

Integrated Resource Recovery Inventory - BC Projects

Ministry of Community and Rural Development

Title	Proponent	Project Type	Location	Stage	Funders	Private Sector	Budget	Economic Benefits	GHG Reduction
Vancouver/Lower Mainland									
Lulu Island Wastewater Treatment Plant (WWTP) Biogas Upgrade	Metro Vancouver; Paradigm Environmental Technologies; National Research Council	WWTP to be upgraded with anaerobic digestion. Biogas will be converted to heat and electricity (cogeneration).	Lulu Island Sewage Wastewater Treatment Plant, near Vancouver	Announced 2008, operational by 2010	Gas Tax-2.4million, ICE Fund \$3 million	Paradigm Environmental Technologies, Micro Sludge	\$12 million	Reduces ongoing operating costs by more than \$500,000 per year, Reduced Capital Costs by eliminating purchase of \$14 million of additional anaerobic digesters and dewatering equipment.	43% of the Lulu Island WWTP's emissions.
Southeast False Creek Neighbourhood Energy Utility (NEU)	City of Vancouver	District Energy System recovers waste-heat from sewage. Provides space heating and domestic hot water to 16,000 residents in SE False Creek and Olympic Village. Will be integrated with a new municipal sewage pump station, increasing efficiency. This is the first Thermal Net Metering and Raw Sewage Heat Recovery System in Canada.	Vancouver	Ready for 2010 Olympics	Gas Tax, FCM Loan, Borrowing		\$36 million	Eliminates need for space heating and domestic hot water boiler production facilities in individual buildings. Operation will contribute \$500,000 per year in wages. 1st phase will inject \$28 million into consulting and construction. Development of technologies will be a model for future projects. City of Vancouver expects 6% Return on Investment.	NEU will supply 70% of neighbourhood's annual thermal needs. It is incorporated into City's Climate Change Action Plan. Will likely lead to reduction of at least 30% of emissions for Southeast False Creek.
Lions Gate Wastewater Treatment Plant (WWTP) Biogas Upgrade	Terasen Gas Inc.	Gas purification to recover biomethane from Metro Vancouver's Lions Gate WWTP.	Vancouver	Announced July 2008; expected completion late 2009	ICE Fund 370,000	Terasen Gas, QuestAir	\$1.12 million	The project will showcase technology used to produce biomethane from wastewater, so it can be applied to other biogas upgrade projects in municipal waste and agricultural sectors	The methane will be turned into higher-quality natural gas and injected into Terasen's natural gas pipeline system, providing enough heating energy for approximately 100 homes.
Landfill Gas Collection and Utilization	City of Vancouver	Landfill gas capture and sale for heat-Maxim pipes LFG to CanAgro Greenhouses, and at the greenhouse burns the gas generating 5.55 MW of electricity for sale to B.C. Hydro and 100,000 GJ/year of heat for sale to CanAgro.	Burns Bog landfill	Operational since 2003	Green Municipal Fund provided a multi-million dollar loan as part of the financing scheme.	Maxim Power Corporation	Total cost of the project approximately \$10 million, invested by Maxim Power Corp.	The City of Vancouver will receive revenues of approximately \$400,000 per year for the duration of the 20-year contract period. Delta expects to received between \$80-\$110K per year in municipal tax revenue. Low-cost heat also supports the protection of 300 greenhouse jobs.	The project results in the recovery of approximately 500,000 GJ/year of energy, the total energy requirements of 3,000 to 4,000 homes, and results in a reduction of more than 230,000 tonnes per year CO2 equivalents. This is equivalent to taking 45,000 automobiles off the road. CanGro's use of fossil fuels also reduced by 20%.
Whistler Athlete's Village District Energy Sharing System (WAVDESS)	Whistler 2020 Development Corporation	District Heating from sewage-will provide 90% of heating and up to 75% of hot water heating for Olympic Village.	Whistler	Operational since			\$2.97 Million capital cost, 37,000 operation and maintenance, and financing 170,000/year (3% discount rate) for annual cost of 207,000	Energy at 14\$/gigajoule (including capital cost financing, system maintenance, etc.)	70% reduction compared to Business As Usual
Catalyst Power	Abbotsford	Anaerobic Digestion for agriculture	Abbotsford	Announced July 2008	ICE Fund 1.5 million		\$4.5 million		

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Port Mann Landfill gas capture		Landfill gas used to fuel dryers in wallboard manufacturing plant.	Surrey	In operation since 1993					GHG reduction equivalent to 40,000 tonnes of CO2
Jackman Landfill gas capture		Landfill gas used to heat commercial greenhouses and to provide Co2 to plants (flora).	Aldergrove, Lower Mainland	In operation since 1995				Reduced heating bill; plants grow faster in a Co2 enriched environment.	GHG reduction equivalent to 18,000 tonnes of CO2
Greenhouse Wood-Fired Heat and CO2 Recovery Plant	SunSelect Produce	Wood waste energy plant will provide heat to power greenhouses.	Aldergrove, Lower Mainland	Announced July 2008	ICE Fund \$2.24 million		\$6.69 million	\$4.3 million per year savings to the greenhouse industry. Commercialization of the technology will help stimulate jobs.	22,000 tonnes per year. Clean energy from a renewable fuel source and is 20% more efficient than existing wood waste plants.
Direct-Fired Boiler Biomass Gasification Demonstration Project	Nexterra, FP Innovations and Kruger Products	Direct-fired biomass gasification system to heat Kruger tissue mill, can accommodate a wide range of wood wastes.	New Westminster	Announced July 2008, slated for completion by end 2009	ICE Fund \$1.5 million, Natural Resources Canada, Ethanol BC	Nexterra, FP Innovations and Kruger Products	\$9 million	Will generate \$1.25 million of labour, 540,000 man hours of BC labour, and save \$2.8 million/year of net energy at the mill, helping to protect 200 jobs	22,000 tonnes per year, 250,000 tonnes by 2014.
Wastewater Recovery at Vancouver Convention Center (VCC)	BC Pavilion Corporation (PavCo) - a Provincial Crown Corporation	On-site sewage treatment provides treated greywater for toilet flushing and irrigation of green roof. Aerobic digestion; no biogas capture; biosolids go to landfill. System requires consistent flow of sewage, therefore during much of the year, project imports and treats sewage from Metro Vancouver's grid.	Vancouver	Operational since April, 2009	Project funded by Infrastructure Canada's Western Economic Diversification program	Project Management by Stantec Consulting	Entire development: \$883.2 million.	Given the low cost of water, and the lack of other forms of resource recovery, economic benefits of the sewage treatment plant appear minimal at present.	Proportionate to emissions from water savings.
The Village - District Energy at Fraser Mills	Terasen Energy Services and The Beedie Group	Local industrial waste heat integrated with geexchange and natural gas. Likely that a biomass system will be integrated. Explicitly interest in other heat source-inputs over long-term.	Coquitlam, BC	Energy system still in planning phase. Phase 1 projected to be in operation by 2011			\$25 Million		"The district energy system will reduce the demand on the province's electricity grid, and could displace up to 8,200 tonnes of greenhouse gas emissions a year – the equivalent of removing more than 2,500 cars from the road.
Geo-Exchange District Energy Utility for Upper Gibsons	Town of Gibsons	Community Energy System (geo-exchange) - while not yet an IRR project, plans to expand in future with waste-heat inputs, such as wasted refrigeration heat form ice rink, exist.	Gibsons, BC		\$244,080 from Island Coastal Economic Trust (ICET)		975,320	Energy savings to customers of over 60%	Expected to reduce GHG emissions by 90%
Richmond Oval - Waste-heat and Water Capture and Re-use	City of Richmond	Heat will be recovered from the ice refrigeration plant and reused for space heating and domestic hot water. The potential for use in a district heating system is being explored. The facility also uses the roof for rainwater capture, and the water is re-used for toilet flushing and irrigation.	Richmond, BC	Construction completed					

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Hillcrest/Nat Bailey Stadium Park Venue - Integrated Heat Recovery Solution	City of Vancouver	Waste heat will be recaptured from the curling rink refrigeration plant to heat the adjacent aquatics centre. This will include the pool water and pre-heating the domestic water; the majority of the energy will be applied to space heating	Vancouver, BC	Completed in 2009. Conversion to community center to begin after Olympics.	VANOC, and federal and provincial funding.				
Whistler Sliding Center - Integrated Heat Recovery Solution	Vancouver Olympic Committee (VANOC); post-games ownership will revert to Whistler Legacies Society	Waste heat recovered from refrigeration plant will be reused to heat refrigeration and guest services buildings, with potential capacity to connect to RMOW District Heating/Cooling system in the future. Heat will also be recovered from exhaust air systems and used to preheat the incoming outside air.	Whistler, BC	Completed 2009.	VANOC, and federal and provincial funding.				The Whistler Sliding Centre, a seasonal operation, will use about 20% of the heat captured from its refrigeration plant to heat the plant building itself and a guest services building. Because of the Sliding Centre's relative isolation, there is no immediate use for the rest of the recaptured heat. In the future, as the Resort Municipality of Whistler implements its Sustainable Energy Strategy, this heat source could be connected to a district heating and cooling system.
Vancouver Island									
Community Energy System at Dockside Green	Nexterra and Corix	Biomass Gasification Project - will gasify locally-sourced wood waste to produce heat to fire a boiler and provide heat and hot water for every building in the development.	Victoria	In operation since 2009	\$2.2 million from Natural Resources Canada, and \$350,000 from the Green Municipal Fund	Terasen Energy Services, Windmill Development Group Ltd., Vancity Capital Corporation and Corix Utilities Inc.		Planned selling excess heat to neighbouring buildings.	Combined energy efficiency measures could result in potential reduction of 5,245 tonnes annually.
Wastewater Treatment Plant (WWTP) at Dockside Green	Windmill Developments	100% of wastewater treated on-site; re-use of over 30 million gallons of water per year; water used for irrigation, toilet flushing, and other non-potable applications; potential sewer-heat capture and use with Community Energy System described above.	Victoria	In operation since 2009				In total, approximately \$80,000 per year in water purchases will be saved through water-reuse. Residents will also not need to pay sewage fees.	Emissions from water treatment.
Hartland Landfill Gas Utilization Project	Capital Regional District	Landfill gas is collected, treated and then fires a 20-cylinder engine to generate 1.6 MW of electricity.	Saanich	In operation since 2004	CRD funded 70%, Maxim Power 30%	Maxim Power	\$2.7 million, not including the gas capture system that was already in place.	CRD receives royalties between \$250,000 and \$2 million over the 20-year project life, depending on the amount of electricity produced and its market value.	
Saanich Peninsula Thermal Energy Recovery System	Capital Regional District	District Heating from Sewage will heat nearby buildings	Saanich	Construction beginning spring 2009	Gas Tax-2.98 million		\$3.652 million	CRD would sell energy to users	38% reduction in heating emissions

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Greater Nanaimo Pollution Control Center	Regional District of Nanaimo	Sewage treatment plant - anaerobic digestion and use of biogas to heat and operate treatment plant. Biosolids composted and used as forest fertilizer.	Nanaimo, BC	Biogas project in operations since 2004.					
Westhills Sewage Treatment Plant		LEED neighbourhood design project includes integrated utility with on-site sewage treatment, energy production, and water recovery connected to compulsory district heating system.	Langford, CRD	Construction slowdown due to economic crisis; future of treatment plant now uncertain.					
Okanagan/Southern Interior									
Okanagan College District Heating from Sewage	Okanagan College	Campus heated with new district energy system; primary heat-source is effluent from nearby Kelowna Wastewater Treatment Plant.	Kelowna	1st WW Heat recovery project in Canada-completed in 2003	Natural Resources Canada's Energy Innovators Initiative and Aquila Networks Canada	N/A	\$1.5 million	Annual savings of \$100,000 (15 year cost recovery)	8,000 tonnes/year. However, reductions not calculated separately from building retrofits, which increased heat retention. Exact reduction from sewer-heat is therefore not known.
Nutrient Recovery at Kelowna Wastewater Treatment Facility	City of Kelowna	Sludge is thickened, dewatered, and blended with polymer, then trucked to the biosolids composting site where it is mixed with wood waste and composted to create Grade A soil conditioner called Ogogrow.	Kelowna						Equivalent to avoided fertilizer consumption. Heat from effluent captured by Okanagan College district heating grid, reducing campus emissions.
Upgrade of Secondary WWTP to Advanced WWTP	Penticton	Currently, water is reused for irrigation and biosolids are composted and used as fertilizer for landscaping and agriculture. The upgrade will allow capture of methane and use it to fire micro-turbines, generating heat and electricity. Heat will be used in the plant and in the future, excess heat can be sold to a district heating grid.	Penticton	Construction beginning spring 2009	Reserves, Borrowing, DCCs, and \$10.6 million from Gas Tax	Earth Tech	\$30,642,500	Operational costs will be recovered through fees.	Use of methane in place of natural gas will offset 95.3 tonnes of GHG emissions. Emissions from nearby businesses will be reduced by a district heating system. 4.2 tonnes will be offset from generating electricity with biogas and micro turbines. After a 20 year upgrade, 7.5 tonnes annually will be saved by the micro turbines. More efficient effluent filtration and energy efficiency from improved bioreactor aeration will reduce 1.5 and 4.1 tonnes respectively.
Wastewater Treatment Upgrade	City of Kamloops	Upgrade of the existing wastewater treatment plant to provide tertiary treatment and nutrient management.	Kamloops	Announced February 18, 2009	\$14.2 million from the federal and provincial governments		valued at \$21.3 million	"Creating jobs, improving our quality of life, and helping our economy now and for years to come. It's estimated that this investment will create 1,750 direct and indirect jobs."	reduce greenhouse gas emissions through methane capture, allow for the reuse of reclaimed wastewater effluent and composted sludge, and increase effluent quality for the protection of the Thompson River.

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Turnkey gasification system	Tolko, Nexterra	Upgrade to existing mill allows conversion of wood residue into syngas, used instead of natural gas to dry veneer and heat water for log conditioning at the Heffley Creek sawmill.	Heffley Creek, near Kamloops	In continuous operation since May 2006	Natural Resources Canada, Ethanol BC, Technology Early Action Measures (TEAM)	Nexterra		Savings of \$1.5 million per year in fuel costs.	Reduction of 12,000 tonnes of GHG emissions annually and reduction of VOCs.
Halfway Ranch Micro-Hydro Generating Plant		Converts energy of water moving through an irrigation system into hydro electric power that can be added to the grid.	Halfway Ranch, west of Kamloops	Announced July 2008	ICE Fund \$40,000		\$200,000		
Turnkey gasification System	Domtar (formerly Weyerhaeuser) and Nexterra	Gasifiers convert wood biomass to combustible syngas, which is direct-fired into a lime kiln - this is a pilot study, prior to a full-scale commercial project.	Kamloops, BC	Expected completion in 2009	Natural Resources Canada, National Research Council - Industrial Research Assistance Program, \$2.7 million from Sustainable Development Technology Canada	FP Innovations, Nexterra		Savings of \$4.5 million per year in fuel costs.	Reductions of 30,000 tonnes of GHG emissions annually.
Community Energy System	City of Revelstoke	Community district heating using energy from Biomass Boiler at Sawmill. Heat used for several building in downtown core. Uses 10% of wood-waste from Downie Sawmills.	Revelstoke	Operational since 2005	FCM Green Municipal Fund grant of \$1,348,000 and loan of \$1,348,000; Equity investment of \$1,250,000 from RCFC Holding Company; Loan of \$1,000,000 from the Revelstoke Credit Union. The City of Revelstoke will purchase up to \$1,000,000 in preferred shares (interest rate 7%) using its Electrical Utility. ICE Fund 750,000?	Downie Timber; FVB Energy	\$5.6 Million	Ten-year payback; 6.7 percent return on investment; 14.8 percent return on equity; Non-taxable source of city revenue.	45,000 GJ displacement of non-renewable fossil fuels such as propane, resulting in 3,700 to 4,000 tonnes avoided Co2 emissions; replacing local beehive burner; lower nitrogen oxide (NOX), sulphuric oxide (SOX) and particulate matter (PM). Since project began, the other 90% of the Mill's wood-waste has become increasingly valuable, and is now exported, mainly to Florida.
Wastewater Nutrient Recovery Study	City of Salmon Arm	Interest in capturing phosphate from the Wastewater Treatment Plant, most likely using a "struvite reactor". This is an emerging technology being researched through the University of British Columbia.	Salmon Arm, BC	Study completed.	Green Municipal Fund	N/A	\$58,000.00	Reduced accumulation of phosphate in water system equipment, which often leads to operational problems. Potential development of a new source of income for the city through the sale of recovered phosphate crystals, a slow release fertilizer.	Avoided emissions from fertilizer production and transport. Reduced eutrophication of the city's water source, Shuswap Lake.
Wastewater Recovery and Reuse	City of Vernon	Treated wastewater is used for irrigation, and digested waste is turned into compost and sold.	Vernon, BC	In operation for over 20 years.				Reduced capital costs; some revenue from fertilizer.	Reduced new fertilizer use; reduced energy use in water treatment and transport.

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Micro-hydro from existing waterworks infrastructure (gravity-fed)	District of Lake Country	1.1 Mw micro-hydro project. Captures waste-energy from gravity - existing drinking water infrastructure steeply sloped and must be slowed for safe use.	District of Lake Country	In operation since June 2009	\$2.8 Million Gas Tax and ecoENERGY for Renewable Power; \$500,000 low-interest loans from Federal government, and \$30,000 from Green Municipal Fund	Canyon Power	3.3 million	3,900 mwgawatt-hours of electricity per year will be provided. \$200,000 in electricity sales to BC Hydro provided.	Electricity for 400 homes provided within existing waterworks infrastructure.
Northern BC									
Turnkey Gasification System	UNBC	Biomass Gasification Project will gasify pine beetle infested biomass, produce heat to fire a boiler at the power plant on campus and to heat university buildings.	University of Northern British Columbia, Prince George	Announced July 2008	ICE Fund \$3.5 million	Nexterra	\$12.86 million	Will be a catalyst for replication as it is first of its kind, establish UNBC as a bioenergy "hub"; reduce fuel costs; 17,000 person hours of work.	3-4,000 tonnes per year by converting heating plant from natural gas to biomass. 80% reduction in emissions from current heating energy practices.
Enviro-Carbonizer	Alterna Energy	Energy from forest waste, mountain pine beetle infested biomass, eventually may incorporate municipal waste and scrap tires.	Prince George	Announced July 2008	ICE Fund \$3 million	Alterna Energy	\$8.16 million	Converts 180,000 tonnes annually, the plant is modular and can be used in other small and/or rural communities affected by the pine beetle.	
BCR	P.G. Interior Waste to Energy Group	Plant will use a chemical decomposition process to convert cellulosic feedstock (wood waste) into electricity, charcoal, and bio-oil. Plant will produce 8 megawatts of electricity from approximately 100,000 cubic metres of waste wood that would otherwise be burned or landfilled.	BCR Industrial Site, Prince George	Contract signed with BC hydro; Expected to begin operations Spring, 2010; expected to be fully operational by Spring, 2011.		P.G. Interior Waste to Energy Ltd.	\$50 Million	Approximately 50 to 75 construction jobs & creation of 70 permanent jobs to operate the facility.	Reduce the amount of government-permitted fine particulate allowed at the site by 70 per cent.
Mackenzie Green Energy Center	Pristine Power, Harbert Power and Balanced Power Engineering	Wood waste to cogeneration project - electricity and heat.	Mackenzie, BC	Expected completion date December 2009		Steam to be used at Pope and Talbot Mill.	\$225 million	260 construction jobs, 26 permanent jobs over 30 year life-cycle; cheap heat to Pope & Talbot mill \$5 million in property tax revenue to District of Mackenzie.	Enough electricity for 50,000 homes. Will likely result in closing of up to 6 beehive burners. Avoids burning/landfilling of up to 1 million tonnes of wood waste/year.