



Round 12 Funded Projects

- Lead organization:** Aboriginal Cogeneration Corp., Winnipeg, Manitoba

Environmental Benefit: Climate Change / Clean Air / Clean Water / Clean Soil

Economic Sector: Waste Management

Consortium members:
Aboriginal Cogeneration Corp.
Energy & Environmental Research Center . University of North Dakota
A forest products facility in Western Canada

Project Description:
Aboriginal Cogeneration Corp. (ACC) will demonstrate, in a small scale gasifier with new syngas scrubbing technology, that it can safely process waste creosote railway ties, and a wide variety of other biomass waste materials, while cogenerating electricity and process heat. This distributed gasification system reduces environmental emissions to acceptable levels and is an environmentally beneficial alternative to stock piling railway ties along tracks, sending them for incineration or land filling them. This technology will provide a sustainable alternative for railway companies in Canada, faced with the annual disposal of the over 3 million ties and addresses the broader need of 25 million scrap ties to be disposed in all of North America. The technology was developed by the Energy and Environmental Research Center (EERC) in Grand Forks, North Dakota, and was licensed to the AAC by the EERC Foundation.
- Lead organization:** A.M.P. Fisheries Ltd., St. Philips, Newfoundland

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Agriculture

Consortium members:
A.M.P. Fisheries Ltd.
Hawbolt Industries Ltd.
Notus Electronics
ScanTol Catching Technology
Toromont Caterpillar

Project Description:

A.M.P. Fisheries Ltd. will construct, install and test electric winches for a midsize fishing vessel (less than 25 metres), creating the world's first completely electrified fishing vessel of this size. These electric winches will replace the existing hydraulic winches currently used on most vessels, which are difficult to control, have hazardous hydraulic fluid and require continued power from conventional diesel engines. The technology is expected to accelerate the adoption of diesel electric propulsion and enable vessels to move to complete electrification, therefore reducing by 72% the greenhouse gas emissions they release.

3. **Lead Organization:** ARC Resins Corp., Longueuil, Quebec

Environmental Benefit: Climate Change / Clean Air / Clean Water / Clean Soil

Economic Sector: Energy Utilization

Consortium members:

ARC Resins Corp.
Chemin de Fer de Québec

Project Description:

ARC Resins Corp. will demonstrate a technology that offers an environmentally friendly replacement for preservative pressure-treated structural wood such as creosote cross ties that contain harmful chemicals making them expensive and difficult to safely dispose of without doing environmental damage. Using chemical pulp cellulose and phenol formaldehyde resin, ARC Resins Corp. will develop composite products with high structural performance characteristics and very high durability under severe weather conditions. The unique ability of cellulose fibres to bond to each other also enables the manufacture of complex shapes with no waste. This will allow products to be specifically designed to meet numerous infrastructure challenges. Just some of the potential infrastructure sectors where ARC's technology could be applied include transportation, marine structures, power generation/transmission, and auto parts.

4. **Lead Organization:** Atlantec BioEnergy Corp., Charlottetown, Prince Edward Island

Environmental Benefit: Climate Change / Clean Air / Clean Water / Clean Soil

Economic Sector: Agriculture

Consortium members:

Atlantec BioEnergy Corp.
Diversified Metal Engineering Ltd.
Global Companies LLC
Island Coastal Services
Island Petroleum
REGA

Project Description:

Atlantec BioEnergy Corp. will build a 13 million litres per year pilot scale ethanol biorefinery in Atlantic Canada, using locally grown sugar beets as the main feedstock. The plant will feature an integrated anaerobic digester, generator set, and nutrient refinery. This first in the world design configuration will result in a net energy neutral and process water neutral facility, while producing ethanol, electricity, and a liquid fertilizer byproduct specifically optimized for the feedstock growing conditions. This technology will offer additional revenue streams for Maritime farmers who will be required by the company to rotate traditional potato crops on a 3 to 4 year cycle while helping the soil retain essential nutrients.

5. **Lead Organization:** Biodiesel Reactor Technologies Inc., Ottawa, Ontario

Environmental Benefit: Climate Change / Clean Air / Clean Water / Clean Soil

Economic Sector: Energy Exploration and Production

Consortium members:

Biodiesel Reactor Technologies Inc.
Biocardel Inc.
Menova Engineering Inc.
Transport Canada
University of Ottawa

Project Description:

Biodiesel Reactor Technologies Inc. and its consortia partners will demonstrate the use of a novel biodiesel membrane reactor using low levels of catalyst to produce high quality biodiesel that meets international quality standards without the need for distillation. The objective of the project is to demonstrate the technology in a 4 M litre/year pilot plant. The project will determine commercial scale reactor design, reaction kinetics, control and safety systems, process integration, operating costs for different feedstocks and the environmental footprint of the technology. This new technology is expected to reduce the production cost of biodiesel thereby improving profitability, provide for more alternative feedstock choices and offer quality assurance to the biodiesel industry, while reducing greenhouse gas emissions, and waste water and solids associated with traditional biodiesel production processes.

6. **Lead Organization:** Clean Current Power Systems Inc., Vancouver, British Columbia

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Power Generation

Consortium members:

Clean Current Power Systems Inc.
Kobelco Marine Engineering Co. Ltd.

Project Description:

Clean Current Power Systems Inc. will demonstrate its novel, highly efficient commercial scale tidal turbine that converts the energy of tidal currents into grid ready electricity. This technology has the potential to reduce greenhouse gas emissions while providing Canada with an opportunity to lead the world in the development of the tidal energy industry. The turbine is one of three technologies selected by the Nova Scotia Department of Energy to showcase at its demonstration site being developed in the Bay of Fundy. SDTC has previously supported the successful testing of Clean Current's pilot scale unit at Race Rock Ecological Reserve, BC. This follow-on project will fully validate Clean Current's technology in a commercial setting (grid connected) and help propel tidal energy into a mainstream renewable energy source.

7. **Lead Organization:** Cyrium Technologies Inc., Ottawa, Ontario

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Power Generation

Consortium members:

Cyrium Technologies Inc.
Centre for Research in Photonics . University of Ottawa
National Research Council . Institute for Microstructural Sciences, Canadian
Photonics Fabrication Centre (CPFC)

Project Description:

Cyrium Technologies Inc. will demonstrate a scale-up manufacturing process to produce highly efficient solar cells for 500 suns concentrated photovoltaics (CPV) using nano-engineered materials based on quantum dots . nano-scale indium arsenide crystals deposited in layers within a multi-junction solar cell . to capture a broader spectrum of light. The project aims to add more than 10% efficiency to existing CPV solar receivers while reducing the costs of producing the electricity in comparison with traditional flat silicon panels. As secure access to an adequate supply of superior solar cells is an ongoing issue, this high quantum efficiency technology brings a long term solution to CPV manufacturers.

8. **Lead Organization:** Growing Power Hairy Hill LP, Vegreville, Alberta

Environmental Benefit: Climate Change / Clean Water / Clean Soil

Economic Sector: Agriculture

Consortium members:

Growing Power Hairy Hill LP
FWS Group of Companies
Highmark Renewables Research LP
Providence Grain Group

Growing Power Hairy Hill LP will build an integrated grain-based ethanol plant near Vegreville, Alberta. The project consists of a 36,000 head cattle feedlot, a 440 tonne/day anaerobic digestion facility, and a 40,000,000 litres per year fuel ethanol plant. Grain that enters the process will be used once to produce ethanol, then to offset a large portion of the ration fed to cattle, and then again in the form of manure feedstock for the anaerobic digester, which produces the energy to power ethanol production. Waste heat from the ethanol production process will be used to maintain the anaerobic process temperature, largely eliminating the consumption of water for ethanol plant cooling; cattle feed water will be used to absorb additional heat from the process. This will reduce water consumption by 50% compared to conventional ethanol plants.

9. **Lead Organization:** Lancaster R&D Inc., Leduc, Alberta

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Power Generation

Consortium members:

Lancaster R&D Inc.
M&L Developments Ltd.
Wind Energy Institute of Canada
University of Alberta

Project Description:

Lancaster R&D Inc. is developing a hydraulic wind energy system with high capacity storage capabilities. The technology draws more power from the wind than conventional turbines through the use of robust equipment from the oilfield drilling industry. The system locally stores wind energy using a hydraulic accumulator in conventional high pressure pipeline storage banks, enabling its use as on-demand peak power. The storage technology can also be used in conjunction with conventional turbines in retrofit applications. The project aims to demonstrate a cost effective 1 Megawatt hydraulic wind turbine with 2 Megawatts of energy storage capacity.

10. **Lead Organization:** Marine Exhaust Solution, Charlottetown, Prince Edward Island

Environmental Benefit: Climate Change / Clean Water

Economic Sector: Transportation

Consortium members:

Marine Exhaust Solution
A major ocean shipping company

Project Description:

Marine Exhaust Solution (MES) will demonstrate a scaled-up version of its EcoSilencer® cleaning technology that uses seawater to reduce sulphur (SOx) and particulate matter (PM) emissions from distilled fuel used by large freighters. Under the new International Marine Organization (IMO) Sulphur Emission Control Area (SECA) standards, ship owners must use higher grade marine diesel fuel or after-treatment to achieve lower SOx and PM emissions. Marine Exhaust Solution technology can reduce SOx emissions by greater than 98% and PM emissions by 50%, and its operating costs are 1 to 2 % of the annual fuel savings, which makes it a viable long-term solution for ship owners.

11. **Lead Organization:** MemPore Corp., North Gower, Ontario

Environmental Benefit: Climate Change / Clean Air / Clean Water / Clean Soil

Economic Sector: Energy Utilization

Consortium members:

MemPore Corp.
Lacombe Waste Services
San Tech Holdings

Project Description:

MemPore Corp. has developed a novel plate and frame polymeric membrane process for refining used lubricating oil from vehicle engines. A large percentage of used motor oil is currently being disposed of in sewers or landfills, and, where it is recycled, the current distillation method is complex, costly, and produces greenhouse gases. Due to the modular design and low cost of the MemPore process, the technology would allow for a small scale plant to be located with a fleet operator or mounted on a skid and delivered to various locations, thereby addressing the harder to reach markets where land-filling is the only disposal option. MemPore technology is expected to save 15% of the energy and emissions of the current distillation method, and to increase profits made from the sale of the recycled oil up to 32%.

12. **Lead Organization:** Morph Technologies Inc., Toronto, Ontario

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Transportation

Consortium members:

Morph Technologies Inc.
E.I DuPont Canada
Integran Technologies Inc.

Project Description:

Morph Technologies Inc. has developed a nanometal polymer which offers up to 47% weight reduction in engine and drive train vehicle components over equivalent steel parts. The MetaFuse™ technology combines the cost advantages and formability of plastics with the mechanical properties of metals by marrying high strength nanometal claddings with engineering polymers. This combination allows new designs that reduce the weight of the parts produced, resulting in improved fuel economy and reduced air emissions. The project focuses on different technology applications like: fuel rails (for pressure), valve rockers, transmission spool valves, shift forks (for stiffness and load bearing) or transmission damper skates (for wear). The aim of the project is to select applications through a customer engagement process, identify a part and a specific model year and have at least two successful applications demonstrated before production start.

13. **Lead Organization:** Pathogen Detection Systems Inc., Kingston, Ontario

Environmental Benefit: Clean Water

Economic Sector: Waste Management

Consortium members:

Pathogen Detection Systems Inc.

Hydromantic Inc.

Queen's University

University of Toronto

Project Description:

Pathogen Detection Systems Inc. will demonstrate a portable, on-site, high-speed, fully automated microbiological water monitoring system to detect E.Coli and Total Coliforms in water. Such automation will replace the current slow, cumbersome methods that require manual visual interpretation by reducing time to results by 50 to 80%, reducing costs and improving test integrity. This project will integrate new, automated test technology with sophisticated water treatment optimization software resulting in improved water plant performance. The project is expected to reduce energy consumption, decrease toxic water treatment by-products., enhance public health and continue Canada's role as a leader in clean water technology.

14. **Lead Organization:** Petroleum Technology Research Centre, Regina, Saskatchewan

Environmental Benefit: Climate Change

Economic Sector: Energy Exploration and Production

Consortium members:

Petroleum Technology Research Centre
ConsumersqCo-operative Refineries Ltd.
Enbridge Inc.
SaskEnergy Inc.
Schlumberger Carbon Services

Project Description:

The Petroleum Technology Research Centre and its consortium members will demonstrate the feasibility of storing CO₂ in deep saline aquifers . geological formations with storage capacity over 10 times larger than depleted oil reservoirs . in the Western Canadian Sedimentary Basin. The salty water contained in deep saline aquifers is not suitable for drinking or agriculture, making the geological formations an ideal large-scale storage solution for large stationary industrial CO₂ emitters around the world. The Aquistore Project represents the first large scale (500 tonnes/day of CO₂) application of saline aquifer storage of CO₂ in North America and the second largest in the world.

15. **Lead Organization:** SiXtron Advanced Materials Inc., Varennes, Quebec

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Power Generation

Consortium members:

SiXtron Advanced Materials Inc.
CaliSolar Inc.
Semco Engineering Group (France)

Project Description:

SiXtron Advanced Materials Inc. is developing photovoltaic (PV) manufacturing process technologies that will increase the efficiency of crystalline silicon solar cells while enabling the use of thinner silicon wafers, an important industry cost-reduction strategy. Both cost-reduction and performance improvements are needed to further the widespread adoption of solar cells. These SiXtron process technologies include new anti-reflective (AR) coating processes and a new passivation coating process. When combined, the processes have the potential to increase the relative efficiency of solar cells by up to 10% compared to present day commercially-manufactured cells. SiXtron's technology also has the distinct advantage of replacing the current silane source used for solar coatings with a plug-and-play alternative that uses a polymer powder, a material that is easy to ship, handle and manage. Solar cell manufacturers need to eliminate silane to reduce manufacturing cost through better plant safety and increased manufacturing scale. Silane is an extremely hazardous pyrophoric gas that has caused operator fatalities in solar cell manufacturing.

16. Lead Organization: Taransys Inc., Ottawa, Ontario

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Energy Utilization

Consortium members:

Taransys Inc.
C-MAC Micro Technology
Kyma Technologies Inc.
MuAnalysis Inc.
National Research Council Canadian Photonics Fabrication Centre

Project Description:

Taransys Inc. will use a Gallium Nitride (GaN) technology to design a normally-off, switching transistor for Hybrid Electric Vehicles which can handle high voltages, high temperatures and currents with much greater control, reliability and efficiency than those currently used. The project will develop an 80A, 600V vertical transistor and an 80A, 600V ultra-fast Schottky diode on GaN substrate assembled and demonstrated in a 4KW, 600V/12V DC to DC converter. This new approach will improve vehicle efficiency by 4%, eliminate the need for a dedicated cooling system for the high power converter, and eliminate the use of existing 12V lead acid batteries for vehicle on-board auxiliary systems.

17. Lead Organization: The Pressure Pipe Inspection Company Ltd., Mississauga, Ontario

Environmental Benefit: Climate Change / Clean Water

Economic Sector: Waste Management

Consortium members:

The Pressure Pipe Inspection Company
City of Calgary Water Services
Halifax Regional Water Commission
Invodane Engineering
Toronto Water

Project Description:

The Pressure Pipe Inspection Company will develop and demonstrate an enhanced version of their licensed Sahara+ water pipe leak detection technology that includes higher pressure deployment, video functionality, sewer application, propulsion for no-flow conditions (for example new pipe installations) and improved quantification algorithms. The demonstration will occur in the municipalities of Calgary, Halifax and Toronto. Improved leak detection will result in lower leakage loss of potable water, less disinfection chemical discharges to the environment and less GHG emissions from reduced pumping energy to replace lost water.

18. Lead Organization: *Verdant Power Canada ULC, Burlington, Ontario*

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Power Generation

Consortium members:

Verdant Power Canada ULC
Mohawk Council of Akwesasne
St. Lawrence College (Cornwall Campus)
St. Lawrence River Institute of Environmental Sciences
Verdant Power Inc.

Project Description:

Verdant Power Canada (VPC) will demonstrate a novel River Kinetic Hydropower System (KHPS) which employs arrays of underwater turbines to generate renewable electricity from large, continuously flowing river systems without the need to divert or impound any part of the river's natural flow. This continuous energy source makes the technology an effective complement to base load power, enhancing commercial viability and potential for replication from major urban areas to remote villages near river systems. The project will be conducted in the St. Lawrence River near Cornwall, Ontario.

19. Lead Organization: Western Hydrogen Limited, Calgary, Alberta

Environmental Benefit: Climate Change / Clean Air

Economic Sector: Energy Exploration and Production

Consortium members:

Western Hydrogen Limited
Aux Sable Canada Ltd.

Project Description:

Western Hydrogen Limited will build a pilot plant to demonstrate its Alkaline Metal Reforming (AMR) process for the production of large volume, high pressure hydrogen. This process can use multiple low cost feedstocks including glycerol, crop waste and petroleum coke / residuals. AMR is expected to have a 35% unit cost advantage over energy intensive and polluting Steam Methane Reforming (SMR), the only commercial scale technology currently available for large volume hydrogen generation. In addition, the process will produce a concentrated stream (over 90%) of CO₂ at high pressure, which will significantly reduce the purification and compression costs associated with CO₂ capture and storage.