

Operation of LNG Powered Vessels in the Canadian Arctic





Petro-Nav

- Commercial Operator of Desgagnés Tankers
- Operate 9 ice class 1A tankers
- 5 newest vessels in Fleet are Dual Fuel (LNG)
- 4 of these vessels built to our specifications in Turkey
- One purchased from Furetank



Petro-Nav

- Largest independent transporter of refined petroleum products in Canadian Great Lakes/St. Lawrence River/Maritimes
- Exclusive Long-term contracts with Canadian oil majors:
 Valero Energy, Suncor, Shell.
- Deliver 4 million m³ (25 million bbls) of liquid bulk cargo per year



LNG Fuel Tankers

	Damia Desgagnés	15,000 DWT
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- Mia Desgagnés
 15,000 DWT
- Paul A. Desgagnés 15,000 DWT
- Rossi A. Desgagnés 15,000 DWT
- Gaia Desgagnés 18,000 DWT
- The 4 sister ships are 135m LOA, 23.5m beam, 7.9m draft-
- These 5 ships are the only LNG powered vessels in Eastern Canada with the exception of ferries
- Two of these vessels worked in the Arctic in 2021



Why select LNG for fuel in 2013

- Almost 100% of operations in ECA
- Alternatives were to operate on MDO or use scrubbers
 - But MDO/Scrubbers does do not help GHG
- The only Low Carbon Solution
- New ships were to have Tier 3 Engines
- 38% Reduction in Greenhouse Gases
- 90% Reduction in Nox
- 99% Reduction of Particulates
- 0% SOx emissions



Anticipated Challenges

- New fuel and new technology —the learning curve
- Regulators Not ready with a certification scheme
- No bunkering logistics
- Crew training No Curriculum
- We knew we would be the first and the logistics of bunkering would be problematic
- Bunkering logistics is now the greatest challenge due to truck transfer



Bunkering LNG





Operation

- First choice is always to operate on LNG rather than MDO
- There have been significant costs savings in 2021 LNG vs MDO
- Operate on MDO only when we have had issues with logistics in arranging bunkering or if there are gas trips in bad weather. Then stay on mdo until weather improves
- We carry additional MDO in the arctic in event of automation failure of gas system or if bad weather extends voyage time by several weeks
- We have not experienced problems consuming only BOG when tanks are low with North American Gas



Arctic Sealift 2021

- Discharge locations in Hudson Bay, Hudson Strait,
 Ungava Bay, Baffin Island
- Approximately 330 ship days per year engaged in Arctic
 Operations by 3 ships
- Total volume delivered: 140,000 m3
- Two Tankers operated on LNG in the Arctic

LNG Fuel Tankers in the Arctic
Mia Desgagnes- Worked in Nunavik for 3 Arctic
Seasons

Pétro-Nav inc.





Arctic Sealift 2021

- Typical Cargo Equipment:
- 9000-10,000 feet of floating hose per vessel mounted on reels
- Typical port requires 5000-6000 feet of hose
- At some ports can deploy up to 7500 of hose
- Workboats
- Anchors and gear to secure hoses
- Pollution response equipment
- Shore manifold equipment

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Sealift 2021

- Gaia Desgagnes
- one voyage to Ungava Bay
- 2nd Voyage from Montreal to Roberts Bay & back on LNG
- First voyage of an LNG powered tanker through North-West Passage
- 70% of Transit on LNG

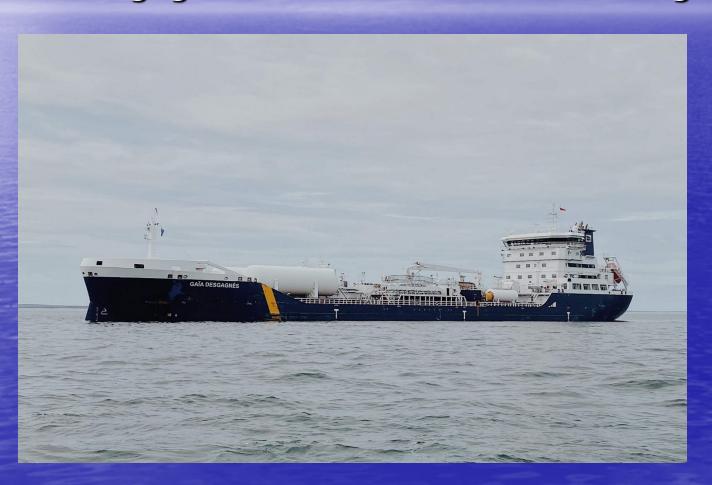


LNG Fuel Tankers in the Arctic Gaia Desgagnes-STS Ungava Bay





LNG Fuel Tankers in the Arctic Gaia Desgagnes- Transit Northwest Passage





LNG Fuel Tankers in the Arctic Gaia Desgagnes- Transit Northwest Passage





Sealift 2021

- Plant Operation
- Did Not use Gas when operating in ice due to varying load conditions
- Varying load conditions could be due to manoeuvring in ice or operating behind an icebreaker
- Carry sufficient diesel to allow completion of voyage if failure of gas valve or automation or if circumstances extends voyage beyond LNG limit of operation



LNG Powered Tankers in the Arctic Gaia Desgagnes- Transit North-West Passage







Thank-You

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