

Mining Hot Water Production Challenge

FAQ

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The Challenge Competition

What is the application deadline?

Applications will be received by Foresight up to December 16, 2016, 5 PM Pacific Time.

Who is eligible to participate in the Challenge?

Any organization is eligible to participate in the program so long as there are demonstrable benefits to developing and commercializing the innovation in Western Canada.

Innovators applying to participate do not require a current working relationship with COSIA or any company in the energy sector.

What Technology Readiness Levels are relevant?

Levels 4 through 7 are of interest in this Challenge. Technology Readiness Levels (TRLs) are a measure to evaluate the maturity of an evolving Innovation. This program references the Build in Canada Innovation Program definition of TRL: <https://buyandsell.gc.ca/initiatives-and-programs/build-in-canada-innovation-program-bcip/program-specifics/technology-readiness-levels>

What is the Evaluation Process?

Projects will be evaluated through four stage gates:

- **Stage Gate 1: Completeness.**
Applications received by Foresight will be reviewed for completeness and their ability to provide relevant information to a technical reviewer.
- **Stage Gate 2: Technical Review.**
Based on a review of submitted information, technical reviewers will assess the fit of the proposed technical solution against their ability to meet the criteria identified in the Challenge Application Package. Selected Applicants will be invited to Stage 3.
- **Stage Gate 3: Presentations.**
Presentations to the selection team will be invited in mid-January, 2017. These presentations will be via videoconference or in person in the Foresight or COSIA Offices. Stage 3 participants will receive more details on the specific elements their presentations need to address based on the feedback of reviewers and whether any additional supporting documents may be needed.
- **Stage Gate 4: Shortlist Due Diligence.**
Shortlisted applicants will be provided with supplementary questions and information

requests to assist with the final selection committee decision. The focus of this stage of evaluation will be on the business and the project requirements.

A decision of the Selection Committee is anticipated in 2017Q1.

Where will the selection process meetings be in January, and what meetings will be needed?

There will be a selection committee that will consist of individuals from COSIA, Alberta Innovates, and Foresight ARCTIC. We may also utilize the skillsets of NRC IRAP. Meetings of the selection committee will occur as necessary to review the proposals and finalise the 2-5 sprint participants. The presentation meetings from the individual companies would be scheduled either online or in person, with the location to be determined.

Will there be feedback on submissions?

Participants interested in receiving feedback on their submission will have an opportunity for a debrief meeting with Foresight at the conclusion of the selection process.

Participation

What support do innovators receive for participation?

The total funding available for projects supported through this call for proposals is up to **\$1,200,000** Canadian Dollars (CAD), subject to the discretion of Foresight Cleantech Accelerator Centre/ARCTIC, Alberta Innovates, and COSIA, and the availability of funds.

The Challenge “Sprint” Phase is designed to involve 2 to 5 proponents in advancing proposed solutions. The per project costs can go up or down based on the final number of projects in the sprint. The maximum contribution includes provision for lab space and overheads, marketing, a lab manager, equipment, materials, accelerator mentoring and cash. The winner(s) of the Challenge Sprint will be invited to undertake the next step in the development of the innovation/field trial (or equivalent). The maximum contribution from ARCTIC and COSIA to this phase includes support for a test site, test support, equipment, materials and cash.

Table 3 Potential Funding by Stage and Organization

Phase	Funding	Candidate In Kind (minimum)
Phase 3 – Sprint	Up to \$475,500	\$50,000
Phase 4 – Field Trial	Up to \$725,500	\$100,000

'In Kind' contributions from candidates includes time of key project staff or other resources required to complete the Challenge Stage.

How will Intellectual Property be treated?

Background Intellectual property of an applicant will remain the property of the applicant. Phase 3 does not anticipate the development of any new intellectual property by applicants. Applicants participation in Phase 4 will be governed by an agreement with the industry partners that will address intellectual property development in the Phase 4 Field Trial.

What is the overall Challenge program timeline?

The ARCTIC Program is designed to operate in 4 Phases of critical activity over a 18-24 month timeframe to produce relevant field trials that will validate solutions to resource sector defined challenges.

Phase 1: Challenge Definition (3 months) (Completed)

In conjunction with resource sector partners and ARCTIC participants, Foresight CAC defines a resource sector identified challenge in order to focus innovators on the most promising market opportunities. A broad community of innovators with the potential to provide solutions to the challenge is identified in this Phase.

Phase 2: Innovator Selection (3 months) (Underway)

Foresight CAC and the ARCTIC participants implement the Launch Plan for each Challenge and invite potential solution providers to respond. A panel made up of industry, investors, and selected experts will select 2 to 5 solutions from the pool of innovators that responded to the Challenge for a six to nine-month development sprint.

Phase 3: Challenge Sprint (6 to 9 months) (2016Q4)

This Challenge Sprint will be sponsored by resource sector industry partners and will leverage the Foresight Accelerator and its mentorship program to further advance the development of proposed solutions through:

- testing in a laboratory or other environment.
- the use of lab space, business and technical expertise.
- moving participating innovators to a point where they can seek first funding.

One technology/solution will be selected for field trial and an industry showcase event delivered with a marketing partner.

Phase 4: Field Trial Preparation (12 months) (2017Q2)

Following the Challenge Sprint, one solution could be selected for field-testing, or for the next appropriate level of development. The field trial phase will focus on getting the technology field trial-ready, including equipment specification requirements.

What role will past references play in the evaluation process?

We will use as much help as we can in evaluations of proposals. If there are references in the proposals, we would take advantage of talking to those references.

Are partnerships between potential solution providers actively encouraged?

Yes, we are looking for a complete solution that hits the objectives of the proposal.

Q - Will there be an FAQ update following the webinar?

A – Yes.

Can you clarify the financial information that would need to be provided to determine the amount of financing that is provided?

The amount of financing information that is included in the proposal does not determine the amount of financing that is received. The amount that each company receives will be made as close to equal as it can be, depending on the number of companies that go into the sprint. The information in the proposal is for evaluating the financial viability. We expect companies to have enough cash flow to see them through the Challenge.

Hot Water Challenge General Questions

In Section 2.4 of, in the Key Reference Facility Table Data, can you clarify if the GHG emissions value of 4,000 tCO_{2e}/day is solely for the burning of natural gas for the heating, or if it includes the electric power for the generation of the steam.

All emissions are included in the GHG emissions value. Please see GHG Emissions Summary in the Energy Flow diagram(s) for a breakdown. Deemed emissions from Heat by Cogen = 2,069 t CO₂e/d.

How important is the issue of fouling in the current system?

The importance depends on location.

Boilers: demineralized water is used as boiler feed water to minimize fouling. Since a fouling avoidance strategy is in place, the fouling occurrence is minimal.

Piping: The strategy is to avoid fouling so as not to occur so often.

Exchangers: self-cleaning balls exchangers are used to avoid fouling.

What pressures do the water boiler or hot water pipes operate at?

The boiler operates at 1,050 kPag for LPS and 2100 kPag for MPS. Please see Energy Flow diagram(s).

What is the distance in between heating stations/how long is the piping between (10km?) heating stations?

<1 km for boiler feed water to boilers

Steam line: 1-2 km

Hot water: up to 4 km

Is the piping in between the heating stations currently insulated?

Yes. The primary reason for the insulation is to avoid freezing. Heat tracing is also available.

What would we be retrofitting in terms of specifications and dimensions of the existing units?

No retrofits are assumed. Technology would be stand alone, located near Ore Processing Plant for provision of hot water.

What kind of power and fuel do we have available on site?

Natural gas is used for fuel. Power is derived from cogen. Please see Energy Flow diagram(s).

What are the current elements in the GHG analysis of the current system?

Please see Energy Flow diagram(s).

What is the rate of heat loss through the piping and associated systems?

Heat loss is secondary as compared to inlet feed temperature.

Would you recommend a solution that incorporates EM heating along with a thermally insulative coating?

All ideas are welcome at this stage, and will be evaluated as part of the review process.

We are looking for clarification on the flow sheets provided for the Hot Water Production Challenge. It is unclear to us where the boiler feedwater preheating takes place. Are the values stated (i.e., 633 GJ/h for summer conditions and 386 GJ/h for the average conditions) either: a) split to preheat both the HRSG and Auxiliary Boiler feedwaters from 51 °C, or b) delivered only to preheat the HRSG feedwater?

It takes places in the process water heat exchanger. Steam and condensates are used to heat up cold process water and demineralized water.

What are the environmental temperature ranges the piping in between heating stations is exposed to in operation?

All piping is outdoors and exposed to on-site air temperature.

What economic factors can we consider to evaluate the economic benefit of using our technical solution? Would it be fair to assume a 2 year payback?

When evaluating the economic benefit a discount rate of 10% can be applied.

What are the primary challenges and/or drawbacks of the currently implemented system?

Please reference the challenge paper for an overview of the current challenges and drawbacks.

The Challenge Sponsors and the ARCTIC Program

What is ARCTIC?

The Advanced Resource Clean Technology Innovation Centre (ARCTIC) was established by Foresight in early 2015 to fulfill the need for a demand-pull approach to innovation targeting both specific environmental, operational and environmental challenges and potential sources of innovation from across Canada and marrying them to drive performance improvements and accelerate the commercialization of new technologies.

ARCTIC models a new approach for industry/innovator collaboration.

The ARCTIC program is funded with support from BC Innovation Council (BCIC), Western Economic Diversification (WD) and Canada's National Research Council's Industrial Research Assistance Program (NRC/IRAP). In this Challenge, the ARCTIC program is working with COSIA to search for remote sensing technologies that target one of the forestry sector's challenges – forest inventory management.

Where can I learn more about ARCTIC?

The website for ARCTIC is <http://arctic.foresightcac.com> where more information about the program and Open Challenges is available.

Who is the Foresight Cleantech Accelerator Centre?

Foresight Cleantech Accelerator Centre is Western Canada's first clean technology accelerator, launched in March 2013 as a not-for-profit corporation to foster the growth of small and medium size businesses (SMEs) in the development and commercialization of viable technology solutions to create and produce energy more efficiently and responsibly.

Funded by the **BC Innovation Council (BCIC)** and **Canada's National Research Council's Industrial Research Assistance Program (IRAP)**, Foresight is dedicated to providing everything it takes to see the clients succeed. They believe start-up success requires an ecosystem of mentorship, like-minded entrepreneurs, and industry specific guidance.

Foresight helps clients discover sustainable and profitable business models through parallel processes of Customer Development and Agile Product Development. During this process they bring clean technology entrepreneurs together with corporate partners, universities, government agencies and local service providers.

Foresight is located in Surrey, British Columbia, Canada.

Who is COSIA?

Canada's Oil Sands Innovation Alliance (COSIA) is an alliance of oil sands producers focused on accelerating the pace of improvement in environmental performance in Canada's oil sands through collaborative action and innovation. COSIA brings together leading thinkers from industry, government, academia and the wider public to improve measurement, accountability and environmental performance in the oil sands in four priority areas. These four Environmental Priority Areas (EPAs) are tailings, water, land, and greenhouse gases (GHG).

COSIA's GHG EPA is looking for innovative and sustainable solutions to significantly reduce GHGs at oil sands mining and in situ (in place) operations without environmental burden shifting (causing negative environmental impacts in other areas). Its aspiration is to "Produce our oil with lower GHG emissions than other sources of oil."

Who is Alberta Innovates?

Alberta Innovates is an important investment by the province in the growth and diversification of Alberta's economy. The corporation, governed by a board and CEO, builds on provincial strengths in health, environment, energy, food, fibre and emerging technologies to produce results that contribute to the province's health, social and economic future. The strengthened research base under Alberta Innovates accelerates innovation for outcomes that benefit all of us, including improved patient care, reduced carbon emissions, support for newer industries – like biorefineries – and development of new technologies. Alberta Innovates delivers the kind of holistic support and leadership that Alberta researchers, entrepreneurs and companies need to thrive in a globally competitive research and innovation context. Services, tools, expertise, partnerships and funding from Alberta Innovates support a broad range of research and innovation activity, from discovery to application, with the focus on accelerating commercial outcomes.

What is the ASBIRI Program?

Launched to address pivotal Alberta market priorities, the Alberta Small Business Innovation & Research Initiative (ASBIRI) provides Small and Medium Enterprises ("SME"s) with a new innovation program that will support a stronger economy and enhanced quality of life for Albertans. Funded by the Government of Alberta and delivered by Alberta Innovates, ASBIRI is designed to facilitate technology development project partnerships between End-Users and

SME technology suppliers; thereby enabling demand-pull innovation. ASBIRI presents a flexible model that supports collaboration amongst innovators, industry and other funding agencies.

For Alberta SMEs, this Program provides funding support, mentorship, and first-client/real-market opportunities for their technologies. For End-users, the Program provides a conduit for identification and investigation of new ideas and mitigates the risk of technology adoption by providing them with the opportunity to evaluate and ideally procure a technology solution that is meaningful to their business.

For more information on this program, please visit www.albertainnovates.ca.

Additional Background

Where can I learn more about COSIA's Priorities?

COSIA has posted a number of its open Challenges on its website: <http://www.cosia.ca>.