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# Leadership Opportunity for Canada: Western Canadian LNG as a Key to Climate Change Mitigation and Economic Reconciliation

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## Summary

Western Canada is well-positioned to play a critical role in exporting liquefied natural gas (LNG) to Asian markets as the world transitions to lower carbon-intensive fuels. LNG Canada, a $40 billion LNG export facility under construction in Kitimat, British Columbia (B.C.), can export approximately 3.5 Bcf/d at full capacity upon completion in 2025 and serve the growing demand for LNG[1].

Since the 2011 earthquake, Japan has adapted to its abrupt loss of nuclear power infrastructure by relying on coal feedstock, a carbon-intensive alternative, to generate electricity. Japan is also geographically situated for easy export of Canadian LNG across the Pacific Ocean from the Douglas Channel, a deep-water fjord in B.C. This paper and presentation examine the benefits and limitations of an energy partnership, wherein Japan replaces its reliance on coal feedstock with LNG from western Canada. On a global scale, without considering the complexities of such a partnership, the benefit of this proposal is a reduction in GHG contributions of 512 kilograms of carbon dioxide per megawatt-hour ($kgCO_2$-eq/MWh) (Figure 1).

Increased LNG uptake from coal phase-outs requires ramping up LNG activity in Canada. The economic and environmental effects of increased GHG emissions from LNG Canada are evaluated, on both a provincial and an international scale, and policy changes are recommended. Through consultation with LNG Canada and the Haisla First Nation, cultural, environmental, and socio-economic aspects of the proposal are jointly prioritized and incorporated into the planning of this proposal.

## Holistic Approach

To assess the impact of Canadian LNG on global GHG emissions, we reviewed existing life-cycle assessments. They take a ‘cradle-to-grave’ approach: accounting for emissions at each stage of the life cycle including raw material extraction, manufacturing and processing, transportation, usage, and end-of-life disposal. We also considered both coal and LNG in terms of the functional unit of kilograms of carbon dioxide equivalent per megawatt-hour (kg $CO_2$-eq/MWh) to allow for comparison between two different energy systems.

The energy required to liquefy and ship LNG impacts GHG emission intensity along the entire value chain, impacting net benefit to GHG reduction efforts worldwide. As such, our assessment also considers Canada’s colder ambient temperatures and shorter shipping distance from

Canada's West Coast to Asia, resulting in lower GHG emissions relative to the only other LNG exporting facility in North America, presenting additional advantages from a climate standpoint[2].

## Effects on Policy and Community

However, the GHG reductions associated with LNG are not realized locally within the Province of B.C. In addition, LNG Canada's annual operational GHG emissions of 16 $MtCO_2$-eq (or 40% of B.C.'s 2030 target)[3] could be viewed as incongruent with B.C.'s GHG reduction goals. These additional emissions, however, could be reduced through project electrification and carbon capture and storage (CCS) in northeastern B.C. (Table 1). Decarbonizing other emission-intensive sectors could also offset the new emissions created by LNG Canada.

To ensure mutual benefit from LNG developments to Indigenous communities, particularly the nearby Haisla Nation, four critical impact mitigation measures were identified around Kitimat, B.C.: (1) enhanced capacity building and community program development, (2) collaboration with private and public sectors, (3) monitoring of LNG Canada's environmental commitments, and (4) climate change mitigation measures (Figure 2).

## Work Conclusions

The Canada-Japan energy partnership proposal demonstrates the potential for Western Canada to reduce global GHG emissions by exporting LNG to Asia and displace coal as feedstock for electricity generation. The collaboration between LNG Canada and the Haisla First Nation demonstrates the potential of the Canadian LNG industry to serve as a pathway to achieve economic reconciliation and economic parity for Indigenous peoples. As shown in these analogies, Western Canada has the potential to be a world leader in the export of LNG through the reduction of GHG emissions and collaborative partnerships with its Indigenous people.

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**Figure 1**. Getting the difference between the life-cycle emissions of coal and LNG, we estimate that global GHG emissions from Japanese power generation can be reduced by 405 kg $CO_2$-eq/MWh by replacing coal feedstock with Canadian LNG[4,5,6,7,8]. This reduction can be as much as 512 kg $CO_2$-eq/MWh if the maximum life-cycle emissions from coal are used.

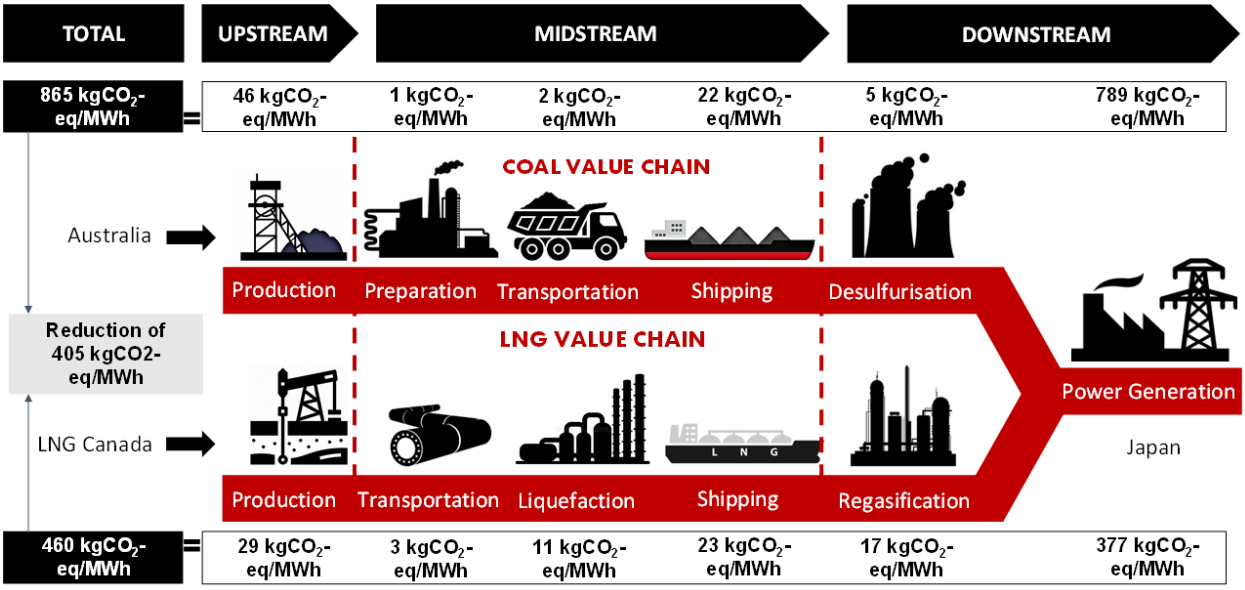
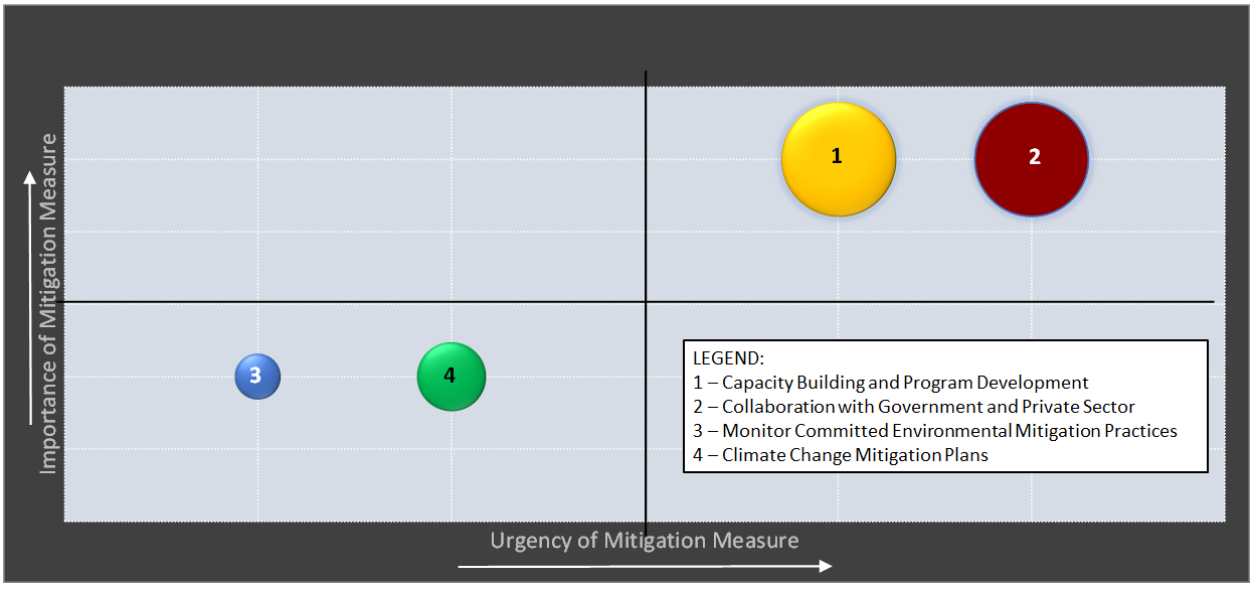



**Figure 2**. Impact mitigation measures matrix illustrating the relative importance of potential impacts of LNG development on the Haisla Nation. Size of the circle corresponds to the degree of impact. Lack of social and health supports [1], and corruption of tradition and values [2] were identified as priority issues.



| Impact | Mitigation Measure |
|---|---|
| 1. Lack of social and health support | Build capacity for community services (e.g., housing, healthcare, and childcare facilities);<br><br>Develop community programs (e.g., mental health, financial literacy, skills training and matching); and<br><br>Complement existing programs and services with technology (e.g., telemedicine, online learning, 24/7 helpdesk). |
| 2. Corruption of tradition, values, and culture | Work with the federal and provincial governments in establishing systems to curb money laundering, drug dealing, and prostitution;<br><br>Include financial literacy curriculum in Haisla Nation's academic program; and<br><br>Collaborate with banks and financial institutions to provide accessible and practical financial and investment products and services to Indigenous peoples. |
| 3. Environmental damage | Continue environmental mitigation practices committed by LNG Canada; and<br><br>Involve Haisla community in monitoring process to foster environmental education programs for youth and job training. |
| 4. Increased GHG emissions causing climate change and potential health risks | Adopt flood mitigation and forest preservation plans;<br><br>Work with the provincial government to improve waste management around Kitimat; and<br><br>Integrate low-carbon energy sources in transportation and the built environment (e.g., use of LNG/ NG to power remote communities and vehicles). |

**Table 1**. Net GHG emissions from LNG activity within Canada and impact of proposed policies.

| LNG Activity | Annual GHG Emissions ($MtCO_2$-eq) |
|---|---|
| Extraction and production | + 10.7 |
| Transportation | + 1.3 |
| Operation | + 4.0 |
| Total | + 16.0 |
| Project electrification and CCS | - 1.6 to - 7.2 |
| Net of policy impact | + 8.8 to + 14.4 |

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