Foresight ARCTIC COSIA Challenge FAQ

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The Challenge Competition

What is the application deadline?

Applications will be received by Foresight up to November 28, 2015, 5 PM Pacific Time.

Is there a page limit on the response document?

There's no formal page limit on the response document. However, given that there will be a number of proposals that we will be reviewing, and that the response document is an initial introduction to your proposed technology, try to keep it concise at this stage and present only relevant information. The review process will provide the opportunity to go into more in-depth discussions.

Who is eligible to participate in the Challenge?

Any corporation 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 oil sands.

Are responses to the Challenge limited to only western Canadian companies?

No, we welcome responses from all over Canada, with a preference for the sprint and field trial phases to occur in Western Canada in settings appropriate to each project.

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

Is there a cap on the capital cost of my proposed technology?

While there is no cap on capital costs, they do tend to be a major deciding factor in the process of shortlisting the proponents. The lower the capital costs, the more interest there will be in the proposed technology.

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 early December, 2015. These

presentations will be via videoconference or in person in the Foresight Offices. Stage 3 participants will receive more details on the specific elements their presentations need to address based on the feedback of reviewers.

- 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 2016Q1.

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 selection process.

Participation

What support do innovators receive for participation?

The total funding available for projects supported through each ARCTIC Challenge Sprint is up to $610,000 Canadian Dollars (CAD), subject to the discretion of Foresight Cleantech Accelerator Centre/ARCTIC and its industry partner(s).

The range of funding available per Challenge Sprint is $87,000 to $305,000, with a requirement for innovator participants to commit a minimum of $50,000 per project as an in-kind contribution. The per project allocation can vary based on the final number of projects in the Challenge Sprint.

The maximum contribution includes provision for lab space and overhead costs, marketing, a lab manager, equipment, materials, accelerator mentoring and cash.

The winner(s) of the sprint will be invited to undertake the next step in the development of the innovation/field trial (or equivalent) with the industry partners. This phase will have a maximum contribution from ARCTIC and industry partners at $175,000, with a requirement for proponents to commit $100,000 as an in kind contribution. The maximum contribution from ARCTIC and industry partners to this Phase includes support for a test site, test support, equipment, materials and cash.

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 ARCTIC COSIA 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) (2016Q1)

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) (2016Q4)

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.

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 environmental technologies that target one of the oil sands challenges – waste heat recovery.

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?

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.

Through COSIA, participating companies capture, develop and share the most innovative approaches and best thinking to improve environmental performance in the oil sands, focusing on four Environmental Priority Areas (EPAs) – tailings, water, land and greenhouse gases.

To date, COSIA member companies have shared 777 distinct technologies and innovations that cost over $950 million to develop. These numbers are increasing as the alliance matures and expands. Through this sharing of innovation and application of new technologies, members can accelerate the pace of environmental performance improvements.

COSIA is headquartered in Calgary, Alberta, Canada.

Additional Background

Where can I learn more about in situ oil sands production?

Several organizations provide public information resources on oil sands facilities, including the following websites:

Oil Sands 101 - Imperial Oil
www.imperialoil.ca/Canada-English/operations_sands_glance_**101**.aspx

Alberta Energy: Oil Sands 101
http://www.energy.alberta.ca/OilSands/1710.asp

How is this Challenge related to the COSIA and GE Waste Heat Challenges?

The COSIA ARCTIC Waste Heat Recovery Challenge covers similar technical areas as the COSIA and GE Challenges but the programs are not related.

Why are Organic Rankine Cycle (ORC) technologies not eligible?

Other processes are pursuing ORC developments and their potential application to in situ oil sands production. The industry sponsor for this COSIA ARCTIC Waste Heat Recovery Challenge is interested in other technologies for this Challenge.

What stack flue gas temperature should be taken as the basis of calculations?

Flue gas temperatures vary slightly from one facility to another. The challenge statement presents the flue gas temperature as 200°C, while the measurement in the energy flow diagram shows it as 195°C. It's also noted that in Table 2 of the challenge statement, the temperature mentioned is 182°C. It is recommended to use 200°C (as mentioned in the challenge statement) as the default flue gas temperature for your calculations. However, other temperatures that are presented in the document are accepted, as long as there's transparency in your calculations regarding which has been chosen as the basis of your calculations.

Is there a plot plan to show the arrangement of the process equipment?

We haven't provided a plot plan because facilities are so different from one to another. There's lots of publically information available online, which respondents are encouraged to review. An example of a plot plan can be found here on slide 11.

What are the approximate dimensions of the steam generator stack?

An example of the stack dimensions from Cenovus' Foster Creek Thermal Project Phase J Project is presented in the table below. While heights are typically in the same range, the diameter may be different depending of the specific relieving loads and design of each flare system.

Capacity (heat input)	Stack Height	Stack diameter
93.7 MW	30 m	1.7 m