



Ministry of
Energy, Mines and
Petroleum Resources

INNOVATIVE CLEAN ENERGY (ICE) FUND

2016-2017 PERFORMANCE REPORT

Programs and initiatives approved under Budget 2016



Table of Contents

1. Communities and Transportation	3
2. Public Sector Infrastructure / Post-Secondary R&D	5
3. Energy Efficiency and Conservation	11
4. B.C. Low Carbon Fuels	22
5. ICE Fund Project Partnerships	24

Communities and Transportation

CLEAN ENERGY VEHICLE (CEV) PROGRAM – PHASE 2

ICE Fund Contribution: \$17,500,000 (over 2 years: 2015/16 to 2016/17)
Recipients: New Car Dealers Association of B.C. and Fraser Basin Council
Leverage: \$100 million in vehicle sales
Program Launch: April 1, 2015



Since 2011, the Province has invested over \$71 million in the Clean Energy Vehicle (CEV) Program. A portion of the funding for the CEV Program **Phase 2** came from the **Innovative Clean Energy (ICE) Fund**, in its support of the B.C. Government's energy, economic, environmental and greenhouse gas reduction priorities and to advance the local clean energy sector.

Funding for CEV Phase 2 approved in Budget 2015 and Budget 2016 is distributed as follows:

- \$13.5 million for point-of-sale incentives, and dealer and sales staff training and incentives,
- \$2.14 million for investments in charging infrastructure and hydrogen fuelling infrastructure,
- \$920,000 to assist fleets in adopting CEVs,
- \$930,000 for research, training, technology development and public outreach to help grow a local clean transportation technology sector.

The Clean Energy Vehicle (CEV) Program is intended to encourage and accelerate the adoption of CEVs in B.C. for their environmental and economic benefits. The program does this by:

- Helping make clean transportation solutions more affordable,

- Increasing awareness of CEVs,
- Investing in infrastructure,
- Supporting research, jobs training & economic development in the CEV sector.

Program Highlights

As of March 31, 2017, Phase 2 of the CEV Program has delivered:

- Over 2,664 Zero Emissions Vehicles (ZEVs) contributing to over \$100 million in new car sales and 159,840 tonnes of avoided greenhouse gas emissions,
- 5 specialty-use ZEVs incented,
- 140 multi-unit residential charging stations,
- 25 fleets participating in the CEV Fleet Challenge,
- One public hydrogen fuelling station to be completed Fall 2017,
- An electrician training program, a public outreach campaign, new research and economic development projects,
- 30 new DC fast charging stations in the planning phase,
- Completion of the B.C. Clean Energy Vehicle Economic Opportunities Assessment report,
- Continued support for Emotive, an electric vehicle public education and outreach program.

Program Update

On February 8, 2017, the Province announced that funding for the CEV Program would be continued outside of the ICE Fund. An investment of \$40 million over the next three years to encourage British Columbians to make the switch to zero-emission vehicles, reduce greenhouse gas emissions, and support investment in made-in-B.C. green technology. To learn more, please visit:

<https://news.gov.bc.ca/releases/2017MEM0005-000265>.

Public Sector Infrastructure / Post-Secondary R&D

Community Energy Leadership Program

ICE Fund Contribution: \$1,300,000 (over three years, 2015/16-2017/18)

Recipients: various local governments and First Nations

Funding Partners: utilities, local governments, provincial ministries, First Nations, federal government, private funders

Program Launch: 2015

Status: The third group of projects are being implemented.

Program Highlights

Launched in 2015, the Community Energy Leadership Program (CELP) has been established to support local governments' and First Nations' investments in energy efficiency and clean energy projects that meet the communities' and Province's energy, economic and environmental goals.

In 2016, the Province provided \$550,000 to support energy efficiency and renewable energy projects, including solar power, biomass heating and energy retrofits to local facilities in eight communities. In 2015, \$162,378 was distributed to projects in six communities. Together, CELP Round 1 and Round 2 received over 93 Expressions of Interest with 84 applications to evaluate. The 14 approved projects for 2015 and 2016 have leveraged over \$11 million in total project costs. These projects will reduce communities' energy costs and greenhouse gas emissions, while supporting provincial commitments under the Climate Leadership Plan.

Program Update

Projects approved under the third round will be completed by March 31, 2018. CELP is no longer accepting applications and plans to complete a program evaluation before proposing future rounds of funding. It is anticipated that the total greenhouse gas offsets realized by projects over rounds one and two of CELP will be 1,588 tonnes of carbon dioxide equivalent per year, equivalent to taking 334 passenger vehicles off the road each year.

First Nations Home EnergySave: Retrofit Pilot

ICE Fund Contribution: \$50,000

Recipient: Fraser Basin Council (administering the program to provide funds to First Nations communities)

Funding Partners: First Nations Communities, BC Hydro, and the Department of Indigenous Affairs and Northern Development (INAC)

Program Launch: 2016

Status: Projects approved under a “Call for Proposals” are being implemented. There will be no additional calls for funding under this pilot.



Program Highlights

Since 2016, the Fraser Basin Council (FBC) has coordinated First Nations Home EnergySave, an initiative to allow First Nations communities to share best practices on improving the energy efficiency of new and existing housing. With community feedback, FBC will provide funding for First Nations community energy efficiency upgrade projects in homes, building on community-specific plans developed by qualified consultants. This allows for customized solutions to be developed for each community. Communities are eligible for up to \$50,000 per community with a maximum of \$5,000 per household for capital cost upgrades, with a minimum payback of 5 years.

Program Update

Projects approved under the pilot in three First Nations communities have been selected and are underway.

Post-Secondary Clean Energy Partnerships Program

ICE Fund Contribution: \$442,000 (over two years)

Recipients: Five B.C. Post-Secondary Institutions

Funding Partners: NSERC

Program Launch: October 2015

Leverage: \$1,056,000 (cash & in-kind)

Status: Program has concluded



Program Highlight

Launched in 2015, the Post-Secondary Clean Energy Partnerships (PSCEP) Program supports research in clean energy science and technology projects undertaken by post-secondary institutions in B.C. The PSCEP Program leveraged federal government funding from **the Natural Sciences and Engineering Research Council of Canada** (NSERC) and required investment from a private company or industrial research partner. The projects were selected through a process defined in a Memorandum of Understanding between the Province and NSERC. Provincial funding was contingent on researchers' successful application for federal funding from NSERC.

Program Update

2016-17 Call for Applications

A second LOI Call for Proposal ended on January 20, 2017 and five B.C. post-secondary institutions were 'pre-approved' for funding. Applicants were invited to proceed with an NSERC application.

Subject to new appropriations, no further funding is allocated to the PSCEP program at this time.

2015 Call for Applications - Award Recipients

The Province provided \$442,000 from the Innovative Clean Energy (ICE) Fund for five clean energy science and technology research projects at British Columbia public post-secondary institutions, supporting energy efficiency and conservation. Under this round of funding, NSERC provided \$461,000 in cash and industrial partners provided \$282,000 in cash and \$303,000 towards in-kind support.

The funding is distributed to research teams at the University of British Columbia, Simon Fraser University, University of Victoria (2), and the British Columbia Institute of Technology for projects dedicated to high-performance batteries and battery chargers, building insulation and coastal wave energy, as follows:

Passive Cooling Solutions for High Power Battery Chargers

Simon Fraser University

ICE Fund: \$96,000 NSERC CRD Grant: \$128,000

This project aimed to use a systematic approach to develop next-generation passive cooling solutions for high power battery chargers, featuring emerging graphite thermal interface materials (TIM), heat pipes, and new efficient naturally-cooled heat sinks. Passive cooling methods are widely preferred, where possible, since they provide low-cost, no-parasitic power, quiet operation, and reliable solutions.

[Delta-Q Technologies](#) is a major manufacturer of battery chargers and has shipped over one million chargers for applications in electric vehicles, golf carts, forklifts, and aerial work platforms worldwide. In an electric vehicle battery charger, 10-15% of the input power is lost as waste heat, and further power must be spent on cooling to remove this heat from the electronic components of the device. A number of failure mechanisms in electronic devices stem from overheating. The trend in the industry is to reduce the size and increase the power, which doubly impacts the cooling needs in battery chargers. Therefore, cooling has become a limiting factor in the development of higher power-density battery chargers.

The proposed thermal solutions will eliminate parasitic power consumption, thus significantly reducing the industry carbon footprint. The research results established design tools to lead Delta-Q Technologies towards the development of next-generation battery charger technologies. In addition, the fundamental knowledge and engineering design tools developed in this research can be employed for a variety of sustainable and green energy applications, including telecom, electronics and power electronics systems, automotive, heat exchanger, heating, ventilating and air-conditioning, and refrigeration sectors. Additionally, the proposed research project supports training of highly qualified personnel in an array of multi-disciplinary areas, such as energy management, green cooling, and design/prototyping.

Extreme Performance Battery Charger Technologies for Transportation

University of British Columbia (Vancouver Campus)

ICE Fund: \$100,000 NSERC CRD Grant: \$100,000

There has been an unprecedented growth in the use of battery-powered transportation equipment and the battery transportation market is expected to increase by 7.7% per year to \$120 billion by 2019. In particular, the adoption of battery-powered transportation systems (industrial vehicles, EVs, buses, e-bikes) will continue to increase rapidly, presenting a unique opportunity for economic growth and sustainable development.

The objective of the collaboration between University of British Columbia and [Delta-Q Technologies](#) was to develop the next generation of high efficiency and smart power converters for electrified transportation battery chargers. Advances in this area will improve conversion efficiency and reduce costs, benefitting both consumers and utility providers. The Research and Development project will help industry leaders and BC-based Delta-Q maintain a competitive advantage over international competitors and enable UBC to provide training to future engineering in alternative power conversion.

Vacuum Insulation Panels with Zeolite-Fibre Composite Core

University of Victoria

ICE Fund: \$49,967 NSERC CRD Grant: \$49,998

The thermal insulating capacity of Vacuum Insulation Panels (VIPs) is 5 to 10 times higher than traditional (i.e. fibrous or foam) thermal insulations. However, the mass application of VIPs in building envelope construction industry is restricted by the cost factor and uncertainty regarding long-term performance. The development of alternative core materials that can reduce the cost without compromising effective service life is a priority for the thermal insulation industry, particularly concentrating on building envelope construction.

Preliminary research shows that fibre-powder composites, consisting of glass/mineral fiber and Zeolite/Pumice powder, have basic thermal characteristics comparable with nano-porous fumed or precipitated silica but can be produced at a cost comparable with traditional insulation materials. These findings open new opportunities for the development of alternative core materials for VIPs. The proposed research project took this concept further and worked on the development of alternative core materials using locally available Zeolite powder. The researchers based at UVic worked with researchers from the [ZMM® Canada Minerals Corp.](#)

Digital Voltage and Current Sensors for Intelligent Grid

British Columbia Institute of Technology (BCIT)

ICE Fund: \$100,000 NSERC CRD Grant: \$83,000

BCIT is an applied research leader in Canada in Smart Grid system and technologies. BCIT has made significant investment in smart grid technology development and qualification, including a Real Time Digital Simulation system and a number of advanced digital controllers and Intelligent Electronic Device. BCIT has also successfully completed a number of significant smart grid initiatives, including a microgrid system, as well as a solar/battery energy management system for Electric Vehicle charging stations.

The objective of the collaboration between BCIT and Vancouver based [NuGrid Power Corp.](#) was for the development of optical medium-voltage (>1000 V and <100kV) current and voltage sensors with direct digital output to provide active measurement and real-time communication of measurements on the electric power grid. The project included development, testing and qualification of 25kV class voltage sensors for Smart Grid.

Creating the Pathway for Standardized Performance Assessment of Canadian Wave Energy Converters

University of Victoria

ICE Fund: \$96,000 NSERC CRD Grant: \$100,000

The West Coast of Canada has a very energetic wave climate with a typical average annual wave power transport of 34.5 MW/km along the Vancouver Island coastline. While the magnitude of this resource suggests potential for a new wave energy industry, there is no consensus on Wave Energy Converter (WEC) design or operational strategies, and it is unclear to what extent the Canadian wave energy resource can be harnessed. Without an accurate and precise assessment of Canada's feasible wave energy production potential, there is no well-defined benefit to balance the well-defined technical and economic challenges facing this new industry. Detailed numerical and experimental studies that precisely define the performance of promising WECs in Canadian waters are sorely needed.

Comprehensive Vancouver Island wave resource data, advanced resource assessment techniques and world class simulation software developed at UVic were refined and applied in comprehensive siting and performance assessment analyses for a Canadian WEC technology developer - [AOE Accumulated Ocean Energy Inc.](#)

Energy Efficiency and Conservation

High Performance Building Training & Tools Program

ICE Fund Contribution: \$100,000

Leverage: \$10,000 (BC Hydro)

Recipient: FortisBC

Funding Partners: BC Hydro

Program Launch: April 2016

Status: Completed



Program Highlights

The ICE Fund and partners provided funding to FortisBC to sponsor training courses for building professionals in Natural Resources Canada's ENERGY STAR for New Homes, R-2000 and the Canadian Home Builders Association's (CHBA) Net Zero Energy (NZE) home standards. These Canadian standards provide steps in increasing energy efficiency for homes and require specialized training and experience. Increasing the number of building professionals with ENERGY STAR, R-2000 and CHBA NZE training builds industry capacity for future building code energy provisions which is moving towards net-zero energy ready requirements by 2032. The cost of training is currently a barrier to many building sector participants.

Program Update

As of March 2017, these funds have subsidized the training of over 500 professionals, including builders, architects, engineers and planners, exceeding the Program target of 200 professionals. Courses have been provided across B.C., including Prince George, Kimberley, Cranbrook, Kelowna, Kamloops, the Lower Mainland and Southern Vancouver Island. Program information is available here:

- <http://communityenergy.bc.ca/energy-star-for-new-homes-builder-workshop/>,
- http://www.chba.ca/CHBA/HousingCanada/Net_Zero_Energy_Program/NZE_Qualified_Training/CHBA/Housing_in_Canada/Net_Zero_Energy_Program/NZE_Qualified_Training.aspx.

Passive House Training Incentive

ICE Fund Contribution: \$100,000 in 2015/16 and \$100,000 in 2016/17

Recipient: Canadian Passive House Institute West

Program Launch: April 2015

Status: Completed



Program Highlights

Funding from the Province's ICE Fund subsidized introductory and certification courses in Passive House design principles offered by CanPHI West (now Passive House Canada). New buildings can be designed to consume 80-90% less energy than conventional construction using Passive House design principles. This system of construction requires specialized training and experience. Having more building professionals with Passive House (or equivalent high performance building) training will build industry capacity for future building code energy provisions which, outlined in the Province's 2016 Climate Leadership Plan, will move the industry towards net zero energy ready requirements by 2032. The cost of Passive House training is currently a barrier to many building sector participants.

Program Update

As of March 2017, these funds have subsidized the training of over 300 professionals including builders, architects, engineers and planners. Passive House training courses subsidized by the ICE Fund have been offered in Kelowna, Prince George, the Lower Mainland and Southern Vancouver Island. Program information is available here: <http://passivehousecanada.silkstart.com/events>.

B.C. EnerGuide Transition Project

ICE Fund Contribution: \$25,000

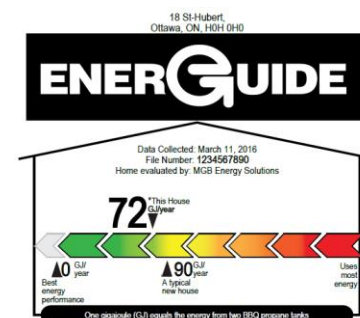
Leverage: \$20,000 (BC Hydro)

Recipient: City Green Solutions

Funding Partners: BC Hydro

Project Launch: April 2016

Status: Completed



Project Highlights

Local governments, utilities and financial institutions rely on EnerGuide rating system (ERS) benchmarks to determine compliance with building energy bylaws and eligibility for a variety of programs and financing offers. Natural Resources Canada introduced an updated ERS (v15) for homes in 2016 that provides an estimated GJ/year rather than the 0-100 scale as the headline ERS metric. In order to facilitate a seamless and coordinated transition, in the first phase of this project, the ICE Fund provided \$25,000, in addition to utility partner funds, to City Green Solutions to undertake modelling analysis to inform updated B.C.-specific ERS benchmarks for homes.

Program Update

City Green Solutions completed its analysis of the updated rating system and provided recommendations on B.C.-specific ERS benchmarks for homes in October, 2016. Of note, this project provided substantial input into the formulation of performance tiers for the B.C. Energy Step Code, led by the Province's Office of Housing and Construction Standards.

Whole-Home Energy Coach Incentive Program

ICE Fund Contribution: \$600,000

Additional Partners: FortisBC

Program Launch: Phase 1 - September 1, 2016; Phase 2 - April 1, 2017

Status: Ongoing



Program Highlights

Funding from the Province's ICE Fund was provided to FortisBC to support training and incentives for home energy professionals to provide customized project advice to B.C. homeowners undertaking home energy retrofits. Reliable, third-party consultation on options for home energy retrofits can have a significant impact on the energy literacy and capacity of homeowners to undertake deeper energy efficiency improvements. Energy coaches help homeowners to better understand the results of home energy assessments, provide an in-depth exploration of retrofit options available, and help homeowners to prioritize, plan and stage retrofits.

Program Update

As of December, 2016 these funds have subsidized the training for 25 energy advisors to provide basic energy coaching services to approximately 400 homeowners in utility and local government-funded home energy retrofit programs, in conjunction with EnerGuide home evaluations. These 25 energy coaches are now listed by region on an online directory, hosted by the Home Performance Stakeholder Council. Details are available here: www.homeperformance.ca/energy-advisors/.

For Phase 2 of the Home Energy Coaching program, Fortis BC hired City Green Solutions to deliver advanced energy retrofit project coaching services to homeowners province-wide. Target launch for this phase of the program is September 2017.

Benchmarking Data Management Options Project

ICE Fund Contribution: \$20,000

Leverage: \$20,000

Recipient: Prism Engineering

Funding Partners: BC Hydro \$10,000 / City of Vancouver \$10,000

Project Launch: April 2016

Status: Completed



Project Highlights

Building energy benchmarking and reporting requirements have proven to be an effective means to facilitate improvements in building energy performance across a growing number of North American jurisdictions. To date, sixteen US cities and two states have adopted policies requiring large buildings (typically 5,000 M² or larger) to report benchmarking data. There is interest in exploring the introduction of similar requirements in B.C. both at the local government level (as indicated by the 2014 LGMA and UBCM Benchmarking Tools for Building Energy Use resolutions).

The prevailing software tool for benchmarking is Energy STAR Portfolio Manager (PM), developed by the U.S. Environmental Protection Agency. Natural Resources Canada has developed a Canadian version that is available for free online. PM allows users to track and assess energy performance across an entire portfolio of buildings in a secure online environment and submit performance reports to third parties. The U.S. Department of Energy has created an open source software platform for managing the process of collecting, storing, using, and sharing building energy performance data. The software, Standard Energy Efficiency Data Platform (SEED), allows jurisdictions to easily import data from PM, store it according to standardized data taxonomy and database structure, conduct basic reporting from the data, and make the data available to others. The ICE Fund, along with project partners, provided funding to Prism Engineering to conduct research, consultation and options analysis to understand: (1) best practices for state and local government building energy benchmarking data management from U.S. jurisdictions that require large building energy reporting; (2) provincial, local government and building sector benchmarking data analysis and reporting needs; and (3) technical options for benchmarking data acquisition, analysis and reporting, including approximate costing.

Project Update

Prism Engineering completed the study in November 2016.

Commercial Building Energy Code Compliance Checklist Project

ICE Fund Contribution: \$15,000

Leverage: \$27,000

Recipient: Salus Systems

Funding Partners: BC Hydro \$20,000; City of New Westminster \$7,000

Project Launch: April 2016

Status: Completed



Project Highlights

While the B.C. Building Code applies in every jurisdiction outside the City of Vancouver, municipal building inspectors do not enforce all energy efficiency provisions resulting in lower overall compliance rates (estimated at 70%). Low compliance rates lead to a significant and long-term increase in province-wide energy use and greenhouse gas emissions given the average life of buildings (50-100 years).

Lack of enforcement of building energy codes has been largely attributed to the complexity of verifying compliance. To minimize this complexity, the ICE Fund, along with project partners, provided funding to Salus Systems to develop requirements for a web-based, commercial building energy code (Part 3 of the B.C. Building Code) compliance checklist system. Once implemented, the checklist will enable streamlined, cost-effective enforcement of Part 3 energy efficiency provisions and allow the Province to create a centralized database of building energy metrics to inform future codes and standards development.

Project Update

Salus Systems completed the study in September, 2016.

High Performance Window Certification Program

ICE Fund Contribution: \$500,000

Leverage: n/a

Recipient: Fenestration BC

Program Launch: April 2017

Status: Ongoing



Program Highlights

Over the next 16 years, the energy performance of buildings is expected to increase to meet the Province's Climate Leadership Plan target to achieve net-zero energy buildings by 2032. A key component of this market transformation will be a ready supply of high performance windows. The costs associated with creating new product lines that exceed current B.C. energy efficiency requirements, including lab testing and certification, are a barrier to the introduction of high performance windows into the market. The High Performance Window Certification Program aims to address this market barrier and stimulate B.C. manufacturers to develop new designs and manufacturing processes that will lead to cost-effective, marketable, high performance windows being built in B.C. These new designs will in turn help B.C. residents and businesses to maximize the energy performance of their homes and buildings. The Program will incentivize manufacturers to test and certify a new window product or product line to two different performance levels: ENERGY STAR Most Efficient or Passive House.

Program Update

Ministry staff consulted with industry on the scope and deliverables of the Program in 2016. In December 2016, agreement was reached that Fenestration B.C., an industry organization representing windows manufacturers in B.C., would administer the Program. The Program was launched in April 2017. More details are available here: <http://www.fen-bc.org/content/view/about-hpwc>.

Oil-to-Heat Pump Incentive Program

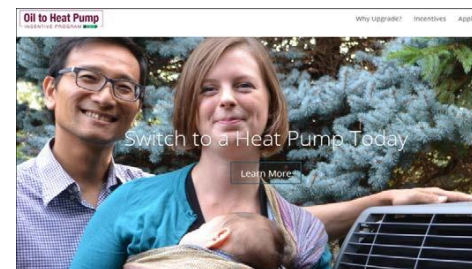
ICE Fund Contribution: \$600,000 in 2015/16 and \$600,000 in 2016/17 **Leverage:** \$80,000

Recipient: City Green Solutions Society

Additional funding partners: \$80,000 in top up incentives from B.C. local governments;
in-kind promotional support from 9 local governments

Program Launch: September 2015

Status: Ongoing



Program Highlights

The Oil-to-Heat Pump Program provides a rebate of up to \$1,700 for homeowners who convert from oil heating to an all-electric air source heat pump. Oil-to-heat pump conversion provides on average the highest greenhouse gas emission reduction of any single upgrade for single family residential homes. The Program currently has funding for up to 600 homes.

Program Update

The Program was launched September 2, 2015. As of July 2017, City Green has paid out 224 rebates, and has an additional 69 registrants in good standing, for a total of 293 current participants. Surveys of participants who have received rebates show high levels of satisfaction. 96% of participants said they would recommend the Program to others.

The Program also aimed to encourage other energy-saving upgrades, and 50% of survey respondents said they completed other energy-saving upgrades (such as insulation, air sealing, windows and doors, water heating, etc.) between pre-and post-retrofit energy evaluations.

Substantial top-up incentives, marketing and in-kind support were received through partnerships with the following local governments and districts: Capital Regional District, District of Saanich, City of Victoria, Township of Esquimalt, Comox Valley Regional District, City of Campbell River, Port Alberni, and Regional District of Nanaimo.

Program information is available here: <http://oiltoheatpump.ca/>.

Natural Gas Heat Pump Pre-Feasibility Study

ICE Fund Contribution: \$10,000

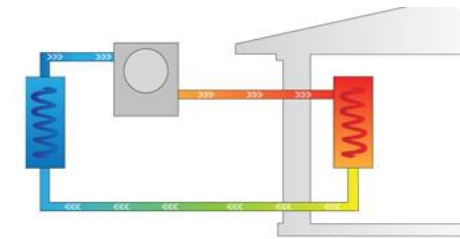
Leverage: \$45,000

Recipient: FortisBC

Funding Partners: FortisBC

Project Launch: July 2016

Status: Completed



Project Highlights

Natural gas heat pumps (NGHP) are a promising technology that has the potential to significantly increase the efficiency of space and water heating, the two largest uses of energy in buildings. To-date, there has been very little direct use of these technologies in B.C. and therefore there is insufficient information to fully assess installed performance potential in the province. The ICE Fund partnered with FortisBC to commission a technology, market and energy savings assessment of gas-driven heat pumps and gas absorption heat pumps to assess the potential for the diffusion of these technologies in B.C. over the next five years.

Project Update

FortisBC contracted Posterity Group to carry out the Natural Gas Heat Pump Pre-Feasibility Study in June 2016. Research and analysis started in July 2016 and was completed in May 2017. The analysis showed that although there are a number of market barriers facing commercialization of natural gas heat pumps in BC, the technology holds sufficient technological and economic potential to warrant a more detailed feasibility study, including lab and field testing.

Pacific Northwest Economic Region / Existing Building Roadmap Project

ICE Fund Contribution: \$7,000 **Leverage:** \$20,000

Recipient: Pacific Northwest Economic Region (PNWER)

Funding Partners: PNWER Members

Project Launch: May 2016

Status: Ongoing



Project Highlights

PNWER contracted RDH Building Science to develop a roadmap for achieving high-efficiency in existing large buildings in the Pacific Northwest region by 2030. The ICE Fund contributed funding, along with other PNWER members, for the first of two project deliverables: 20 high performance building case studies representing seven different major building types across the PNWER jurisdictions. The second major deliverable – a region-wide economic and energy impacts analysis of ultra-efficient buildings extrapolating from the case studies – is planned for 2017.

Project Update

The first phase of the PNWER Roadmap project was completed in February 2017. RDH Building Science carried out costing, energy and design analysis of ultra-low energy buildings throughout the PNWER region, developing 22 case studies. PNWER is currently overseeing the second phase of its broader roadmap project which is using the results of the 22 case studies to estimate the region-wide economic and energy impacts of high performance buildings.

BC – Natural Resources Canada ISO 50001 Standard Incentive

ICE Fund Contribution: \$200,000 in 2015/16 and \$80,000 in 2016/17 **Leverage:** \$280,000

Recipient: Natural Resources Canada (NRCan)

Funding Partners: NRCan

Project Launch: May 2015

Status: Ongoing



Project Highlights

ISO 50001 Energy Management Systems Standard is a voluntary standard that helps organizations to take a systematic, continual improvement approach to energy management. Industries that have adopted the standard have reported annual energy savings between 10 and 20 percent within the first five years. To accelerate uptake of the standard, the Province is working together with NRCan to offer up to \$80,000 of cost-shared assistance to B.C. industrial companies to implement projects that help achieve ISO 50001. This includes development of an energy baseline, energy use assessment, energy performance monitoring and reporting, and purchase of instrumentation, software and metering equipment.

Project Update

Seven projects have been funded through March 2017 in a range of industrial companies in the cement, forest, mining and agricultural sectors.

B.C. Low Carbon Fuels

Regulatory Compliance and Enforcement

Compliance and Enforcement Program, Renewable and Low Carbon Fuel Requirements Regulation

ICE Fund Contribution: \$300,000 (over three years - 2015/16 to 2017/18)

Recipient: Ministry of Finance - Consumer Taxation Audit Branch

Leverage/Impact: By supplementing the staff at the Consumer Taxation Audit Branch (CTAB) with one additional FTE at a cost of \$100,000 per year, the CTAB offers services to implement a complete renewable and low carbon fuel requirements inspection program comparable to the audit program for enforcement of the *Motor Fuel Tax* and *Carbon Tax* (approx. \$0.5 M per year).

Program Highlight

This compliance and enforcement approach comes in at a much lower cost when compared to hiring and training specialized audit staff at the Ministry of Energy, Mines and Petroleum Resources, or contracting out the audits.

Program Update

- Ministry of Energy, Mines and Petroleum Resources and Ministry of Finance maintain a formal MOU to govern the arrangement.
- Regular audits of fuel suppliers are being conducted, and have resulted in corrective action by several companies.

Low Carbon Fuel Credit Trading and Reporting

Transportation Fuel Reporting System

ICE Fund Contribution: \$1.5 million (over three years – 2017/18 to 2019/20)

Recipient: Ministry of Energy, Mines and Petroleum Resources - Low Carbon Fuels Branch

Leverage/Impact: The Transportation Fuel Reporting System (TFRS) will improve the effectiveness of B.C.'s market-based regulatory approach to reducing the lifecycle GHG emissions of transportation fuels.

Program Highlights

TFRS will ultimately encompass a number of points of interaction with fuel companies, including low carbon fuel credit trading and compliance reporting. Electronic credit trading is seen as a necessary precursor to linking B.C.'s low carbon fuel credit market with similar markets in Oregon and California.

Program Update

- The TFRS project was selected for agile software development by the Province's DevEx Innovation Hub established under the 2016 Corporate Plan for the B.C. Public Service.
- Initial development has focused on the credit trading components of the system.

ICE Fund Partnerships

Air-to-Liquid Synthetic Fuels Plant

ICE Fund Contribution: \$3.75 million

Leverage: \$8.25 million

Recipient: Carbon Engineering Ltd.

Funding Partners: Private Funding Partners

Project Launch: March 2016

Status: Ongoing



Project Highlight

Funding provided by the ICE Fund to Carbon Engineering Ltd. is supporting the design and construction of a synthetic fuels demonstration plant in Squamish that will use carbon dioxide captured from air to synthesize diesel or gasoline fuel. The project will deliver the world's first "air-to-fuels" plant and demonstrate that it is technically and economically viable to produce low-carbon fuel using carbon captured directly from the atmosphere. Such synthetic fuels – diesel or gasoline – would be manufactured from carbon dioxide captured from the air, water, and renewable electricity, so that once burned in a vehicle they would simply return the carbon to the air – meaning the fuels can be nearly carbon neutral.

Project Update

The project is still ongoing and is expected to be completed in March 2019.

Mine Wastewater Treatment Pilots

ICE Fund Contribution: \$1.25 million

Leverage: \$2.5 million

Recipient: Saltworks Technologies

Funding Partners: SDTC, Teck, NRC-IRAP, EPCOR

Project Launch: March 2016

Status: Ongoing



Project Highlight

Funding provided by the ICE Fund to Saltworks Technologies of Vancouver has been helping to design, build and implement two demonstration pilots using patented energy efficient wastewater treatment technologies. If successful, the projects could result in the construction of full-scale mine-water-treatment plants around the world using Saltworks' made-in-B.C. technology.

Project Update

The project is expected to be completed in 2018.