

US EPA ARCHIVE DOCUMENT

Chapter 3. Funding and Financial Incentive Policies

Policy Description and Objective

Summary

States are implementing many policies that affect the economics of energy efficiency, renewable energy, and combined heat and power (CHP). Such policies make investments more attractive by reducing cost barriers, lowering risk, and reducing regulatory compliance costs. These include targeted funding and incentive programs that increase investment in energy efficiency, renewable energy, CHP, and services by residents, industries, and businesses in their state.

Over the past three decades, states have diversified their programs from grants and loans into a broader set of programs that target specific markets and customer groups. This diversification has led to program portfolios with greater sectoral coverage, a wider array of partnerships with businesses and community groups, and reduced risk associated with programmatic investments in energy efficiency, renewable energy, and CHP.

The types of funding and financial incentive programs discussed in this chapter include:

- Direct cash incentives including grants, rebate programs, and performance-based incentives.
- Tax incentives.
- Loans and financing programs such as revolving loans, property assessed clean energy (PACE) financing, energy performance contracting (EPC), credit enhancement, and energy-efficient mortgages (EEMs).
- Green banks.

In addition to funding and financial incentives programs, states have found that other policies, such as standards, programs, and requirements, can improve the effectiveness of their energy efficiency, renewable energy, and CHP investments. These policies can lower investment risks; increase the pace of adoption; and create stronger markets for energy efficiency, renewable energy, and CHP. For example, state requirements, such as a renewable portfolio standard (RPS), can lower the costs of renewable energy over time as the technology deployment scales up; they can also lower risks as they demonstrate the benefits of action through experience. This chapter touches on these policies but many are discussed in greater detail in other chapters of the *Guide to Action*.

Objective

State-provided funding and incentives help support technologies, products, and practices that are new to, or are not otherwise captured by, the market. Such programs also encourage private sector investment. Financial incentives can reduce market barriers associated with high “first cost” or be used to spread the costs over a period of time so that costs and benefits are realized in a more synchronized fashion.

Benefits

States have found that providing funding and incentives for energy efficiency, renewable energy, and CHP can offer the following environmental, energy, social, and economic benefits:



- Reduces total energy costs by supporting cost-effective energy efficiency, renewable energy, and CHP projects.
- Ensures that renewable energy is delivered, specifies which technologies are used, and offers incentives to install technologies.
- Accelerates the adoption of clean energy technologies by improving the project economics and helping to lessen market, institutional, or regulatory barriers until those barriers can be removed.
- Establishes the necessary energy efficiency, renewable energy, and CHP technology or project development infrastructure to continue stimulating the market after the incentives are no longer in effect.
- Offers opportunities to lower energy bills and enhance comfort in low-income housing (sometimes known as “affordable comfort”).
- Leverages federal incentives and stimulates private sector investment by further improving the economic attractiveness of energy efficiency, renewable energy, and CHP, which may lead to broad support and increase adoption of a technology or process.
- Stimulates energy efficiency, renewable energy, and CHP businesses and job creation within the state.
- Supports environmental objectives, such as improving air quality; reducing water discharges; frequently limiting water use and solid waste; and improving land resource use, including the reuse of formerly contaminated lands, landfills, and mine sites.
- Increases consumer awareness through program-related education campaigns.
- Transforms the market towards offering more energy efficiency, renewable energy, and CHP.

Guide to Action Roadmap of Funding and Financial Incentives

Several of the incentive programs identified in this chapter are also discussed in other chapters of the *Guide to Action*. The following table provides a roadmap for identifying policies described in the *Guide to Action* that use these incentives:

Table 3.1: Crosswalk of Funding and Financial Incentives and *Guide to Action* Policies

Category	Incentive	Section/Chapter				
		4.1	4.2	4.3	4.5	6.0
Direct Cash Incentive	Grant Programs	✓	✓			✓
	Rebate Programs and Performance-Based Incentives	✓	✓			✓
Tax Incentives			✓	✓		✓
Loans/Financing	Revolving Loan Funds	✓	✓		✓	✓
	On Bill Repayment or On Bill Financing					
	PACE Financing		✓	✓		✓
	Tax Increment Financing					
	Qualified Energy Conservation Bonds					
	EPC		✓	✓	✓	
	Credit Enhancement		✓	✓		✓
	EEMs		✓	✓		✓
Green Banks			✓	✓	✓	✓

Direct Cash Incentives

Direct cash incentives either help offset the cost of building or installing equipment or services, or provide a revenue source tied to performance. Typically, energy efficiency measures are supported through rebates or buy-downs that offset the cost of energy efficiency technologies or services, while renewable energy and CHP generation is supported by buy-downs, rebates, and generation-based incentives.

Ratepayer-funded programming is a significant source of funding for direct cash incentives (particularly incentives related to energy efficiency), which in many cases are administered by utilities with public utility commission (PUC) oversight.

Quick Guide to Direct Cash Incentives

Grants are cash incentives that are allocated *prior to* installation and *do not* require repayment.

Rebates are cash incentives that are allocated *after* installation and *do not* require repayment.

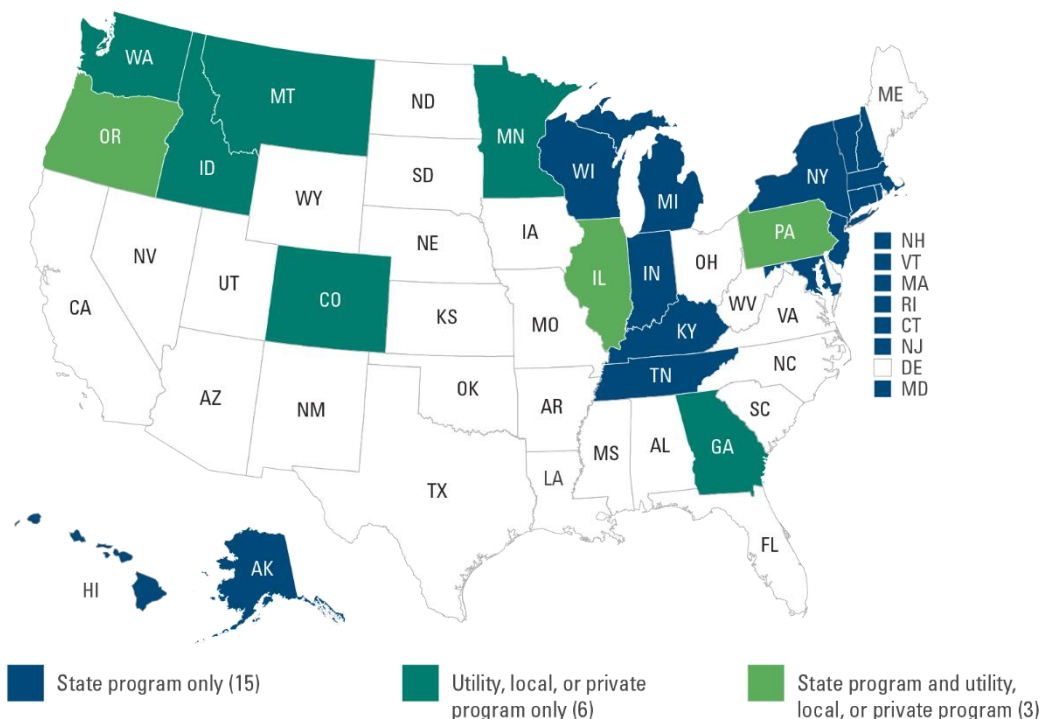
Performance-based Incentives are similar to rebates but are administered *based on performance* of the upgrade and *do not* require repayment.

Grant Programs

State grant programs cover a broad range of activities, and may help fund system installation costs, research and development, business and infrastructure development, system demonstration, and feasibility studies. Grants can be given alone or leveraged by requiring recipients to match the grant. Grants can also be bundled with other incentives, such as low-interest loans.

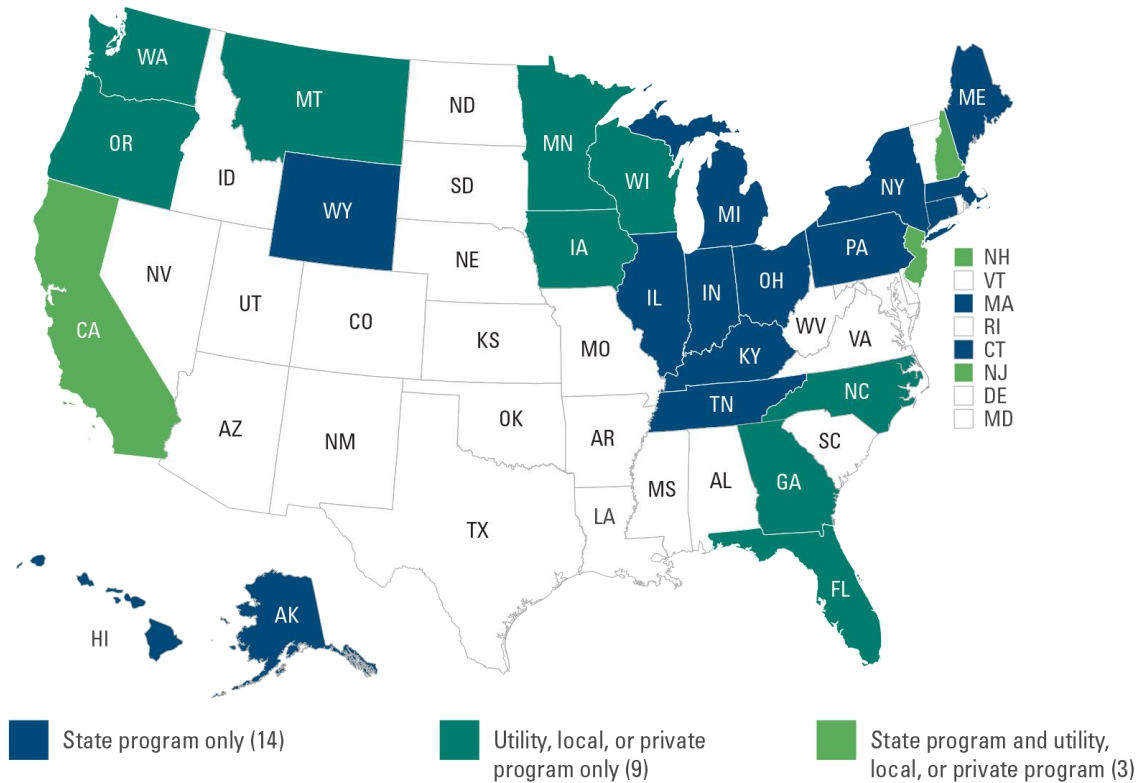
Twenty-four states have grant programs that promote renewable energy technologies, while 26 states have grant programs that promote energy efficiency technologies (DSIRE 2015c). These grant programs are usually administered by states, nonprofit organizations, and/or private utilities. For example, the New York State Energy Research and Development Authority (NYSERDA) oversees a grant program to help companies develop and deploy renewable energy technologies manufactured in New York.

Figure 3.1: States with Grant Programs for Renewable Energy, as of March 2015



Source: DSIRE 2015c

Figure 3.2: States with Grant Programs for Energy Efficiency, as of March 2015



Source: DSIRE 2015c

Rebate Programs and Performance-Based Incentives

Sometimes, the cost of installing renewable energy systems or purchasing energy efficiency equipment is a barrier to wider use of these technologies. Some states seek to lower this barrier by offering rebates or performance-based incentives that will reimburse system operators and consumers for some of the costs they incurred. Other states operate hybrid systems that incorporate both rebates and performance-based incentives to reduce initial costs *and* ensure that ongoing operation of the system is financially attractive.

Typically, rebates and performance-based incentives are funded by utility customers and administered by utilities, with oversight from PUCs. In a handful of states, they are administered by a state agency.¹⁰ In most cases, utility bill charges are collected as a separate line item on the bill, discrete from other utility charges. In a few states, programs are funded by utilities directly under utility commission directives. For example, Minnesota's Conservation Improvement Program is funded by the state's utilities.

States have found that rebate and performance-based incentive programs can help create conditions for long-term market development and growth. States have found that to do this, rebate and incentive programs are most effective when they have some degree of stability and predictability, with the flexibility to adapt to changing market conditions. For example, if there is high market saturation of a particular technology, then incentives can be reduced or criteria can be increased to respond to market conditions.

¹⁰ A database of state utility sector efficiency programs can be found at <http://aceee.org/portal/programs>.

Rebates

Rebates are usually used to offset the initial purchase cost of the renewable energy system or energy efficiency technology. For example, several states such as California and Maryland have employed programs that offer rebates to help reduce the initial upfront costs of onsite solar photovoltaic (PV) systems. Rebates are frequently used to encourage the purchase of energy-efficient appliances as well. In some cases, cash incentives are targeted to retailers, contractors, or homebuilders to ensure efficient options are available and promoted by suppliers. Suppliers can use the incentive to offer a lower price to consumers.

Rebate levels vary by technology and state. Fifteen states have renewable energy rebate programs (DSIRE 2015g). All 50 states and Washington, D.C., offer energy efficiency rebates or similar kinds of incentives from the state, local government, or utilities. For example, Alaska's Home Energy Rebate Program provides up to \$10,000 in rebates to homeowners who make energy efficiency improvements to an existing home, and up to \$10,000 for the construction of a qualified energy-efficient new home. States have found it helpful to continually reassess and adapt the suite of energy efficiency, renewable energy, and CHP rebates based on market opportunities.

States frequently provide rebates for solar PV, but rebates are also provided for other resources, technologies and applications, such as wind, biomass, and solar water heating. In general, rebates are provided on a systems capacity or per-watt basis, with the total rebate amount expressed as a maximum dollar amount or a maximum percentage of total system cost. For example, as of August 2014, NYSERDA provides a \$1.00 per watt rebate for solar PV up to 50 kilowatts (kW) and an additional \$0.60 per watt for installed capacity over 50 kW and up to 200 kW. Oregon's Small Wind Incentive Program provides a rebate of \$5.00 per kilowatt-hour (kWh) (based on 1 year's expected generation) for systems expected to generate up to 9,500 kWh per year, and \$1.75 per kWh for expected generation over 9,500 kWh per year. Total incentives are capped at 50 percent of the total installed cost.

Performance-Based Incentives

Performance-based incentives typically pay equipment owners/operators based on the output of renewable energy produced over time. Unlike an upfront rebate, a performance-based incentive helps ensure that only well-designed and maintained systems receive incentive payments over their intended operational life. Performance-based incentives have also been used to encourage whole-building energy efficiency improvement. In some cases, hybrid rebate and performance-based incentives are used to reduce initial costs *and* ensure that ongoing operation of the system is financially attractive.

In contrast to incentives that help finance initial capital costs (e.g., rebates and sales tax exemptions), some states distribute funds based on the amount of energy generated by a renewable energy system or the energy conserved by installing energy-efficient technology. For example, the California Solar Initiative, though currently at its funding limitation, has provided incentive payments of \$0.39 per kWh during the first 5 years for solar systems 30 kW and larger (\$0.50 per kWh for government entities and nonprofits). The rebate is based on the actual electricity generated by PV systems. This performance-based incentive is paid monthly depending on the actual amount of energy produced for a period of 5 years. New Jersey's Clean Energy Program uses a pay-for-performance model that rewards incentives based partially on the completion of a post-construction benchmarking report. The report verifies energy reductions from energy efficiency that exceed 15 percent savings after a year of post-construction operations.

Twenty-nine states offer some form of performance-based incentive (DSIRE 2015f).

Hybrid Approach—Combining Rebates and Performance-Based Incentives

Hybrid incentives can be used to share the investment risk between the funding organization and the recipient. Through a hybrid approach, rebates are used to decrease the initial cost of investing in energy efficiency, renewable energy, and CHP technologies, while the performance-based incentive limits the funding organization’s investment until the recipient demonstrates the project’s effectiveness (ACEEE 2013). Hybrid incentives can be used for energy efficiency, renewable energy, and CHP projects, and are frequently used for large CHP systems, which can vary in performance and have high initial costs.

California established a tiered capacity payment for CHP projects over 30 kW (projects under 30 kW receive the entire incentive up front), in which 50 percent of the total incentive is paid up front, and the remaining incentive is paid out over several years based on the program’s performance (ACEEE 2013). In New York, larger CHP systems (greater than 1.3 megawatts [MW] nameplate capacity) are eligible for both a performance-based incentive (based on output) and an initial capacity-based incentive (based on projected reduction in peak demand). Bonus incentives are paid based on performance, and projects not meeting certain performance standards receive a reduced payment (NYSERDA 2014).

Tax Incentives

Tax incentives can be used to reduce income, property, or sales tax burdens, thus making investments in energy efficiency, renewable energy, and CHP more attractive. State tax incentives can be directed towards individuals or corporations. They can be administered through sales, property, corporate, and income taxes imposed by the state and may take the form of credits, deductions, or incentives. See the “Quick Guide to Tax Incentives” text box for a brief explanation of each type presented in Table 3.2, which summarizes the incentives as of March 2015 (DSIRE 2015b).

Quick Guide to Tax Incentives

Tax Exemptions or credits are used to excuse *individuals* or *corporations* from paying income, sales, corporate, or property taxes on upgrades or state-designated equipment purchases.

Tax Deductions are used to reduce the amount of income upon which *individuals* or *corporations* pay taxes.

Table 3.2: Summary of Tax Incentives by State, as of March 2015

State	Sales Tax Incentive	Property Tax Incentive	Personal Tax Credit	Corporate Tax Credit	Personal Tax Deduction	Corporate Tax Deduction	Corporate Tax Exemption
AL					✓		
AK		✓					
AZ	✓	✓	✓	✓	✓		
AR							
CA	✓	✓					
CO	✓	✓					
CT	✓	✓					
DE							
FL	✓	✓		✓			
GA	✓						
HI		✓	✓	✓			
ID		✓			✓		
IL	✓	✓					

Table 3.2: Summary of Tax Incentives by State, as of March 2015

State	Sales Tax Incentive	Property Tax Incentive	Personal Tax Credit	Corporate Tax Credit	Personal Tax Deduction	Corporate Tax Deduction	Corporate Tax Exemption
IN	✓	✓			✓		
IA	✓	✓	✓	✓			✓
KS		✓			✓	✓	
KY	✓	✓	✓	✓			
LA		✓	✓	✓			
ME							
MD	✓	✓	✓	✓			
MA	✓	✓	✓			✓	✓
MI		✓					
MN	✓	✓					
MS							
MO	✓	✓		✓	✓		
MT		✓	✓	✓		✓	
NE	✓	✓	✓	✓			
NV		✓					
NH		✓					
NJ	✓	✓					
NM	✓	✓	✓	✓			
NY	✓	✓	✓	✓			
NC		✓	✓	✓			
ND	✓	✓	✓	✓			
OH	✓	✓					
OK		✓	✓	✓			
OR		✓	✓	✓			
PA		✓					
RI	✓	✓	✓				
SC	✓		✓	✓			
SD	✓	✓					
TN	✓	✓					
TX	✓	✓				✓	
UT	✓		✓	✓			
VT		✓	✓				
VA	✓	✓			✓		
WA	✓						
WV		✓					✓
WI	✓	✓	✓	✓			
WY							

Source: DSIRE 2015b



Tax incentives can help spur innovation in the private sector by making investments in certain technologies more attractive, and can also help make energy efficiency and renewable energy technologies more cost-competitive with traditional technologies. However, unlike grants and rebates, tax incentives require the system owner to pay the entire cost up front and wait until after the owner files their taxes to receive the incentive. Additionally, tax-exempt sectors (i.e., municipal, education, and nonprofit) cannot receive these incentives because their expenditures are not taxed.

Forty-five states currently have a total of 203 personal, corporate, sales, and property tax incentive programs for renewable energy (DSIRE 2015b). These programs are typically funded by general taxpayers or some subset of taxpayers; therefore, it is important to model the likely uptake of the incentives so that states can budget appropriately. States have found it helpful to regularly reevaluate tax incentives to ensure that they continue to meet the program's objectives—spurring investment and making energy efficiency, renewable energy, and CHP technologies competitive.

The most common types of state tax incentives are credits on personal or corporate income tax, and exemptions from sales tax, excise tax, and property tax. In addition, some states have established production tax credits. For example, New Mexico offers a \$0.01 per kWh production tax credit for solar, wind, and biomass. Because different tax incentives are suitable to different taxpayers' circumstances, states have found that they can use a range of tax incentives to match these circumstances. For example, property tax exemptions might be more attractive for large wind projects, while homeowners might prefer to claim an income tax credit for the purchase of a solar PV system.

The following are other examples of tax incentives:

- North Carolina offers a renewable energy tax credit equal to 35 percent of the cost of newly constructed, purchased, or leased renewable energy property. Eligible expenditures include equipment, design, construction, and installation costs (less any discount or rebates that may have already been applied). Nationally, North Carolina is currently ranked fourth in installed solar capacity (722 MW) and third in solar electric capacity (335 MW) installed in 2013 (SEIA 2014a).
- New Mexico offers income tax credits for energy production from CHP systems. States typically allow a broad range of CHP system designs for their tax incentives (EPA 2014a).

States also offer tax incentives for energy efficiency investment. Seventeen states have tax incentives for energy efficiency, for a total of 45 tax incentive programs (DSIRE 2015b). These incentives are typically offered as state income tax credits or deductions, but can also be structured as exemptions from state sales tax on appliances or titling tax on vehicles. States with tax incentives for energy efficiency investment include Maryland, Kentucky, Montana, New York, and Oregon (DSIRE 2015b). (See the *State Examples* section later in this chapter for more information.)

Loans and Financing Programs

Loans and financing programs help individuals and businesses overcome initial costs of installing or investing in energy efficiency, renewable energy, and CHP technologies. Although energy efficiency, renewable energy, and CHP upgrades can be cost-effective in the long run, some individuals, businesses, and state or local governments find it difficult to pay the upfront costs. Loans and financing programs provide a source of funding for those upfront costs, usually at favorable interest rates or loan terms. Oftentimes, these loan programs will fund activities or programs that otherwise might not be eligible for loans from traditional sources. Forty-eight states and Washington, D.C., offer loan programs for energy efficiency, renewable energy,

and CHP (DSIRE 2015d). Loan and financing programs include revolving loan funds, on-bill programs, PACE financing, EPC, credit enhancement, tax increment financing (TIF), qualified energy conservation bonds (QECBs), EEMs, and third-party ownership/power purchase agreements (PPAs).

Loan Maturity

In addition to the interest rate, the loan maturity (or duration of the repayment period) is an important aspect of financing because it allows the consumers to achieve positive cash flow quickly and affects the opportunity for interest rate buydowns.

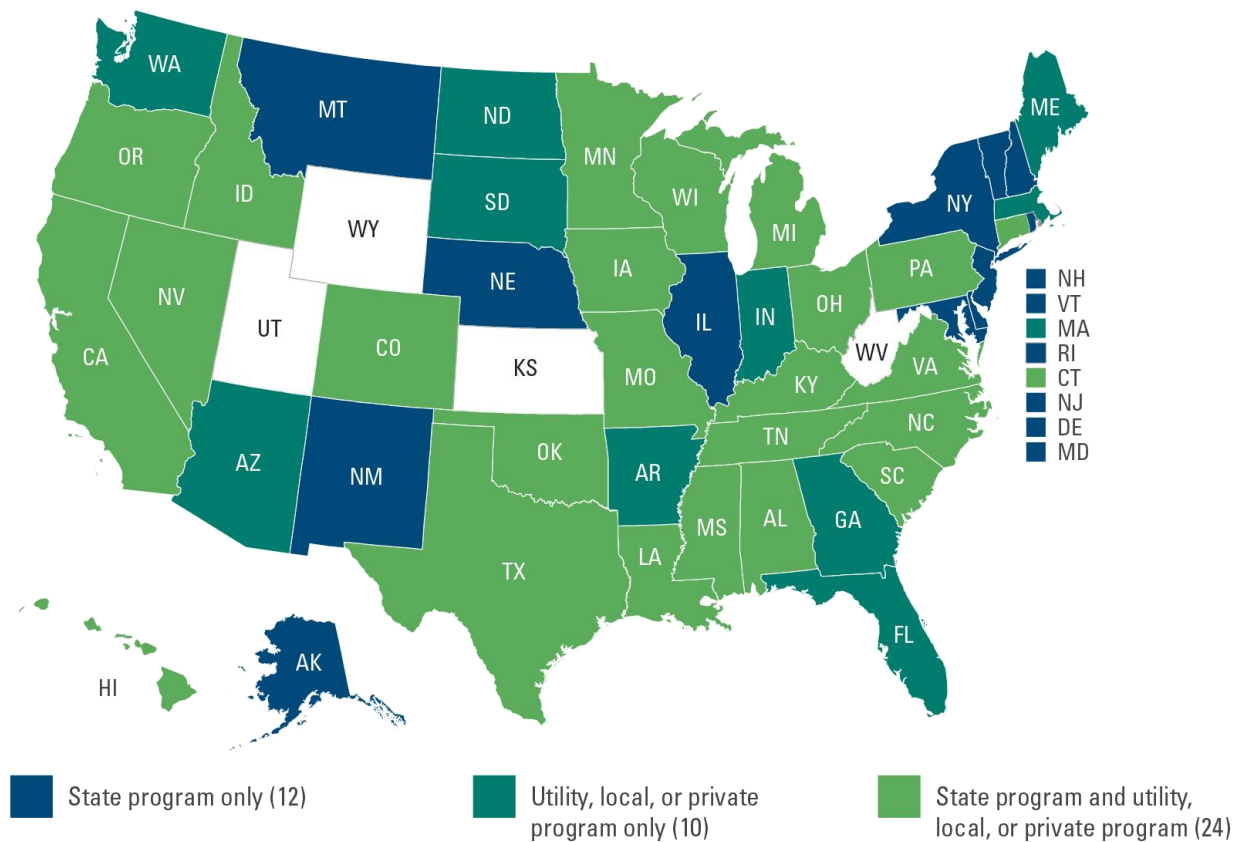
Positive cash flow. The longer the maturity on a loan, the more likely that consumers will see positive cash flow where the energy savings exceed loan payments. This enables consumers to go deeper on energy efficiency upgrades and renewable energy installation because there is quicker payback.

Interest rate buydown. It is better to encourage private investment to extend maturities through loss reserves rather than to have public entities buy down the interest rate on longer term maturities.

Table 3.3: Quick Guide to Loans and Financing Programs

Program	Definition	Program Audience		
		Government	Individuals	Corporation
Revolving Loan Funds	Self-supporting programs that use the payments from earlier borrowers to provide loans for new borrowers.	✓	✓	✓
On-Bill Programs	Allow participants to pay back loans through their regular utility bills.	✓	✓	✓
PACE Financing	Provides building owners upfront cash to install the technology through a lien, which can be paid off over several years and would be transferred to any subsequent property owners.		✓	✓
TIF	Allows local governments to sell debt in the form of bonds serviced by future tax increases that are anticipated to result from the project.	✓		
QECBs	Are used as a low-cost public financing tool that can be structured as a tax credit or direct subsidy to support community projects.	✓		
EPC	Uses reduced energy consumption to repay the upfront cost of a project. It is typically structured with the building owner repaying a third-party installer through energy savings.	✓	✓	✓
Credit Enhancement	Tool to reduce the perceived risk of loans to make more loans available for projects that may not be typically supported by a financial institution.	✓	✓	✓
EEMS	Special mortgages that allow a higher debt-to-income ratio and can be used to purchase homes that qualify as energy-efficient (such as an ENERGY STAR-certified home), based on future savings in operation costs.		✓	✓
Third-Party Ownership/PPAs	Contract vehicle through which a building owner can agree to allow a third party to install a renewable energy system on their property and agree to purchase the energy generated at a predetermined price.	✓	✓	✓

Figure 3.3: States with Loan Programs for Renewable Energy, as of March 2015



Source: DSIRE 2015d

Revolving Loan Funds

Revolving loan funds provide low-interest loans for energy efficiency, renewable energy, and CHP projects. These programs are administered directly by state governments, local governments, and utilities (DSIRE 2015d). States have used revolving funds primarily for energy efficiency investments in publicly owned buildings or for facilities with a clear public purpose.

The funds are designed to be self-supporting. States create a pool of capital when the program is launched. This capital then “revolves” over a multi-year period, as payments from borrowers are returned to the capital pool and are subsequently lent to new borrowers. Revolving funds can grow in size over time, depending on the interest rate that is used for repayment and the program’s administrative costs.

States have found revolving loan funds can be created from several sources, including public benefits funds (PBFs), utility program funds, state general revenues, or federal funding sources. Loan funds are typically created by state legislatures and administered by state energy offices. One example is the Texas LoanSTAR program, which provides loans for energy

Texas LoanSTAR Program

The Texas LoanSTAR program is designed to provide low-interest loans to finance energy efficiency retrofits in state public facilities. Loans are repaid in 4 years or less, depending on expected energy savings, often by using cost savings from reduced energy costs. Energy savings are verified by benchmarked energy use before retrofits are installed, followed by monthly energy use analysis for each building.

efficiency projects in state public facilities. The loan fund is based on a one-time capital investment of \$98 million from federal oil overcharge restitution funds and is funded at a minimum of \$95 million annually.

States have found that revolving funds must be both well-capitalized (e.g., large enough to meet a significant portion of the market need) and long-term (e.g., to allow funds to fully recycle and be re-loaned to a sizable number of borrowers) to effectively contribute to state energy goals and be self-sustaining. In order to maintain a large pool of capital states have found it helpful to consider several tradeoffs. For example, states determine the balance between private and public sector loans and between short-term and long-term loans. Successful loan repayment programs are structured such that there are adequate funds to continue making new loans. Additionally, states have found that funds that have a higher volume of loans with multiple types of borrowers (i.e. commercial and industrial) spread the risk and are more resilient if a borrower defaults on a loan.

On-Bill Programs

On-bill financing (OBF) and on-bill repayment (OBR) are utility bill-based methods in which the consumer repays the program administrators through their regular utility bills. As of January 2014, on-bill programs were operating or preparing to launch in at least 25 states (SEE Action 2014a). Many states have found it helpful to adopt legislation that encourages the implementation of on-bill programs, and several state utility regulators have taken action to assess the feasibility of these programs in their states.

The State and Local Energy Efficiency Action Network's (SEE Action's) 2014 review of 30 existing programs¹¹ found that the programs had delivered over \$1.8 billion of financing to more than 232,000 consumers for energy efficiency improvements. The Tennessee Valley Authority, Alliant Energy Wisconsin, United Illuminating/Connecticut Light & Power (CL&P), and National Grid are program administrators for some of the larger on-bill programs in the United States.

The 2014 SEE Action report identified several key attributes of on-bill programs that proponents advocate:

- Consumers are familiar with making utility bill payments.
- Energy investment (loan payments) and energy savings are reflected in the same bill; consumers can easily see the results of their investment.
- Default rates may be lower because service disconnection could result from non-payment.
- Lower default rates may make it possible for program administrators to offer more attractive financing, such as lower interest rates or longer loan terms, which could expand the number of qualified consumers.
- On-bill programs can be designed to address barriers to efficiency such as renter/owner split incentives.

Interest Rate Buydown

Another type of incentive is an interest rate buydown. By paying an upfront fee when a loan is initiated (or refinanced), an administering agency can lower the interest rate for consumers. The JEA program in Jacksonville, Florida, found that buying interest rates down was an effective way to significantly increase customer participation. For more information about JEA, visit <http://energy.gov/eere/better-buildings-neighborhood-program/strategic-financing-partnerships-help-jacksonville>.

SEE Action Network

SEE Action offers resources, discussion forums, and technical assistance to help states and local decision-makers develop financing programs. States have found SEE Action resources to be useful in designing effective programs.

A full list of SEE Action resources is available at <https://www4.eere.energy.gov/seeaction/resources>. Specific resources are included in the list of information resources at the end of this chapter.

¹¹ The report analysis included a few programs in Canada and the United Kingdom, as well as programs in the United States.

PACE Financing

PACE financing is a loan alternative that states and local governments can use to encourage energy efficiency, renewable energy, and CHP for commercial property owners who are deterred by the associated high upfront costs. Most PACE financing is positioned as a lien on the property, providing upfront cash to property owners to install the technology and allowing them to pay off the lien over several years. The lien will transfer to a new owner if the property is sold, reducing a disincentive for property owners to invest in technology if they believe they may move in a few years.

This type of financing does not reduce the total technology cost, but reduces the upfront burden by spreading the system's cost over a long period of time. It also helps the technology payment coincide more closely with the benefits received from it. Commercial PACE financing has been used to upgrade office buildings, restaurants, industrial properties, multi-family homes, and municipal properties (PACENow 2014). Due to the larger scale use of energy by commercial property owners relative to residential homeowners, the expansion of PACE to the commercial sector has the potential to greatly increase the impact of PACE financing. PACE financing can be used to finance CHP programs.

PACE financing has been authorized in 31 states and Washington, D.C., and a handful of local governments have created similar programs. Maine authorized PACE financing in April 2010 for energy efficiency, renewable energy, and CHP projects. The state received \$30 million in funds from the U.S. Department of Energy's (DOE's) Better Buildings Program to implement PACE financing. Although the legislation does not stipulate what types of properties are eligible, the program mainly supports residential properties (DSIRE 2013). Connecticut's PACE financing program supports commercial, industrial, and multi-family property owners for energy efficiency, renewable energy, and CHP improvements through a special assessment on their property tax bill; it is repaid over a period of up to 20 years.

In most states and localities, residential PACE financing programs are on hold due to the Federal Housing and Finance Agency's (FHFA) concerns over senior-lien provisions in PACE programs. Specifically, FHFA is concerned that PACE obligations linked to senior liens on homes with Fannie Mae or Freddie Mac-purchased mortgages would add potential risk to residential mortgage markets. However, FHFA does not oppose PACE programs in which loan obligations are structured as secondary (subordinate) liens, which are not paid off ahead of first-mortgage holders. Secondary-lien PACE programs thus are not seen as affecting risks associated with first mortgage holders (FHFA 2014). Accordingly, a few states have enacted legislation that explicitly removes the senior lien provision in PACE programs, giving PACE obligations a subordinate-lien position (DSIRE 2015e).

Tax Increment Financing

TIF was initially introduced to encourage redevelopment and finance infrastructure in jurisdictions where such investments may not otherwise occur. This financial tool allows local governments to sell debt in the form of bonds that are serviced by future tax increases and those that are anticipated to result from the project. Some states are exploring opportunities to expand the use of TIF to finance energy efficiency and renewable energy upgrades.

Qualified Energy Conservation Bonds

QECBs are a low-cost, public financing tool that enables qualified state, tribal, and local government issuers to borrow money for energy conservation projects. The U.S. Department of the Treasury subsidizes the issuer's borrowing costs. QECBs can be structured as tax credit bonds or direct subsidy bonds (DOE 2015).

Energy Performance Contracting

EPC uses cost savings from reduced energy consumption to repay the cost of installing energy conservation measures (HUD 2014). Under an EPC program, an energy service company (ESCO) conducts an energy audit. The ESCO then designs and constructs a project that achieves the building owner's energy efficiency needs and arranges for the project's financing, usually through a third party. The third party is repaid by the building owner/operator from the savings in their energy costs. Thus, the builder owner/operator does not need to incur upfront expenses, but will experience the benefits of the upgrades, including monetary savings once the financier's costs have been repaid (ICF 2007).

EPC programs have been used extensively by state, federal, and local facilities to reduce utility and operating costs and to help meet environmental and energy efficiency goals. These energy efficiency improvement projects can include the use of CHP. Forty-nine states have implemented performance contracting activities, primarily through legislation, covering a combination of entities that include public agencies, school districts, municipalities, state colleges and universities, counties, or the state (ESC 2013). While EPC programs are widespread, states have found that they can further utilize this approach by extending eligibility to all public facilities in the state.

EPCs are often used to meet state, federal, or municipal requirements regarding the energy performance of government-owned buildings. For example, in 2001, the Washington legislature adopted legislation requiring all state facilities to conduct energy audits. Their goal was to identify energy savings opportunities and to use performance contracting as their first option for achieving those savings. This law led to a surge in EPC activity: through 2010, over \$200 million was invested in project implementation by the private sector, with total avoided energy costs of over \$90 million by 2010 (WA DES 2010; Washington HB 2247 2001).

Credit Enhancement

Credit enhancements are tools to reduce the perceived risk of lending money or financing projects. By reducing the perceived risk, more financial partners may be willing to make funds available for loans or projects, increasing the overall funding available; they can also make financing available to projects or borrowers who would otherwise not meet the financial partners' lending criteria. Credit enhancements are frequently used to help finance commercial-scale renewable energy projects, but are also used to finance energy efficiency efforts.

A common type of credit enhancement is the establishment of a loan loss reserve fund. Under a loan loss reserve fund, public funds are set aside proportional to the total amount loaned through the loan program (usually about 5 percent of total amount loaned) (SEE Action 2014b). This reserve fund would cover some of the lenders' losses if some of the loans were not repaid, effectively reducing the lenders' risk. This type of credit enhancement is also known as a "first loss reserve," as it is the first source of capital to take a loss (NREL 2014).

Another type of credit enhancement is co-investment between public and private equity. A public entity will invest alongside a private investor, taking an equal risk on potential losses, but not necessarily an equal stake in potential financial returns (NREL 2014). This arrangement allows a private investor to potentially realize greater returns at a relatively lower risk.

A third type is known as mezzanine investment. In this arrangement, a credit enhancement party will invest in a project with the agreement that their investment will be paid back after the investments of lenders (but



before the investment of equity partners) (NREL 2014). This arrangement allows for additional funds to be available for a project while keeping the risk to the lenders lower.

Michigan Saves is an example of a loan loss reserve fund. Established with a \$6.5 million grant from the Michigan Public Service Commission, Michigan Saves has used the grant funds to attract private investors in order to create a \$60 million lending program for residential and commercial energy efficiency loans. Michigan Saves has a loan loss reserve of 5 percent of total loans, and this reserve can be used to cover up to 80 percent of a defaulted loan amount (DOE 2014).

Many states are rolling these financing approaches into state-capitalized, quasi-public green banks that perform a wide array of financing activities to further develop renewable energy and CHP capacity (see Chapter 5, “Renewable Portfolio Standards,” and Chapter 6, “Policy Considerations for Combined Heat and Power”).

Energy-Efficient Mortgages

EEMs are mortgages used to purchase homes that qualify as energy-efficient (such as an ENERGY STAR-certified home). Because the homes will have lower utility costs, the mortgages will allow higher debt-to-income ratios, meaning borrowers may be approved for larger mortgages. To get approved for an EEM, a home energy rating is usually required to ensure that the house is really energy-efficient.

EEMs sometimes also refer to energy improvement mortgages (EIMs), which are mortgages used to purchase homes that will have energy efficiency improvements made to them after the home sale. The cost of the energy efficiency improvements are included in the mortgage, with the energy savings being used to pay for the additional cost of the mortgage (ENERGY STAR 2014).

The Colorado Energy Office (CEO) offers an EEM and EIM program that is administered through mortgage lenders. For new homes, the incentive ranges from \$2,000 for homes meeting a Home Energy Rating System (HERS) Index Rating of at least 50, to \$8,000 for homes meeting a HERS Index Rating of at least 10 (on the HERS index scale, lower scores indicate more efficient homes). For existing homes, the incentive ranges from \$2,000 for improvements that reduce the HERS score by at least 10 points, to \$6,000 for improvements that reduce the HERS score by at least 66 points; the benefits cannot exceed more than half of the cost of the improvements themselves (CEO 2014).

Third-Party Ownership/Power Purchase Agreements

Third-party ownership agreements and PPAs are frequently used by states to promote distributed solar energy projects (although they can be used to support other renewable energy and CHP projects as well). Third-party ownership is a state policy decision that allows parties other than the utilities to generate and sell electricity to a purchaser. Once a state allows third-party ownership agreements, PPAs are used as the contract vehicle through which the agreement is executed between a developer and a purchaser. Under this agreement, a homeowner or building owner agrees to allow a third-party company to install solar panels and also agrees to purchase the solar electricity generated from the panels at a predetermined price. The predetermined price is usually set below the building owner’s regular rate when purchasing electricity from the electrical grid and can often include an energy cost escalator over time. The building owner benefits from reduced electricity bills without assuming the project’s investment, performance, or operational risk. The third-party company makes money from the sale of the electricity to the building owner, and capitalizes on available tax or other financial incentives (EPA 2014b).

States have found that laws require utilities to continue providing service to the building owner, and in many cases the utilities must also purchase excess energy that is fed back into the grid (under net metering laws). Thus, the building owner is guaranteed reliable electricity even when the solar panels do not produce enough to meet all of the building's needs. If net metering laws are in place, the third-party vendor can guarantee revenue even if the host building does not need electricity.

States have found that third-party ownership helps promote distributed solar projects. Many homeowners are deterred by the upfront cost of installing solar panels. The third-party company, however, is able to leverage financing, longer financial timeframes, and tax-based incentives to afford the upfront cost and still make money over time. With the establishment of a PPA, the third-party company lowers uncertainty about the long-term costs and benefits to the homeowner or building owner.

Energy Savings Agreement or Efficiency Services Agreement

An energy savings agreement is a partnership among a program administrator, service provider, and customer. The program administrator pays for the upfront cost of the upgrade and the service provider installs the project on the customer's property. This type of contract is similar to a PPA, but it is more commonly used for energy efficiency and CHP programs (Metrus 2015).

Designing Effective Funding and Incentive Programs

When developing and implementing effective funding and incentive programs, states have found it effective to consider a variety of key issues including design principles, key participants, level of funding, and program timing and duration. It is also important to consider interactions with federal and state policies, as well as opportunities to coordinate and leverage programs and resources.

How Other Policies Affect the Economics of Energy Efficiency, Renewable Energy, and CHP

States have found that beyond direct funding and financial incentive programs, other policies and programs, such as standards and requirements, affect and can improve the economics of energy efficiency, renewable energy, and CHP through indirect impacts on the economic viability of projects. These policies do not typically provide direct funding opportunities, but instead advance agreements, partnerships, and market development that make energy efficiency and renewable energy technologies financially viable. States have found it useful to consider aligning policies, programs, and funding incentives to optimize synergies that can further support economic viability and deployment of energy efficiency, renewable energy, and CHP upgrades. For more information, see *Interaction with State Policies* later in this chapter.

Design Principles

States have developed extensive experience in funding and incentives programs. While program design considerations are somewhat specific to the markets and technologies involved, four general design principles have emerged:

- Select specific target markets and technologies based on technical and economic analyses of a state's energy efficiency, renewable energy, and CHP potential, markets, and technologies.
- Use financing and incentives as part of a broader package of services designed to encourage investments by targeting public efforts to supplement, not supplant, private efforts.
- Establish specific technical and financial criteria for clean energy investments, such as those related to cost, size, or performance that matches desired outcomes.
- Track details of program participation costs, energy savings, and energy production to enable evaluation and improvement.

In designing their funding programs, states assess their intended markets and other funding sources, particularly the competitive commercial financing options that are available to their target customers. Some states take the approach of targeting markets that currently receive minimal attention from the commercial financing industry, rather than competing with private offers. Other states have sought to augment the incentives offered through private financing by working with the financial industry to design effective programs that address market barriers other than lack of capital alone, such as risk.

Some states have found that coordinating funding and incentives with other program policies results in more effective programs and creates opportunities to leverage investments. For example, Delaware offers a package of financial incentives, combined with its RPS, which has reduced the payback period for solar home systems to 5 years (NESEA 2013). Other program features that states bundle with financing and incentives include customer education and outreach; standardized and streamlined interconnection and permitting processes for clean energy production; and creation of effective partnerships with financial institutions, equipment providers, and installers.

Green banks offer an emerging approach used by an increasing number of states to evolve away from traditional state funded incentive programs. It uses creative financing to bring and leverage private capital to develop projects and markets. Green banks can be self-sufficient and manage their seed capital in perpetuity. They do not require ongoing funding from the legislative and state budget process once they are capitalized. Because green banks are effectively nonprofit organizations, they can offer a capital cost far lower than any other source of capital available in the market. States may want to consider consolidating their incentive programs and resources under a green bank framework. Examples include the New York Green Bank, and Connecticut Green Bank, and New Jersey's Energy Resilience Bank (ERB).

Participants

Participants include both public and private sector organizations. Public sector participants can include state and local government agencies, state legislatures, school districts, and nonprofit organizations. Private sector participants can include utilities, financial institutions, large corporations, small businesses, and individual residents. Depending on a state's energy efficiency goals, budgets, and general policy acceptance, certain stakeholders might be targeted more directly than others during the initial policy rollout phase or over the entire life of the program.

The following is a list of funding and incentive program participants and their typical roles and responsibilities:

- *State legislatures.* State legislatures pass bond legislation and authorize appropriations for incentives. They also authorize changes to state tax laws and state accounting and procurement rules that enable clean energy funding programs. State legislatures or executive branches can authorize outsourcing or conduct performance contracting in any facilities under their fiscal authority. They can pass legislation to create an independent, quasi-governmental entity (e.g., Connecticut Green Bank).
- *State energy offices and PUCs.* Energy offices and PUCs conduct statewide energy planning, administer financing programs, provide technical assistance, and measure and evaluate state-funded projects to ensure that intended results are being achieved.
- *Utilities.* Utilities administer related publicly- and privately-funded programs that states and energy customers can leverage, such as rebates, buydowns, OBF, and OBR.

- *Third parties.* Third parties, such as financial institutions and nonprofit organizations, can serve as financing centers to manage funds (e.g., the Iowa Energy Investment Corporation), as “trade allies” (e.g., equipment installers and ESCOs), and as lending institutions.
- *Businesses.* Businesses apply for funding and incentives, contribute their own financial resources, and purchase and/or use clean energy technologies.
- *Residents and other consumers.* Consumers apply for funding and incentives and purchase and/or use clean energy technologies.

Green Banks—A Sustainable Financing Alternative

Green banks serve as an umbrella framework through which states can coordinate many of their existing energy efficiency, renewable energy, and CHP incentive programs to maximize the efficiency and alignment of public dollars and attract private sector investment. Green banks are operated sustainably, allowing finite state resources to be utilized for greatest market impact.

State-level financing authorities for energy efficiency, renewable energy, and CHP initiatives, often referred to as “green banks” or “clean energy finance banks,” are established as a way to encourage investment in energy efficiency, renewable energy, and CHP technologies. A green bank is a public or quasi-public financing institution that provides low-cost, long-term financing support to clean, low-carbon projects. Through the use of various financial mechanisms—including some of the financing mechanisms discussed earlier in this chapter, such as PACE financing—green banks leverage public funds to attract private investment for clean energy projects. In this way, each public dollar supports multiple dollars of private investment. In fact, Connecticut’s Green Bank has demonstrated that for every \$1 of public money invested in clean energy projects, it has been able to attract more than \$9 of private investment.

Green banks offer states the opportunity to transition away from traditional government-funded grants, rebates, and other subsidies, and towards deploying private capital. Once capitalized, and if managed correctly, green banks can become self-sustaining enterprises. Green banks typically rely on public resources to get started (capitalized) and then use these resources to establish financial tools such as long-term and low-interest rate loans, revolving loan funds, insurance products (e.g., loan guarantees or loan-loss reserves), and low-cost public investments. For example, the New York Green Bank used a portion of the funds collected from the state’s energy efficiency portfolio standards, RPSs, and system benefits charges to encourage private investment.

According to the Coalition for Green Capital, creating and administering a green bank typically involves three steps:

- *Assessment.* In the first stage, the state identifies its specific green bank opportunities and needs, including a review of existing clean energy programs, prioritization of clean energy markets, identification of obstacles to clean energy market growth, and development of proposed green bank financing mechanisms and market development tools. During this stage, states also identify a legislative and capitalization strategy.
- *Establishment.* In this stage, the green bank organization is established, which includes hiring staff, building capabilities, identifying goals, assessing markets, and developing financial products.
- *Administration.* In the final stage, the green bank acquires customers, administers funds in partnership with private investors, and manages funds over time to ensure the bank is self-sustaining.

As of 2014, Connecticut, Hawaii, New Jersey, and New York have established state-level green banks or green bank-like institutions. In addition, several other states, including California, Vermont, Minnesota, Maryland, Rhode Island, and Nevada, are in the process of proposing or developing green banks or green bank-like institutions.

Resources for more information on green banks:

- The Coalition for Green Capital: <http://www.coalitionforgreencapital.com/>
- The Green Bank Academy: <http://www.greenbankacademy.com/>
- State Clean Energy Finance Banks: New Investment Facilities for Clean Energy Deployment (2012): <http://www.cleangroup.org/assets/Uploads/State-Clean-Energy-Banks-Sept2012.pdf>.
- Working Paper: State Green Banks for Clean Energy (2014): http://energyinnovation.org/wp-content/uploads/2014/01/WorkingPaper_StateGreenBanks.pdf.
- Report: Green Bank Academy (2014): http://www.coalitionforgreencapital.com/uploads/2/5/3/6/2536821/green_bank_academy_report.pdf.



Funding

State clean energy programs that offer financing or financial incentives have used a wide range of funding sources, including:

- *PBFs.* As of June 2014, 22 states offer PBFs that can support energy efficiency, renewable energy, and CHP projects (C2ES 2014). Between 2002 and 2012, state clean energy funds supplied a total of \$2.7 billion in support of renewable energy, and leveraged an additional \$9.7 billion in federal and private sector investment. This \$12 billion total investment supported the development of more than 72,000 renewable energy projects in the United States (Brookings-Rockefeller 2012).
- *Annual appropriations.* Some states support energy financing and incentive programs with general state revenues appropriated through the annual budget process.
- *Bonds.* States have used their bond issuance authority to raise capital for lending programs. In some cases, loan repayments are applied to bond debt service.
- *Utility budgets.* In states that have established utility incentives for demand-side resources, utilities provide funding support for energy efficiency, renewable energy, and CHP as part of their responsibility to deliver least-cost reliable service to their customers. Utilities can fund these resources in different ways, such as within their resource planning budgets or as a percent of total revenues, as directed by state policy.
- *Environmental enforcements and fines.* States that collect fines and penalties from environmental enforcement actions can use the proceeds to support clean energy financing and incentives. Alternatively, funds can come directly from a violator, through a supplemental environmental project (SEP).
- *Carbon dioxide (CO₂) offset programs.* States have used their CO₂ offset programs as a source of funding. For example, Oregon's 1997 state law, HB 3283, required new power plants in the state to offset approximately 17 percent of their CO₂ emissions. Power plants can do this directly or by paying the Oregon Climate Trust, which uses the funds to support offset projects, including sequestration, energy efficiency projects, and renewable energy projects. The program currently does not recognize CHP as an efficiency technology either in calculating the required offsets or in the generation of offsets.
- *Cap and trade allowance auction revenue.* CO₂ allowance auctions through the Regional Greenhouse Gas Initiative (RGGI) generate revenue that states can reinvest in consumer benefit programs, energy efficiency, renewable energy, direct energy bill assistance, and other greenhouse gas reduction programs. To date more than \$707 million has been invested, with approximately \$460 million invested in energy efficiency and \$42 million invested in renewable energy (RGGI 2014).
- *Petroleum Violation Escrow (PVE) funds.* Legal settlements stemming from 1970s-era oil pricing regulation violations generated billions of dollars, which states used primarily during the 1980s and 1990s for clean energy programs.
- *EPA State Revolving Fund.* Primarily intended for water conservation, state agencies such as NYSERDA have been able to use these funds for clean energy and efficiency bonds (Clean Energy Group 2013).
- *DOE programs.* DOE provides multiple funding opportunities, including the State Energy Program, the DOE Loan Programs Office, QECBs, and Clean Renewable Energy Bonds.

Funding Levels

When designing financing and incentive programs, states have found it important to determine the incentive levels that are appropriate to market conditions. Ideally, incentives provide just enough inducement to generate significant new market activity and limit financial risk.

For loans or other credit-related incentives such as loan guarantees, public financing typically pays for just enough of the project cost to motivate private investment. If public financing covers too much of a project, it can promote projects that are not financially sound. If investors invest a significant amount of their own money in the project, they will likely be more motivated to make it succeed. Another method is to buy down the interest rates. This is often attractive to both businesses and homeowners. While different than loan guarantees, buy-downs can help put monthly payments within budgetary reach.

For financial incentives such as grants or rebates, the amount offered is often set at a level just high enough to induce private investment. Incentives that are too high can distort market behavior so that the technology does not sustain market share after the incentives end.

Timing and Duration

When developing funding and incentive programs, states have found another key consideration is determining how long the program will be in effect and whether funding will be available on a consistent year-to-year basis. State incentive and funding programs have been more effective when consistently sustained over time (e.g., the Texas LoanSTAR program).¹² Several years are typically required for a significant effort to become known and accepted in the marketplace. States with effective programs have typically established 5- to 10-year authorizations for their programs. Program cycles may be longer in some markets, especially where projects require long lead times for design, permitting, construction, and underwriting. In other cases—for example, in Oregon where faster-turnover consumer products are involved—programs can be conducted in a shorter timeframe. Programs involving incentives, loans, or other forms of financial assistance that have been offered on a short-term basis failed to allow time for markets to respond.¹³

States have found that the appropriate duration of an incentive or financing program also depends on the target market's characteristics and the program's goals. A revolving loan program can continue indefinitely, since the fund typically requires a single initial capitalization. If the size of the target market is large relative to the size of the fund principal, the program can run productively for many years. In other cases, an incentive effort might be targeted at acquiring a specific level of resources in a given timeframe; in such cases, funding levels would tend to be higher and the program duration shorter. Incentives are gradually reduced and ultimately eliminated when the technology or practice becomes standard practice in the target market.

¹² Personal communication with Bill Prindle, American Council for an Energy-Efficient Economy, July 29, 2005.

¹³ Ibid.

Best Practices: Designing Energy Efficiency, Renewable Energy, and CHP Funding and Incentive Programs

The best practices identified below address common design elements for developing energy efficiency, renewable energy, and CHP funding and incentives programs. They are based on the experiences of states that have implemented successful programs and organized into three categories: research and design, implementation and integration, and review and modify.

Research and Design

- Conduct or review existing robust technical and economic analyses to screen technologies and program designs, as well as to ensure that the program is cost-effective and designed to achieve significant impacts.
- Conduct or review existing market research to understand customer preferences, market structures, and other factors that will affect program success, as appropriate.
- Analyze market potential to inform the development of targets and goals that reflect the actual economic and technical capacity of the energy-efficient or renewable energy technology.
- Keep program design and procedures as simple as possible, and make it easy to participate.
- Set technical requirements for eligible equipment and practitioners to encourage significant energy savings and system performance (for renewable energy and CHP), and to ensure that measures and projects receive appropriate quality control.

Implementation and Integration

- Incorporate incentives into an overall market development strategy; include installer training and certification.
- Consider how financial incentives can complement or leverage other state programs and policies and federal financial incentives.
- Engage utilities, industry allies, and market participants to reach key market “gateways.”
- Provide ongoing public education about energy efficiency, renewable energy, and CHP technologies and available incentives.
- Provide for hard-to-reach market segments, including public facilities, low-income households, small businesses, and nonprofit organizations.
- Provide stable, long-term program funding where appropriate and plan for decreasing funding as markets change.
- Develop a coordinated package of incentives and other services, including:
 - For energy efficiency: customer promotions and industry ally partnerships for marketing, training, and education.
 - For renewable energy: interconnection standards and net metering.

Evaluation and Modification

- Establish a consistent but cost-effective quality assurance mechanism.
- Design the program to be valuable by creating program tracking and reporting systems that allow review of completed projects.
- Allow flexibility for program modifications.
- Consider lifetime savings to avoid emphasizing near-term savings and overlooking low-cost, long-term measures.
- Identify opportunities to enhance the program with innovative strategies.

Interaction with Federal Policies

Several kinds of federal policies and programs can interact with incentive and financing programs. These programs offer technical assistance, technical specifications for eligible products or projects, federal funding, and opportunities to coordinate delivery of state efforts with regional and national programs. Examples of federal initiatives with which state programs can form partnerships or otherwise interact include:

- **ENERGY STAR®.** Most states have used ENERGY STAR specifications as the basis for incentive or financing qualifications. Since the late 1990s, EPA has worked with utilities, state energy offices, and regional non-profit organizations to help them leverage ENERGY STAR messaging, tools, and strategies and to enhance their local energy efficiency programs. By leveraging ENERGY STAR in local energy efficiency programming, these organizations initiate their programs more quickly; increase their program’s uptake

and impact; help drive local market share for ENERGY STAR-certified products, homes, buildings, and plants; contribute to long-term change in the market for these products and services; and deliver on local objectives to increase energy efficiency, maintain electric reliability, and improve environmental quality. (For more information, see <http://www.energystar.gov/>.)

- *Green Power Partnership.* The Green Power Partnership is a voluntary program developed by EPA to boost the market for green power resources. Although the program does not provide funding for green power purchases, state and local governments that participate in the partnership receive technical assistance and can use the program's *Green Power Purchasing Guide* to inform their green power purchasing decisions. (For more information, see <http://www.epa.gov/greenpower/index.htm>.)
- *Combined Heat and Power Partnership.* The Combined Heat and Power Partnership is a voluntary program that seeks to reduce the environmental impact of power generation by promoting the use of CHP. The Partnership works closely with energy users, the CHP industry, state and local governments, and other clean energy stakeholders to facilitate the development of new projects and to promote their environmental and economic benefits. Although the program does not provide funding assistance, the partnership maintains a CHP Policies and Incentives Database (dCHPP) which is useful to state and local governments developing and implementing policies to promote CHP. (For more information, see <http://epa.gov/chp/index.html>.)
- *EPA's RE-Powering America's Land Initiative.* EPA provides tools, technical assistance, and outreach to promote renewable energy installations on contaminated lands, landfills, and mine sites, when such development is aligned with the community's vision for the site. (For more information, see <http://www.epa.gov/renewableenergyland/>.)
- *Economic Development Administration (EDA) Green Growth.* EDA makes investments to promote American innovation and accelerate long-term sustainable growth in economically distressed communities. To promote environmentally sustainable economic development, EDA directs investments to cultivate innovations with regional energy clusters and cutting-edge technologies. (For more information, see <http://www.eda.gov/pdf/GreenGrowthOverview.pdf>.)
- *Community Reinvestment Act.* The Office of the Comptroller of the Currency and associated agencies provide oversight and implementation of the Community Reinvestment Act of 1977, which was designed to eliminate discriminatory housing practices such as redlining. In 2014, the Office proposed clarification of community development loans to include loans related to renewable energy or energy-efficient technologies that have a community development component. (For more information, see <http://www.occ.gov/news-issuances/news-releases/2014/nr-ia-2014-121a.pdf>.)
- *Rural Energy for America Program.* The U.S. Department of Agriculture's Rural Energy for America Program provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses to purchase or install renewable energy systems or make energy efficiency improvements. (For more information, see http://rurdev.sc.egov.usda.gov/BCP_ReapResEei.html.)

Interaction with State Policies

States have aligned their financial incentives with other state clean energy programs and policies to deliver even greater energy and cost savings. Funding and incentives programs interact with and can complement many state policies, including:

- *PBFs.* PBFs can be used as a source of direct incentives, such as rebates, and also as a source of financing assistance. PBFs are funds typically created by levying a small fee on customers' utility bills. PBFs in 16



states and Washington, D.C., support energy efficiency programs, and PBFs in 15 states and Washington, D.C., are used to promote renewable energy.

- *Portfolio management.* Portfolio management refers to an electric utility’s energy resource planning and procurement strategies. Effective portfolios are diversified and include a variety of fuel sources, generation and delivery technologies, and financial incentives to encourage customers to reduce their consumption during peak demand periods. Portfolio management delivers clean air benefits by shifting the focus of procurement from short-term, market-driven, fossil fuel-based prices to long-term, customer costs and customer bills. It accomplishes this by ensuring that energy efficiency and renewable generation resources are considered. (See Section 7.1, “Electricity Resource Planning and Procurement.”)
- *Environmental enforcement cases.* Under a settlement, a violator may voluntarily agree to undertake an SEP (an environmentally beneficial project) as a way to offset a portion of its monetary penalty.
- *Permitting standards and fees.* Reducing or waiving permit fees, plan check fees, design review fees, or other charges for renewable energy system installations, or expediting the permit process, can often translate into cost savings for a developer or consumer. There is a wide disparity in the charges assessed across jurisdictions—ranging in some cases from \$0 to more than \$1,200 per project regardless of size. By expediting the permitting process and reducing the financial burden of renewable energy development with permitting incentives and procedural changes, states and local jurisdictions can lessen one of the more significant barriers to project development.
- *Lead by example programs.* Many states lead by example by implementing programs that achieve energy cost savings within their own facilities, fleets, and operations. Lead by example programs include innovative financing mechanisms, such as revolving loan funds, tax-exempt master lease-purchase agreements, lease revenue bonds, performance contracting, and procurement policies and accounting methods. (See Section 4.5, “Lead by Example.”)
- *RPSs.* In states with RPS requirements, financial incentives can be used strategically to support the development of more specific renewable energy generation in the state. Several states have established programs known as “RPS carve-outs” or “set-asides,” which require that one or more specific renewable energy technologies be used to meet a portion of the RPS requirements. This practice is often used to stimulate economic development or energy diversity and to help develop markets for technologies that may currently be higher cost. In addition to carve-outs, some states may also include “credit multipliers” in their RPS program, which provide extra credit for electricity generated by favored technologies. Some states have decided to use financial incentives to support only renewable energy generation that occurs in addition to the state’s RPS requirements. New Mexico, Arizona, Maryland, Colorado, New Jersey, and Delaware have enacted carve-outs for solar energy to meet over 2 percent of electricity sales. States can also add energy efficiency to the RPS, as in Pennsylvania. (See Chapter 5, “Renewable Portfolio Standards.”)
- *Interconnection, net metering, feed-in tariff (FIT), and standby rates.* Some states have modified their interconnection standards, net metering rules, and/or standby rate structure to facilitate easier interconnection for distributed energy resources, to increase their profitability, and to provide incentives for renewable energy. In states where interconnection issues have not been addressed, renewable energy generators may face hurdles connecting to the grid and may not have the financial incentives required to ensure the system is sufficiently profitable. Net metering rules enable renewable energy system owners to sell excess production to the utility at retail rates rather than wholesale rates, effectively providing a per-kWh incentive. (See Section 7.3, “Interconnection and Net Metering Standards.”) Some states are also reviewing utility standby rates to ensure that they are reasonable and appropriate and do not

unnecessarily limit the development of clean and efficient onsite generation. (See Section 7.4, “Customer Rates and Data Access.”) FIT programs guarantee payment per unit of electricity generated and provided to the grid for customers who own a FIT-eligible renewable electricity generation facility.

- Green power purchasing.* Some states stimulate the green power market by establishing mandates for state government facilities to satisfy a percentage of their electricity demands with green power (e.g., renewable energy certificates [RECs] or green power electricity products) and to make tariffs available for renewable-sourced purchases by all customers. For example, Green Mountain Power’s Cow Power offers customers the option to opt in to a program to purchase energy produced by methane generators powered by Vermont’s dairy farms (Green Mountain Power 2015). These mandates or standards are usually above and beyond applicable state-mandated RPS requirements. Affected agencies can meet these requirements by participating in utility green power programs, buying RECs, developing their own onsite systems, or entering into PPAs. These mandates help drive demand for renewable energy, encourage the development of new capacity, and provide a revenue stream to projects. As more and more renewable energy projects get under way, the scale of technology deployment can help further drive down costs. (See Section 4.5, “Lead by Example.”)
- Building codes and equipment/appliance standards.* Building energy codes require new building construction and existing building major renovations to meet minimum energy efficiency, renewable energy, and CHP requirements. Well-designed and enforced codes create a market for energy efficiency design and construction practices. Some states have adopted energy codes; for example, the mandatory statewide 2012 Washington State Energy Code includes two versions for residential and commercial codes. As these practices become widespread within the building industry and property owners and managers take note of the reduced building energy costs, other property owners may be encouraged to invest in energy efficiency retrofits and upgrades that are not required by code. (See Section 4.3, “Building Codes for Energy Efficiency,” and Section 4.4, “State Appliance Efficiency Standards.”)
- Contractor licensing and certifications.* States have found general contractor licensing requirements can lower transaction costs by ensuring that contractors have the knowledge to incorporate energy-efficient practices into building practices. Licensing contractors who install renewable energy technology also reduce transaction costs and promote consumer confidence within the market. By setting aggressive minimum standards for the knowledge of these practices, states can encourage a healthy market for energy efficiency and renewable energy projects. Similarly, some states have introduced certification programs that identify building operators who are knowledgeable in operating building systems efficiently.

Solarize Campaigns Rapidly Reach New Customers

Solarize Connecticut—a program of the Connecticut Green Bank (formerly the Clean Energy Finance and Investment Authority), implemented in partnership with the non-profit SmartPower—is an on-the-ground “group buy” program that works locally within communities, lowers acquisition costs, and makes solar installations more affordable. To date, 58 Connecticut communities have “Solarized” through the campaign, resulting in:

- The deployment of 16 MW of new solar PV capacity in 2,000 homes across the state in less than 2 years.
- A rate of adoption for residential solar installations between 24 and 64 times greater than the previous 9 years.
- Average savings per Solarize customer of \$5,500 to \$7,500 on their system compared to average market costs and state incentives at the time of purchase.

For more information, see <http://solarizect.com/>.

Implementation and Evaluation

Implementing and Administering Funding and Incentives Programs

States have found that the most appropriate agency to implement and administer funding and incentive programs varies depending on the state and type of incentive program offered. In many states, the state energy office manages the program. Other agencies involved in program implementation include the state department of general services, treasury department, and others. In some states (e.g., Oregon and Iowa), a private nonprofit organization implements and evaluates funding and incentive programs.

States have found that the administering agency's objectives include (ACEEE 2002):

- Creating sufficient budget authorizations and appropriations to ensure the program's effectiveness, measured against actionable performance criteria where possible.
- Allowing for an adequate time period (typically 5 to 10 years) for the funding to influence the market.
- Determining an appropriate incentive level for targeted technologies and markets (e.g., incentives should be large enough to generate the investment needed to meet program goals and moderate enough to stay within the budget).
- Establishing funding caps per project and per customer to keep programs affordable and sustainable.
- Setting clear program goals for which technologies should be encouraged. Examples of program focuses include:
 - The most cost-effective technologies, to maximize immediate return.
 - Technologies that are currently underutilized, perhaps due to a market failure, to spur market development.
 - High-efficiency technologies and practices to encourage the high end of the market.
- Being flexible with respect to who receives the incentives so that the most appropriate parties can participate.
- Incorporating sufficient reporting requirements to document program results accurately and prevent program abuse.
- Budgeting adequately for evaluation and conducting evaluations on regular cycles. Allowing for selected detailed audits of larger and more complex projects.

The implementing/administering agency is also responsible for ensuring that an adequate program support structure is in place. States have found this might entail the following actions:

- Allocating sufficient personnel and time for program administration.
- Collaborating with other agencies.
- Establishing agreements with equipment installers, manufacturers, and service providers.
- Collaborating with utilities.
- Conducting public outreach and education campaigns.
- Conducting periodic program evaluations and take corrective measures, if necessary.

Best Practices: Implementing Funding and Incentive Programs

- Consult with other states to gain the benefit of their experiences with program implementation details.
- Reach out to the regional energy efficiency organizations to learn from other programs in your region.
- Select the most appropriate delivery organization(s) for program delivery.
- Approve long-term funding cycles (5 to 10 years) to enable programs to achieve significant market acceptance and impacts.
- Maintain stakeholder communications via working relationships, collaboratives, and advisory groups.
- Provide for adequate program tracking and reporting systems to enable effective evaluation and mid-course program corrections.

Evaluation

In general, states evaluate their state financial incentives programs based on quantitative metrics, such as the amount of money granted, energy savings, and the number of systems installed. In addition, the administrative process is frequently evaluated to track data such as the number of days it takes the state to process an application. While more challenging, states also attempt to determine if financial incentives have the desired effect on the marketplace (i.e., understanding the causal relationship between the incentives and the changes occurring in the market, accounting for “free riders” and estimating the net energy savings impacts achieved by incentives). Standardized reporting requirements and independent evaluation, measurement, and verification (EM&V) of program impacts provide the information required to redirect future investment dollars for optimal effectiveness.

States have found that EM&V methods are critical for ensuring that sufficient projected savings are realized. This determines if funding and incentive investments provide their expected return. For simpler measures with well-established savings performance records, a “deemed savings” approach can be used. A project-specific EM&V approach is warranted for more complex measures, newer technologies, and larger projects. (For more information on EM&V methods, see Section 4.1, “Energy Efficiency Resource Standards,” and Section 4.2, “Energy Efficiency Programs.”)

Best Practices: Evaluating Funding and Incentive Programs

States have found that evaluating funding and incentive programs requires tracking program use, cost, and energy savings. States best practices include:

- Evaluating programs regularly, rigorously, and cost-effectively.
- Using methods proven over time in other states, adapted to state-specific needs.
- Providing “hard numbers” on quantitative impacts, process feedback on the effectiveness of program operations, and ways to improve service delivery.
- Using independent third parties, preferably with reputations for quality and unbiased analysis.
- Measuring program success against stated objectives, providing information that is detailed enough to be useful and simple enough to be understandable to non-experts.
- Providing for consistent and transparent evaluations across all programs and administrative entities.
- Communicating results to decision-makers and stakeholders in ways that demonstrate the benefits of the overall program and individual market initiatives.



State Examples

The following examples illustrate effective state programs, innovative approaches, and program results for each of the key types of financing and incentive programs.

Direct Cash Incentives

Grant Programs

New York

NYSERDA implements a grant program to assist companies in developing, testing, and commercializing renewable energy technologies manufactured in New York. The program focuses on product and technology development rather than on installation of individual renewable energy systems. Projects are selected based on whether they will be commercially competitive in the near term and the company's ability to achieve specific performance and quality milestones. Eligible technologies include solar thermal, PV, hydro, alternative fuels, wind, and biomass.

Website: <http://www.nyserda.org/>

Rebate Programs and Performance-Based Incentives

Alaska Home Energy Rebate Program

The Home Energy Rebate Program, administered by the Alaska Housing Finance Corporation, provides up to \$10,000 in rebates to homeowners who make energy efficiency improvements to an existing home, and up to \$10,000 for the construction of a qualified energy-efficient new home. For existing homes, a home energy rater will evaluate the home before and after improvements, and the amount of the rebate will depend both on the amount spent on improvements, and the amount of efficiency gained. For new homes, the amount of the rebate depends on the energy efficiency rating of the home.

Website: <http://www.ahfc.us/efficiency/energy-programs/home-energy-rebate/>

California Solar Initiative

California Solar Initiative offers solar incentives to encourage energy customers to implement solar systems in their existing buildings. The initiative began in 2007, has a budget of \$2.4 billion over 10 years and sets a goal of 1,940 MW of new solar capacity by 2016. Program components include incentives for single family and multi-family housing, low-income solar water heating, solar thermal, and solar PV. For solar PV, the program uses a tiered structure that decreases the incentive over time. Early adopters (second tier) that installed residential and commercial systems up to 30 kW could receive \$2.50 per watt; customers who waited to participate only receive \$0.20 per watt. For systems larger than 30 kW, the program offers a performance-based incentive decreasing from \$0.39 per kWh (early adopters) to \$0.10 for later participants for the first 5 years. Higher incentives are available for government and nonprofit participants. As of March 2015, rebates for Pacific Gas and Electric and Southern California Edison customers had been exhausted.

Website: <http://www.cpuc.ca.gov/PUC/energy/solar>

New York

NYSERDA provides performance-based incentives for existing facilities to encourage applicants to implement large scale energy efficiency projects. Funding ranges from \$30,000 to \$2 million for electric efficiency, energy storage, natural gas, demand response, or monitoring-based commissioning projects. Proposed projects must

meet minimum savings thresholds, as well as require an engineering analysis to verify energy savings upon project completion.

Website: <http://www.nyserda.org/>

Hybrid Approach—Combining Rebates and Performance-Based Incentives

California

California, for example, established a tiered capacity payment for CHP projects over 30 kW (projects under 30 kW receive the entire incentive upfront), in which 50 percent of the total incentive is paid up front, and the remaining incentive is then tied to a fixed rate based on the expected generation of the system and the number of years that performance payments will be given out. This way, facilities have an additional incentive to operate systems at expected levels (ACEEE 2013).

New York

In New York, large CHP systems (greater than 1.3 MW nameplate capacity) are eligible for both a performance-based incentive (based on output) and a capacity-based incentive (based on reduction in peak demand). Systems receive payments of \$0.10 per every kWh generated as well as between \$600 and \$750 for every kW of summer peak demand reduced. Projects are also eligible for bonus incentive payments based on the location and load the system is serving as well as the system fuel conversion efficiency. Projects not meeting certain performance standards receive a reduced payment (NYSERDA 2014).

Website: <https://www.nyserda.ny.gov/Energy-Efficiency-and-Renewable-Programs/Commercial-and-Industrial/CI-Programs/Combined-Heat-and-Power.aspx>.

Tax Incentives

North Carolina

North Carolina offers a renewable energy tax credit equal to 35 percent of the cost of eligible renewable energy property that is constructed, purchased, or leased by a taxpayer. The 2009 bill was extended to include geothermal equipment and the expiration was extended to December 2015. The credit ceilings depend on the technology and type of renewable system (DSIRE 2015a). As a result of the tax credits, and other renewable energy policies, North Carolina is ranked fourth nationally in installed solar capacity. As of 2013, 722 MW of solar energy have been installed, enough to power 64,500 homes (SEIA 2014a).

Expenditures eligible for the tax credit include equipment, design, construction, and installations costs, less any discounts, rebates, allowances, assistance credits, or any other similar reductions. The credit may not exceed 50 percent of the taxpayer's tax liability for the year (DSIRE 2015a).

Loan and Financing Programs

Revolving Loan Funds

Texas LoanSTAR

Texas LoanSTAR, also known as the Loans to Save Taxes and Resources program, began in 1988 as a \$98.6 million retrofit program for energy efficiency in buildings (primarily public buildings such as state agencies, local governments, and school districts). As of January 2014, the program has funded over 237 loans, totaling more than \$395 million. It is the largest state-run building conservation program in the country. Funding for the program comes from PVE funds. The Texas State Energy Conservation Office (SECO) administers the funds.



SECO provides extensive program oversight and documentation, ensuring that the data used to establish claims for energy savings are accurate. SECO has developed procedures and guidelines that allow LoanSTAR to prove that the financed energy retrofits would pay for themselves. As part of its quality control, SECO:

- Issues energy assessment guidelines.
- Trains energy engineering consulting firms on audit techniques and LoanSTAR guidelines.
- Develops protocols to meter and monitor each LoanSTAR project to track pre- and post-retrofit energy consumption.
- Develops new methods to analyze energy savings from retrofits.

Projects funded through the LoanSTAR program have had a significant impact on environmental pollutants, preventing the release of 11,291 tons of nitrogen oxides (NO_x), 3.7 million tons of CO₂, and 8,134 tons of sulfur oxide. The program, which is considered one of the most successful building energy efficiency programs in the country, has achieved over \$419 million in savings.

Website: <http://www.seco.cpa.state.tx.us/ls>

PACE Financing

Commercial Property Assessed Clean Energy Program

The Connecticut Green Bank (CGB) is the statewide administrator of its Commercial Property Assessed Clean Energy (C-PACE) program. The CGB maintains a warehouse of capital from which it finances C-PACE transactions and sells to capital markets upon completion. The C-PACE program allows for transferring the obligation and its associated tax lien to the next building owner in the event of a property sale. In the event of a default or foreclosure, all delinquent payments must be brought current by the succeeding property owner. Because of this feature, financed improvements must be permanently fixed to the property; eligible “fixed” improvements include insulation, mechanicals, solar rooftop installations, fuel cells, and underground natural gas piping. The CGB also requires a savings-to-investment ratio greater than 1 over the life of the project improvements.

As of December 2014, 105 towns (of 169 statewide) had opted into CGB’s C-PACE program, giving over 88 percent of the commercial and industrial properties in the state access to C-PACE financing. Over 200 contractors were trained for participation in the program, and 16 capital providers were approved. Additionally, over \$58 million in C-PACE assessment advances were approved, delivering 20 to 40 percent energy savings for energy efficiency projects and 50 to 90 percent energy savings for renewable energy projects. An initial portfolio of \$30 million comprised of 32 energy efficiency and solar PV projects across a dozen municipalities was sold to Clean Fund, a CGB C-PACE capital provider, in March 2014. Using an auction process, bids for the portfolio were solicited across all of CGB’s capital providers. The structure is, in effect, a “private securitization” of the underlying portfolio.

Website: <http://www.c-pace.com/>

Energy Performance Contracting

Washington

In 2001, the Washington legislature adopted legislation requiring all state facilities to conduct energy audits to identify energy savings opportunities, as well as to use performance contracting as their first option for achieving those savings (Washington HB 2247 2001). This law has led to a surge in performance contracting

activity: \$100 million has been invested in project implementation by the private sector, with net savings of over \$8.3 million annually.

The Washington Department of General Administration (DGA) energy team has designed an EPC program specifically for state agencies, colleges and universities, cities and towns, counties, school districts, ports, libraries, hospitals, and health districts. The EPC program provides assistance to public facilities in completing EPC projects and includes free preliminary audits and consulting services. The program complies with competitive statutory requirements to save time and money. The DGA helps state agencies qualify for the low-interest state treasury financing that is available for EPC projects.

Credit Enhancement

Michigan Saves

Michigan Saves is a statewide energy efficiency lending program established in 2010. It started with grant money from the Michigan Public Service Commission. The program initially focused on residential energy efficiency projects but has since expanded to include commercial programs. It leveraged \$3 million of state funds to attract an additional \$57 million in loan capital from local credit unions. Michigan Saves has a loan loss reserve fund equal to 5 percent of the outstanding balance of the loans. If any loans default, this reserve fund will cover up to 80 percent of the lenders' losses from that default. Michigan Saves offers loans of up to \$30,000 to homeowners, and up to \$250,000 to business owners, to make energy efficiency improvements.

Website: <http://michigansaves.org/>

GreenSun Hawaii

GreenSun Hawaii, administered by the Hawaii Community Reinvestment Corporation (HCRC), is a loan loss reserve fund that covers up to 100 percent of losses on eligible energy efficiency and renewable energy system financing. The fund was created to reduce the risks for financial institutions participating in the Clean Energy Initiative, which aims to achieve 70 percent energy efficiency, renewable energy, and CHP by 2030. Financial providers are able to provide more favorable loan terms to homeowners, businesses, and others who wish to install energy-efficient or renewable energy technologies. GreenSun Hawaii was developed in 2009 with Recovery Act funds from DOE. The program has leveraged \$2.67 million into \$53 million in energy efficiency equipment loans across the state.

Homeowners are allowed to finance ENERGY STAR refrigerators or air conditioners, solar thermal hot water systems, or solar PV systems. Non-residential owners are required to get an energy audit before they can use the program to finance lighting or air conditioner retrofits/upgrades, solar thermal systems, solar electric systems, or energy-efficient windows.

Website: <https://www.hcrc-hawaii.org/community-development/financing-programs2.html>

Energy-Efficient Mortgages

Colorado Energy Office

CEO offers two EEM programs, one for new homes and one for existing homes. Under both programs, mortgage lenders can provide Colorado homebuyers with a mortgage incentive at the time of closing. The amount of the incentive varies depending on the degree of energy efficiency (for new homes) or the improvement to the energy efficiency (for existing homes). Energy efficiency is determined through an audit using the HERS index.

The tiered incentive levels are shown in Table 3.4.

Table 3.4: Colorado Energy-Efficient Mortgage Incentives

New Homes	
HERS Index Rating 50–40	\$1,000
HERS Index Rating 39–25	\$2,500
HERS Index Rating 24–11	\$3,000
HERS Index Rating 10 and below	\$8,000
Existing Homes	
HERS Index Rating Improvement of 10 to 20 points	\$2,000 benefit not to exceed half the improvement cost
HERS Index Rating Improvement of 21 to 35 points	\$3,000 benefit not to exceed half the improvement cost
HERS Index Rating Improvement of 36 to 50 points	\$4,000 benefit not to exceed half the improvement cost
HERS Index Rating Improvement of 51 to 65 points	\$5,000 benefit not to exceed half the improvement cost
HERS Index Rating Improvement of 66 points or more	\$6,000 benefit not to exceed half the improvement cost

Website: <http://www.colorado.gov/cs/Satellite/GovEnergyOffice/CBON/1251649995727>

Green Banks

New York Green Bank

The New York Green Bank, a division of NYSERDA, takes a wholesale financing approach and seeks to partner with financial institutions, retail lenders, and service providers who will then engage directly with end customers. It is a state-sponsored fund that was established in December 2013 with initial capital of \$218.5 million. Initial capital came from uncommitted funds raised through clean energy surcharges on the state’s investor-owned utility customers and auction proceeds from the RGGI. The Green Bank aims to reach \$1 billion in capitalization in the coming years, with projections that this will attract an additional \$8 billion in private sector funding into clean energy projects over the next 10 years. The fund is dedicated to increasing capital availability and overcoming obstacles in clean energy financing markets. The Green Bank is one component of the New York State Energy Plan, which emphasizes improving energy affordability, providing a more resilient and flexible power grid, giving customers more control over their energy use, aligning energy innovation with market demand, and unleashing the power of the private sector energy financing.

Website: <http://greenbank.ny.gov/>

New Jersey Energy Resilience Bank

On February 3, 2014, New Jersey announced its intent to establish the ERB, which will be capitalized with \$210 million in Community Development Block Grant-Disaster Resilience funds provided by Congressional supplemental funding. The ERB will address the energy vulnerabilities that were revealed at critical facilities throughout the state and allow the most innovative and resilient energy projects, such as dynamic microgrids (such as those being designed for the NJ TransitGrid) to become a reality throughout the state.

The ERB would be the first bank of its kind in the nation; it would focus exclusively on hardening critical facilities to address energy vulnerabilities. The ERB would support energy infrastructure projects that lack funding, as well as projects that incorporate resilient energy technologies that allow infrastructure to continue operating even if the larger electrical grid fails. To the extent possible, the ERB would leverage limited federal dollars with state funding and private sector capital to maximize energy resilience at the most critical facilities. It will provide the resources New Jersey’s critical facilities need to invest in fuel cells, CHP, solar with storage,

and other technologies that better prepare water and wastewater facilities, schools and hospitals, police and fire stations, and other key community infrastructure for future weather events. DOE has been providing technical assistance in the design, structure, and pipeline development of the ERB.

Website: <http://www.state.nj.us/bpu/commercial/erb/>

Connecticut Green Bank

The CBG operates at a retail level by creating its own financial products, marketing them directly to end customers, and performing loan underwriting. It was established by the Governor and Connecticut's General Assembly on July 1, 2011, through Public Act 11-80 as a quasi-public agency that supersedes the former Connecticut Clean Energy Fund (CCEF). As the nation's first state "Green Bank," the CGB leverages public and private funds to drive investment and scale up clean energy deployment in Connecticut. The CGB's mission is to support the Governor's and Legislature's energy strategy to achieve cleaner, cheaper, and more reliable sources of energy while creating jobs and supporting local economic development. Its goals include:

- Attracting and deploying private capital to finance the clean energy goals of the state.
- Developing and implementing strategies to bring down the cost of clean energy to make it more accessible and affordable to consumers.
- Reducing the market reliance on grants, rebates, and other subsidies and moving it towards innovative, low-cost financing of clean energy deployment.

In its first 3 years of operation, the CGB has demonstrated the financing model's efficacy when compared to the subsidy model (see Table 3.5).

Table 3.5: Summary of Connecticut's Clean Energy Fund and Green Bank Programs

	FY 2000 FY 2011 (CCEF)	FY 2012 FY 2014 (CGB)
Model	Subsidy	Financing
Years	11	3
Clean Energy (MW/Lifetime GWh)	43.1/2,299	65.3/3,189
Total Investment (\$MM)	\$349.20	\$350.20
Ratepayer Investment (\$MM)	\$168.10	\$100.00
Investment as Loans (%)	9	57

GWh= gigawatt-hour

According to the CGB, the Bank is deploying more clean energy at a faster rate while using public resources more responsibly, creating nearly 2,500 jobs and reducing carbon emissions by over 580,000 tons over the life of the projects.¹⁴

Website: <http://www.ctcleanenergy.com/>

Hawaii Green Energy Market Securitization

In 2013, the Hawaii state legislature authorized a program that combines bond financing and OBR to finance clean energy infrastructure in the state. The program, known as Green Energy Market Securitization (GEMS),

¹⁴ Comprehensive Annual Financial Report of the CGB (June 30, 2014). Available at <http://www.ctcleanenergy.com/Portals/0/CGB%20-%20finalized%20financials.pdf>.



will create a green infrastructure loan fund capitalized by low-interest utility tariff-financed bonds sold to private investors. Residents will be given access to low-cost loans from the loan fund that can be repaid through OBR on their utility bill. GEMS is targeted for implementation in late 2014.

Website: <http://energy.hawaii.gov/testbeds-initiatives/gems/gems-overview>

What States Can Do

States have diversified what were originally simple grant or loan programs into a broader set of funding and incentive programs that encourage specific markets and customer groups to invest in energy efficiency and clean supply projects. The information in this *Guide to Action* describes best practices for design, implementation, and evaluation; summarizes a wide range of state experiences with funding and incentive programs; and offers a variety of information resources on funding and incentive strategies. Based on these state examples, action steps for states that want to establish their own funding and incentives programs or strengthen and expand existing programs are described below.

Action Steps for States

States interested in creating or expanding funding and incentive programs for energy efficiency, renewable energy, and CHP can take the following steps:

- *Develop an inventory of current financing and incentive programs.* Review existing programs and identify the need for new or expanded offerings. Conduct market research, as necessary, to identify these needs.
- *Design funding and incentive programs based on the best practices developed by other states.* States' experiences with funding and incentive programs provide a rich source of information on how to develop successful programs.
- *Identify and secure funding sources.* This can be done via legislative and administrative initiatives, as appropriate. Seek to coordinate program targets and information collection efforts to avoid overlap and duplication.
- *Conduct rigorous evaluation.* Upon completion, report the results to policy-makers, industry, and the public.
- *Revise program.* Make program changes based on the results of the findings of the evaluation.

Information Resources

Information about States

Title/Description	URL Address
The dCHPP . The dCHPP provides information on state and federal policies and incentives for CHP.	http://epa.gov/chp/policies/database.html
Database of State Incentives for Renewables and Efficiency (DSIRE) . This database contains information on federal, state, and local incentives that promote energy efficiency and renewable energy. It provides information for all 50 states and is updated regularly.	http://www.dsireusa.org
EISPC EZ Mapping Tool . This is a searchable database that contains information on policies and regulations.	https://eispectools.anl.gov/policy_query
Innovation, Renewable Energy, and State Investment: Case Studies of Leading Clean Energy Funds . This Lawrence Berkeley National Laboratory website contains case studies of various state clean energy funds.	http://emp.lbl.gov/publications/innovation-renewable-energy-and-state-investment-case-studies-leading-clean-energy-fu-0
Case Studies on the Effectiveness of State Financial Incentives for Renewable Energy . This National Renewable Energy Laboratory report presents state case studies on financial incentives for renewable energy.	http://www.nrel.gov/docs/fy02osti/32819.pdf
Performance Contracting By State . This Oak Ridge National Laboratory website contains information on performance contracting legislation by state. The site includes links to legislation and state performance contracting legislation.	http://web.ornl.gov/info/esco/legislation/nwesco.shtml
Plugging in Renewable Energy: Grading the States . This Union of Concerned Scientists report assigns grades to each of the 50 states based on their commitment to supporting wind, solar, and other renewable energy sources.	http://www.ucsusa.org/assets/documents/clean_energy/plugging_in_renewable_energy.pdf

General Information

Title/Description	URL Address
Designing Financial Incentives	
Council of Development Finance Agencies (CDFA): CDFA Brownfields Financing Toolkit . This 2015 document provides easy-to-use best practices and information on revolving loan funds, TIF, bond financing, new markets tax credits, and the EB-5 visa program.	http://www.cdfa.net/cdfa/cdfaweb.nsf/ord/201502_BF_Toolkit/\$file/CDFA%20Brownfields%20Financing%20Toolkit%2002.02.15.pdf
Credit Enhancement Overview Guide . 2014 SEE Action report describing successful credit enhancement strategies for residential and commercial buildings.	https://www4.eere.energy.gov/seeaction/publication/credit-enhancement-overview-guide
Energy Efficiency Financing Program Implementation Primer . 2014 SEE Action report about implementing successful energy efficiency financing programs in existing buildings.	https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-financing-program-implementation-primer
Energy Efficiency Finance Programs: Use Case Analysis to Define Data Needs and Guidelines . 2014 SEE Action report about data collection practices for energy efficiency lending.	https://www4.eere.energy.gov/seeaction/publication/energy-efficiency-finance-programs-use-case-analysis-define-data-needs-and-guidelines



Title/Description	URL Address
<p>Energy Efficiency's Next Generation: Innovation at the State Level. This 2003 American Council for an Energy-Efficient Economy (ACEEE) report describes state energy efficiency activities.</p>	<p>http://www.aceee.org/files/pdf/e031full.pdf</p>
Revolving Loan Funds	
<p>Financing Programs: GreenSun Hawaii. HCRC administers the GreenSun Hawaii financing program. Information on the program is available on the HCRC website.</p>	<p>https://www.hcrc-hawaii.org/community-development/financing-programs2.html</p>
<p>LoanSTAR Revolving Loan Program. The Texas SECO administers the LoanSTAR program. Additional information about the program is available at SECO's website.</p>	<p>http://www.seco.cpa.state.tx.us/lr</p>
Energy Performance Contracting	
<p>Putting Energy Savings to Work. The Energy Services Coalition (ESC) is a nonprofit organization that promotes energy service performance contracting.</p>	<p>http://www.energyservicescoalition.org/</p>
<p>National Association of Energy Service Companies (NAESCO). NAESCO is a trade association in the energy services industry, representing ESCOs, distribution companies, DG companies, engineers, consultants, and finance companies. The website contains information on energy efficiency for buildings.</p>	<p>http://www.naesco.org</p>
<p>Case Study Database. This section of the ESC website provides case studies about performance contracting programs by state.</p>	<p>http://www.energyservicescoalition.org/case-studies</p>
<p>Performance Contracting by State. This Oak Ridge National Laboratory website contains information on performance contracting legislation by state. The site includes links to legislation and state performance contracting legislation.</p>	<p>http://web.ornl.gov/info/esco/legislation/new-esco.shtml</p>
Tax Incentives	
<p>DSIRE. This website provides information on state, local, utility, and selected federal incentives that promote energy efficiency renewable energy.</p>	<p>http://www.dsireusa.org/</p>
<p>Pace Financing. This National Conference of State Legislatures Web page has additional information about PACE financing, including state examples and legislation.</p>	<p>http://www.ncsl.org/research/energy/pace-financing.aspx</p>
<p>Tax Credits for Energy Efficiency and Green Buildings: Opportunities for State Action. This ACEEE report analyzes state tax energy efficiency incentives provided by the states for the private sector.</p>	<p>http://www.aceee.org/research-report/e021</p>
Designing Financial Incentives	
<p>Incentives, Mandates, and Government Programs Promoting Renewable Energy. This paper discusses major financial incentives used by federal and state governments and their effectiveness in promoting renewable energy.</p>	<p>http://lobby.la.psu.edu/_107th/128_PURPA/Agency_Activities/EIA/Incentive_Mandates_and_Government.htm</p>
<p>CHP Association. This website provides information on federal policies, including tax incentives, designed to promote more widespread use of CHP systems.</p>	<p>http://chpassociation.org/</p>
Grants, Buy Downs, and Generation Incentives	
<p>Energy Efficiency Programs. This site is ACEEE's energy efficiency program database.</p>	<p>http://aceee.org/portal/programs</p>

Title/Description	URL Address
<p>Emerging Renewables Program. This California Energy Commission (CEC) site provides information about the Emerging Renewables Program (formerly called the “Emerging Renewables Buy-Down Program”), which was created to stimulate market demand for renewable energy systems by offering rebates to reduce the initial cost of the system to the customer.</p>	<p>http://www.energy.ca.gov/renewables/emerging_renewables/</p>
<p>Financing Energy Improvements on Utility Bills: Market Updates and Key Program Design Considerations for Policymakers and Administrators. 2014 SEE Action report about the current state of on-bill programs.</p>	<p>https://www4.eere.energy.gov/seeaction/publication/financing-energy-improvements-utility-bills-market-updates-and-key-program-design</p>
<p>Rebates Available for Energy-Efficient Lighting; Heating, Ventilation, & Air Conditioning; Vending Machines; Commercial Kitchen Equipment and Commercial Clothes Washers. The CL&P Energy Efficiency at Work website describes the utility’s Express Rebate Program. The programs offer CL&P business customers an opportunity to improve the energy efficiency of their stores or buildings.</p>	<p>https://www.cl-p.com/Business/SaveEnergy/BusinessRebates.aspx</p>
<p>California Public Utilities Commission (CPUC). The CPUC website provides information on CPUC activities and regulations.</p>	<p>http://www.cpuc.ca.gov/</p>
<p>Self-Generation Incentive Program. This site provides information about CPUC’s program to provide rebates to encourage DG technologies.</p>	<p>http://www.cpuc.ca.gov/PUC/energy/DistGen/sgip/</p>
<p>New York State Department of Environmental Conservation. This website describes energy efficiency projects that the Department administers, including details on the Green Building Initiative tax credits.</p>	<p>http://www.dec.ny.gov/</p>
<p>North & West America Solar Services. This site provides information on the use of solar energy in the Northwest. It contains information on Washington’s production incentive program.</p>	<p>http://northwestsolarcenter.org/</p>
<p>NYSERDA. This website provides information on NYSERDA’s projects, including those promoting energy efficiency.</p>	<p>http://www.nyserdera.org/</p>
<p>Renewable Resources Development Report. This report by the CEC provides details on actions the state is taking to promote development of renewable energy generation, with particular focus on RPS.</p>	<p>http://www.energy.ca.gov/reports/2003-11-24_500-03-080F.PDF</p>
NO_x Set Asides for Energy Efficiency and Renewable Energy Projects	
<p>Creating an Energy Efficiency and Renewable Energy Set-Aside in the NO_x Budget Trading Program. This EPA guidance document contains additional details on designing the set-aside application process, allocating to eligible projects, translating energy savings into emission reductions, determining a timeframe for implementation and awards, and establishing documentation and reporting procedures.</p>	<p>http://www.epa.gov/statelocalclimate/documents/pdf/ee-re_set-asides_vol2.pdf</p>
<p>Designing Measurement and Verification Requirements. This EPA document is under development and will provide additional guidance to states on options for measuring and verifying the potential emission reductions resulting from energy efficiency, renewable energy, and CHP projects.</p>	<p>URL not available.</p>
<p>Guidance on Establishing an Energy Efficiency and Renewable Energy (EE/RE) Set-Aside in the NO_x Budget Trading Program. This 1999 EPA guidance document discusses the elements that a state may consider when deciding whether to establish an energy efficiency, renewable energy, and CHP set-aside and how it should be designed (e.g., the size of the set-aside, eligibility, and the length of awards).</p>	<p>http://epa.gov/statelocalclimate/documents/pdf/ee-re_set-asides_vol1.pdf</p>



Title/Description	URL Address
<p>A Toolkit for States: Using Supplemental Environmental Projects (SEPs) to Promote Energy Efficiency and Renewable Energy. This EPA toolkit is intended to help state and local governments pursue energy efficiency or renewable energy projects through SEPs. It presents the case for pursuing energy efficiency and renewable energy within settlements, provides examples in which SEPs have been used to support such projects, offers additional ideas for projects, and includes a step-by-step regulatory “road map” for pursuing SEPs.</p>	<p>http://epa.gov/statelocalclimate/documents/pdf/sep_toolkit.pdf</p>
Evaluation, Measurement, and Verification	
<p>CALMAC Website. California’s statewide CALMAC evaluation clearinghouse contains resources for deemed savings and project-specific EM&V techniques.</p>	<p>http://www.calmac.org/</p>
<p>Efficiency Vermont Technical Reference User Manual. Vermont provides a set of deemed-savings methods in this manual.</p>	<p>Contact Efficiency Vermont at 1-888-921-5990.</p>
<p>International Performance Measurement and Verification Protocol (IPMVP) Public Library of Documents. IPMVP Inc. is a nonprofit organization that develops products and services to aid in the EM&V of energy and water savings resulting from energy/water efficiency projects—both retrofits and new construction. The site contains the IPMVP, a series of documents for use in developing an EM&V strategy, monitoring indoor environmental quality, and quantifying emission reductions.</p>	<p>http://www.evo-world.org/index.php?option=com_content&view=article&id=272&Itemid=379&lang=en</p>
<p>M&V Guidelines: Measurement and Verification for Federal Energy Projects Version 3.0. This DOE Federal Energy Management Program (FEMP) document describes and provides links to numerous resources on the engineering techniques and tools used for energy savings verification.</p>	<p>http://www1.eere.energy.gov/femp/pdfs/mv_guidelines.pdf</p>

Examples of Legislation

State	Title/Description	URL Address
Revolving Loan Funds		
Iowa	<p>Legislative Guide: Energy Efficiency Programs. This guide provides an overview of the enabling legislation for state buildings’ energy management program.</p>	<p>https://www.legis.iowa.gov/DOCS/LSA/Legis_Guide/2013/LGLSL001.PDF</p>
Montana	<p>Senate Bill No. 506. This 2001 bill established an Alternative Energy Loan Fund.</p>	<p>http://leg.mt.gov/bills/2001/billpdf/SB0506.pdf</p>
	<p>Senate Bill No. 50. This 2005 bill amended the Alternative Energy Loan Fund.</p>	<p>http://leg.mt.gov/bills/2005/billpdf/SB0050.pdf</p>
Texas	<p>Texas Administrative Code. Subchapter on Loan Program for Energy Retrofits. This subchapter describes the Texas revolving loan program for energy efficiency retrofits.</p>	<p>http://texreg.sos.state.tx.us/public/readtac\$ext.TacPage?sl=T&app=9&p_dir=P&p_rloc=95986&p_tloc=&p_ploc=1&pg=2&p_tac=&ti=34&pt=1&ch=19&rl=43</p>
Tax Incentives		
Maryland	<p>2001 Clean Energy Incentive Act. Established tax incentives for energy-efficient equipment.</p>	<p>URL not available.</p>
	<p>Income Tax Credit for Green Buildings (House Bill 8). Provides tax credits for buildings meeting aggressive energy efficiency standards.</p>	<p>http://mgaleg.maryland.gov/2001rs/bills/hb/hb0008f.PDF</p>

State	Title/Description	URL Address
New York	Green Building Credit. The New York Assembly passed the Green Building Tax Credit legislation in May 2000.	http://www.chej.org/ppc/docs/pvc_polyvinyl_chloride_or_vinyl/PVC_NYGL.pdf
Performance Contracting		
Colorado	Enabling Legislation for Performance Contracting. (See Title 29 Local Government 29-12.5-101, 29-12.5-102, 29-12.5-103, 29-12.5-104, and Title 24 State Government 24-30-2001, 24-30-2002, 24-30-2003.)	URL not available.
Washington	An Act Relating to the Management of State Energy Supply and Demand (EHB 2247). Washington's 2001 enabling legislation for performance contracting.	http://lawfilesexternal.wa.gov/biennium/2001-02/Pdf/Bills/House%20Bills/2247.E.pdf
Grants and Rebates (Buy Downs)		
California	The California Solar Center. Tracks some of the legislation passed for financial incentives for solar in California.	http://www.californiasolarcenter.org/incentives.html
	Senate Bill No. 1038. Legislation for the Supplemental Energy Payments Program.	http://www.energy.ca.gov/portfolio/documents/documents/SB1038.PDF
Massachusetts	Massachusetts Technology Collaborative's Commercial, Industrial, and Institutional Initiative.	URL not available.
New York	The New York State Environmental Conservation Law (§§ 1-0101, 3-0301, 19-0103, 19-0105, 19-0305, 19-0311). Provides the New York DEC's authority.	http://www.dec.ny.gov/regulations/40195.html
	Current Funding Opportunities, PONs, RFPs, and RFQs. NYSERDA's information about its funding program.	http://www.nyserda.ny.gov/funding/
Washington	Providing Incentives to Support Renewable Energy (Senate Bill 5101). This bill establishes production incentives and economic multipliers for renewable energy.	http://apps.leg.wa.gov/billinfo/summary.aspx?bill=5101&year=2005

Examples of State Legislation and Program Proposals

State	Title/Description	URL Address
Illinois	Electric Service Customer Choice And Rate Relief Law of 1997 (220 ILCS 5/ Public Utilities Act). This legislation provides an example of exit fee provisions that encourage CHP.	http://www.ilga.gov/legislation/ilcs/ilcs4.asp?ActID=1277&ChapterID=23&SeqStart=35100000&SeqEnd=39400000
Massachusetts	220 CMR 11.00: Rules Governing the Restructuring of the Electric Industry. This legislation provides an example of exit fee provisions that encourage CHP.	http://www.env.state.ma.us/dpu/docs/restruct/96-100/cmr11-2.pdf

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