Modelling the impact of Liquefied Natural Gas (LNG) export facilities on local air quality and population exposure to air pollution

What is the goal of this research?

This study will use satellite data on emissions from flaring activities at existing liquid natural gas (LNG) export facilities, to develop modelled predictions of potential future impacts on local air quality and health from the Woodfibre LNG operation in BC (Woodfibre LNG is currently in construction, with flaring operations expected to begin in 2027). The study findings may support air quality monitoring and management related to Woodfibre LNG during the operations phase.

Who is leading this project?

This study is lead by Dr. Laura Minet of the University of Victoria (Faculty of Engineering and Computer Science).

What other organizations are associated with the project?

The lead researcher will be supported by researchers from Simon Fraser University, University of British Columbia, University of Toronto, and Texas A&M University.

Vancouver Coastal Health (VCH) will provide advice on the health impact modelling components of the work (step 4 below) and will help other government partners and community representatives understand the methods and findings. VCH programs and personnel often support, inform, and communicate findings from research projects across the region that study health-affecting issues.

The researchers have also engaged with community organization from My Sea To Sky on this project. My Sea to Sky identifies as an "environmental organization that was founded in 2014 to defend, protect, and restore Átl'ḵa7tsem / Howe Sound." This group has actively opposed the Woodfibre LNG facility. The project is also supported by the Canadian Association of Physicians for the Environment. The views and actions of these organizations do not represent those of Vancouver Coastal Health.

VCH is committed to supporting an unbiased scientific process.

What are the methods for this research?

1. Satellite data from existing LNG export facilities will be summarized to estimate the typical amount of "flaring" under start-up conditions and regular operations for these types of facilities.

    -   This will be done using the open-access online *Visible Infrared Imaging Radiometer Suite* (VIIRS) *Nightfire* (VNF) products, which use satellite data to estimate the annual volume of gas flared at sites globally. This project will examine the monthly frequency of flaring activities at existing onshore LNG export terminals that have commenced operations since 2012, the year when satellite data became available for flare tracking. This analysis will specifically aim to determine the frequency of potential unusual "upset flaring" at those facilities.

July, 2024
Research Project Information

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2. Using these satellite flaring estimates, this project will consider potential flaring scenarios covering ideal and worst cases for Woodfibre LNG for both starting years and regular operating conditions. These scenarios will be used to estimate air pollutant emissions.

    - The potential future air pollutant emissions from Woodfibre LNG will be estimated for the scenarios using scientific information on emissions from natural gas flaring at other facilities. The study will not actually measure, sample or analyze any emissions from Woodfibre LNG as it will not be flaring during the time of the study.

3. The project will use a computer model to estimate the impact of flaring under each of the scenarios on local air quality and population exposure to air pollution:

    - The project will study air quality impacts around the Woodfibre LNG facility and nearby communities (including Squamish Nation reserves, the District of Squamish, and Britannia Beach).

4. The project will then model the possible population health impacts of the changes in air quality that are estimated under each of the scenarios, using methods from Health Canada (the "Air Quality Benefits Assessment Tool").

    - Health impacts will be estimated for changes in airborne fine particulate matter (PM2.5), nitrogen dioxide, and ozone concentrations. These are air pollutants that are found across our region and are often monitored by government air quality monitoring stations.

When will results of the research be available?

Results of the project are expected at the end of 2025.

How does this research relate to government approval of the Woodfibre LNG facility, which is permitted to begin operations?

The research findings may be applied to plans for air quality monitoring and protection during the future operations phases of Woodfibre LNG. The findings may also be shared in relation to future facility development applications for other LNG projects.

What is the funding source for this project?

This study is funded by the National Sciences and Engineering Research Council through the Alliance Grant program. (Further information available online: https://www.nserc-crsng.gc.ca/Innovate-Innover/Alliance-Alliance_eng.asp).

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