax credit rate on the bond sale date. States still must pay interest and principal on QECBs, but the federal subsidy reduces their interest cost while ensuring that QECBs offer an interest rate attractive to potential investors.
This can result in low financing costs for state energy efficiency projects and also allows state and local issuers to take advantage of the larger taxable base (instead of marketing the bonds solely to tax-exempt municipal investors). QECBs can be used for energy efficiency capital expenditures, energy research facilities. Allocations for QECBs total $3.2 billion, shared among the states based on population. Two percent of QECB proceeds can be applied to cover the cost of issuance. QECBs do not expire.

**Colorado** has closed nine QECBs transactions as of December 2010. These have provided funding for a variety of clean energy projects. The **Connecticut Development Authority** approved $3.8 million in QECBs to support heating and air conditioning improvements and window replacement for the Waterbury city hall and library. Yolo County, **California**, issued $2.019 million in QECBs to subsidize the cost of building a solar photovoltaic system that will save an estimated $8 million in energy costs over the bond term.

**TAX SUBSIDY BONDS:**
**A CREB/QECB ILLUSTRATIVE EXAMPLE**

Under one possible CREB/QECB scenario, individual or institutional investors (bondholders) receive a 6 percent return (interest rate), which is competitive with the daily U.S. Treasury bond rate. The state receives a 70 percent federal subsidy, making its effective bond interest rate (coupon) 2.3 percent. This example illustrates how states can save significantly on interest costs with tax subsidy bonds.

<table>
<thead>
<tr>
<th>Principal amount</th>
<th>$10,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Years to maturity</td>
<td>17</td>
</tr>
<tr>
<td>Interest rate paid to bondholder</td>
<td>6.00%</td>
</tr>
<tr>
<td>Tax credit rate</td>
<td>5.29%</td>
</tr>
<tr>
<td>Direct federal subsidy (70%)</td>
<td>3.70%</td>
</tr>
<tr>
<td>Interest paid by state (taxable coupon rate minus subsidy)</td>
<td>2.30%</td>
</tr>
</tbody>
</table>

**Recovery Zone Facility Bonds (RZFBs).** RZFBs are tax-exempt bonds that states can use to help private businesses located in federally designated recovery zones to finance a broad range of capital projects. Because investors do not pay taxes on the interest they receive from RZFBs, they are willing to accept lower rates. RZFBs have a $15 billion nationwide cap, allocated to counties and large cities in proportion to the local employment decline during 2008. Eligible projects include renewable energy manufacturing facilities, including wind and solar energy. Up to 2 percent of RZFB proceeds can be used to cover the cost of issuance. RZFBs do not expire.

**Wisconsin** issued $6.7 million in Recovery Zone Facility bonding authority to Western Technical College (WTC) for the Cashton Greens Wind Farm project in Monroe County, Wisconsin. The Cashton Greens Wind Farm project is a community-based wind energy project that includes the acquisition and installation of two commercial scale, 1.8 megawatt wind turbines and associated facilities to be owned and operated by Cashton Greens Wind Farm, LLC. WTC will provide workforce training opportunities to businesses using new energy sources.
<table>
<thead>
<tr>
<th>BOND TYPE</th>
<th>ISSUER</th>
<th>TAX STATUS</th>
<th>PURCHASER</th>
<th>ELIGIBLE USES</th>
<th>METHOD OF REPAYMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STATE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General obligation</td>
<td>State agencies, typically treasury and/or finance agency.</td>
<td></td>
<td></td>
<td>A wide range of capital projects, including roads and bridges, waste</td>
<td>State funds, including general funds of any kind.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>treatment facilities, university facilities, and energy projects.</td>
<td></td>
</tr>
<tr>
<td>Revenue</td>
<td></td>
<td>Tax-exempt.</td>
<td></td>
<td>Revenue-generating projects such as toll roads and bridges; can also</td>
<td>Project revenues.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>include first-time home-buyers’ mortgages.</td>
<td></td>
</tr>
<tr>
<td>Industrial revenue</td>
<td>State agencies, typically industrial finance or development agencies (IFAs).</td>
<td></td>
<td>Both public and private investors,</td>
<td>Economic development and job creation.</td>
<td>IFA operating budgets.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>either as individuals or through</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>institutional investments.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>FEDERAL</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QECB</td>
<td>State agencies, typically treasury and/or finance agency.</td>
<td>Tax subsidy.</td>
<td></td>
<td>Energy efficiency capital expenditures, renewable energy, R&amp;D, energy</td>
<td>The state repays the principal and interest. The federal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>reduction measures for public transit.</td>
<td>government subsidizes up to 70% of the bond’s interest</td>
</tr>
<tr>
<td>CREB</td>
<td>Public power providers, government agencies, and electric cooperatives.</td>
<td></td>
<td></td>
<td>Qualified list of renewable energy facilities, including wind, solar,</td>
<td>The state repays the principal and interest. The federal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>geothermal, biomass, etc.</td>
<td>government subsidizes up to 70% of the bond’s interest</td>
</tr>
<tr>
<td>RZFB</td>
<td>State can provide guidance, but counties and municipalities have</td>
<td>Tax exempt.</td>
<td></td>
<td>Factory upgrades or new equipment purchases for businesses in economically</td>
<td>The federal government provides a tax credit equal to the</td>
</tr>
<tr>
<td></td>
<td>authority.</td>
<td></td>
<td></td>
<td>distressed areas, including energy efficiency and renewable energy projects.</td>
<td>bond’s interest cost.</td>
</tr>
</tbody>
</table>

**TABLE 2. STATE AND FEDERAL BONDS ELIGIBLE FOR CLEAN ENERGY PROJECTS**
State Funds

States can use their own funds from taxes, fees, and other charges to support clean energy financing programs. This may be part of an investment strategy, a policy goal, or both. The options include public benefit funds generated by small charges on electric and natural gas utility bills, treasury funds generated by state taxes, and proceeds from greenhouse gas emissions auctions.

Public Benefit Funds

Public benefit funds (PBFs) are pools of funds generated by a small surcharge on customers’ electricity bills. A few funds also collect from natural gas customers. PBFs are established by state statute or public utility commission regulation. They are administered by states, utilities, or third parties who decide how to allocate the funds. PBFs support clean energy financing by providing incentives and capital.

Twenty-one states have PBFs supporting energy efficiency; 16 have PBFs for renewable energy. Collectively, these are expected to generate $7.3 billion annually by 2017. Efficiency Vermont, an independent non-profit funded via a PBF, uses various financing approaches to help achieve its mission of offsetting all new energy demand with gains in energy efficiency.

State Treasurer Investments

State treasurers manage state-generated funds, which include tax revenue, government investments, state-sponsored retirement accounts, public works funds, and other state money. State treasurers may invest available state funds in secure loans, often at below-market interest rates, to guarantee the return. State treasurers can do this through linked deposit programs and energy efficiency loans. (Chapter 3 contains more details on state treasurer investment programs in clean energy.)

Greenhouse Gas Allowance Auctions

Another potential source of state funds is proceeds from emission allowance auctions. In the Northeast, 10 states have agreed to cap power plant emissions and sell allowances (the right to emit CO₂) to power plants. States that receive revenue from participating in a cap-and-trade structure can use the funds to seed clean energy finance programs. While state investment percentages vary, the 10 participating states collectively have designated 80 percent of the $777 million in RGGI auction proceeds to date for programs to improve energy efficiency and accelerate the deployment of renewable energy technologies. For instance, approximately 65 percent of Delaware’s auction proceeds are directed to its Sustainable Energy Utility, which provides energy efficiency and renewable energy programs for households and businesses. Connecticut has used nearly $2 million from the state’s first two auctions for energy efficiency and renewable energy.

The Western Climate Initiative (WCI) and the Midwestern Regional Greenhouse Gas Reduction Accord are considering similar market-based mechanisms to cap-and-trade emission allowances by auction. Although neither market is imminent, the WCI states are preparing for a cap-and-trade program that covers power plans and transportation sources, which could generate additional revenue for clean energy financing.

Federal Resources

Federal funds from grant programs are another source of clean energy capital or of leverage in the form of loan guarantees. Sources include the U.S. Departments of Energy (DOE), Housing and Urban Development (HUD), and Agriculture (USDA). The infusion of more than $32 billion in new federal clean energy funds under ARRA expanded many existing programs, created new grant programs, and enhanced loan guarantees. The leading sources include:

- **DOE**. The bulk of federal clean energy funding for states comes through the DOE’s State Energy Program (SEP). SEP provides financial and technical assistance to states through formula and competitive grants. States can use a portion of their formula grants to develop state strategies and goals for clean energy financing, subject to a matching requirement. They can also use SEP funds to cover up to 50 percent of program administrative costs. Competitive grant solicitations are also available, dependent on annual funding, to support clean energy initiatives. ARRA increased SEP funds to $3.1 billion (to be spent in three years).⁵ ARRA funds also provided $3.2 billion in Energy Efficiency and Conservation Block Grants to local communities. These funds must be expended by April 30, 2012.

DOE is encouraging states to use ARRA funds to build new clean energy markets through self-sustaining clean energy financing programs. States
can thus look to ARRA funding to help them create new clean energy financing tools and programs. Beyond ARRA, states can also use up to 50 percent of their annual SEP allocation to create clean energy financing programs. Texas is using ARRA SEP funds to capitalize a $158 million revolving loan fund, known as the Building Efficiency and Retrofit Program (BERP). The BERP loan program will provide funds on a competitive basis to public facilities, including local governments, K-12 public schools, public higher education institutions, and state government-owned facilities, similar to the existing Texas LoanSTAR program (see Chapter 3 for more on LoanSTAR). Projects are evaluated based on expected energy savings and can include high-efficiency heating, ventilation, and air conditioning systems and building energy retrofits, as well renewable energy installations. The BERP loan program will provide loans at 2 percent interest.

HUD. HUD programs for states for financing clean energy are limited, but two block grant programs offer states that opportunity:

- The Public Housing Capital Fund, in which $4 billion is available in grants for energy-efficient renovation of public housing, with most of the funds disseminated through state housing authorities; and
- Assisted Housing Energy Retrofit, under which $250 million in state and local grants is targeted for energy-efficient modernization and renovation of housing for low-income individuals, the elderly, and persons with disabilities.

HUD, through its mortgage insurance unit, the Federal Housing Administration (FHA), is creating a program to encourage greater private lender activity that states can leverage in their own energy residential retrofit financing programs. The FHA PowerSaver program provides federal loan insurance and other incentives to participating lenders who deliver low-cost home energy improvement.
loans to qualified consumers. Under the program, homeowners can borrow up to $25,000 for up to 20 years to make proven home energy improvements based on a list developed by FHA and DOE. The PowerSaver begins a national two-year pilot program in 2011.

- **USDA.** The USDA provides $60 million in funding to states through its Rural Energy for America Program (REAP). REAP promotes clean energy for agricultural producers and rural small businesses through (1) grants and loan guarantees for energy efficiency improvements and renewable energy systems, and (2) grants for energy audits and renewable energy development assistance. The USDA also makes annual competitive grants to state and local governments using discretionary funds.

**Private Capital**

Private capital can be an important component in state-initiated clean energy programs, complementing public funds. States can also use public funds to support various credit enhancement mechanisms that lower risk and encourage investment by private financial institutions, foundations, and utilities:

- **Banks.** Both community and national banks are potential sources of clean energy capital. Some banks have a long-standing engagement in municipal-level energy efficiency financing and experience to draw on. Some “niche” commercial lenders also have experience administering loans for residential energy efficiency upgrades.

- **Credit unions.** Credit unions are generally smaller institutions that are interested in advancing their ties to a local community. Because they often have experience with automobile loans, they are likely to be comfortable with the smaller loan amounts typical for clean energy projects. Efficiency Vermont works with local lenders to help consumers finance energy efficiency upgrades. VSECU, Vermont’s state employees’ credit union, is the most active in signing up customers for energy efficiency retrofits.

- **Community development financial institutions (CDFIs).** These non-profit banks provide credit, capital, and financial services to economically distressed communities. There are some 1,000 CDFIs nationwide. The Reinvestment Fund
(TRF) is a CDFI that provides capital to launch residential clean energy financing programs in the Mid-Atlantic region.

**Foundations.** States may look to foundations that have “program-related investment” policies, under which a portion of their endowment is invested in assets, such as clean energy, that complement their program goals. The John D. and Catherine T. MacArthur Foundation provided the Iowa Finance Authority a $2 million program-related investment for energy efficiency improvement loans to preserve affordable rental housing in Iowa.

**Utilities.** “Demand-side management” (DSM) refers to utility-sponsored programs to encourage their customers to modify their pattern and level of energy use. The use of funds from such programs, recovered in utility rates, is subject to approval by state public utility commissions. Nevada Power, which serves the Las Vegas area, has implemented a wide range of DSM programs, yielding energy savings equal to about 1.3 percent of total retail electricity sales. Nevada has a Lost Revenue Recovery mechanism that provides for annual recovery of both the utility’s efficiency program expenses and the revenues lost from the reduced sales caused by energy efficiency programs. Utilities may also administer public benefit funds (discussed above in the section on state funds).

Although some national banks have had large-scale energy efficiency investment programs at the municipal level for some time, particularly for improvements to government buildings, clean energy is a relatively new area of investment for most commercial institutions. As a result, states will need to provide data to help make a sound business case and possibly some technical assistance to help orient new players. For utility programs, which can be complex, it will be helpful for states to ensure proper communication and coordination among policy staff, the public utility commission, and electricity servicers and providers. This support is discussed further in Chapter 3.

## Using State Funding to Leverage Private Sector Lending

States can use their own funds to reduce the risk for private sector investors and thus encourage greater private sector participation in clean energy. Decreasing risk is especially important in new markets, such as clean energy. The sections below describe four credit enhancement mechanisms that states can use to support clean energy.

**Loan Loss Reserve Funds (LRF).** These are funds set aside to cover potential defaults in a loan portfolio. A loss reserve fund provides partial risk coverage to encourage lenders to pioneer new products, broaden access to financing, increase the size of unsecured loans, extend loan tenors, and/or lower interest rates. LRFs are particularly useful in markets consisting of a large number of small projects, where financial institutions will be making a large number of relatively small loans, such as loans for energy efficiency improvements or residential-scale renewable projects. Loan loss reserves can exceed 20 percent of the total loan portfolio, but have typically been set at around 10 percent, sometimes with the ability to adjust as these loan performance data become available.

The Clean Energy Works Portland program, in Oregon, has set up a 10 percent loan loss reserve fund for its energy efficiency retrofit program. More detail on this program can be found in Chapter 3. The Michigan SAVES residential retrofit program entails a 20 percent loan loss reserve for the first $200,000 in loans and a 5 percent loan loss reserve for each future loan.

**Debt Service Reserves.** States can set aside cash reserves to guarantee the payment of principal and interest. Such a reserve may be a useful tool for state bond issuers who wish to boost the security of their bonds. The reduced risk from adding a debt service reserve may help states expand the market for their bonds while reducing the bond coupon rate. For example, states can use SEP funds to establish a debt service reserve to support federally authorized clean energy bonds, such as QECBs and CREBs. Private business and public entities have used debt service reserves for years to support debt issues; they typically represent about 10 percent of the bond principal.
Subordinated Debt. State governments can use a subordinated debt structure to help guarantee the capital cost of a clean energy project. This involves the use of two separate loans (senior and subordinated). The state project funder (which acts as the subordinated lender) takes on much greater risk than the senior lender. This structure permits the senior lender, typically a private sector entity experienced in project finance, to put in more capital and charge a lower interest rate because the subordinated lender is absorbing most of the project risk. State governments, utilities, or others investing in clean energy funds (for example, public benefit funds) agree to act as the subordinated lender, guaranteeing any project losses up to the value of their loan.

The Vermont Clean Energy Development Fund (CEDF) uses subordinated debt financing. Established in 2005 by state statute, the fund receives between $4 million and $7 million per year from the Department of Public Service and the utility Entergy. It has a fund manager who, with an investment committee of expert stakeholders, identifies and allocates funds to subordinated debt investments.

Loan Guarantees. States can also reduce risk for private capital by guaranteeing repayment of loans in the event of default. This reduces the interest rate the state must pay and helps secure participation by private sector partners. Although most examples of loan guarantees are federal, states can develop their own loan guarantee programs.

In Illinois, the legislature passed a bill bringing renewable energy projects under the state’s development assistance umbrella, managed by the Illinois Finance Authority (IFA). The legislation authorized the IFA to issue $3 billion in loan guarantees for economic development purposes. Under this expanded financing model, a developer would still launch a renewable energy project using traditional lenders but add the IFA as a partner, providing a loan guarantee to the private sector lenders. IFA participation adds the state’s moral obligation, which is expected to help to reduce the cost of the loan.

State governments rely on a number of different sources of capital to support clean energy finance programs. States seeking to secure clean energy capital may wish to consider a number of approaches described here, either alone or in combinations.
States have developed a range of financing programs to support clean energy in the residential, commercial, industrial, agricultural, and institutional sectors. Some programs, such as clean energy revolving loan funds and energy savings performance contracting, have been around for years, typically supporting energy efficiency improvements in state government buildings. Several new clean energy financing programs, such as utility on-bill repayment and renewable power purchase agreements, have emerged in recent years as states seek to move to larger-scale programs involving multiple sectors and to leverage private capital. This chapter describes eight types of clean energy financing programs that may serve as models for broader replication:

- Revolving loan funds;
- Utility on-bill financing;
- Loan purchase programs;
- Linked deposit programs;
- Energy savings performance contracting;
- Renewable power purchase agreements;
- Pooled bond and pooled lease purchase financing; and
- Property assessed clean energy programs (PACE).

Each description aims to help states answer the following questions:

- What is the source of capital?
- Who is the target audience?
- What is the repayment mechanism?
- What are the advantages and challenges?

Additional details on the first five types of programs are included in the case studies in Appendix A.

### Revolving Loan Funds

Clean energy revolving loan funds (RLFs) are a broad category of financing in which a state recycles principal and interest payments as loans mature. To create an RLF, a state sets aside a capital fund and loans money from it for designated clean energy activities. Loan repayments are used to reseed the fund. Most RLFs have targeted the residential, small business, and public buildings sectors, although they can be used in any sector. In a state-sponsored RLF, the state either is itself the lender or delegates the lending functions (loan origination, underwriting, servicing, and collection) to a third-party financial institution.

Many state revolving funds began in the late 1980s, when state energy offices received allocations of Petroleum Violation Escrow (PVE) funds through the U.S. Department of Energy. Many states enhanced their programs or created new ones with federal stimulus funding: 32 states and two territories are using ARRA funding to support 51 RLFs (some states have more than one RLF targeting different sectors) with a total initial capitalization of $647 million.

The Texas LoanSTAR (Loans to Save Taxes And Resources) program uses a revolving loan mechanism to fund energy retrofits for public facilities, including K-12 public schools, public higher education institutions, local governments, and state government-owned facilities. The original capitalization of the program came from petroleum violation escrow funds from the federal government. The size of the original investment—$98.6 million—makes LoanSTAR the largest state-run energy efficiency and conservation program in the United States. The funds are managed by the Texas State Energy Conservation Office (SECO) through the U.S. Department of Energy’s State Energy Program. The revolving loan mechanism allows borrowers to repay loans through the energy cost savings realized from the projects. Each specific energy efficiency measure must have a payback within its estimated useful life and the total project must have an average payback of 10 years or less. LoanSTAR utilizes a competitive process to select borrowers. As of November 2010, the program had made 207 loans, with an average loan size of $1.4 million and cumulative energy savings of $309 million. The case study in Appendix A provides more details on this program.

Florida’s Clean Energy Investment Program (CEIP), launched by the Florida Opportunity Fund with an initial $36 million in ARRA funding, is an RLF that includes an equity investment option for up to 49 percent of the fund. CEIP provides funding, ranging from $500,000 to $5 million, to businesses to increase the use of energy efficiency and renewable energy technologies,
equipment, and materials in the state. Under the equity investment option, Florida would replenish the fund using their portion of the company’s profits and increased valuation, making CEIP the first known program of this kind to allow equity returns within a traditional RLF, and leverage private capital investment to optimize the potential for job creation and industry growth.

**Advantages**

Many states have found that an RLF is an effective way to finance clean energy projects, typically those costing between $2,000 and $10,000, although some funds support much greater amounts. RLFs are attractive because they are relatively simple to set up and are an established, well-understood tool. They are easy to manage because all the operations can be performed in-house by the state.

**Challenges**

The biggest drawback to RLFs is that they do not leverage private sector funding, compared to some other clean energy funding tools. Funds come back over a long period of time (from 5 to 20 or more years) and typically do not produce significant interest payments (loans often carry very low interest rates). Moreover, controlling operations in-house, as noted above, may put the state in competition with private lenders or may be burdensome.

**Utility On-Bill Financing**

Utility on-bill financing allows consumers—typically in the commercial and residential sectors, sometimes including renters—to repay capital investments in energy efficiency or renewable energy improvements through their monthly bill for electricity or gas service. The financing associated with the on-bill mechanism usually takes one of three forms: (1) a third party, such as a bank or credit union, makes a loan, perhaps with the state or the utility providing a credit enhancement; (2) a utility provides the loan, usually from ratepayer funds collected to promote energy efficiency and renewable energy, possibly with a loan loss reserve provided by the state; or (3) a state provides capital to seed a program from public benefit funds or from federal grants. In the first case, the utility acts as the billing agent and possibly as the servicer; in the second and third cases, it acts as billing agent, lender, and servicer. The historically high rate of utility bill payment and the potential for disconnection in the event of nonpayment provides a degree of security to lenders.

On-bill financing programs can be structured as an on-bill loan or an on-bill tariff:

- An on-bill loan is a personal or business loan from the utility to a customer, paid back through that customer’s utility bill. The loan tenor in these cases is relatively short (2 to 10 years) and falls on the person or business that assumes the loan.

- An on-bill tariff program is an arrangement in which the utility bill payer agrees to cover the cost of energy efficiency measures, but the obligation to pay transfers when tenancy transfers. The payment obligation is attached to the meter, and whoever is responsible for paying the utility bill pays the efficiency financing charges. This arrangement allows for longer loan tenors and consequently longer amortization periods and smaller monthly charges.

On-bill financing programs are now in operation in several states, including California, Connecticut, and Oregon, and are under development or consideration in others including Arizona, Illinois, Michigan, and Washington. Some successful programs go back to the early 1990s.

Clean Energy Works Portland (CEWP) is helping 500 qualified homes in Portland, Oregon, to install energy efficiency upgrades through low-cost loans. Participating homeowners pay for the improvements via a monthly charge on their utility bills. Initial funding for CEWP came from a $1.2 million Energy Efficiency and Conservation Block Grant and an additional $1 million from the city. Enterprise Cascadia, a non-profit community development financial institution (CDFI) serving Oregon and Washington, manages the program's funds and provides the energy upgrade loans. Three utilities—Pacific Power, NW Natural, and Portland General Electric—provide the repayment mechanism by allowing homeowners to repay loans through their power bills. In April 2010, the city of Portland was awarded $20 million in ARRA funds to expand Clean Energy Works to qualified participants in metro and rural Oregon. The case study in Appendix A provides more details on this program.
Advantages

The on-bill financing mechanism is attractive because it bundles repayment with a convenient, familiar utility bill that historically has high payment rates. It can also be structured to "stay with the meter," allowing repayment to be stretched out over longer terms, as it is transferred to successive building occupants, including owners and renters.

Challenges

Utilities may not support on-bill financing programs due to a variety of concerns. First, utilities may need to revamp their billing systems to operate financing programs. These concerns vary and may range from small changes to multi-million dollar changes, depending on the billing systems in question. Some utilities may be concerned about potentially having to take on underwriting responsibilities, such as evaluating the creditworthiness of loan applicants. Utilities may also be concerned about exposing their shareholders to the risk of nonpayment. Utilities may prefer to administer on-bill programs in which a third party assumes the financial risks or in which a strong loan loss reserve is in place.

Loan Purchase Programs

Loan purchase programs entail state treasurers’ purchasing loans after they have been originated by a private lender. This type of program is a public-private partnership in which the state treasury provides the core investment capital and a financial institution administers the lending process. Thus far, it has been used in the residential sector. Although loan purchase programs are not common, states have shown increasing interest in them based on the success of the program in Pennsylvania, described below and in a case study in Appendix A.

Under Pennsylvania’s Keystone Home Energy Loan Program (HELP), the Pennsylvania Treasury Department has purchased almost $45 million in unsecured loans to generate a market-based return on investments in residential energy efficiency. Principally supported by the Pennsylvania Treasury Department, the Pennsylvania Department of Environmental Protection (DEP), and the Pennsylvania Housing Finance Agency (HFA), the Keystone HELP program is administered by AFC First Financial Corporation, a national energy efficiency lender. The Pennsylvania Treasury provided the initial core capital of $20 million to launch the program in 2006, making a commitment to purchase energy efficiency loans originated by AFC First. These loans are serviced by AFC First, with an independent loan loss reserve established through grants from the Pennsylvania Department of Community and Economic Development and the Pennsylvania Energy Development Authority.

Keystone HELP was later expanded through a partnership with the Pennsylvania HFA for larger loans for energy efficiency and renewable energy improvements, which are secured by a lien on the home. AFC First aggregates the unsecured and secured loans and sells them on a periodic basis to, respectively, the treasurer and the Pennsylvania HFA. Since its inception, Keystone HELP has supported almost $45 million in loans to 7,000 homeowners. It has provided a consistent return of approximately 5 percent, better than many other investments in recent years, and has maintained loan losses of less than 1 percent, which is exceptionally good for the unsecured consumer loan instrument that is offered.

Advantages

State capital invested in loan purchase programs can lower the cost of capital for clean energy loans. These programs also can help the state demonstrate the market for clean energy financing to public and private commercial lending institutions who can adopt their own programs, expanding the pool of loans and reducing the burden on the state.

Challenges

The amount of funding that treasurer-funded mechanisms can provide will depend on the treasurer’s willingness to invest state capital. If the return is expected to be below market, the investment standards of some state treasurers will preclude them from investing in these kinds of programs. Other public investors may need to decide whether policy goals justify the lower rate of return. State statutes or internal investment guidelines also may make it difficult to raise more than a few million dollars in this sector. One way to move these programs to a larger scale is to sell the clean energy loans into a secondary market of investors and use the capital from that sale to replenish the state funds available to lend. This concept is being developed by the Energy Programs Consortium, a non-profit energy
finance consulting group, working with the Pennsylvania Treasury Department.

**Linked Deposit Programs**

Linked deposit programs place a portion of state treasury funds with selected financial institutions that “on-lend” (relend) them to priority sectors. This contribution of low-cost public capital typically allows the financial institution to reduce borrowers’ interest rate by two or three percentage points. When the treasurer’s office places certificates of deposits with a financial institution at an interest rate two percentage points below market, for instance, the financial institution can reduce the loan rate to borrowing businesses by two percentage points. The treasury does not share any of the risk, leaving the financial institution wholly responsible for credit underwriting, collections, and losses. The target groups in this case typically have been the residential, small commercial, and agricultural sectors.

The Illinois Green Energy Loans program supports renewable energy and energy efficiency improvements by offering low-interest loans to businesses, non-profit organizations, and local governments in the state. The Illinois State Treasurer secures below-market interest rates for borrowers who finance their purchase or installation of energy efficient and renewable energy equipment through participating lenders. The below-market interest rate is available for two years, with the possibility of a three-year extension. Projects can range from $10,000 to $10 million in size. The case study in Appendix A provides more details on this program.

**Advantages**

Treasury capital invested in linked deposit programs can lower the cost of clean energy loans. The primary cost to the state is the interest forgone on the funds that are loaned. The state also has limited administrative and monitoring costs. Programs of this kind also can help the state demonstrate the market for clean energy financing to commercial lending institutions, so that they can later adopt their own programs.

**Challenges**

The program requires the participation of banks or other lenders willing to make clean energy loans. The lenders, which are responsible for loan underwriting and bear the principal risk, must be comfortable with the program, and so in some cases, the state treasurer may need to actively market it.

**Energy Savings Performance Contracting**

Under an energy savings performance contract (ESPC), a state agency enters into a contractual agreement with an energy services company (ESCO) to manage an energy efficiency project for its building or facility from beginning to end. The ESCO acts as a turnkey contractor responsible for all tasks associated with the energy efficiency improvements, including identifying and evaluating energy-saving opportunities and designing, installing, and monitoring the project. The company may, in some cases, provide ongoing equipment service and maintenance. ESCOs can also help arrange private financing if the state is not self-financing. The targets of this program are state government buildings, including schools, colleges, and universities. ESPCs are also used in the commercial sector, financed from private sources.

Typically, the ESCO guarantees a level of energy and maintenance cost savings as part of its contract, but the savings may extend beyond the contract period. If the savings do not materialize as projected, the ESCO makes up for any financial shortfalls. Because energy cost savings are expected to pay for all project costs over the term of the contract, ESCOs have a strong
financial incentive to design well-performing projects. ESCO service fees for maintenance, project monitoring, savings measurement, and the like must also be paid from the facility savings. The ESCO thus does not receive full payment if savings are not achieved. Because of the guarantee risk the ESCO takes, the project costs may be higher than traditional construction costs.

Three primary sources of funding are available to states to initiate an energy savings performance contract:

- State capital budget funding;
- State bonds (for example, general obligation and revenue bonds); and
- Private sector loans or tax-exempt lease-purchase financing from a local bank or a specialized national or regional energy project financier. Interest rates and contract terms can be customized to meet the needs of a particular state agency.

Regardless of how it is funded, the energy savings from an ESPC go first to service the debt incurred in financing the project. Irrespective of the source of financing, the financial risks for the state remain the same. If the energy efficiency project does not produce enough savings to cover the finance payments, the state collects on the ESCO’s savings guarantee.

An example is the state of Washington’s General Administration ESPC program, which provides access to a full range of services including audits, project feasibility studies, project development and procurement services, construction monitoring, coordination with utility incentive programs, long-term monitoring and evaluation of projects, and low-cost financing through the Washington State Treasurer’s Office. The program is self-sustaining, covering its full budget from project development fees that are added to each project’s capital cost. This fee is typically 2 percent to 4 percent of total project costs. The case study in Appendix A provides more details on this successful program.

Advantages

ESPC is a well-established financing mechanism, with a proven record of success and an existing infrastructure and delivery system. State facilities, including office buildings, schools, and colleges and universities, are major energy users with generally predictable loads and are therefore a good target for ESPCs. ESPC projects can launch without public funds and can be structured to ensure that energy savings meet or exceed loan payments. ESCOs often bring technical resources and project capital to bear on the project from the start, preventing start-up or project delivery delays that might occur if the state were to undertake such a project on its own.

Challenges

Developing and implementing ESPC projects can be a demanding task that requires states to conduct procurements, review project engineering, negotiate contracts, and establish effective project monitoring systems. Therefore, states may want to consider having a central state agency provide these services, rather than requiring each individual agency to develop such skills independently. State laws and regulations govern the way ESPC projects are developed and implemented, and they can vary from state to state. Some states have robust regulations in place to support ESPC projects.

Renewable Power Purchase Agreements

Third-party power purchase agreements (PPA) can be used to finance a range of renewable energy projects, generally solar photovoltaic (PV) systems, on state buildings. Under these agreements, a project developer procures, installs, and operates a PV system on a customer’s premises (for example, at a state government facility). The customer on whose premises the project has been constructed then enters into a long-term contract (20 to 25 years) to purchase 100 percent of the electricity the system generates from the system owner (the developer). The customer enjoys the benefits of solar power, while transferring the initial costs to the project developer and avoiding the logistics of financing, building, and maintaining the system. The project developer acquires financial benefits such as tax credits and income from the sale of electricity. At the end of the contract, the customer usually can renegotiate future PPA terms or purchase the installed system. PPAs typically require approval by state utility regulators.

PPAs are used more commonly in the private sector, but they are an option for states to pursue as part of a public sector project. As part of Maryland’s Generating Clean Horizon initiative, the state has entered into a 20-year agreement with Constellation Energy for the company to build, own, and operate a 17.1 megawatt solar farm on 100 acres of Mount St. Mary University’s campus.
The university will receive income from leasing the land and will purchase 1.2 megawatts of electricity from the facility. The rest of the power will be sold to the University System of Maryland. The system is expected to be completed by December 2012. The Generating Clean Horizons program was initiated to encourage the construction of large-scale, renewable energy power plants. Under the program, the University System of Maryland and the Department of General Services have entered into two other PPAs from wind projects in Maryland and West Virginia.

**Advantages**

PPA financing can be attractive because they reduce the cost of building power-generating facilities and make the cost of electricity predictable over 20 to 25 years. The state has no operating and maintenance responsibilities and incurs minimal risk.

**Challenges**

PPAs are site specific. They involve fairly complex negotiations and high transaction costs to arrive at an agreed rate and contract terms, including risk allocation.

**Pooled Bond and Pooled Lease-Purchase Financing**

Pooled bonding and pooled lease-purchase financing are additional options to generate new capital to support clean energy investments. The target audience for both these types of financing is state and local government buildings or facilities.

- Using pooled bonding, a state can aggregate clean energy projects in a number of facilities, such as schools or office buildings, and finance them with tax-exempt bonds, usually through the state treasurer.

- With pooled lease-purchase agreements, the government purchases property or equipment via an annually renewable contract. The financing can come from an outside financial institution or the government may issue certificates of participation, which are bond-like instruments by which an investor purchases a share of the lease revenues.

**Iowa’s Building Energy Management Program** provides financing options, technical assistance, and project management assistance to public schools, local governments, hospitals, and non-profit organizations to implement energy efficiency and renewable energy projects. For state facilities, financing is provided through general budgeting or lease purchasing authorized by the Iowa legislature and administered by the State Treasurer’s Office. The Iowa Office of Energy Independence ensures that the best energy efficiency projects are selected and works closely with program participants to ensure that the projects are properly executed and achieve the projected energy savings.

**Advantages**

Pooled finance approaches allow many small projects to be aggregated so as to gain longer loan terms and lower interest rates. The office of the state treasurer can use its credit rating and bonding authority to access lower-cost pooled financing.

A tax-exempt lease-purchase transaction can be concluded without the voter approval required for a bond issue. That is accomplished by including a “nonappropriations” provision in the lease document, which allows the lessee to terminate the lease if funds are not appropriated to make the lease payments. Investors can accept this provision, provided that the leased facilities are essential to the operations of the lessee, as is the case with many energy efficiency retrofits to public facilities.

**Challenges**

Pooling calls for the development of several projects, and that can make it difficult to have a robust number of projects available at the same time. The agreements necessary to finance large state facilities under pooled lease-purchase financing are complicated and involve numerous players, such as bond counsels, underwriters, and trustees.

**Property-Assessed Clean Energy Programs**

Property-assessed clean energy (PACE) financing allows a government (typically a county or municipality) to provide energy retrofits to property owners in a defined financing district or geographic area and be repaid via assessments on the properties. Repayment of the assessment is linked to the property and is collected
with the property tax. Thus, all the collections methods and enforcement mechanisms of the property tax can be applied to collection of PACE assessments, including a lien on the property that is often senior to the mortgage, making the payments secure. Most programs have focused on the residential sector, although some permit work with the commercial sector, which may not carry the same priority lien provisions.

Capital for PACE residential programs typically comes from local government–issued general obligation bonds, backed by the pledge of property assessment revenues, but can also be supported by federal ARRA funding or concessionary funding from local governments. Financing can be offered on longer terms (typically up to 20 years) and at reasonable rates. The amount of each assessment is set to amortize the specific property owner’s financing, with interest.

PACE programs are authorized in 24 states: California, Colorado, Florida, Georgia, Hawaii, Illinois, Louisiana, Maine, Maryland, Michigan, Minnesota, Missouri, Nevada, New Hampshire, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Texas, Vermont, Virginia, and Wisconsin. Most of the authorizing legislation is very recent, passed in 2009 or 2010. However, many PACE residential programs and program development efforts are on hold following a July 2010 determination by the Federal Housing Finance Agency (FHFA) that programs with first liens are contrary to the Fannie Mae-Freddie Mac Uniform Security Instrument. Efforts to resolve this issue are continuing, but it seems unlikely to be resolved soon.

Because significant uncertainty remains about the future of senior lien residential PACE programs, states are exploring subordinate lien financing or commercial-only programs. Mainehas a subordinate lien PACE program using its $30 million Better Buildings grant from ARRA/DOE. Maine will use two-thirds of the grant to make 2,200 loans in the first two years of the program. The revenue received from loan repayment over the first two years will subsidize four future statewide bond issues of around $26 million planned for years 3, 5, 7, and 9 and provide credit enhancements for them. Loan repayments are expected to bring in $6 million every two years. The capital will be added to the bond issue to make $32 million in new retrofit loans available every other year.

Virginia’s enabling legislation for municipalities to create loans to citizens for clean energy technologies places the lien in a subordinate position behind a mortgage. Residents can pay back these loans through a variety of mechanisms depending on how the local ordinance is written: tariff fees, on-bill financing, or through property tax bills. Michigan’s PACE legislation is limited to commercial properties only and requires the consent of mortgage holder(s) for participation in the program. Subordinate lien PACE programs do not run afoul of FHFA and Office of the Comptroller of the Currency concerns because lien holders cannot recover funds until first mortgage holders have recovered their full investment. However, these programs may face challenges in attracting secondary market financing, and hence their ability to scale up would be limited. States that have already passed PACE enabling legislation with senior lien may have to amend it to allow subordinate lien PACE programs.

**Advantages**

The PACE mechanism bundles payments with a convenient, familiar bill (property tax) with a good payment history. In addition, the first lien on the property provides security to investors, improving the terms of any general obligation or other bond issue. The longer repayment term helps to lower payment amounts, and the debt can be structured to stay with the property when it is conveyed to successive owners.

**Challenges**

PACE programs face a number of challenges, including the FHFA determination and mortgage industry resistance mentioned above. They also require multiple participants, as PACE programs require state legislative action to create special assessment authority and local government action to authorize their use. Also, some homeowners and businesses may be reluctant to put a lien on their property.

(See Table 3 on pages 24-25 for a summary of leading current state clean energy financing programs; Table 3 is the same as Table 1.)
<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>CAPITAL SOURCE</th>
<th>TARGET SECTOR</th>
<th>REPAYMENT MECHANISM</th>
<th>ADVANTAGES</th>
<th>CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revolving Loan Funds</td>
<td>A broad category of programs in which the state sets aside a fund and loans money to pay for clean energy investments. Repayments of principal and interest (P&amp;I) reseed the fund to make new loans.</td>
<td>Various, including Petroleum Violation Escrow (PVE) funds, direct appropriations from state legislatures, ratepayer funds, state bond proceeds, and federal grants.</td>
<td>Residential, commercial, institutional.</td>
<td>Investment costs are repaid through collections based on energy bills savings.</td>
<td>Relatively simple to establish; many states have experience in this area. Relatively simple to control and manage.</td>
</tr>
<tr>
<td>Utility On-Bill Financing</td>
<td>Utility places financing charge on the utility bill. Utility collects principal and interest charges, in most cases.</td>
<td>Third-party loan (e.g., bank or credit union). Utility loan capital from ratepayer funds. May entail state funds to seed (e.g., from federal grants).</td>
<td>Residential, small commercial.</td>
<td>Repayment through monthly utility bill for electricity and/or gas services.</td>
<td>Secure repayment stream. Single payment mechanism for consumer. Potential for long amortization and small monthly payments.</td>
</tr>
<tr>
<td>Loan Purchase Program</td>
<td>State treasuries purchase loans following origination by a private lender.</td>
<td>State treasury funds.</td>
<td>Residential, small commercial.</td>
<td>Borrower pays the financial institution, which periodically pays back the state treasurer.</td>
<td>Allows for on-lending at a lower-than-market rate. Potential to demonstrate the market to commercial financial institutions.</td>
</tr>
<tr>
<td>Linked Deposit Program</td>
<td>Portion of state treasury funds placed with select financial institutions at an interest rate lower than the current market rate.</td>
<td>State treasury funds.</td>
<td>Residential, small commercial, agricultural.</td>
<td>Borrower pays the financial institution, which periodically pays back the state treasurer.</td>
<td>Lowers the cost of capital for clean energy loans. State has limited administrative costs and oversight, with the financial institution responsible for credit underwriting, collections, and losses.</td>
</tr>
</tbody>
</table>

Often structured with very little leverage—a $5 million fund remains a $5 million fund because no private capital is brought into it. Structure in which state controls all aspects of lending may place state in competition with private lenders and may be beyond operational capacity of some state agencies.
### Energy Savings Performance Contracting

State agency qualifies ESCOs and works with client to develop project, including audits or feasibility studies, arranging for financing, and accessing utility incentives and rebates. ESCO provides financial guarantee that covers annual debt service from project energy cost savings.

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>CAPITAL SOURCE</th>
<th>TARGET SECTOR</th>
<th>REPAYMENT MECHANISM</th>
<th>ADVANTAGES</th>
<th>CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Savings Performance Contracting</td>
<td>Various, including state capital budget, state bonds, private sector loans, or tax-exempt lease-purchase financing.</td>
<td>Institutional</td>
<td>Energy services performance contract, whereby energy cost savings are used to repay the investment cost and financing charges.</td>
<td>Public facilities are major energy users with generally predictable loads and therefore good targets for ESCOs. Projects can be structured so that loan payments match the energy savings. Quality assurance is high due to the performance guarantee contract.</td>
<td>Arranging ESCO contracts can be a demanding task that requires states to conduct procurements, review project engineering, negotiate contracts, and establish effective project monitoring systems.</td>
</tr>
</tbody>
</table>

### Power Purchase Agreements

Project developer procures, installs, and operates a PV system on a state government facility, which signs a long-term contract (20 to 25 years) to purchase 100 percent of the electricity generated. Initial capital costs borne by project developer.

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>CAPITAL SOURCE</th>
<th>TARGET SECTOR</th>
<th>REPAYMENT MECHANISM</th>
<th>ADVANTAGES</th>
<th>CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Purchase Agreements</td>
<td>Third-party financing arranged by project developer.</td>
<td>Institutional</td>
<td>Repayment facilitated through a power purchase agreement, so that investment costs are repaid through energy bill savings.</td>
<td>No or low up-front costs; no operating and maintenance responsibilities. Predictable cost of electricity over 20-25 years and minimal risk.</td>
<td>Site-specific negotiations that raise transaction costs and entail complex issues.</td>
</tr>
</tbody>
</table>

### Pooled Bond and Pooled Lease-Purchase Financing

A public agency can aggregate several smaller public entities (schools, wastewater treatment plants, etc.) and obtain tax-exempt bond funding, usually through the state treasurer.

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>CAPITAL SOURCE</th>
<th>TARGET SECTOR</th>
<th>REPAYMENT MECHANISM</th>
<th>ADVANTAGES</th>
<th>CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pooled Bond and Pooled Lease-Purchase Financing</td>
<td>Financial institution; certificates of participation issued by the government.</td>
<td>Institutional</td>
<td>Repayment through energy bill savings to bondholders.</td>
<td>Pooling and aggregating the entities allow for an overall better credit rating, which enables access to lower-cost and longer-term financing.</td>
<td>Requires project development for several entities, adding complexity and the need to coordinate timing to prepare multiple projects/borrowers.</td>
</tr>
</tbody>
</table>

### Property Assessed Clean Energy Programs

Consumer makes qualifying clean energy improvements, and the cost is added to property tax bills as a special assessment. Assessment assumes first lien priority on mortgage, which supports bonding to raise capital.

<table>
<thead>
<tr>
<th>PROGRAM</th>
<th>CAPITAL SOURCE</th>
<th>TARGET SECTOR</th>
<th>REPAYMENT MECHANISM</th>
<th>ADVANTAGES</th>
<th>CHALLENGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property Assessed Clean Energy Programs</td>
<td>Local government-issued bonds, ARRA funding, concessionary funding from local governments.</td>
<td>Residential, large commercial (still being explored).</td>
<td>Repayment is linked to property and made via an assessment on the property.</td>
<td>Security and familiarity of repayment stream. Priority lien allows for more favorable bond terms. Investment and loan stay with the property (transfer to new owner), allowing for long amortization and small monthly payments.</td>
<td>State legislature must enact special assessment authority, and local government authorize use. Mortgage industry resistance to the first position lien on property. Some homeowners or businesses are reluctant to put lien on their property.</td>
</tr>
</tbody>
</table>

---

*a* Energy Savings Performance Contracting and Power Purchase Agreements are also used in the private sector, where the state does not play any role.  

*b* Many PACE residential programs are on-hold, following a July 2010 determination by the Federal Housing Financing Administration (FHFA) that programs with priority liens run contrary to the Fannie Mae-Freddie Mac Uniform Security Instrument.
To select which financing program will work best for them, states must identify the markets that they want to assist and tailor their program to meet that sector’s needs. Among the factors to be considered are the following:

- What policy objectives does the state want to achieve?
- Does a financing gap exist that needs to be addressed, rather than an outreach or marketing gap?
- What level of demand for financing can be expected, compared to the resources available?
- How much risk will the state assume?
- What limitations exist under current state laws and regulations?

Once the state has identified the target market to be addressed, it can examine its characteristics in detail to determine which programs correspond to the market’s energy demand profiles, potential participants’ familiarity with financing options, and their payback period needs. States can tailor their chosen program to better meet the sector’s needs by, for instance, lengthening loan tenors, providing additional technical assistance, or developing a more extensive outreach component.

Identify a Target Market

A first step in designing a successful financing program is determining what market or market segments will be targeted. Markets are usually differentiated into seven categories: residential single family, residential multifamily, small commercial, large commercial, industrial, agricultural, and institutional. The last category is also known as the “MUSH” sector, which stands for “municipalities, universities, schools, and hospitals” and covers state government buildings and fleets. Each segment may be further differentiated, as well. For instance, states may want to distinguish low-income or middle-income residents, or it may focus on the hospital sector as part of the larger institutional market.

The selection of a market segment to focus on depends on a number of factors:

- State policy objectives;
- Existence of a financing gap;
- Expected demand;
- Size of available financing pool;
- Risk tolerance; and
- Existing state enabling legislation, regulations, and programs.

State Policy Objectives. States may have a policy objective for their clean energy financing program that leads to the selection of a particular market segment or subsegment. For instance, a state may want to help low-income households or support an emerging or traditional industry. Broader social goals, such as job creation potential or economic development strategies, may also be a consideration. For example, the desire to create jobs in the near term may steer states into the residential energy retrofit market, which can boost demand for contractors and home energy raters relatively quickly, or into small commercial programs that make use of a product manufactured in the state, such as solar panels.

Wisconsin targeted its ARRA SEP-funded revolving loan fund, the Green to Gold Fund, at the manufacturing sector as part of a broader policy goal to advance economic development in that sector. Wisconsin is directing 100 percent of its SEP funds – more than $55 million – to help state manufacturers enter green supply chains and markets, bring down their costs, and reduce greenhouse gas emissions through energy efficiency and renewable energy projects. As states consider how to support their policy objectives, it is still important to examine other factors affecting the target market, such as whether the size of the funding pool is adequate or whether there is indeed a financing gap, rather than an outreach and education barrier.

Existence of a Financing Gap. Financing programs are most effective if they fill a need not currently being met through other private or public sources of capital. For example, a state with a strong revolving loan fund for the commercial sector may choose to promote development in the residential market. It is important to examine what products are already available, whether they are being widely used, and if not, why. It could be that the product is not right for the market, or it could be that outreach and education efforts have been inadequate. Many states have recently focused on the single-family residential sector, in which financing options...
have mostly been limited to credit cards, with their high interest rates, and home equity lines of credit, which have high transaction costs compared to the relatively small amounts borrowed. As part of its effort to develop a new financing product for the home retrofit market, Utah held a series of meetings with representatives of the financial industry in the state to identify where gaps existed.

**Expected Demand.** Predicting level of demand can be difficult, but states can look to research done by the private sector, conduct focus groups, and examine efforts in other states to form an assessment. Factors shaping demand include general economic conditions, the customer’s perception of the value of the purchase, and ease of participation. All may vary over time and depend on the particular program being offered. Low-interest or no-interest loans may be attractive, but other considerations such as ease of application may generate more demand. At minimum, states should examine the size of the potential market and assume that it will take months or years for demand to grow. The size of the potential market can be established using tax assessment and census data. Developing a prediction of demand within a sector requires detailed research, perhaps including looking at historical demand for energy financing and commercial market research.

**Size of Available Financing Pool.** The amount of financing available, whether solely from state resources or including private sector capital, can also affect the choice of market or market sub segment. Where funding is limited, but the goal is wide participation, states may want to target a segment of a broader sector, or pick a sector, such as residential or small commercial, in which loan amounts are small. A large pool of funds means that states can diversify into multiple segments. However, the amount of financing available from the private sector may depend on which market segment is addressed; for example, lenders may be more comfortable with commercial loans than residential loans because of past experience in the commercial area. The interests of other market players are also part of the state’s calculus.

**Risk Tolerance.** The amount of risk a state wants to assume can also influence which market segments are most attractive and whether additional underwriting standards or limitations need to be part of a program. Risk can depend on factors such as technology, creditworthiness, and the security of the revenue stream. In the current economic climate, few states are likely to have a very high risk tolerance, but some may be willing to assume calculated risks to help establish a new market for a homegrown technology or to further policy goals related to advancing a particular market segment.

If its risk tolerance is lower, a state may want to limit financing to proven technologies, to raise the credit score required for borrowers, or to limit its efforts to a performance contract that guarantees savings for state buildings that are under its control. If risk tolerance is higher, a state may direct some financing to more cutting-edge technologies (possibly balancing that risk with more predictable technologies), reduce income requirements to attract more homeowners to participate, or address a market segment such as the small commercial, in which default rates may be higher. In developing its energy efficiency initiative, the Illinois Finance Authority (IFA) considered requiring projected savings to be guaranteed by an insurance policy (a warranty) purchased by the borrowers and pledged to the IFA.

**Existing State Enabling Legislation, Regulations, and Programs.** States may be limited by existing law or regulations that restrict programs to particular market segments. It may be necessary to modify an existing program, for instance, to expand it from the commercial to the residential sector. If such a change requires legislative approval, that will increase the time needed for program development. For example, the Iowa Alternate Energy Revolving Loan Program (AERLP) does not cover geothermal projects because they were not included in the definition of “renewable energy” that the legislature established.

All of these factors, as well as a decision about how broadly or narrowly to focus, go into the selection of a target market segment.
Select and Tailor Programs to Target Market(s)

Once the target market has been identified, the state must select an appropriate program and tailor it accordingly. Each market segment has different characteristics that will affect the potential scope and transaction costs of a program and that call for different product types and program designs. Important characteristics to consider include the potential participants’ familiarity with energy systems and financing, the level of energy use per unit (house, store, facility), the key influences on energy demand, whether the householders or business owners pay energy bills directly, and whether programs can be easily expanded or upgraded in the sector. An example of tailoring in the residential sector, where energy use is lower than in large businesses, would be extending loan tenors to achieve equivalent cost-effectiveness.

(See Table 4 on page 30 for an overview of the characteristics of each market segment; potential programs, based on past state efforts within the segment; and the types of tailoring that may be needed. More detail is provided in Appendix B).
<table>
<thead>
<tr>
<th>MARKET SEGMENT</th>
<th>CHARACTERISTICS</th>
<th>POTENTIAL PROGRAMS</th>
<th>TAILORING NEEDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single family residential</td>
<td>• limited knowledge of energy systems and financing&lt;br&gt;• low energy use per unit, but high aggregate use&lt;br&gt;• typically consider energy use at point of replacement only&lt;br&gt;• large heating and cooling load, followed by lighting, water heating, electronics</td>
<td>• revolving loan funds&lt;br&gt;• on-bill financing&lt;br&gt;• loan purchase programs&lt;br&gt;• credit enhancements to private sector programs</td>
<td>• longer loan tenors&lt;br&gt;• transferability between owners&lt;br&gt;• options for tenants&lt;br&gt;• technical assistance for financing&lt;br&gt;• streamlined application&lt;br&gt;• contractor training on financing options&lt;br&gt;• whole-home efficiency focus</td>
</tr>
<tr>
<td>Multifamily residential</td>
<td>• some knowledge of energy systems and financing&lt;br&gt;• typically rental units; may be low-income&lt;br&gt;• owners may not pay energy bills&lt;br&gt;• opportunity for scale&lt;br&gt;• large heating and cooling load, followed by lighting, water heating, with some appliances centrally located</td>
<td>• on-bill financing&lt;br&gt;• loans leveraged by private sector capital&lt;br&gt;• programs for low-income sector via housing finance agencies</td>
<td>• auditing services to assess energy cost savings in aggregate&lt;br&gt;• options for tenants to make improvements with owner approval</td>
</tr>
<tr>
<td>Small commercial</td>
<td>• limited knowledge of energy systems and financing&lt;br&gt;• moderate energy use per unit but low aggregate energy use&lt;br&gt;• building owners may not pay energy bills&lt;br&gt;• large heating, cooling, lighting loads</td>
<td>• revolving loan funds&lt;br&gt;• on-bill financing&lt;br&gt;• some PACE programs&lt;br&gt;• credit enhancements to private sector programs</td>
<td>• technical assistance to explain financing options&lt;br&gt;• streamlined application process&lt;br&gt;• options for lease situations</td>
</tr>
<tr>
<td>Large commercial</td>
<td>• complex building technologies&lt;br&gt;• high energy use&lt;br&gt;• familiarity with energy use and financing&lt;br&gt;• owners may not pay energy bills&lt;br&gt;• may be able to secure financing on their own&lt;br&gt;• large heating, cooling, and lighting load</td>
<td>• revolving loan programs&lt;br&gt;• on-bill financing&lt;br&gt;• some PACE programs&lt;br&gt;• credit enhancements to private sector programs</td>
<td>• adjust financing terms to be competitive with what is available in marketplace or via self-financing (if feasible)&lt;br&gt;• options for lease situations</td>
</tr>
<tr>
<td>Industrial</td>
<td>• high variability in energy system complexity, energy use density, familiarity with energy and financing issues&lt;br&gt;• high concern with maintaining process integrity&lt;br&gt;• may be able to self-finance&lt;br&gt;• high rate-of-return needs&lt;br&gt;• lower electricity rates&lt;br&gt;• process-related needs for heat and power dominate energy demand</td>
<td>• revolving loan funds&lt;br&gt;• linked deposit programs&lt;br&gt;• credit enhancements to private sector programs</td>
<td>• low cost of financing&lt;br&gt;• technical assistance for implementation</td>
</tr>
<tr>
<td>Agricultural</td>
<td>• high variability in energy sophistication and use, depending upon size of operation, crop/product, region&lt;br&gt;• high rate-of-return needs&lt;br&gt;• demand driven by equipment use, on-site vehicles, lighting&lt;br&gt;• often served by electric cooperatives</td>
<td>• revolving loan funds&lt;br&gt;• linked deposit programs&lt;br&gt;• credit enhancements to private sector programs&lt;br&gt;• partnerships with rural electric cooperatives</td>
<td>• low cost of financing&lt;br&gt;• technical assistance for implementation</td>
</tr>
<tr>
<td>Institutional</td>
<td>• some familiarity with energy issues and financing&lt;br&gt;• moderate levels of energy use&lt;br&gt;• scalability&lt;br&gt;• budget or procurement limitations may be present in public sector&lt;br&gt;• load driven by heating and cooling and lighting&lt;br&gt;• owner-occupied with high credit ratings</td>
<td>• revolving loan funds&lt;br&gt;• ESPCs&lt;br&gt;• pooled bond financing&lt;br&gt;• lease-purchase financing</td>
<td>• technical assistance on energy costs savings and financing options&lt;br&gt;• adjust budgeting and/or procurement provisions</td>
</tr>
</tbody>
</table>
The clean energy financing programs described in this report are more complicated than the typical grant and rebate programs that many states have been operating successfully for years. They involve more players, are more financially complex, and are not yet widely understood by most of the public. States will need to develop a robust implementation strategy to launch any new financing program or enhance existing ones. Such a strategy requires thinking through several questions:

■ Who are the state players that need to be engaged?
■ What existing policies will affect the program?
■ How are contractors and vendors involved in the process?
■ What is the outreach and marketing strategy to build awareness?
■ How will the program identify and meet the technical assistance needs of the target markets?
■ What is the revenue source for program administration?
■ Is there a plan for program monitoring and evaluation?

Engage State Entities

Various entities in the state government have important roles in clean energy financing programs. These entities can be sources of capital and sources of operational support for a lending program, can provide advice or technical assistance, and can assist with outreach. As states develop their clean energy financing programs, they should evaluate the potential roles the following can play: state energy offices, state-chartered bond authorities, state treasurers, utility regulators, state legislatures, financial regulators, industrial assessment centers within universities, economic development authorities, and workforce agencies (See Table 5 on page 33 for more details).

■ State Energy Offices. Since the late 1980s and early 1990s, when large infusions of Petroleum Violation Escrow (PVE) funds enabled many states to support clean energy lending, state energy offices have traditionally been the centers for financial support of energy efficiency programs. State energy offices have recently received substantial infusions of federal stimulus money. The state energy office can act as a direct lender or as a partner with financial institutions. State energy offices typically take the lead in formulating clean energy finance policy, assessing markets, designing and developing programs, and providing technical assistance to finance program partners and others. They can be the lead agency to consult and coordinate with other state agencies.

■ State-Chartered Bond Authorities. State-chartered bond authorities, such as housing finance agencies, have the authority to issue bonds and may be able to lend directly, as well. In some cases, these authorities may operate credit enhancement mechanisms with financial institutions, or they may operate lending programs dedicated to energy efficiency. Some act as development finance agencies and can also provide technical assistance to clean energy finance program partners.

■ State Treasurers. State treasurers can provide loan capital to a clean energy finance program through a linked deposit program or the purchase of loans or a portfolio of loans. State treasurers’ offices can be consulted as clean energy finance programs are designed. They may work with financial institutions that can be enlisted to participate in clean energy finance programs. They typically are not involved in delivery of technical assistance.

■ Utility Regulators. Regulators at the state public utility commission and similar bodies may require utilities to operate financing programs to support clean energy or to develop programs to address cost recovery for energy efficiency lending programs, and determine whether utility financing programs will need to meet cost-effectiveness tests. Regulators can also review and approve program designs. Clean energy finance programs can benefit from coordinating with, and building on, these utility programs with the help of utility regulators. Utility regulators can also help develop on-bill financing mechanisms and determine whether it is possible to use existing utility demand-side management or energy efficiency budget resources to support financing programs.
State Legislatures. State legislatures can enact legislation that provides funds to support energy efficiency financing. They may also enact legislation providing policy support mechanisms, such as the following:

- Enabling a state treasurer to own qualified clean energy loans. Legislation can allocate a specific dollar budget of state treasurer funds to be available to the clean energy loan program and stipulate the below-market interest rate to be charged, the participating financial institutions’ spread, and other underwriting criteria;
- Encouraging on-bill financing by utilities. Legislation can help define, and further the development of, on-bill financing programs, including removing any existing barriers to their use; and
- Authorizing state-chartered bond authorities. Legislation can extend the range of borrowers eligible for clean energy projects, mandate and fund technical assistance programs that the bond authorities can then operate, and provide for credit enhancements.

Financial Regulators. State financial regulators are an important, but often overlooked, resource in the development and implementation of clean energy financing programs. They include state bank and credit union supervisors, residential mortgage regulators, state insurance regulators, and state security regulators. State financial regulators can provide advice and guidance in program design and development. They can also help determine how state financing rules apply to different clean energy financing mechanisms. For instance, state financial regulators determine whether publicly provided credit enhancement mechanisms can be counted toward a financial institution’s statutory reserve and capital adequacy requirements.

Industrial Assessment Centers within Universities. Many state universities operate energy efficiency assessment and outreach programs, generally known as Industrial Assessment Centers (IACs). These centers conduct energy audits of industrial facilities and help develop investment-ready projects. They can be active participants in delivering engineering and project development technical assistance to the industrial sector. They may also offer other services to assist the industries with investment planning, financial structuring, and arranging financing for projects. IACs supported by the U.S. Department of Energy (DOE) Energy Industrial Assessment Program (IAP) are at 26 universities across the country. The IAC at the University of Louisiana at Lafayette has helped industries achieve average savings of $55,000 per year after they implemented IAC assessment recommendations.

Economic Development Authorities. As more and more states are advancing the clean energy sector as both an economic and an environmental strategy, economic development authorities can become important partners in promoting a state’s clean energy goals and supporting clean energy financing efforts. They may offer financing programs or engage in education and outreach.

State Workforce Agencies. State workforce agencies can train workers to perform manufacturing, design, installation, and maintenance activities for clean energy projects. Many state Workforce Investment Boards are conducting assessments of clean energy jobs in their regions, and are producing inventories of existing workforce training and education programs to help inform future investments in clean energy training and education programs. Partnerships among workforce development entities, including state departments of labor, local workforce investment boards, chambers of commerce, labor unions, and related non-profits, are working on training programs for workers in the energy efficiency and renewable energy industries.
TABLE 5. THE ROLES OF STATE ENTITIES IN CLEAN ENERGY FINANCING PROGRAMS

<table>
<thead>
<tr>
<th>STATE ENTITY</th>
<th>PRIMARY ROLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>State Energy Office</td>
<td>Operational support, subcontracting, loan capital, or credit enhancement provider.</td>
</tr>
<tr>
<td>State-Chartered Bond Authorities</td>
<td>Conduit bond issuers such as housing finance agencies, health care facilities authorities, industrial development authorities; in some cases they are also capital providers, with links to networks of financial institutions; can provide operational support in some states to run direct lending or credit enhancement programs.</td>
</tr>
<tr>
<td>State Treasurer</td>
<td>Potential capital provider.</td>
</tr>
<tr>
<td>Utility Regulators</td>
<td>Economic regulators that oversee use of ratepayer funds; may order utilities to implement clean energy finance programs or approve their doing so.</td>
</tr>
<tr>
<td>State Legislatures</td>
<td>Policy oversight over state agencies; may also set energy efficiency goals or require regulated or nonregulated utilities to engage in efficiency financing programs.</td>
</tr>
<tr>
<td>Financial Regulators</td>
<td>Oversee lending practices of regulated financial entities.</td>
</tr>
<tr>
<td>Industrial Assessment Centers within Universities</td>
<td>Audit and provide technical assistance for industrial sector projects.</td>
</tr>
<tr>
<td>Economic Development Authorities</td>
<td>Funding and financing programs; outreach and education with industry.</td>
</tr>
<tr>
<td>Workforce Agencies</td>
<td>Workforce training and education programs.</td>
</tr>
</tbody>
</table>

Consider the Impact of Existing Policies

Clean energy financing programs do not exist in a vacuum. They are affected by the policy context in the state and the extent to which it encourages the demand for clean energy investments. As states develop their financing strategy, they need to consider the impact of a range of existing policies and how best to coordinate with them and make use of them. Measures that are likely to have the biggest impact include energy efficiency resource standards or renewable portfolio standards; feed-in tariffs for renewable energy; public benefit funds; realignment of utility rates to remove disincentives to clean energy investments or to encourage them; establishment of building energy codes; and tax incentives.

- **Energy Efficiency Resource Goals or Standards.** Energy efficiency goals, or energy efficiency resource standards (EERS), call for or require utilities to reduce their sales of energy by a specified percentage each year and to reach a total percentage reduction within a certain number of years. The goal is typically in the range of 1 percent to 2 percent each year. Thirty-one states or territories currently have energy efficiency targets.

- **Renewable Portfolio Goals or Standards.** Renewable portfolio goals or standards establish goals or binding targets for sales of renewable energy. Some goals are as high as one-third or higher of all electricity sales. These initiatives target large-scale production of energy from renewable sources at central power plants. Sometimes, they also set requirements or incentives for small-scale, community-based renewable energy activities that may be in need of the type of financing mechanisms described in this report. Forty-three states or territories have renewable energy goals or targets.

- **Feed-in Tariffs.** Feed-in tariffs (FITs) are incentive programs in which utilities are required, under a long term contract, to purchase electricity generated from qualified renewable energy sources at a guaranteed rate. A FIT’s typical two-decade-long guaranteed return makes it especially attractive for financing for solar installations and may remove a financing gap. Some states and municipalities...
are considering FITs as a policy tool for fostering renewable energy development, based on experience in Europe.

**Public Benefit Funds and Other Utility Ratepayer–Supported Funds.** Public benefit funds (PBFs) are created via a small surcharge on consumption of electricity, and sometimes natural gas, and are used to support energy efficiency or renewable energy incentive and financing programs. Sixteen states have PBFs for renewable energy projects, which are expected collectively to generate $7.3 billion annually by 2017. In addition, 21 states have PBFs supporting energy efficiency. When launching a new program, states need to consider how to avoid replication or customer confusion around existing PBF programs. Good opportunities may also emerge to coordinate with existing programs to boost overall performance.

**Utility Rate Realignment.** Utility rate realignment by state utility regulatory commissions entails one to three actions: (1) decoupling, or removing disincentives that link energy sales (kWh or therms) to profits, (2) providing incentives for achieving clean energy goals, and/or (3) recovering costs. Where it has occurred, utilities are likely to operate robust clean energy programs, and they may have related financing products available. Eighteen states have realigned rate structures for natural gas utilities and 12 have done so for electricity utilities.

**Building Energy Codes.** Building energy codes set minimum levels of energy efficiency for the design and construction of new or renovated residential and commercial buildings. The most recent codes are set to achieve approximately 30 percent improvement in energy efficiency, compared to versions issued six years ago. Thirty states have adopted the most recent energy codes or other, more stringent codes for the residential sector; 31 have done so for the commercial sector.

**Tax Incentives.** A variety of sales, property, income, and other tax incentives are available to encourage clean energy investments. Forty-seven states have one or more tax incentives supporting renewable energy; 24 have incentives for energy efficiency.

---

**Enhance Contractor and Vendor Networks to Deliver Projects**

Contractors and vendors are often the public face of a clean energy financing program. They interact with potential customers and present financing options to help support a sale. They are also largely responsible for the satisfaction of the customer once the work has been completed. States therefore should seek to develop a network of contractors who are trained and certified. That can take many years and involves outreach to contractor and vendor associations to educate their members about the financing options. It may also entail some sort of process, such as a state-sponsored list, to help customers locate qualified contractor and vendors.

**Develop an Outreach and Marketing Strategy**

As with any new program, launching a new clean energy financing program requires states to consider how to inform potential participants about the product that is available and why it makes sense for them. Based on the most successful state efforts thus far, a successful launch requires strategies that will help overcome misperceptions about which types of investments are most cost-effective. For instance, window replacements provide modest savings at fairly high cost, compared to insulation and sealing. It also requires using the power of new behavioral economic concepts to connect target audiences with a full range of benefits. The strategy should provide a unified statewide message to reduce...
confusion about multiple products and should leverage opportunities to work with utility companies, non-profits, community organizations, and others to deliver the marketing message.

**Identify and Meet Needs for Technical Assistance**

Many potential participants, especially first-time participants, will find it somewhat difficult to understand and make the best use of a clean energy financing program. Private financing partners may also need assistance understanding the clean energy sector and working with new financing products. States can help provide technical assistance to each of these audiences.

States may need to provide tools to help homeowners and businesses determine the net financial impact they can expect from a project (for example, actual net cost, including financing charges, after energy cost savings have been deducted) and how to evaluate different financing options if more than one is available. For private sector financing partners, many of whom will be new to the area of clean energy, states may need to provide assistance with: market research; marketing support to help establish relationships with contractors and vendors; training for loan officers and processors; and procedures for engineering due diligence associated with the loans to avoid equipment failure before the end of the loan term.

**Identify Funding for Program Administration**

Clean energy finance programs require funding for staff, technical assistance, and other administrative and start-up costs. It is important to build a source of funding into the program budget or identify a source of outside capital for ongoing administrative costs. As an example, the Michigan SAVES program began with an initial allotment of $6 million in loan capital and $1.5 million for administrative and start-up costs. Potential sources of funding include annual appropriations for the state energy program, fees, interest earned from a revolving loan fund, and loan repayment funds.

- **State energy program.** Each state receives an annual appropriation for its State Energy Program (SEP) from the U.S. Department of Energy (DOE), based on its population. SEP funding can be used to cover up to 50 percent of total administrative costs. DOE also provides SEP funding through competitive grants.

- **Fees charged to contractors, lenders, or customers.** A modest program fee, for instance, 1-2 percent, may compare well to the fees attached to financing alternatives. For instance, a contractor that accepts credit card payments, a traditional source of financing for clean energy investments, is typically charged in excess of 3 percent of the value of each transaction and passes that cost on to the customer. The Georgia energy savings performance contract system charges a development fee for larger projects upon successful financial closing.

- **Interest earnings from revolving loan funds.** Interest earnings from revolving loan funds can be substantial, depending on the size of the initial capitalization. They will decline as use of the fund increases; therefore, they are best suited to support start-up costs.

- **Loan repayments.** As loans are repaid, including those repaid into a revolving loan fund, states can use a portion of the repayment to support the program. The Oregon Small-Scale Energy Loan Program (SELP), supported by general obligation bonds, sets interest rates on its loans to cover both the expected bond yield and administrative costs.

**Support Program Monitoring and Evaluation**

The long-term success of state clean energy financing programs depends on understanding what worked, what did not work, and why. Often program monitoring and evaluation are required for federal funding and are needed to satisfy private investors. California has spent more than $100 million on evaluation, measurement, and verification over the last three years to evaluate its $3 billion utility sector program. The evaluation has provided a solid business case for California’s utilities to continue to pursue increased investment in energy efficiency.
CASE STUDY: REVOLVING LOAN FUND

Texas LoanSTAR Program

Program Overview

The Texas Loans to Save Taxes And Resources (LoanSTAR) program uses a revolving loan mechanism to fund energy retrofits for public facilities, such as school districts and public buildings. Managers of eligible facilities can apply for loans to pay for expert-recommended retrofits. The program was initiated by the Texas Energy Office in 1988 to improve energy efficiency in public buildings. Its revolving loan mechanism allows borrowers to repay loans through the energy cost savings that they realize from the projects. Projects must have an average payback of 10 years or less.

Source of Capital

The original capitalization for the program used Petroleum Violation Escrow funds from the federal government. The size of the original investment—$98.6 million—makes LoanSTAR the largest state-run energy efficiency and conservation program in the United States. The funds are managed by the Texas State Energy Conservation Office (SECO) through the U.S. Department of Energy’s (DOE) State Energy Program.

Program Description

There have been many changes to the Texas LoanSTAR program since its inception. The initial loans, from 1989 to 1994, were for four years, with program payback averaging 3.4 years. All major projects had to be metered and monitored to verify energy savings. In 1995, the loan period was lengthened to eight years and metering and monitoring became an option for the loan recipient, the cost of which could be rolled into the loan. In 2001, SECO received approval from DOE to allow LoanSTAR to finance projects through energy service companies (ESCOs) and to include water conservation retrofits. The payback period was extended to the current 10 years maximum loan term.

A prospective borrower must hire a professional engineer to analyze the projects that will be submitted for funding. Once the projects are analyzed and the borrower approves them, the engineer prepares an energy assessment report (EAR) for design-bid-build (DBB) and design-build (DB) projects. For ESPCs, the engineer prepares a Utility Assessment Report (UAR). SECO technical staff review and approve the EAR or UAR before project financing is authorized. To ensure that DBB and DB projects are designed and constructed according to the EAR, SECO performs a review of the design documents at 50 percent and 100 percent completion. On-site construction monitoring is also performed during these phases. Monitoring and verification are required to ensure that the borrower is achieving the estimated energy savings. The level of monitoring and verification may range from utility bill analysis to individual system or whole-building metering. Metering and monitoring costs can be rolled into the loan.

The current interest rate is 3 percent APR. Loans are repaid through savings in energy costs. Projects must have an average payback of 10 years or less. As of November 2010, the program had made 207 loans, with an average loan size of $1.4 million and cumulative energy savings of $309 million.

Energy efficiency improvements include, but are not limited to, HVAC, lighting and insulation, building shell improvements, water management improvements, and load management projects. Funds can be used for retrofitting existing equipment or, in the case of new construction, to finance the difference between standard and high-efficiency equipment. The evaluation of on-site renewable energy options, such as solar water heating, photovoltaic panels, or small wind turbines, is encouraged in the analysis of potential projects.

Elements of Success

The quality control in all phases of the program has made it one of the most successful revolving loan programs in the nation. SECO has established detailed guidelines to ensure that the energy retrofits financed not only pay for themselves, but also produce actual energy savings 20 percent greater than the estimates.

Next Steps and Challenges

The Texas LoanSTAR program has, for the first time since its inception, begun using a competitive process to identify and select borrowers. This process takes place every six months. Leveraging additional sources of funds to expand the program remains a key challenge.
CASE STUDY: UTILITY ON-BILL FINANCING

Clean Energy Works Portland

Program Overview
Clean Energy Works Portland (CEWP) started as a pilot on-bill financing program to help up to 500 qualified homes in Portland, Oregon, finance and install energy efficiency upgrades through low-cost loans. Participating homeowners pay for the improvements via a monthly charge on their utility bills. CEWP is a project of the City of Portland in collaboration with Multnomah County, Shorebank Enterprise Cascadia, Energy Trust of Oregon, NW Natural, Pacific Power, Portland General Electric, Worksystems Inc., and Green For All. Since CEWP was implemented in 2009, about 420 homes have been weatherized or are scheduled for energy efficiency improvements.

Source of Capital
Initial funding for CEWP came in the form of a $1.2 million Energy Efficiency and Conservation Block Grant and an additional $1.3 million from the city. The City of Portland chose Enterprise Cascadia, a non-profit community development financial institution (CDFI) serving Oregon and Washington, to manage the program’s funds and provide low-interest energy upgrade loans to residents. The city plans to recycle customer payments in a revolving loan fund. In April 2010, the City of Portland received $20 million in ARRA funding to expand Clean Energy Works to qualified participants in metro and rural Oregon.

Program Description
The CEWP pilot offers qualified homeowners access to low-cost financing for energy efficient home improvements, such as new insulation or a high-efficiency furnace or water heater. Each participant receives a free home energy assessment performed by a certified Building Performance Institute contractor, who is accompanied by a qualified energy advocate who helps decide which upgrades and financing options make sense for the homeowner. In coordination with the energy advocate, the contractor arranges to implement the energy efficiency improvements. Homes in the pilot program must be owner-occupied and located inside the City of Portland.

CEWP offers loans at 5.99 percent on weatherization, space heating, and water heating upgrades and at 3.99 percent for all upgrades for income-qualified participants. Payment periods may be stretched to as long as 20 years and are designed to match the monthly energy savings. To date, the average loan amount is $12,721.

Three utilities—Pacific Power, NW Natural, and Portland General Electric—provide the repayment mechanism by allowing homeowners to pay on their loans through their power bills.

The Energy Trust of Oregon is assisting the City of Portland with all aspects of service delivery. It has trained the energy advocates, who walk qualified homeowners through the program by helping with loan paperwork, overseeing the contractor bid process, and conducting quality assurance. In addition, the Energy Trust has helped the city by providing Web site and call center support, processing incentive checks, scheduling home performance assessments, and finding contractors.

Elements of Success
Much of the program’s progress is due to partnerships fostered among governments, non-profits, utilities, and contractors. The program is easy for interested homeowners to navigate, with a qualified energy advocate to assist them through the process.

Next Steps and Challenges
If it is successful and expands throughout the state, CEWP will look to the Oregon Department of Revenue to issue bonds to back the program.
CASE STUDY:
LOAN PURCHASE PROGRAM

Pennsylvania Keystone Home Energy Loan Program (HELP)

Program Overview
The Keystone Home Energy Loan Program (HELP) is a loan purchase program in which the Pennsylvania Treasury has purchased almost $45 million in unsecured loans to generate a market return on investments in residential energy efficiency. The target sector is owner-occupied, one- and two-family residential properties. Principally supported by the Pennsylvania Treasury Department, the Pennsylvania Department of Environmental Protection, and the Pennsylvania Housing Finance Agency, Keystone HELP is administered by AFC First Financial Corporation, a national energy efficiency lender. Since its inception, Keystone HELP has supported more than $45 million in unsecured loans to 7,000 homeowners. The program has added a fixed term, secured loan category to its portfolio, which is secured by a lien on the home.

Source of Capital
The Pennsylvania Treasury provided the initial capital of $20 million to launch the program in 2006, by making a commitment to purchase loans that AFC First originated. In 2008 the state legislature passed the Alternative Energy Investment Act, which created a new funding stream from bonds and general revenues for energy efficiency improvements. The Pennsylvania Department of Environmental Protection (DEP), together with the Pennsylvania Housing Finance Agency (PHFA), was entrusted with spending the funds annually. Treasury and DEP have used this appropriated money to support new loan categories, in a tiered system that rewards higher levels of energy performance with greater financial incentives. An unsecured loan loss reserve, totaling $2.5 million as of July 2010, is capitalized by funds from the state and ARRA funding.

Program Description
Pennsylvania homeowners who own, and make qualifying improvements to, their one- or two-unit primary residence, whose annual household income does not exceed $150,000, are eligible to apply for loans. The following types of loans are available:

- **Energy Star Loans** (unsecured) for the installation of qualifying Energy Star improvements or other improvements that meet program criteria. The loan range is $1,000 to $15,000, and the rate is 6.99 percent (fixed). The term options are 3, 5, or 10 years.

- **Advanced Performance Energy Star Loans** (unsecured) for the installation of qualifying improvements that exceed Energy Star standards. The loan range is $1,000 to $15,000, and the rate is 5.99 percent (fixed). The term options are 3, 5, or 10 years.

- **Renovate and Repair Energy Star Loans** (secured) for the installation of qualifying improvements that meet Energy Star standards or improvements that meet program criteria. The loan range is $15,000 to $35,000, and the rate ranges between 6.375 percent and 8.875 percent (fixed). The term options are 10, 15, or 20 years.

- **Whole House Improvement Loans** (unsecured) for improvements that make a whole house more energy efficient, as recommended by an approved energy auditor. The loan range is $1,000 to $15,000, and the rate is 4.99 percent (fixed). The term options are 3, 5, or 10 years. Applicants also receive $325 toward the cost of the energy audit.

- **Whole House Improvement Loans** (secured) for improvements that make a whole house more energy efficient, as determined by a comprehensive, “whole house” energy audit conducted by a qualifying approved energy auditor. The loan range is $5,000 to $35,000, and the rate ranges from 3.875 percent to 6.375 percent (fixed). The term options are 10, 15, or 20 years. The secured loan program is available through the Renovate and Repair Loan Program of the PHFA. Security is provided by lien on property.

AFC First Financial Corporation administers all aspects of the program. It underwrites, originates, and services the unsecured loans. The unsecured loans require a minimum FICO score of 640 and a maximum debt-to-income ratio of 50 percent. As of June 2010, AFC First had originated and serviced 5,761 unsecured loans, totaling $36.8 million, which have been purchased by the state treasurer. AFC First also underwrites and originates the secured loans. The PHFA services the loans. The secured loans require a minimum FICO score of 620 and a maximum debt-to-income ratio.
of 45 percent. Thus far, AFC First has originated $11 million of secured loans, which have been purchased by the PHFA.

AFC First also oversees a network of more than 1,500 contractors authorized to perform work under the program. The contractors market the program to their own network of customers and help them apply for financing. Customers use a Web site or a toll-free number to apply.

AFC First aggregates the unsecured and secured loans and sells them on a periodic basis to the treasurer and the PHFA. AFC First has access to a loan loss reserve fund, set at 5 percent of the total loans outstanding. Thus far actual losses for the program have been less than 1 percent.

**Elements of Success**

The program markets to customers through a network of qualified contractors, who put their customers in direct contact with AFC First. Customers find out within minutes whether they are approved, based on their credit scores. The program is streamlined and easy to navigate, ensuring more participation.

**Next Steps and Challenges**

Keystone HELP has financed over $40 million worth of loans, attracting national attention as a model that is sustainable and not dependent on significant infusions of outside grant funding. However, Keystone HELP, as a unique asset class, has become a sufficiently large portion of the state treasury’s investment portfolio that diversification limits are being reached. The program is looking for a way to expand by developing a secondary market for home energy loans. Selling bundled loans on a secondary market would reduce risk and free more core capital to reinvest in loans. The lack of national standards for certified, trained contractors, however, poses a challenge to developing a secondary market that relies on a well-designed product, a reliable delivery network, and quality contractors.
CASE STUDY: LINKED DEPOSIT PROGRAM

Illinois Green Energy Loan Program

Program Overview
The Green Energy Loan Program encourages energy efficient development and improvements by offering low-interest loans to businesses, non-profit organizations, and local governments in Illinois. The Illinois State Treasurer secures below-market interest rates for borrowers who finance their purchase or installation of energy efficient and renewable energy equipment through participating lenders. The below-market interest rate is available for two years, with the possibility of a three-year extension.

Source of Capital
The Illinois Treasurer deposits a portion of state treasury funds with selected financial institutions, which in turn make loans. Projects can range in value from $10,000 to $10 million.

Program Description
Borrowers first apply for and receive a loan from a participating, eligible bank for a comprehensive energy efficiency project or renewable energy system. After approval, the lending bank applies for the rate reduction from the Illinois State Treasurer’s Office, using the Green Energy Loan application. If the application is approved, the treasurer’s office deposits state funds in the bank, and the bank passes along the rate reduction. The actual reduction varies depending on the bank.

To qualify, a project must be located in Illinois and meet one of the following four criteria:

- Participate in a state or utility-administered efficiency program;
- Have a contract with an ESCO;
- Have a Leadership in Energy and Environmental Design (LEED)–certified professional working on the project, with the intent to pursue LEED certification for the project; or
- Have a plan to install a renewable energy system.

Green Energy loans cover the purchase and installation of renewable energy equipment (solar panels, solar thermal energy systems, small wind energy systems) or upgrades to a building that improve energy efficiency.

Elements of Success
The Illinois Green Energy Loan Program is a public-private partnership to help Illinois businesses, non-profits, and local governments manage energy costs. It has offered discounted interest rates to businesses that are investing in energy efficiency improvements independently or through Ameren, ComEd, and other energy efficiency programs. As a result, the program has received strong support from the utilities (ComEd and Ameren launched energy conservation programs for commercial and industrial customers in June 2008), which have marketed it to their customers.

Next Steps and Challenges
The Illinois State Treasurer needs to market the program actively among non-profits and local governments and encourage them to take advantage of program incentives. The treasurer’s willingness to invest additional state capital will also limit the amount of funding that the Green Energy Loan Program can provide.
**CASE STUDY: ENERGY SAVINGS PERFORMANCE CONTRACTING**

**Washington Energy Savings Performance Contracting Program**

**Program Overview**

The Washington Department of General Administration (DGA) Energy Team administers the Energy Savings Performance Contracting Program to help state agencies, state colleges and universities, local governments, and other entities use energy savings performance contracting (ESPC). The program helps state agencies to identify energy efficiency measures for their facilities and to use ESPC to implement them. These actions are required to comply with state law HB 2247 (2001).

**Source of Capital**

A variety of options for project financing are available, including financing through an energy services contractor, or ESCO tax-exempt municipal leases, utility grants or rebates, the State Treasurer’s Lease/Purchase Program, capital budgets, or a combination.

**Program Description**

The Washington DGA is the lead agency for energy performance contracting by state agencies. There is a five-step process:

1. **Interagency agreement**: facility owner and DGA agree to work together.

2. **Select ESCO**: facility owner chooses from DGA’s list of prequalified ESCOs.

3. **Audit phase**: (1) preliminary audit to identify the greatest energy savings potential, (2) owner sets cost-effectiveness criteria, (3) the ESCO and DGA sign a contract for an investment grade audit, (4) the ESCO completes the investment grade audit, (5) the ESCO presents the guaranteed maximum cost and savings, and (6) the facility owner approves, based on advice from the Department of General Administration.

4. **Design and construction phase**: (1) the ESCO and DGA sign a contract for project design and construction, (2) the owner authorizes funding, (3) the ESCO prepares bid documents, (4) subcontractors and equipment are selected, and (5) DGA manages the ESPC project.

5. **Monitoring and verification**: savings verification 12 to 36 months following commencement of energy savings; verification is based on international protocols.

DGA has established a dedicated Energy Team that includes a program manager; an analyst; energy engineers; and building commissioning, green building, and LEED resource staff. The Energy Team provides free feasibility assessments. The team has developed a questionnaire for facility managers to help them determine whether their building is a good candidate for performance contracting. The Energy Team also helps agencies select ESCOs from a prequalified pool, assists in contract negotiation, provides an energy engineer to manage the project, offers guidance on monitoring and verification, reviews ESCO annual savings reports, and can assist with obtaining low-interest financing from the state treasurer.

**Elements of Success**

Several elements of the program contribute to making it easier for eligible participants to navigate the process. DGA has a prequalified list of ESCOs that facility owners can choose from, so that they are not just limited to the low bidder. DGA assigns an experienced energy engineer to help manage the project. Facility owners participate in equipment and subcontractor selection, and DGA can help with low-interest state treasurer financing.

**Next Steps and Challenges**

DGA is working with the state treasurer, Office of Financial Management, and ESCOs to expand energy performance contracting in state buildings. Washington’s “Efficiency First” legislation, signed in May 2009, requires state agencies to rate their buildings (greater than 10,000 square feet) using Energy Star and disclose the data to the public. A preliminary energy audit is required for buildings with an Energy Star rating below 50 (on a scale of 0 to 100). If the audit identifies cost-effective energy savings, an investment grade audit is required by July 1, 2013, and cost-effective measures must be implemented by 2016.
This appendix describes the characteristics of each major market for clean energy financing, followed by a list of programs to consider for each sector and specific tailoring options. It covers the following markets:

- Residential Sector
  - Single-family
  - Multifamily
- Commercial Sector
  - Small commercial
  - Large commercial
- Industrial Sector
- Agricultural Sector
- Institutional Sector

**Residential Sector.** The residential sector is typically divided into single-family and multifamily, to reflect differences in ownership and scale. Single-family residences account for 80 percent of energy use in the residential sector.

**Single-family residential.** Single-family units are generally owner occupied but can include rental units.

**Characteristics.** This segment is characterized by a more limited knowledge of energy systems and financing mechanics and low energy use per unit but high aggregate energy use. Households typically consider energy improvements only during a replacement decision, and they may not want to spend a lot of time to arrange financing. Heating and cooling lead energy demand, at approximately 40 percent, followed by lighting, water heating, electronics, and refrigeration.

**Programs to consider.** Options for this segment include revolving loan funds, on-bill financing, and loan purchase programs. Private sector participation can also be obtained through credit enhancement mechanisms.

**Tailoring.** States may want to offer longer loan tenors to accommodate longer payback periods, transfer between owners (original owners can transfer the remaining portion of their loan to future owners), options for tenants, and technical assistance to explain how the financing works and help streamline the application process. States may also train contractors to present financing for energy efficient replacements. Efforts focused on whole-house efficiency, to address heating and cooling loads, will have more impact than those targeting only lighting or appliances.

**Multifamily residential.** Multifamily units are typically rental apartments or townhouses with five or more units. They include low-income units that may be owned by public housing authorities or non-profits.

**Characteristics.** This segment is characterized by some professional knowledge of energy systems and financing mechanics. Owners may not pay the energy bills and thus may not directly reap the benefits of any efficiency-induced cost savings. There is some degree of scale available. The energy demand profile is similar to that of single-family residences, but appliances for heating, cooling, and clothes washing and drying are likely to be centrally located.

**Programs to consider.** Options for this segment include on-bill financing and loans from private sector capital. In addition, state housing finance agencies may be able to provide programs specialized for the low-income public sector.

**Tailoring.** States can offer auditing services to assess energy cost savings across multiple units. State may want to make financing available to renters who can make improvements with owner approval, with a focus on elements under their direct control.
**Commercial Sector.** The commercial sector is typically divided into small and large, based on size of energy load. The small commercial sector is often similar to the residential, whereas the large commercial may be more like the industrial sector.

**Small commercial.** The small commercial area includes small offices, small retailers, grocery stores, restaurants, dry cleaners, and other small businesses.

- **Characteristics.** This segment is characterized by limited knowledge of energy systems and financing options, moderate energy use per unit, and low aggregate energy use. Building owners may not pay energy bills. Energy demand is led by heating and cooling, at approximately 30 percent, followed by lighting at 25 percent, and electronics.

- **Programs to consider.** Options for this segment include revolving loan funds, on-bill financing, and some PACE programs. Private sector participation can also be secured through credit enhancement mechanisms.

- **Tailoring.** States may need to offer technical assistance to explain financing options and help streamline the application process. They may need to include options for lease situations, to allow repayment to transfer to future occupants.

**Large commercial.** The large commercial area includes large offices, shopping centers, large retailers (such as the “big-box” stores), hotels, and theaters. The main difference from the small commercial category lies in the sophistication of building technology and the scale of energy use.

- **Characteristics.** This segment is characterized by complex building technologies such as centrally managed heating and ventilation systems, high energy use, and familiarity with energy cost issues and financing. Building owners may not pay energy bills, and that creates a “split-incentive” around lower energy costs. Owners of these establishments may be able to secure financing on their own. Energy demand is led by heating and cooling and lighting.

- **Programs to consider.** Options for this segment include revolving loan programs, on-bill financing, and some PACE programs. Private sector participation can also be obtained through credit enhancement mechanisms.

- **Tailoring.** States need to compare the financing terms that they may be able to offer to what is already available in the marketplace or to self-financing. Options may be needed for lease situations to allow loan repayment to transfer to future occupants.

**Industrial Sector.** The industrial sector includes manufacturing, processing, and refining operations involving metals, chemicals, cement, fuels, forest products, and food and beverages. There is broad similarity with the agricultural sector, with which it is sometimes grouped.

- **Characteristics.** This segment is characterized by great variability in energy system complexity, energy use density, and familiarity with energy and financing issues. A leading concern is maintaining the integrity of the manufacturing/processing/refining process. Such enterprises may be able to secure financing on their own. They may also self-generate a portion of their load. They will likely have high rate-of-return needs (requiring short payback periods) and pay lower electricity rates. Energy demand is largely for heating and power need for manufacturing, amounting to approximately two-thirds of their total demand.

- **Programs to consider.** Options for this segment include revolving loan funds and linked deposit programs. Private sector participation can also be obtained through credit enhancement mechanisms.

- **Tailoring.** States will likely need to provide very low cost financing and technical assistance to implement programs in this sector.

**Agricultural Sector.** The agricultural sector includes farms, fisheries, nurseries, greenhouses, and other food production businesses.

- **Characteristics.** This segment is characterized by high variability depending on the size of the operation, the crop or product, and the region. Enterprises are likely to need a high rate of return (short payback periods). Energy demand is largely for equipment use, vehicles, and lighting. Water use is also a big energy cost in some regions. These businesses are often served by electric cooperatives.
Programs to consider. Options for this segment include revolving loan funds and linked deposit programs. Private sector participation can also be encouraged through credit enhancement mechanisms. States may want to consider working in partnership with rural electric cooperatives for energy efficiency or renewable energy project financing.

Tailoring. States will likely need to provide very low cost financing and technical assistance to implement programs in this sector.

Institutional Sector. The institutional sector includes schools, colleges and universities, state and local government, health care facilities, and water and wastewater treatment facilities. It shares characteristics with the multifamily residential (dormitories are an example) and large commercial segments (for example, government buildings), with which it is sometimes grouped. Ownership can be public or private and includes non-profits.

Characteristics. This segment is characterized by some familiarity with energy issues and financing, moderate levels of use, and scalability. Procurement or budget restrictions may exist for potential public sector participants. Energy demand is led by heating and cooling, followed by lighting, except in the cases of water and wastewater treatment facilities, which have major costs from process-related energy use. Buildings may have some on-site generating capability, for instance, via district heating. Most buildings are owner occupied and have high credit ratings.

Programs to consider. Options for this segment include revolving loan funds, ESPPCs, pooled bond financing, and lease-purchase financing.

Tailoring. States need to consider how to provide technical assistance regarding energy cost savings and financing options. They may need to adjust budgeting or procurement provisions to permit governments to take advantage of some mechanisms.
END NOTES

i Several states limit their debt obligation below typical debt ceilings (low debt states) and a few have prohibitions against general obligation bonds. For more information, see: http://www.census.gov/govs/state/.

ii For more information, see: http://www.mass.gov/?pageID=gov3pressrelease&l=1&l0=Home&csid=Agov3&b=pressrelease&f=100225_clean_energy_investment_program&csid=Agov3

iii For more information, see: http://www1.eere.energy.gov/wip/guidance.html

iv SEP funding was $125 million in 2007, and it is expected it will be approximately half that amount in 2011.

v Please note that ARRA SEP funding cannot be used for loan guarantees.


ix International Code Council, IECC 2012 and ASHRAE/IESNA 90.1-2010 compared to 2006 IECC and Standard 90.1-2004

NGA CENTER DIVISIONS

The NGA Center is organized into five divisions with some collaborative projects across all divisions.

- **Economic, Human Services & Workforce** focuses on best practices, policy options, and service delivery improvements across a range of current and emerging issues, including economic development and innovation, workforce development, employment services, research and development policies, and human services for children, youth, low-income families, and people with disabilities.

- **Education** provides information on best practices in early childhood, elementary, secondary, and postsecondary education. Specific issues include common core state standards and assessments; teacher effectiveness; high school redesign; science, technology, engineering and math (STEM) education; postsecondary education attainment, productivity, and accountability; extra learning opportunities; and school readiness.

- **Environment, Energy & Transportation** identifies best practices and provides technical assistance on issues including clean energy for the electricity and transportation sectors, energy and infrastructure financing, green economic development, transportation and land use planning, and clean up and stewardship of nuclear weapons sites.

- **Health** covers a broad range of health financing, service delivery, and coverage issues, including implementation of federal health reforms, quality initiatives, cost-containment policies, health information technology, state public health initiatives, and Medicaid.

- **Homeland Security & Public Safety** supports governors’ homeland security and criminal justice policy advisors. This work includes supporting the Governors Homeland Security Advisors Council (GHSAC) and providing technical assistance to a network of governors’ criminal justice policy advisors. Issues include emergency preparedness, interoperability, cyber-crime and cyber-security, intelligence coordination, emergency management, sentencing and corrections, forensics, and justice information technology.