To: Rt. Hon. Justin Trudeau, Prime Minister and Minister of Intergovernmental Affairs and Youth

Cc: Hon. Catherine McKenna, Minister of Environment and Climate Change; Hon. Marc Garneau, Minister of Transport; Hon. Dominic LeBlanc, Minister of Fisheries, Oceans, and Canadian Coast Guard; Hon. Carolyn Bennett, Minister of Indigenous Affairs and Northern Development; Hon. Jim Carr, Minister of Natural Resources; Hon. Kirsty Duncan, Minister of Science

15 November 2016

Dear Prime Minister Trudeau,

It is an exciting time to be a scientist in Canada. We celebrated when you restored the long-form census, increased basic research funding, and encouraged federal scientists to speak freely. Your commitment to "*a higher bar for openness and transparency*", the expectation for "*Canadians to hold [government] accountable",* and to make "*government and its information…open by default*"[1] rang true to emerging standards in the scientific community. ***Yet, we are concerned that current environmental assessments and regulatory decision-making processes lack scientific rigour, with significant consequences for the health and environment of all Canadians.***

As the next generation of Canadian scientists, we are professionally and personally affected by such decisions, especially regarding large-scale and long-term projects. Not only might our expertise be required to mitigate problems, but we have longer to live with the impacts, including a planet profoundly affected by climate change. Canadians invest deeply in our training, and in turn, we take seriously the responsibility of collecting, analyzing, and disseminating scientific information that serves society.

Science thrives by upholding strong standards of integrity. Carefully conducted and independent science is crucial to evaluating the consequences of actions: objectivity and transparency are essential, and inconvenient information cannot be dismissed. Since limited or biased science will not fully reflect the benefits and risks of a project, it cannot accurately inform decision-making. Hundreds of scholars have decried weak Canadian environmental assessments and regulatory reviews[2,3,4,5] and cautioned about the risks involved in large-scale energy projects.[6,7,8] Environmental and health tragedies (*e.g.*, Calgary floods;[9] Mount Polley dam;[10] asbestos[11]) show that incompletely evaluated or mitigated risks have real consequences for Canadians, our environment, and the legacy we leave future generations.

We recognize that science is not the only basis upon which project decisions are made; Indigenous knowledge, values, and socioeconomic considerations play critical roles. Nevertheless, input from and engagement with Canadian researchers could significantly improve the scientific standards and process used to assess proposed and existing projects. ***To aid your government's commitment to strengthening environmental and regulatory compliance and review processes,[12] we suggest the following five actions to help rebuild public trust in robust, open, and fair decision-making:***

1. Seek and act on the best available evidence. Making defensible and credible inferences supported by the best available evidence includes incorporating knowledge from experiments, theory, observations, and/or modeling from multiple disciplines,[13,14,15] collected and interpreted without influence from those who stand to gain or lose from the conclusions. We recommend that existing and potential environmental impacts of projects be assessed – with methods, results, and interpretations rigorously peer-reviewed – by parties with arms-length relationships from proponents. Where knowledge gaps impede adequately assessing risk or effects, information should be generated rather than extrapolated from limited and/or lower quality information; decisions can be adapted considering new, robust evidence.

2. Make all information from environmental assessments permanently and publicly available. Making raw data, reproducible analyses, and/or results readily available have rapidly become scientific best practices (subject to privacy and intellectual property laws), including by Canada's three federal research granting agencies,[16] the European Commission,[17] and top peer-reviewed scientific journals.[18,19,20,21] Barring certain private and community-held knowledge, or national security implications, we recommend that publicly and permanently sharing such information in a free, searchable federal registry[22] become a condition of environmental assessment and review processes. This will help ensure

that conclusions can be verified and that data can serve as benchmarks for future studies.

3. Assess cumulative environmental effects from past, present, and future projects and activities across multiple scales. Few things in society or nature occur in isolation. Although regulatory reviews consider a project's potential effects, in many cases they do not adequately consider cumulative effects (*e.g.*, greenhouse gas emissions from product transportation and use, not just project construction and operation; interactive effects of past and future projects on human and environmental health and well-being)[23]. We recommend that cumulative effects be comprehensively evaluated across multiple temporal and spatial scales to inform project-level assessment, including areas under all jurisdictions and global-level effects where appropriate, and to align decision-making with provincial, national and international commitments to control carbon emissions and protect biodiversity.[24,25]

4. Work to prevent and eliminate real, apparent, or potential conflicts-of-interest. A key component of scientific integrity includes protecting decision-making from undue influence and actual or perceived individual or institutional bias. We recommend that, in addition to independently conducted and reviewed assessments, all meetings among interested individuals, organizations, stakeholders, and members of the decision-making process be made public, and that all parties publicly disclose any real, apparent, or potential conflicts-of-interest.[26] Greater transparency will elevate public trust that decisions are based on evidence, knowledge, and values.

5. Develop explicit decision-making criteria and provide full, transparent rationale of factors considered. Explicit decision-making criteria[27] are necessary to "*ensure that decisions are based on science, facts, and evidence, and serve the public's interest*".[28] Furthermore, providing a full, transparent, and cogent accounting of all the evidence presented, risks weighed, and alternatives considered would enable experts, stakeholders, and the public to evaluate the legitimacy of such decisions[29]. When other factors are prioritized over scientific evidence (*e.g.*, economic gains justifying environmental impacts),[30] the metrics and rationale for these trade-offs ought to be thoroughly and openly explained, including the spatial and temporal scales considered.

We are passionate about using our scientific expertise to serve the public good. We commit to working with you to incorporate the actions outlined above to help strengthen Canada's environmental and regulatory compliance and review processes[31] for existing and proposed projects.

Sincerely,

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