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# PROGRAM GUIDE: BITUMEN BEYOND COMBUSTION (BBC)

## OVERVIEW

### Background

Alberta Innovates is a catalyst for innovation. As a Government of Alberta corporation and consistent with Government priorities, Alberta Innovates supports research and innovation that lead to economic diversification, enhanced environmental performance, and social well-being.

Specifically, Alberta Innovates is furthering the development of non-combustion products and their production technologies, derived from bitumen contained in Alberta's extensive oil sands. The latter are amongst the world's largest hydrocarbon resources, with proven reserves of approximately 180 billion barrels. At present, most bitumen products (such as gasoline, diesel, and heating oil) are destined for energy generation by combustion.

By facilitating and supporting the development of novel clean technologies from bench scale to field pilots, the **Bitumen Beyond Combustion (BBC)** program is intended to:

- diversify the uses of oil sands bitumen, resulting in high-value, large-scale non-combustion products that can be made by or in partnership with Alberta's oil sands industry
- accommodate increasing bitumen production in Alberta, by creating new and/or expanded markets for bitumen and bitumen-derived products
- reduce greenhouse gas emissions associated with bitumen uses
- offset potential lessening in the demand growth of bitumen, resulting from factors that include increased global oil supplies, environmental concerns about the use of oil-based fossil fuels, energy conservation, and electrification of transportation

The BBC program focuses on large-scale non-combustion products and their production technologies that are:

- technically and commercially viable now or can become so

- competitive with or superior to existing products and production technologies
- large-scale, requiring at least 100,000 barrels of bitumen per day (bpd) by 2030
- contributing to Alberta’s prosperous, environmentally and socially sustainable diversified economy.

Collectively, the focus and its specifications are called ‘*BBC criteria*’.

Alberta Innovates, supported by representatives of some of Canada’s major oil sands producers and chemical companies, governmental agencies, and research organizations, commissioned two backgrounds studies on the challenges of identifying, manufacturing, and marketing non-combustion products from oil sands bitumen. Several possibilities were identified. The [BBC Phase 1](#) and [BBC Phase 2](#) studies can be found on the Alberta Innovates website. The BBC concept and opportunity were also recently highlighted by [Alberta’s Energy Diversification Advisory Committee](#) (EDAC)\*.

## Program Details

Through an Open Call, Alberta Innovates is making available up to \$2 million over two years and invites proposals that build on and extend the findings of the previous BBC studies by

- producing and characterizing previously identified and/or new BBC products and demonstrating their production technologies, on laboratory- or pilot-scales
- validating technical, logistical, environmental, and market solutions to accelerate the commercialization of BBC products
- assessing the business, marketing, energy, environmental, and greenhouse gas (GHG) issues related to BBC products and their production technologies.

Previously identified product areas include:

- Carbon fibers and products incorporating carbon fibers
- Asphalt and asphalt transportability
- Vanadium flow batteries for electricity storage
- Polymers.

Consistent with Open Calls, proponents may suggest other products and production technologies that meet BBC project criteria. General knowledge gaps that require addressing include:

- Production technologies
- Performance characteristics of products
- Competitiveness of products and production technologies
- Scale-up issues and parameters

- Market size and uptake
- Environmental and social implications

The potential global market for each product should, in aggregate, positively impact at least 100,000 bpd (barrels per day) of bitumen. The market potential may arise from the expansion of existing markets and/or the creation of new markets. While the full market potential may not be reached by 2030, products and production technologies with high near-term market potential are of great interest.

Proponents may focus on one or more products or production technologies. If several unrelated products and production technologies are proposed, separate proposals may be submitted.

The application process, described later in this document, involves a two-stage process beginning with an expression of interest (EOI) followed by full project proposal (FPP) for successful EOIs.

## HOW THE PROGRAM WORKS

### Eligibility

#### (a) Applicant Eligibility Criteria

Eligible applicants are technology developing companies, post-secondary institution research teams, or other organizations that have expertise with respect to:

- scientific, engineering, business, transportation, regulatory, environmental, and social fundamentals pertaining to the performance and competitiveness of their proposed BBC products and production technologies;
- undertaking and successfully completing scientific and technical laboratory and other small-scale practical work on products and production technologies relevant to the petroleum / petrochemical industries and, preferably, the oil sands sector;
- utilizing the results and conclusions from laboratory and other small-scale work to establish the viability and competitiveness of products and production technologies, such ability to include experience with preparing process flowsheets (with mass and energy information and basic equipment specifications) for purposes of scale-up;
- identifying and addressing critical business issues, including CAPEX and OPEX estimates; market characteristics; environmental and social acceptance;
- addressing scientific, technical, business, and environmental challenges and opportunities;
- working relationships with leading companies and research entities pertinent to BBC products and production technologies.

Various partnerships may be eligible, including: companies, consortia, organizations working with InnoTech Alberta, and post-secondary institutions whose mandates include research and applied research.

#### (b) Partner Eligibility Criteria

- preference for partners in Alberta industry or research institutions;
- demonstrate that the relationship between the Applicant and the Partner(s) does not create a conflict of interest;
- have no outstanding balance or otherwise owe money and/or reports to Alberta Innovates or its subsidiaries.

**(c) Project Eligibility Criteria** - To qualify for funding all projects must:

- be aligned with GOA and AI strategic priorities and targets;
- submit a completed application template with well-defined outputs and milestones in terms of technology advancement (Technology Readiness Level 2 – 6), quantified GHG emissions reduction potential, prototypes built, proof of concept, personnel trained, spin-off company creation, partnerships established, products brought to market, etc.;
- submit to other criteria that Alberta Innovates may develop from time to time.

**(d) Additional Information:**

Funded research initiatives may provide experiential learning opportunities for undergraduate and graduate students, aiming to develop HQSPs, supporting new technology development, and adoption of technologies in practice.

## Performance Management and Evaluation

Over the life of a project, Alberta Innovates employs an active project management philosophy, regularly monitoring performance and supporting the Applicant and Partner to reach their outcomes. Funding is tied to outcomes and achievement of results and submission of progress and performance reports. For this reason, Alberta Innovates funds on a milestone completion basis. This means the Applicant and Partner are expected to complete a task and submit a progress report before Alberta Innovates advances the next tranche of funds. Failure to complete annual performance reporting will also impact fund release.

Once projects are completed, Alberta Innovates continues to monitor performance for an additional five-year period to accurately evaluate the economic, environmental and social benefits realized for Albertans and our province.

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*A results-focused organization, Alberta Innovates uses a performance management framework to monitor and evaluate the outcomes and impacts of its investments. The Applicant is responsible for annually reporting on all required indicators to Alberta Innovates.*

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The BBC Program contributes to the strategic outcomes of the Climate Change Innovation and Technology Framework (CCITF).

**CCITF Vision:** *By year 2030, Alberta’s use of innovation and clean technology (“Clean Innovation”) will accelerate the shift to lower carbon economy, generating significant environmental and economic benefits.*

Short, mid and long-term program outcomes and a sample of key performance indicators are highlighted in the following diagram.

# Pathway to Outcome



## INSTITUTION/SME/ INDUSTRY BENEFITS

- Respond to carbon emissions reduction pressures
- Profitably evolve toward low carbon economy
- Innovate to find new market growth opportunities
- Funding de-risk for technology and commercialization development
- Access to financial resources, relationships and mentorship
- Increased global competitiveness



## SHORT TERM PROGRAM OUTCOMES

Increased technology development to meet Alberta's clean innovation needs across the innovation continuum

Improved support for people advancing knowledge with creative and innovative lower carbon ideas

### SAMPLE OF PERFORMANCE INDICATORS

- \$ for platform technologies
- # of and \$ for proposals/funds requested
- \$ invested by innovation continuum stages
- # of clean technology patents filed by AB researchers
- \$ leveraged from Federal gov't, industry and others
- # of patents licensed by industry
- # of and \$ for increased research jobs & student/postdoctoral fellow/research associate supports
- # of publications and relative citation impacts
- # of spin off companies
- # of prototypes or other results ready for use
- # of and \$ for industry sponsored projects
- # of people attracted, trained and developed in support of clean technology development and industry adoption



## MID / LONG TERM PROGRAM OUTCOMES

Increased supply & use of clean technology, products & practices

### SAMPLE OF PERFORMANCE INDICATORS

- \$ market value from projected deployments of BBC technologies
- # of potential reduced GHG emissions
- # of employment opportunities generated



## ALBERTA STRATEGIC OUTCOMES

- **Environmental Performance – GHG Emission Reductions**
- **Lower Carbon Diversified Economy**
- **Lower Carbon Energy Transition**



SHORT TERM

LONG TERM

## How Funding Works

### **(a) Project Funding**

There is no limit on individual grant amounts, however they will not exceed \$0.5 million from this Open Call per BBC project.

The BBC program normally supports 25 – 50% of total project costs, with the remaining funding being in-kind and cash support from Applicants and their project partners. For projects involving Canadian post-secondary institution researchers, leveraging from federal funding organizations (NSERC, etc.) is highly desirable.

Funding will be dispersed to successful Applicants at the end of each milestone, based on milestone proof, over the maximum two-year project. Normally, the projects will be 1 – 2 years in duration.

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*Alberta Innovates encourages co-funding of projects with other funding agencies, and does not limit the amount of stacking towards the applicant's contribution.*

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### **(b) Eligible and ineligible expenses**

Alberta Innovates funds expenses directly attributable to the performance of agreed upon projects. All costs incurred must be critical to the performance of the project, as outlined in the application.

Alberta Innovates only funds reasonable costs incurred as defined in the investment agreement after it has been executed.

A high-level summary of eligible and ineligible expenses is provided in Appendix A.

## HOW TO APPLY

The BBC Program is delivered in three phases. Project proposals will be evaluated on their merit and the potential for impacts aligned with the BBC Program and, more generally, the Climate Change Innovation and Technology Framework.



### PHASE 1

#### Expression of Interest

EOIs are accepted from applicants until the submission deadline.

Applications received after the deadline will not be reviewed.

**Successful applicants will be invited to submit a Full Project Proposal (Phase 2) for evaluation.**

For current Competition timelines, please see the funding section of the [Alberta Innovates website](#).



### PHASE 2

#### Full Project Proposal

The evaluation process at this phase is highly competitive and only the highest-quality projects will be considered for funding.

Please complete submissions in consultation with an Alberta Innovates Advisor to ensure all information is complete.



### PHASE 3

#### Project Management

Successful applicants will execute an agreement with Alberta Innovates to proceed with the activities of the Project.

Agreement expectations will include:

- participation in project management activities;
- reporting on progress to milestones and budget on a quarterly basis during the term of the Agreement; and
- reporting on progress to outcomes on an annual basis during the term of the Agreement and annually for five years after that term.

Project payment is tied to milestone, progress and performance reporting.

## APPLICATION REVIEW PROCESS

During the distinct phases of the application and review process, Alberta Innovates leverages internal staff and external expert reviewers to evaluate applications submitted. Alberta Innovates retains the sole right to determine the evaluation process and does not disclose the names of its external reviewers to ensure their objectivity and impartiality. All external parties are subject to confidentiality, intellectual property management and conflict of interest policies set by Alberta Innovates. For a more detailed account of the evaluation process for this program, see Appendix B.

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*All investment decisions are at the sole discretion of Alberta Innovates.*

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## TERMS AND CONDITIONS

This Program Guide is intended as a high-level overview of the BBC program. It provides interested parties with a roadmap of what to expect over the lifecycle of a project, from the application stage, during the project and post-completion. Should you have any questions about this guide or what is expected, please contact Alberta Innovates. Please be aware Alberta Innovates may modify this guide from time to time in keeping with any changes to the BBC program, or the Climate Change Innovation and Technology Framework.

Once we have evaluated and approved an application for funding, Alberta Innovates will require the participants to sign a standard form investment agreement. The investment agreement sets out in detail the roles, responsibilities and obligations of the various parties to ensure a successful project. Alberta Innovates will not provide any funding until the investment agreement has been signed by all parties.

## CONTACT INFORMATION

To discuss eligibility for this program, to receive an application form or for specific questions regarding the BBC program and this guide, please contact:

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## APPENDIX A

### Summary of Eligible and Ineligible Expenses

Category	Eligible Expenses	Ineligible Expenses
<b>Labour</b>	<ul style="list-style-type: none"> <li>✓ Salary and benefits for individuals who are specifically working on the project</li> </ul>	<ul style="list-style-type: none"> <li>✗ Overhead costs charged to employee labour rates</li> <li>✗ Professional training &amp; development</li> <li>✗ Professional fees unless directly related to the project</li> </ul>
<b>Materials</b>	<ul style="list-style-type: none"> <li>✓ Reasonable material costs</li> </ul>	
<b>Capital Assets &amp; Software</b>	<ul style="list-style-type: none"> <li>✓ Capital improvements</li> <li>✓ Capital equipment</li> <li>✓ Software or information databases</li> </ul> <p><i>Note: Eligible costs will be pro-rated to the project time frame based on the asset's expected economic life</i></p>	<ul style="list-style-type: none"> <li>✗ Acquisitions of land or buildings</li> <li>✗ The undepreciated value of eligible capital costs which extends beyond the project timeframe</li> </ul>
<b>Travel</b>	<ul style="list-style-type: none"> <li>✓ Travel, including mileage, low economy airfare, and accommodation for the purposes of executing the project</li> </ul>	<ul style="list-style-type: none"> <li>✗ Passport or immigration fees</li> <li>✗ Costs relating to meals, entertainment, hospitality and gifts</li> <li>✗ Reimbursement for airfare purchased with personal frequent flyer programs</li> <li>✗ Commuting costs between place of residence and place of employment</li> </ul>
<b>Sub-contractors</b>	<ul style="list-style-type: none"> <li>✓ Services or products of another entity</li> </ul>	<ul style="list-style-type: none"> <li>✗ Costs associated with applying for government grants and programs</li> <li>✗ Provisions for contingencies, technical or professional journals</li> <li>✗ Routine testing and maintenance unrelated to the project</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>✓ Costs which Alberta Innovates pre-approves in writing as an eligible expense</li> </ul>	<ul style="list-style-type: none"> <li>✗ Collection charges, allowance for interest on debt, fines and penalties</li> <li>✗ Federal and provincial income taxes, goods and services taxes</li> <li>✗ Expenses for projects or activities outside the approved Project</li> </ul>

## APPENDIX B

### Detailed Evaluation Criteria per phase

#### PHASE 1

At the **Expression of Interest** stage of application, your project will be evaluated on the following criteria:

1. **The Opportunity:** This section includes non-confidential project abstract, project description and an opportunity to identify the project's alignment with the BBC Program. The technology status and technology readiness level (if appropriate) can be indicated. A description of the market for the technology and market penetration should be included.
2. **Outcome Focus:** This section focuses on how the project will help Alberta reach the outcomes identified in the BBC program. Applicants are asked to estimate the benefits (economic, social, environmental, GHG emission reductions) from the BBC products and technologies to Alberta.
3. **Implementation:** This section focuses on the work plan and the research team. Evaluators also consider the training, attraction and retention of Highly Qualified People to Alberta. The funding commitments from other partners should be identified here.

**Signatures:** Authorized representatives of the lead applicant's employing organization must sign the application form and may indicate if Alberta Innovates can share the application with trusted funding partners.

#### PHASE 2

At the **Full Project Proposal** stage of application, your project will be evaluated on the following 11 criteria:

1. **Knowledge/Technology Opportunity** - Proposals will be evaluated on the strength of the product/technology, including the scientific basis for the innovation and novelty of the solution, and the extent to which the proposed project will achieve meaningful technological advancement.
2. **Competitive Analysis** - Proposals will be evaluated on the competitiveness of the proposed solution, including advantages relative to existing and nascent technologies or research. Opportunities for synergies and collaboration must be described.
3. **Implementation Potential and Market** - Proposals will be evaluated on the strength of the implementation potential and pathway that will lead to application or use of the knowledge/technology in Alberta. Proponents must identify the market opportunity, including the size of addressable market(s) and alignment of the technology or research with market needs.
4. **Risk Analysis and Mitigation** - Proposals will be evaluated on the identification of key project risks and the mitigation strategy and status to support the achievement of short and long-term goals of the project.

5. **Economic Benefits to Alberta** - Proposals will be evaluated on the potential for economic benefits in Alberta, including increased employment, attraction of investment capital, increased resource revenues, economic diversification, and improved export potential.
6. **GHG Emissions Reductions and Climate Change Benefits** - Proposals will be evaluated on the potential to reduce GHG emissions in Alberta in the near term, by 2025, 2030, and beyond. This includes reductions directly resulting from implementation of the project, from future commercial implementations (e.g., retrofits at existing sites relative to historic operation, new builds), and from broader adoption across the relevant industry.
7. **Environmental and Social Benefits** - Proposals will be evaluated on the potential to provide additional benefits to Alberta, including reduced environmental impacts and societal benefits (e.g. environmental and/or societal benefits of the research / technology relative to current practice. Consider climate adaptation, water quantity and quality, land management, contaminant reduction, health improvements, safeguarding investments).
8. **Job Creation and Building Innovation Capacity** - Proposals will be evaluated based on their potential to contribute to the training and development of Highly Qualified Skilled Personnel (HQSP). The Full Project Proposal must provide details of the project's expected contribution to the training of HQSP, and their potential to be retained within or recruited to Alberta.
9. **Work Plan, Budget and Deliverables** - Proposals will be evaluated on the strength of the project plan, including how well developed the work structure is, whether the key elements are present to enable meeting project objectives, and the quality of task/category breakdown in the work plan and budget. The project deliverables will be evaluated on the ability of the applicant to measure and describe project success.
10. **Excellence of the Project Team** - Proposals will be evaluated on the expertise and capability of the project team to carry out the proposed project and advance toward commercialization, including the level of commitment from key team members and partners, as well as additional capacity provided by strategic partners to support commercialization and widespread adoption of the technology.
11. **Funding Commitment** - Proposals will be evaluated on the applicant's financial ability to carry out the proposed project, including the financial position of the applicant organization, the level of non-CCITF funding that is confirmed or in discussion, and the justification for seeking CCITF funding for the BBC project.