COSIA INNOVATION OPPORTUNITY

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

Higher Value Use of Low-Grade Heat

SOLUTION DESCRIPTION:

Technologies that create value from excess low-grade heat resulting from Steam Assisted Gravity Drainage (SAGD) oil sands production and/or related surface facility 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.

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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.

HIGHER VALUE USE OF LOW-GRADE HEAT

DETAILED SOLUTION DESCRIPTION

The COSIA GHG Environmental Priority Area Steering Committee seeking leading edge technologies that create value from excess low-grade heat resulting from Steam Assisted Gravity Drainage (SAGD) oil sands production and/or related surface facility operations.

The successful technology will:

- Be implementable within a SAGD oil sands Central Processing Facility (CPF) and/or with SAGD well bores
- Upgrade low grade heat (130° C) OR convert low grade heat to electricity at >10% efficiency
- Function successfully in existing SAGD oil sands operations with high reliability
- Require lower energy inputs than the higher heat value or electricity produced
- Break even over installation and capital costs in less than 4 years
- Technologies at all stages of technical maturity are of interest

BACKGROUND

The most common recovery process employed for producing from oil sands reservoirs is known as SAGD. In this process, steam is generated at a Central Processing Facility (CPF), transported to well pads, and injected below ground into a horizontal well bore within the reservoir. The heat supplied by the steam warms the heavy oil in the reservoir allowing it to flow via gravity drainage into a second underlying wellbore that captures the oil/water mixture and produces it to the surface. Once at the surface, the mixture of oil and water is cooled from 130 - 200 °C down to around 80 °C prior to separation.

Once separated, the produced water is treated and recycled for steam generation. The resulting oil is treated and delivered into a pipeline for shipping. This cooling process generates significant amounts of low-grade heat at 60-80° C.

COSIA would like to identify technologies that can create value from this by-product by converting it to higher value heat for use either within the CPF or SAGD wellbores, or by converting it to electricity at >10% efficiency rate. Existing technologies to upgrade waste heat are not widely used due to associated high capital expenses.

APPROACHES NOT OF INTEREST

The following approaches are not of interest:

- Organic Rankine Cycle

ADDITIONAL INFORMATION

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

- Power generation: E = (HVH-EC)/Q
- Heat pump: COP = HVH/EC
- E = Efficiency
- COP = Coefficient of Performance
- HVH = Higher Value Heat, GJ (electricity produced)
- EC = Energy Consumed, GJ (to produce HVH)
- Q = total waste heat available, GJ

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**