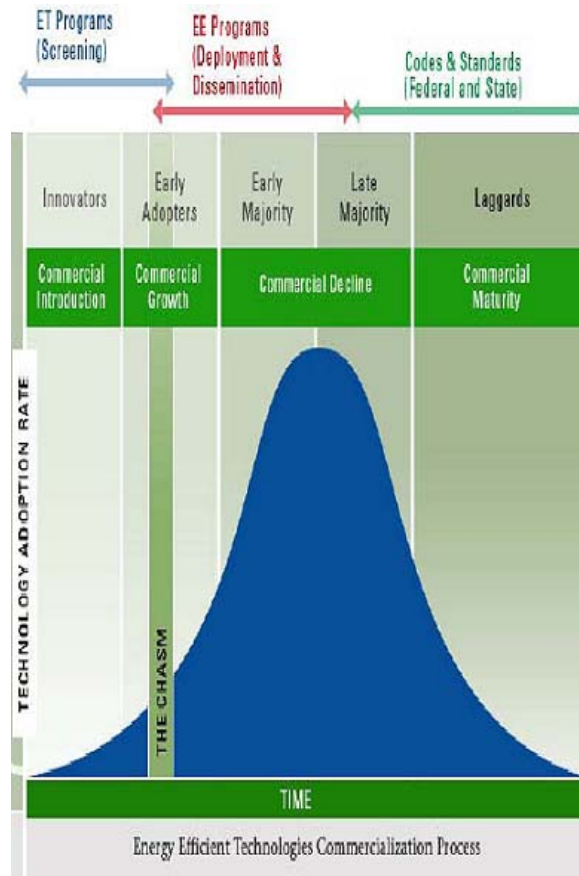


EPA Clean Energy-Environment Technical Forum
State Programs for Emerging Climate Protection Technologies
November 8, 2007

I. Introduction

Several states have established programs to encourage emerging climate protection technologies, and to ease the transition from research and development to commercialization of these technologies. Benefits of these programs include mitigating climate impacts, encouraging energy efficiency and renewable energy, promoting demand response and stimulating economies through job creation. As emerging technologies, these products generally start out earlier on the commercialization curve (the commercial introduction phase, as shown below), where there may be cost and reliability issues. State programs can help address these issues and support a technology's evolution into a proven, highly cost-effective product appropriate for promotion through programs like ENERGY STAR.

Product Commercialization Curve



II. Financial Mechanisms

States that support emerging technologies are using targeted financial mechanisms and designing programs to overcome key barriers, including the challenge of achieving economies of scale, demonstrating reliable performance, creating installation and maintenance infrastructure, and meeting short investment payback criteria.

Funding typically comes from public benefits funds (PBF) or system benefits charges (SBC), such as in California, Connecticut, Massachusetts, and New York. However, funding in North Carolina comes from tax-deductible private contributions and in Illinois, a utility settlement endowed funds to promote these technologies. The Illinois Clean Energy Community Trust has issued 2,200 grants for emerging energy efficient and renewable energy technologies since 2001 (DSIRE, 2007). In Minnesota, a settlement between the Prairie Island Indian Community and an electric utility requires the utility to contribute \$16 million annually to the state Renewable Development Fund in return for operating a nuclear power plant in the jurisdiction (U.S. DOE, 2003).

Other financial incentives offered by states to promote these technologies include grants (Connecticut, Massachusetts, New York), rebates (California, New York), tax credits (New York), sales tax exemptions (Connecticut), and low-interest loans (Massachusetts).

III. State Efforts

Below are examples of five state programs that encourage the development of emerging climate protection technologies.

CALIFORNIA

Several California government agencies promote climate protection technologies through renewable energy activities and energy efficiency efforts.

PBF:

- The Emerging Technologies Coordinating Council (ETCC), developed through a partnership with California's IOUs and the California Energy Commission (CEC), coordinates among its members to facilitate the assessment of promising energy-efficient emerging technologies that will benefit California customers.
- The ETCC's *Emerging Technologies (ET) Program* provides technology assessments and information to utility customers and industry, often in the form of technology demonstrations at customer facilities.
- The CEC's *Public Interest Energy Research (PIER)* program funds a significant number of projects each year, some of which produce "near market ready" technologies appropriate for ET Program demonstrations. The PIER Program annually awards up to \$62 million to conduct the most promising public interest energy research by partnering with research, development and demonstration (RD&D) organizations, including individuals, businesses, utilities, and public or private research institutions.

Rebates:

- The CEC's *Emerging Renewables Program* was created to stimulate market demand for renewable energy systems that meet certain eligibility requirements by offering rebates to reduce the initial cost of the system to the customer. The program offers cash rebates on grid-connected small wind and renewable fuel cell electric-generating systems, based on technology type and size. To qualify for the rebate, the renewable energy system must generate electricity to offset the consumer's on-site electrical load, but the expected production may not be more than the historical or expected electrical needs of the consumer.
- The California Public Utilities Commission (CPUC) coordinates the *Self-Generation Incentive Program (SGIP)*, which offers rebates to customers who produce electricity with microturbines, gas turbines, wind turbines, fuel cells, and internal combustion engines. The rebates depend on the type of system and use of renewable vs. non-renewable fuel.

CONNECTICUT

Connecticut has three types of vehicles to help clean emerging technologies.

PBF:

- The Connecticut Clean Energy Fund (CCEF) develops, invests in, and promotes clean energy for Connecticut ratepayers. CCEF is administered by Connecticut Innovations, which was created by the state legislature to advance emerging technologies. The CCEF invests in solar energy, wind, ocean thermal energy, wave or tidal energy, fuel cells, landfill gas, low emission advanced biomass conversion, and hydrogen production and hydrogen conversion technologies.
- The Connecticut Energy Efficiency Fund (CEEF), advances energy efficiency through load management programs and research, development, and commercialization of products or processes that are more energy efficient than those generally available.

Tax: The *Sales and Use Tax Exemption* for solar and geothermal systems includes solar electricity generating systems and passive or active solar water or space heating systems.

Grants:

- The *On-Site Renewable Distributed Generation Program* is a state grant program with a maximum of \$4 million per project (plus potential additional production incentives for projects installed in southwestern Connecticut). The program, which includes solar, fuel cells, small wind, small biomass, landfill gas, and hydro, requires a minimum system capacity of 10 kW, and systems must be commercially available.
- The *Project 100* initiative is a state grant program designed to encourage financing of renewable energy projects, stimulate the development of new projects, and increase the available supply of renewable energy. It implements legislation requiring the state's two electric distribution companies to enter into contracts with minimum terms of 10 years to obtain a total of at least 100 MW of "Class I" renewable energy.
- The *New Energy Technology Program* provides grants up to \$10,000 to small commercial firms for promising, pre-commercial renewable technology.

MASSACHUSETTS

The Massachusetts Division of Energy Resources (DOER) helps establish markets for climate protection technologies. The DOER has several climate protection technology initiatives, including a program promoting renewable energy, and development of a *Model Zoning Law for Wind Facilities* to assist cities and towns in establishing reasonable standards for wind power development.

In addition, the Massachusetts Technology Collaborative (MTC) promotes climate protection technologies and fosters the emergence of sustainable markets for electricity generated from renewable sources.

PBF: The Renewable Energy Trust provides funding for renewable energy projects throughout the state. Funds for projects are collected through a Renewable Energy Charge on ratepayers' bills.

Grants and Loans:

- MTC administers a *Clean Energy Pre-Development Financing Initiative* that offers grants and loans to support the development of grid-connected solar thermal electric, photovoltaics, landfill gas, wind, biomass, and hydro in New England. Funding is available for feasibility studies and for pre-development activities.

- *The Large On-site Renewables Initiative* develops a diverse portfolio of renewable energy projects across a variety of locations, technologies, and building types through provision of grants for feasibility studies, design and construction.
- *The Clean Energy Choice* program supplies funding for local clean energy initiatives and for low-income energy project through matching grants of up to 100% for each dollar consumers spend on clean energy. This program also educates consumers on clean energy and certifies clean power suppliers.

NEW YORK

New York promotes climate protection technologies primarily through the New York State Energy Research and Development Authority (NYSERDA), which is funded through an SBC. The *Power Systems, Research, Technology and Product Development* program supports emerging distributed generation technologies, including PEM fuel cell systems, microturbine/CHP demonstrations, and storage technology such as high speed foil bearings.

Tax credit:

The Solar and Fuel Cell Personal Tax Credit, administered by the Department of Taxation and Finance, provides credits for fuel cells and solar technologies. Tax credit amounts and maximum levels vary by type of system.

Grants and rebates:

The *Renewables R&D Grant Program* provides grants for solar thermal electric, solar PV, landfill gas, wind, biomass, hydroelectric, renewable transportation fuels, and CHP. It assists companies in developing, testing, and commercializing renewable energy technologies that will be manufactured in New York and in developing innovative business models to increase market penetration.

NORTH CAROLINA

The North Carolina Utilities Commission founded Advanced Energy in 1980 to investigate and implement new technologies for distributed generation, load management, conservation, and energy efficiency. Their current mission is to bring innovative and market-based approaches to energy production and use. Programs are designed to stimulate and transform markets. For example, Advanced Energy provided seed money and incubator services to the Microcell Corporation, a company that is developing a new approach to fuel cell fabrication based on microfiber technology.

Current initiatives include hosting a sustainable building design competition for universities and community colleges, and transforming the nation's school bus market toward the use of plug-in hybrids.

Grants:

Their *Motors and Drives* program conducts independent testing of electric motors to determine their energy efficiency and reliability, and helped develop the Energy Policy and Conservation Act regulations setting minimum motor efficiency standards for three phase motors (1-200 hp).

IV. Resources

Examples of State Programs for Emerging Climate Protection Technologies	
Title	Web Site
California	
California Energy Commission	http://www.energy.ca.gov/
California Public Utilities Commission	http://www.cpuc.ca.gov/static/energy/enviro/matters.htm
Emerging Technologies Coordinating Council	http://www.etcc-ca.com/
Emerging Technologies (ET) Program	http://www.etcc-ca.com/program/index.php
Public Interest Energy Research (PIER)	http://www.energy.ca.gov/pier/index.html
Emerging Renewables Program	http://www.consumerenergycenter.org/erprebate/
Self-Generation Incentive Program	http://www.cpuc.ca.gov/static/energy/electric/051005_sgip.htm
Connecticut	
Connecticut Clean Energy Fund	http://www.ctinnovations.com/funding/ccef/about.php
Connecticut Energy Efficiency Fund	http://www.ctsavesenergy.org/
On-site Renewable Distributed Generation Program	http://www.ctinnovations.com/funding/ccef/renewable_dg.php
CTCleanEnergyOptions Program	http://www.ctcleanenergyoptions.com/
Sales and Use Tax Exemption	http://www.ctinnovations.com/funding/ccef/solar_rebates.php
Project 100	http://www.ctinnovations.com/funding/ccef/project_100.php
New Energy Technology Program	http://www.opm.state.ct.us/pdpd2/grants/new_t.htm
Massachusetts	
Massachusetts Division of Energy Resources	http://www.mass.gov/doer/
Massachusetts Technology Collaborative	http://www.mtpc.org/
Model Zoning Law for Wind Facilities	http://mass.gov/doer/programs/renew/renew.htm
Clean Energy Pre-Development Financing Initiative	http://www.mtpc.org/renewableenergy/predvelop.htm
Small Renewables Initiative Rebate	http://www.mtpc.org/renewableenergy/small_renewables.htm
Large On-site Renewables Initiative	http://www.mtpc.org/renewableenergy/large_renewables.htm
Clean Energy Choice	http://masstech.org/CleanEnergyOrg/index.htm
New York	
New York State Energy Research and Development Authority	http://www.nyserda.org/default.asp
Power Systems, Research, Technology and Product Development	http://www.nyserda.org/programs/transportation/powersystems.asp

Examples of State Programs for Emerging Climate Protection Technologies	
Title	Web Site
Renewables R&D Grant Program	http://www.powernaturally.com/Funding/funding.asp?i=2
Solar and Fuel Cell Personal Tax Credit	http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=NY03F&state=NY&CurrentPageID=1&RE=1&EE=1
North Carolina	
North Carolina State Energy Office	http://www.energync.net/
Advanced Energy	http://www.advancedenergy.org/
Motors and Drives Program	http://www.advancedenergy.org/motors_and_drives/

Information Resources for Emerging Climate Protection Technologies	
Title/Description	Web Site
ACEEE Emerging Technologies in Energy Efficiency Summit. The American Council for an Energy-Efficient Economy (ACEEE) sponsored a conference on emerging technologies. This link provides access to numerous presentations from the conference.	http://www.aceee.org/conf/06et/06etwrap.htm
Community Jobs in the Green Economy. This Apollo Alliance report provides an overview of the economic benefits of investing in renewable energy technologies.	http://home.apolloalliance.org/community-jobs-report/Community-Jobs-in-the-Green-Economy.pdf
DOE Building Technologies Program – Emerging Technologies. The purpose of this DOE program is to increase demand for new, highly efficient technologies, bring them to the market, and provide assistance to manufacturers, ESCOs, and utilities.	http://www.eere.energy.gov/buildings/emergingtech/
DOE Industrial Technologies Program. The Industrial Technologies Program works with industry to improve energy efficiency by investing in high-risk, high-value research and development.	http://www1.eere.energy.gov/industry/
Emerging Energy-Efficient Technologies in Buildings: Technology Characterizations for Energy Modeling. This report provides an overview of the long-term potential for energy efficiency improvement in buildings based on improvements in five product categories.	http://www.energycommission.org/files/finalReport/III.6.b%20-%20EE%20in%20Buildings.pdf
Energy Technology Solutions: Public-Private Partnerships Transforming Industry. This DOE report provides an overview of DOE's efforts to assist industry in research and development of emerging energy technologies.	http://www1.eere.energy.gov/industry/bestpractices/printable_versions/pdfs/itp_successes.pdf
Focus on Energy. Focus on Energy, a Wisconsin PBF-funded nonprofit, supports several emerging climate protection technologies. The Emerging Technologies Web site provides information on these technologies.	http://www.focusonenergy.com/page.jsp?pageid=1627
Initiative for Enhanced Climate Protection through Emerging Technologies Scoping Paper. EPA has developed a scoping paper for stakeholder comment outlining a variety of approaches for accelerating the adoption of emerging climate protection technologies.	http://www.epa.gov/cleanenergy/pdf/public-comment.pdf
Lawrence Berkeley National Laboratory – Advanced Energy Technologies. The LBNL Advanced Energy Technologies program directs research efforts aimed at developing environmentally friendly methods for generating and storing energy.	http://eetd.lbl.gov/r-aet.html
Lawrence Berkeley National Laboratory – Emerging Industrial Technologies. LBNL has developed an emerging industrial technologies program within its Industrial Energy Analysis Department.	http://industrial-energy.lbl.gov/node/5
Northwest Energy Efficiency Alliance. The Northwest Energy Efficiency Alliance administers a program for encouraging emerging technologies. The program funds technology investments in several states, including Idaho, Montana, Oregon, and Washington.	http://nwalliance.org/ourwork/ourwork_bysector.aspx?sector=technologies

References

- ACEEE. 2000. Emerging Energy-Efficient Industrial Technologies. Available: <http://www.aceee.org/pubs/ie003.htm>. Accessed 9/19/2007.
- Arkansas. 2001. Arkansas Emerging Technology Development Act of 1999. Available: http://www.sosweb.state.ar.us/elections/elections_pdfs/register/dec_reg/168.00.01-005.pdf. Accessed 9/17/2007.
- California. 2006. Assembly Bill 32. Available: http://www.climatechange.ca.gov/documents/ab_32_bill_20060927_chaptered.pdf. Accessed 9/17/2007.
- DSIRE. 2007. Illinois Clean Energy Community Foundation Grants. Available: http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=IL06F&state=IL&CurrentPageID=1&RE=1&EE=1. Accessed 9/18/2007.
- FEMP. 2006. Role of Demand Response and Demand Reduction in Energy Purchasing Strategy. Available: http://www1.eere.energy.gov/femp/pdfs/energy06_joseluiscontreras.pdf. Accessed 9/18/2007.
- FoE. 2007. Emerging Technologies. Available: <http://www.focusonenergy.com/page.jsp?pageId=1627>. Accessed 9/17/2007.
- NYSERDA. Undated. A Three-Year Plan for Energy Innovation. Available: <http://www.nysl.nysed.gov/scandoclinks/ocm45125332.htm>. Accessed 9/18/2007.
- Pacific Gas Edison. 2007. California PUC. Available: <http://www.pge.com/tariffs/advice/adviceletters/3063-E.pdf>. Accessed 9/18/2007.
- Southern California Edison. 2005. Available: www.californiaenergyefficiency.com/pagdocs/Handout%204B%20-%20SCE%20-%20ET.ppt
- U.S. DOE. 2003. New Minnesota Law Supports Renewables, Requires Xcel Energy to Boost Funds and Install 300 Megawatts of Wind Power. Available: http://www.eere.energy.gov/news/news_detail.cfm/news_id=6367. Accessed 9/24/2007.
- EPA. 2007. Initiative for Enhanced Climate Protection through Emerging Technologies. Available: <http://www.epa.gov/cleanenergy/pdf/public-comment.pdf>. Accessed 9/18/2007.