NGIF NATURAL GAS INNOVATION FUND
GAZ NATUREL FINANCEMENT INNOVATION

August 7, 2020

Dear Members of the Standing Committee on Finance,

On behalf of our investor companies, the Natural Gas Innovation Fund welcomes the opportunity to submit a 2021 pre-budget submission to support measures Canada could take to restart the Canadian economy, as it recovers from the COVID-19 pandemic. NGIF is proposing a 3-year funding program to accelerate clean technology development from concept to market that leads to cost improvements and emissions reductions in Canada's natural gas value chain from wellhead to the consumer.

By way of background, the Natural Gas Innovation Fund (NGIF) is a first of its kind industry-led, industry-funded, granting organization, created by the Canadian Gas Association. It seeks to accelerate targeted cleantech innovation in the upstream, midstream, and downstream sectors of the natural gas industry through funding support to emerging technology, start-ups, and small to medium-sized enterprises. In doing so, we aim to improve the environmental and economic performance of all in this important sector.

Canada's natural gas resource base exceeds more than twelve-hundred trillion cubic feet of natural gas[1]. These levels are significant enough to sustain current gas production for the next 300 years[2]. This abundance of natural gas resources, along with a well-regulated, technically advanced, and highly skilled personnel, is an impetus to this sector to address global energy challenges through cleantech innovation.

NGIF represents energy leadership throughout the natural gas sector. Twelve investors from across Canada's natural gas value chain are involved: five natural gas utilities (ATCO, Enbridge Gas Inc., FortisBC Energy Inc., Pacific Northern Gas Ltd., and SaskEnergy), and seven natural gas producers (Birchcliff Energy Ltd., Canadian Natural Resources Limited, Chevron Canada Limited, Perpetual Energy Inc., PETRONAS Energy Canada Ltd., Shell Canada Energy, and Tourmaline Oil Corp).

Since we launched in 2016, we have become the largest cleantech innovation fund for natural gas with $8.6M in approved funding and $90M invested in 29 cleantech start-ups leading project demonstrations with our portfolio forecasted to deliver an aggregated total in Greenhouse Gas (GHG) reductions of at-least, 3.5 Mt CO2e from 2020 to 2030.

NGIF has developed co-funding relationships (called 'trusted partnerships') with several provincial and federal granting agencies interested in cleantech: Natural Resources Canada, Emissions Reduction Alberta (ERA), Alberta Innovates, the British Columbia Innovative Clean Energy (ICE) Fund, Geoscience BC, Innovation Saskatchewan, and the Ontario Centres of Excellence (OCE). Through these partnerships, grants from our industry and those from trusted partners can co-fund cleantech innovation in our sector within aligned and streamlined processes.

The Finance Committee has advised that its theme for the 2021 pre-budget is "Restarting the Canadian economy, as it recovers from the COVID-19 pandemic." In this context, Canada's natural gas sector offers the opportunity to contribute to restarting the economy. NGIF, and its industry investors, are already committed to taking action now to reduce GHG emissions by granting funding support to the right pre-commercial cleantech innovation for one of Canada's largest economic contributors – the natural gas sector. Our proposal is to build on our work in cooperation with the Government of Canada.

This pre-budget submission recommends two actions by the Government of Canada:

1. Create a three-year, $100M program dedicated to ensuring Canada is producing the cleanest and most competitive gaseous fuel mix

This program will be delivered by NGIF:

- Canada's largest cleantech innovation fund for natural gas
- Bridges the gap between cleantech start-ups and Canada's natural gas value chain companies.
- Uses rigorous technical, business, and industry peer review due-diligence processes.
- Leverages investors who are also the customers creating the market demand

1. Natural Gas Resource Base - Canada. Canadian Gas Association, 2018, www.cga.ca/wp-content/uploads/2019/04/Chart-9-Natural-Gas-Resources-Canada-new-chart.pdf.
2. "Natural Gas Facts." Natural Resources Canada, 2019, www.nrcan.gc.ca/science-and-data/data-and-analysis/energy-data-and-analysis/energy-facts/natural-gas-facts/20067.
3. Data collected by the Canadian Gas Association from the National Inventory Report.

2. Develop a Team Canada Approach with the Natural Gas Innovation Fund for recovery by:

    - Including the Natural Gas Innovation Fund in the newly launched Industry Strategy Council and Economic Tables under the Resources of the Future and Clean Technology Innovation components.
    - Co-design funding calls and co-fund projects under the Climate Action Incentive Fund, the Low-Carbon Economy Fund, and the Clean Growth Fund with renewed capitalization.

NGIF investors are committed to the acceleration of clean technology development for Canada's gas sector to support Canada's economic recovery. We would welcome the opportunity to appear before the Finance Committee to present our submission directly and discuss our recommendations.

Sincerely,

John Adams
Managing Director
Natural Gas Innovation Fund

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Setting the World Standard for Clean and Competitive Gaseous Fuels:
The Natural Gas Innovation Fund Opportunity
2021 Pre-Budget Submission

Recommendation 1: Create a three-year, $100M program dedicated to ensuring Canada is producing the cleanest and most competitive gaseous fuels
This program will be delivered by NGIF:

- Canada's largest cleantech innovation fund for natural gas
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The program proposes to allocate $100M to support emission-reducing competitive clean technology projects (commercialization through SME and start-up enterprises).

- Key objectives are to: encourage the creation of consortia bringing stakeholders together in projects (including government, academic and research centers, First Nations communities, and others); the creation of new Intellectual Property (IP) for Canada in clean technologies for natural gas; the transparent sharing of aggregated results and technology performance data to broaden access to opportunities for cleantech; and the development of next generation highly qualified personnel.

- Key Outcomes would be: high performance and cost-effective for emission reduction; clean technologies in Canada's natural gas sector; reduced compliance costs for industry; accelerated adoption of clean technology; generation of better data sets on technology opportunities and possible outcomes; and development of high-quality cleantech personnel working to reduce emissions in Canada's natural gas sector.

The program would be operationalized through the Natural Gas Innovation Fund, a first of its kind, industry-led, industry-funded, granting organization that seeks to accelerate targeted cleantech innovation in the upstream, midstream and downstream sectors of natural gas. NGIF has a:

- **Vision** of positioning Canada – already a leader in the responsible and economic production and use of natural gas – as a more competitive global leader in cleantech innovation across the natural gas value chain;

- **Mission** of building a diversified portfolio of investments, strategic partnerships, and a trusted investment model that delivers on environmental and economic performance for the natural gas value chain; and a

- **Mandate** of taking action to advance the most promising enterprises in cleantech innovation and support them through their projects to commercialization and market success.

The opportunity would be to leverage NGIF industry funding together with federal government funding from this program into cleantech projects for natural gas with environmental performance.

Cleantech Categories: The program would represent a one sector (natural gas value chain), four environmental sectors and a range of cleantech categories – please see below.

	Environmental Sector	Clean Technology Area	Examples
Natural Gas Value Chain – Upstream, Midstream and Downstream	**Air (NO_x, SO_2, Particulate Matter)**	Air/Fuel Systems	Technologies on equipment design such as improving air/fuel mixing systems for natural gas burners.
		Energy Efficiency	'Ultra-Low' NO_x gas turbine technology; Technologies on the reduction of SO_2 in unprocessed natural gas and fuel substitution projects with natural gas.
	Greenhouse Gas Emissions	Advance Natural Gas Recovery	Emerging clean technologies that can improve environmental performance and economics of natural gas assets and operating facilities.
		Carbon Capture Storage and Utilization	Next generation CO_2 capture systems that leverage advanced materials and equipment (e.g. absorption, adsorption, membrane and cryogenic technologies) to reduce the cost of CO_2 capture from natural gas combustion for a broader range of applications including small-scale, and modular systems.
		Digital Transformation	Enabling technologies including advanced sensors; advanced analytics; Internet of Things (IoT), artificial intelligence, machine learning, and block chain applications in the natural gas value chain.
		Emissions Monitoring and Measurement	Advance emissions detection and measurement technologies including leak detections through local installations; aerial monitoring through satellite, aircraft, and drones.
		Energy Efficiency	New technologies and innovative approaches for efficient production, transmission and distribution and end-use of natural gas.
		Heat and Power Generation	Clean technologies for heat and power generation along the entire natural gas value chain including combined heat and power (CHP); waste heat capture; natural gas engines and other applications that can reduce the emissions profile of natural gas.
		LNG and micro-LGN	Technologies in LNG process optimization, re-liquefaction; floating storage, and re-gasification techniques.
		Methane Venting, Flaring and Fugitive Emissions	Emerging technologies to reduce methane emissions including electrification of valve actuators; mobile air quality monitoring systems; methane gas detectors.
		Renewable Gas	Technologies for clean-up of landfill gas to produce Renewable Natural Gas (RNG); RNG from wastewater bio-solids, and from woody biomass; renewable H_2 from electrolysis; advanced hydrogen fuel cell technologies.
		Transportation	Technologies include advanced fuel-efficient engines with improved performance and market viability for light, medium and heavy-duty transportation systems; LNG/ hydrogen-powered vehicles and trains; effective fuel storage; LNG/CNG refueling stations.

Funding Streams: The program would have 3 funding streams:

- Stream 1—Demonstration (TRL 4-7): $25M
  Demonstration projects led by a start-up enterprise or SME with a cleantech solution to support lower lifecycle emissions of natural gas.
- Stream 2—Growth and Expansion (TRL 8-9): $50M
  Commercial demonstration or operational deployment of a cleantech solution to support lower lifecycle emissions of natural gas and improve the viability of the recipient through company growth and output.
- Stream 3—Investment Attraction to Canada (TRL 4-9): $25M
  A focus on attracting international cleantech solutions and bringing them to Canada to be adapted and improved for the Canadian market and for re-export.

Full Value Chain: The program represents the full value chain of natural gas:

- Upstream Natural Gas (Production)
  All forms of cleantech applications with the production of natural gas.
- Midstream Natural Gas (Processing and Pipeline)
  All forms of cleantech applications with the processing and transmission natural gas.
- Downstream Natural Gas (Distribution and End-Use)
  All forms of cleantech applications with the distribution and end-use of natural gas.

Funding Mechanisms: The program would have 2 funding mechanism options:

- Grants - up to 30% of eligible project costs in the form of non-repayable grants for technology development and demonstrations with Technology Readiness Levels (TRL 4-7)
- Green Loans - up to 40% of eligible project costs in the form of repayable loans for a first of kind commercial demonstration (TRL 8-9).

Results and Performance: The program will assess projects based on each project's potential to generate quantitative and qualitative benefits. In addition, the program will track and report on actual, aggregated quantitative benefits from funded projects and qualitative case studies. Examples of measures and case studies are listed below:

- Economic
  - Incremental reserves and production (mmcf, mcf/d)
  - Natural gas industry maintenance/operational savings ($/yr)
  - Applicant revenues ($/yr)
  - Patents (# of applications, # of patents granted)
  - Jobs created (# of jobs)
  - Contribution to Federal and Provincial GDP ($/yr)
  - Case studies on value creation, efficiency improvements, and applicant benefits
- Environmental
  - GHG mitigation (kt CO_2e/yr)
  - Clean air (t NO_x/yr, t SO_x/yr)
  - Clean water (m^3 conserved/yr, m^3 recycled/yr)
  - Clean soil (tones landfill avoidance, m^2 land disturbance avoided)
- Safety
  - Case studies of safety improvements (e.g., new technologies that reduced likelihood and severity of hazards, quantitative measures)
- Community
  - Case studies of local economic development, partnerships with First Nations and other societal benefits

Recommendation 2: Develop a Team Canada Approach with the Natural Gas Innovation Fund for recovery.

- Including the Natural Gas Innovation Fund in the newly launched Industry Strategy Council and Economic Tables under the Resources of the Future and Clean Technology Innovation components.

- Co-design funding calls and co-fund projects under the Climate Action Incentive Fund, the Low-Carbon Economy Fund and the Clean Growth Fund with renewed capitalization.