

May 5, 2021

Research projects investigate ways to reduce offshore emissions

- Projects to study carbon capture, energy efficiencies, transportation, renewable energy
- Proponents include small technology and engineering companies, universities, operators
- Projects consist of technology development/adaptation; demonstration; proof of concept, field trials and feasibility studies

St. John's, NL – Sixteen research, development and demonstration (RD&D) projects are receiving a total of \$24.4 million to investigate how to reduce greenhouse gas (GHG) emissions from Newfoundland and Labrador's offshore oil and gas operations.

The projects cover the operational areas of offshore drilling, production and transportation and will examine the use of technology and other methods to optimize energy efficiencies in power generation, flaring, piping integrity; the feasibility of using renewable energy sources to support offshore operations; carbon capture and storage; and emissions monitoring.

Natural Resources Canada is funding the projects through the offshore [RD&D component](#) of its [Emissions Reduction Fund](#). The fund is being managed by Petroleum Research Newfoundland and Labrador (PRNL), the leading facilitator of research, technology development and innovation for Canada's offshore.

"The oil and gas industry plays an integral role in Newfoundland and Labrador's economy and society, and we believe we can safely and sustainably develop our resources. As our industry continues to make strides to reduce emissions from operations, these projects will provide additional knowledge about how to reduce GHGs offshore while still developing these resources for the benefit of our province," said Petroleum Research Newfoundland and Labrador's Chief Executive Officer Dave Finn.

Half of the projects involve developing new technology or determining how to adapt existing equipment or technology to reduce emissions from offshore facilities. Other projects will develop feasibility assessments, proofs of concept, and studies to fill knowledge gaps for Newfoundland and Labrador in the area of emissions reduction.

Recipients (in alphabetical order) and their projects include:

- **Atlantic Towing Limited** - Novel Battery Hybrid Retrofit of a Multi-Purpose Platform Supply Vessel through the Integration of Spinning Reserve and All-Electric Transit Capabilities on a SMART Ship AI Platform
- **Cnergreen Corp.** - Reducing GHG Emissions Offshore Using Novel Nanoparticle-based Foam Technology
- **Design by Analysis Engineering Inc.** - LUMENATE Wellbore Operations Monitoring System
- **DuXion Motors Inc.** - Express Hybrid Electric Retrofit Solution for Offshore Vessels
- **ExxonMobil Canada Properties** - Flare Reduction Technology Feasibility Study
- **Growler Energy** - Investigation of Offshore Electrification

- **Hibernia Management and Development Company Ltd.** – Hibernia Digital Twin - Power Generation System Digital Prototype
- **Husky Energy, part of the Cenovus group of companies** - Flare Gas Optimization
- **Husky Energy, part of the Cenovus group of companies** - Main Power Generation Optimization
- **Intecsea, a division of Worley** - Evaluation of Floating Wind Technology
- **M. A. Procense Inc.** - Developing Compact Capture Technology for Removal of Carbon Dioxide
- **Memorial University of Newfoundland Faculty of Science, Dr. Michael Katz** - Separation First Technology – Development and Demonstration of Porous Materials for the Reduction of Carbon Dioxide in Offshore Oil Production
- **Planetary Hydrogen** - Ocean Climate Restoration Using Offshore Carbon Capture and Storage
- **St. Francis Xavier University Fluxlab Research Group, Dr. David Risk** - Measuring Methane Emissions from Offshore Oil and Gas Platforms
- **Suncor Energy Inc.**- Sustainable Emissions Reduction by Digital Integrity Management (SERDIM)
- **Waterford Energy Services Inc. - Saitec Partnership** - Modification of Mobile Offshore Drilling Units for Shared Renewable Power Supply and Storage

“The extent of collaboration within these projects is promising because it means we will be working on a wide number of fronts to address this very complex issue. We are encouraged by the broad range of ideas put forward and excited to see the results of these research projects,” said PRNL CEO Dave Finn.

Petroleum Research Newfoundland and Labrador (PRNL) advances research, development and demonstration (RD&D) and innovation projects in the offshore oil and gas industry, with a focus on health, safety and the environment. PRNL is a federally incorporated, not-for-profit organization whose members include Chevron Canada Resources, Equinor Canada, ExxonMobil Canada, Husky Energy, part of the Cenovus group of companies, and Suncor Energy.

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Backgrounder attached - PROJECTS BACKGROUNDER

Lynn Evans
Communications Manager
Petroleum Research Newfoundland and Labrador
709-738-7916
Lynn.evans@petroleumresearch.ca
<https://petroleumresearch.ca/>

PROJECTS BACKGROUNDER

Recipient: Atlantic Towing Limited (NL, NB)

Project Title: Novel Battery Hybrid Retrofit of a Multi-Purpose Platform Supply Vessel through the Integration of Spinning Reserve and All-Electric Transit Capabilities on a SMART Ship AI Platform
Funding Amount: \$4,943,761

This demonstration project is a first-in-kind integration of multiple battery technologies and will integrate spinning reserve and all-electric transit on a multi-functional offshore supply vessel to reduce GHG emissions in the offshore NL oil and gas sector. Battery technology has emerged as a successful method to enable carbon-free, all-electric, operation of smaller ferries in various countries, including Canada, where transits are short and power demand is low. Battery technology using a battery-hybrid drive train has also been used on offshore supply vessels in the North Sea under different operating power demands and operating environments than in offshore NL. This novel project aims to combine these technologies together under a single power management system, while also enabling future clean energy technologies, such as hydrogen fuel cells, to easily integrate into the system in the future.

<https://www.atlantictowing.com/>

Recipient: Cnergreen Corp. (AB)

Project Title: Reducing GHG Emissions Offshore Using Novel Nanoparticle-based Foam Technology

Funding Amount: \$917,600

Cnergreen will develop its patent-pending, nanoparticle-stabilized foam technology “CnerFoam” to reduce GHG emissions and provide CO₂ storage opportunities for the Newfoundland and Labrador offshore industry. CnerFoam increases the reservoir’s ability to store more gas, reducing gas processing and energy requirements, thereby reducing GHG emissions. Memorial University of Newfoundland will perform a series of laboratory experiments and reservoir simulations to formulate and investigate CnerFoam’s performance in offshore conditions to improve gas storage in the reservoir. The project also includes building an injection skid to proceed with a field trial. www.cnergreen.ca

Recipient: Design by Analysis Engineering Inc. (NL)

Project Title: LUMENATE Wellbore Operations Monitoring System

Funding Amount: \$1,903,370

This project involves developing and demonstrating a novel downhole pressure monitoring system that provides measurements during the various phases of offshore drilling. Offshore oil and gas drilling operators will have the real-time information about downhole conditions needed to optimize wellbore operations, remove uncertainty, and reduce the time required to construct and work over wells. This reduces the time required to drill a well and therefore the greenhouse gas (GHG) emission intensity associated with each well.

Recipient: DuXion Motors Inc. (NL)

Project Title: Express Hybrid Electric Retrofit Solution for Offshore Vessels

Funding Amount: \$1,992,300

A factor preventing the offshore marine industry from making significant strides towards a large-scale shift to renewable energy is the large number of diesel vessels currently operating that cannot be easily retrofitted with a hybrid-electric system without incurring significant cost through downtime. DuXion will develop the world’s first 400kW hybrid diesel-electric propulsion system that can be retrofitted to in-service offshore vessels without the need for costly dry docking or significant drive shaft modification, offering Canadian and global vessels a greener propulsion system with significant emissions reductions. This project will cover an in-depth investigation of design challenges at scale, manufacturing optimization, prototyping and testing, and will deliver a physical prototype that can be used in a demonstrator.

<https://www.duxion.com/>

Recipient: ExxonMobil Canada Properties (NL, ON)

Project Title: Flare Reduction Technology Feasibility Study

Funding Amount: \$2,000,000

This study will assess the flare gas stream chemistry and feasibility of installing equipment on the Hibernia platform to support proprietary technology, currently being demonstrated onshore, to reduce flaring. Experimental lab research will be conducted to determine if the proprietary reactor technology configuration can validate a reduction in Hibernia's flare gas emissions. The study will also consider the spacing limitations associated with the existing offshore facility, equipment design and sizing to ensure viability and applicability of the technology for the installation. Researching innovative options for equipment sizing on Hibernia could lead to the development of technology, that if deemed successful, could lead to a reduction in GHG emissions as less gas is flared.

<https://corporate.exxonmobil.com/Locations/Canada/ExxonMobil-in-Canada>

Recipient: Growler Energy (NL)

Project Title: Investigation of Offshore Electrification

Funding Amount: \$1,532,376

This project assessment will help close the knowledge gap to the barriers that currently exist in electrifying the offshore industry with renewable energy, thereby reducing greenhouse gas emissions from offshore operations. The project will take a strategic risk-based approach and provide a framework to understand the risks and opportunities associated with using renewable energy sources for offshore power generation. The project will look at how to integrate the renewable energy and offshore oil and gas industries and will deliver a Newfoundland and Labrador-specific Offshore Renewable Energy Electrification roadmap. <https://www.growlerenergy.ca/>

Recipient: Hibernia Management and Development Company Ltd. (NL)

Project Title: Hibernia Digital Twin - Power Generation System Digital Prototype

Funding Amount: \$1,881,376

The purpose of this project is to build a prototype digital twin of Hibernia's power generation system to be able to simulate and optimize energy usage on the platform. The ability to simulate various power saving scenarios on the Hibernia platform will enable better line of sight into GHG emission reduction opportunities. Power systems account for a significant amount of an offshore facility's GHG emissions. The digital twin will provide the ability to simulate adjustments to electrical loads and optimize power usage to reduce GHG emissions. In addition, a digital twin of the generators themselves will also help optimize the combustion process of the generators in the field. <https://www.hibernia.ca/>

Proponent: Husky Energy, a part of the Cenovus group of companies (NL)

Project Title: Flare Gas Optimization

Amount of ERF funding: \$440,713

The *SeaRose* FPSO (floating, production, storage and offloading vessel) includes open flare and cargo blanketing equipment as part of its primary safety systems. The proposed study will examine the feasibility of employing new processes and technologies to reduce greenhouse gas (GHG) emissions on the FPSO that would modernize the existing design capabilities. The study will examine modification options to reduce venting and flaring from the facility from several sources, including flash gas compression, cargo tank blanketing gas and background flaring. This study will determine the technical and commercial feasibility of these options to recommend a path forward on GHG reduction. www.Cenovus.com

Proponent: Husky Energy, a part of the Cenovus group of companies (NL)

Project Title: Main Power Generation Optimization

Amount of ERF funding: \$470,954

The power generation system for the *SeaRose* FPSO (floating, production storage and offloading vessel) comprises three dual fuel turbine driven generators, which provide power to the process and utility equipment. The *SeaRose* currently runs three of the main power generators with a partial load. This study will identify the necessary modifications to increase the energy efficiency of the *SeaRose* power generation system with a target of reliably operating with two main power generators. This could result in a significant reduction in associated greenhouse gas (GHG) emissions by removing the requirement to run the third main power generator. The study will determine the technical and commercial feasibility of the options and provide a recommendation on the path forward to achieve a GHG reduction. www.Cenovus.com

Recipient: Intecsea, a division of Worley (NL)

Project Title: Evaluation of Floating Wind Technology

Funding Amount: \$1,346,103

Electrification of offshore oil and gas production facilities eliminates or reduces the requirement for local power generation via turbine generators under normal operation. This project examines the suitability of potential offshore floating wind concepts in the NL offshore, using wind energy to supply power to offshore facilities, reducing the need for fuel powered turbine generators, and thereby decreasing GHG emissions from power generation. The study looks at the full-field approach, from suitability of design to construction to operations and maintenance of offshore wind technology. <https://www.worley.com/>

Recipient: M.A. Procense Inc. (NL)

Project Title: Developing Compact Capture Technology for Removal of CO₂

Funding Amount: \$1,380,393

This project will build a prototype of an advanced and compact system to remove carbon dioxide (CO₂) from the exhaust gas of power generation systems including gas turbines and steam generation systems. The proposed system addresses the weight and space restriction challenges of offshore installations. The prototype will use an integrated system to separate solid carbon dioxide from the exhaust of power generation systems. The separated CO₂ by the proposed system can be further pressurized and made ready for storage.

Recipient: Memorial University of Newfoundland Faculty of Science, Dr. Michael Katz (NL)

Project Title: Separation First Technology – Development and Demonstration of Porous Materials for the Reduction of CO₂ in Offshore Oil Production

Funding Amount: \$655,900

This proof-of-concept project aims to explore the use of metal-organic frameworks (MOFs) to sequester carbon dioxide from offshore oil and gas exhaust streams that can be subsequently stored or converted to other products. MOFs are a porous material that can be designed at the atomic level for different applications and can be tuned by changing the size, shape and surface chemistry to make CO₂ separation more efficient. Having developed and pilot tested a potential MOF porous material, this project will focus on developing a small-scale filtration system to separate carbon dioxide from a simulated exhaust stream, which will be capable of being scaled up to real-world offshore applications.

www.mun.ca/science

Recipient: Planetary Hydrogen (NS)

Project Title: Ocean Climate Restoration Using Offshore Carbon Capture and Storage (CCS)

Funding Amount: \$1,950,534

This study will research the potential to apply Planetary Hydrogen's carbon capture and storage technology to offshore oil and gas production facilities. If successful, the technology could reduce emissions from offshore production facilities and store the carbon in the ocean as harmless bicarbonate, helping to reduce the effect of ocean acidification and providing benefits to local ecosystems.

www.planetaryhydrogen.com

Recipient: St. Francis Xavier University Fluxlab Research Group (NS)

Project Title: Measuring Methane Emissions from Offshore Oil and Gas Platforms

Funding Amount: \$294,810

This project will collect aircraft-based measurements of methane around oil production facilities offshore NL to quantify and verify methane emission levels. The aircraft surveys will be performed across several days to assess temporal variability. Results will be compared to measured values of other offshore platforms that have been the focus of similar work (North Sea and Gulf of Mexico), and to Canadian onshore environments which are thought to have higher methane intensity. The study will provide recommendations for offshore operations and government regulations and policy regarding GHG emissions. <https://fluxlab.ca/>

Recipient: Suncor Energy Inc. (NL)

Project Title: Sustainable Emissions Reduction by Digital Integrity Management (SERDIM)

Funding Amount: \$1,489,366

Copsys Intelligent Digital Skin (CIDS) is a new coating-based (paint) digital sensor technology that could transform existing corrosion and integrity management systems. Developed by Copsys Industries Inc and led by Suncor, this project aims to further test and advance CIDS technology and its ability to replace predominantly labour-intensive piping inspection processes to detect and manage corrosion under insulation. This could improve process safety, facility integrity, reliability, and environmental performance. CIDS has the potential to reduce greenhouse gas emissions by reducing the frequency of production upsets which can result in a decrease in flaring, and a significant reduction in the likelihood of fugitive emissions caused by corrosion. This technology could be used in oil and gas production and transportation as well as other process industries. <https://www.suncor.com/>

Recipient: Waterford Energy Services Inc.-Saitec Partnership (NL)

Project Title: Modification of Mobile Offshore Drilling Units for Shared Renewable Power Supply and Storage

Funding Amount: \$1,191,407

This study will examine the feasibility of using floating wind energy to power near-shore oil and gas assets such as idle, warm-stacked mobile offshore drilling units (MODUs) and shore bases. The project plans to use currently stacked MODUs as a test case to identify technology gaps associated with real world use of floating wind power for offshore assets. Examples of technology gaps include challenges associated with motions of a MODU, requirements for quick disconnect and reconnect in a harsh weather and ice environments.

<https://wesi.ca/>