

Technical Protocol Plan

For Alberta Environment and Climate Change Central

Part B: Description of the Technical Protocol Plan

B.1 Description of the Project Type and How Reductions will be Achieved

The protocol covers the quantification of greenhouse gas (GHG) emission reductions, or carbon offsets, from eligible energy efficiency measures at end user facilities. This GHG quantification protocol can be used by project developers to quantify GHG emission reduction resulting from the implementation of energy conservation measures (ECM) in eligible facilities. These facilities must be located in Alberta; activity change must occur on or after January 1 2002; project must prove real, demonstrable, and quantifiable; not required by law; establish clear ownership of activity; and be verified by an independent qualified third party.

The GHG quantification protocol provides guidance on determining the energy baseline, comparing it to reporting period energy use and making appropriate adjustments for changing conditions affecting the baseline. The guidance for determining energy savings follows methods published by the Efficiency Valuation Organization in its International Performance Measurement and Verification Protocol (IPMVP) (www.evo-world.org).

The document offers two levels of rigour allowing users to select a simple or advanced approach. This flexibility allows users to maximize the GHG emission reductions quantified based on availability of data and budget. The simple approach requires less accurate data monitoring but in return utilizes more conservative quantification approaches therefore yielding less GHG emission reductions, while the advanced approach requires a more accurate and detailed monitoring approach but allows users to maximize the GHG emission reductions quantified and claimed.

This quantification protocol is applicable to the quantification of direct and indirect GHG emission reductions resulting from the implementation of energy conservation measures (ECMs) in new commercial and institutional (CI) buildings or for the retrofit of existing buildings. More specifically, this protocol is applicable and designed to accommodate ECM related to heating, ventilating, air conditioning and lighting systems. Other types of ECMs (i.e. building envelope, tap water heating, elevators, occupant small electrical equipment, residential kitchen and laundry, outdoor lighting, street lighting, swimming pool pumping or heating) may also be quantified with this protocol but must be clearly identified and the calculations procedures utilized must be justified in the project document. Examples of eligible buildings include but are not limited to: multifamily residences, hotel/motel/resort, retail stores (including food supply), retail malls, office buildings, arenas, hospitals and clinics, schools and universities, campus residences, community centres, library, and fire/ambulance service.

Real reductions will be achieved through the implementation of new ECMs in existing facilities beyond what would have occurred in the absence of the project, or through the construction of new facilities incorporating energy efficiency measures above and beyond those required by relevant legislation or normal business practice. In all cases, implemented ECMs will reduce energy consumption at project sites to levels below the

baseline case. Examples of ECMs include: replacement of existing equipment with more energy-efficient equipment, modifying operational practices to reduce energy demand, enhancing insulation or making other modifications to reduced energy losses, making process adjustments to reduce the amount of energy required. In all cases, functional equivalence in level of type and level of service provided in the project and baseline cases will be maintained. Depending on the complexity of the ECMs implemented, a testing period may or may not be required prior to full-scale implementation.

A net emission reduction would be achieved by such activities so long as a net reduction in overall energy consumption is achieved, since production of energy, particularly from fossil energy sources, has significant associated GHG emissions (typically combustion-related), including both direct and indirect sources.

A project must fully abide by the quantification and reporting methodology outlined in this seed document and the protocol in order to prove that the emission reductions are quantifiable.

To be eligible under this protocol, the projects implemented must create greenhouse gas emission reductions that are incremental to provincial regulations. Therefore projects or activities that are already covered in the Specified Gas Emitters Regulations or that are associated with actions to meet the outlined requirements under the Alberta's regulatory statutes and therefore, will not be eligible under this protocol.

In order for emissions reductions to be considered surplus, the baseline level of emission reductions must reflect the requirements of any federal regulation associated with the construction of new commercial buildings. These emission reductions must also be surplus to emission reductions achieved as a result of a Climate Change Incentive Measure [discussed further in this seed document in the section: Determining the Baseline Scenario].

Relevant documentation to establish the effect of these requirements must be provided in the description of the project for validation by the Offset System Program authority.

If the PP implements the requirements of this protocol in terms of data quality and data management, they should be able to provide sufficient information to a third party verifier to assess their emission reduction claim.

Any emission reductions quantified using this seed document's methodology cannot have already received Offset Credits; the emission reductions must be unique. A precise description of the location of the project and a clear definition of the ownership of the reductions should prevent double issuance.

The PP is to provide an ownership claim and evidence to support the claim including quit claims or private contracts with potential claimants of ownership. Potential claimants of ownership should be listed by the PP and at minimum include the: owner and manager of new commercial building, owner of the land, and all other parties to the new commercial building construction.

2.2 Description of Background Information/Best Practice Guidance Used

The following lists in Table 2.1 the background information used in the development of the GHG quantification approaches and/or the selection of the project and baseline scenarios in the proposed protocol, including sources of best practice guidance, best available science used and technical experts consulted.

TABLE 1 Good Practice Guidance

1. Document Title	2. Publishing Body / Date	3. Description
ISO 14064-2:2006 Specification With Guidance at the Project Level for Quantification, Monitoring and Reporting of GHG Emission Reductions or Removal Enhancements	Canadian Standards Association, through International Standards Organization. April 2006	This is the first edition of CAN/CSA-ISO 14064-2, Greenhouse Gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements, which is an adoption without modification of the identically titled ISO Standard.
International Performance Measurement and Verification Protocol, Volume I, II and III	US Department of Energy	The U.S. Department of Energy sponsored the development of this standard. It outlines measurement and verification (M&V) terminology and defines four M&V options to quantify energy and water savings. It is a savings-verification tool with principles that are applicable to commercial and industrial energy efficiency projects. Reviewed by 150 committee members.
Guideline 14-2002 Measurement of Energy and Demand Savings	American Society of Heating, Refrigerating and Air-Conditioning Engineers	The Guideline describes a consistent manner to measure energy savings due to building energy management projects. It provides a standardized set of energy and demand savings calculation procedures including measures for pre- and post-retrofit data to qualify the billing determinants and outlines a minimum acceptable level of performance in determining energy and demand savings.
Model Energy Efficiency Program Impact Evaluation	Guide under the US National Action Plan for Energy Efficiency November 2007	The Guide assists gas and electric utilities, utility regulators, and others in the implementation of the National Action Plan for Energy Efficiency and other goals. The Guide describes a structure and several model approaches for calculating energy, demand, and emissions savings resulting from facility-based energy efficiency activity.
Draft Energy Efficiency Methodology	GE-AES Greenhouse Gas Services (GHGS)	Greenhouse Gas Services has developed a rigorous Standard of Practice to ensure the environmental and scientific integrity. GGS designs its standard on a framework

		established by ISO 14064 and crafted its approach to maximize compatibility with other recognized standards.
Small Scale CDM Methodologies, and New Methodologies from UNFCCC	CDM Executive Board's website as of January 2008	SSC Methodology number - AMS-II.
Protocol Development Process	Alberta Environment, Carbon Offsets Solutions website	The outlined Process states the required steps in the development and approval process for the Alberta Offset system including 3 rounds of stakeholder input.
Draft Guide to Quantification Methodologies and Protocols	Environment Canada March 2006	This Guide outlined the steps taken to develop a quantification methodology and protocol under the proposed Federal Offset System.
Draft Greenhouse Gases- Guide for Protocol Developers	Environment Canada August 2008	This Guide supersedes the above listed document and provides detailed information on how to prepare and complete an Offset System Quantification Protocol.
Approved Quantification Protocol for Energy Efficiency Projects	Alberta Environment September 2007, Version 1	Scope of Protocol includes industrial, commercial, and agricultural process changes and facility retrofits in energy use per unit of productivity.
Draft Quantification Protocol for Commercial and Institutional Green Building Projects	Alberta Environment January 2008	Scope of Protocol includes implementation of new and retrofit buildings, for residential, commercial and institutional, in energy use per unit of productivity.
Offset Credit Project Guidance Document	Alberta Environment February 2008	This Guide outlines the process and requirements for undertaking Offset Projects in Alberta.
Offset Credit Verification Guidance Document	Alberta Environment September 2007	This Guide outlines the process and requirements for Verifiers to verify Alberta based Offset Projects.

2.3 Regulatory, Legal Requirements and/or Government Incentive/Grant Programs

Energy Efficiency Incentive and Rebate Programs throughout Canada

Source Legend

OEE

[Office of Energy Efficiency](#)

EC

[Environment Canada](#)

Fortis BC

[FortisBC](#)

Manitoba Hydro

[Manitoba Hydro](#)

NWTEnv

[NWT Environmental and Natural Resources](#)

Gaz Metro

[Gaz Metro](#)

C3

[Climate Change Central](#)

FEDERAL

Program	Details	Source	Type
ecoENERGY Retrofit	Provides federal grants and incentives to small businesses/homeowners to help them invest in energy/pollution saving upgrades	OEE	residential/ commercial
ecoENERGY Retrofit Incentive for Industry	Provides financial incentive to help small and medium industrial facilities implement energy-saving projects	NRCan	Industrial
ecoENERGY Energy Efficiency in Existing Buildings	As part of the ecoENERGY initiative, the program supports building owners by supplying training, energy rating and labelling systems, other assistance in energy efficiency maintenance.	NRCan	commercial/ industrial
Canada Mortgage and Housing Corp mortgage loan insurance premium refund	Offers a 10% refund on it's mortgage loan insurance premium when a borrower buys or builds an energy efficient home. The energy efficiency must be rated using EnerGuide rating system or be R-2000 certified	OEE	residential
Canada Mortgage and Housing Corp mortgage loan insurance premium refund	Offers a 10% premium refund on it's mortgage loan insurance premiums to individuals who use CMHC insured financing to renovate their existing home to make it more energy efficient	EC	residential
Genworth Financial Canada Energy Efficient Housing program	Instituted ane energy efficient housing program that offers the same reduction in loan insurance as CMHC and is based on the same criteria	OEE	residential
Project Porchlight	Campaign for supplying 1 free compact flourescent bulb to every household	EC	residential
ecoENERGY for Renewable Heat	Incentives are offered to install active energy efficient solar air and/or water heating systems. Eligible projects must be completed within 6 months of the signing of the contribution agreement with NRCan. Program runs from April1, 2007- March 31, 2011	EC	commercial/ institutional/ industrial
NRCan Commercial Building Incentive Program			

	Environment Canada EcoAction	Provides financial support to community groups that have measurable, positive impacts on environment. Projects are required to match funds. Maximum amount available per project is \$100,000	EC	Non-profit organizations
	PROVINCIAL			
	Program	Details	Source	Type
Alberta				
	Built Green Municipal Incentive building permit fee rebate	Offers a permit fee rebate for homebuilders who achieve R-2000 or Built Green certification. Percentage of rebate will be based upon the certification of R-2000, gold, silver, or bronze. Available in Calgary, Strathcona county, and Edmonton	OEE	residential
	City of Medicine Hat incentives for residential lots	Offering up to \$10,000 in incentives for residential lots which when built on receive Built Green certification, or instal solar water heating, or microgeneration installation	OEE	residential
	City of Lethbridge SunRidge development housing rebate	Offering homebuyers in the SunRidge development rebates for houses that meet the Gold standard for environmental performance targets. Homeowners will receive a rebate of \$3500 for Gold, and \$2500 for silver	OEE	residential
	City of Calgary residential toilet replacement program	Residents can receive a \$50 reward when they replace their old toilet with a new water saving, low flush toilet	EC	residential
	Alberta high efficiency furnace CO2RE rebate program	CO2RE is working with NRCan ecoENERGY retrofit program to help edmonton residents overcome the \$2000 installation fee for a new high efficiency furnace with variable speed motor. Eligible residents can receive up to an extra \$500 high efficiency furnace rebate from CO2RE as well as the ecoENERGY grant	EC	residential
	Alberta low income household high efficiency furnace CO2RE rebate program	Qualifying low income residents who replace their furnace with an ENERGY STAR qualified furnace with variable speed motors may receive a rebate up to \$2000 from CO2RE	EC	residential
	Climate Change Central Soak Up the Savings program	Albertans were offered a \$50 rebate to consumers who replaced old washers with ENERGY STAR qualified models. First program was launched in 2005, and the second in 2006	C3	residential
	Climate Change Central Exit to Savings program	A temporary rebate program which offered cash rebates to condominiums, apartment buildings, and seniors' complexes in Alberta to switch to LED exit signs from conventional signs. The program ran for three months.	C3	residential

Climate Change Central Furnace Replacement program	C3 ran a three month program in 2004 that offered up to a \$400 rebate to Albertans who purchased a high efficiency furnace under the \$1.5 million program.	C3	residential
Climate Change Central Furnace Replacement program 2	A second short term replacement program was hosted in 2005. Homeowners received up to \$300 for converting their old furnaces to ENERGY STAR rated furnaces or boilers.	C3	residential
Climate Change Central Alberta Plus program	Pilot program to encourage energy efficient design for commercial and industrial buildings. The program provided top up grants up to \$40,000 to the max. \$60,000 offered from NRCan	C3	residential
Climate Change Central ME First program	The 4 year program began in 2003 and offered municipalities in Alberta interest free loans to fund projects that reduced GHG emissions and increased energy efficiency. The fund helped municipalities install efficient aeration systems, traffic lights, furnaces, arena controls, etc.	C3	residential
Climate Change Central OnFarm program	Dairy, Poultry and Swine producers in Southern Alberta can receive an energy assessment for only \$200 of the total \$1800 cost. The assessment will show them how to become more energy efficient, save money, and protect resources.	C3	agricultural
Alberta Advanced Education and Technology Immigrant Outreach program	A collaborative project among environmental organizations in Alberta to provide immigrants with information on simple ways to save energy and encourages newcomers to maintain conservative practices from their homeland. The free ESL newsletter features over 40 energy efficient tips.	C3	residential
ATCO EnergySense	AES team offers both free advice and a range of cost-effective in-depth residential and commercial energy assessment services	NRCan	residential/ commercial
HAT Smart Medicine Hat Environmental Initiative	Program to educate and assist residents and utility customers in saving on resources like water, gas, and electric, etc. If individuals attend a conservation seminar held on the first Wednesday of every month, they can receive a \$200 discount coupon for a VerdaTech Home Evaluation	NRCan	residential
EPCOR Business Energy Audit	Analysis tool offered at no charge to EPCOR business customers. It provides a thorough breakdown of energy use of the company as well as customized recommendations for reducing energy consumption	EC	Industrial
EPCOR EnVest Environmental Stewardship program	EnVest Energy Efficiency through Epcor delivers electricity, natural gas, and water consumption reductions through a multi-staged energy	EC	Industrial

		<p>efficiency process involving assessments, audits, project management, and financing solutions</p> <p>This program provides information and increases awareness for residential customers regarding the energy efficiency of appliances, lighting, cooling, and control systems.</p>	EC	residential
	EPCOR Residential Appliance Buying Guidelines			
British Columbia				
	BC Hydro, Hydro Power Smart ENERGY STAR Appliance Rebate Program	Offering rebates on the purchase of new ENERGY STAR qualified appliances	OEE	residential
	The BC Government Provincial Sales Tax Exemption	Provincial sales tax exemption from February 21, 2007 - March 31, 2009 on pre-manufactured ENERGY STAR qualified windows, doors, skylights, etc. Up to March 1, 2009 rebates will be offered for ENERGY STAR qualified boilers, heat pumps, air furnaces, ground source heat pumps. If all are bought or leased for residential purposes	OEE	residential
	BC Hydro's Power Smart Program	Offers a \$30 rebate for vending machine sensors that are purchased/installed in B.C.	OEE	commercial
	Smart Wash Program Incentive on the purchase of high efficient clothes washers	The city of Victoria is offering a \$125 rebate on the purchase and installation of qualifying high efficiency clothes washers.	OEE	residential
	FortisBC incentive for energy efficient air source heat pumps	Offers all it's customers an incentive for energy efficient air source heat pumps through the PowerSense Air Source Heat Pump program. Will either consist of financing up to \$5000 over 10 years or a rebate	Fortis BC	residential
	Built Green Municipal Incentive building permit fee rebate	Offers a building permit fee rebate for homebuilders who achieve R-2000 certification or BuiltGreen certification. Rebates range from 30% of the permit fee for R-200- certification down to 10% for BuiltGreen bronze certification	OEE	residential
	Fortis BC New Home Program (NHP)	Offers home owners rebates on energy efficient windows, lighting and technologies for new construction projects	Fortis BC	residential
	Fortis BC ENERGY STAR windows rebate	Rebate based on \$.50 per square foot	Fortis BC	residential
	FortisBC incentive for energy efficient ground source heat pumps	Rebate or loan on energy efficient ground source heat pumps of either \$0.05 per kWh in savings or a loan of up to \$5000 over 10 years at 4.9%	Fortis BC	residential
	Fortis BC free compact fluorescent light bulbs under the NHP	With any new home construction receive 10 free CFL bulbs	Fortis BC	residential
	Fortis BC CFL bulb rebate	Receive up to \$5 per bulb purchased	Fortis BC	residential

BC Hydro Smart Fridge Buy Back Program	BC hydro will pick up free of charge any old, inefficient second refrigerator and will give a \$30 payment. The refrigerator must be in working condition and only 2 per customer account	EC	residential
BC exemption for material and equipment used to conserve energy	Provincial sales tax exemption on the purchase of ENERGY STAR qualified furnaces, boilers and heat pumps	EC	residential
BC tax exemption on ENERGY STAR windows	ENERGY STAR labelled windows are exempt from provincial sales tax	EC	residential
VanCity Bright Idea cashback	The VanCity credit union provides a cash reward of \$170 for energy efficient home renovations recommended by an EnerGuide for Houses evaluation. The renovations must achieve at least a five-point improvement in the EnerGuide for Houses rating.	EC	residential
VanCity Bright Idea loan	The VanCity credit union offers its members a prime rate loan to finance energy efficient home renovations recommended by an EnerGuide for Houses evaluation. The renovations must achieve at least a five-point improvement in the EnerGuide for Houses rating. The loan amount is between \$3,500 and \$20,000 and the term is up to seven years.	EC	residential
BC Water Efficient Rebate Program	A fixture replacement rebate program offers a \$75 rebate when old fixtures are replaced, \$125 for replacement of an old washer, \$50 for the installation of a 365 day irrigation controller, \$25 for a rain shut-off device	EC	residential
BC Hydro Analyze my Home program	A free online tool available through bchydro.com. The 30 minute profile provides free consumption information (when account #is used) and provides a personalized breakdown of where energy improvements can be made.	EC	residential
BC Hydro Power Smart Seasonal LED Program	Program offers a \$5 incentive rebate to customers purchasing seasonal LED (SLED) light strings.	EC	residential
BC Hydro Design Assistance	Program helps clients plan and design cost effective and energy efficient buildings. The program works with design teams at the very early stages of building projects.	EC	commercial/ institutional
BC Hydro Incentive Funding	Program provides incentives to help customers reduce the payback period for electrical energy saving projects, enabling customers to implement energy saving measures that would previously not have met internal funding requirements	EC	industrial

	BC Hydro Power Smart Partner program: Energy Saving Identification Funding	Partners of Power Smart have access to matching funds to identify electrical energy saving opportunities. Funds can be used to hire and energy manager, conducting an electrical energy study, securing an energy performance contract, etc.	EC	industrial
	BC Hydro Power Smart Product Incentive Program	Program provides financial incentives to business customers who replace existing inefficient products with energy-efficient technologies. Minimum of \$100 must be requested on the application	EC	industrial
	BC Hydro Power Smart Refrigeration Initiative	Program offers partially funded level 1 assessments. Identifies poor performance refrigeration systems, and supplies assistance with monitoring and tracking systems.	EC	industrial
	Terasen Gas Efficient Boiler Program	incentive to install condensing or near-condensing boilers in new and retrofit market. Incentive is based on size of boiler with specific incentive for design, purchase, ventilation, etc.	EC	Residential/ commercial/ institutional
	Terasen Gas Energy Assessment program	Help companies assess their energy consumption by providing an analysis from gas experts.	EC	industrial
	Terasen Gas ENERGY STAR Upgrade	Residential retrofit program to upgrade to ENERGY STAR furnace or boiler. Amounts are up to \$250 for a furnace or boiler, \$100 if it includes a VSM, \$150-\$1000 in manufacturers rebates, and a PST exemption for B.C. residents	EC	residential
Manitoba				
	Manitoba Hydro Rinse and Save Program	Offers energy efficient pre-rinse spray valves to be installed free of charge in any restaurant or commercial food service establishment (schools, hospitals, hotels, etc.) in the service area	Manitoba Hydro	commercial
	Manitoba Hydro Commercial Kitchen Appliance Program	If upgrades are made to ENERGY STAR qualified commercial steamers and fryers, you could receive rebates of \$1200 per fryer and \$2500 per steamer	Manitoba Hydro	commercial
	Manitoba Hydro Commercial Clothes Washers Program	Encourages installation of energy efficient clothes washers at businesses and facilities by offering \$180 per ENERGY STAR qualified front loading commercial clothes washer	Manitoba Hydro	commercial
	Manitoba Hydro Power Smart Furnace/Boiler replacement program	From August 5 - October 13, 2008, the high efficiency natural gas furnace/boiler rebate will be increased to \$500. Furnaces must have a minimum efficiency of 92% AFUE and a DC VSM, boilers must have a minimum of 85% AFUE	Manitoba Hydro	residential

Manitoba Hydro Certificate Program for front loading washing machines	Offers up to a \$1000 certificate towards the purchase of an ENERGY STAR qualified front loading washing machine, or a \$600 electricity bill rebate to customers who build a new family home heated with electricity or natural gas that have energy efficient components	Manitoba Hydro	residential
Manitoba Hydro Commercial Refrigeration program for retail and restaurants	Power Smart program promotes energy efficient equipment upgrades at no cost/low cost operation and maintenance measures	Manitoba Hydro	commercial
Manitoba Hydro Commercial Building Envelope Program	Provides incentives to encourage building owners to install energy efficient measures into their commercial buildings	Manitoba Hydro	commercial
Manitoba Hydro Commercial Building Optimization Program	Designed for larger commercial buildings. Can help improve the energy efficiency of building by identifying energy saving opportunities focusing on training and documentation	Manitoba Hydro	commercial
Manitoba Hydro commercial custom measures	Works with energy efficient projects not included in the power smart program. Typical projects include electrical and/or natural gas measures that use more efficient equipment systems, recover and reuse energy that is currently lost, etc.	Manitoba Hydro	commercial
Manitoba Hydro Commercial HVAC Program	Designed to encourage the use of higher efficiency heating and cooling systems in commercial buildings	Manitoba Hydro	commercial
Manitoba Hydro Commercial Lighting Program	Offer assistance to commercial, industrial, and agricultural customers to install energy efficient lighting in new construction and renovation projects	Manitoba Hydro	commercial
Manitoba Hydro Commercial Parking Lot Controllers Program	If upgrades are made from standard plugs to energy efficient parking lot controllers receive \$50 per controlled circuit	Manitoba Hydro	commercial
Manitoba Hydro Appliance Program	Rebates will be available for a limited time on select appliances that meet Power Smart standards for energy efficiency.	Manitoba Hydro	residential
Manitoba Hydro Earth Power Program-geothermal heat pumps	Financing is available to assist with the cost of installations, and qualified homeowners may be eligible for a residential earth power loan or a federal grant.	Manitoba Hydro	residential
Manitoba Hydro Home Comfort and Energy Savings Program	Program includes a Power Smart residential loan, home energy evaluation services, and home comfort information initiative	Manitoba Hydro	residential
Manitoba Hydro Home Insulation Program	Offers information and rebates to owners who add insulation to their existing home. Eligible homeowners may receive up to 100% of the insulation cost.	Manitoba Hydro	residential

Manitoba Hydro Lower Income Energy Efficiency Program	Qualified households are eligible for retrofits. Lower income households may qualify for an in-home energy evaluation, insulation upgrades, and a high efficiency heating system upgrade.	Manitoba Hydro	residential
Manitoba Hydro R-2000 Program	Testing, evaluation and inspection of new high efficiency R-2000 homes are paid for by Manitoba Hydro. This is usually between \$800-\$1000 per home	Manitoba Hydro	residential
Manitoba Hydro New Home Program	Offers incentives to owners newly built homes that meet either Gold or Silver standards after an assessment by Manitoba Hydro	Manitoba Hydro	residential
Manitoba Hydro Power Smart home energy evaluation services	In-home energy evaluation gives an indication as to how much energy a home uses and federal ecoENERGY grants may be offered to those homes which have had specific energy improvements done.	Manitoba Hydro	residential
Manitoba Hydro W.I.S.E seniors helping seniors program	Manitoba Society of Seniors working together to help seniors save energy and money. Seniors who qualify will receive an in-home energy visit to provide seniors with advice about different ways to save energy around their homes.	Manitoba Hydro	residential
Manitoba Hydro Customer Contribution Time Payment Plan	Offers some financing for permanent extensions to existing residential and farm services.	Manitoba Hydro	residential
Manitoba Hydro Energy Finance Plan	Offers customers convenient financing to improve the electrical or natural gas services with Man. Hydro	Manitoba Hydro	residential
Manitoba Hydro Power Smart residential loan	A loan offered at 6.5% to improve the energy efficiency of your home. The loan covers things such as insulation, ventilation, windows, doors, water heaters, etc.	Manitoba Hydro	residential
Manitoba Hydro residential earth power loan	Assists homeowners with the cost of installing a geothermal heat pump, including financing up to \$20, 000, 4.9% fixed interest rate, etc.	Manitoba Hydro	residential
Manitoba Hydro Commercial Earth Power Program	Provides financial incentives to customers who install geothermal heat pump systems to replace conventional electric heating systems	Manitoba Hydro	commercial
Manitoba Hydro Heat Pad Program	Guidance and financial assistance to agricultural customers that switch from heat lamps to heat pads in farrowing crates	Manitoba Hydro	commercial
Manitoba Hydro Power Smart Energy Manager Program for schools	Provides training and support to Manitoba school divisions to hire dedicated energy managers.	Manitoba Hydro	commercial
Manitoba Hydro recreation facilities	If facilities fill out the Facility Survey for Ice Arenas and Curling Rinks, Manitoba Hydro will review the survey and provide a report of ways to improve the energy efficiency of the facility.	Manitoba Hydro	commercial

	Manitoba Hydro Religious Buildings Initiative	Initiative offers an audit that compares a facility to other similar facilities and a low interest loan to assist customers in carrying out the recommendations identified in the building assesment	Manitoba Hydro	commercial
	Manitoba Hydro Bioenergy Optimization Program	If access to biomass based material, technical and financial support to help approved customers install, operate and maintain equipment that can deliver consistent and reliable savings	Manitoba Hydro	industrial
	Manitoba Hydro Performance Optimization Program	Provides industrial and larger commercial customers with technical support and financial incentives that are necessary to identify, invesigate, and implement system efficiency improvements	Manitoba Hydro	industrial
	Manitoba Hydro Natural Gas Optimization Program	Provides industrial and large commercial customers with the technical support and financial incentives. Promotes energy efficiency through the optimization of process related natural gas fired systems and equipment	Manitoba Hydro	industrial
	Manitoba Hydro Eco-Efficiency Solutions Program	Developed to provide businesses with the technical expertise and financial assistance they need to identify and make improvements in systems, processes, and energy efficiency	Manitoba Hydro	industrial
	Manitoba Hydro Energy Finance Plan	Offers customers convenient financing to improve the electrical or natural gas services with Man. Hydro	Manitoba Hydro	industrial
	Manitoba Hydro Internal Retrofit program	provides support for Manitoba Hydro building and facility managers to upgrade their building plans tp Power Smart standards	Manitoba Hydro	commercial/ institutional/ industrial
	Manitoba Hydro Chiller program	Provides customers with expert technical guidance and financial assistance to maximize efficiency and assist with the incremental cost of upgrades.	Manitoba Hydro	industrial

New Brunswick

	Efficiency NB public education initiatives on ENERGY STAR qualified appliances	Crown corporation of the government of NB promotes ENERGY STAR qualified appliances and products in it's public education initiative	OEE	residential
	New Homes Program basic grant	A grant of \$1000 is available to first owners of new homes that achieve an ecoENERGY for new house rating of at least 80 or are R-2000 certified regardless of heating system	OEE	residential
	New Homes Program central heating-non electric grant	A grant of \$3000 is available to first owners of new homes that have an ecoENERGY for new houses efficiency rating of at least 80 or are R-2000 certified and have an eligible non-electric heating system	OEE	residential
	New Homes Program ENERGY STAR package bonus	An additional incentive is available to homeowners that install at least 2 of ENERGY STAR refrigerator, freezer, clothes washer AND install ENERGY STAR compact flourescent lamps or	OEE	residential

		other ENERGY STAR rated lamps in ALL fixtures in the home		
	NB Energy Efficiency Retrofit Program for low-income households	Low income homeowners and landlords are eligible for grants to replace existing energy systems. For single unit or semi detached grants are available up to \$4500 per household and for multi unit, \$1500 per unit. Incomes must be below that of the established levels in the neighborhood.	EC	residential
	NB existing homes energy efficiency update	Government of NB provides either an interest free loan of up to \$10000 or a rebate of 20% of the cost of renovations up to a maximum of \$2000 to owners of single family homes that renovate to improve the energy efficiency of the home	EC	residential
Northwest Territories				
	Energy Efficiency Incentive Program for purchasing appliances	Offers various rebates on the purchase of refrigerators and front loading washers depending on whether the community is a hydro or non-hydro community	OEE	residential
	Energy Efficiency Incentive Program for purchasing heating appliances	Offers various rebates on the purchases of woodstoves, wood pellet stoves and boilers, heat recovery ventilators, oil furnaces and boilers, oil furnaces and mobile homes, gas furnaces and boilers, and hot water heating. Rebates are based on level of efficiency	NWTEnv	residential
	Energy Efficiency Incentive Program for transportation	Offers various rebates on the purchase of snowmobiles, outboard motors, and energy efficient vehicles	NWTEnv	residential
	Energy Efficiency Incentive Program for home renovations	Offers grants for select items from ecoENERGY retrofit program (insulation, windows, doors, skylights, and water conservation)	NWTEnv	residential
Newfoundland				
	NFLD Power R-2000 financing	Offers up to \$10,000 in financing to cover the cost difference between a conventionally constructed home and and the same houses built as high efficiency registered R-2000 homes	EC	residential
	NFLD Power Electric Heat Financing Program	Offers homeowners up to \$10000 in financing for the purchase and installation of electric home heating systems. Loan payments are made through monthly bills in up to 60 months	EC	residential
	NFLD Power high performance thermostat rebate	NFLD Power offers a cash rebate of \$4 off the purchase price of high performance thermostats. The qualifying thermostats must be purchased from participating dealers	EC	residential

	NFLD Power Wrap Up for Savings Program	Offers financing up to \$2500 to cover the labour and material cost of heat saving insulation upgrades in homes where electricity is the primary source of heating	EC	residential
Nova Scotia				
	Department of Energy EnerGuide building plan evaluation	Provides incentives to offset the initial cost of an EnerGuide building plan evaluation. Homeowners will receive \$175 for a rating of less than 77 on the EnerGuide scale, \$350 for a 77-79 rating and \$500 for a rating of 80 or higher	OEE	residential
	Heritage Gas Natural Gas Equipment Rebate Program	Provides rebates for customers converting from electric, oil, or propane heating to high efficiency natural gas heating. The maximum total rebate is \$700 per home	EC	residential
	Nova Scotia Energuide for Houses Assistance Program for low to modest income nova scotians	Qualified participants will receive a grant of up to \$400 in addition to the EnerGuide provincial grant. They may even be reimbursed the cost of the initial home evaluation	EC	residential
	Nova Scotia EnerGuide for Houses Program	Offering evaluations at a reduced rate of \$150. Homeowners who undertake the suggested improvements may also qualify for a grant of up to \$2000	EC	residential
	Nova Scotia Environmental Home Assessment Program	Homeowners can receive a free home assessment with respect to their on-site water wells and septic system, as well as their home oil tank. May also receive a \$50 rebate on septic tank pumping, or a grant of up to \$3000 for septic system repairs	EC	residential
	Nova Scotia solar water or air heating rebate	Province is offering a 15% rebate on the cost of solar water heating systems used for year round applications, and for solar air heating systems. Must be purchased and installed between January 1, 2007 and March 31, 2010 and must be on NRCan's list of approved systems	EC	Residential/ commercial/ institutional/ industrial
	Nova Scotia Wood Appliance Rebate program	Homeowners are eligible for a \$200 rebate from the province off the purchase and installation of a new wood pellet stove or a new EPA certified wood stove purchased between October 12, 2005 and August 31, 2007	Halifax	residential
Ontario				
	The Clean Air Foundation's CoolShops Program	Offers free pre rinse spray valves for restaurants	OEE	commercial

<p>Wash n' Save Incentive Program on the purchase of water efficient clothes washers</p>	<p>City of Toronto offers residents a rebate on the purchase of an eligible water efficient clothes washer.</p>	OEE	residential
<p>Province of Ontario Point-of-Sale retail sales tax exemption for efficient appliances/lighting/cooling/heating equipment</p>	<p>Point-of-sale exemption is available on certain household appliances and lighting products listed as ENERGY STAR qualified by the OEE. Qualifying appliances etc. will be exempt from RST on the selling price as well as any delivery charge.</p>	OEE	residential
<p>"Spray n' Save" program: Enbridge Gas Distribution</p>	<p>Offers a free pre-rinse spray valve replacement program to full-service restaurant customers</p>	OEE	residential
<p>Enbridge Gas Distribution Natural gas heating system rebate</p>	<p>Offering their customers a rebate on all ENERGY STAR qualified high-efficiency natural gas heating systems purchased and installed between April 1, 2008 and September 30, 2008. Also receive a \$15 rebate on the purchase of a programmable thermostat</p>	OEE	residential
<p>OPA cool savings rebate</p>	<p>Offers a \$25 rebate when a programmable thermostat is purchased and installed by a program registered contractor. \$125 rebate when an existing furnace is replaced with a mid to high efficiency furnace with an electrically commutated motor (ECM). \$250 rebate when an existing central air conditioner is replaced with an ENERGY STAR qualified AC, heat pump, or ductless split system. \$400 rebate when an existing central air conditioner is replaced with a stand alone "tier 2" level central AC system</p>	EC	residential
<p>Ontario Energy Efficiency Assistance Program for houses</p>	<p>Low income electrically heated households may be eligible for a free energy audit and energy efficient measures</p>	EC	residential
<p>Ontario Home lighting equipment purchase</p>	<p>Save up to \$35 when certain energy efficient projects are purchased. ENERGY STAR qualified light fixtures, tube fixtures, CFL floodlights and spotlights, heavy duty timers</p>	EC	residential
<p>Hawkesbury Hydro ENERGY STAR rebates</p>	<p>Customers can obtain percentage rebates on the purchase price of selected ENERGY STAR qualified appliances. The rebate is 15% for all products except programmable thermostats and consumer electronics for which the rebate is 20%</p>	EC	residential

	Horizon Utilities Peak Saver Program	Sign up for the peak saver program and receive a \$25 Horizon Utilities account credit. A professional technician will come to the home and install a programmable thermostat valued at \$250 for free	EC	residential
	Hydro Ottawa powerWISE electricity tune up	Customers can obtain a subsidized home visit by a qualified specialist who will identify potential home energy conservation opportunities. The visit includes water tank blankets, pipe wrap, etc. The tune up is valued at around \$100. The customer would only need to pay \$50 of this amount	EC	residential
	Hydro Ottawa powerWISE power pack	Customers who qualify can obtain a powerWISE power pack by participating in a phone survey. It includes 2 energy efficient CFL bulbs an EE nightlight and a series of tips and publications	EC	residential
	Kitchener Utilities Furnace Rebate Program	Customers can obtain rebates on upgrading their home heating systems: Various rebates are offered for upgrading to high efficiency furnaces, boilers, and thermostats	EC	residential
	Newmarket Hydro Compact fluorescent light discount	Customers can purchase a 6 pack of compact fluorescent light bulbs for \$11 less than regular price while supplies last	EC	residential
	Newmarket Hydro ENERGY STAR qualified appliance rebate	\$100 rebate is provided to customers who purchase an ENERGY STAR qualified front loading clothes washer	EC	residential
	Newmarket Hydro ENERGY STAR qualified dishwasher rebate	\$75 rebate is provided to customers who purchase a qualified dishwasher with time delay. Rebates are provided until funds run out.	EC	residential
	Ontario Home Energy Retrofit Program	Ontario government provides homeowners with grants of up to \$5000 for home energy improvements. Reimbursements are based on the measures taken and amount allowed for each component	EC	residential
	Ontario TAPS Program	Homeowners in Toronto who use natural gas heating can obtain free delivery and installation of up to two low-flow showerheads, aerators for kitchen/bathroom taps, and water pipe insulation material. Program is only offered in select cities	EC	residential
	Union Gas programmable thermostat credit	\$15 rebate to customers who purchase any programmable thermostat by December 10, 2007	EC	residential
Prince Edward Island				
	PEI Alternative Heating Loan Program	Loans at a rate of 6% are available to PEI homeowners for the purchase and installation of alternative heating systems that reduce oil consumption. Reduced interest loan would be up to a maximum of \$5000	EC	residential

	PEI Residential Energy Assistance Program	Eligible homes can receive a free home energy efficiency upgrade that includes up to \$200 worth of energy saving measures such as weather stripping, caulking, programmable thermostat, furnace tune up, etc. Open to families and individuals with incomes of less than \$30,000	EC	residential
Quebec				
	Gaz Metro Programmable Thermostat Incentive Program	Offers a \$30 financial incentive on the purchase of an ENERGY STAR programmable electronic thermostat	OEE	residential
	Gaz Metro High Efficiency Hot Air Furnace Program	Offers up to \$450 on the purchase of an ENERGY STAR high efficiency hot air furnace	Gaz Metro	residential
	Gaz Metro Superior Energy Efficiency Boiler Program	Offers up to \$600 on the purchase of an ENERGY STAR superior energy efficiency boiler	Gaz Metro	residential
	Gaz Metro Customers window/door rebate	Program offers owners of residences supplied by Gaz Metro for heating purposes a \$5 per square foot rebate with the purchase of high energy efficiency ENERGY STAR windows and sliding doors up to \$500	OEE	residential
	Hydro Quebec Mail in Appliance Rebate Program	Program offers \$50 on the purchase of a new ENERGY STAR qualified clothes washer, \$50 on the purchase of a new ENERGY STAR qualified refrigerator and \$25 on the purchase of a new ENERGY STAR qualified freezer. Offer is valid for purchases made between January 1 and December 31, 2008	OEE	residential
	Quebec's Energy Efficiency Fund Novoclimat housing incentive	Buyers of a new high efficiency Novoclimat certified house heated with natural gas and located in Gaz Metro territory can obtain a \$2000 incentive from Quebec's Energy Efficiency Fund to help cover the extra construction costs for a Novoclimat house	OEE	residential
	Quebec Agence de L'efficacité Énergétique Community Program for low income households	This program provides free energy-saving advice and equipment to qualifying low income householders who pay energy bills directly (not included in rent). Technicians will provide energy saving advice as well as low flow shower heads, sealing materials, and tap aerators. Households heated with electric baseboard heaters may also qualify for an electronic thermostat. Home visit is valued at \$310 and thermostat installation is valued at \$300	EC	residential

<p>Gaz Metro/Energy Efficiency Fund Residential Renovations Rebate</p>	<p>Owners of single family houses, duplexes, triplexes heated with natural gas who have completed energy-saving renovations, can obtain a one-time rebate equal to \$1 per cubic meter in reduced natural gas consumption. An EnerGuide evaluation must be carried out before and after the renovations, so another \$50 rebate is offered towards those.</p>	<p>EC</p>	<p>residential</p>
<p>Gazifère Residential Energy Efficiency Program- hot water saving kit</p>	<p>Customers living in homes built before 1990 can obtain a hot water saving kit free of charge. The kit includes 2 low flow shower heads, aerators for kitchen and bathroom taps, and water pipe insulation material.</p>	<p>EC</p>	<p>residential</p>
<p>Gazifère Residential Energy Efficiency Program- programmable thermostat</p>	<p>Customers switching from a mid-efficiency natural gas furnace or from oil/electric heating to a new high efficiency natural gas furnace can have a programmable thermostat installed for \$40</p>	<p>EC</p>	<p>residential</p>
<p>Gaz Metro Green Discount</p>	<p>From March 5 to June 1, 2007, customers who convert oil central heating appliances to natural gas are eligible for: a free connection to the gas grid, a rebate of up to \$1400 on the purchase and installation of a new natural gas heating appliance, savings on the purchase of an ENERGY STAR heating appliance, saving of up to \$500 for various energy saving conversions</p>	<p>EC</p>	<p>residential</p>
<p>Hydro Quebec Electronic Thermostats</p>	<p>Rebates are provided for the purchase and installation of electronic thermostats for electric baseboards. The rebate is \$45 for the first 5 thermostats and \$10 for each of the 6th and 7th thermostats installed in a single family home. The maximum available rebate is \$130 for a single family home, condominium or business establishment</p>	<p>EC</p>	<p>residential</p>
<p>Hydro Quebec Geothermal System Purchase and Installation grant</p>	<p>Hydro Quebec will provide financial assistance to those who choose to install a geothermal system valued at \$2800. When combined with other provincial and federal programs, a total of \$6800 can be received in assistance</p>	<p>EC</p>	<p>residential</p>
<p>Hydro Quebec Energy Wise Coupons</p>	<p>Customers who complete an online Energy Wise "home diagnostic" can access discount coupons for a wide range of energy saving equipment and materials. The coupons change monthly.</p>	<p>EC</p>	<p>residential</p>
<p>Hydro Quebec Energy Efficient Lighting</p>	<p>Customers are eligible for rebates on the purchase of energy efficient light bulbs and lighting products. A rebate of \$5 for every \$10 spent on ENERGY STAR qualified light bulbs up to a max. of \$25. A rebate of \$15 is available for the purchase of a CFL lightbulb.</p>	<p>EC</p>	<p>residential</p>

Hydro Quebec Household Appliance Rebate	Hydro Quebec will provide up to a \$125 rebate for the purchase of an ENERGY STAR qualified clothes washer, refrigerator, or freezer purchased from a Quebec retailer between January 1 and December 31, 2008	EC	residential
Hydro Quebec Pool Timers	A \$10 rebate is available to those who purchase swimming pool pump timers between January 1 and December 31, 2007.	EC	residential
Hydro Quebec RECYC-FRIGO Environmental Program	This program is for homeowners and tenants who own their appliances even if electricity is included in their rent. A refrigerator must be owned and in working condition, and over 10 years old. A maximum of \$120 for two of either a refrigerator, freezer, or one of each.	EC	residential
Gaz Metro Drain Water Heat Recovery System	This program provides a loan and a subsidy for participants who install a Power-pipe drain water heat recovery system. The loan is interest free for 5 years and is used to finance the installation and purchase of the system. The loan cannot exceed 5 times the annual energy savings and cannot exceed \$500,000. The customer can also receive a subsidy due to the installation of the system and cannot exceed \$75,000	NRCan	commercial/ institutional/ industrial
Gaz Metro Condensing Boiler	Offers a financial incentive to clientele to install natural gas condensing boilers.	NRCan	commercial/ institutional/ industrial
Gaz Metro Condensing Water Heater	Offers a financial incentive to clientele to install condensing water heaters.	NRCan	commercial/ institutional/ industrial
Gaz Metro Implementation incentive for Energy Efficiency	Gaz Metro makes a financial contribution to its clientele in order to encourage the undertaking of feasibility studies and the implementation of energy efficiency measure with natural gas.	NRCan	commercial/ institutional/ industrial
Gaz Metro Intermediate Energy Efficiency Boilers	To promote the installation of high-efficiency natural gas boilers, Gaz Metro offers a financial incentive to facilitate measures	NRCan	commercial/ institutional/ industrial
Agence de l'efficacité énergétique Building Regulations program	Program ensures that new buildings consume 10 to 25 percent less energy.	NRCan	New Buildings in All sectors
Quebec Energy Efficiency Assistance Program	Program provides financial support for research and development in all areas of energy technology. Financing is provided to businesses, research groups, and specialized associations	NRCan	All sectors

	Quebec Industrial Initiatives program	Offers financial support for energy initiatives in large businesses (new and existing). The funding will be the lesser of 75% of project cost, 15¢/kWh saved or \$350K	NRCan	industrial
Saskatchewan				
	SaskEnergy ENERGY STAR for New Homes program	Provincial energy efficiency rebate for new homes starts at \$1000 with the purchase of an ENERGY STAR qualified or R-2000 home up to a max. of \$2400	OEE	residential
	Saskatchewan PST exemption for qualified heat pumps, boilers, furnaces	Province offers a PST exemption for qualifying ENERGY STAR residential furnaces, boilers and heat pumps.	OEE	residential
	Saskatchewan Sales Tax Exemption for New Energy-Efficient Household Appliances	New ENERGY STAR qualified freezers, refrigerators, dishwashers and clothes washers are exempt from the 7% PST. Also applies to new appliances leased for at least one year. Combined washer/dryer units are exempt from 60% of the sales tax payable. Appliances purchased or leased (for at least one year) between October 1, 2003 and March 31, 2005 remain eligible for a refund of the PST paid.	EC	residential
	Saskatchewan EnerGuide for Houses Retrofit Grant	Homeowners that complete an EnerGuide evaluation are eligible to receive a provincial grant up to \$5000. This program is in effect until March 31, 2011	EC	residential
	Saskatchewan Home Energy Improvement Program for low-income households	The government of Sask. Provides financial assistance to defray the costs of home improvements like heating upgrades, insulation and draft proofing. The amount is determined by area. Single detached homes are eligible for a grant up to \$4000 in Southern Sask. and a grant of up to \$4700 in Northern Sask.	EC	residential
	SaskEnergy/SaskPower ENERGY STAR Programmable Thermostat Rebate	Both companies provide a rebate to customers who purchased an ENERGY STAR programmable thermostat between September 1, 2005 and March 31, 2007. The rebate is valued at \$45 or the price paid for the thermostat if less than \$45	EC	residential
	SaskEnergy ENERGY STAR Loan program	From April 1, 2007- March 31, 2009 customers can finance the installation of an ENERGY STAR qualified furnace with a VSM and a condensing boiler at a prime rate. Maximum loan per customer is \$10,000	NRCan	residential
	Saskatchewan Research Council Demand Side Management for Rinks	SRC will pay a one time fee for the purchase of pre and post -energy consumption utility records from municipalities and municipal organizations as related to the installation of certain items. SRC will pay 25% of the total project costs for specified DSM equipment.	NRCan	commercial
Yukon				

	Yukon Housing Corp. mortgage financing for GreenHome standard homes	Offers mortgage financing of up to \$200,000 at a reduced interest rate for home built or upgraded to the corporation's GreenHome standard which include strict energy efficiency requirements. The houses must be built by Yukoners and 75% of the material must be from Yukon businesses	OEE	residential
	Yukon Housing Corp. Home Repairs Program	Low interest financing for home improvements including renovations that improve energy efficiency. Loan up to \$35,000 is available. Mobile home owners can obtain low interest loans up to 95% of the projected future market value of the home. Owners of rental suited can obtain a low interest loan up to \$30,000 with repayment period of up to 10 years	EC	residential

2.4 Barriers to Implementation

Energy Efficiency projects are small sized offsets projects in relation to the quantity of emission reductions being created by each project. The largest barrier to implement each project doesn't lie with the project itself but instead is with the costs associated with meeting all the Offset System requirements like project documentation and verification of the project. These costs are prohibitive for projects that would not deliver a large quantity of tonnes without aggregation.

2.5 Review of Technology

No project-specific technologies will be included within the protocol, as the protocol is intended to apply to a wide range of different projects and associated technologies, and since energy efficiency improvements can be realized by a wide range of approaches.

2.6 Review of Existing Projects

The Federal department of Natural Resources Canada has an internal division, Office of Energy Efficiency (OEE) that solely focuses on Energy Efficiency in Canada. The OEE has published relevant reports that provide technical information on the state of energy efficiency in Canada and also has developed an Energy Efficiency Index (OEE Index). The OEE publishes an annual technical report *Energy Efficiency Trends in Canada* which outlines the annual assessment of trends in energy use and related Greenhouse Gas (GHG) emissions in Canada since 1990¹.

The OEE Index depicts annual changes in energy efficiency in the Canadian economy. It outlines an estimate of changes in energy efficiency in the economy including accounting for factors that influence energy intensity (activity, weather, structure, and service level). The Index presents that over the period of 1990-2003 an increase in energy efficiency improvements by 13% which equates to approximately \$13.4 billion in energy costs in 2003 alone. This improvement increased the use of energy use by 22 percent.

The latest report was released in 2006 and reported that the end use of energy within the commercial/institutional sector represented 48 MT in 1990 and climbed to 68 MT in 2004 – growing 42% over this time period. This time period also showed improvements in the energy efficiency within this sector by 1 MT.

¹ *The State of Energy Efficiency in Canada*. NRCAN OEE. 2006
<http://www.oee.nrcan.gc.ca/publications/statistics/see06/pdf/see06.pdf>

2.7 Summary of Quantification Approaches used in the Proposed Protocol

The project may generate GHG emission reductions through the introduction of eligible energy savings which affect the GHG emission output of the project SSRs. Eligible energy savings are comprised of energy reductions achieved through the implementation of a project, and not through a decrease in operating capacity.

The project's GHG emission reductions are quantified for each energy type (i) saved as:

$$\text{GHG Emission Reduction}_i = \sum (\text{Eligible Energy Savings}_i \times \text{Emission Factor}_i)$$

Where:

Eligible Energy Savings_i come from the procedures for each energy type i

Emission Factor_i comes from the procedures for each energy type i.

GHG emission reductions shall be expressed in metric tonnes of CO₂ equivalent.

Determination of Energy Savings

Quantification of GHG emission reduction is performed based on the energy savings created by the project (difference between the baseline scenario and the project). The IPMVP suggests four (4) energy savings quantification options. Should IPMVP Option A or Option B be applied, secondary effects must be taken into consideration.

According to the IPMVP "energy savings cannot be directly measured, since savings represent the absence of energy use. Instead, savings are determined by comparing measured use...before and after implementation of a program, making suitable adjustments for changes in conditions." For this Quantification protocol the energy savings are calculated according to the following formula taken from IPMVP:

Energy Savings = "Adjusted Baseline" Energy – "Reporting Period" Energy +/- "Non Routine Adjustments" of baseline energy to reporting period conditions

Where,

"Adjusted Baseline Energy" is defined as the baseline energy plus any routine adjustments needed to adjust it to the conditions of the reporting period."

"Baseline energy" is defined as the lowest energy usage level reflected by the then prevalent laws, regulations, and legal obligations."

"Routine Adjustments" are defined as any adjustments made for any energy-governing factors, expected to change routinely during the reporting period.

"Non routine Adjustments" are defined as any adjustments made for those energy-governing factors which are not usually expected to change."

Typical baseline information required includes the following:

- energy consumption values with meter reading intervals at various locations depending on quantification option selected (A, B, C or D);
- static factors: "energy governing characteristics of the facility which do not normally change. For example: building size shape, type of usage, fixed schedules, indoor temperatures, light levels, ventilation rates, equipment nameplate data"²; and

² From IPMVP Volume I, 2007

- independent variables: “energy governing characteristics of the facility and its use or environment which are expected to routinely change.” For example: weather, occupancy, etc...

Options for Determining Energy Savings

The energy savings equation can be applied following 4 different options as defined by IPMVP and summarized in Table 2: Site Savings Determination Options presented below.

Table 2: Site Savings Determination Options³

IPMVP Option	How Savings Are Calculated	Typical Applications
<p>A. Retrofit Isolation: Key Parameter Measurement</p> <p>Savings are determined by field measurement of the key performance parameter(s) which define the energy use of the ECM’s affected system(s) and/or the success of the project.</p> <p>Measurement frequency ranges from short-term to continuous, depending on the expected variations in the measured parameter, and the length of the reporting period.</p> <p>Parameters not selected for field measurement are estimated. Estimates can be based on historical data, manufacturer’s specifications, or engineering judgment. Documentation of the source or justification of the estimated parameter is required. The plausible savings error arising from estimation rather than measurement is evaluated (need to evaluate the savings uncertainty associated with the estimation versus the savings uncertainty associated with actual measurements)</p>	<p>Engineering calculation of baseline and reporting period energy from:</p> <ul style="list-style-type: none"> • Short-term or continuous measurements of key operating parameter(s); and • Estimated values. <p>Routine and non-routine adjustments as required. Interactive effects, must be examined to accurately determine net energy savings.</p>	<p>A lighting retrofit where power draw is the key performance parameter that is measured periodically. Estimate operating hours of the lights based on building schedules and occupant behaviour.</p>
<p>B. Retrofit Isolation: All Parameter Measurement</p> <p>Savings are determined by field measurement of the energy use of the ECM-affected system.</p> <p>Measurement frequency ranges</p>	<p>Short-term or continuous measurements of baseline and reporting-period energy, and/or engineering computations using</p>	<p>Application of a variable-speed drive and controls to a motor to adjust pump flow. Measure electric power with a kW meter installed on the</p>

³ From IPMVP Volume 1, April 2007, page 19

<p>from short-term to continuous, depending on the expected variations in the savings and the length of the reporting period.</p>	<p>measurements of proxies of energy use.</p> <p>Routine and non-routine adjustments as required.</p> <p>Interactive effects must be examined to accurately determine net energy savings.</p>	<p>electrical supply to the motor, which reads the power every minute. In the baseline period this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to track variations in power use.</p>
<p>C. Whole Facility</p> <p>Savings are determined by measuring energy use at the whole facility or sub-facility level.</p> <p>Continuous measurements of the entire facility's energy use are taken throughout the reporting period.</p>	<p>Analysis of whole facility baseline and reporting period (utility) meter data.</p> <p>Routine adjustments as required, using techniques such as simple comparison or regression analysis.</p> <p>Non-routine adjustments as required.</p>	<p>Multifaceted energy management program affecting many systems in a facility. Measure energy use with the gas and electric utility meters for a twelve month baseline period and throughout the reporting period.</p>
<p>D. Calibrated Simulation</p> <p>Savings are determined through simulation of the energy use of the whole facility, or of a sub-facility.</p> <p>Simulation routines are demonstrated to adequately model actual energy performance measured in the facility.</p> <p>This Option usually requires considerable skill in calibrated simulation.</p> <p>(see IPMVP volume 1- Section 4.10.1 titled "Option D: Types of Building Simulation Programs" for examples of simulation software)</p>	<p>Energy use simulation, calibrated with hourly or monthly utility billing data. (Energy end use metering may be used to help refine input data.)</p>	<p>Multifaceted energy management program affecting many systems in a facility but where no meter existed in the baseline period. Energy use measurements, after installation of gas and electric meters, are used to calibrate a simulation. Baseline energy use, determined using the calibrated simulation, is compared to a simulation of reporting period energy use.</p>

Table2 is only a brief summary of the four options presented in IPMVP. Additional guidance provided in volume 1 and 3 of the IPMVP may be useful to project proponent in developing the project document associated with their projects.

Guidance on Option Selection

IPMVP states that the selection of the option is a decision based on various factors including project conditions, analysis required, budget and professional judgement. The following figure (from IMPVP volume 1) presents a diagram meant to assist project developers in determining which option is best suited for their type of project.

Figure 1: IPMVP Suggested Option Selection Process

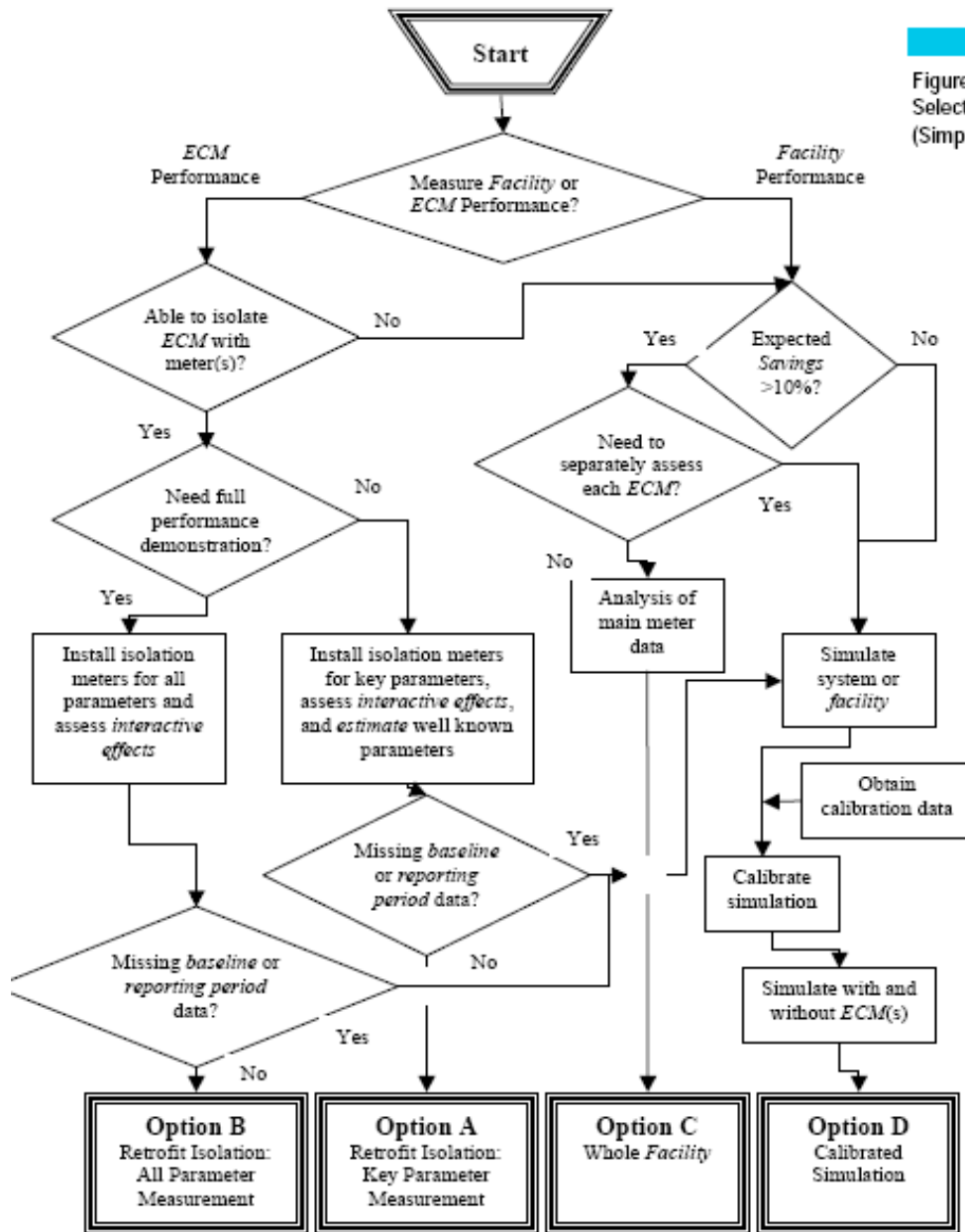


Figure 3 Option Selection Process (Simplified)

In addition IPMVP provides the following table to further assist project developers in selecting an option. Table3 presents key characteristics that suggest commonly favoured options.

Table 3: Suggested Option Selection Based on Project Key Characteristics

ECM Project Characteristic	Suggested Option			
	A	B	C	D
Need to assess <i>ECMs</i> individually	X	X		X
Need to assess only total facility performance			X	X
Expected <i>savings</i> less than 10% of utility meter	X	X		X
Multiple <i>ECMs</i>	X		X	X
Significance of some <i>energy</i> driving variables is unclear		X	X	X
<i>Interactive effects</i> of ECM are significant or unmeasurable			X	X
Many future changes expected within <i>measurement boundary</i>	X			X
Long term performance assessment needed	X		X	
Baseline data not available				X
Non-technical persons must understand reports	X	X	X	
Metering skill available	X	X		
Computer simulation skill available				X
Experience reading utility bills and performing regression analysis available			X	

Secondary Effects for Option A and B (sometimes D): Retrofit Isolation

The application of the retrofit isolation techniques requires that no significant energy effects be excluded from the measurement boundary. When the measurement boundary is selected, care should be taken to ensure that energy flows affected by the ECM but outside the measurement boundary are considered. The project document must list all potential effects of an ECM (positive or negative) on any energy stream, along with an estimate of the likely annual savings magnitude of each. The method of estimating each listed impact must be described, noting the factors affecting the accuracy of each estimate.

The largest energy effect must be measured. All other secondary energy effects must be treated as described below⁴.

1. The secondary energy effects associated with the ECMs listed in Table must be measured or estimated depending on the approach (simple or advanced) selected.
2. If all secondary effects which individually have an impact less than 10% of the primary effect, have a combined net effect of *reducing* energy savings by 5% or more, advanced approaches must be used.

⁴ Taken from GHGS Draft Energy Efficiency Methodology

3. For all secondary effects and ECMs not covered by 1) or 2) above, the following rules govern the measurement or estimation of interactive effects for simple and advanced approaches when applying Options A or B.

A) For Simple Approaches:

- Measure any single secondary effect that is estimated to be greater than:
 - i. 10%, of the primary effect (positive or negative), where the net estimated energy impact of all ECM secondary effects would *increase* savings by more than 30%, or
 - ii. 30% of the primary effect (positive or negative)
- Estimate all other secondary effects which *reduce* savings; and
- Ignore all other secondary effects.

B) For Advanced Approaches:

- Measure all secondary effects equal to or larger than 10% of the primary effect. Estimate all other secondary effects.

Table 4: Minimum Interactive Effect Treatment⁵

ECM	Simple Approach	Advanced Approach
	Estimated Secondary Effects	Measured Interactive Effects
Electric to fuel conversion	Fuel	Fuel
Lighting efficiency improvement or operating period reduction	Heating, Cooling	
High efficiency electric motor	Motor speed effect on system and horsepower needs	Motor speed effect on system and horsepower needs
High efficiency boiler or furnace	Less heat recovered elsewhere	Less heat recovered elsewhere
High efficiency refrigeration or chilling compressor system	Condenser fan, pump	Condenser fan
Heat recovery device	Load on associated air or water circulation systems	Load on associated air or water circulation systems

Savings Accuracy Requirements and Eligibility Multiplier Factors

Depending on the approach chosen by the project proponent; simple or advanced, a multiplier factor must be applied to the energy savings calculated. This multiplier is applied to ensure that GHG emission reductions are not over-estimated due to uncertainty related to monitoring techniques selected. Since the advanced approach requires more accurate data to be collected the multiplier factor will be less stringent for project proponent utilizing this approach.

Eligible Energy Savings = Energy Savings * M

Where,

Energy Savings are defined as the difference between the baseline scenario and the project.

⁵ Table adapted from Draft GHGS Energy Efficiency Methodology

M is an Eligibility Multiplier factor determined to be .90 to ensure a conservative energy savings calculation when using the simplified approach. For advanced approaches, the Eligibility Multiplier is determined to be 1.0

Simple Approach Accuracy Requirements

Minimum requirements governing accuracy of different activities are defined below, for simple approaches.

Table 5: Minimum Accuracy Requirements - Simple Approach

Meter Type	Confidence Interval	Precision	Additional Information
Measurement			
Whole facility energy meters	N/A	N/A	Utility Quality Metering
Electrical sub-meters	95%	±2%	No more than 15% of the expected measured values will exceed the selected meter's range, and no more than 1% of the expected measured values will exceed it by more than 20% the meter's range maximum or minimum.
Liquid flow meters		±10%	
Liquid flow meters (used to compute energy flow)		±3%	
Air flow meters		±10%	
Air flow meters (used to compute energy flow)		±3%	
Steam flow meters		5%	
Simple temperature		3%	
Differential temperature readings with matched sensors		0.5%	
Pressure or differential pressure		3%	
Operating hours		0.1%	
Random Sampling			
Random sampling	80%	±20%	Provide statistical analysis of all quantifiable uncertainties.
Modeling			
Regression models	R ² static of 0.8 or higher		
	t statistic independent variable of 1.8 or higher		

If measured data comes from an independent source (e.g. government weather data, electricity grid emission factor accepted by Alberta Environment) precision is presumed ±0%.

Special circumstances for option A and C:

Option A: In addition, any parameter(s) estimated in IPMVP Option A must be selected to yield savings that are lower than would be obtained from 90% of the probable actual values of the estimated item. ⁶The project design document must present the range of possible values, their likely distribution, and the statistical analysis to justify the selection.

⁶ 90% of all values in a normally distributed range are above a value that is 1.28 standard deviations below the mean (z = 1.28, see standard normal distribution tables). Example – Under Option A, measured chillers efficiency improvement will be multiplied by estimated annual cooling load. Suppose the plausible values of annual cooling loads ranged between 2,000,000 ton-hours and 2,500,000 ton hours and can be assumed to be normally distributed over the range. The mean is 2,250,000 ton-hours. Assuming the 500,000 ton-hours range represents 99% of all possible values (and six standard deviations), one standard deviation is 83,300 ton-

Option C :(without the on/off test method⁷):

- there can be no gaps in the baseline record;
- there shall be a minimum of 9 valid energy meter readings during the baseline period;
- no baseline data points can be excluded;

Accuracy & the Advanced Approach

Minimum requirements are defined below, for advanced approaches.

- The project design document shall present full analysis of all quantifiable uncertainties expected in the energy savings reports. This analysis must use good statistical techniques⁸.
- Average savings must have an expected $\pm 10\%$ precision at 90% confidence or better, assuming savings are achieved as planned.

When using Calibrated Simulation Option D1⁹, the Coefficient of Variation of the Root Mean Squared Error or CV (RMSE)¹⁰ of deviations between actual calibration energy data and the simulation model's predicted energy data must be less than 15% if using monthly calibration data, or 30% if using hourly data¹¹.

2.9 Other Impacts (optional)

No other impacts are expected to occur from this project type.

2.10 Assessment of Baseline Scenarios

The baseline is the most appropriate and best estimate of GHG emissions and removals that would have occurred in the absence of the project. In this protocol, Identification of the baseline scenario is presented for two distinct project types; retrofits to existing facilities and new buildings.

Baseline Scenario Identification for Existing Facilities

According to the IMPVP guidance, the baseline scenario for existing facilities is typically determined based on the historical data collected over the baseline period. IPMVP describes the baseline period as:

- “Representing all operating modes of the facility. This period should span a full operating cycle from maximum energy use to minimum. For example, building energy use is normally significantly affected by weather conditions, so a whole year's baseline data is needed to define a full operating cycle. Likewise the energy use of a ...system (fan) may only be governed by a fixed occupancy pattern..., which varies on a weekly cycle. So one week's data would be all that is needed to define baseline performance. ECM planning may require study of a longer time period than is chosen for the baseline period. Longer study periods assist the planner in understanding facility performance and determining what the normal cycle length actually is.”
- “Fairly represent all operating conditions of a normal operating cycle. For example, though a year may be chosen as the baseline period, if data is missing during the selected year for one month, comparable data for the same month in a different year should be

hours. The mean is 2,250,000 ton-hours. So, 1.28 standard deviations below the mean is $2,250,000 - (1.28 * 83,300) = 2,140,000$ ton-hours. The estimated load should be 2,140,000 ton-hours, or lower to satisfy the 90% criterion.

⁷ Refer to IMPVP volume 1 for detailed description of on/off test method

⁸ IPMVP Vol I, 2007, Appendix B, gives some basic guidance on statistical concepts relevant to energy savings reports, but does not define all aspects of statistical analysis.

⁹ Refer to IMPVP volume 1 for detailed description of Calibrated Simulation Option D Method 1.

¹⁰ See IPMVP Vol I 2007, Appendix B-2.2.2

¹¹ See ASHRAE Guideline 14-2002 Section 5.3.2.4.f for examples of error ranges although these are not the only acceptable values but rather examples to guide the users

- used to ensure the baseline record does not under represent operating conditions of the missing month.”
- “Include only time periods for which all fixed and variable energy-governing facts are known about the facility. Extension of baseline periods backwards in time to include multiple cycles of operation requires equal knowledge of all energy-governing factors throughout the longer baseline period in order to properly derive routine and non-routine adjustments...after ECM installation.”
 - “Coincide with the period immediately before commitment to undertake the retrofit. Periods further back in time would not reflect the conditions existing before retrofit and may therefore not provide a proper baseline for measuring the effect of just the ECM.”

This type of baseline scenario is referred to in this protocol as an historical benchmark.

When parts of the projects involve change in operating procedures or replacement of failed equipment, the baseline energy use shall reflect the lowest energy usage level contained in the then prevalent laws, regulations, and legal obligations.

Baseline for New Facilities

For energy efficiency projects added to the design and construction of a new system or facility, the baseline is the lowest energy usage level reflected by the then prevalent laws, regulations and legal obligations. Local building codes may provide minimum requirements for the energy-efficient design of buildings which can be used as the baseline scenario¹². ASHRAE Standard 90 and Canada’s MNECB are examples of relevant building code referenced standards that can be used to determine the minimum requirement for building energy efficiency. The code or standard selected must be the version current at the time of building design. If the time of design is unclear (may be difficult to clearly identify), it will be deemed to be no more than 3 years before the commissioning of the building. The code/standard selected for the purpose of determining the baseline of new facilities must be identified and justified. Publication date and version number must also be clearly identified.

2.11 Selection of Baseline Scenario

The procedure used to identify the baseline scenario for each type of project (retrofit and new facilities) is presented in Table 6 below. Various potential baseline scenarios were considered and assessed in order to determine the best available option.

A comparison of each potential baseline scenario is presented below. Potential types of baseline scenarios approaches evaluated include:

1. Historical benchmark: Typically site-specific and can be constructed to reflect reductions in a base period (such as the average emissions of the previous three years). This approach assumes that past trends in emissions and/or carbon stock changes will continue into the future.
2. Performance standard: Assumes the typical emissions profile for the industry or sector is a reasonable representation of the baseline. An assessment of comparable activities within a given industry or sector is necessary.
3. Comparison-based: Actual measurements of parameters from a control group (such as a plot of forested land, space heating natural gas consumption per square meter, etc.) to compare with the project. Emissions or removals from the control group are monitored throughout the project and compared with the emissions from the project site to

¹² Refer to IPMVP Volume III, Part 1 (2006) Chapter 2, and Volume I (2007), section 4.10.4 for additional information on baselines for new facilities

determine the incremental reductions from the project. Such a control group can be used with more than one project.

4. Projection-based: Projections of reductions in the future can use a variety of techniques, from simple straight-line growth assumptions to complex models. Forward-looking projections can be specified in terms of a set of constant parameters or can vary over time according to pre-defined procedures.

The baseline scenario approach most appropriate for this protocol was determined based on expected project types in the building sector, typical data availability and good practice guidance for the energy efficiency sector, more specifically the International Performance Measurement and Verification Protocol, Volume I, II and III (IPMVP). The possible baseline approaches are presented in Table 6, below, in hierarchal order (i.e. “historic benchmark” is the preferred approach, while “performance standard” may be used if “historic benchmark” is not feasible, etc.). Any departure from the hierarchal order must be justified appropriately.

Table 6: Assessment of Potential Baseline Scenario Approaches

Possible Baseline	Rational For	Rational Against
Historic Benchmark	<ul style="list-style-type: none"> • Accurate, historical data is available for an appropriate operating periods • Historical data in conjunction with baseline adjustments best represents the conditions that would have taken place had the project not been implemented • According to the IMPVP guidance, the baseline scenario for existing facilities is typically determined based on the historical data collected over the baseline period. 	<ul style="list-style-type: none"> • Accurate, historic information may not be available because the facility is new or historical data has not been recorded accurately • A historic benchmark assumes that past predominant energy use patterns will continue into the future and, under current circumstances, this is unlikely
Performance Standard	<ul style="list-style-type: none"> • Historical data for the facility is not available • Available performance standard are used throughout the industry and accurately represents common industry practice • Good practice guidance (i.e. MNECB, ASHRAE) can provide minimum requirements for the energy-efficient design and can be used as a conservative baseline scenario 	<ul style="list-style-type: none"> • Does not necessarily represent the conditions that would have taken place at the facility had the project not been implemented, but rather the conditions that would typically take place in the industry • In some cases, a performance standard for the relevant project type may not be readily available
Comparison-Based	<ul style="list-style-type: none"> • For a new facility, in the absence of a performance standard, a comparison-based baseline from a 	<ul style="list-style-type: none"> • No accurate comparison exists for this type of facility/project • More accurate baseline approaches can be available for

	comparable building built by the same owner for the same purpose, with the same level of occupancy may provide an accurate representation of energy use had the project not been implemented	this project
Projection-Based	<ul style="list-style-type: none"> In the absence of both a performance standard and accurate comparison, a project-based methodology provides the more accurate baseline scenario 	<ul style="list-style-type: none"> In most cases, projections are not as accurate as other readily available baseline conditions Often, more accurate baseline approaches for this type of project are available

Justification of Baseline Scenario Selected for Retrofit Projects

The evaluation of the potential baseline approaches performed and the guidance provided in IPMVP strongly support selecting an historical baseline scenario approach. Therefore the default baseline scenario approach selected for this protocol related to retrofit projects is the historical baseline approach.

Justification for Baseline Scenario Selected for New Building

The evaluation of the potential baseline approaches performed strongly support the use of a performance standard (or the lowest energy usage level contained in the then prevalent laws, regulations and legal obligations-i.e. MNECB, ASHRAE) for projects related to new buildings/facilities. Since historical data is not available, the best option left to project proponents to determine GHG emissions from the baseline scenarios is a conservative approach following the lowest energy usage level contained in regulations. In these cases good practice guidance or standards (including, but not limited to MNECB, ASHRAE) provide minimum requirements for the energy-efficient design of buildings can be used as the performance standard. The selection of the appropriate edition of the standard or building is left to the protocol user but require justification to ensure that the relevant version is used based on the project/building characteristics and year of design and/or commissioning.

Baseline Scenario Adjustments¹³

The baseline scenario identified for the projects eligible under this quantification protocol may require adjustments to ensure functional equivalence with the project. These adjustments are usually performed when the energy savings are quantified. In many cases, the quantification and claims of GHG emission reductions will occur on a yearly basis, therefore these adjustments will need to be performed according to that same schedule.

Typical adjustment includes routine adjustments and non-routine adjustments as defined below.

Routine Adjustments of the Baseline

IPMVP provides the following guidance on performing routine adjustments. “for any energy-governing factors, expected to change routinely during the reporting period, such as weather... A variety of techniques can be used to perform the adjustments. Techniques may be as simple as a constant value (no adjustment) or as complex as a several multiple parameter non-linear equations each correlating energy with one or more independent variables. Valid mathematical

¹³ Appendix A of IMPVP Volume 1 contains examples of routine and non-routine adjustments that may be useful for users of this protocol to review.

techniques must be used to derive the adjustment method.” Users of the protocol are strongly encouraged to review IPMVP volume for examples of routine adjustments.

Non-Routine Adjustments of the Baseline

IMPVP provides the following guidance on performing non-routine adjustments “for those energy-governing factors which are not usually expected to change, such as: the facility size, the design and operation of installed equipment, or the type of occupants. These static factors must be monitored for change throughout the reporting period.”

Non-Surplus Adjustments of the Baseline

Non-routine adjustments are defined to also include any necessary adjustments to the baseline arising from changes in the ‘surplus’ status of the project or parts thereof. During the reporting period, baseline data must be adjusted for any parts of the project which become non-surplus.

Surplus projects are defined as ECMs that were not required by law, regulation or legal obligation. However, if any change occurs to such requirements after the project was installed, project eligibility (or surplus) may change. Therefore any necessary non-surplus adjustment must be made to the baseline.

A common situation warranting a non-surplus baseline adjustment arises when a project replaces equipment with more efficient equipment, but ahead of its normal end of life date. Up to its normal end of life date, the savings would be surplus and therefore determined relative to the historical baseline. However after this date, the baseline becomes the efficiency standard prevailing at the time of the retrofit.

To enable non-surplus baseline adjustments, the project design document must report the:

- original installation date and normal lifetime of all equipment that is replaced under the project. Normal lifetime data should come from referenced independent sources.
- energy standards inherent in any relevant laws, regulations, legal obligations and common products or practices used in the industry, as of the date of the retrofit.

Ongoing reporting of savings must make non-surplus adjustment beginning with the date of change in surplus status, such as the date of a relevant new regulation or the notional end of life dates of relevant Sections of the retrofit. These adjustments must bring the baseline level to that of the standard that was in place at the time of project design. (If the project only installed equipment meeting those standards, the baseline equals the project energy use, and there are no further eligible savings.)

2.12 Definition of the Project Condition

This quantification protocol is applicable to the quantification of direct and indirect GHG emission reductions resulting from the implementation of energy conservation measures (ECMs) in new commercial and institutional (CI) buildings or for the retrofit of existing buildings. More specifically, this protocol is applicable and designed to accommodate ECM related to heating, ventilating, air conditioning and lighting systems. Other types of ECMs (i.e. building envelope, tap water heating, elevators, occupant small electrical equipment, outdoor lighting, swimming pool pumping or heating) may also be quantified with this protocol. Examples of eligible buildings include but are not limited to:

- hotel/motel/resort
- retail stores
- retail malls
- office buildings
- arenas

- hospitals and clinics
- schools and universities
- campus residences
- community centres
- library,
- fire/ambulance service.

2.13 Functional Equivalence

The Project and the Baseline should provide the same function and quality of products or services. This type of comparison requires a common metric or unit of measurement (such as the mass of beef produced, land area cropped, energy use/per unit of product) for comparison between the Project and Baseline activity (refer to the Project Guidance Document for the Alberta Offset System for more information).

The baseline scenario identified for the projects eligible under this quantification protocol may require adjustments to ensure functional equivalence with the project. These adjustments are usually performed when the energy savings are quantified. In many cases, the quantification and claims of GHG emission reductions will occur on a yearly basis, therefore these adjustments will need to be performed according to that same schedule.

2.15 Flexibility Mechanisms

Flexibility in applying the quantification protocol is provided to project developers in the following ways.

1. Four (4) quantification options¹⁴ are available to the project developers
 - a. Option A – *Retrofit Isolation: Key Parameter Measurement*; Savings are determined by measurements of the key parameters which affect the energy use of the ECM-affected systems
 - b. Option B – *Retrofit Isolation: All Parameter Measurement*; Savings are determined by measuring the energy use of the ECM-affected systems
 - c. Option C – *Whole Facility*; Energy use for the entire facility is measured and any savings are calculated accordingly.
 - d. Option D – *Calibrated Simulation*; Energy use and savings are determined using an accurate and calibrated simulation of the facility
2. The protocol offers two levels of rigour:
 - a. Simple Approach - prescribes conservative monitoring methods, computations and assumptions.
 - b. Advanced Approach - requires a higher level of monitoring (and usually associated cost), and less conservative assumptions, which may allow eligible projects to deliver greater GHG credits to the market than the simple approach.

These two approaches are allowed in order to provide flexibility. They balance the level of detail in monitoring requirements with the degree of conservativeness in various calculations to ensure that GHG emission reduction quantified under each approach are comparable from the standpoint of quality and verifiability.

¹⁴ These options are described further in the Protocol.