

**Invitation for an
Expression of Interest**
Next-Generation Carbon Capture Processes

December 2007

1. Part A – Purpose, Vision, Guiding Principles

1.1 Purpose

Alberta has one of the largest supplies of hydrocarbons in the world. Today, our energy and industrial sectors are facing their greatest challenges and opportunities. Alberta must reduce CO₂ emissions, maintain production from its maturing conventional oil and gas fields, develop new technologies to recover non-conventional oil and gas and produce more hydrogen for fuel cells and upgrading heavy oil. An important solution is to capture and use or geologically store CO₂ emissions from large industrial emitters.

Alberta has world-class geological storage capacity but relatively few concentrated sources of CO₂ (less than 5% with >20% CO₂ concentration). Consequently, the cost of CO₂ capture using current technology is very high, and in many plants the parasitic energy required to capture CO₂ is such that it may make them impractical for Carbon Capture and Storage (CCS) application. This Expression-of-Interest seeks to identify and support the development of the *Next-Generation* of capture technologies that could significantly reduce the cost of CO₂ capture.

AERI's intent is to evolve a **CO₂ Capture Program**, comprising of several nodes of researchers from universities and other organizations, potential users from industry and funders from industry and government, who would work towards a common purpose, share information and develop CO₂ capture technologies that would accelerate the introduction of CCS in Western Canada.

1.2 Background

A concerted and coordinated effort is needed to develop suites of CCS technologies for evolving our fossil energy systems and infrastructure, from “developing” to “commercially attractive”, within 15 years. This was identified as a fundamental building block for action in Alberta's 2002 **Climate Change Plan**. Through discussions with stakeholders to support the development of a **renewed Climate Change Plan**, it is clear that the role of CCS is even greater. It not only provides an opportunity area for significant greenhouse gas emission reductions, but CCS is emerging as a key underpinning of a broader focus on clean and sustainable energy development.

The Alberta Energy Research Institute (AERI) focus is on supporting the development of key CCS technologies that would enable industry to capture its high-value CO₂ emissions and either use it either for enhanced energy production or geological storage, including better understanding CO₂ storage mechanisms, more reservoir characterization and modelling, ways to improve sweep efficiency, using CO₂ to maintain gas-over-bitumen reservoir pressure, better well design and near-wellbore injection processes and CO₂ storage in low-permeability reservoirs, heavy oil reservoirs, reservoirs less than 800 m in depth and saline aquifers.

1.3 Vision

"Alberta is a global leader in reducing greenhouse gas and other emissions of concern through the adaptation and development of technologies to capture, transport, store CO₂ in deep geological formations or use in oil and gas recovery and technologies to significantly reduce environmental emissions."

In 2006, the Canadian CO₂ Capture and Storage technology roadmap¹ identified carbon capture and storage (CCS) as a key technological solution to the global climate change challenge. It stated, "*CCS is strategically important to Canada for several reasons. First and foremost, Canada is endowed with an abundance of fossil fuels... around which a very strong set of industry sectors already exist. Second, CCS is not simply about enabling the use of existing energy reserves. It is also about increasing reserves through enhanced oil, natural gas and coal bed methane recovery. Third, reducing CO₂ emissions is a critical federal policy... Finally, Canadian researchers and energy industries are already recognized internationally.*"

Recognizing this, the Government of Alberta, through AERI, is committed to supporting selected CCS initiatives in Alberta. In order to improve the profitability and sustainability of Alberta's oil and gas operations, AERI considers it critical for industry, government, and research organizations to take a collaborative approach to accelerating CCS innovation.

AERI invites Expressions of Interest (EOI) from universities, research organizations and the private sector for a new initiative titled: "***Next-Generation Carbon Capture Processes***". "CO₂ capture" includes new concepts for separation, dehydration and compression, from stationary and mobile sources. Such processes are high-risk but have the potential to deliver significant cost reductions over current methods. AERI expects that such processes would require basic research and development within a university or similar environment. Commercial processes, and those which are presently close to commercialization but do not provide substantial reductions in costs, would not qualify.

Interested parties are invited to submit proposals, summarizing their interest and preferred participation model. Respondents must provide a detailed description of the approach that they will take to complete this study, as well as an estimate of the effort required to complete the work.

After a formal evaluation and selection process and subject to AERI Board approval, it is the intention of AERI to work closely with the successful respondents and link the various research capabilities. We anticipate that this would result in a world-class multi-year program that will involve several funders and R&D organizations. The successful respondents may also be invited to finalize the study scope and submit a full application for funding, either collectively or individually.

¹ http://www.nrcan.gc.ca/es/etb/cetc/combustion/co2trm/htmldocs/ccstrm_doc_e.html

1.4 AERI Program Goal

The Five-Year goal is to support the development of key technologies that will enable a 25% reduction in greenhouse gas emissions per unit of energy produced. Technologies will be developed to capture carbon dioxide and either use it to increase oil and gas recovery or store in deep saline aquifers. The focus of this EOI is on CO₂ capture only.

1.5 Organization and Guiding Principles

Each portfolio is managed by AERI program directors, under the direction of the AERI Board of Directors. The process would be as follows:

- Interested parties are invited to submit Expression of Interest (EOI) proposals to AERI, using the guidelines in Section 2.1.
- The proposals will be screened by an Evaluation Committee and selected applicants will be invited to submit full applications, both collectively or individually, linked together in a focussed program and using the procedure and forms available at the AERI website, http://www.aeri.ab.ca/sec/fun_opp/app_pro_001_1.cfm.
- The full applications would then be reviewed by the Evaluation Committee, which (in the case of AERI) would make recommendations to the AERI Board of Directors for final funding decisions.

1.6 Intellectual Property (IP) Principles.

- Background IP remains with its original owner(s).
- IP developed as part of the co-funded activities (“new IP”) would be owned by the universities, research organizations and private sector participants.

1.7 Confidentiality

AERI is committed to keeping application details confidential. However, as a government entity, AERI is subject to the protection and disclosure provisions of the Freedom of Information and Protection of Privacy (FOIP) Act. Applicants’ rights as a third party are protected under the provisions of the protection of privacy sections of this Act. AERI is prohibited from disclosing personal or business information where disclosure would be harmful to an applicant’s business interests or would be an unreasonable invasion of personal privacy [*FOIP Act s. 15 and s. 16*].

Government of Alberta employees are required to take an oath that limits them from discussing any information gained during their employment with government. In addition, the Government of Alberta Employee Code of Ethics stresses that any information an employee receives in the course of their employment must remain confidential.

External experts that are asked to review a proposal sign a confidentiality form.

2. Part B - Guidelines for Submission of Expressions of Interest

Expressions of interest are invited from operating companies, process developers and licensors and other organizations wishing to participate in the AERI CCS program. The program could be of particular interest to companies planning future expansions and wishing to be early adopters of new CCS technologies.

The following steps and deadlines are envisioned:

- Expressions of Interest, using the guidelines in Section 2.1: **February 15, 2008.**
- Review of expressions of interest and follow up discussions with prospective applicants: **April 1, 2008.**
- Request for submission of full applications: **April 14, 2008.**
- Submission of formal proposals: **May 20, 2008.**
- Due diligence evaluation process, decision and informing applicants on funding decision: **June 30, 2008.**

2.1 Guidelines for Submission of Expressions of Interest

- **Length:** There is no length restriction but the initial Expressions of Interest are generally not expected to exceed *five (5) pages in length*. More details can be provided as appendices, if required.
- **Format:** Submissions are to be made electronically as a word document or PDF format. AERI will maintain the confidentiality of the material submitted. Facsimile or digital proposals will be accepted, in Word or PDF format. However, three signed original must also be sent. All materials and copies must be received by AERI by 4:30 pm, Alberta Time, February 15, 2008.
- The following **headings and topics** listed below are presented as a general guideline for the preparation of the EOI project description and represent some of the criteria that will be used to evaluate the submissions.
 - **Title of the proposed project:**
 - **Name, Address and Affiliation of the Principal Applicant(s):**
 - **Contact Information: Project Leader and key team members**
 - **Description of Interest:**
 - **Technology Opportunity:** The extent and location of application of a successful technology is discussed.
 - **Competitive Analysis:** The proposed technology is clearly shown to be Next-Generation, and a significant reduction in CO₂ capture costs as compared to currently-available technology is demonstrated.

- **Benefits:** Preliminary estimates of the potential benefits of the project, in terms of building research capacity, economic impact and addressing environmental and climate change issues, are provided.
- **Management Structure:** The project leader and project management are described.
- **Research Team & Facilities:** Descriptions of the expertise and experience of key personnel and the suitability and availability of required laboratory facilities are provided
- **Comprehensive Proposal:** The proposal includes tasks, milestones, budget and schedule.
- **Financial Structure & Leverage:** The budget is sufficiently detailed and realistic, and other funders have made commitments to the project.
- **Deliverables:** All deliverables are identified and when they would be delivered.

2.2 Evaluation Criteria

Proposals will first be evaluated using the following mandatory administrative criteria:

Mandatory Administrative Criteria	Yes	No
Is it a Next-Generation CO ₂ Capture technology?		
Strategic Fit with Government of Alberta's Goals?		
Within AERI's mandate, as described at www.aeri.ab.ca ?		

Those Proposals that meet all of the mandatory criteria listed above will then be evaluated using the following criteria:

No.	Desired Criteria	Max Score
1	Technology Opportunity	15
2.	Competitive Analysis	15
3.	Benefits	10
4	Management Structure	10
5	Research Team & Facilities	15
6	Comprehensive Proposal	15
7	Financial Structure & Leverage	10
8	Deliverables	10
	Total Score (Maximum 100)	100

Applicants receiving the highest score would be invited to submit a full application to AERI.

Please submit letters of expression of interest to:

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