GIIGNL Technical Learning Sharing

Maintaining Leak Free MLAs at LNG Production, Import and Bunker Operations

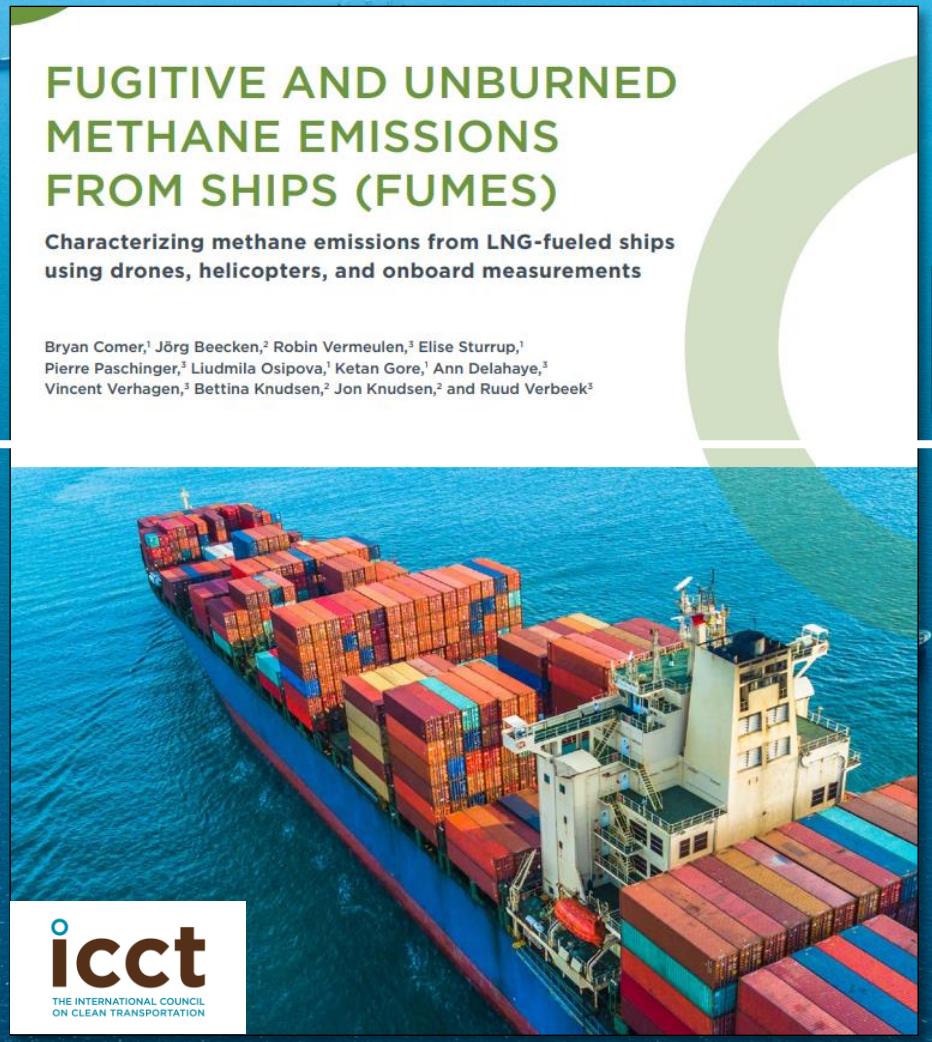
A learning focused to excellence in leak detection, repair and maintaining leak free operations

Objective

- Sharing the trigger to test for MLA leaks at your site
- Sharing refresher for leak detection on MLAs

NGO Study Starts

December 2022



Study Published, coinciding with the maiden voyage of the worlds largest LNG powered Cruise Ship

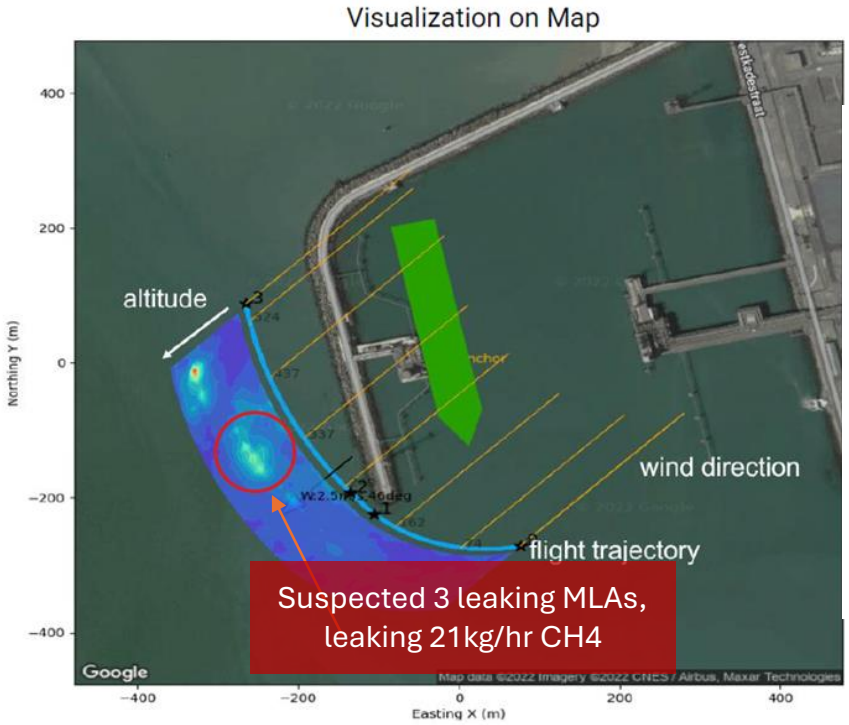
January 2024

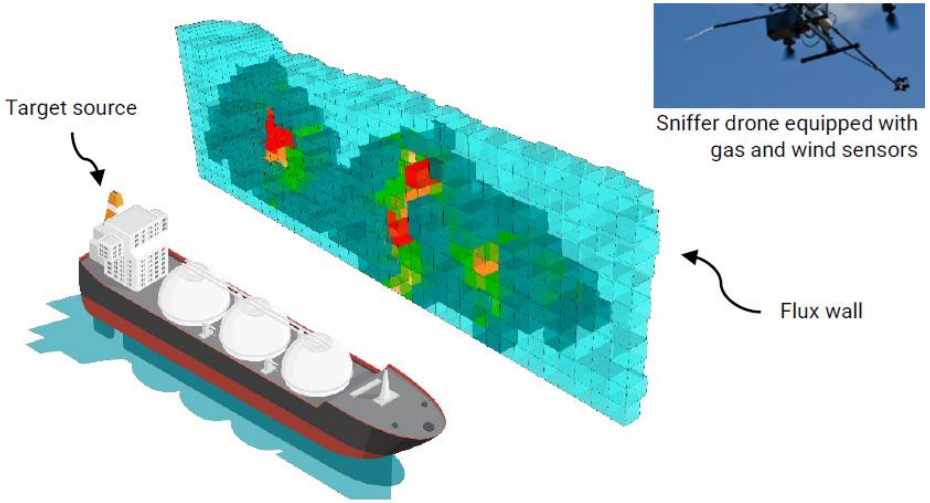
March-May 2024

Key Regulators from IMO and FuelEU Maritime receive the report

Key Summary Shared in FUMES1

Occurred 10th April 2023 at 6:50pm at LNG import terminal in Europe, where a large carrier was unloading at an estimated rate of 11,000 m^3/hr.





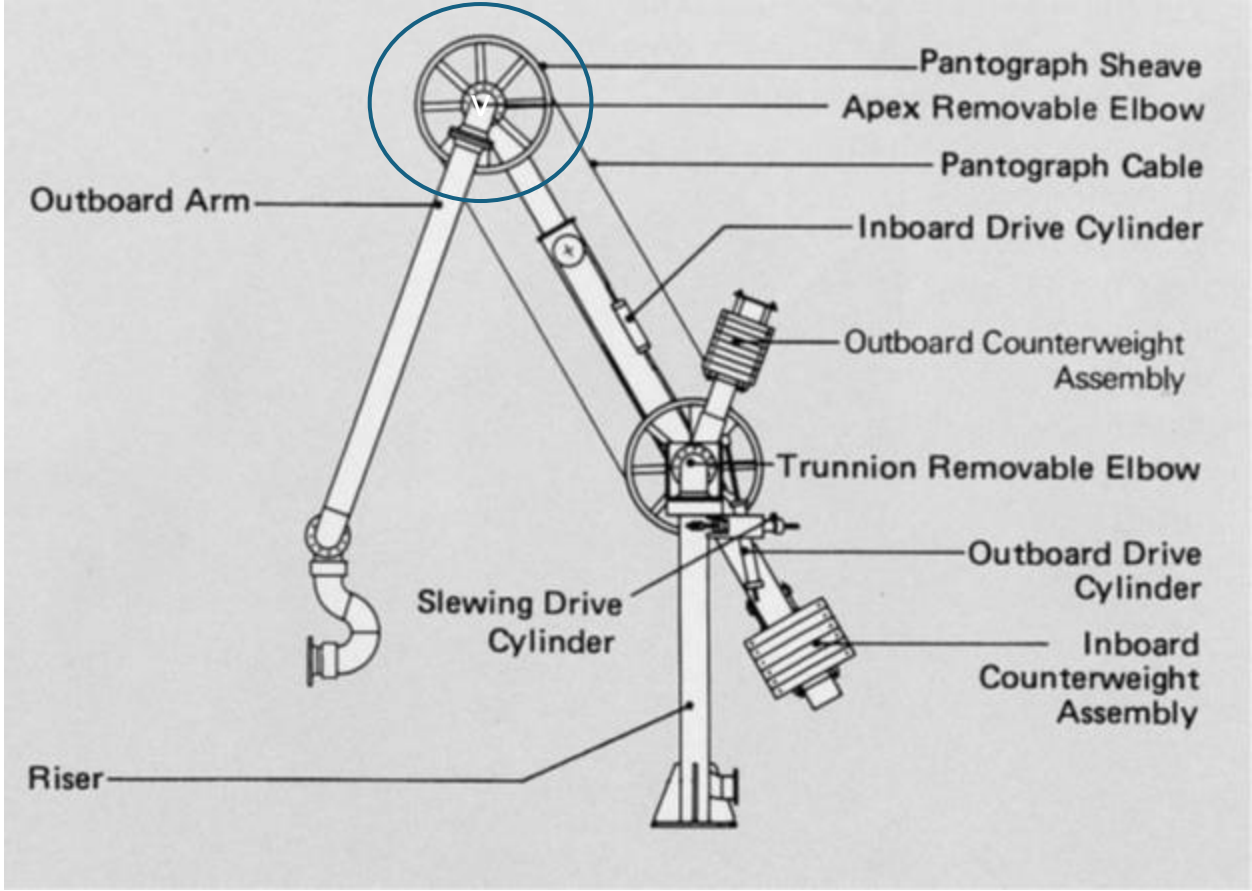
Sniffer drone equipped with gas and wind sensors

Observation:
from FUMES1, of the 6hr drone surveys, one observation lasting 19 minutes detected ~21kg/hr CH4 fugitive/leak emission around LNG loading arm swivels.

Acronyms of: FUMES = Fugitive and Unburned Methane Emissions from Ships | MLA = Marine Loafing Arms

MLA design – leak detection

- **Industry standards** for MLA's recommend a s**wivel leak detection port**, to be able to verify seal integrity
- The LNG **swivels** have a **primary and secondary seal**
- The leak detection is connected to the cavity between primary and secondary seal
- Good **industry practice** is to **regularly test (~every 6 months)** for seal leakage and replace any leaking primary seal – this requires people access (e.g. by EWP, rope) to all swivels
- **Seal failures are a known issue** in the industry with various know root causes: E.g.
  - Basic seal design & material selection of seal and spring
  - (Execution of) cool down procedure
- Replacing seals (in particular top seal) requires significant effort (scaffolding etc.)



Seal design:

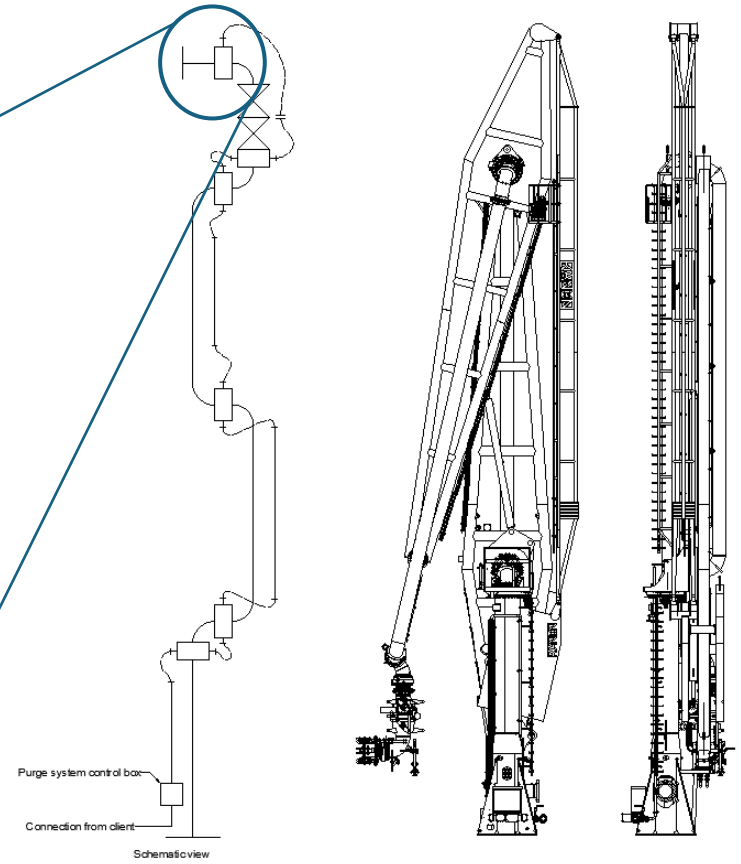
- LNG
- Primary seal
- Test port
- Secondary seal
- Nitrogen purge
- Weather seal

MLA design – swivel nitrogen purging system

- **Industry standards** for MLA's recommend a s**wivel nitrogen purge system**, to keep swivel bearings dry
- The swivel nitrogen purge system is connected to the cavity between secondary and weather seal
- It runs from MLA base from swivel to swivel to a flow meter at the style 80 and tube to atmosphere
- Good **industry practice** is to check nitrogen flow at every offload to verify integrity of nitrogen purging system

- Check during every offload if any of the nitrogen lines coming out of the swivels is icing up

- Hand-held gas detector can be used to detect leak by measuring at flow meter outlet during offload



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