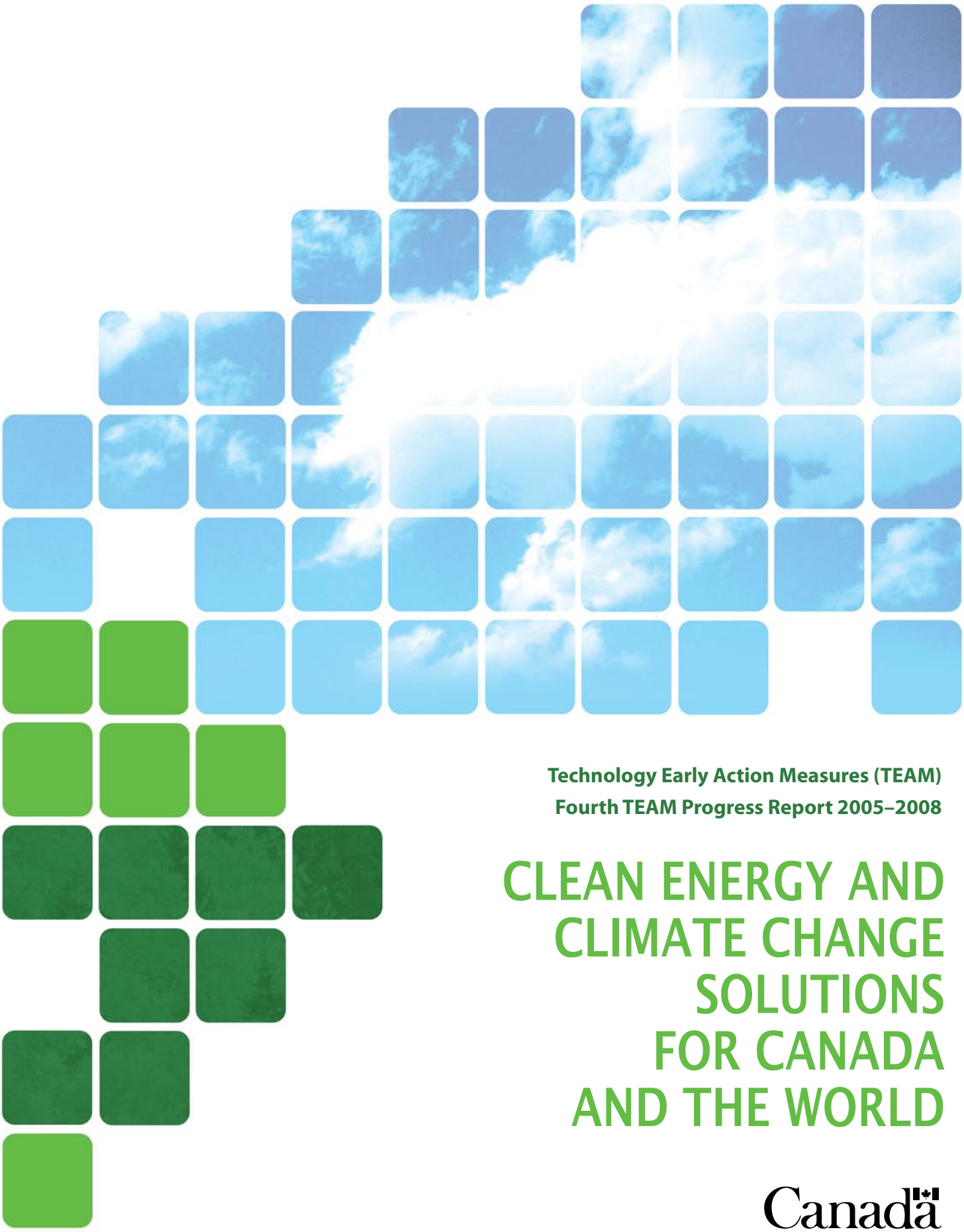

Technology Early Action Measures (TEAM)

Fourth TEAM Progress Report 2005–2008

CLEAN ENERGY AND CLIMATE CHANGE SOLUTIONS FOR CANADA AND THE WORLD

Canada

Acknowledgements

We would like to acknowledge the many individuals in both the private and public sectors who have been part of the Technology Early Action Measures (TEAM) program. Without their long-term vision and commitment of time, effort and financial resources, the TEAM program would not be the success it is.

Special thanks are extended to the TEAM Executive Committee, Interdepartmental Review Committee, the TEAM Operations Office staff, and to the communications and financial management staff of Natural Resources Canada, Environment Canada and Industry Canada.

This report is available in English and French on the TEAM Web site at **www.team.gc.ca** and in hard copy from:

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Visit TEAM at:
www.team.gc.ca

About this Report

This report, Clean Energy and Climate Change Solutions for Canada and the World, provides an update on the progress of the TEAM program for 2005 to 2008 (Phase III of the TEAM program) and also summarizes the 10-year history of TEAM.

The update highlights the 35 Phase III TEAM projects out of the 140 projects funded by TEAM since 1998. These 35 projects are organized into six priority areas:

Because this report is brief, a wealth of information cannot be presented. Please visit the TEAM Web site at www.team.gc.ca for more detailed information on TEAM, its projects and its partners.

Technology Early Action Measures (TEAM)

Technology Early Action Measures (TEAM) is a federal interdepartmental technology investment program that began in 1998. During its 10-year history, TEAM brought together private and public sector partners, and identified, developed and supported the most promising environmentally sound technologies with the greatest potential to reduce greenhouse gases (GHGs). Under the leadership of Natural Resources Canada, Environment Canada and Industry Canada, and with the participation of several other federal government departments, TEAM brought 140 technology demonstration projects to reality in Canada and around the world. TEAM is currently transitioning to the Government of Canada's new ecoACTION program under the ecoENERGY Technology Initiative.

ecoACTION Initiatives

Using Less • Living Better

The Government of Canada will continue to support clean energy production and end use through its ecoACTION Initiatives program unveiled in early 2007.

Energy production is the backbone of the Canadian economy and contributes significantly to Canadians' quality of life. However, energy production and use are also the source of most of Canada's air pollution and GHG emissions. Canada's challenge is to become a clean energy superpower.

The ecoENERGY Initiatives are designed to meet this challenge. Natural Resources Canada is focusing on coordinated measures to help deliver results.

Through evaluation and research, Natural Resources Canada has identified three areas of prime importance:

- Applying science and technology to clean up conventional energy.
- Increasing the clean energy on the grid and using renewable energy.
- Improving energy efficiency. The largest untapped source of energy in this country is the energy we waste.

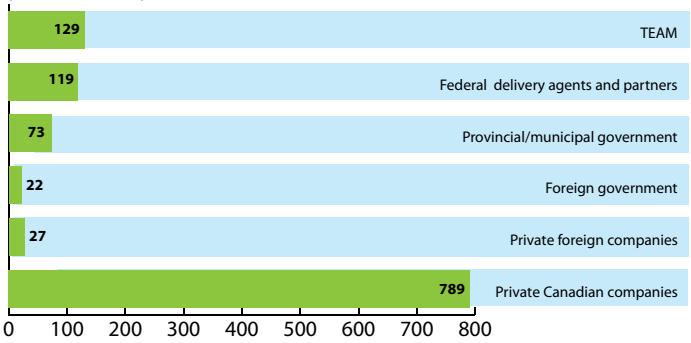
Many of the environmental issues associated with how we produce, transmit, distribute and use energy can be resolved only by developing advanced energy technologies –technologies that currently do not exist or that are in the early stages of development.

The ecoENERGY Technology Initiative is a targeted investment of $230 million that will fund the research, development and demonstration of next-generation clean-energy technologies that will increase the clean energy supply, reduce energy waste, and reduce pollution from conventional energy sources.

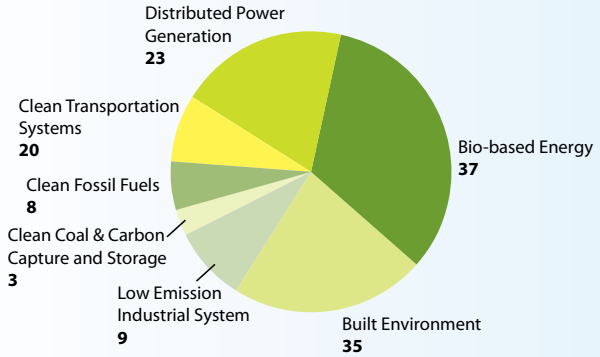
We invite you to look inside to read more about some of the innovative technology demonstration initiatives in which TEAM has played a strategic role.

DISTRIBUTION OF TEAM PROJECTS BY PRIORITY AREAS
(1998–2008)

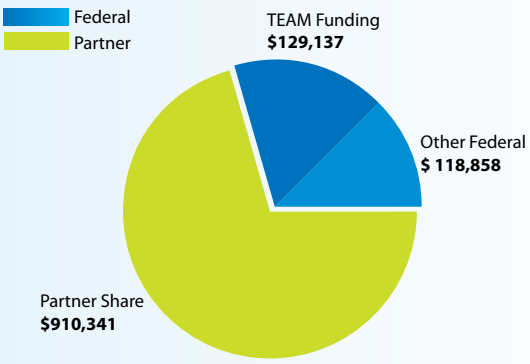
TEAM FUNDING (1998–2008)
($ MILLIONS)



TEAM SECTORS
(Number of projects)



TEAM FUNDING
($ K)



Reporting to Canada and the World

An important element of the TEAM program is the commitment to report the technical performance and GHG mitigation potential of all TEAM-funded projects. TEAM's pioneering work in the development of tools and methodologies for measuring and reporting GHG reductions has resulted in the System of Measurement and Reporting for Technologies (SMART).

SMART provides a basis to evaluate the project proponent's processes and documentation so that the technological performance claims and the GHG mitigation potential can be substantiated. Since 2004, all TEAM projects have followed the SMART process.

Benefits of Credible Measurement and Reporting

SMART benefits the companies working on the projects and the government programs that support them. SMART helps companies to:

- Establish credibility;
- Gain experience and skill in GHG reporting;
- Show leadership;
- Build their competitive advantage; and
- Maintain constructive relations with the government and with the public.

The growing network of third-party evaluators created under TEAM's leadership are gaining valuable experience in preparing for emerging markets in GHG emissions trading. The federal government benefits by knowing that its investments have measurable results, produce tangible results, build capacity in the private sector, and reduce the risks associated with GHG emissions.

While the emphasis of TEAM projects is technology demonstration towards commercialization and replication, there is an important need for credible and transparent reporting of measurable GHG performance data. The SMART process helps TEAM companies report GHG information so that it can be used effectively by:

- Government agencies, for regulatory and international reporting purposes;
- Emissions trading organizations; and
- Technology proponents, for sales and marketing and for sustainability reporting.

The tables on pages 22 - 24 summarize the SMART results of TEAM projects.

Building National and International Capacity

TEAM staff have continued to play a leading role in providing internationally accepted standards in GHG measurement and reporting. TEAM staff co-chaired the Canadian Advisory Committee in the development of the ISO standards 14064, Parts 1, 2 and 3, which were officially approved in February 2006.

Specifically, TEAM's SMART protocol led to the creation of ISO 14064 Part 2. These ISO standards will help GHG programs ensure global credibility and consistency. The recent Voluntary Carbon Standard is one of the first programs to be released that uses these standards. TEAM staff also worked internationally to draft guidance documentation for ISO 14065 on the accreditation of validation and verification bodies.

In March 2007, TEAM signed a memorandum of understanding with the Standards Council of Canada for creating a national system for the accreditation of verification bodies (as per ISO 14065) and a certification scheme for GHG validators, verifiers and consultants. This new national system will replace the TEAM list of qualified consultants. The results of this project will also contribute to any eventual carbon trading/credit scheme for Canada.

Enhancing SMART for Demonstration Projects

The SMART process will continue to be improved under the ecoENERGY Technology Initiative, which demonstrates the Government's continued commitment to credible performance measurement and reporting. Work continues on incorporating other air pollutants and toxic emissions into the measurement and reporting framework so that we can assess the impact of technologies funded by the Government more comprehensively in order to achieve the objectives of the Clean Air Regulatory Agenda.

PROJECT DESIGN >> PROPOSAL + INITIAL SMART EVALUATION >> PROJECT APPROVAL >> DEVELOPMENT OF PROJECT MASTER PLAN (PMP) WITH THIRD PARTY >> PROJECT IMPLEMEN-TATION >> FINAL SMART REPORT >> OPTIONAL THIRD PARTY GHG VERIFICATION

"The SMART process managed by the TEAM Operations Office has successfully demonstrated value by providing useful information on project-related GHG performance at an affordable cost. Through effective stakeholder engagement and the use of accepted practices, the TEAM SMART process has shown leadership in facilitating both Canadian and international efforts to establish credible approaches for measuring, verifying and reporting environmental performance information. This has helped to build capacity and market confidence, leading to the commercialization of viable and environmentally sound energy technology solutions."

Ontario Centre for Environmental Technology Advancement - Kevin Jones, President and CEO

Clean Fossil Fuels

The objective of this technology area is to ensure a continued, secure supply of affordable and cleaner fossil fuels (primarily oil sands), while minimizing the environmental impact on air and water quality.

IND-146

IND-147

IND-146 Petroleum Technology Research Centre

Heavy oil extraction using a new solvent vapour extraction process

This TEAM project will demonstrate a heavy oil extraction process called solvent vapour extraction (SVX) in three types of heavy oil fields with three major heavy oil companies. The SVX process has significant advantages compared to the current steam-assisted extraction processes. SVX uses much less natural gas, eliminates the need for fresh water, produces significantly fewer flue gas emissions, and significantly reduces the carbon dioxide (CO_2) intensity of heavy oil extraction.

Greenhouse gas reduction:

- 21,786 tonnes (t) CO_2 equivalent (CO_2e) over the duration of the project

Partners:

- Nexen
- Canadian Natural Resources Ltd.
- Husky
- Province of Saskatchewan
  Saskatchewan Industry and Resources
- Saskatchewan Research Council
- Alberta Research Council
- Sustainable Development Technology Canada (SDTC)
- Natural Resources Canada
  (CETC-Devon – Advanced Separation Technologies)

IND-147 Quadrise Canada Corporation[1]

Oil sands extraction combining MSAR™ fuel and emissions capture and underground storage

Quadrise Canada has developed an enriched oxygen emulsion fuel called Multiphase Superfine Atomized Residue (MSAR™). MSAR™ is made from bitumen to replace natural gas in oil sands extraction operations that use steam-assisted gravity drainage. This project will focus on using MSAR to develop a near-zero emission technology for the oil sands sector. By combining the oxyfuel combustion of MSAR with emissions capture technology, CO_2 emissions will be sequestered.

Greenhouse gas reduction:

- 37,236 t CO_2e per year
- 616.5 kilograms (kg) CO_2e per tonne of bitumen produced

Partners:

- MEG Energy Corp.
- Colt Engineering
- Paramount Resources
- Alberta Energy – Innovative Energy Technologies Program
- Natural Resources Canada
  (CETC-Ottawa – Fuel Assessment)

[1] At time of print, final negotiations pending

"TEAM supported ARISE in the development of technology, standards, policy and system expertise in the very early stages of grid-tied photovoltaic applications in Canada. This allowed us to grow our business while at the same time support the greater photovoltaic industry in Canada"

ARISE - Ian MacLellan, President and CEO

Clean Transportation Systems

In this area of technology, the goal is to promote the development of advanced vehicle technologies, including hydrogen fuel cells, plug-in hybrid electric vehicles, emission reduction technologies and advanced fuels.

IND-130 Terra Nova Marine Company Limited

Efficient diesel-electric propulsion systems for medium-sized fishing vessels

The purpose of this project is to develop a commercially viable diesel-electric propulsion system for wide, deep, medium-sized fishing vessels. Highly efficient electric motors will replace the main diesel propulsion engine, and the power production will be split between several smaller diesel generators. As a result, fishing vessels will be more fuel efficient and less costly to operate, and emissions will be significantly reduced.

Greenhouse gas reduction:
- 962 t CO_2e per year
- 1.37 t CO_2e per tonne of fish caught and processed

Partners:
- AMP Fisheries
- National Research Council (NRC)
- NRC – Industrial Research Assistance Program

IND-144 AirScience Technologies

Hydrogen production from landfill gas using the Terragas® process

The project will produce "green" hydrogen from landfill gas at a commercial waste management site using the Terragas® process to purify the hydrogen. The hydrogen will then be tested and purchased for resale by Air Liquide, a well-established global producer and marketer of hydrogen.

Greenhouse gas reduction:
- 74 t CO_2e per year
- 5 kg CO_2e per kilogram of hydrogen

Partners:
- Waste Management of Canada
- Air Liquide
- SDTC

IND-149 Delta-Q Technologies Corp.

Optimization and testing of battery charger systems for plug-in hybrid electric vehicles

In this project, Delta-Q will develop, optimize, demonstrate and test 20 on-board battery charger systems on new models of plug-in hybrid vehicles that are being developed by a major automotive manufacturer.

Greenhouse gas reduction:
- 7.2 t CO_2e per year
- 1.44 kg CO_2e per charge

Partners:
- A major automotive OEM
- Transport Canada

INT-043 ATFCAN

Conversion of vehicles to natural gas to improve India's air quality

ATFCAN is leading a consortium of companies in the compressed natural gas (CNG) vehicle industry, using an integrated approach to demonstrate Canadian CNG technologies in India, to address urban air quality. This project will convert 250 commercial fleet light-duty vehicles to natural gas and install low-emission natural gas engines and low-weight natural gas storage systems on six transit and intercity buses.

Greenhouse gas reduction:
- 864 t CO_2e per year
- Taxis: 57 kg CO_2e/1000 km
- Buses: 146 kg CO_2e/1000 km

Partners:
- Cummins Westport Inc.
- Dynetek Industries Ltd.
- ECO Fuel Systems Inc.
- ACE Gas Conversions Pvt. Ltd. (India)
- Cummins India Ltd. (India)
- Empire Industrial Equipment (India)
- Environmental Systems Products Pvt. Ltd. (India)
- Maruti Suzuki India Limited (India)
- Mumbai Gold Cabs Pvt. Ltd. (India)
- Tata Motors (India)
- Veecon IPA Gastechnik Ltd. (India)
- Environment Canada - Environmental Technology Centre

IND-130

IND-144

IND-149

INT-043

Built Environment

The objective of this technology area is to increase the energy efficiency and reduce the air emissions in new and existing housing, buildings and communities in Canada. Of particular interest are projects that integrate renewable energy technologies into buildings and community systems.

COM-094 CIMCO Refrigeration

ECO CHILL® technology at three ice rinks

CIMCO's innovative ECO CHILL system reduces the energy consumption in ice rinks by continuously adjusting the condensing temperature, recycling waste heat throughout the building using secondary fluids. This project will demonstrate the performance of the ECO CHILL system in installations at three ice rinks, each with a different heating, ventilation, air conditioning and refrigeration system. The project is projected to reduce total energy consumption by 50 percent.

Greenhouse gas reduction:
- 488 t CO_2e per year
- 150 kg CO_2e per square metre per year

Partners:
- A. D. Williams Engineering
- Natural Resources Canada (CETC-Varennes – Refrigeration Program)

COM-097 Dockside Green

Mixed-use sustainable green community

Dockside Green is a sustainable mixed-use development of 1.3 million ft^2, planned for Victoria, British Columbia. Based on an integrated systems approach to energy, water, waste and resource management, Dockside Green will feature the first urban use of a wood-waste biomass gasifier to produce heat. Heat will also be recovered from onsite sewage treatment and from municipal sewage trunk lines. Dockside Green will use 65 percent less water and 50 percent less energy than a standard development, and will be GHG-neutral. Dockside Green is committed to achieving Leadership in Energy and Environmental Design (LEED) for New Construction Platinum certification, the highest level under the Canadian Leadership in LEED® program. Dockside Green would be one of only a handful of projects around the world that have achieved this rating for a whole development.

Greenhouse gas reduction:
- 5,270 t CO_2e per year

Partners:
- Windmill Developments
- Busby Perkins + Will
- DYSarchitecture
- Hughes Condon Marler Architects
- Worley Parsons Komex
- Sanitherm Engineering Limited
- BC Hydro
- Stantec
- Carmanah
- Reliable Controls
- Aqua-Tex Scientific Consulting Ltd.
- Nexterra
- Federation of Canadian Municipalities
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

COM-100 Ice Kube Systems

Heat recovery from ice rinks for district energy

This project will recover heat from two ice rinks at the Cansport Arena in Bedford, Nova Scotia. The heat will be used to meet space and water heating needs in the arena and in two nearby buildings – a four-storey hotel and a single-storey office building. The project includes a heat storage system that will optimize the recovery and use of heat 24 hours a day.

Greenhouse gas reduction:
- 1,028 t CO_2e per year

Partners:
- Can Sport Limited
- High Performance Energy Systems
- Natural Resources Canada (CETC-Varennes – Refrigeration Program)

COM-102 High Performance Energy Systems Inc.

Borehole thermal energy system that stores the cold from seawater to cool buildings

This TEAM project will involve building and demonstrating an innovative system of boreholes to store cold seawater, as part of a seawater-based cooling system that will replace conventional chillers in a building complex in Halifax, Nova Scotia. The "cold" will be extracted from seawater during cool seasons, stored in a field of up to 90 boreholes that have significantly enhanced

COM-094

COM-097

COM-100

COM-102

COM-103

IND-131

IND-145

heat transfer properties, and then used as needed during warm periods. The project will also involve developing and optimizing a control system to integrate the cooling technology into existing buildings.

Greenhouse gas reduction:
- 449 t CO_2e per year

Partners:
- Halifax Regional Municipality
- Environment Canada
- Natural Resources Canada (CETC- Ottawa – Sustainable Buildings & Communities)

COM-103 Solar Buildings Research Network

Combined solar heat and power co-generation technologies for commercial and residential buildings

The goal of this project is to advance the design and development of combined solar heat and power co-generation using solar photovoltaic and thermal technologies. Building envelopes will become dynamic energy conversion systems that are seamlessly integrated into the heating, ventilating and air-conditioning systems of both new and retrofitted commercial and Net Zero energy residential buildings. These hybrid technologies will be demonstrated in four demonstration sites, including a new commercial/institutional building and two net-zero, or low-energy-impact, residential buildings.

Greenhouse gas reduction:
- 20 t CO_2e per year (combined savings from four sites)

Partners:
- Solar industry (Day4 Energy, Conserval Engineering, SET)
- Concordia University
- Alouette Homes
- Servag Pogharian Design
- City of Toronto
- Hydro Quebec
- Agence de l'efficacité énergétique
- Regulvar
- CMHC (Canadian Mortgage and Housing Corporation)
- Natural Resources Canada (CETC-Varennes – Integration of Renewable & Distributed Energy Resources)

IND-131 Menova Energy Inc.

Space heating, water heating and electricity generation using Power-Spar® solar technology

This project will demonstrate Menova's Power-Spar solar technology, which can be used for space heating, water heating and electrical power generation in homes and in commercial and industrial buildings. Solar reflectors concentrate the sunlight and surplus heat is transferred to a thermal storage system.

Greenhouse gas reduction:
- 77 t CO_2e per year
- 250 kg CO_2e per Megawatt-hour – thermal (displacing propane heat)
- 300 kg CO_2e per Megawatt-hour – thermal (displacing electric heat)

Partners:
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

IND-145 Loblaw Companies Limited

First use of CO_2 for supermarket refrigeration

As Canada's first project using CO_2 in refrigeration, this project will demonstrate the CoolSolution™ suite of refrigeration features in a new Loblaw supermarket. CO_2 will be used as a secondary refrigerant for freezers, and recovered heat will be used by the store's fully integrated heating, ventilating and air-conditioning system. The project will also include working to change the Canadian Standards Association building codes to permit the use of CO_2 for refrigeration in supermarkets. Compared with conventional supermarkets, this demonstration store is expected to reduce energy consumption by 20 percent, reduce refrigerant leaks by 95 percent and reduce GHGs by 50 percent.

Greenhouse gas reduction:
- 1640 t CO_2e per year
- 100 kg CO_2e per square metre of floor space per year

Partners:
- Hill Phoenix
- Air Liquide
- Natural Resources Canada (CETC-Varennes – Refrigeration Program)

"With both the domestic and international focus, TEAM funding allowed us to demonstrate our innovative technology and concepts in Canada and then promote these internationally"

IceKube - Steve Sacher, Manager of International Business Development

IND-150 Ecologix Heating Technologies Inc.

Multizone forced-air heating and cooling for homes

Ecologix has produced Canada's first integrated multizone forced-air heating and cooling system, which is more efficient than conventional single-zone systems in optimizing energy use. This project will include monitoring systems installed in demonstration sites, documenting installation steps and defining ways to maximize energy savings. More than 80 systems will be installed in three types of residential housing: new townhouses, new single and semi-detached homes, and retrofit semi-detached and single homes.

Greenhouse gas reduction:

- 240 t CO_2e per year

Partners:

- McMaster University
- Homebuilders, Installers and Owners in South West Ontario
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

IND-151 Carmanah Technologies Corporation

Solar-powered LED outdoor lighting

Carmanah has developed self-contained, off-grid solar-power LED lighting systems for use in city infrastructure and for public outdoor illumination purposes. In the first phase of this project, the products will be optimized for municipal applications and costs reduced. In the second phase, 100 solar-power LED lighting systems will be installed and tested in Kelowna, British Columbia, in parks, on pedestrian and bike trails, on directional signs, as accent lighting, and in security and safety applications. The final phase will include transferring installation and maintenance know-how to the City of Kelowna.

Greenhouse gas reduction:

- 1.7 t CO_2e per year
- 340 kg CO_2e per solar-power system

Partners:

- City of Kelowna, BC
- Natural Resources Canada (CETC-Varennes – Integration of Renewable & Distributed Energy Resources)

INT-044 Smardt Inc.

Energy-efficient chiller systems for Cuba

This project involves installing 8 to 10 high-efficiency Smardt chillers as an alternative to older, inefficient chillers in Cuban hospitals, office buildings and commercial buildings. Based on Turbocor frictionless compressors, Smardt chillers consume significantly less energy than conventional centrifugal chillers, and do not use chlorofluorocarbons. This project will be important in showcasing Canadian leading edge technology in a developing country.

Greenhouse gas reduction:

- 7,349 t CO_2e per year

Partners:

- National Ozone Unit of Cuba
- Heating, Refrigeration and Air Conditioning and Industry of Canada
- United Nations Development Program
- Environment Canada (Montreal Protocol)

INT-046 EcoSmart Foundation

Showcasing EcoSmart concrete and Canadian expertise in Dubai's construction industry

The aim of this project is to create a high-profile international demonstration project for EcoSmart concrete technology in the booming United Arab Emirates construction market. In EcoSmart concrete, ordinary Portland cement is partially replaced by supplementary cementing materials, which creates a more durable concrete and reduces solid waste and GHG emissions. This project will be an important showcase for Canadian engineering expertise in one of the world's busiest construction markets.

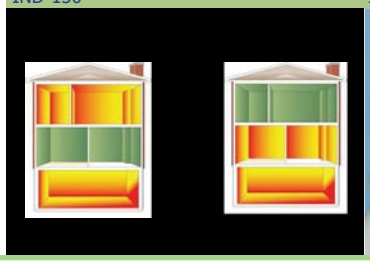
Greenhouse gas reduction:

- 120,079 t CO_2e
- 279 kg CO_2e per tonne of cement

Partners:

- Construction companies, design firms, developers, concrete suppliers and research institutions in the UAE
- Canadian design and engineering companies
- Natural Resources Canada (CANMET Materials Technologies Lab)

IND-150



IND-151

INT-044

INT-046

IND-135

COM-096

Low-Emission Industrial Systems

This area of technology focuses on working with industry to improve the energy and emissions performance of the Canadian industrial sector while ensuring it remains economically competitive. Existing processes and technologies will be improved, and new ones will be developed that reduce energy intensity and reduce emissions of Criteria Air Contaminants and GHGs.

IND-135 Yava Technologies Inc.

In-situ leach mining

In this TEAM project, Yava is demonstrating a new, environmentally friendly in-situ mining technique to recover valuable minerals, including lead, zinc, manganese and calcium, from a sandstone deposit in Sydney, Nova Scotia. The technique involves injecting an environmentally friendly leachate into the ore, bringing the minerals to the surface and allowing them to be recovered onsite through ion exchange. Compared to conventional mining, this approach results in less disruption to the environment and a significant reduction in GHG emissions per tonne of metals and minerals mined.

Greenhouse gas reduction:

- 40 446 t CO_2e per year
- 1.83 t CO_2e per tonne of lead
- 1.26 t CO_2e per tonne of other metals and minerals

Partners:

- Enterprise Cape Breton Corporation

Distributed Power Generation

In this area of technology, the objective is to continue to promote the production of electricity from renewable energy sources, from small combined heat and power systems, and from other distributed clean-generation technologies, and to integrate these systems into the electrical grid.

COM-096 New Energy Corporation Inc.

Vertical axis hydro turbines that convert water's kinetic energy to electricity

New Energy Corporation Inc. developed vertical axis turbines that convert the kinetic energy of moving water into electricity without the need for dams. In this project, New Energy will increase the power of the 5-kW turbines to 25 kW, and install 5-kW and 25-kW turbines in several sites and applications, such as run-of-river hydro applications, and industrial and irrigation canals. The performance data generated in this project will be used to improve the design of the turbines for the commercial market.

Greenhouse gas reduction:

- 299 t CO_2e per year
- 700 kg CO_2e per kilowatt hour of electricity generated

Partners:

- National Research Council (NRC) – Canadian Hydraulics Centre
- NRC – Industrial Research Assistance Program (IRAP)
- Natural Resources Canada – (CETC-Ottawa – Renewable Energy Technologies)

IND-132 Outland Technologies Inc.

Power-recovery turbine generator that converts wasted energy into electricity

Outland Technologies Inc. developed and patented a power-recovery turbine generator that recovers the wasted letdown energy from the processing of natural gas and converts it to electricity. The technology will be demonstrated at one gas well site.

"Our world-leading mixed use development in Victoria with our LEED Platinum commitment has been strengthened by TEAM both financially and through the SMART process, allowing us to fully develop and communicate our measured GHG reductions."

Dockside Green - Joe Van Belleghem, Partner

Greenhouse gas reduction:
- 597 t CO_2e per year*
- 0.98 t CO_2e per Megawatt-hour – electrical*

Partners:
- Zedi Solutions
- Celtic Exploration
- National Research Council
- Northrock
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

* GHG Reductions based on 3 projects sites, however, only one site to be implemented.

IND-138 Enbridge Gas Distribution and Enbridge Inc.

Recycling waste energy from a pipeline's pressure letdown stations

This project will demonstrate how waste energy recovered from the pressure letdown stations in Enbridge's natural gas pipeline can be recycled to produce electrical power and heat. In phase 1, a turbo expander will produce electricity, and in phase 2, a stationary fuel cell will be integrated with the turbo expander to produce additional electricity and heat.

Greenhouse gas reduction:
- 839 t CO_2e per year
- 3401 t CO_2e per year (with a fuel cell integrated with the turbo expander)
- 0.194 t CO_2e per Megawatt-hour – electrical
- 0.313 t CO_2e per Megawatt-hour – thermal

Partners:
- Toronto Hydro
- NYSEARCH (administered by the Northeast Gas Association)
- Ontario Fuel Cell Commercialization Fund
- Alberta Energy Research Institute (AERI)
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

IND-141 Toronto Hydro Energy Services

Natural gas-fuelled combined electricity, heat and emergency power system

This project will demonstrate and test an onsite 335 kW generator fuelled by natural gas that generates heat, provides electricity to offset the use of utility power, and also provides back-up emergency power in the event of a power outage. Because traditional emergency standby generators use diesel fuel, the project requires that building codes and standards be changed to allow a back-up system based on natural gas and this project will include obtaining these regulatory changes. The project includes five demonstration sites in two types of installations: institutional long-term care and a public high-rise multi-unit residential buildings.

Greenhouse gas reduction per site:
- 233 t CO_2e per year
- 75 kg CO_2e per Megawatt-hour – electrical
- 184 kg CO_2e per Megawatt-hour – thermal

Partners:
- Toronto Community Housing Corporation
- Villa Charities
- Enbridge
- Powerstream
- Toronto Atmospheric Fund
- DDACE Power Systems
- Ontario Power Authority
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

IND-148 TM4 Inc.

Small-footprint permanent magnet generator for large wind turbines

TM4 developed an efficient, lightweight, small-footprint generator prototype for wind turbines that is based on permanent magnet technology. The goal of this project is to take this generator to a more commercial scale by designing and developing a similarly efficient, lightweight, small-footprint 660-kW generator, to install four such generators into a large (2.5 MW) wind turbine, and to monitor the performance of the generators in the large turbine installed on a Canadian wind farm.

Greenhouse gas reduction:
- 11 958 t CO_2e per year
- 1253 t CO_2e per megawatt of electricity generated per year

Partners:
- Sustainable Development Technology Canada (SDTC)
- Natural Resources Canada (CETC-Ottawa – Renewable Energy Technologies)

IND-132

IND-138

IND-141

IND-148

Bio-based Energy Systems

In this area of technology, the focus is on harnessing the potential of bio-resources to produce bio-energy, bio-fuels, industrial bio-products and bio-processes. These innovative energy systems are another way that Canadian industry and communities can improve energy efficiency and reduce toxic emissions.

COM-098 PlanET Biogas Solutions

Conversion of manure and organic biomass to biogas

In this project, PlanET Biogas will design, build and demonstrate advanced anaerobic digester systems for several new applications and feedstocks in Canada. Feedstock materials will include by-products from greenhouse operations (vegetables and flowers), dairy and poultry manure, sweet corn silage, grain based animal food, corn silage, potato culls, and glycerin.

Greenhouse gas reduction:
- 10,423 t CO_2e per year
- 256 kg CO_2e per megawatt hour of electricity produced
- 2.29 t CO_2e per 1000 m^3 of natural gas offset

Partners:
- BLT Farms
- Vandermeer Greenhouses
- Bayview Flowers
- Pelee Hydroponics and Seacliff Energy
- Agriculture and Agri-Food Canada (CanAdvance & PAVE)
- Natural Resources Canada (CETC-Ottawa - Industrial Innovation Group Bio-energy)

COM-099 Powerbase Energy Systems Inc.

Modular anaerobic digester and combined heat and power system

This project will involve demonstrating a modular, factory-built, containerized combined heat and power system and anaerobic digester. This modular energy system can potentially reduce the capital, installation and commissioning costs of AD systems. The project will also include developing a closed-loop feedback controller and algorithms that will monitor and coordinate the biological processes within the AD to ensure optimal biogas production.

Greenhouse gas reduction:
- 4,503 t CO_2e per year
- 4.3 t CO_2e per head of cattle per year

Partners:
- Clearydale Farms
- Donnadale Farms Inc.
- Ledgecroft Farms Inc.
- Natural Resources Canada (CETC-Ottawa - Industrial Innovation Group Bio-energy)

COM-101 AmbientEco Group

Conversion of municipal solid waste to EnviroFuel™

This project will demonstrate the conversion of municipal solid waste into a fuel product, called EnviroFuel through a conversion process that includes the use of optical sorting and an innovative desiccant drying technology. The project, which will be located in the Peel Region of Ontario, will also demonstrate the recovery of heat energy from EnviroFuel using a cement kiln and evaluate a number of advanced energy technologies to convert EnviroFuel into syngas that could be used to generate heat and electricity.

Greenhouse gas reduction:
- 6,000 t CO_2e per year
- 375 kg CO_2e per tonne of Municipal Solid Waste processed

Partners:
- Region of Peel
- Matthews Southwest
- Natural Resources Canada (CETC- Ottawa - Industrial Innovation Group Bio-energy)

IND-133 Nexterra Energy Corp.

Low-cost thermal energy from wood residue

This project has demonstrated Nexterra's proprietary gasification technology at the Tolko Industries plywood mill in Heffley Creek, British Columbia. In the gasification system, 25 000 tonnes per year of wood residue from the mill are converted into clean, low-cost thermal energy, displacing enough natural gas to heat 1900 homes in British Columbia, and significantly reducing the mill's energy costs. This low-cost, low-emission technology is ideally suited to onsite energy generation because of its design simplicity and flexibility. The project has resulted in Volatile Organic Compound (VOC) and GHG emission reductions and the Heffley Creek mill is now the most energy efficient in North America.

COM-098

COM-099

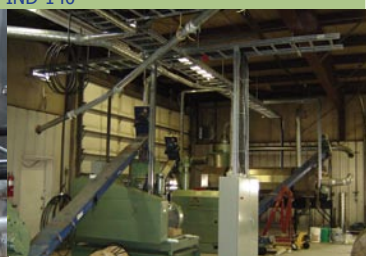
COM-101

IND-133

IND-134

IND-139

IND-140



Greenhouse gas reduction:
- 13,727 t CO_2e per year
- 530 kg CO_2e per tonne of veneer produced

Partners:
- Tolko Industries Ltd.
- Ethanol BC
- ARC Financial
- Natural Resources Canada (CETC-Ottawa - Industrial Innovation Group Bio-energy)

IND-134 Entropic Energy

Biomass-based combined heat and power system

This TEAM project will demonstrate a small-scale bioenergy system that generates both heat and power using the "Entropic" cycle. As the system burns sawmill waste, the flue gas generates electricity and heat for the mill, and electricity for the grid.

Greenhouse gas reduction:
- 1,705 t CO_2e per year
- 320 kg CO_2e per dry tonne of wood residue combusted

Partners:
- Ridgeview Mills
- Natural Resources Canada (CETC-Ottawa – Sustainable Buildings & Communities)

IND-139 Vaperma Inc.

Advanced membrane separation technology for the production of fuel ethanol

To reduce the GHGs and energy use associated with the production of ethanol fuel, several membrane processes have been developed for the dehydration of both grain and cellulose ethanol. This project has demonstrated a separation technology that uses a vapour phase water/alcohol membrane that is capable of separating a 40/60 ethanol/water vapour mixture into a 99+ percent fuel-grade ethanol product. Compared with the traditional distillation/dehydration technologies, this technology is expected to result in major energy savings and the reduction of GHGs.

Greenhouse gas reduction:
- 26 t CO_2e per year
- 3.2 kg CO_2e per hour of plant operation

Partners:
- Greenfield Ethanol
- Sustainable Development Technology Canada (SDTC)
- Natural Resources Canada (CETC-Ottawa - Industrial Innovation Group Bio-energy)

IND-140 Milligan Bio-Tech

Biodiesel from waste canola seed

This project will develop and demonstrate a bio-refinery technology that profitably turns waste canola seeds into biodiesel fuel. Milligan proposes to demonstrate a hub-and-spoke commercial approach, where the hub is a permanent biodiesel (esterification) plant in Saskatchewan, and the spokes are portable mechanical oil seed crushing plants in Manitoba and Alberta.

Greenhouse gas reduction:
- 7,045 t CO_2e per year
- 1.57 t CO_2e per tonne of distressed seed

Partners:
- University of Saskatchewan
- Natural Resources Canada (Biofuels Targeted Measures)
- Canadian Renewable Fuels Association
- Saskatchewan Canola Development Commission
- Agriculture and Agri-Food Canada

"This project is a world-leading demonstration of environmentally preferred electricity generation, and the TEAM funding was a key factor in reducing the technical risk in a project that involved numerous first-of-kind engineering and environmental design improvements that will support future technology replication."

Enbridge – David Teichroeb, Business Development – Fuel Cell Markets

IND-153 Thermal Energy International Inc.

Combining a biomass dryer and a heat-recovery unit at a pulp mill

A pulp and paper mill in Eastern Canada, will be the site for this project, which will demonstrate two of Thermal Energy's technologies working together: its DRY-REX™ biomass drying system and its FLU-ACE® heat-recovery unit. Using these two technologies, sludge from the paper mill will be dried and then burned in the mill's boiler system to produce steam for the mill processes. This process will reduce landfill waste, reduce the need for oil, and reduce air emissions and odours.

Greenhouse gas reduction:

- 11,454 t CO_2e per year

Partners:

- A pulp and paper mill in Eastern Ontario
- Natural Resources Canada (CETC-Ottawa – Industrial Innovation Group Bio-energy)

IND-154 Advanced BioRefinery Inc.

Transportable pyrolysis systems turn waste biomass into energy

Advanced Biorefinery Inc. developed a transportable pyrolysis system that can be moved to the biomass source, which expands the geographic range of biomass sources that can be economically developed. In this TEAM project, two innovative, small-scale, transportable pyrolysis systems will be installed and demonstrated. The system on a large chicken farm in Wolfville, Nova Scotia, will convert chicken manure into bio-energy, and the other system will convert forestry waste into bio-oil and char.

Greenhouse gas reduction:

- 77 t CO_2e per year
- 205 kg CO_2e per tonne of chicken litter processed

Partners:

- ACA Cooperative
- Arizona Public Service
- Natural Resources Canada (CETC-Ottawa – Industrial Innovation Group Bio-energy)

IND-155 Nexterra Energy Corp.

Direct-fired boiler gasification reduces energy costs and emissions

This project will involve the design, construction and demonstration of a direct-fired boiler gasification system at a large tissue mill. The gasification system would convert wood waste generated at the tissue mill into syngas, displacing the natural gas fuel that is now used. The project will significantly reduce the mill's energy costs and GHG emissions.

Greenhouse gas reduction:

- 26,158 t CO_2e per year
- 270 kg CO_2e per dry tonne of hog fuel used

Partners:

- Ethanol BC
- Natural Resources Canada (CETC-Ottawa – Industrial Innovation Group Bio-energy)

INT-047 Versus Goliath Project Solutions Inc.

Remote sensing of small-scale biogas systems in Argentina

In this project, Versus Goliath will develop and demonstrate a remote sensing, monitoring and control system in two biogas generation projects in Argentina – at a wastewater treatment facility and at a landfill site. Both electricity and heat will be produced with the biogas. Versus Goliath seeks to minimize maintenance and operations costs and demonstrate that small and medium scale projects using biogas can be economically exploited, via the use of remote telemetry-based systems.

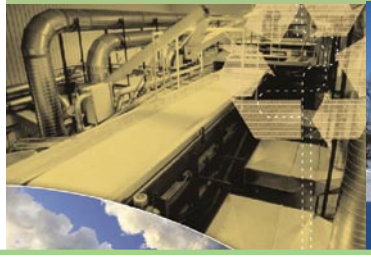
Greenhouse gas reduction:

- 14,600 t CO_2e per year
- 292 kg CO_2e per cubic metre of LFG produced
- 9.524 t CO_2e per cubic metre of wastewater treated

Partner:

- OptimEn Generation Systems Inc.

IND-153



IND-154

IND-155

INT-047

INT-049

INT-049 PyroGenesis Canada

Plasma resource recovery system turns waste into energy

In this project, PyroGenesis Canada will enhance its existing design towards commercial scale and demonstrate a 10 tonne-per-day plasma resource recovery system (PRRS) that turns waste into syngas, vitrified rock and metal. Syngas can be used to generate electricity and heat while the "glassy rock" can be used as an aggregate for construction and metals can be sold for recycling. This project will use a wide range of waste streams from the United States Military, including municipal solid waste, hazardous waste and bio-medical waste.

Greenhouse gas reduction:

- 83,037 t CO_2e per year
- 25.66 t CO_2e per tonne of waste processed

Partner:

- The United States Military

"TEAM is a smart, sophisticated and highly responsive technology funding program that has played a pivotal role in helping move our technology from pilot to full commercial operation. Without question, their collaboration has helped accelerate commercial deployment of our technology."

Nexterra – Jonathan Rhone, President and CEO

Clean Fossil Fuels : 8 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
IND-067	Oil sands thermal solvent process (Suncor Energy Inc.)	$697	$189	$8
IND-090	Fine tailings paste technology (Syncrude)	$2,272	$607	$15
IND-094	VAPEX engineering for heavy oil recovery (PTRC)	$315	$65	$38
IND-095	Thermal solvent process (Alberta Research Council)	$357	$92	$0
IND-117	GHG gas imaging systems (Power Diagnostic Technologies)	$1,261	$297	$85
IND-119	Energy audits in the upstream oil and gas sector (CETAC-WEST)	$5,106	$1,036	$875
IND-146	Enhanced Joint Implementation of Vapour Extraction (JIVE) Demonstration Project (PTRC)	$11,628	$1,000	$0
IND-147	SAGD MSAR Fuel & Sequestration Project (Quadrise Canada)	$30,050	$565	$50
Clean Fossil Fuels Total		**$51,686**	**$3,851**	**$1,071**

Clean Transportation Systems: 20 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
COM-002	Montreal electric vehicles (Montreal 2000)	$2,400	$420	$100
IND-056	Hydrogen refueling appliance (Stuart Energy Systems Inc.)	$4,025	$2,123	$375
IND-084	Intelligent control systems for fuel cell vehicles (PRECARN)	$2,945	$765	$350
IND-086	Compressed H_2 on-board storage (Dynetek Industries Ltd)	$1,044	$534	$150
IND-099	Fuel cell enabling electronics (Agile Systems Inc.)	$9,275	$2,605	$1,500
IND-107	Home natural gas refueling appliance (FuelMaker)	$9,030	$1,036	$1,983
IND-122	Compressed hydrogen fuelling stations (IMW Industries)	$4,030	$1,730	$300
IND-128	Vancouver fuel cell vehicle demonstration (Fuel Cells Canada)	$6,495	$1,730	$300
IND-130	Diesel electric propulsion for fishing vessels (Terra-Nova Marine)	$12,779	$1,185	$594
IND-144	Production of hydrogen from Landfill Gas (LFG) using the Terragas Process (Air Science Technologies Inc.)	$3,593	$656	$1,138
IND-149	Plugging into Plug-in Hybrid Electric Vehicles (Delta-Q)	$1,703	$820	$0
INT-008	Natural gas technology in Romania (BC Gas International)	$993	$515	$120
INT-010	Low emission autorickshaws in Pakistan (Yugo-Tech Inc.)	$1,244	$347	$235
INT-030	Natural gas motorcycles in Egypt (Yugo Tech Inc.)	$1,410	$580	$110
INT-043	Natural gas vehicle flagship project for Mumbai, India (ATFCan)	$8,330	$3,570	$56
TPC 730-477199	Gaseous fuel control program (Teleflex GFI)	$19,500	$1,142	$5,358
TPC 731-473889	Small engine technology (Linamar Corp.)	$27,294	$1,000	$8,280
TPC 731-122373	Oxygen separation technology (Questair Inc.)	$14,135	$1,500	$3,447
TPC 731-460753	Hydrogen supply for fleet use (Stuart Energy)	$17,700	$1,500	$5,541
TPC 731-461093	Hybrid electric bus (Orion Bus, Western Star Trucks)	$28,190	$1,000	$7,457
Clean Transportation Systems Total		**$176,115**	**$24,758**	**$37,394**

Built Environment: 35 Projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
COM-001	Sudbury cogeneration district energy (City of Sudbury)	$14,500	$545	$200
COM-010	Deep lake cooling (City of Toronto / Enwave)	$120,150	$1,150	$10,000
COM-038	Adopt-a-roof solar thermal technology (Communities of Perth & Hinton, AB)	$230	$82	$42
COM-043	Heat recovery from diesel power generation (Northwest Territories Power Corporation)	$1,440	$400	$0
COM-046	Building Integrated Photovoltaics (BIPV) (BCIT Technology Centre)	$300	$110	$40
COM-051	Watson Lake district energy (Yukon Electrical Co.)	$750	$109	$28
COM-054	Green roof technology (Green Roofs for Healthy Cities)	$840	$320	$105
COM-058	Fly ash in concrete construction (Greater Vancouver Regional District)	$27,589	$257	$106
COM-059	Gas infusion for wastewater treatment facilities (inVentures Technologies Inc.)	$1,554	$620	$269
COM-079	EcoSmart Concrete (Greater Vancouver Regional District)	$154,551	$1,090	$720
COM-086	Photovoltaic solar homes (ARISE Technologies Corporation)	$2,073	$891	$160
COM-091	District solar heating (Town of Okotoks)	$5,561	$956	$3,780
COM-094	Eco-Chill technology in three ice rinks (CIMCO Refrigeration)	$3,473	$885	$150
COM-097	Dockside Green sustainable community (Dockside Green Ltd.)	$13,971	$2,270	$452
COM-100	Demonstration of integrated heat recovery & disctrict energy for ice rinks (Ice Kube Systems Ltd.)	$2,873	$1,270	$179
COM-102	Aldernay 5 Cold Source Advanced Coaxial Energy Storage System (High Performance Energy Systems)	$2,978	$1,070	$0
COM-103	PV Demonstration Project (Solar Building Research Network)	$2,609	$970	$210
IND-061	Solar water heating (Enerworks)	$5,346	$760	$231
IND-068	ēKOCOMFORT advanced home HVAC appliance (Heating, Refrigeration and Air Conditioning Institute of Canada)	$13,985	$2,900	$715
IND-091	High-volume fly ash for roadways (Levelton Engineering)	$743	$315	$48
IND-092	Sustainable buildings using life-cycle assessment (Athena)	$765	$225	$90
IND-096	Rapid cooling of foods in commercial kitchens (Sorentec)	$4,989	$803	$250
IND-100	New membranes for water and wastewater treatment (Zenon)	$4,075	$1,575	$500
IND-110	Air-cooled refrigerant compressor (Turbocor Inc.)	$9,598	$1,506	$478
IND-123	HVAC and refrigeration systems in Loblaw supermarkets (Loblaw Properties Ltd.)	$3,344	$734	$155
IND-125	Building integrated PV in high performance curtain walls (Visionwall)	$2,800	$599	$150
IND-131	Demonstration of Power-Spar Solar technology (Menova Engineering)	$4,129	$1,333	$558
IND-137	Solar Cooling at Long-Term Care Facility (Mondial)	$664	$200	$95
IND-145	Cool solutions CO_2 refrigeration (Loblaw)	$3,196	$820	$240
IND-150	Zone comfort residential HVAC demonstration (Ecologix Heating Technologies Inc.)	$1,450	$520	$175
IND-151	Solar + LED Outdoor Lighting Innovations (Carmanah Technologies Inc.)	$1,222	$544	$20
INT-029	Energy efficiency program in Russia (ENSI Canada)	$3,316	$384	$2,072
INT-040	Building rehabilitation and energy efficiency in China (International Centre for Sustainable Cities)	$7,297	$980	$365
INT-044	Efficient chillers for Cuba (Smardt Inc.)	$2,330	$725	$215
INT-046	Demonstration of EcoSmart concrete in Dubai (EcoSmart Foundation)	$2,405	$1,001	$150
Built Environment Total		**$427,096**	**$28,919**	**$22,948**

Low Emission Industrial Systems: 9 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
IND-003	Microwave Assisted Process (MAP) for extraction of edible oils (CanAmera Foods)	$7,987	$1,987	$400
IND-063	SME eco-efficiency (IRAP/OCETA)	$3,996	$578	$624
IND-070	Natural gas technologies for industrial settings (Union Gas Limited)	$11,598	$787	$262
IND-073	Plasma treatment for tool and dye manufacturers (Chessen Group Inc.)	$2,686	$859	$286
IND-097	Automated anode replacement system for aluminum Production (STAS)	$6,528	$1,155	$485
IND-111	Pervaporation technology (Fielding Chemical Technologies Inc.)	$1,059	$350	$102
IND-135	Demonstration of in-situ leach mining process for metals extraction (Yava Technologies Inc.)	$1,964	$780	$237
INT-032	Multi-country solar drying (Conserval Engineering)	$1,583	$583	$175
INT-039	Hydrocarbon refrigerant in Cuba (Refrigerant Services Inc.)	$337	$152	$40
Low Emission Industrial Systems Total		**$37,738**	**$7,231**	**$2,611**

Distributed Power Generation: 23 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
COM-035	Wind power cooperative in Toronto (TREC Wind Power Co-op)	$1,549	$347	$121
COM-060	Mini & small hydro retrofit demo (City of Hull & Ottawa Hydro)	$15,905	$412	$135
COM-092	Wind-diesel control systems in Newfoundland (Frontier Power Systems)	$1,225	$528	$111
COM-096	Commercialization of the Vertical Axis Hydro Turbine (New Energy Corp)	$2,175	$820	$355
IND-074	Morgan Falls small hydro demonstration (Morgan Falls)	$943	$400	$72
IND-075	Solid oxide fuel cell heat & power demonstration (Ontario Power Technologies)	$26,250	$1,119	$373
IND-078	Micro-turbines for heat & electricity (Suncurrent Industries Inc.)	$668	$113	$38
IND-079	Solid oxide fuel cell materials (Global Thermoelectric Inc.)	$550	$163	$94
IND-080	Solid oxide fuel cell heat & power balance of plant (Ontario Power Technologies)	$1,600	$378	$200
IND-088	Fuel cell powered 10 and 50 kW generators (Hydrogenics Corp.)	$6,078	$1,678	$400
IND-089	Canadian 10 and 60 kW wind turbines (Wenvor Technologies)	$2,246	$999	$162
IND-101	High Pressure Direct Injection (HPDI) engines (Westport Innovations Inc.)	$2,265	$805	$250
IND-116	Manufacturing process for generic wind turbine blades (Polymarin - Bolwell composites)	$1,791	$970	$0
IND-118	Spheral Solar Technology (ATS Automation Tooling System Inc.)	$98,482	$4,150	$25,500
IND-124	Multi-energy source platforms for distributed generation (Xantrex)	$3,206	$818	$190
IND-132	Power recovery turbine demonstration (Outland Technologies Inc.)	$1,509	$395	$264
IND-138	Pipeline to Ultra-Clean generation (Enbridge)	$9,068	$1,843	$522
IND-141	Combined heat & emergency power system (Toronto Hydro Energy Services Inc.)	$2,568	$849	$390
IND-148	Demonstration of 660 kW PM Generator for Large Wind Turbines (TM4 Inc.)	$4,937	$1,070	$1,735
INT-002	Small hydro control systems in China (Powerbase Automation Systems Inc.)	$3,349	$557	$260
INT-025	Low-head hydro in Poland (ESI Ecosystem Int's & Swiderski Engineering)	$12,186	$781	$245
INT-028	Solar photovoltaics for developing & developed countries (ATS Automation Tooling System Inc.)	$10,426	$3,267	$847
INT-038	Small hydro development in Nepal (The SCP Group)	$8,305	$680	$100
Distributed Power Generation Total		**$217,281**	**$23,142**	**$32,364**

Bio-based Energy Systems: 37 Projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
COM-008	Cryogenic processing of landfill gas (CFS Alternative Fuels Inc.)	$1,091	$563	$210
COM-047	Composting of swine manure (Global Earth Products)	$460	$200	$55
COM-048	Co-composting of industrial/municipal wastes (KC Environmental & Cleanit)	$1,786	$336	$190
COM-056	On-farm demonstration of manure treatment technologies (CETAC - WEST)	$459	$84	$400
COM-081	Montreal biodiesel transit buses (Canadian Renewable Fuels Association)	$3,701	$436	$100
COM-089	Integrated Manure Utilization System (IMUS) (Highland & Flint Energy Services)	$7,853	$818	$1,950
COM-090	Aerobic manure treatment for pork producers (Envirogain)	$1,700	$500	$300
COM-093	Turnkey integrated manure processing plant (Lynn Cattle Inc.)	$6,775	$732	$150
COM-095	Waste to Energy Eco-Systems (Genesis)	$23	$23	$0
COM-098	Conversion of animal manure & organic biomass to biogas via anaerobic digestion (PlanET Biogas)	$7,203	$460	$93
COM-099	Modular anaerobic digestor combined heat & power (CHP) systems (Powerbase)	$2,185	$670	$50
COM-101	EnviroFuel Demonstration Plant (AmbientEco)	$5,870	$1,270	$100
IND-048	Development of high-grade pelletized activated carbon (Ensyn)	$1,157	$434	$145
IND-058	Szego mill process (Commercial Alcohols Inc.)	$854	$324	$108
IND-062	Green diesel from pyrolysis oil (Ensyn Technologies Inc.)	$410	$156	$50
IND-102	Wastewater treatment for pulp and paper applications (Tembec)	$19,810	$2,360	$750
IND-103	Biomass gasification system for greenhouse applications (Malahat Systems Corporation)	$765	$335	$60
IND-105	Biodiesel technology processing (Biox Corporation)	$1,228	$465	$138
IND-109	Enzymes for fuel ethanol production (Iogen)	$5,475	$1,875	$900
IND-115	Advanced harvesting technology (McLeod Harvest)	$923	$198	$65
IND-133	Heffley Creek biomass gasification demonstration (Nexterra)	$5,831	$1,522	$297
IND-134	Development and Demonstration of Turbion™ CHP System (Entropic Energy Inc.)	$2,849	$422	$300
IND-139	Biofuel advanced dehydration system (Vaperma)	$4,760	$1,700	$1,871
IND-140	Bio-diesel processing of distressed canola seed (Milligan)	$7,065	$1,570	$500
IND-153	Combined biomass dryer/exhaust energy recovery for pulp & paper mills (Thermal Energy Inc.)	$6,070	$970	$0
IND-154	Small scale pyrolysis systems for waste biomass (Advanced Biorefinery Inc.)	$977	$460	$58
IND-155	Direct-fired boiler gasification demonstration project (Nexterra)	$7,320	$1,670	$100
INT-017	Energy from waste in Argentina (Conestoga-Rovers & Associates)	$2,280	$987	$240
INT-020	Landfill demonstration in Brazil (CEIA & CNI)	$1,947	$585	$132
INT-024	Seedling inoculation in Chile (Mikro-Tek)	$2,767	$872	$155
INT-031	Landfill methane bioreactor in Egypt (RJ Burnside International)	$1,740	$760	$140
INT-041	Peak Electrical Power Generation from Landfill Gas in Brazil (Golder and Associates)	$1,988	$797	$180
INT-047	Small-scale Biogas utilization in Argentina (Versus Goliath Project Solutions Inc.)	$4,439	$1,020	$0
INT-049	Transportable Plasma Waste to Energy System (Pyrogenesis Canada)	$7,550	$820	$0
TPC 731-122410	Production of ethanol from agricultural waste and crops (Iogen)	$45,000	$4,980	$4,987
TPC 731-451040	Municipal solid waste digestion for power production (Eastern Power Ltd.)	$27,220	$2,725	$4,080
TPC 731-461092	Gas turbines for bio-oil (Orenda)	$4,024	$667	$1,265
Bio-based Energy Systems Total		**$203,555**	**$34,766**	**$20,119**

Clean Coal & Carbon Capture & Storage: 3 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
IND-076	Coalbed methane (Alberta Research Council)	$15,300	$2,250	$750
IND-112	Application of advanced clean coal technology (TransAlta Corporation)	$4,998	$1,000	$666
IND-113	Flue gas desulphurization with fertilizer co-product (AIRborne Technologies Inc.)	$22,000	$2,574	$823
Clean Coal & Carbon Capture & Storage Total		**$42,298**	**$5,824**	**$2,239**

TEAM Operations Office: 5 projects

Project Number	Title (Proponent)	Total Project Investment ($K)	Investment by Government of Canada ($K)	
		Total	TEAM	Other Federal
TOO-009	GLOBE 2004 (Strategies for Change)	$350	$143	$0
TOO-010	World Resources Institute	$1,096	$90	$60
TOO-011	GLOBE 2006 (Strategies for Change)	$542	$210	$52
TOO-012	National Angel Organization	$110	$20	$0
TOO-014	GLOBE 2008 (Globe Foundation)	$469	$183	$0
TEAM Operations Office Total		**$2,567**	**$646**	**$112**

Grand Total	**$1,158,336**	**$129,137**	**$118,858**

TEAM Projects with SMART Results

Project Number	Project Title	Proponent	GHG Measurement and Reporting Status			GHG reductions for project	GHG reductions per unit of activity
			Initial TEAM Assesment[1]	SMART[2]	Validated SMART Results[3]	(t CO_2e/ year)	(t CO_2e/unit of activity)
Community							
COM-002	Montreal electric vehicles	Hydro-Québec		×		22	510 kg CO_2e/1,000 km travelled
COM-008	Cryogenic processing of landfill gas	CFS Alternative Fuels Inc (CAFI)		×		-118	1.95 t CO_2e/1,000 L of LNG used in vehicles
COM-048	Co-composting of industrial/ municipal wastes	KC Environmental Group Ltd.		×		792	110 kg CO_2e/t of organic waste processed 170 kg CO_2e / t of finished compost
COM-060	Mini and small hydro retrofit demo	Hydro Ottawa and City of Gatineau		×		8,274	78 kg CO_2e / MWh_e
COM-081	Montreal biodiesel transit buses	Canadian Renewable Fuels Association			×	1,277	2.36 t CO_2e / 1,000 L of 100% biodiesel
COM-089	Integrated Manure Utilization System (IMUS)	Highland Feeders Limited			×	6,624	930 kg CO_2e / MWh_e 710 kg CO_2e / t manure
COM-090	Aerobic manure treatment for pork producers	Envirogain			×	1,614	
COM-093	Turnkey Integrated Manure Processing Plant	RENTEC Renewable Energy Technologies Inc.			×	26,549	493 kg CO_2e / t of manure
COM-094	ECO CHILL Refrigeration System for Ice Rinks	CIMCO Refrigeration			×	488	150 kg CO_2e / m^2 of rink building / yr
COM-095	Okanagan Biodigester	Genesis			×	1075	293 kg CO_2e / t of waste treated or disposed of
COM-096	Commercialization of the Vertical Axis Hydro Turbine	New Energy Corp.			×	299[7]	700 kg CO_2e / kWh of electricity generated*
COM-097	Dockside Green Sustainable Community	Dockside Green Ltd			×	5,270	N/A
COM-098	Demonstration and Optimization of Advanced Biogas Systems	PlanET Biogas			×	10,423	256 kg CO_2e / MWh_e 2.29 t CO_2e / 1000 m^3 natural gas
COM-099	Modular, Containerized Anaerobic Digester Combined Heat and Power System	Powerbase			×	4,503	4.3 t CO_2e / cattle / year
COM-100	Integrated Heat Pump /District Energy System	Ice Kube Systems			×	1,028	N/A
COM-101	EnviroFuel Demonstration Plant	AmbientEco			×	6,000	375 kg CO_2e / t MSW processed
COM-102	Alderney 5 Cold Source Advanced Coaxial Energy Storage System	High Performance Energy Systems			×	449	N/A
COM-103	PVT Demonstration	Solar Buildings Research Network			×	20[6]	average of 103 kg CO_2e / MWh_e and MWh_t of solar energy generated
Industry							
IND-078	Micro-turbines for heat and electricity	Mariah Energy Corp		×		195	electric element – 780 kg CO_2e/MWh_e thermal element – 37 kg CO_2e/MWh_t
IND-101	High Pressure Direct Injection (HPDI) engines for stationary power	Westport Innovations			×	154	250 kg CO_2e/MWh_e
IND-118	Spheral Solar Technology	Automation Tooling Systems (ATS)			×	27,273	680 kg CO_2e/kWpeak of PV cells produced
IND-119	Energy audits in upstream oil and gas sector • Sirius Emission Reducer • REMVue© Natural Gas Engine Controller	CETAC West			×	332 738 (per engine controller)	55.3 t CO_2e/controller/ year 290 kg CO_2e/1,000 m^3 natural gas consumed
IND-123	HVAC and refrigeration systems in Loblaw supermarkets	Loblaw			×	564	80 kg CO_2e/m^2 floor space/year

Project Number	Project Title	Proponent	GHG Measurement and Reporting Status			GHG reductions for project	GHG reductions per unit of activity
			Initial TEAM Assesment[1]	SMART[2]	Validated SMART Results[3]	(t CO_2e/ year)	(t CO_2e/unit of activity)
Industry (Cont'd)							
IND-124	Multi-energy source platforms for distributed generation	Xantrex			×	13	970 kg CO_2e/MWh_e
IND-125	Building integrated PV in high performance curtain walls	Visionwall Corporation			×	129	450 kg CO_2e/m^2 of Visionwall surface/year
IND-128	Vancouver fuel cell vehicle demostration	Fuel Cells Canada			×	11	100 kg CO_2e/1,000 km travelled
IND-130	Diesel / Electric Propulsion System for Fishing Vessels	Terra-Nova Marine			×	962	1.37 tCO_2e/t of fish caught and processed
IND-131	Menova Power-Spar Solar Heat, Hot Water and Electricity Generation Storage and Distribution System	Menova Engineering			×	77	displacing propane heating: 250 kg CO_2e/MWh_t displacing electric heating: 300 kg CO_2e/MWh_t
IND-132	Power Recovery Turbine	Outland			×	597[9]	980 kg CO_2e / MWh_e[9]
IND-133	Heffley Creek biomass gasification demostration	Nexterra			×	13,727	530 kg CO_2e / t veneer produced
IND-134	Development and demonstration of Turbion™ CHP System	Entropic Energy			×	1,705	320 kg CO_2e / bone dry t of wood residue combusted in system
IND-135	Demonstration of in-sit leach mining process for metals extraction	Yava			×	Lead – 11,927 All products – 40,446	Lead – 1.83 t CO_2e / t Pb All products – 1.26 t CO_2e / t product
IND-137	Integrated Solar Cooling at Long Term Care Facility	Mondial Energy			×	74	N/A
IND-138	Enbridge Pipeline to Ultra-Clean Generation Project	Enbridge			×	3401	194 kg CO_2e / MWh_e 313 kg CO_2e / MWh_t
IND-139	Biofuel Enhanced Dehydration System Using Novel Vapor Permeation Membrane	Vaperma Inc.				26	3.2 kg CO_2e / hr of plant operation
IND-140	Portable oilseed extraction and biodiesel processing units for producer and rural community processing of distressed canola seed	Milligan Bio-Tech			×	7,045	1.57 t CO_2e / t distressed seed
IND-141	Combined Heat & Emergency Power (CHeP) System	Toronto Hydro Energy Services Inc.			×	233	75 kg CO_2e / MWh_e 184 kg CO_2e / Mwh_t
IND-144	Landfill Gas conversion to Hydrogen	AirScience			×	74	5 kg CO_2e / kg H_2
IND-145	Cool solutions CO_2 Refrigeration	Loblaw			×	1,640	100 kg CO_2e / m^2 of floor space / year
IND-146	Capability Enhancements to Support JIVE (Joint Implementation of Vapour Extraction)	PTRC - Petroleum Technology Research Centre			×	21,786[8]	480 kg CO_2e/ m^3 of oil produced[a]
IND-147	MSAR Combustion and Sequestering Technology (MCST) Demonstration Project	Quadrise Canada			×	37,236	616.5 kg CO_2e / t bitumen produced
IND-148	Demonstration of High Density 660 kW Permanent Magnet Generator (PMG) for Large Wind Turbines	TM4			×	11,958	1253 t CO_2e / MW / year
IND-149	Plugging into PHEVs	Delta-Q			×	7.20	1.44 kg CO_2e / charge
IND-150	ZoneComfort Residential HVAC Demonstration	Ecologix			×	240	34 t CO_2e / MJ
IND-151	Solar + LED: Outdoor Lighting Innovations	Carmanah	×			2[4]	340 kg CO_2e / unit installed
IND-153	Combined Biomass Dryer/Exhaust Energy Recovery for Pulp & Paper Mills	Thermal Energy	×			11,454[4]	N / A
IND-154	Transportable Pyrolysis Systems for Waste Biomass	Advanced BioRefinery Inc			×	150	218 kg CO_2e / t of chicken litter processed
IND-155	Direct-Fired Boiler Gasification Demonstration Project º	Nexterra			×	26,158	270 kg CO_2e / bone dry ton of hog fuel used

Project Number	Project Title	Proponent	GHG Measurement and Reporting Status			GHG reductions for project	GHG reductions per unit of activity
			Initial TEAM Assesment[1]	SMART[2]	Validated SMART Results[3]	($t CO_2e$/ year)	($t CO_2e$/unit of activity)
International							
INT-017	Energy from waste in Argentina	Conestoga-Rovers & Associates (CRA)		×		154	600 kg CO_2e / t waste in controlled part of landfill
INT-024	Seedling inoculation in Chile*	Mikro-Tek Inc.		×		Jack Pine – 0.52 (per ha); Black Spruce – 0.26 (per ha); White Spruce – 0.37 (per ha)	Jack Pine – 2.35 t CO_2e/ ha/rotation; Black Spruce – 24.7 t CO_2e/ha/rotation; White Spruce – 31.7 t CO_2e/ha/rotation
INT-028	Solar photovoltaics for developing and developed countries	Automation Tooling Systems (ATS)		×		6.3[5]	0.345 t CO_2e / MWh_e[5]
INT-041	Peak electrical power generation from landfill gas in Brazil	Golder, Conestoga-Rovers, and R. J. Burnside		×		850	3 kg CO_2e / t waste in controlled part of landfill
INT-043	The Natural Gas Vehicle Flagship Project for Mumbai, India	ATFCAN			×	864	Taxis – 57 kg CO_2e / 1000 km travelled; buses – 146 kg CO_2e / 1000 km travelled;
INT-044	Energy Efficient Chillers in Cuba	Smardt Inc.			×	9,812	981 t CO_2e / year / chiller
INT-046	EcoSmart Concrete in Dubai	EcoSmart Foundation			×	120,079 one time reduction	279 kg CO_2e / t of cement used
INT-047	Small-scale biogas utilization in Argentina	Vs Goliath			×	14,600	292 kg CO_2e / m^3 LFG produced 9.524 t CO_2e / m^3 waste-water treated
INT-049	Transportable Plasma Waste to Energy System	PyroGenesis Canada			×	83,037	25.66 t CO_2e / t of waste processed

1 The SMART-Lite is a quick assessment of the GHG reduction potential of a project. It has been included in proposals since early 2004.
2 SMART Performed prior to updated SMART format (January 2004) and not validated.
3 The updated SMART PMP (Project Master Plan) includes a 2nd party validated LCA quantification of the project's emission reductions.
4 Indicates first- or second-party reporting only.
5 Validated GHG results for installation at Queen's University only.
6 Aggregation of 4 sites
7 Average of scenarios/sites
8 Over duration of project
9 GHG Reductions based on 3 project sites, however, only one site to be implemented

"TEAM's early and ongoing leadership has not only shaped national greenhouse gas measurement approaches such as their pioneering SMART system, but also significantly influenced emerging international quantification and reporting standards such as the ISO 14064 series. Such standardized approaches add credibility, consistency and transparency to the greenhouse gas accounting world."

Canadian Standards Association - Kevin Boehmer, ISO TC 207 Secretary and Program Manager, Business Management and Sustainability

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