NGIF NATURAL GAS INNOVATION FUND
GAZ NATUREL FINANCEMENT INNOVATION

Recommendation 1:
Allocate $300M to **Driving GHG Emissions down for Canada and the World: The Natural Gas Innovation Fund (NGIF) Opportunity**

Recommendation 2:
Create a **Clean Technology Economic Strategy Table for "Globally Competitive Low GHG Emission Gas"**

August 2, 2019

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 2020 pre-budget submission for your consideration.

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 is in excess of twelve-hundred trillion cubic feet of natural gas[1]. These levels are significant enough to sustain current gas production for the next several hundred years[2]. This abundant resource along with a well-regulated, technically advanced, and highly skilled industry makes the sector particularly well-suited to address global energy challenges through cleantech innovation.

NGIF represents energy leadership throughout the natural gas sector. Twelve investors that stretch 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 it launched in 2016, NGIF's stage-gated evaluation process and national funding competitions has screened more than 190 cleantech submissions (31 cleantech submissions in our most recent call for sustainable production of gas) and has approved $8.9M in industry grant funding to support 44 cleantech project investments. These projects are led by emerging technology enterprises across Canada with total eligible project costs of $77M. It also has another $5.5M in approved funding for projects currently in its evaluation process. To date, NGIF's portfolio of 14 active enterprises has already resulted in one new cleantech patent for natural gas, 24 new cleantech jobs within the projects, and the portfolio has an aggregated projection of at-least 3.4 Mt CO_2e Greenhouse Gas (GHG) reductions 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, Alberta Innovates, the British Columbia Innovative Clean Energy Fund, Innovation Saskatchewan, and the Ontario Centres of Excellence. 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 2020 pre-budget is "Climate Emergency – Required Transition to a Low-carbon Economy." Canada's natural gas sector offers the opportunity to deliver significant GHG emission reductions. NGIF's goals and objectives are fully aligned with Canada's plan to reduce GHG emissions as per The Pan-Canadian Framework on Clean Growth and Climate Change. NGIF, an[1]d 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.

NGIF's pre-budget submission has two recommendations to the committee:

1. Recommendation 1:
   Allocate $300M to **Driving GHG Emissions down for Canada and the World: The Natural Gas Innovation Fund (NGIF) Opportunity** for a three-year program to build on NGIF's 3.4 Mt CO_2e cumulative GHG reductions by 2030 and deliver on performance improvements to reduce GHG

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

emissions from the natural gas sector.

2. Recommendation 2
   Create a **Clean Technology Economic Strategy Table for "Globally Competitive Low GHG Emission Gas"** dedicated to building on NGIF's portfolio and strength of Canada's natural gas sector to realize a low GHG emission global advantage for Canada.

We would welcome the opportunity to appear before the Finance Committee to present our submission directly. We look forward to working with the Committee and subsequently with federal departments to deliver these natural gas solutions to Canadians, and ensure this sector has a long-standing future in a new low-carbon economy.

Sincerely,

John Adams
Managing Director
Natural Gas Innovation Fund

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Recommendation 1:
Allocate $300M to **Driving GHG Emissions down for Canada and the World: The Natural Gas Innovation Fund (NGIF) Opportunity** for a three-year program to build on NGIF's 3.4 Mt CO_2e cumulative GHG reductions by 2030 and deliver on performance improvements to reduce GHG emissions from the natural gas sector.

The program proposes to allocate $300M to support GHG emission-reducing 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 centres, 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: cost-effective emissions reductions; 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 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 one broad industrial sector (the natural gas value chain), four environmental sectors (air, GHGs, water and soil), 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; and Technologies on the reduction of SO_2 in non-marketable 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-LNG	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	Processes for clean-up of landfill gas to produce Renewable Natural Gas (RNG); RNG from wastewater, 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 medium and heavy-duty transportation systems; LNG/ hydrogen-powered vehicles and trains; effective fuel storage; LNG/CNG refueling stations.
	Water	Water Reduction and Reuse	New technologies that can lower fresh water use associated with resource extraction.
		Advanced Water Treatment Technologies	Clean technologies in water treatment equipment, operation, and maintenance.
	Soil	Land Reclamation and Reuse	Advancement of projects that aim to reduce land disturbances and enable land reclamation for natural gas assets.

Funding Streams: The program would have 3 funding streams:

- Stream 1—Demonstration, Technology Readiness Levels (TRL 4-7): $75M
  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): $150M
  Commercial demonstration or operational deployment of a cleantech solution to support lower lifecycle GHG 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): $75M
  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 of 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 (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 (tonnes landfill avoidance, m^2 land disturbance avoided)
- Safety
  - Case studies of safety improvements (e.g., new technologies that reduced the likelihood and severity of hazards, quantitative measures)
- Community
  - Case studies of local economic development, partnerships with First Nations and other societal benefits

Recommendation 2:
Create a **Clean Technology Economic Strategy Table for "Globally Competitive Low GHG Emission Gas"** dedicated to building on NGIF's portfolio and strength of Canada's natural gas sector to realize a low GHG emission global advantage for Canada. This will be a federal government, industry, and cleantech sector economic table dedicated to building on the strength of Canada's natural gas industry to deliver a low GHG emission global advantage of Canada. This group will be made up of Canadian leaders from the natural gas full value chain, government, and cleantech enterprises, and will endeavour to turn Canada's natural gas sector GHG emission reduction strength into a global advantage using a common vision, targets, policies, innovation and champions.