Impact and strategic importance

Canada’s oil and natural gas industry has an established track record for driving innovation

Canadian resourcefulness and ingenuity found a way to take the oil out of the sand and natural gas out of the rock. Oil and gas development was founded in technology and innovation and has continued to drive improved environmental performance and bring prosperity to Canadians.

More energy and world-leading environmental performance

World energy demand will continue to grow and oil and natural gas will remain an important part of the global energy mix for the foreseeable future. Canada is well-positioned to provide the world with secure, reliable and affordable energy.

Canada’s oil and gas sector has an opportunity to transform into a low carbon, lower cost industry that is able to attract global investments for continued prosperity.

Building on a strong foundation to accelerate innovation and economic growth

Alberta’s oil and gas sector is a strong regional hub of innovation with national significance and global reach. With a critical mass of large businesses, SMEs, financial institutions, and industry-relevant academic and research institutions with global reach, Calgary and Edmonton are already well-positioned as a large-scale innovation supercluster that is accelerating commercialization of new oil and gas technologies. Alberta has a diverse and skilled workforce and the opportunity to attract new investments, organizations and talent through a focused approach to enhance the sector’s profile as a global innovation hub for specified research areas.

The Clean Resource Innovation Network (CRIN) is an industry-led network that leverages the oil and gas industry’s strengths in large-scale heavy industrial collaboration by aligning research and technology priorities, addressing gaps, and incenting innovation. As a collaborative and inclusive approach to the energy innovation ecosystem, CRIN creates efficiencies to accelerate and deliver transformative solutions both within Alberta and the oil and gas nodes across Canada.

A leading sector in R&D investment

- Number of patents related to extractive industries more than doubled from 2005 to 2010 (Calgary Economic Dev.)
- Leading R&D investor in the country with increased investments in R&D from 2009 to 2015 by 1,400% (State of Nation report)
- Calgary has one of the fastest-growing and largest concentrations of workers and small businesses in the professional, scientific and technical services industry in North America (Calgary Economic Dev.)

Building on a history of collaboration & innovation

Alberta Oil Sands Technology and Research Authority (AOSTRA) pioneered many of the technologies used within in-situ SAGD projects through a collaborative partnership between the Alberta government, federal government, academia and industry. Since 1995, significant industry investments in innovation focused on enhancing operational efficiencies, horizontal drilling, tailings management and multi-stage fracking (shale gas) to name a few.

Our vision as an innovation ecosystem

Canada is the global leader in producing clean hydrocarbon energy from source to end use.
CLEAN RESOURCE INNOVATION NETWORK (CRIN)

A strong value proposition

CRIN will accelerate the development of ground-breaking solutions by establishing industry priorities and connecting innovators within the ecosystem (researchers, investors, SMEs, governments, NGOs, other innovators) and resources (funding, talent, labs, and facilities) to focus on world leading environmental performance and cost competitiveness. This will ensure Canada’s continued prosperity with new high-skilled, high-value jobs and produce economic diversity through spin offs and enhanced technology exports.

Seizing the opportunities for exponential economic growth and industry benefits

Canada’s vast natural resources along with significant oil and gas investments have brought prosperity to Canadians for decades. CRIN positions the oil and gas sector as a global leader and centre of expertise in developing clean hydrocarbons and clean energy. We’ll be attracting the world to Alberta and the industry nodes to invest in oil and gas innovation resulting in diversification and growing the Canadian economy as a heavy industrial, high tech hub.
**Clean Resource Innovation Network (CRIN)**

**Economic Impacts**
of the Oil and Natural Gas Industry in Canada

- The oil and natural gas industry is the largest single private investor in Canada.
- Capital expenditure: $81 billion in 2014, $37 billion in 2017
- Contribution to government revenues: $15 billion/year
- Supply chain: Over 5,000 companies in Canada (outside of Alberta) providing goods and services to the oil sands.

**Strong commitment to world-class technology leadership**
CRIN will co-invest with Innovation, Science and Economic Development (ISED) in advancing technology solutions that are mapped against industry priorities and are aimed to address environmental and cost competitiveness challenges. Innovations are designed to result in transformational impact on the sector and capture new export opportunities for Canadian technologies. These activities will create value by fostering growth in the SME entrepreneurial sector, creating new employment, contributing to GDP, delivering increased revenue to governments in royalties and taxes, and investing in local communities through education, training and social benefits.

<table>
<thead>
<tr>
<th>Thematic area</th>
<th>Technology sub theme (if applicable)</th>
<th>Specific technology platform (if applicable)</th>
<th>Reduced water/land footprint</th>
<th>Improved cost competitiveness</th>
<th>Reduced greenhouse gas intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ecosystem Investments</td>
<td></td>
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<tr>
<td>2. Carbon Competitiveness</td>
<td>Decarbonization</td>
<td>• Low to zero carbon hydrocarbon end use</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td></td>
<td>• Methane monitoring, quantification and abatement including fugitive emissions.</td>
<td>✓</td>
<td></td>
<td>✓</td>
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<tr>
<td></td>
<td>Operating efficiencies</td>
<td>• Non-aqueous/novel in-situ bitumen recovery</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td></td>
<td></td>
<td>• Digital oil and gas</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>3. Environmental Technologies</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Process water technology development centre</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Remediation and reclamation (soil desalination and mitigation)</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>

Source: NRCAN, 2016 and CAPP
Leveraging investments results in continued prosperity

Canada’s oil and gas industry continues to demonstrate its exceptional commitment to technology and innovation, having spent $1.3 Billion in research and development in 2015 alone. The industry is committed to matching any supercluster funding from ISED and also working to leverage other funding opportunities (academia, ERA, NRCan, SDTC, NRC, etc.). That industry investment will translate into more activity on the ground – translating into capital investments, job growth and economic spinoff opportunities by enabling the innovation hubs, technology solution companies and SMEs to prosper.