


Energy Sustainability Case Study Guide

A guide for local governments

October 2008

The 'first stop' for local government leaders addressing energy sustainability and climate change

Community Energy Association

Infrastructure Canada

Canada

ENERGY SUSTAINABILITY CASE STUDY GUIDE

Produced by the Community Energy Association

About this Guide

This case study guide is a directory to a wide range of existing, practical, energy-related case studies that can inspire work toward community energy sustainability. The guide is intended to assist local government staff and elected officials to find appropriate information to support local government energy planning, efficiency and renewable energy. While this guide presents numerous case studies for action on climate change, it is not intended to provide information on adaptation to climate change impacts.

The majority of case studies included are from Canada (many from British Columbia), and some are from the US. Each entry includes a title, organization that produced the case study, description and weblink. At the end of this document is a listing of many organizations and websites, which include many more case studies.

How To Use This Guide

The guide is organized by category: Corporate Operations, Land Use, Transportation, Buildings, Infrastructure and Renewable Energy. Many case studies are applicable to more than one category or sub-category, and are cross-linked. To find case studies according to other criteria, use the 'Search' function.

Due to limited space, it is only possible to include key information about each case study and a limited number of case studies. Contact the Community Energy Association, or the organizations listed in each case study, for more information.

Feedback and Updates

Many case studies are available on topics covered in this guide; this guide is not intended to be comprehensive. It is the intent of the Community Energy Association to provide annual updates to this guide, and to attempt to include notable case studies and sources. We welcome your feedback and suggestions, and we appreciate you bringing to our attention, any case studies which you consider worthy of inclusion.

Updated versions of this guide will be posted to the Community Energy Association website:
www.communityenergy.bc.ca

About the Community Energy Association

The Community Energy Association is a charitable organization linking communities, energy and sustainability. For contact information and many more local government resources, including updated versions of this guide, please visit: www.communityenergy.bc.ca.

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Cover photo (second from left): Design Centre for Sustainability, School of Architecture and Landscape Architecture, University of British Columbia.

Corporate Operations

Policies & Overall Operations

City of Richmond Power Smart Plan, BC Hydro

The City of Richmond is a BC Hydro Power Smart Certified Customer. The Richmond Power Smart plan includes upgrading existing buildings, operating buildings and equipment for maximum efficiency, and ensuring new buildings are designed and built to high standards. Upgrades to the six Richmond Ice Centres alone have cut energy use by 18%, saving nearly $26,000 a year.

http://www.bchydro.com/powersmart/success_stories/government_facilities/richmond_city_of.html

Whistler Natural Step Sustainability Framework, The Natural Step

Whistler was the first community in North America to adopt a sustainability framework known as "The Natural Step." Its new community sustainability plan, Whistler2020, has won numerous awards including FCM's Sustainable Community Award. Recent achievements include the opening of a LEED (Leadership in Energy and Environmental Design) Gold public library.

http://www.naturalstep.org/en/resort-municipality-whistler-bc

New Buildings

Green Buildings in Canada: Overview and Summary of Case Studies, Canada Green Building Council (CaGBC), Canadian Mortgage and Housing Corporation, & Industry Canada

This document is a collection of ten case studies of buildings across Canada that have received LEED certifications through the CaGBC. The case studies include a recreational centre, a civic centre, residential high rises, retail, offices, a university building, an emergency medical services fleet centre, and a cancer research lab.

http://www.cagbc.org/uploads/Green%20Buildings%20in%20Canada.pdf

Township of Langley LEED-CI Silver Civic Facility, Township of Langley

Langley Township Civic Centre was the first municipal hall in Canada to achieve the LEED-CI (Commercial Interiors) silver rating; achieved by using an existing structure for the facility, green power, a ground-source heat pump, energy and water conservation measures, sourcing local materials, and high indoor environmental quality. Energy efficient lighting strategies alone reduced building energy costs by over 30%.

http://www.tol.bc.ca/index.php?option=com_content&task=view&id=1612&Itemid=596

White Rock Operations Building LEED Gold, City of White Rock

White Rock Operations Building is certified LEED Gold, with environmentally advanced design, renewable energy systems including solar thermal panels and a water-source heat pump, and water conservation. The innovations only increased costs by 8% compared to equivalent conventional construction, and reduced energy costs by 40%.

http://www.city.whiterock.bc.ca/2005City-Operations/pdfscityoperations/leadingbyexample.pdf

Also see:

- all case studies in Buildings, Green Buildings, below
- all case studies in Buildings, Site Planning, below

Building Retrofits

Salmon Arm Recreation Centre, Improved Boiler Controls and Temperature Management, Terasen Gas

An internal investigation of gas usage at Salmon Arm Recreation Centre led to the realization that significant savings could be made by improving boiler control and internal temperature management. A new direct digital control (DDC) system was installed for $58,000, reducing gas usage by 32% and saving $40,000 from the 2002 gas bill.

http://www.terasengas.com/documents/EnergyProfileSalmonArm.pdf

District of Saanich – Buildings Energy Retrofits, Green Buildings BC (GBBC)

In 2004 the District of Saanich initiated a comprehensive energy retrofit program on 50% of their buildings accounting for 500,000 square feet of building space. An Energy Services Company (ESCO) delivered the projects, which included lighting upgrades, water fixture upgrades, and installation of energy management and heating controls. Energy savings are estimated at $83,000 per year.

http://www.greenbuildingsbc.com/Portals/GBBC/docs/case_studies/GBBC-LG.CaseStudy.Saanich.pdf

Also see:

- **City of Richmond's Power Smart Plan** case study in Corporate Operations, Policies & Overall Operations, above

Fleets

BC Municipalities Take On Biodiesel, Fraser Basin Council Biofleet

Six BC municipality fleets – Burnaby, Delta, North Vancouver, Richmond, Vancouver, and Whistler – conducted a biodiesel pilot on behalf of the BC Municipal Fleet Managers Group (MFMG). After positive results, these six municipalities plus others in the MFMG have greatly increased their consumption of biodiesel.

http://biofleet.net/documents/BioFleet_Case_Study_Muni_Sept%201%2007_Final.pdf

BC Transit Diesel Electric Hybrid Buses, BC Transit

In summer 2005 BC Transit began a pilot of six diesel-electric hybrid buses in Victoria and Kelowna. Fuel and CO_2 savings compared to conventional 2006 buses were estimated at 10%. The buses are popular with customers, reliable, and low maintenance, but the fuel savings have not met early expectations and with higher capital costs make the vehicles a more expensive option on a lifecycle financial basis.

http://hybridexperience.com/documents/bc_transit_hybrid.pdf

Also see:

- **Green Buildings in Canada: Overview and Summary of Case Studies** in Corporate Operations, New Buildings, above
- **Biodiesel in Transit and Municipal Fleets** in Transportation, Transit, below
- all case studies in Transportation, Vehicle Technologies, below
- **Halifax Tackles Fleet Idling** in Transportation, Idling, below

Recycling / Composting

Edmonton Waste Management Centre, ICLEI – Local Governments for Sustainability

Edmonton invested US $565 million in the Edmonton Waste Management Centre (EWMC), operational in 2000. The Centre houses North America's largest co-composter, composting residential waste and wastewater biosolids. The EWMC has reduced household waste going to landfill from 86% to 30%, and is a best practice centre for research, demonstration, and training.

http://www.iclei.org/index.php?id=1207

Bow Valley Waste Management Commission – recycling and composting, Biosphere Institute of the Bow Valley

In 1999 the sustainability-focussed Bow Valley Waste Management Commission in Alberta purchased an 80 acre local landfill. On site the Commission began residential yard waste composting, a regional compost demonstration project taking food waste from hotels, a program to help local schools recycle, electronic waste collection and a recycling education program.

http://www.biosphereinstitute.org/docs/EA-Case-Study-BVWMC.pdf

Other

Calgary – Streetlights Retrofit, City of Calgary

From 2002 to 2005 the City of Calgary undertook a complete retrofit of its approximately 37,500 residential streetlights, switching to lower wattage flat lens EnviroSmart fixtures. Annual energy savings are estimated at 25,000 MWh or $1.7 million, leading to a payback by 2011 or 2012.

http://content.calgary.ca/CCA/City+Hall/Business+Units/Roads/Streetlights/EnviroSmart+Streetlight+Retrofit/EnviroSmart+Streetlight+Retrofit.htm

Improving Energy Efficiency in Production of Drinking Quality Water, Federation of Canadian Municipalities

The District of West Vancouver experimented with low pressure submerged membrane treatment systems to produce drinking quality water from a reservoir. These systems were proven to be extremely effective, with a chlorine dosage reduced by 25-30% and energy reduced from 810 to 780 kWh per 3.79 million litres compared to conventional water treatment systems.

http://www.sustainablecommunities.ca/Search/PDF/EF0605%20WestVanE.pdf

Land Use

Complete Communities

Triple Bottom Line in Practice: From Dockside to Dockside Green, Community Research Connections

The City of Victoria sought a development on city-owned land, through a tendering process based on triple bottom line sustainability (environmental, social, and economic). The resulting mixed-use development "Dockside Green" is the first master planned neighbourhood built to LEED Platinum standards, with exemplary water and sustainable energy measures (including a biomass boiler feeding a district heating scheme), and integrated transport planning.

http://www.crcresearch.org/node/376

Cheakamus Crossing, Whistler – Compact, Mixed-Use, Alternative Energy, Whistler Real Estate

Cheakamus Crossing is primarily built as Whistler's 2010 Olympic Village, but its long-term use is as a permanent mixed-use neighbourhood. Sustainable, compact, pedestrian-focussed, and with wastewater-source heat pumps feeding a neighbourhood district heating scheme – it was one of only 20 Canadian developments to pilot LEED-ND (Neighbourhood Development).

http://www.cheakamuscrossing.ca/information.shtml#community

Southeast False Creek, City of Vancouver

Approx. 80 acres of former industrial land near downtown Vancouver, built as the 2010 Olympic athlete village and then conversion to a mixed-use high-density neighbourhood. The development re-establishes wildlife habitat, and includes a renewable district heating scheme, parks, open spaces, and paths and streets designed for pedestrians, cyclists and transit.

http://www.city.vancouver.bc.ca/commsvcs/southeast/

Also see:

- **Simon Fraser University's UniverCity** in Land Use, Smart Growth, below
- **Regional and Municipal Town Centres in Metro Vancouver** in Transportation, Transportation Planning, below

Smart Growth

Residential Intensification Case Studies, Municipal Initiatives, Canadian Mortgage and Housing Corporation

Twelve Canadian case studies are presented that are successful examples of how municipalities can significantly contribute to increasing urban residential densities by using a wide variety of instruments. These include flexible zoning, marketing vacant lands, mediation, and financial incentives such as grants, tax credits and waiving development charges.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/sucopl_002.cfm

Reclaiming Streets for People: Sidewalk Cafés in Downtown Halifax, Transport Canada

In 1995 the Halifax community supported the first sidewalk cafés in downtown Halifax. Their success led to a rapid increase in their numbers, and today they contribute to vibrant pedestrian-oriented streets. A 2004 Downtown Pedestrian study showed a 29% increase in pedestrian traffic compared to 1995, with sidewalk cafés as a contributing factor.

http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs41E_sidewalkCafes.pdf

Simon Fraser University's "UniverCity", UniverCity

The Simon Fraser University Community Trust developed "UniverCity" -- a complete and sustainable community on Burnaby Mountain adjacent to the University, urban areas and a nature conservation area. Sustainability features include a stormwater system that returns nearly 100% of stormwater to ground and has retention ponds aerated by a windmill and solar bubblers. Coordinated transport planning includes bicycle parking, a network of paths, and car-sharing.

http://www.univercity.ca/about_us/sustainability.46.html

Also see:

- case studies in Land Use, Complete Communities, above
- case studies in Transportation, Transportation Planning, below

Urban Design

Residential Intensification Case Studies, Built Projects, Canadian Mortgage and Housing Corporation

Twenty-three Canadian case studies demonstrate successful examples of residential projects that have overcome the barriers to intensification. The case studies illustrate challenges to intensification such as increased costs, neighbourhood opposition and regulatory issues; and rewards such as improved neighbourhood environment and increased sustainability.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/sucopl_003.cfm

Brownfield Redevelopment for Housing in Canada, Canadian Mortgage and Housing Corporation

Eleven Canadian case studies of redevelopment on brownfield sites are available here. Brownfield development is shown to offer great opportunities for sustainable development, revitalizing older neighbourhoods, lowering municipal infrastructure costs, and lessening urban sprawl.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/sucopl_004.cfm

Greyfield Redevelopment for Housing in Canada, Canadian Mortgage and Housing Corporation

Available here are three case studies of municipal initiatives and seven case studies of built projects on land composed of failed or failing retail uses, "greyfields". Greyfields offer similar opportunities for sustainable development as brownfields.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/sucopl_005.cfm

Comparing High and Low Residential Density: Life-Cycle Energy & GHG Analysis, Campaign for Sensible Growth

Using two Toronto case studies, this study provides an empirical assessment of the energy use and GHG emissions associated with high- and low-density, residential development with respect to infrastructure construction materials, building operations, and transportation. Results show that low-density residential development is 2 - 2.5 times more energy and GHG intensive on a per capita basis.

http://www.growingsensibly.org/cmapdfs/Comparing%20High%20and%20Low%20Resedential%20Density%20-%20Life%20Cycly%20Analysis%20of%20Energy%20Use%20and%20Greenhouse%20Gas%20Emmissions.pdf

Red Deer County, Alberta – Re-Designing Rural Communities, Climate Change Central

With a rapidly increasing population, Red Deer County in Alberta had to revise its development policies. Now new communities have reduced the amount of road required per person by 20 times, encouraged walking, and have green spaces. The urban design plan for one new community received an award from the Canadian Institute of Planners in 2007.

http://www.climatechangecentral.com/publications/c3-views/september-2007/case-study-rural-design

Also see:

- all case studies in Transportation, Transportation Planning, below

Eco Industrial Networking

Eco-Industrial Networks Currently Developing in Canada, Canadian Eco-Industrial Network

Two case studies are presented here. At The Bruce Energy Centre, Tiverton, Ontario, several industries utilize low-cost steam from adjacent Bruce Nuclear. At Burnside Industrial Park, Halifax, an Eco-Efficiency Centre, eco-business program, and some exchanges of by-products (particularly of packaging materials) have been established.

http://www.cein.ca/cein/projects.html

Eco Industry Option Explored in Maplewood, Federation of Canadian Municipalities

At Maplewood, the District of North Vancouver sought to make environmental improvements, increase business efficiencies, and better integrate the entire community through a public consultation and design workshop. Resulting ideas included recycling stormwater, a coordinated energy management program, installing a local fuel cell and micro hydro plant, having recycling-based manufacturing, increasing transportation efficiency, and reusing industrial waste heat in greenhouses for local food.

http://www.sustainablecommunities.ca/Search/PDF/EF3345%20NV%20Maplewood%20EN.pdf

Also see:

- **Burnaby Waste-to-Energy Facility** case study in Infrastructure, Landfills, below

Transportation

Transportation Planning

Transit-Oriented Development, Canadian Mortgage and Housing Corporation

Five case studies of Canadian transit-oriented developments are available here. The developments are compact, mixed-use residential developments situated within a five-minute walk of a public transit node. The case studies describe challenges faced and creative solutions.

http://www.cmhc-schl.gc.ca/en/inpr/su/sucopl/sucopl_007.cfm

Transit-Oriented Development, Victoria Transport Policy Institute

A detailed description of transit-oriented development, and how it relates to smart growth and urban design, is presented here. Sixteen North American case studies are presented only one of which is in Canada, which describes how the SkyTrain has catalyzed development of regional and municipal town centres in Metro Vancouver.

http://www.vtpi.org/tdm/tdm45.htm

Metro Vancouver Regional Growth Strategy, Metro Vancouver

A key goal of Metro Vancouver's Regional Growth Strategy is to promote an effective and sustainable transportation system. Land use and transportation strategies are integrated to emphasize transit-oriented developments, therefore expanding opportunities for the use of public transit, walking, and cycling, and reducing GHG emissions associated with automobile use.

http://www.metrovancouver.org/planning/development/strategy/

Regional and Municipal Town Centres in Metro Vancouver, Metro Vancouver

Metro Vancouver and its partner municipalities have worked to create a compact, liveable and sustainable metropolitan region. A key component has been the development of interconnected regional and municipal town centres that serve as the foundation of complete communities. They are public transit- and pedestrian-oriented, and high density, and have a full range of commercial and residential opportunities.

http://www.metrovancouver.org/planning/development/livablecentres/

Kelowna's Smart Transit Plan, City of Kelowna

Kelowna's Smart Transit Plan emphasizes transit-oriented development. A series of land use and transportation guidelines have been developed to encourage public transit, walking, and cycling; in particular higher density, mixed-use developments around efficient transportation nodes.

http://www.kelowna.ca/CM/Page468.aspx

Short Street Redevelopment, Saanich BC, Smart Growth BC

Initially a small L-shaped street of mainly single-family residential lots in a commercial part of Saanich, Short Street is adjacent to major bus routes, a regional hiking and cycling trail and a retail area. Site redevelopment includes increased residential density, mixed-use and a pedestrian-dominated street. With easy pedestrian access for residents to retail and employment opportunities and public transit, automobile dependence is greatly reduced.

http://smartgrowth.bc.ca/AboutUs/Issues/Transportation/ShortStreetVillageSaanich/tabid/141/Default.aspx

Planning for Sustainable Urban Transportation in Kamloops BC, Transport Canada

In 1999, responding to rapid population growth and costs of developing additional road capacity, the City of Kamloops implemented a program called TravelSmart. It modelled different growth scenarios and found a land use scenario that minimized impacts on existing transportation infrastructure. TravelSmart has since improved local air quality, reduced transport-related energy consumption, and reduced planned future capital transportation infrastructure costs from $120 million to $14 million.

http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs03E_TravelSmartPlanning.pdf

Tackling Transportation in Quesnel BC, Community Energy Association
A community of just 11,000, Quesnel's efforts in tackling transportation demonstrate what similar small communities could achieve. Following public consultations the municipality implemented a number of measures including smart land use planning policies, reduced embodied-energy roads, bicycle paths and a study into public transport possibilities.
http://www.communityenergy.bc.ca/showcase-and-awards-introduction/tackling-transportation-in-quesnel

Transit

Montreal's Public Bicycle Scheme, Bixi
Half bicycle and half taxi, the "Bixi" scheme in Montreal is a key component of the city's public transit network. Following European cities like Paris and Barcelona, with a 2008 pilot and 2009 launch Bixi is one of North America's first public bicycle schemes. Users pay to borrow one of the 2,400 bicycles for a short trip, and return it to any one of the 300 solar-powered stations around the city. A deposit discourages theft, and the scheme closes during Montreal's harsh winter.
http://www.bixi.ca/

Universal Transit Passes at Canadian Universities, Transport Canada
Students at the Universities of Victoria, Western Ontario, and Saint Mary's are obliged to pay for passes that give them unlimited access to local public transit services. As intended, this has resulted in a dramatic increase in the number of students taking public transit. Saint Mary's for example has seen an approximate doubling in campus transit ridership.
http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs25E_Universaltransitpasses.pdf

Car Sharing in Canada: Making More Sustainable Personal Travel Choices, Transport Canada
This study describes the Vancouver-based Co-operative Auto Network (CAN) and Montreal-based Communauto car-sharing organizations, which have 2,000 and 7,000 members respectively. Car sharers have GHG emissions and driving distances 10 times lower than the average driver, and only around 10-15% of car sharers or their partners own a vehicle.
http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs27E_CarSharingINCanada.pdf

Biodiesel in Transit and Municipal Fleets, Transport Canada
Municipal fleets are typically responsible for 3-5% of municipality-wide GHG emissions, hence many municipalities are turning to biodiesel. Brampton, Saskatoon, and Halifax were the first to do so, converting fleet vehicles, buses and even marine ferries. They found that biodiesel reduced emissions of CO_2 and other gases, reduced engine wear and improved fuel economy for minimal cost.
http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs31E_biodiesel.pdf

Also see:

- **BC Transit Diesel Electric Hybrid Buses** case study in Corporate Operations, Fleets, above

Vehicle Technologies

enviroTruck: The Cleaner, Greener Transportation Choice, Green Fleets BC
In June 2008, BC's first enviroTrucks came into service. For every older truck replaced with an enviroTruck the GHG emission savings are the equivalent of removing 10 cars from the road. They are 20% more fuel efficient than older trucks, reduce particulate matter by 90% and nitrous oxide emissions by 45%. They also contain a feature to reduce idling time.
http://greenfleetsbc.com/index.php?option=com_content&task=view&id=74&Itemid=1

Novex Courier - Canada's First Carbon Neutral Fleet, Green Fleets BC
With 102 vehicles, Novex Courier's fleet was made carbon neutral through a greening of the fleet and some offsetting. The fleet now contains hybrid cars, and biodiesel and natural gas powered trucks and vans. Replacing twenty cars with Honda Civic hybrids reduced GHG emissions by approximately 60 tonnes a year alone.
http://greenfleetsbc.com/index.php?option=com_content&task=view&id=61&Itemid=78

Also see:

- **BC Municipalities Take On Biodiesel** and **BC Transit Diesel Electric Hybrid Buses** in Corporate Operations
- **Biodiesel in Transit and Municipal Fleets** in Transportation, Transit, above

Idling

Halifax Tackles Fleet Idling, Natural Resources Canada

To start tackling fleet idling Halifax Regional Municipality educated fleet managers of four separate municipal vehicle fleets, responsible for approximately 1800 vehicles, on the negative impacts of vehicle idling. A key result was successfully convincing upper management of the validity, feasibility and desirability of driver anti-idling education.

http://oee.nrcan.gc.ca/transportation/idling/material/reports-research/ecology-action-report.cfm?attr=16

Richmond School District Idle-Free, Idle Free BC

In fall 2005, Richmond School Board worked together with the City of Richmond to pilot an idle-free project. Starting with two high schools, the campaign has spread to others, with schools receiving free anti-idling signs and students receiving training as awareness-raising ambassadors. The students have been instrumental in developing and spreading the campaign.

http://www.idlefreebc.ca/resources/downloads/IdleFreeResources/Richmond_School_District.pdf

An Idle-Free Mississauga, Transport Canada

In 2001 the City of Mississauga ran a year-long anti-idling marketing project, encouraging motorists at various locations to turn off their engines whilst parked. A post-campaign survey showed an increase of 5% in the number of households that believed idling caused unnecessary air pollution (from 90 to 95%), and an increase of 23% in awareness of the term “idle-free zone”.

http://www.tc.gc.ca/programs/environment/UTSP/docs/casestudiesPDF/cs08E_IdleFreeZone.pdf

Also see:

- **enviroTruck: The Cleaner, Greener Transportation Choice** in Transportation, Vehicle Technologies, above

Buildings

Green Buildings

Green Value of Green Buildings, Metro Vancouver

This document presents case studies of twelve green buildings in North America, eight of which are in Canada. The buildings covered are mainly offices and university buildings, but include a Paramedic Service Headquarters, a technology park, retail, a residential high-rise and a co-housing community. The key green features of each building and the environmental, social and financial benefits are described.

http://www.metrovancouver.org/about/publications/Publications/greenvaluecasestudies.pdf

The Silva – Canada's First LEED Certified Residential High-Rise, NRCan

Completed in February 2005, the Silva in Vancouver was Canada's first LEED-certified multi-unit high-rise residential building. The project boasts a 60% reduction in water use (compared to the region's average), 27% decrease in stormwater runoff and 14% reduction in energy use (compared to standard practices), and during construction 83% of waste was recycled.

http://www.sustainablebuildings.gc.ca/default.asp?lang=En&n=46259395-1

Gulf Islands National Park Reserve Operations Centre LEED Platinum, Canada Green Building Council

This building in Sidney BC, owned by Parks Canada, was the first Canadian project to achieve LEED Platinum certification. Energy cost savings of 75%, energy intensity savings of 49%, and potable water savings of over 60% were achieved. Among its innovative features the building has solar photovoltaic panels, an ocean source heat pump and a rainwater collection system.

http://my.cagbc.org/green_building_projects/leed_certified_buildings.php?id=41&press=1&draw_column=3:3:2

Also see:

- all case studies in Corporate Operations, New Buildings, above
- all case studies in Buildings, Site Planning, below

Site Planning

Sustainable Site Planning at CIRS (Centre for Interactive Research on Sustainability), University of British Columbia

Among the many sustainability features of CIRS, all of its internal lighting is provided by the sun during daylight hours, and almost all of the ventilation is provided naturally by the wind. Local products were sourced for the construction, and the site has been designed so that there is zero stormwater run-off.

http://www.cirs.ubc.ca/

Passive Solar Design for Space Heating at CMHC's Healthy House, Toronto, Canada Mortgage and Housing Corporation

CMHC's Healthy House in Toronto has used its site orientation, large energy-efficient south-facing windows, and thermal mass to maximize the heating potential from sunlight. As a result the house only requires a tenth of the energy for space heating as a conventional house. Careful design ensures the house does not overheat during summer.

http://www.cmhc.ca/en/co/maho/yohoyohe/heho/hehoto/hecoveelsy/index.cfm

Also see:

- **Langley Civic Facility Earns LEED-CI Silver Rating** in Corporate Operations, New Buildings, above
- **Simon Fraser University's "UniverCity"** in Land Use, Smart Growth, above

Infrastructure

District Heating

District Heating Best Practice – Detailed Case Studies, Canadian District Energy Association (CDEA)

Twenty-four one-page district energy case studies can be found on the CDEA website. Case studies included are heating (or cooling) by natural gas boilers, combined heat and power, solar, biomass, waste, manure biogas, and heat pumps using the ground, lakes, or sea.

http://cdea.ca/resources/best-practices/compendium-of-case-studies/

Waste Wood Heats Up Revelstoke, Federation of Canadian Municipalities

The City of Revelstoke explored community energy opportunities using local waste wood. A CHP plant (Combined Heat and Power) was investigated, but ultimately the City proceeded with a heat only option, supplying heat to Revelstoke buildings via a district heating network, reducing GHG emissions by about 4,000 tonnes a year and improving local air quality.

http://www.sustainablecommunities.ca/Search/PDF/EF2316%20Revelstoke%20EN.pdf

North Vancouver Keys Up Mini-Plants, Federation of Canadian Municipalities

The project assessed technical, environmental, and economic feasibility of delivering energy using a series of mini-plants connected to district heating, instead of one large plant, so construction could be staggered to match the course of the area's development. The mini-plants system produces significantly lower emissions than if each building had its own boiler.

http://www.sustainablecommunities.ca/Search/PDF/EF2578%20North%20Vancouver%20EN.pdf

Also see:

- all case studies in Land Use, Complete Communities, above
- **Wood-Fired Combined Heat and Power (CHP). St. Paul, Minnesota** in Renewable Energy, Biomass below
- **Ground-Source Heating Boosts Tofino Resort's Bottom Line** in Renewable Energy, Heat Pumps, below
- list of district heating schemes in Canada, p.34 of the Community Energy Association's Renewable Energy module: *Heating Our Communities* http://www.communityenergy.bc.ca/sites/default/files/CEA_REG_Heating_Module_2008.pdf

Heat From Wastewater

Vancouver Warms Up To Wastewater Heat, Federation of Canadian Municipalities

A feasibility study to assess the potential for Metro Vancouver sewers to be used as heat sources and sinks was conducted. An unobtrusive, low cost and proven technology called "Rabtherm" was identified with significant economic and environmental benefits. A key lesson learned is that the technology is best installed during a development's construction.

http://www.sustainablecommunities.ca/Search/PDF/EF3009%20GVRD%20Sewers%20E.pdf

Okanagan College Utilizes Heat From a Wastewater Treatment Plant, Community Energy Association

In 2003 Okanagan College undertook an energy retrofit of some campus buildings and decided to use heat pumps to extract heat from the wastewater of a treatment plant owned by the City of Kelowna. The capital cost was $1.5 million and savings are approximately $100,000 a year. Capital costs would have been lower if the treatment plant had been closer.

Page 24 of http://www.communityenergy.bc.ca/sites/default/files/CEA_REG_Heating_Module_2008.pdf

Also see:

- **Cheakamus Crossing, Whistler – Compact, Mixed-Use, and Alternative Energy** in Land Use, Complete Communities, above

Landfills

Hartland Landfill Gas Utilization Project, Victoria, Capital Regional District (CRD)

The CRD owns and operates Hartland landfill, the only landfill for Greater Victoria. From February 2004 the site's landfill gas was not just collected and flared but also used to generate 1.6 MW of electricity, enough for 1,600 homes. To overcome the initial costs the project was developed as a financially innovative cooperative private/public partnership.

http://www.crd.bc.ca/waste/documents/fcm_landfillgas.pdf

Burnaby Waste-to-Energy Facility, Metro Vancouver

Opened in 1988 and upgraded several times since, the Greater Vancouver Regional District's Waste-to-Energy facility in South Burnaby incinerates about 20% of the Lower Mainland's garbage to produce about 960 tonnes of steam and 400 MWh of electricity a day. The steam is used in a nearby paper plant helping offset fossil fuel use.

http://www.metrovancouver.org/about/publications/Publications/WasteEnergyFactsheet.pdf

Also see:

- **Corporate Operations**, e.g. streetlighting, drinking water

Renewable Energy

Solar

Solar Thermal for Space Heating and Hot Water at Drake Landing Solar Community, Okotoks, Alberta, Enerworks

This community of 52 homes in Okotoks uses 900 solar thermal collectors with seasonal ground storage to supply 90% of the space heating and 70% of the hot water demand of the houses. Five tonnes of GHG emissions are reduced per home per year. It was North America's first residential solar community.

http://www.enerworks.com/Pdf/CaseStudies/Drake_Landing_Solar_Community_rev1.0.pdf

Solar Thermal at Hyde Creek Recreation Centre, Port Coquitlam, BC, Community Energy Association

In 2004 the City of Port Coquitlam completed an energy retrofit of Hyde Creek Recreation Centre by installing a high efficiency boiler, heat recovery system and 42 solar thermal panels. Natural gas consumption was reduced by 44% or $40-50,000 a year, with the solar panels alone accounting for an estimated $4,000 of savings.

Page 30 of http://www.communityenergy.bc.ca/sites/default/files/CEA_REG_Heating_Module_2008.pdf

Solar Photovoltaic Lighting in Kelowna, BC, Community Energy Association

The City of Kelowna has many public-space lights, powered by solar photovoltaics. These public solar lighting systems are designed and manufactured by the Victoria-based company, Carmanah Technologies. There are other solar photovoltaic installations in the city on parking kiosks and pedestrian signals.

Page 13 of http://www.communityenergy.bc.ca/sites/default/files/Powering%20Our%20Communities.pdf

Also see:

- **LEED Gold for White Rock Operations Building** in Corporate Operations, New Buildings, above
- **Montreal's Public Bicycle Scheme** in Transportation, Transit, above
- **Operations Centre Gulf Islands National Park Reserve** in Buildings, Green Buildings, above
- **District Heating Best Practice – Detailed Case Studies** in Infrastructure, District Heating, above

Wind

Wind Farm Benefits – Prince Wind Energy Project, Ontario, Canadian Wind Energy Association

The area around City of Sault Ste. Marie in Ontario is host to 126 turbines of 1.5 MW capacity, a 189 MW wind farm. Operational from November 2006, the area produces 534 GWh a year, or enough electricity for 61,660 homes, and bring $1.6 million of revenue a year into the local community. Seventeen full-time jobs have also been created in operation and maintenance.

http://www.canwea.ca/images/uploads/File/Case_studies/CanWEA_Brookfield_EN.pdf

Canada's First Wind Co-operative, Toronto, Canadian Wind Energy Association

The Exhibition Place turbine in Toronto, generating from January 2003, was North America's first urban wind turbine. The 750 kW wind turbine has an innovative ownership model under a wind co-operative. It generates 1.4 million kWh a year, reducing GHG emissions by 1,400 tonnes. The project has been a tremendous success and is being replicated elsewhere.

http://www.canwea.ca/images/uploads/File/Wind_Energy_Policy/Economic_Impacts/Toronto_Case_Study.pdf

Wind Turbines Powering Whitehorse, Yukon, Energy, Mines, and Resources – Government of Yukon

Two wind turbines powering Whitehorse, Yukon, prove the viability of wind energy in northern communities. A good wind resource and a reliance on expensive diesel generation during winter when it is too cold for hydro, made wind attractive. A 150kW turbine was installed in 1993, and in 2000 it was joined by a 660 kW turbine. Some modifications to the turbines have been necessary because of the extreme cold.

http://www.emr.gov.yk.ca/energy/wind.html

Heat Pumps

Ground-Source Heating Boosts Tofino Resort's Bottom Line, GeoExchange BC

Pacific Sands Beach Resort, adjacent to Tofino, constructed 42 new waterfront villas with a central ground-source heating system providing heat to all of them through district heating. The payback for the ground-source heating system is about 6 years and the energy savings at over 60% compared to electricity, which was the optimal conventional alternative for the site.

http://www.geoexchangebc.ca/casestudy/PacificSands.pdf

Ground-Source Heat Pump Replaces Aging Ice Plant and Electric Heaters, CanREN

In 1994 Oliver Curling Club in Oliver, BC, replaced its aging ice-making ammonia refrigeration system and electric heaters with a ground-source heat pump. With the energy bills reduced by half the installation paid for itself in just three years and also allowed the club to reduce labour costs. In addition the improved indoor environment led to increased rentals of the lounge.

http://www.canren.gc.ca/app/filerepository/43672FF2263046F080DB6C6FA6D0DBB5.pdf

Also see:

- **LEED Gold for White Rock Operations Building** in Corporate Operations, New Buildings, above
- **Langley Civic Facility Earns LEED-CI Silver Rating** in Corporate Operations, New Buildings, above
- **Cheakamus Crossing, Whistler – Compact, Mixed-Use, and Alternative Energy** in Land Use, Complete Communities, above
- **Gulf Islands National Park Reserve Operations Centre Achieves LEED Platinum** in Buildings, Green Buildings
- **District Heating Best Practice – Detailed Case Studies** in Infrastructure, District Heating, above
- all case studies in Infrastructure, Heat From Wastewater above

Biomass

Biomass Combustion System for a Forestry Products Facility, Depository Services Program

Greenwood Forest Products in Penticton, BC, had an issue with disposing of its wood dust from its sanding operations. In 2002 it installed a biomass combustion system to turn the problem into free space heating for its factory, reducing its gas costs and GHG emissions.

http://dsp-psd.pwgsc.gc.ca/Collection/M92-252-2002E.pdf

Wood-Fired Combined Heat and Power (CHP) at St. Paul, Minnesota, Community Energy Association

The City of St. Paul, Minnesota has a large wood-fired CHP plant feeding a district energy scheme, providing electricity, heating, and cooling to the city. The scheme has improved air quality as buildings have removed their chimneys and cooling towers, and backyard burning and landfilling of green waste have been reduced.

Page 11 of http://www.communityenergy.bc.ca/sites/default/files/CEA_REG_Heating_Module_2008.pdf

Also see:

- **Triple Bottom Line in Practice: From Dockside to Dockside Green** in Land Use, Complete Communities
- **Waste Wood Heats Up Revelstoke** and **District Heating Best Practice – Detailed Case Studies** in Infrastructure, District Heating, above

Run-of-the-River Hydro

Micro Power for the Hupacasath, Federation of Canadian Municipalities

In March 2004 Green Municipal Funds were used to prepare a detailed water permit application for a joint run-of-the-river micro-hydro project between the Hupacasath First Nation and City of Port Alberni, on Vancouver Island. The project generates enough electricity for 950 homes, and annual GHG emission reductions are estimated at 4-5,000 tonnes.

http://www.sustainablecommunities.ca/Search/PDF/EF3869%20Port%20Alberni%20EN.pdf

Rutherford Creek Run-of-the-River Hydro, Innergex Power Income Fund

The Rutherford Creek Facility is a run-of-the-river installation close to Pemberton BC, commissioned May 2004. This 49.9 MW facility powers about 18,000 homes, and over the next 40 years will mitigate approximately 2.9 million tons of GHGs.

http://www.innergex.com/en/energie/02-11-01-rutherford-somm_e.html

ADDITIONAL CASE STUDIES

Many additional energy/GHG-related case studies are available at the following websites:

BC Sustainable Energy Association	http://www.bcsea.org/
BC Hydro	http://www.bchydro.com/
Biofleet	http://www.biofleet.net/
Canada Mortgage and Housing Corporation	http://www.cmhc-schl.gc.ca/
Canadian District Energy Association	http://www.cdea.ca/
Canadian Green Building Council	http://www.cagbc.org/
Cascadia Green Building Council	http://www.cascadiagbc.org/
Canadian Wind Energy Association	http://www.canwea.ca/
Climate Change Central	http://www.climatechangecentral.com/
Community Energy Association	http://www.communityenergy.bc.ca/
Community Research Connections	http://www.crcresearch.org/
EnerCAN	http://www.enercan.ca/
Federation of Canadian Municipalities Centre for Sustainable Community Development	http://www.sustainablecommunities.ca/
Green Buildings BC	http://www.greenbuildingsbc.com/
Green Fleets BC	http://www.greenfleetsbc.com/
Idle Free BC	http://www.idlefreebc.ca/
Natural Resources Canada	http://www.nrcan-rncan.gc.ca/com/
Natural Resources Canada, Canadian Renewable Energy Network	http://www.canren.gc.ca/
Natural Resources Canada, Sustainable Buildings	http://www.sustainablebuildings.gc.ca/
Ontario Ministry of Energy and Infrastructure	http://www.energy.gov.on.ca/
Retscreen	http://www.retscreen.net/
SmartGrowth BC	http://www.smartgrowth.bc.ca/
Smart Growth on the Ground	http://www.sgog.bc.ca/
Terasen Gas	http://www.terasengas.com/
Transport Canada	http://www.tc.gc.ca/
Victoria Transport Policy Institute	http://www.vtpi.org/
West Coast Environmental Law	http://www.wcel.org/