

Building a new generation M/S Aurora Botnia



Kvarken
Link

History



2013

On 4 Jan 2013
NLC Ferry/Wasaline
started the traffic
between Vasa and
Umeå with
m/s Wasa Express.

2015

Kvarken Ports,
a joint port company
commenced
the operation
1 Jan 2015.

Kvarken Link Ab
was founded.

2019

Kvarken Link Oy
was founded.

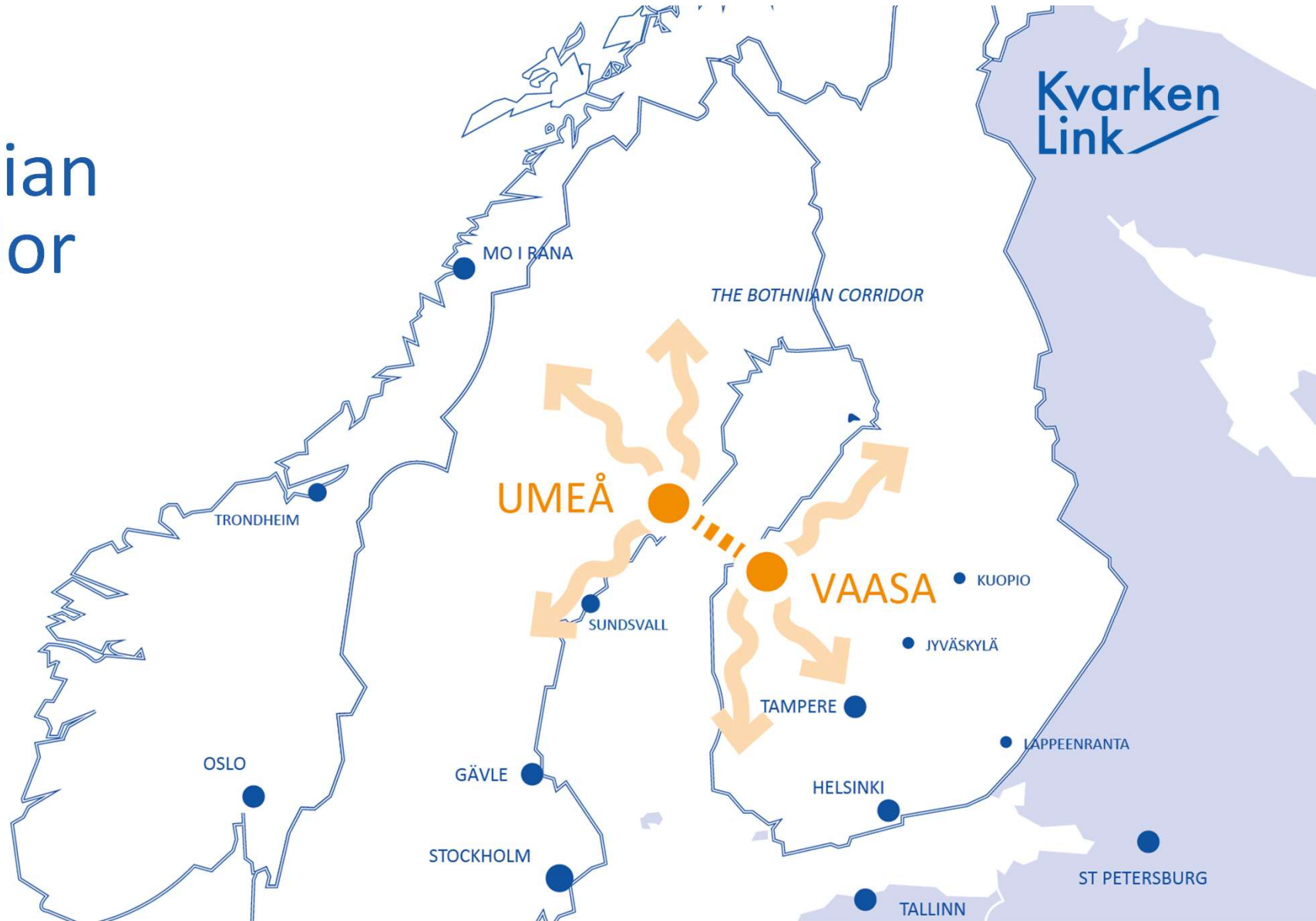
Construction
agreement

2021

Maiden Voyage
of the new ferry

All companies are owned 50-50 by the City of Vaasa and Umeå Kommunföretag AB (Municipality)

Bothnian Corridor



Guidelines for design

- Build the most environmentally friendly ship on Earth that is reliable and fit for purpose, minimum 50 % reduction of CO₂
- Use predictable maintenance with a long-term operational agreement to reduce and increase predictability of OPEX and reduce risks for unexpected surprises and increase operational reliability
- Future ready to allow for upgrades and sustainability improvements

Establish a long-term sustainable transport solution between Finland and Sweden. The alternative to an 800 km road transport is the 80 km sea transport route.

Guidelines for design

Wasaline is the northernmost year-round ferry line in the world. We have ice winters every year.

Generally, ice winters are classified as follows:

1. **Mild ice winter**
Ice from the beginning of February to the end of March
2. **Normal ice winter**
Ice from January to approximately the 20th of April
3. **Severe ice winter**
Ice from mid-December to the beginning of May



Guidelines for design

- Environmental footprint
- Power generation
- Navigation
- Automation
- Optimized operations & performance
- Passenger flow and experience

Environmentally friendly



Kvarken
Link

ENVIRONMENTAL FOOTPRINT

- Bio/LNG gas solutions - fuel gas handling, gas tanks, land and sea and bunkering
- Catalyst for max reduction of NO_x (exceeding IMO Tier III requirement)
- Waste heat and cool recovery to maximise energy use

POWER GENERATION

- 2-stage turbocharged multi-fuel engines (BioGas)
- Power Conversion/ Drives with high redundancy
- Hybrid solution with batteries and inductive charging
- Built in Flexibility to swap or add power sources

Automation and Navigation

Kvarken
Link

NAVIGATION

- Smart bridge enabling autonomous shipping and remote navigation

AUTOMATION

- Integrated Automation System with Smart Power Management System of engines, batteries etc.

OPTIMIZED OPERATIONS & PERFORMANCE WITH CONNECTION TO SYSTEM SUPPLIERS

- Condition Based & Predictive Maintenance with connection to Wärtsilä Hub
- Remote operation & services
- Minimizing emissions and environmental impact

Passenger Comfort

Kvarken
Link

PASSENGER FLOW AND EXPERIENCE

- Flexible use of passenger areas with intelligent ventilation and lightning
- Smart Harbors and autoregistering of cars
- Smart cabins
- Environmental friendly materials

Wasa Express vs Aurora Botnia



- Low sulphur distillate diesel fuel → Dual fuel gasoil / LNG machinery LBG ready
 - Low CO₂
 - No SO_x
 - Low No_x
- Waste heat utilization on Low Temperature water → Waste heat utilization on Low and High Temperature water and exhaust gas
- Optimized mechanical propulsion → Electric propulsion "future ready" for further energy efficiency
- Shafted propulsion with CP propeller → Podded propulsion gives fuel saving.
Improved maneuvering and ice navigation.
- Diesel load highly variable → Power plant partly replaced by battery energy storage.
- Energy produced with diesels → High capacity shore connection.
Energy storage charging at quayside.

BASE LINE TECHNOLOGY vs MAXIMUM FUEL SAVING, MINIMUM EMISSIONS

We operate
in a unique
archipelago

Kvarken – A World Heritage Site



M/S Aurora Botnia

DELIVERY IN MAY 2021

Kvarken
Link



Technology

- Dual fuel with LNG as primary energy source
- Possibility to use LBG
- Electric propulsion drive with Azimuth thruster units
- Battery power for port entry/departure, peak shaving, hotel load and boost power
- Energy recovery and environmental footprint in focus
- Ice Class 1A Super
- Passenger and crew comfort
- SOLAS 2020 and “Stockholm agreement” stability rules
- Marine evacuation system (“no life boats”)
- No separators, green filter technique
- NACOS Platinum navigation
- DNV GL Clean Design

M/S Aurora Botnia

DELIVERY IN MAY 2021

Kvarken
Link



Main dimensions		Capacities	
Loa	150.0 m	Passengers	800
Lwl	137.8 m	Lane metres	1 500
Beam mld.	26.0 m	Cabins	68
Draught, design	6.10 m	Speed	20 kn
Gross tonnage, about	24 300 t	Public Decks	2
Deadweight, design abt.	3 500 t	Aft ramp	15 m
Max. persons onboard (LSA)	1 000	Forward ramp	6 m

Innovations in ferry technology



First LNG/LBG battery ship in the world with pods under the vehicle deck

- 2 x tunnel thrusters with controls
- Integrated automation system
- Energy and power management
- NOR catalysators

Wärtsilä Nacos Platinum navigation



ABB azimuthing propulsion

Leclanché Battery Energy Storage

VEO electrical cabinets

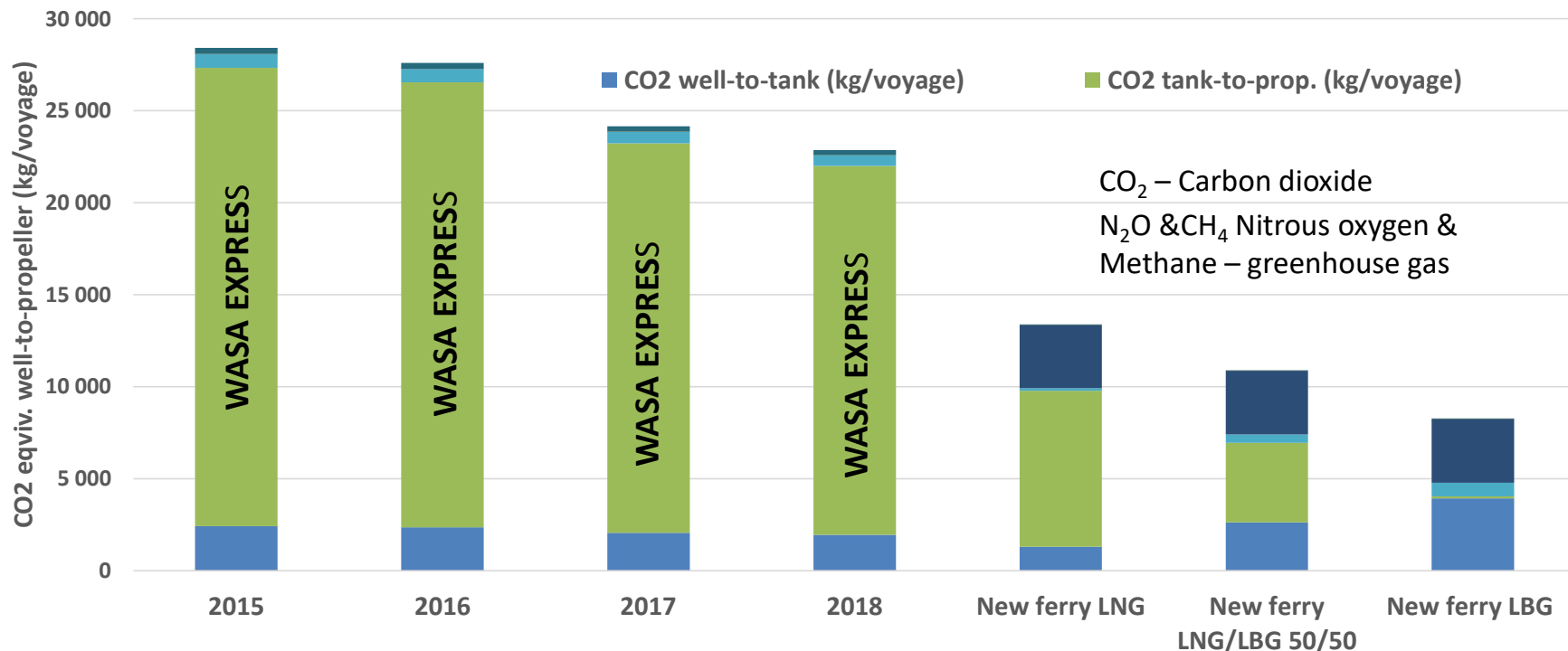
WE Tech Solutions: Electrical design and vessel's power generation and hybrid propulsion system, propulsion switchboards, propulsion frequency converters, generators, energy management system, propulsion control system and bow thruster motors

Danfoss Liquid-cooled 6-MW AC drives for power generation and hybrid propulsion systems

Wärtsilä 31DF Engines
Tank Connection Space with Integrated GUV
LNG tank

Environmental Assessment of Present and Future Marine Fuels

SSPA(Brynolf 2014)



Well-to-tank emissions which occur during the extraction, transport and conversion process.

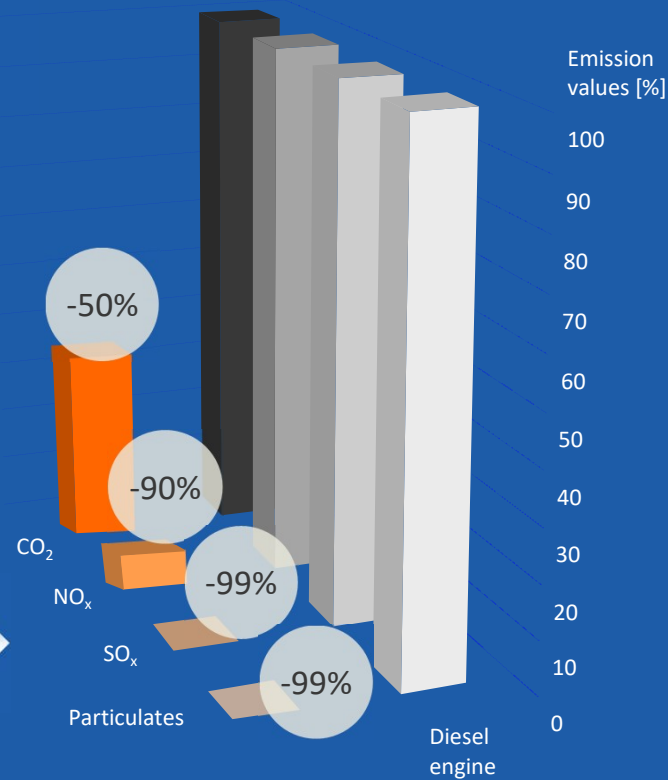
Tank-to-prop. (propeller) emissions which occur on combustion on board.

Emission reduction new vs old vessel

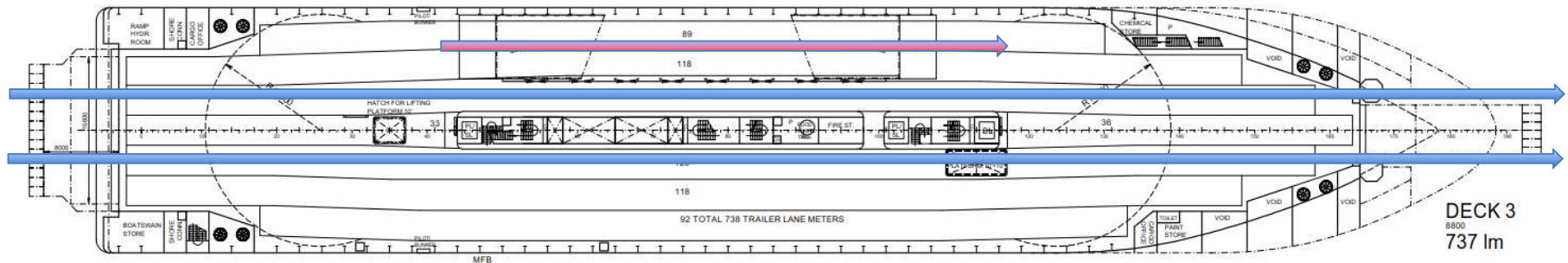
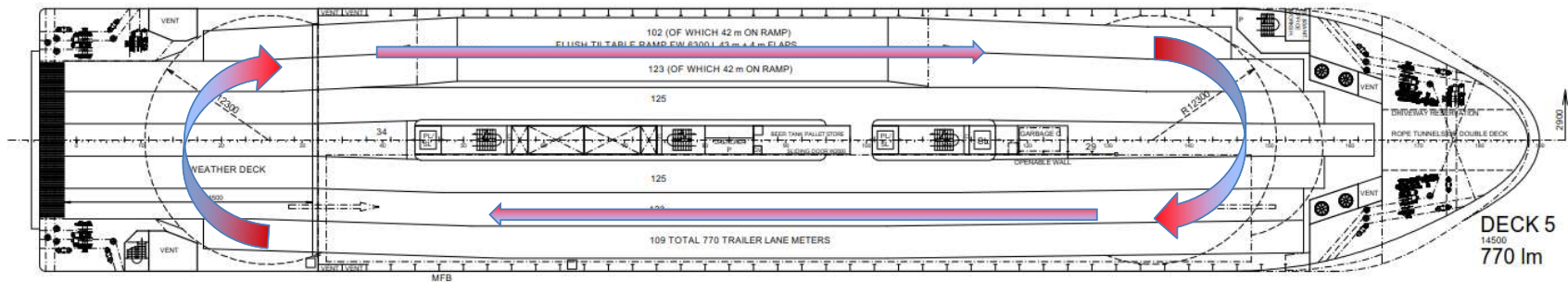
IMO Tier III compliant

IMO 2030 compliant

SO_x compliant



More efficient cargo loading





www.kvarkenlink.com

Twitter: @KvarkenL