

Mobilizing the world's minds and resources to improve environmental performance.



New Heat Exchanger Technology

SOLUTION DESCRIPTION:

Technology which could replace heat exchanger technology in either new or existing thermal in situ operations

UPDATED: March 2022

All project proposals are evaluated and actioned as they are received.

INNOVATION OPPORTUNITY CHAMPION:

COSIA's GHG EPA is championing this Innovation Opportunity.

Our aspiration is to produce our oil with lower greenhouse gas emissions than other sources of oil.

For more information on this COSIA Innovation Opportunity please visit

www.cosia.ca/innovation-opportunities/greenhouse-gases

SUBMIT YOUR IDEA [HERE](#)

Canada's Oil Sands Innovation Alliance (COSIA) accelerates the pace of environmental performance improvement in Canada's oil sands through collaborative action and innovation. COSIA Members represent more than 90 per cent of oil sands production. We bring together innovators and leading thinkers from industry, government, academia and the wider public to identify and advance new transformative technologies. Innovation Opportunities are one way we articulate an actionable innovation need, bringing global innovation capacity to bear on global environmental challenges.



NEW HEAT EXCHANGER TECHNOLOGY

WHAT TO SUBMIT TO COSIA

COSIA requires sufficient non-confidential, non-proprietary information to properly evaluate the technology.

Some items that will be especially important to present in your submission are:

- Concept and basic unit operations
- Technical justification for the approach (e.g. laboratory batch or continuous experiments; pilot or demo plants; process modeling; literature precedent)
- Describe quantities and qualities of utilities and consumables that are required
- Energy inputs – quantity and type(s)
- Capital and operating cost estimates if available based on described capacity targets
- 3rd party verified comparison of your proposed technology against an MEA baseline. 3rd party verifiers should be reputable, independent engineering companies if possible
- Basis of cost estimation, including estimation scope, contingency, etc.
- IP status of your proposed technology
- What operating environment restrictions might your technology face:
 - Explosive atmospheres
 - Severe weather
 - Power fluctuations

FUNDING, FINANCIALS, AND INTELLECTUAL PROPERTY

COSIA Members are committed to identifying emerging technologies, while protecting the Intellectual Property (IP) rights of the owner of the technology.

HOW TO SUBMIT TO COSIA

Submit a summary of your solution using COSIA's Environmental Technology Assessment Portal (ETAP) Process, available at:

<https://cosia.ca/focus-areas/e-tap>

Please note: ETAP is a staged submission process. The initial submission requires only a brief description and limited technical information. Upon review by COSIA, additional information may be requested. Instructions for submission are provided on the ETAP site.

All information provided is non-confidential. COSIA will respond to all submissions.

NEW HEAT EXCHANGER TECHNOLOGY

DETAILED SOLUTION DESCRIPTION

The COSIA Greenhouse Gas Environmental Priority Area Steering Committee has identified New Heat Exchanger as a technology which could improve the environmental performance of the oil sands. New technology is sought which could replace heat exchanger technology in either new or existing thermal in situ operations.

The minimum temperature approach in a heat exchanger network defines the maximum energy recovery opportunity of a plant. While lower temperature approaches allow for better heat recovery and integration, the heat exchanger and piping requirements lead to higher capital and operating costs.

COSIA seeks new heat exchanger technologies and designs that:

- Significantly improve heat transfer characteristics
- Incorporate technology that improves resistance to fouling (including silicates at 300 °C) and are wear and corrosion-resistant (particularly for produced water coolers).

BACKGROUND

Heat transfer equipment used in bitumen production facilities consists primarily of shell and tube heat exchangers, with some spiral and plate and frame exchangers. The service includes cooling and heating bitumen emulsion, diluted bitumen, produced water, boiler feed water, make-up water (fresh or brackish) and other. This is done through either process to process contact as well as through a glycol loop network.

Heat exchangers with a heat transfer duty of less than 100 GJ/h are:

- Emulsion/Boiler Feedwater
- Glycol Air Cooler

Heat exchangers with a heat transfer duty of greater than 100 GJ/h are:

- Process Water: Boiler Feed Water
- Blowdown Glycol Cooler
- Boiler Feedwater Pre-heaters, and

NEW HEAT EXCHANGER TECHNOLOGY

Other, smaller, exchangers include: Produced water and gas glycol coolers, make-up water glycol heater, process water-make up water exchange, diluent heater and sales oil cooler, natural gas heater and air heater.

POSSIBLE APPROACHES

Possible approaches might include, but are not limited to:

- Spiral
- Plate and Frame
- Double Pipe

ADDITIONAL INFORMATION

COSIA has several tools you can use, including sample Reference Facilities. These tools will help you analyze and quantify the benefits of your technologies prior to submitting them to our [Environmental Technology Assessment Portal \(ETAP\)](#). You can find these tools on the Green House Gases Innovation Opportunity page at [Greenhouse Gases Innovation Opportunities | Canada's Oil Sands Innovation Alliance - COSIA](#).

For this specific Innovation Opportunity, please review the tools noted below:

SAGD Reference Facility

- Base Case, mechanical lift, Warm Lime Softening CPF **pg 43/60**
- Base Case WLS/OTSG Energy Flow **pg 45/60**

Mine Reference Facility

- High Grade PFT (Mass and) Energy Flow **pg 23/26**
- High Grade NFT (Mass and) Energy Flow **pg 25/26**