

**EPA State Clean Energy-Environment Technical Forum**  
**Call #12: Measurement and Tracking in State Lead-by-Example Programs**

**January 17, 2006**  
**2:00 – 3:30 PM EDT**

**I. Background**

Lead by Example programs offer states opportunities to achieve substantial energy cost savings within their own operations, demonstrate environmental leadership, and raise public awareness of the benefits of clean energy technologies. Lead-by-example programs include energy efficiency targets for public buildings, specifications for product procurement, fleet efficiency, green power requirements, and variety of other initiatives. State and local governments develop these programs to save on energy costs, reduce emissions, and promote market acceptance of clean energy technologies. Measurement and verification of energy savings and avoided emissions are key factors in establishing the effectiveness and credibility of these programs.

In addition to cost savings, Lead by Example programs provide direct operational benefits to state and local governments, including:

- Encouraging clean energy development in the state and region and demonstrating environmental leadership.
- Achieving substantial savings through aggregated purchasing of energy-efficient products and green power.
- Supporting the development of in-state markets for clean energy products, manufacturers, and services (e.g., ESCOs, renewable energy equipment installers).

Many state and local governments are leading by example with energy efficiency and renewable energy (EE/RE) programs for their own facilities and fleets. Lead by Example programs take many forms, including:

- Incorporating clean energy principles into statewide energy policies.  
Several states are incorporating specific clean energy goals and objectives for state facilities in their state energy plans.
- Adopting energy efficiency savings goals for existing public buildings.  
States also set energy savings goals for existing facilities, typically expressed as percentage targets with calendar milestones (e.g., reducing energy use per square foot by 20% by 2010).
- Establishing energy efficiency performance standards for public buildings.  
Some states establish sustainable design principles that incorporate energy efficiency criteria in performance standards for new and renovated buildings and facilities.
- Purchasing and using renewable energy and clean energy generation in public facilities.  
State and local agencies have established clean energy supply targets that are met through on-site generation or by purchasing green power electricity or renewable energy certificates.

- Procuring energy-efficient equipment for public facilities, including implementing “green fleets” programs.
- Developing innovative financing mechanisms.  
States are developing a wide range of innovative financing mechanisms, including revolving loan funds, lease revenue bonds and performance contracting.
- Providing technical assistance and training to state and local facility managers and their staff.

## **II. Designing an Effective Lead by Example Program**

Issues that states consider when designing effective Lead by Example programs include identifying and working with key stakeholders, tracking and measuring energy and emissions savings, funding sources and leveraging federal and state programs.

### **A. Stakeholders**

Key stakeholders in the design and implementation of Lead by Example programs include:

- **Executive Branch.** The executive branch plays a key role in these initiatives. Many state governors have issued Executive Orders that set energy savings targets for state buildings, define energy and environmental performance standards for buildings, set fuel economy targets for state vehicle fleets, create energy efficient equipment and green power purchasing policies. An example of this is New York’s Executive Order 111 Green and Clean State Buildings and Vehicles, which sets targets for 100% of all new light-duty vehicles to be alternative-fueled vehicles by 2010 and for energy consumption in all buildings to be reduced by 35% (relative to 1990 levels) by 2010.
- **State Legislature.** In many cases, legislative authority is not needed to launch Lead by Example initiatives. However, legislative authority may be required when modifying procurement regulations. For example, Washington’s Engrossed House Bill 2247 requires energy audits in state buildings. If the audits produce opportunities to save energy, the improvements are to be accomplished by using performance contracting. (Performance contracting is described below under Energy Service Companies).
- **State Energy Office.** In many states, the energy office develops and administers a range of clean energy programs and provides technical assistance and training to state and local agency staff and facility managers.
- **State Department of General Services and Department of the Treasury.** One of these agencies typically serves as the custodian of state facilities. They administer state capital construction programs and establish guidelines for construction, operation, and purchasing practices.
- **State Housing and Economic Development Offices.** These agencies may operate a variety of programs, including housing and development programs, state mortgage financing programs, and redevelopment initiatives.

- **Local Governments.** In many cases, local governments have initiated and adopted their own Lead by Example programs. Some states work with local governments to provide financial assistance, education, training, and technical assistance to local governments. For example, Arizona's Municipal Energy Management Program, administered by the Arizona Commerce Department, provides training, tools, technical assistance, and grants to municipal and tribal governments to help implement energy saving projects.
- **School Districts, Colleges, and Universities.** There are many opportunities to improve energy efficiency and purchase or generate clean on-site power at schools and universities. One option is to use efficiency savings in operating budgets to finance new energy projects, thereby freeing up capital budget dollars for other uses. Some universities and colleges have found that investing in energy efficiency projects provides better yields than the market. For example, Duke University has used endowment funds to finance energy efficiency projects.
- **Utility Energy Programs.** Utilities that have energy efficiency and on-site distributed generation programs can support a state's Lead by Example efforts by providing technical assistance to state facility managers and new facility design teams.
- **Energy Service Companies.** Energy service companies (ESCOs) can perform energy project assessments and/or conduct full energy efficiency projects on a performance-contracting basis. In such projects, the state does not provide upfront capital; the ESCO develops and finances the project, using efficiency savings to cover the cost of capital.
- **Nonprofit Organizations.** Some states designate and work with third-party nonprofit corporations to develop and administer Lead by Example programs. For example, Iowa established the State of Iowa Facilities Improvement Corporation, a nonprofit corporation that helps state agencies implement cost-effective energy efficiency improvements.
- **State Treasurers and Public Pension Fund Managers.** Some state treasurers and public pension fund managers invest in clean energy programs and energy audit investments to identify cost savings. For example, California's state treasurer started the Green Wave program to encourage pension fund investment in energy efficiency and renewable energy retrofits and upgrades on state property.

## **B. Tracking and Measuring Energy and Emissions Savings**

Tracking the progress of lead-by-example programs and measuring energy savings is important in determining the effectiveness of the initiatives and progress in meeting the goals prescribed. In addition, these quantitative results may be used to promote clean energy in the broader marketplace. Three online tools for energy and emissions measurement include:

- **ENERGY STAR® Portfolio Manager**  
EPA's energy performance rating system compares the energy use of an individual building against the national stock of similar buildings using a 1 to 100 point rating system. The rating shows whether a building is a high or low energy performer, or somewhere in between. In addition to commercial office buildings, the rating was recently extended to financial centers, courthouses, bank branches, warehouse/ storage facilities, residence halls, and medical

offices. EPA now provides the commercial market with the capability to rate building types that represent more than 50 percent of the sector's energy use.

- **ENERGY STAR Target Finder**

Target Finder is an internet-based tool that helps manage energy during the design of a new building. With Target Finder a building designer can set an aggressive energy performance target for a building design and compare the estimated energy consumption to the established target. Target Finder provides an energy performance target rating for whole-building energy use.

- **Texas A&M University's eCalc**

Texas A&M University's web based calculator, eCalc, is a tool originally designed to estimate energy and emissions reductions from EE and RE projects in 41 Texas counties. The calculator processes energy and meteorological data into several models, including the DOE-2 program (building simulation analysis) and the ASHRAE Inverse Model Toolkit (for monthly utility billing analysis). In the final process, the EPA's eGRID database is used to determine the estimated emissions impact from the EE and RE projects.

### **C. Funding**

States sometimes pay for energy efficiency and renewable energy projects with general funds that are allocated through the budget and appropriations process. However, because of fiscal constraints, states are developing new funding approaches for their clean energy investments. Several states have adopted innovative funding mechanisms to support Lead by Example programs, including:

- **Revolving Loan Funds.** These entities make loans and re-lend current loan payments to fund new projects. The original capitalization can come from a variety of sources including system benefits charges and oil overcharge refunds. They are typically low interest, long-term loans for energy conservation or renewable energy projects.
- **Energy Savings Performance Contracting (ESPC).** The ESPC industry has developed over the past 25 years in response to the need for major new capital investments in energy efficiency, particularly in public and institutional facilities. Under an ESPC, the customer makes no initial capital investment and the customer's energy savings are greater than any debt service resulting from the project.
- **Public Benefits Funds (PBFs).** PBFs are funds typically created by per kWh charges on electricity bills. Many states use PBF resources to help support clean energy programs. PBFs were initially developed during the 1990s to provide resources to help fund public benefits programs that utilities were not expected to pursue in a restructured electricity market.
- **Aggregated Purchasing Contracts for Green Power.** An increasing number of organizations, including state and local governments, are aggregating electricity demand to purchase green power. By combining the electrical needs of a number of agencies, state and local governments are often able to negotiate lower prices for green power.

- Pension Funds. Some states use pension funds to invest in clean energy projects. Pension fund managers seek a mix of investments that ensure stable returns for their contributors when they retire. Energy cost savings are captured over a set time period to pay off the capital investment, and generate a solid return to the pension fund.
- Use of Lifecycle-Cost Accounting for Energy Efficiency Projects. Cost-effective energy-efficiency investments can pay for themselves in the form of reduced energy bills over the life of the investment. However, government procurement and capital budgeting practices frequently do not take life-cycle costs into account. To overcome this, some states have modified procurement rules by (1) specifying minimum efficiency levels for designated types of purchases (such as requiring certain product types to be ENERGY STAR-certified), or (2) instituting a lifecycle-cost bid procedure, where vendors provide both equipment investment costs and estimated lifetime energy costs for designated equipment types.

#### **D. Interaction with Federal Programs**

##### **ENERGY STAR**

EPA offers its ENERGY STAR program to governments, schools, and businesses as a straightforward way to achieve superior energy management and realize the cost savings and environmental benefits that can result. EPA's guidelines for building energy management promote a strategy that starts with the top leadership, engages the appropriate employees throughout the organization, uses standardized measurement tools, and helps an organization prioritize and get the most from its efficiency investments.

##### **Energy Policy Act of 2005**

Several sections of the Energy Policy Act of 2005 may have implications for state lead-by-example initiatives. In many cases, these programs will involve states coordinating and/or administering federal programs in cooperation with various implementation partners such as those listed above. Some of the sections of the Act include:

- Section 123 increases mandatory state efficiency goals in State Energy Assistance Programs from 10% to 25% above 1990 levels by 2012. Funding is \$100 mil in 2006 and 2007 and \$125 mil in 2008.
- Section 124 offers federal matching funds for up to 50% of the cost of state ENERGY STAR residential Energy Efficient (EE) appliance rebate programs. Funding is \$50 mil/yr, 2006-2010.
- Section 125 provides grants for energy efficient local government buildings. Funding is \$30 mil/yr, 2006-2010.
- Section 128 provides funding for states that implement plans for compliance with residential and commercial building energy efficiency codes that meet or exceed the requirements of the 2004 International Energy Conservation Code, or ASHRAE Standard 90.1-2004.

### **III. State Experience with Lead-by-Example Programs**

#### **A. California**

Executive Order S-20-04 requires a 20% reduction 2003 energy consumption levels by 2015 and includes provisions for:

- LEED "Silver" certification<sup>1</sup> for new and renovated state-owned facilities;
- ENERGY STAR rating for leases of 5000 sf or more, and requires procurement policies specifying ENERGY STAR qualified electrical equipment;
- Benchmarking -- by the California Energy Commission (CEC) -- for all state-owned buildings built by 2007;
- Retro-commissioning for all buildings of 50,000 sf or more, with re-commissioning every 5 years;
- Public school green design guidelines; and
- CEC and California Public Utilities Commission (CPUC) buildings and state prison building use of CHP.

The CEC offers an Energy Efficiency Financing Program that provides low interest loans for public sector energy audits and energy efficiency measures.

The CEC's Energy partnership programs offer technical support for public sector energy efficiency improvements, including audits, feasibility studies, proposal and design review, equipment performance specifications, contractor selection, and commissioning.

#### **B. Iowa**

Iowa offers financing-related programs for public and private EE and RE implementation, including building energy management for state agencies, a revolving loan fund, and sales tax exemptions for RE equipment.

The State of Iowa Facilities Improvement Corporation was established to help state agencies make cost-effective EE improvements to buildings, including feasibility assessments, financing, construction management, and energy savings monitoring.

The Iowa Energy Bank Program is a public-private program to finance EE improvements in public and non-profit facilities. Saved energy costs pay for the projects. The Energy Bank conducts energy audits and engineering analyses and negotiates financing with lenders.

Executive Order 41 requires 10% renewable energy generation or purchase, energy efficient equipment, and 15% reduced energy use by state buildings (relative to 2000) by 2010.

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<sup>1</sup> Leadership in Energy and Environment (LEED) is a voluntary rating program developed by the U.S. Green Building Council.

By 2010, the state's non-law enforcement light duty vehicle fleet must consist of hybrid-electric and alternative fuel vehicles. Bulk diesel purchases must contain increasing percentages of renewable fuel such as biodiesel. Quarterly progress reports will be required.

House File 577 requires all electric utilities operating in the state to offer green power options.

Tax exemptions are available for methane and wind generation equipment and an Alternative Energy Revolving Loan Program offers interest-free loans for half the cost of several kinds of RE projects.

### **C. New Hampshire**

Executive Order 2005-4 requires state agencies to reduce energy use by 10%. Equipment purchases must have ENERGY STAR rating. State facility construction and renovations must exceed code by 20%. Clean fleets programs require state vehicles to achieve a minimum of 27.5 mpg (highway).

Executive Order 2004-7 requires the New Hampshire Department of Administrative Services to develop an energy information system, which includes use of EPA's Energy Performance Rating System to assess each facility's energy efficiency. Also requires development of an energy reduction goal and plan, a procedure for conducting audits, procurement policies that require ENERGY STAR products, energy efficiency standards for new construction, and a procedure for commissioning new facilities. The executive order also stipulates state fleet new vehicle highway fuel economy of 30 miles per gallon or better and an emissions classification for a Low Emission Vehicle (LEV) or better, and other fleet-related efficiency provisions.

The 1997 Building Energy Conservation Initiative (BECI) provides an innovative program for financing and tracking energy efficiency program for public facilities. The initiative uses performance contracting and requires M and V for energy savings using either a "stipulated savings" approach, in which savings are calculated before the work, or a "measured savings" approach, which involves metering and sub-metering to verify actual savings.

### **D. Oregon**

The State Energy Efficiency Design Program requires energy conservation 20% beyond code for state facility renovation and construction projects. The state DOE administers the program and provides technical expertise for identifying and designing the most cost-effective energy conservation measures.

The State Energy Loan Program offers low interest public, commercial and residential sector energy efficiency projects. The program is self supported.

The Oregon DOE provides technical support for building commissioning for public and private buildings under the state building commissioning program, SB 1149 Energy-Related Capital Projects. Specific energy-related capital projects funded by the state's Public Purpose Fund are required to undergo commissioning or retro-commissioning.

Oregon's offers a Business Energy Tax Credit designed to stimulate investment in energy conservation, renewable energy, recycling and renewable fuels. The credit offers 35% of eligible project costs (incremental cost beyond standard practice). There are specific requirements for project eligibility. Renewable resource projects to produce, displace, or reclaim energy must replace at least 10% of the electricity, gas, or oil used. Retrofits must be 10% more efficient than existing installations, lighting retrofits must be 25% more efficient, and all measures in new buildings must be 10 more energy efficient than code requirements. Sustainable buildings must meet LEED Silver certification standards.

#### **IV. Discussion Questions**

- What were the primary policy drivers for your state lead-by-example programs on buildings, procurement or renewable energy?
- How did you determine the target reduction or procurement goals?
- How does your state measure and track progress in meeting lead-by-example program efforts?
- Are there tools, models, software applications that you use in your tracking or measurement efforts?
- How do you determine baselines?
- What emissions estimating protocols and tools do you use?
- What information or data gaps are you encountering in your efforts?
- What funding challenges have you/do you face with implementing lead by example efforts?
- What other challenges or lessons learned can you share with other states?



## V. Resources

### A. State

#### 1. California

California 2005 Integrated Energy Policy Report  
[www.energy.ca.gov/2005\\_energypolicy](http://www.energy.ca.gov/2005_energypolicy)

California's Renewable Portfolio Standard (RPS)–SB 1078 of 2002  
<http://www.energy.ca.gov/portfolio/index.html>

Energy Efficiency Financing Program  
A source for low-interest loans provided by the CEC  
<http://www.energy.ca.gov/efficiency/financing/>

CEC Energy Partnership Program  
California Energy Commission assistance for energy audits, commissioning, and other elements related to measuring energy efficiency.  
<http://www.energy.ca.gov/efficiency/partnership/index.html>

#### 2. Iowa

State of Iowa Facilities Improvement Corporation  
Includes optional energy savings monitoring  
<http://www.iowadnr.com/energy/ebank/sfp.html>

The Iowa Energy Bank Program  
A financing program that uses saved energy costs to pay for the projects. The Energy Bank conducts an energy audit and engineering analysis and negotiates financing terms with private lenders.  
<http://www.state.ia.us/dnr/energy/MAIN/PROGRAMS/BEM/EBANK/>

Iowa Executive Order 41  
Requires state agencies to obtain a percentage of their electricity from renewable energy sources.  
[http://www.governor.state.ia.us/legal/41\\_45/EO\\_41.pdf](http://www.governor.state.ia.us/legal/41_45/EO_41.pdf)

#### 3. New Hampshire

Executive Order 2005-4  
[http://www.nh.gov/governor/orders/documents/Executive\\_order\\_2005-4.pdf](http://www.nh.gov/governor/orders/documents/Executive_order_2005-4.pdf)

Executive Order 2004-7  
<http://www.sos.nh.gov/EXECUTIVE%20ORDERS/Benson2004-7.pdf>

Building Energy Conservation Initiative  
<http://nh.gov/oep/programs/energy/beci.htm>

#### 4. Oregon

State Energy Efficiency Design Program  
<http://egov.oregon.gov/ENERGY/CONS/SEED/SEEDhome.shtml>

State Energy Loan Program (SELP)  
<http://egov.oregon.gov/ENERGY/LOANS/selphm.shtml>

Commissioning SB 1149 Energy-Related Capital Projects  
<http://egov.oregon.gov/ENERGY/CONS/BUS/COMM/bldgcx.shtml>

Oregon's Business Energy Tax Credit (BETC)  
<http://egov.oregon.gov/ENERGY/CONS/BUS/BETC.shtml>  
<http://egov.oregon.gov/ENERGY/CONS/BUS/comm/commissioning.shtml>

5. Massachusetts

Massachusetts Executive Order No. 438  
<http://www.mass.gov/envir/Sustainable/>

Commonwealth of Massachusetts State Sustainability Program  
Agency Sustainability Planning and Implementation Guide  
[http://www.mass.gov/envir/Sustainable/pdf/ss\\_guide\\_web.pdf](http://www.mass.gov/envir/Sustainable/pdf/ss_guide_web.pdf)

6. New York

NYSERDA Energy Analysis  
[http://www.nyserda.org/programs/Energy\\_Analysis/default.asp](http://www.nyserda.org/programs/Energy_Analysis/default.asp)

New York Green and Clean State Buildings and Vehicles, Executive Order 111  
<http://www.nyserda.org/programs/exorder111.asp>

7. Texas

Alternative Energy Curriculum  
[http://www.seco.cpa.state.tx.us/alt\\_curriculum.htm](http://www.seco.cpa.state.tx.us/alt_curriculum.htm)

Alternative Fuels Program  
<http://www.seco.cpa.state.tx.us/alt.html>

eCalc

The eCalc tool assesses emissions reductions from energy efficiency in Texas.  
[http://www.eere.energy.gov/regions/mid-atlantic/docs/oconnor\\_getftexas.ppt](http://www.eere.energy.gov/regions/mid-atlantic/docs/oconnor_getftexas.ppt)

Energy Efficiency/Renewable Energy Impact in the Texas Emissions Reduction Plan (TERP)

This annual Texas A&M University, Energy Systems Lab report describes energy savings and NO<sub>x</sub> reduction resulting from statewide adoption of the Texas Building

Energy Performance Standards and from energy code compliance in new residential construction in 41 Texas counties.

<http://energysystems.tamu.edu/sb5/documents/tceq-report-2-14-2005-vol-I.pdf>

LoanSTAR Revolving Loan Program

<http://www.seco.cpa.state.tx.us/lr.htm>

Performance Contracting Guidelines and Reviews

[http://www.seco.cpa.state.tx.us/sa\\_performcontract.htm](http://www.seco.cpa.state.tx.us/sa_performcontract.htm)

Energy Efficient Partnership Program

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

Senate Bill 5, the Texas Emissions Reduction Plan

<http://www.seco.cpa.state.tx.us/sb5compliance.htm>

Texas Public Finance Authority (TPFA) Master Lease Purchase Program (MLPP)

<http://www.tpfa.state.tx.us/MLPPOverview.asp>

Texas A&M University's on-line energy and emissions calculator, eCalc

<http://ecalc.tamu.edu>

## **B. Federal**

EPA's Guide to Action

The Guide to Action identifies and describes 16 clean energy policies and strategies that states have used to achieve cost-effective clean energy.

<http://www.epa.gov/cleanenergy/stateandlocal/guidetoaction.htm>

ENERGY STAR

<http://www.energystar.gov/>

ENERGY STAR Portfolio Manager

[http://energystar.gov/index.cfm?c=evaluate\\_performance.bus\\_portfoliomanager](http://energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager)

ENERGY STAR Target Finder

[http://energystar.gov/index.cfm?c=new\\_bldg\\_design.bus\\_target\\_finder](http://energystar.gov/index.cfm?c=new_bldg_design.bus_target_finder)

eGRID Emissions & Generation Resource Integrated Database

eGRID is an EPA database that provides information on the air quality attributes of almost all the electric power generated in the United States.

<http://www.epa.gov/cleanenergy/egrid/index.htm>

DOE-2 Energy Savings Calculator

DOE-2 is an energy analysis program that calculates building energy performance and life-cycle cost of operation. It can also be used to analyze utility demand-side management and rebate programs, development and implementation of energy efficiency standards and compliance certification, and as a training tool for designers and engineers.

[http://www.eere.energy.gov/buildings/tools\\_directory/software.cfm/ID=34/pagename=alpha\\_list](http://www.eere.energy.gov/buildings/tools_directory/software.cfm/ID=34/pagename=alpha_list)

The Energy Policy Act of 2005

[http://www.fedcenter.gov/\\_kd/Items/actions.cfm?action=Show&item\\_id=2969&destination>ShowItem](http://www.fedcenter.gov/_kd/Items/actions.cfm?action=Show&item_id=2969&destination>ShowItem)

Interlaboratory Working Group (Five Labs), Scenarios of U.S. Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, Argonne National Laboratory, National Renewable Energy Laboratory, Pacific Northwest National Laboratory, prepared for the Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy, September, 1997.

<http://www.ornl.gov/~webworks/cpr/rpt/95134.pdf>