# Appendix 3
# Energy Efficiency Program Case Studies

# Appendix 3: Energy Efficiency Program Case Studies

The following program types are highlighted in this Appendix:

1. Residential Energy Efficiency Renovation Programs
2. Residential New Home Programs
3. EnergyStar Technologies Promotion and Financing Programs
4. Building Operator Training Programs
5. Commercial and Institutional Building Retrofit Programs
6. Commercial and Institutional New Building Programs
7. Multi-Purpose Efficiency Programs

A series of case studies are provided under each category, offering information on the financial, and energy saving performance of relevant established energy efficiency programs in North America.

# 1 Residential Energy Efficiency Renovation Programs

**Case Study 1 – EnerGuide for Houses and ATCO Energy Sense**

This program offers home evaluations that will assist in planning renovations, reducing drafts and increasing comfort, proper ventilation, reduce heating and cooling costs, assessing building plans, buying a house, and providing an energy efficiency rating. It provides homeowners with the facts they need to make informed decisions about energy efficiency. It applies to Canadian homeowners. This program was recently launched in Alberta through ATCO Energy Sense. It provides home energy audits for $150/home, while the Natural Resources Canada (NRCan) Office of Energy Efficiency (OEE) provides an incentive of more than $150/house to ATCO. Program participation figures for Alberta are unavailable. In the Yukon, since May 1999, more than 200 Yukon households have participated in the EnerGuide for Homes program[1].

**Case Study 2 – Yukon Home Repair Program**

The Yukon Housing Corporation offers low-interest loans of up to $35,000 to carry out home repairs. These are 10-year loans at a 1.9% interest rate. Additional subsidies are available for low-income families. The goal of the program is to improve the housing stock in the Yukon. Energy efficiency has been identified as one of the program's objectives. In the 2001/2002 fiscal year, 157 homeowners participated, of which 85% (133) included energy efficiency repairs. Since 1995, the Home Repair Program has assisted with improvements for over 350 Yukon households.

In the period of January through June 2001 there were 183 applications which is three times higher than the same period for the previous year. This was likely due to high energy prices at the end of 2000 and the lowering of program interest rate to half of the average 5-year bank mortgage rate.

The 2001/2002 Budget was $3.24 million with $2.862 million directed to loans. In the previous year, $1.247 million was expended.

Homeowners are responsible for implementing the actual repairs. The program requires a technical inspection before and after repairs to identify eligible repairs to get house up to current standards. Upgrades can include doors, windows, insulation, furnaces and water heater. Houses that are five years of age and older are eligible. The program will begin to use the NRCan EnerGuide auditing system for inspections in the future[2].

[1] References: EnerGuide for Houses contact person: Barbara Mullally-Pauly (613) 995-2945, Office of Energy Efficiency website: oee.nrcan.gc.ca/english/programs/index.cfm, EnerGuide website: oee.nrcan.gc.ca/energuide/home.cfm, ATCO EnergySense website: www.atcoenergysense.com, Yukon Energy Solutions Centre website: www.nrgsc.yk.ca

[2] References: Marc Perreault (867-393-7154) and Don Routledge (867-667-5759), Yukon Housing Corporation and Yukon Energy Solutions Centre website: http://www.nrgsc.yk.ca

**Case Study 3 – Old Crow Yukon Contractor Energy Efficiency Training Initiative**

The Pembina Institute implemented a project in Old Crow, Yukon in collaboration with the Yukon Housing Corporation and the Vuntut Gwitchin First Nation (VGFN) Housing Department to provide technical training for local trades people to carry out a series of renovations on residential homes that were targeted through an energy efficiency program. Funding for identifying the energy efficiency options was provided by Devon Energy Canada (formerly Anderson Exploration), while funds for training were provided by Yukon Housing Corporation and Natural Resources Canada.

A detailed four-day training workshop was delivered in the community in late April, 2002. It encompassed the following topics:

- Overview of the R-2000 housing program
- Building Science and Indoor Air Quality
- Overview of the R-2000 Building Envelope Standard
- Overview of mechanical systems – heating and domestic hot water
- Overview of mechanical systems – ventilation
- Examination of participants' learnings
- Hands on experience at the VGFN Safe House construction site

15 individuals from the community participated in the training program and 13 of them wrote and passed the exam, including several builders, the housing manager and other interested parties. As a result of the initiative, Old Crow currently has a large number of skilled energy efficiency practitioners that can proceed with housing renovations that meet high energy efficiency standards.

**Case Study 4 – Massachusetts In-Home Services Program**

This program aims to improve the energy efficiency of existing homes through retrofit programs (there is another program to build new homes that are 15% more energy-efficient than conventional homes). This program demonstrates effective partnerships between the Department of Energy Resources and electric utilities. Each utility offers a distinctive program and also offers consumer incentives.

The NStar Residential Conservation Service Program has energy efficiency specialists determining eligibility for a Home Energy Assessment. The assessment includes an analysis of home's energy use, advice for saving energy, and rebate offers on recommended energy improvements[3].

Massachusetts Electric Company's "Mass-Save" program offers a free home energy analysis to residential customers and installs low-cost energy and water-saving materials. They provide a report detailing the energy-saving recommendations identified by the energy advisor. For larger buildings, a Multi-family Building Audit is also available. They also sell energy efficient light bulbs at a discount[4].

[3] See http://www.nstaronline.com/index2.asp?lk=home
[4] See http://www.masselectric.com/res/conserv/index.htm

**Case Study 5 – PowerSmart Home Information Program**

Power Smart is a BC Hydro demand side management program that has invested $600 million over the last 10 years. The residential sector activities include a website and targeted initiatives in select "Power Smart Communities" including the Comox Valley, Quesnel, and all of Vancouver Island. These programs are smaller that initiatives in the early 1990's across British Columbia.

PowerSmart has budgeted $70 million for residential and commercial sector programs during the period 2003-2005. As part of the residential programs in Comox Valley and Quesnel, BC Hydro gave away over 40,000 energy saving light bulbs to community residents and picked up and recycled over 500 second refrigerators. The energy savings from the two programs combined have avoided emitting up to 1,250 tonnes of greenhouse gases into the atmosphere per year. These and several other programs helped residents save energy and money while positively impacting the environment. Other programs include access to home energy efficiency audits, and incentives for energy efficiency improvements made by certified contractors[5].

The Power Smart website for homeowners includes the following components:

- A Home Energy Profiling tool to find out what areas homeowners can target to reduce their energy consumption.
- An Appliance Calculator that calculates how much energy each homeowner's appliances use.
- Power Smart Tips, which provides advice on how to save energy around the house.
- An Energy Library, which is a comprehensive resource full of, detailed information on heating, water, lighting, appliances and more.
- A Shop Power Smart site that highlights those home products that are Power Smart certified and where to buy them.
- A section on Power Smart Homes that indicates which new housing developments have Power Smart certification and general advice on how to include maximum energy efficiency in home renovation plans.

[5] See http://www.bchydro.com/powersmart/ and article: "Power Smart re-launched on the Island" by Darrell Bellaart, Nanaimo News Bulletin, 7 October 2002.

## 2 Residential New Home Programs

**Case Study 1 – Yukon Green Mortgage**

The Yukon Housing Corporation Green Mortgage Program encourages building or upgrading houses to meet a high standard of energy efficiency and indoor air quality as specified by the Green Home Certification standard. It offers residential mortgages with a preferred interest rate for green homes. Once a new or existing dwelling is certified as a Green Home, the purchaser and subsequent purchasers are eligible to apply for a Green Mortgage with a preferred interest rate. The rates on Monday, January 13, 2003 were (prime rate was 4.5%):

- 3.880% for a 1 year term
- 4.580 2 yr
- 4.980 3 yr or 4yr
- 5.230 5yr

The Green Mortgage program offers a minimum down payment of 5%, no mortgage insurance fee (i.e., worth up to 4.25% of the mortgage), 1,2,3,4, and 5 year term options, a maximum borrowing amount of $200,000, and interest rate reduction based on the average interest rates posted at local banks.

Any revenues from the Green Mortgage are directed into the "Senior's Housing Fund" which will help address future housing needs of Yukon Seniors. As such, it is a revolving fund that reinvests savings into further energy efficiency and housing improvements.

The basic Green Home criteria include the following:

- Specific design standards, primarily based on the R-2000 criteria
- 75% of building materials
- 
- 
- n business
- Acceptable EnerGuide rating, including a pressure test

As of 2001, 17 certified Yukon Green Homes have taken advantage of the Green Mortgage Program. The program involves a partnership between contractors, the federal government (R-2000 program), local materials suppliers, and homeowners[6]. One shortcoming of the program is that it is taking mortgages away from private banks.

[6] See http://www.nrgsc.yk.ca/programs/yukon_energy_programs.php#Yukon_Housing_Programs or contact Heather Doucet. 867-667-8784 (heather.doucet@gov.yk.ca)

**Case Study 2 – Texas Housing Partnership Program**

This program aims to improve energy efficiency in low to moderate income housing through the establishment of partnerships among non-profit organizations, community action agencies, local governments, utility companies, public housing authorities, and social service-related organizations. The program encourages community and residential involvement in energy efficiency projects such as housing retrofits, model demonstration projects, technical training assistance, and energy education workshops and seminars. The program is a partnership between the State Energy Conservation Office (SECO) and various other bodies.

The Housing Partnership Program has 3 sub-programs.

1. Energy Efficient Housing Demonstration Project: Encourages community and residential involvement in energy efficiency projects such as housing retrofits, model demonstration projects, technical training assistance, and energy education workshops and seminars. Through a competitive bid process, several projects have demonstrated the cost-effective use of energy efficiency in residential housing since 1997. Many of the project activities and results can be replicated across Texas. The projects cover a range of activities:
    - Energy efficient design and building methods
    - Metering/monitoring of household energy consumption
    - Builder/homeowner training
    - Energy efficient appliances
    - Passive solar design/measures

2. Housing Trust Fund Program: SECO is partnering with the Texas Department of Housing and Community Affairs' Housing Trust Fund Program to increase the energy efficiency of new and existing multi- and single-family housing for low income persons and families. The Housing Trust Fund Program is the only state-authorized program dedicated to the development of affordable housing, and provides loan funds to finance, acquire, rehabilitate, and develop affordable housing for low income persons and families. SECO will provide funds to ensure that energy efficient design and appliances are incorporated in the new construction. The SECO funding will be through grants that require the housing construction to exceed a minimum standard[7].

3. Rebuild Texas - Rebuild Texas is a partnership of Rebuild America – a program sponsored by the U.S. Department of Energy (DOE) to help communities improve energy efficiency in commercial and multifamily buildings. SECO has two initiatives under this partnership:
    - Public Housing Energy Efficiency. SECO has helped develop a series of training workshops, to pass on the technical expertise from the DOE's Oak Ridge National Laboratory to promote buildings that are more energy efficient. The workshop topics range from performance contracting to local contracting; from

[7] Council of American Building Officials Model Energy Code (CABO MEC) '92 and '95.

maintenance and upkeep to resident education; and from no-cost/low-cost measures to major rehabilitation projects.

- Texas Showcase Communities. SECO is establishing partnerships to improve energy efficiency in cities which have populations ranging from 10,000 to 35,000. The aim is to implement a wide range of energy efficiency measures in local government buildings, schools, hospitals, small commercial buildings, farms and housing. The saving achieved in the local community through these measures will be used to provide additional improvements in the communities.

This program is run by the State Government agency SECO[8]. However, many programs in Texas are run by utilities following the 1999 Senate Bill 7 which restructured the state electric utilities and required each investor-owned utility to meet at least 10% of the utility's annual growth in demand through cost-effective energy efficiency measures. Most programs were offered full-scale in 2002[9].

[8] See http://www.seco.cpa.state.tx.us/Hp.htm and http://www.seco.cpa.state.tx.us/hp_eef.htm
[9] See http://www.aceee.org/new/texas.pdf

# 3 EnergyStar Technologies Promotion and Financing Programs

**Case Study 1 – Ontario Sales Tax Exemption (8%)**

All Energy Star appliances are to exempt from provincial sales tax (8%) under the new Bill 210, "Electricity Pricing, Conservation and Supply Act, 2002". Anecdotal evidence has shown this has been a great success, partly because consumers love to save taxes.

**Case Study 2 – BC Hydro PowerSmart EnergyStar Promotion**

This program aims to encourage the transformation of the appliance market in British Columbia to Energy Star products using incentives for retail sales staff. BC Hydro's Power Smart "product designation" program for products that either improve electricity efficiency (e.g., weather stripping) or have high efficiency (e.g., certain electric water heaters) has been extended to include promotion of the Energy Star labeling of refrigerators, clothes washers, and dishwashers.

There are several components to the promotion:

- Pilot projects to provide financial incentives to retail sales staff to sell Energy Star appliances – the sales person receives a bonus of $20 for each Energy Star appliance sold.
- Providing information on Energy Star on the Power Smart web site and in promotion of Power Smart products.
- Listing of all retailers in BC that carry Energy Star appliances on web site.
- Pilot projects to provide incentives to consumers to buy Energy Star appliances when an old refrigerator is removed from the home at the same time.

The pilot staff incentive program targeted a small number of retail stores. It ran for 12 months and the results show that although it has resulted in good awareness building for Energy Star among sales staff, it has not helped sales. The normal mark-up on appliances is so large that $20 is no real incentive for selective selling – maximizing volume is.

Annual energy savings for each appliance have been estimated below based on differences in performance between typical Energy Star and conventional appliances:

- Energy Star refrigerators use about 50% less electricity than a typical 10-year-old fridge and at least 10% less than the minimum federal standard.
- Energy Star clothes washers use 35-50% less hot water than a conventional washer.
- Energy Star dishwashers use 25% less electricity than the minimum federal standard.

The pilot program was run in partnership with the NRCan OEE and certain major retailers. The estimated cost of the pilot by OEE was $137,000[10]. Actual energy savings are not available.

[10] Reference: OEE 2002/2003 Business Plan

BC Hydro has had better success with consumer incentives – especially on compact fluorescent lights. The buy-one-get-one-free promotion has worked well and is liked by suppliers.

**Case Study 3 – SaskEnergy High Efficiency Furnace Loans**

This program aims to promote gas heating furnaces and appliances and achieve energy savings by accelerating the replacement of old heating systems with a new ones. Retailers also gain from selling and installing the new equipment.

The program is delivered through the Sask Energy Natural Gas Network – a group of independent equipment retailers and contractors across Saskatchewan. Prime interest rate loans are offered on the following new gas heating appliances:

- Furnaces
- Water Heaters
- Radiant Heaters
- Unit Heaters
- Space Heaters
- Boilers
- Fireplaces
- Clothes Dryers

The program offers a six month deferred payment option, a fixed loan rate at the prime rate (currently about 4.5%), a maximum loan per customer of $10,000, and a maximum loan period of 5 years. The program started in July 1, 2001 and has recently been extended to June 2003. Loans are arranged through local financial institutions with Sask Power paying the difference in loan interest.

No preferences are currently given for energy efficiency. The reasons given are that 1) until Energy Star there has been no simple definition of high efficiency, and 2) some rural members of the Network were not able to service condensing furnaces. However, Sask Energy plans to promote the selection of Energy Star furnaces and water heaters under the program in the spring of 2003, in cooperation with the NRCan OEE as part of their national strategy to promote Energy Star. No decision has been made yet to limit the loans to Energy Star only.

All residential and small business customers in Saskatchewan are eligible. As of December 2002, 5,882 residents had participated in the program with approved loan value of $19.8 million. The target for each year was 2,500 customers. Operating costs are estimated at $800,000 per year.

The program is operated by the Sask Energy Marketing and Sales Department and funds are allocated through the marketing budget. Sask Energy provided training and

information to the members of the Network and made arrangements with financial institutions to provide the loans[11].

### Case Study 4 – California Appliance Recycling Program

The Statewide Residential Retrofit Program includes an Appliance Recycling provision. The objective of the program is to encourage the removal of operable but inefficient appliances (i.e., refrigerator, freezer). In addition, the program includes a focus on second refrigerators within homes, so does not necessarily involve replacement.

#### Target Audience and Participation

The program had a target of removing 34,800 units in 2002, at an estimated cost of US $200 per unit. This target was exceeded in the summer of 2000, when two utility companies retired and recycled 37,000 working inefficient refrigerators and freezers.

#### Program Management

The California Public Utilities Commission sets out general requirements and approves or amends plans and budgets submitted by 3 major utility companies. Each utility plan may vary in terms of the number of units they propose to recycle, the budgets and consumer incentive structure. However, in 2002 companies were required to target and obtain a certain proportion of hard-to-reach customers. Companies are required to offer comprehensive toxic material recycling and disposal in accordance with California environmental laws.

#### Budget and Funding

The statewide program budget was nearly US $7 million for 2002, of which $6.7 million was for delivery and the remainder was for evaluation, monitoring, etc. Consumers were offered either a $35 rebate per refrigerator/freezer that was removed, or a five-pack of compact fluorescent light bulbs, worth $50.[12,13,14] The program is offered on a first come, first served basis, depending on the budget.
The program is one of many that is funded by Public Purposes Charge. This is a direct tax on electricity and natural gas that is used to fund energy efficiency programs. The charge was introduced at the same time as deregulation, to ensure the continuation of energy efficiency measures. The charge appears as part of the monthly utility bill (both electricity and natural gas). It is approximately US 0.37 cents per kWh for electricity (or

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[11] Reference: Sask Energy Web site and Sask Energy Marketing staff. NRCan OEE staff.
[12] California Public Utilities Commission, 2002. *Interim Opinion Selecting 2002 Statewide Energy Efficiency Programs,* IV Programs Selected. Website at: http://www.cpuc.ca.gov/published/final_decision/14345-03.htm
[13] Originally the rebate was US$50. See Pacific Gas and Electric, Statewide Residential Appliance Recycling Program, Program Report October 1 to December 31, 2002, p.2. Website at: http://www.pge.com/003_save_energy/003a_res/cempe/pdf/4q02_recycling_narrative.pdf
[14] The energy efficient lamp bulbs have a retail value of $50, which provides an incentive for customers to choose the light bulb option, rather than the money, see Southern California Edison, Refrigerator and Freezer Recycling Program. Website at: http://www.sce.com/sc3/011_reb_off/011a_fyh/011a1_reb_off/011a1b_ref/011a1b2_ref_frez.htm

between 2 and 3%, though the actual amount varies, depending on the sector and company).[15]

Energy Savings

In 2002 the CPUC targeted a reduction of 72.9 million kWh per year and a reduction of overall demand by 11MW for the three utility companies[16].

To assess the actual achievements of the program, one needs to look at the reports of the individual utility companies. Southern California Edison had an initial budget of US$4 million, which resulted in 19,916 units being recycled (actual and committed), for a net saving of 34.4 million kWh and 5.5MW capacity.[17] Before the end of the year, additional funds were added which will allow a further 4512 units to be recycled, with additional energy and demand savings of 7,782 MWh and 1.2 MW.

At the end of the year, Pacific Gas and Electricity (PGE) reported spending its full budget of US$1.68 million and that additional funds were shifted to the program, increasing the total budget to US2.5 million. When the fourth quarter report was compiled, the company had recycled 10,193 appliances (actual and committed), for an energy saving of 17.4 million kWh and saving of 2.7 MW capacity.[18,19] These are preliminary figures and do not appear to account for the full, enlarged budget. The company will update the figures in their 2003 report. At the time the report was compiled only US$1.83 million of the budget had actually been spent. At PGE the energy efficient light bulbs were chosen rather than the financial rebate in exchange for more that half the appliances recycled (5460 chose light bulbs, compared with a total 10,193 appliances). As a result of the uptake of the lamp bulbs additional energy savings of 249,000 kWh were achieved (that is, 1.6% more than the program target).

Because final figures are not available, it is not possible to report the total savings accomplished in 2002.

Financial Characteristics for Consumers

The consumer would pay for a replacement appliance, where required, but could offset the cost by $35 received for recycling the old appliance.

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[15] California Energy Commission, 2003. California Investor-Owned Utilities Retail Electricity Price Outlook 2003-2013, see also http://www.energy.ca.gov/energypolicy/documents/index.html

[16] Interim Opinion Selecting 2002 Statewide Energy Efficiency Programs, California Public Utilities Commission. IV Programs Selected. http://www.cpuc.ca.gov/published/final_decision/14345-03.htm

[17] Southern California Edison, Residential Appliance Recycling Program, October 1, 2002 thru December 31, 2002, p. 1 and 2. Website at: http://www.sce.com/NR/rdonlyres/eq27aqkd5wzpd2lt5vklnox2otzdhdlijw6mvmuybjzket4z2iienubq3tgbil4gofrxsoex4l3jj644hip37rv7iwc/EE_Filings_4Qtr_2002_Report.pdf,

[18] Pacific Gas and Electric, Statewide Residential Appliance Recycling Program, Program Report October 1 to December 31, 2002. Website at: http://www.pge.com/003_save_energy/003a_res/cempe/pdf/4q02_recycling_narrative.pdf

[19] Full details about the program implemented by Pacific Gas and Electric are available in a workbook at http://www.pge.com/003_save_energy/003a_res/cempe/xls/4q02_recycling_wkbk.xls N.B. This report may be removed from the website at the end of the first quarter, 2003.

Implementation Issues

One of the utility companies (PGE) informed the public about the refrigerator/freezer recycling through a cable TV bill insert, that was sent by direct mail to over 6 million homes in the third quarter of 2002. In addition they supplied 25,000 point-of-sale fliers to appliance retailers, issued a press release and did 30 second cable TV ads.[20]

PGE note that customers received their incentive cheques within 10 business days of pick up.

**Case Study 5 – California Upstream Residential Lighting Program**

The objective of this program is to continue the upstream lighting program and, in 2002 to broaden the availability of EnergyStar qualified lighting products to include lighting fixtures, ceiling fans and other lighting measures in more stores and outlets. Retailers or manufacturers receive additional incentives that are passed on to the customer. The California Public Utilities Commission sets out general requirements and approves or amends plans and budgets submitted by individual utilities. The program will also target the "hard to reach" through the addition of non-traditional delivery channels, such as grocery stores, drug stores, etc. The total program budget for 2002 was $9.3 million. The program's energy reduction targets for the 2002 program were 293 GWh of energy savings per year and a demand reduction of 23 MW[21].

[20] This was reported in the third quarter report for the program. However, this report is no longer available on the website, since it has been replaced with the fourth quarter report.

[21] Reference: Interim Opinion Selecting 2002 Statewide Energy Efficiency Programs, California Public Utilities Commission. IV Programs Selected. http://www.cpuc.ca.gov/published/final_decision/14345-03.htm

# 4 Commercial Building Operator Training/Certification Programs

**Case Study 1 – Northwest Energy Efficiency Alliance Building Operator Certification**

The Regional Building Operator Certification (BOC) program aims to achieve energy efficiency through improved building operations. BOC is a professional development program that teaches facility managers, building operators, maintenance personal and others who monitor commercial building controls how to reduce energy and resource consumption in the facilities they operate. Building operators and managers who successfully complete a training series earn certification.

Studies show that electricity use in Northwest commercial and government buildings could be cut by 15 percent or more if building operators managed and maintained their structures and building systems more effectively. The program was initiated by the Northwest Energy Efficiency Alliance (NEEA) and is delivered by industry through a voluntary, competency-based certification process.

Almost 1000 students have participated since 1997, with about 250 per year. The program has trained over 10% of eligible participants. A target of 40% of operators has been made for 2010.

The program operates through a partnership between facility-oriented associations (e.g., Northwest Building Operators Association - NWBOA, Washington Association of Maintenance and Operations Administrators, Oregon Schools Facility Management Association, Operating Engineers Union, International Facility Managers Association), utilities and trade associations, and major employers in the Northwest (e.g., Boeing, U.S. Navy, Washington State Department of General Administration, University of Oregon). They develop an agreement on marketing and training responsibility through the Northwest Energy Efficiency Council in Oregon and Washington and NWBOA in Idaho and Montana.

The annual program costs include US$1.8 million for delivery, $140,000 for administration, and $233,000 for evaluation. The NEEA gets its funding from ratepayer sources sponsored by the Bonneville Power Association. They charged on average $966 per student between 1997 and 2000. The cumulative computed impact for the period 1997-2000 per student participating in the program was estimated to be 177,500 kWh (compared with an initial planning value of 25,000 kWh per year). Total annual energy savings of the whole program were estimated at 172 GWh at the end of the period between 1997 and 2000. A demand reduction of 19 MW was estimated to be achieved by 2001. The program demonstrated a benefit-cost ratio of 7.8[22].

[22] See http://www.nwalliance.org/projects/projectdetail.asp?PID=41 and http://www.nwalliance.org/resources/reports/88.pdf

# 5 Commercial and Institutional Retrofit Programs

### Case Study 1 – NRCan OEE Energy Innovators Program

The Energy Innovators Initiative is designed to facilitate large-scale energy retrofit projects by providing funding of up to 25% of eligible costs to a maximum of $250k. Projects are selected on a competitive basis. The program will also subsidize study and feasibility costs. It requires that client commit to very strict and extensive process requirements. It unofficially relies on ESCOs to generate projects. It will pay up to $15/GJ of energy savings through funding provided by the federal government through the NRCan OEE. It is managed through an independent office[23].

### Case Study 2 – New York Standard Performance Contracting Program

The New York State Energy Research and Development Authority (NYSERDA) offers a commercial and industrial performance program which aims to encourage contractors to implement cost-effective electrical efficiency improvements or summer demand reductions for eligible customers. This performance-based program offers incentive payments to contractors and ESCOs that develop projects delivering verifiable annual electric energy savings. Eligible measures include lighting (e.g., LED traffic signals and exit signs), motors, variable-speed drives, energy management systems, certain process equipment, packaged air conditioning devices and chillers (e.g., including non-electric refrigeration and chillers), and custom measures that result in electric-energy savings or demand reductions.

This program is open to facility owners or tenants who agree to pay the New York State System Benefits Charge for the duration of the standard performance contract (SPC) agreement. All classes of customers (i.e., commercial, industrial, and residential) that meet program requirements are eligible. Eligible customers are electricity distribution (i.e., default) customers of Central Hudson Gas & Electric Corp., Consolidated Edison Company of New York, Inc., New York State Electric & Gas Corporation, Niagara Mohawk Power Corporation, Orange and Rockland Utilities, Inc., and Rochester Gas and Electric Corporation. The performance-based incentives are provided through an SPC between NYSERDA and the contractor. The contract between the customer and the contractor can be an energy performance contract or a fee-for-service contract. The average annual electric energy savings will be verified for up to a two-year period following project installation. There is a customer cap of $1 million and a contractor cap of $4 million. Documented Nitrogen Oxide (NOx) emission reductions achieved by energy efficiency projects receiving incentive funds are eligible to receive additional incentives.

Energy marketers are encouraged to participate and offer energy efficiency as a value-added service. There are two stages: project planning/installation which occurs prior to and just after installation of the energy efficiency measures; and project measurement and verification activities which occur after the energy-efficient equipment is installed and operating. The NYSERDA reviews profile information provided by the ESCO to determine if the measure is cost effective on a resource cost basis. Cost effective measures with long lives and higher energy and demand savings produce higher cumulative present value of savings and will receive higher incentive rates. Photovoltaics, and other renewable technologies, are sometimes eligible for

[23] See http://oee.nrcan.gc.ca/eii

incentives. The maximum incentive for custom measures is capped at 30 percent of its cost. The total contracted project incentive paid to an ESCO may not exceed 50% of the total project cost[24].

Cumulative funding for the program to date has been US$81 million. As of September, 2002, $33.5 million was spent. Funding for June 2002 to June 2003 period is $20 million on first come, first served basis. As of June 2002, a total of 405 projects were in various stages of completion, from project development to measurement and verification. Incentives of more than $70 million were awarded to 93 ESCOs.

As of September, 2002, annual savings of 232 GWh and a demand reduction of 51 MW were achieved. When fully implemented in 5 years, the projects are expected to reduce electricity use by 489 GWh per year, including a reduction of the summer peak demand by more than over 100 megawatts[25].

**Case Study 3 – New York Energy Efficiency Services Technical Assistance**

This program is a part of the New York State Energy Research and Development Authority's (NYSERDA) Business and Institutional Program. The program provides technical assistance in the following areas:

- Energy feasibility studies – to identify capital improvements
- Energy operations management – to improve electrical energy efficiency of facility operations
- Rate analysis and aggregation – to prepare customers to negotiate energy prices and services with independent marketers

Businesses, not-for-profit and private institutions, state and local governments, schools, universities, multi-family buildings, health-care facilities, and building owners are all eligible. Customers can select their own consultants or use one of NYSERDA's 36 pre-selected firms to provide help through the Flexible Technical Assistance program, which offers the same services as the standard Technical Assistance program.

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[24] The total contracted project incentive is the sum of the energy efficiency incentive, and any small site bonus, electric chiller and A/C bonus, and NOx incentives, included in the SPC Agreement. The total contracted project incentive also includes any demand reduction incentive approved for a custom demand reduction measure. The total contracted project incentive paid to an ESCO may not exceed 50% of the total project cost. If a project includes a custom conversion measure, the incentive will be capped at 30% of the measure cost. For these purposes, total project cost includes all costs directly associated with the energy savings of the project including, but not limited to: the Detailed Energy Analysis; energy efficiency measure design, procurement and installation; measurement and verification of energy savings (where the ESCO is responsible for M&V); and ESCO overhead and profit. Where a project includes more than one customer, the 50% limit applies to each customer individually See section 3.2 Total Project Incentive at: http://www.nyserda.org/695pon.html

[25] See http://www.nyserda.org/695pon.html and http://www.nyserda.org/sbcsept2002.pdf Technical questions should be directed to Todd Baldyga at (518) 862-1090, ext. 3354 or tab@nyserda.org Contractual questions should be directed to Mary Sauvie at (518) 862-1090, ext. 3229 or mks@nyserda.org

Up to US$100,000 of funding is available per project for cost-shared help from energy engineers and experts. The total budget is $24.6 million of which $6.7 million has already been spent.

According to a survey of NYSERDA's clients, two-thirds of them have implemented recommendations made by Technical Assistance contractors. Each dollar spent on engineering services has resulted in $14 in capital improvements and $4 per year in energy savings. Savings of 195.5 GWh have been achieved, with a demand reduction of 52 MW. The program is targeting annual savings of 560 GWh and a demand reduction of 149 MW[26].

### Case Study 4 – Texas LoanSTAR Revolving Loan Fund

This revolving loan fund was legislatively mandated to be funded at a minimum of US$95 million at all times. It aims to provide financing for energy efficiency projects to institutions of higher education, school districts, non-profit hospitals and local governments. Projects can include energy efficient lighting systems; high efficiency heating, ventilation and air conditioning systems; computerized energy management control systems; boiler efficiency improvements; energy recovery systems; and building shell improvements.

127 loans have been made to public institutions since the program started in 1989 with low interest rates that depend on money market costs and administrative costs. For the year ending August 2002, the rate was 3%. The fund is managed by the State Energy Conservation Office (SECO). Texas A&M University is responsible for monitoring and verifying the energy savings.

Between 1989 and the end of 2000, the program had achieved annual energy savings of $100 million. The program has a 20-year target of $500 million of annual energy savings. Actual energy savings have exceeded targeted savings by 5% on average[27]. The maximum load repayment period is 10 years and the fund has already revolved one complete cycle.

SECO also has a State Agency Program which provides a provision for higher education, state agencies, public school districts and local governments to enter into performance contracting agreements, under which facilities make no upfront investments but finance projects through guaranteed annual energy savings[28].

### Case Study 5 – VanCity Community Foundation

The VanCity Community Foundation is a catalyst for community transformation based on social and economic justice in a sustainable environment. It supports community partners to connect their current activity to transformation.

The Foundation provides the following services:

- grants of $2,500 to $15,000
- guaranteed loans and lines of credit of $10,000 to $100,000
- low interest loans of $10,000 to $100,000

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[26] See http://www.aceee.org/new/eedb.htm and http://www.nyserda.org/techasst.html and http://www.nyserda.org/sbcsept2002.pdf . Contact for the Flex Tech program: Jillina Baxter at (518) 862-1090, ext. 3279; fax (518) 862-1091; jb1@nyserda.org

[27] See http://www.seco.cpa.state.tx.us/ls.html or contact theresa.sifuentes@cpa.state.tx.us

[28] See http://www.seco.cpa.state.tx.us/sa_performcontract.htm

- technical assistance in marketing and communications, budgeting, business plan development, strategic and operational planning, board governance and others

The VanCity Credit Union provides an annual donation to the Foundation. Gifts are also provides from other donors. The general endowment has grown to more than $7.3 million in 2002. Committed community supporters have also added capacity through permanent legacies in the form of Named Fund endowments. Named Funds can be created with a gift of $1,000. The Foundation also provides matching interest for a period of time on Funds, which meet the mandate of the Foundation's grants program. The total permanent endowments are now more than eleven million dollars.

The Foundation provides grants to organizations that are involved in the following community economic development categories including:

- affordable housing
- employment development
- non-profit enterprise

Total grants and loans approved in 2001-2002 were $415,963[29]. The Foundation provides a model for financing of community based projects and could be applied to energy efficiency measures in a different context.

### Case Study 6 – California Express Efficiency Program

The Express Efficiency program pays rebates to distributors and small to medium sized nonresidential customers for equipping facilities with selected EE measures, including T8 and T5 lamps, electronic ballasts, lighting controls such as photocell controllers and occupancy sensors, compact fluorescent lamps, high-efficiency motors and HVAC measures. There is an emphasis on the hard-to-reach sectors. The California Public Utilities Commission (CPUC) sets out general requirements and approves or amends plans and budgets submitted by individual utilities. The program targets small to medium sized nonresidential customers. Customers must have monthly demand of less than 500 MW and annual gas usage of less than 250,000 therms (7.3 GWh).

The total budget for the program is US$23.8 million. The program target for 2002 was savings of 284 GWh of electricity per year and 82 GWh of thermal energy savings along with an electrical demand reduction of 56 MW[30].

### Case Study 7 – California Standard Performance Contract Program

The Standard Performance Contract Program provides energy efficiency incentives for comprehensive retrofit projects for large and medium businesses. Small businesses can also participate if their measures do not qualify for the Express Efficiency program. The programs include lighting, but only as part of the overall project. These programs are also coordinated by CPUC and delivered by individual utilities. Any customer paying the gas or electricity "Public Goods Charge" would be eligible, even if the customers have opted to purchase their gas or electricity from suppliers other than the default utility. The program involves a partnership between energy service companies who sponsor energy efficiency retrofit projects at utility customers' facilities. The utility companies provide general promotion and program information to customers.

[29] Reference: Vancity Community Foundation Annual Report 2001-2002
[30] Reference: CPUC (2002).

The program's budget was $20.7 million in 2002, of which $20.1 million for program delivery. The program has achieved savings of 73 GWh of electricity per year and 50 GWh of thermal energy savings along with an electrical demand reduction of 13 MW[31].

### Case Study 8 – Massachusetts Commercial and Institution Retrofits

This program aims to improve the energy efficiency of commercial and institutional buildings through retrofit programs. The Massachusetts Division of Energy Resources (DOER) coordinates the program which involves a partnership with utilities which each have unique programs. In the year 2000 the budget for the program was US$53 million out of a total DOER budget for all energy efficiency programs of US$130 million. The benefit to cost ratio for this program and residential programs was 2.3, including post-program effects[32]. Program savings are expected at 122 million kWh per year.

The NStar utility program enables client to incorporate energy efficient lighting fixtures, controls, high-efficiency mechanical equipment, and other energy saving strategies within their current facility. Benefits of this program include: rebates up to 50% of the total project cost; cost sharing for engineering services; and design and commissioning services. NStar also has gas efficiency programs including: Small Business High-Efficiency Heating Rebate Program; Small Business High-Efficiency Water Heating Rebate Program; Infrared Heating Equipment Rebate Program; Building Operator Certification Training; and customized programs[33].

Massachusetts Electric Co. has several programs for large businesses. For small business they pay 80% of the cost of the installation of a company's energy saving improvements and finance the remaining 20%, interest free, for up to 24 months[34].

### Case Study 9 – BC Hydro Power Smart Partners Program

The BC Hydro Power Smart Partners Program is designed to facilitate large scale electrical energy retrofit projects by funding electricity demand reductions on a competitive bid basis. It works with the 1000 largest electricity consumers in the province. The Bid "price" is determined by dividing funding requested by electrical energy saved. The program will also subsidize study and feasibility costs. The program reportedly has an unofficial price cap of 5 cents/kWh for savings. It is managed and funded by BC Hydro, but unofficially relies on energy service companies (ESCOs) to generate projects. Anecdotal evidence also suggests that program is overly complex for benefit realized, and may be replaced by a rate incentive program. The large required administrative and technical infrastructure is problematic[35].

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[31] Reference: CPUC (2002).
[32] See http://www.state.ma.us/doer/pub_info/ee00-long.pdf p.15
[33] See http://www.nstaronline.com/index2.asp?lk=buss
[34] See http://www.masselectric.com/bus/effic/index.htm
[35] See http://eww.bchydro.bc.ca

# 6 Commercial and Institutional New Building Programs

### Case Study 1 – NRCan OEE Commercial Building Incentive Program

The Commercial Building Incentive Program (CBIP) pays an incentive to a building owner in proportion to the annual energy cost savings relative to a reference building roughly based on the Model National Energy Code for Buildings (MNECB). The maximum annual incentive is $60k per building. Savings must be demonstrated using software provided by the program. The objective of the program is to reduce energy consumption in new commercial construction. The program is financed and administered by NRCan's Office of Energy Efficiency using federal funds. The program is centrally managed by CBIP specific technical and administrative infrastructure. It has been in operation for 4 years. Energy and financial savings are unknown.

CBIP has already invested huge amounts in the setup and maintenance of the program. The CBIP budget unknown, but is clearly substantial. CBIP has experienced significant difficulties with all aspects of the program design and delivery. Major program revisions may be pending. However, it is likely to be an excellent fit for supporting Alberta programs because of the substantial financial investment to date in program infrastructure[36].

### Case Study 2 – California Savings By Design

This program provides incentives for efficiency during the design process for non-residential buildings. This creates an incentive for designers to become engaged in energy efficiency. The California Public Utilities Commission sets out general requirements and approves or amends plans and budgets submitted by individual utilities. CPUC has directed that at least 50% of funds be used for "whole-building" oriented projects. Building architects, design teams, building owners and developers receive incentives passed on the % by which the work exceeds the "Title 24 standards" (California's building energy standard). Building owners or designers receive an incentive if work exceeds 10% above the standard, while if the work exceeds standards by 15%, the architects and design team also receive an incentive.

The total budget for the program is $23.3 million per year, of which $22.5 million is for programs and the remainder is for monitoring and administration. The program savings goals approved by CPUC for 2002 were 87.6 GWh/year of electricity and 14 GWh of thermal energy along with an electrical demand reduction of 29MW[37].

### Case Study 3 – New York State New Construction Program

This program aims to save energy in buildings by providing technical and financial incentives to applicants to specify and install selected energy-efficient equipment or to erect buildings that exceed the energy efficiency of standard design practice as determined by NYSERDA and the minimum requirements of the New York State Energy Conservation Construction Code. It can also be used for substantial renovations of buildings.

Applicants may choose among incentives for pre-qualified equipment, custom measures or whole building capital costs. The program provides technical assistance incentives to applicants to assist in the evaluation of energy-saving options for each qualified project and

[36] See http://cbip.nrcan.gc.ca/cbip. Further information is available from the Manager, Pierre Geuvrement, 613-996-6722, pgeuvrem@nrcan.gc.ca.
[37] Reference: CPUC (2002).

capital cost incentives to defray a portion of the incremental capital cost to purchase and install more energy-efficient or advanced equipment. The program may cover up to 80% of the incremental costs of qualified energy-efficiency measures. All energy-efficiency measures must meet cost-effectiveness and benefit/cost criteria set by NYSERDA.

The cumulative budget of US$64 million to date will deliver anticipated savings of 238 GWh and a demand reduction of 38MW. $28 million is available for projects during the period of June 2002 to December 2003 on a first come, first served basis, with $3 million allocated to building-integrated photovoltaics.

The process starts through an application to NYSERDA which has retained several Outreach Project Consultants (OPCs) to assist applicants. These OPCs work directly with program applicants to determine eligibility, explore participation options, identify technical assistance needs, and assist in completing program applications. NYSERDA provides written pre-approval of all qualified applications for incentives under this program. This pre-approval authorizes the applicant to proceed with the purchase and installation of the specific equipment and building features outlined in the approved application. Upon completion of the approved installation, the applicant is asked to provide written certification that the equipment and building features have been installed. NYSERDA may elect to inspect any or all projects prior to final approval. All building projects with approved incentive offers over $50,000 are inspected prior to payment[38].

[38] See http://www.nyserda.org/593pon.html and http://www.nyserda.org/sbcsept2002.pdf .
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# 7 Multi-Purpose Efficiency Programs

### Texas Standard Offer and Market Transformation Programs

The 1999 Texas State Senate Bill 7 requires that utilities to acquire energy-efficiency savings equal to the equivalent of at least 10% of their growth in demand. The Texas Public Utility Commission (PUC) oversees the implementation. A preliminary evaluation of programs was undertaken for the "Emission Reduction Incentive Grants Report" which was prepared for the Texas Natural Resource Conservation Commission in September 2002. As most energy efficiency programs were new in 2002, there is not a lot of analysis yet on their performance.

**Utilities are to obtain the required energy savings by selecting programs in the following categories:**

| Standard Offer Programs | Market Transformation Programs |
|---|---|
| Commercial and Industrial | Air Conditioning Distributor |
| Industrial and Small Commercial | Energy Star Homes |
| Load Management | Residential Energy Star Windows |
| Hard to Reach | Air Conditioning Installer Information and Training |

These programs apply to all sectors. They aim to maximize synergies with federal programs such as EnergyStar. Programs are managed by utilities.

The budget in 2002 was US$43.8 million, according to the utility reports to the PUC. Funding comes through transmission and distribution rates that are collected by utilities in areas where retail competition has begun and through electric rates in areas where competition has not begun. Energy savings of 246 GWh per year have been achieved. By 2007 it is estimated that the program will facilitate 510 GWh/year savings.

### California Energy Efficiency Programs

California energy efficiency programs are controlled by the California Public Utilities Commission (CPUC). The following table highlights the various programs that are currently offered, some of which are explained in more detail in previous sections of this report. The table highlights energy and demand reduction targets for each program and program budgets[39].

[39] See http://www.cpuc.ca.gov/published/final_decision/14345.htm

**Table 3.1 – California Energy Efficiency Programs**

| Program | Energy Reduction Target (GWh/yr) | Demand Reduction Target (MW) | Gas demand Reduction Target (GWh/yr) | Total Budget (US$ million) |
|---|---|---|---|---|
| **Statewide Residential Retrofit Programs** | | | | |
| Home EE surveys | | | | 2.1 |
| Appliance Recycling | 72 | 11 | 88 | 6.7 |
| Single-Family Unit Rebates for EE Equipment | 47 | 33 | 88 | 24.5 |
| Multi Family EE rebates | 17 | 7 | 59 | 8.3 |
| Statewide Residential New Construction | 9 | 13 | 12 | 14.0 |
| **Statewide Nonresidential Retrofit Programs** | | | | |
| Nonresidential SPC Programs | 73 | 13 | 50 | 20.1 |
| Efficiency Express Programs | 283 | 55 | 82 | 23.1 |
| Nonresidential Audit Programs | | | | 7.1 |
| Building Operator Certification and Training | | | | 1.0 |
| Emerging Technologies | | | | 1.6 |
| Statewide Nonresidential New Construction Programs | 87 | 29 | 15 | 22.5 |
| Marketing and Outreach Programs | | | | 10.0 |
| Education and Training | | | | 7.3 |
| Codes and Standards Advocacy | | | | 2.0 |
| Statewide Upstream Residential Lighting Program | 293 | 23 | | 9.3 |
| Total | | | | $160 |