COSIA INNOVATION OPPORTUNITY

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

Direct Hot Water Production for an Oil Sands Mining & Extraction Process

SOLUTION DESCRIPTION:

Replace conventional hot water production approaches, which use economizers or low-grade steam, in existing mining operations

CREATED: 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.

DIRECT HOT WATER PRODUCTION FOR AN OIL SANDS MINING & EXTRACTION PROCESS

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.

DIRECT HOT WATER PRODUCTION FOR AN OIL SANDS MINING & EXTRACTION PROCESS

DETAILED SOLUTION DESCRIPTION

The COSIA Greenhouse Gas Environmental Priority Area has identified Direct Hot Water Production as a technology which could improve the environmental performance of mineable oil sands. New technology is sought which could replace conventional hot water production approaches, which use economizers or low-grade steam, in either new or existing mining operations.

The successful technology will:

- Directly produce commercial scale (5,000 – 10,000 m3/hr) of 40-90 °C hot water without using existing (or new) steam resources for heat exchange purposes;
- Target approximately a 25% reduction (for a single solution, or cumulatively through multiple solutions) in energy requirements, or CO2 emissions, for hot water production; and
- Be amenable to retrofitting of existing operations. Technologies at all stages of technical maturity are of interest

BACKGROUND

Oil sands mining and extraction processes require large amounts of hot water in two separate streams: In the 40-60 °C range and the 70-90°C range. Currently this hot water is produced indirectly through contact with steam produced in natural gas fired boilers. Hot water volumes will differ between operations, but generally would be in the range of 5,000 – 10,000 m3/hr in total. Current operations use 900 -1,300 GJ/hr of energy to produce hot water in naphthenic-based froth treatment operations; and 1,000-1,900 GJ/hr for paraffinic froth treatment dependent on season and ore grade.

Heat integration and efficient use of recycle water can significantly improve overall energy efficiency of hot water generation. While use of non-conventional energy sources (like deep geothermal) or novel concepts for hot water generation has been studied, no clear technology options have emerged.

APPROACHES NOT OF INTEREST

The following approaches are currently considered to be lower priority:

- Solar hot water generation (limited days of sunshine, given northern latitudes); and
- Additional Information

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:

Mine Reference Facility

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