

CLEAN RESOURCE INNOVATION NETWORK (CRIN) FREQUENTLY ASKED QUESTIONS

Questions and comments submitted via webinar or follow-up email:

1. What is CRIN?

The Clean Resource Innovation Network is an Alberta-based hub of industry, academia, government, innovators and businesses connected to like nodes across Canada with global reach. It shares a goal to improve and accelerate the economic and environmental competitiveness of the oil and natural gas sector as part of the global lower carbon economy.

2. How will CRIN work?

CRIN leverages industry strengths in large-scale collaboration by aligning research and technology priorities, addressing gaps, and incenting innovation across all ecosystem players that create efficiencies to accelerate and deliver transformative solutions towards a low carbon, low cost oil and natural gas industry.

3. How is CRIN different than other initiatives and organizations already in place?

The Canadian oil and gas industry is already globally recognized for its excellence in innovation and collaboration through many successful organizations like Alberta Innovates, Canada's Oil Sands Innovation Alliance (COSIA), Petroleum Technology Alliance of Canada (PTAC), Saskatchewan's Petroleum Technology Research Centre (PTRC) and Petroleum Research Newfoundland and Labrador (PRNL), which have varying core focus areas. CRIN unites the entire oil and natural gas industry with the intent of taking an even broader approach to better align our challenges and accelerate solutions.

4. What will CRIN focus on?

CRIN will advance technology solutions mapped against priority environmental challenges across the oil and gas sector. Always striving for excellence, CRIN's activities will be designed to result in transformational impacts with the intent to export technologies internationally and to other Canadian industrial sectors. The initial focus areas include a holistic approach to water management, decarbonization, operating efficiencies and digitization of the oil and natural gas sector.

5. Why should the federal government support innovation in the heavy industrial sector rather than invest in renewables or other clean energy?

Many independent analysts forecast global demand for crude oil and natural gas to grow on an absolute basis, thereby remaining an important part of the global energy mix for the foreseeable future. The world will continue to need energy from new oil and natural gas development and Canada is well positioned to meet this demand.

Canada's approach to climate change ensures our oil and natural gas continues to be developed responsibly with world-leading environmental performance standards. It strengthens our position compared with other jurisdictions. In this way, Canada's oil and natural gas resources will be an important part of the lower-carbon economy on a global basis.

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6. Who is involved in CRIN?

(CRIN) is a group of innovation practitioners committed to: the success of the **oil and gas sector**, the wellbeing of the **people and communities** that it involves, and supporting a strong, diversified **Canadian economy**.

Current members with involvement on CRIN development and/or organizations engaged on this initiative includes:

- **Industry:** Canadian Natural Resources, Cenovus Energy, ConocoPhillips Canada, Crescent Point Energy, Devon Energy, Encana, Husky Energy, Imaginea, Imperial Oil, MEG Energy, NAL Resources, CNOOC-Nexen, Shell, Suncor Energy, Canadian Association of Petroleum Producers, COSIA, PRNL and PTAC
- **Government:** Calgary Economic Development, Alberta Economic Development and Trade, Alberta Innovates, Industry Science and Economic Development Canada, Natural Resources Canada, CANMET, Emissions Reduction Alberta and Saskatchewan Research Council
- **Academia:** University of Calgary, University of Alberta, NAIT, SAIT, Queens University, University of Guelph, Queens University, Innovate Calgary and others
- **SMEs:** Actively engaging small and medium sized enterprises (SMEs) through COSIA's associate member program, PTAC, and the research and academic communities. Direct engagement with Carbon Upcycling, Inventys, Interface Fluidics, Saltworks and Zedi
- **Other:** Alberta Centre for Advanced Micro Nano Technology Projects (ACAMP), BC Cleantech CEO Alliance, Canadian Gas Association, Rainforest Alliance and SNC Lavalin
- **Finance & Entrepreneurs :** Business Development Canada, and Evok Innovations

7. What is the difference between CRIN and COSIA?

COSIA is focused on innovation in the oil sands and is an important member in CRIN. The scope of CRIN's work is broader, encompassing all aspects of oil and gas activities, including working with end users.

CRIN is a network not a legal entity like COSIA. As a network for developers and users of Canadian energy, funders and financiers of innovation, academic and government researchers and industry alliances (including COSIA, PTAC and PRNL), CRIN acts as a funnel to catch promising ideas from people or organizations looking to innovate in the different energy spaces, and more rapidly move ideas from concept to commercialization. CRIN will not duplicate COSIA's mandate or effort, but it will help to boost COSIA's effectiveness, by matching innovators, solution providers, and funders, more effectively and efficiently.

CRIN is building on a strong local foundation and it will accelerate innovation through a "synthesis process" that allows the diverse players in the clean-resource innovation space to align.

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8. What Technology Readiness levels are you expecting for the ideas?

One of the key roles for CRIN will be to provide clear communication of the industry's needs to the myriad solution providers to focus resources, shorten development time, accelerate adoption, and encourage more ideas and new innovators into the system. We are open to the full range of potential TRL of ideas that feed into the platform areas identified through CRIN. When evaluating technologies that are more commercially ready with a path to deployment. Areas we have identified as a gap will rank higher.

9. What if CRIN doesn't get government funding?

Support from the Innovation Supercluster Initiative (ISI) will allow the oil and natural gas sector to accelerate and commercialize technologies faster. However, this collaboration will continue with or without ISI government funding. The development of groundbreaking solutions by establishing and communicating industry priorities and connecting innovators within the ecosystem is critical to ensure Canada is a global leader in producing clean hydrocarbons from source to end users.

Given the pace and scale of technology and the challenges facing the oil and natural gas sector, enhancing and building on the energy ecosystem will require focus that positions Canada as leading global solutions related to reduced GHG emissions, enhanced environmental performance and improved cost competitiveness.

10. Can you please define what do you mean by these three pillars of CRIN: connectivity, diversity, and inclusivity?

Connectivity, diversity and inclusivity are essential to weaving a world-class ecosystem that will effectively generate tangible and impactful innovation. With a focus on excellence, these pillars provide a foundation upon which the innovation community will operate to address the significant challenges the industry faces.

Connectivity: CRIN will use traditional and digital means to build a community of connected individuals and organizations across industry, academia, research, government finance/investment, and SMEs. CRIN will facilitate the flow of information, knowledge and understanding required for collaborative transformation on priority challenges. Bringing together people, ideas and work across the network – and beyond – will enable innovators and other stakeholders to connect with the people, expertise and resources they need to drive innovation to the benefit of the entire network. This will be done in a way that maximizes the effectiveness of technology platforms, and allows CRIN to work in a pan-Canadian fashion to improve the inclusivity.

Diversity: Sustained system-wide innovation depends upon creating an environment where diversity in thought, perspectives, and approaches is sought, valued and fostered. CRIN's commitment to a network that is rich in diversity translates into engaging people from:

- a wide array of organizations (small to large, a variety of sectors, private and public, start-ups to mature),
- a broad spectrum of technologies,
- a diversity of professions and roles; and
- a wide range of cultures, educations and experience.

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Inclusivity: CRIN members will foster an attitude and approach that demonstrates acceptance and promotes a sense of belonging to people and organizations across the network. It involves a commitment to valuing and anticipating the needs of other members of the community, being open to ideas and innovation beyond the network through ongoing outreach and engagement.

- 11. Is CRIN an organization that is going to track technology projects and results, including summarized outcomes? One of the difficulties in this space is being able to find credible and validated technical information about technology trials, pilots, and implementations. There are many great ideas, but what have we learned and what can be shared so that others don't waste their time on things that someone knows doesn't work, or where focused work is still needed?**

CRIN's work is evolving in this area. However, we are seeking how we can best track results of the network efforts. The objective is to create a system that enables innovators to communicate their learnings and enhance collaboration with others working in the field to eliminate duplication in research efforts. It should also increase the pace of commercialization for new technologies.

- 12. If CRIN's objective is that newly developed and proven technologies will be available to the entire industry, wouldn't the pace of adoption be determined by each individual company's ability and financial/technical capacity to adopt?**

That is correct. However, the industry will have identified priorities based on CRIN's focus areas. One has to assume that they are allocating resources if it is a priority. CRIN and industry are also acutely aware of the need for speed to market due to societal and competitive pressures.

- 13. I am concerned though that CRIN's focus may be too narrowly in limiting itself to the oil and gas sector, which in the Canadian context is a subsector of the larger resources sector. I will grant you that it is a significant sub sector, but I think the proposal would have much more traction if it included other resources that are mined in Canada.**

We have an advisory council from which there will be members from adjacent sectors like mining, petrochemicals, transportation, etc. Enhancing the cross-sectoral application on technology will be critical to its success. Linkages between oil and gas – oil sands mining, in particular – and the mining sector are evident. The convergence of mining and energy with regard to GHG emissions, remote locations, real-time monitoring of complex industrial processes is generating a critical opportunity to advance ideas that will determine the economic viability of the industries.

The natural resources sector – energy, mining and forestry – is one of the most technically advanced in the world and provides the ideal laboratory to implement new ways to resolve big environmental and societal challenges.

- 14. Mining contributed \$56 billion to Canada's Gross Domestic Product (GDP) in 2015. The industry accounted for 19% of the value of Canadian Goods exports in 2015. Canada's value of mineral production was \$42.8 billion in 2015. The mining industry's payments to Canadian federal and provincial governments total \$71 billion in taxes and royalties over the last decade (2003-2012). Mining sector in Canada employs more than 550,000 people.**

See Question 13

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- 15. In 2015, exports accounted for 31.5% of GDP, up from 25% before Canada signed a series of free trade agreements starting in 1988. Exports were 36% of GDP before the global recession began in 2008. Value-added exports, which subtract the imports embedded in exports, represented 22.2% of GDP. Exports directly and indirectly accounted for 2,942,400 jobs in Canada in 2011 according to Statistics Canada, or 16.7% of all employment. Imports were the equivalent of 33.8% of GDP in 2015. About 26% of imports are used as inputs into production in Canada, notably in export-intensive sectors like autos and high-tech. The effective tariff rate on imports is 1%, down from 3.5% before the push to more free trade began in the late 1980s.**

The energy sector is one of the most-export focused industries in the Canadian economy and in a rapidly changing energy world, Canada is engaged in a global market share war. As a higher-cost producer, innovation and advancements in technology to develop our resources more efficiently – and with a smaller environmental footprint – are Canada’s best option to improve cost competitiveness and to ensure access to global markets.

As the energy industry undergoes a fundamental restructuring, responsibly produced, cost effective hydrocarbon energy will become an attribute as society increasingly puts a premium on environmentally responsible industrial development. Alberta has a long history driving technological advances in the energy sector and the highly skilled workforce to build on that foundation to drive progress.

Advancing innovation and technology developed through the supercluster will improve Canadian energy production and are a potential export business that leverages the connections to the existing global supply networks by Canadian energy companies.

- 16. Firms in Canada that export have significantly higher productivity than those that do not.**

Because Canada’s oil and gas sector is export focused and part of a global industry, it needs to be as productive as any worldwide source of petroleum energy. This has forced our sector to compete for capital, labour, and technology, and CRIN will allow us to compete more effectively for innovation oriented suppliers, and inventors.

Also, see Question 15

- 17. What is the timeline you would see this rollout? For example, when would your first call be issued?**

The CRIN Steering Committee submitted a Letter of Intent to the Government of Canada on July 21, 2017. This is the first step in the process to apply for funding and to be designated as an innovation supercluster. We understand that there will be five to seven superclusters across Canada funded by ISED.

We anticipate the government will notify CRIN by fall 2017 of the results. If CRIN is on the short list of candidate superclusters, we will be invited to develop a detailed application. We anticipate the designation and funding approval for the supercluster will occur in late 2017 or early 2018.

The date for the first call and the mechanism to be used has not yet been determined. We are in the initial outreach, engagement and input phase. We will be announcing further CRIN updates, input and engagement sessions this summer and early fall. We are collecting contact information. If you want to be notified of further sessions and are not on our list, please email CRINinfo@PTAC.org.

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As noted in Question 9, CRIN will proceed whether federal funding is secured or not. In the months ahead, we will continue working to get CRIN operational as well as holding input and engagement sessions with the broader community at key points.

CRIN has already shared its focus areas. If you have technology solutions, you can bring them forward to PTAC, COSIA or any of the innovation groups that are a part of CRIN and support those areas of focus. The email address above can help direct you.

- 18. In theory if CRIN is successful in receiving federal funding, any RFP issued by CRIN would also be promoted by the Federal Government's Concierge Service as well as other stakeholder Federal Government departments and agencies.**

Yes. We are open to working with government resources, where appropriate and efficient. Our goal is to utilize and leverage the services to optimize CRINs reach and effectiveness in achieving results.

- 19. The convergence of technologies being adopted by both the mining and the oil and gas sector would argue for a collaborative approach.**

See Question 13

- 20. I attended the CRIN presentation via webinar this morning, and am very interested in being involved with CRIN, or at least part of the network. How I can be connected to CRIN going forward?**

Depending on the nature of your organization (entrepreneur, SME, large technology company, researcher, or funder), there will be different ways to get your input to CRIN as it rolls out. For more information about CRIN please email CRINinfo@PTAC.org.

- 21. I participated via webinar in the CRIN presentation. As a researcher with InnoTech Alberta, I see there is a valuable role for research organizations such as InnoTech Alberta and C-FER Technologies in conducting multi-SME trials, validation and technology optimization. Will the CRIN consider and help to facilitate such activities?**

The intention is for CRIN to work more collaboratively with these research organizations and support SME trial, validation and technology optimization in specific focus areas. CRIN will work to connect SMEs/technology developers with the appropriate support at the right time.

InnoTech is a member of CRIN and will have opportunities to make people aware of the services it provides. Other CRIN members will also be aware of the services Innotech provides and will connect SMEs to them. Currently, people are being connected manually, but it is the goal to create a collaboration platform within a year.

- 22. What is the perceived or actual role tech accelerators will play in CRIN? Other than funding companies successful in a call for applications, how else will the money be used? Will the funded companies work with service providers of their choice, for example my accelerator, to access needed services? If there a TRL (technology readiness level) sweet spot that CRIN is looking to fund companies/innovators in? Is the focus commercialization only or will there be funding for technology development as well?**

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It is critical to our ecosystem and potential funding from the government that jobs will be created in the SME category. Accelerators and incubators will connect and direct start-up tech companies (many of them founded by former energy industry professionals) to large companies.

Also, see Question 2

23. If a project progresses, who has access to the technology at the end and how will the agreements work? What about Intellectual Property?

Each project will be reviewed on a case-by-case basis. For each project and agreement, consideration to the current state of the technology, what are we going to learn and advance, what's the value in it, and what kind of equity is each project partner contributing. We know intellectual property is an important component of technology development. This will require working closely with all parties to address concerns and ensuring enough IP protection to secure the value of the technology for those who taking the risks to develop it, while also ensuring the technology can be reasonably adopted broadly by the industry and other sectors.

24. Are the matching investments only made by the Steering Committee and do they get to decide on the focus areas? Will venture capitalists be expected to match the funds?

Matching industry funds one-to-one to government funds will come from any industry participant not just companies that are on the Steering Committee (we envision that Steering Committee Members will rotate over time). CRIN's initial focus areas established for the proposal were identified by the Steering Committee with input from the constituents they represent.

These focus areas will be further refined by seeking broader and more diverse feedback and through completing the road mapping exercise. Investments will be determined based on the individual projects and participating project partners. Venture capital funds are not expected to match the Innovation Supercluster Initiative (ISI) funds but to invest in specific projects or companies to advance technologies identified in our focus areas.

25. Is there an opportunity to highlight Indigenous communities and businesses in this work given the national significance on Indigenous culture, businesses and reconciliation?

CRIN welcomes all industry interested and working in the energy innovation space, including Indigenous technology businesses and associations. We are exploring ways to ensure Indigenous businesses are included and can contribute to CRIN. We are open to feedback on how to further engage and ensure Indigenous technology business participation are part of CRIN.

26. Who decides if a project gets funded?

Some of these details will be forthcoming assuming CRIN is successful in progressing to the next phase of the supercluster funding application this fall. At this point, we're anticipating that CRIN as a group will set the priorities and lead the decision-making with some form of engagement and input from the federal government and perhaps some outside expertise. We will establish an adjudication mechanism to ensure a fair process but await further details from the lead federal department – Innovation, Science and Economic Development Canada.

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27. Will CRIN be working with ENGOs?

CRIN is an inclusive network that seeks to improve alignment across our innovation ecosystem to ensure we are focused on the right priorities that will result in transformational change. We hope that solutions-oriented environmental non-governmental organizations (ENGOs) are interested in getting involved in CRIN whether it be through an advisory capacity role or through project-specific work.