



13th Arctic Passion Seminar 2018

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A significant year for the arctic development

- Yamal LNG, first ever Arctic LNG project to start



Old ideas of arctic LNG production and transport.



Artist's impression of an early Arctic LNG carrier design from mid 1970s: Finnish shipbuilders' proposal for gas turbine powered ships capable of passing the Northwest Passage. Aker Arctic's predecessors participated in many such LNG trade and ship studies related to the Canadian Arctic.

A significant year for the arctic development

- Yamal LNG, first ever Arctic LNG project to start

Winter route
Russia to China – 53 days

Summer route (NSR)
Russia to China – 18 days



First one million ton of LNG from Sabetta

Less than two months after the Yamal LNG plant opened, ships carry out the first one million ton of liquified natural gas from the deep frozen waters of the Ob Gulf.



Chinese Icebreaking research vessel, PC3

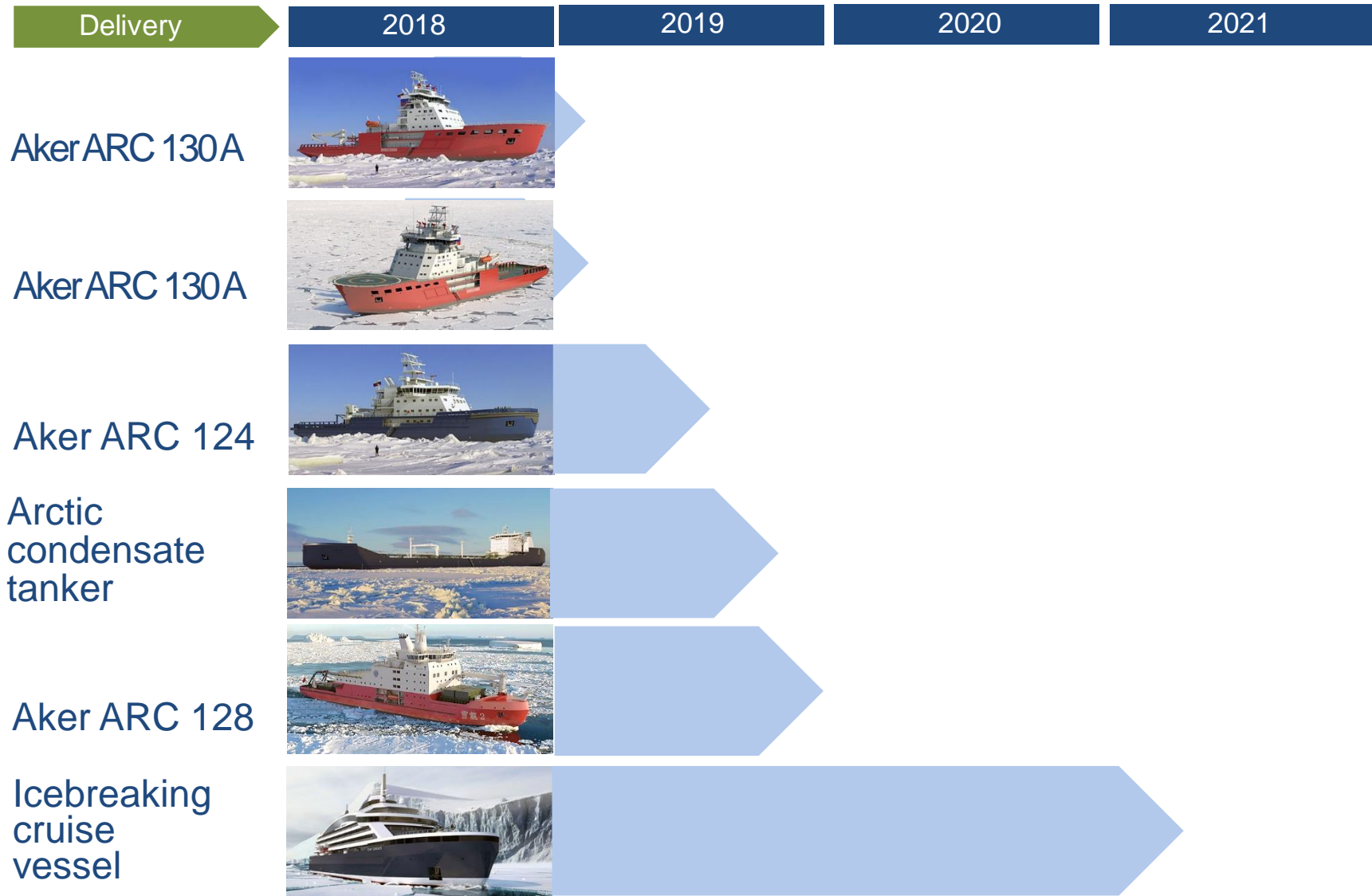
- Design contract 2012
- Feasibility 2015
- Design complete 2017

- Construction ongoing
- Delivery 2019

- Jiangnan Shipyard, Shanghai
- Name: Xue Long 2

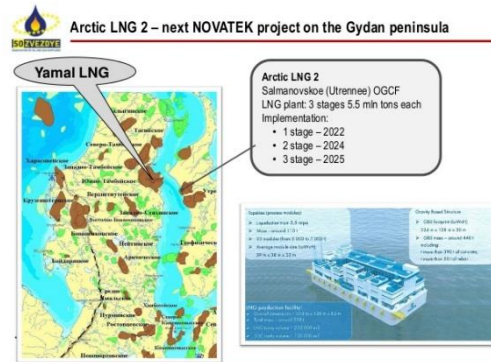


Ships under construction with our design



Outlook to forthcoming activities

- Global LNG production and use will increase substantially
- Russia is continuing its arctic strategy and new vessel programs
- China to be more active in the arctic development, already plans for the 3rd icebreaker.
- Canada and Baltic countries has intentions to fleet renewal
- Northern Sea Route and Cruises segment is expected to increase
- New regulations, EEDI, BWM, IMO Marpol, HFO restriction, Polar Code regs.



Icebreakers

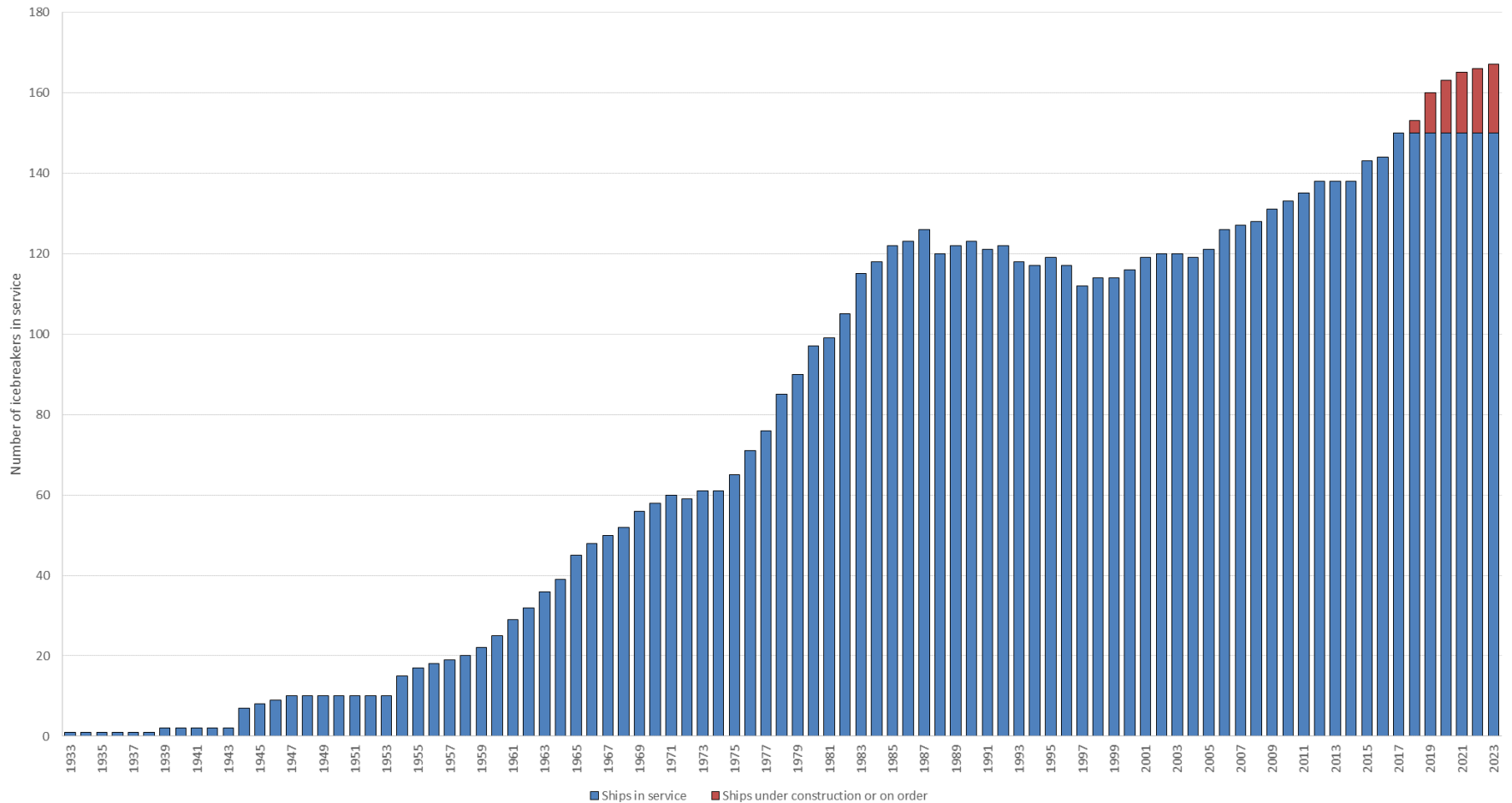
RFP Released for USCG's Heavy Polar Icebreaker

By Team Ships Public Affairs | March 5, 2018

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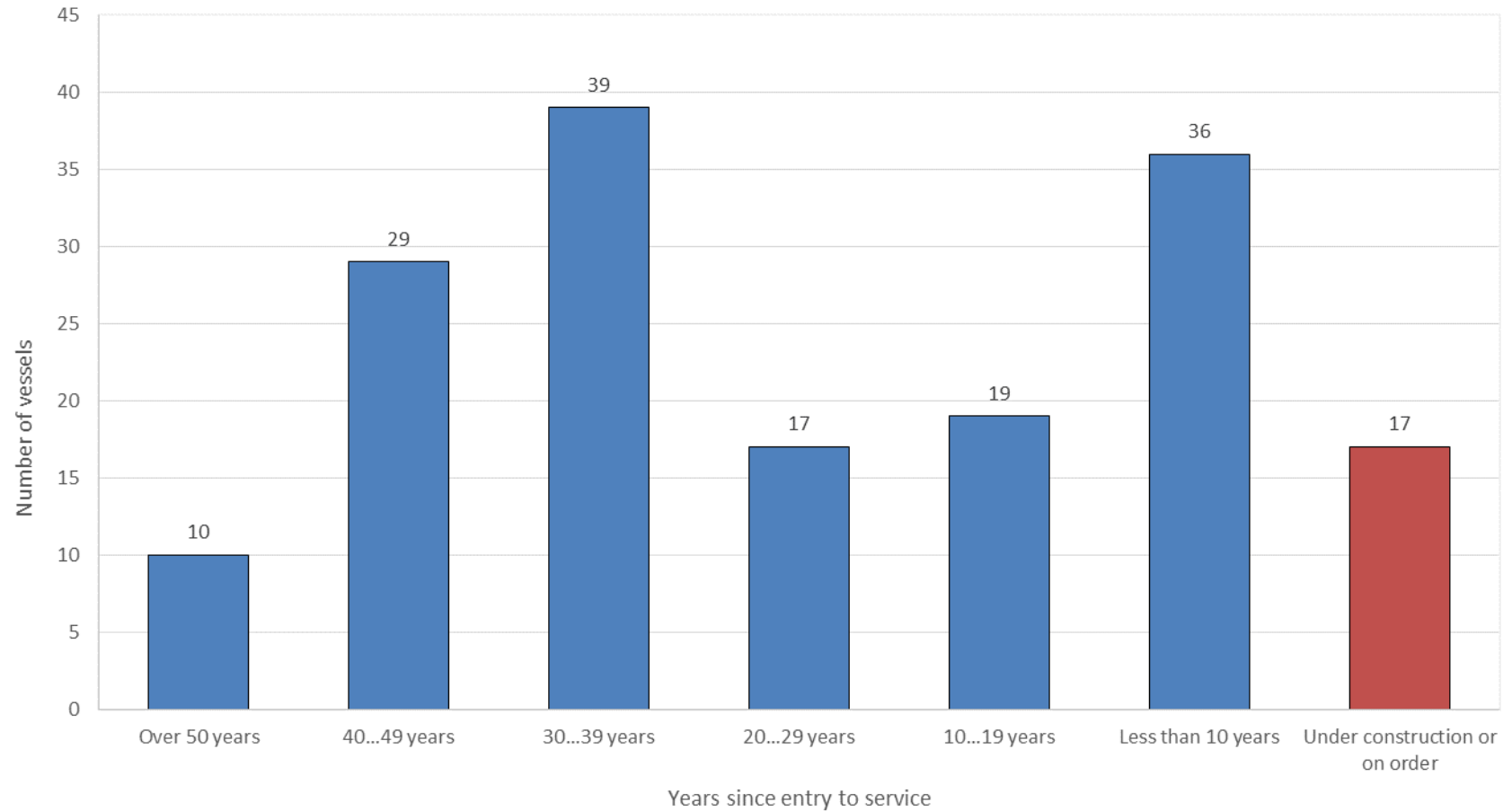


World icebreaker fleet - development



Note! Future decommissionings after 3/2018 not taken into account

Icebreakers age distribution

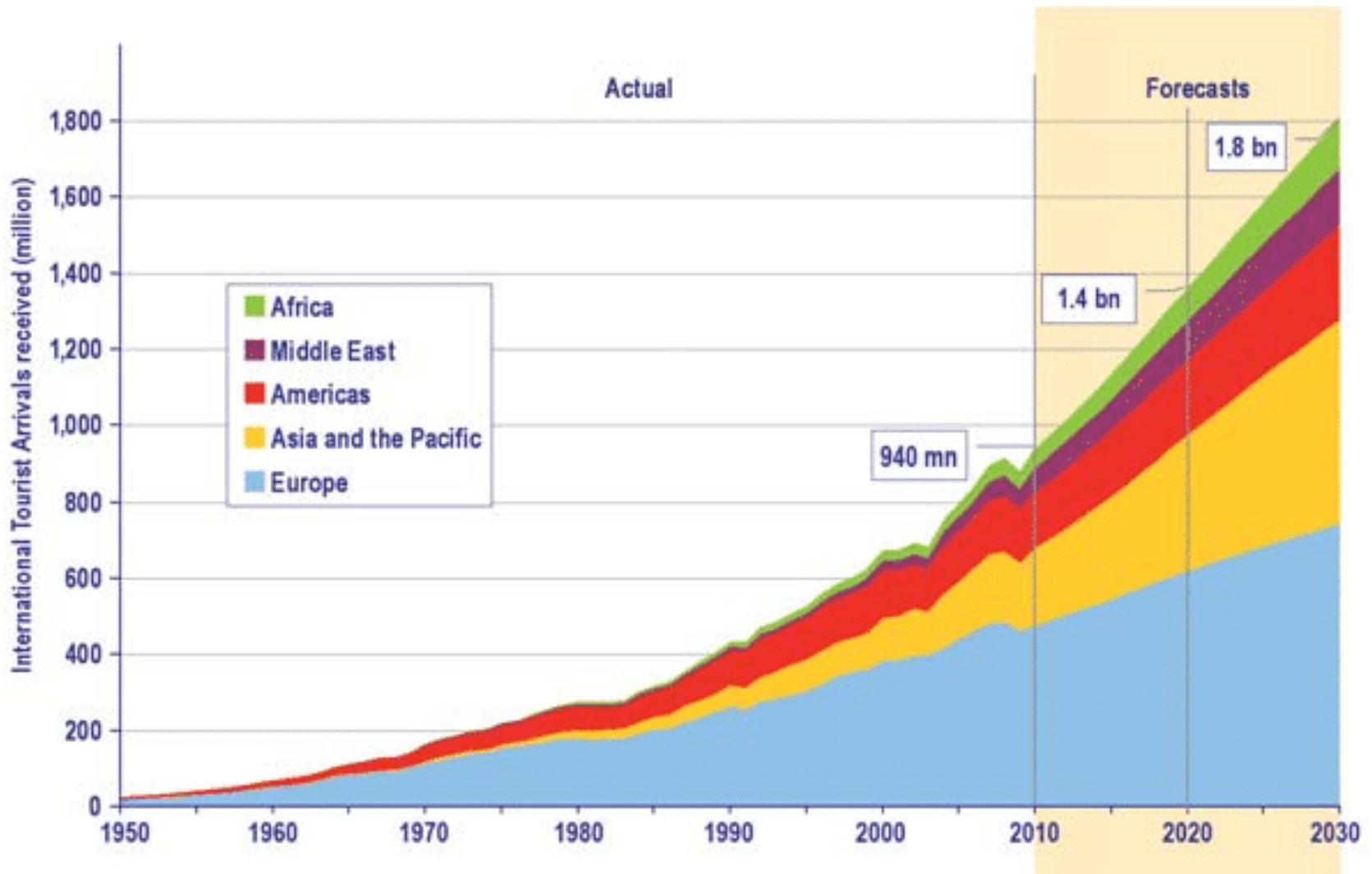


Polar Cruises

- Cruise market is increasing, and also interest for the polar regions is on the rise.
- Expedition type cruises have been carried out for a long time.
- Majority of them in "small scale" operations.
- Cruise prices vary a lot, starting from few thousands up to 40 000 USD for the North Pole voyages.
- Today the capability is increasing, as many new polar class cruise vessels are coming into market.

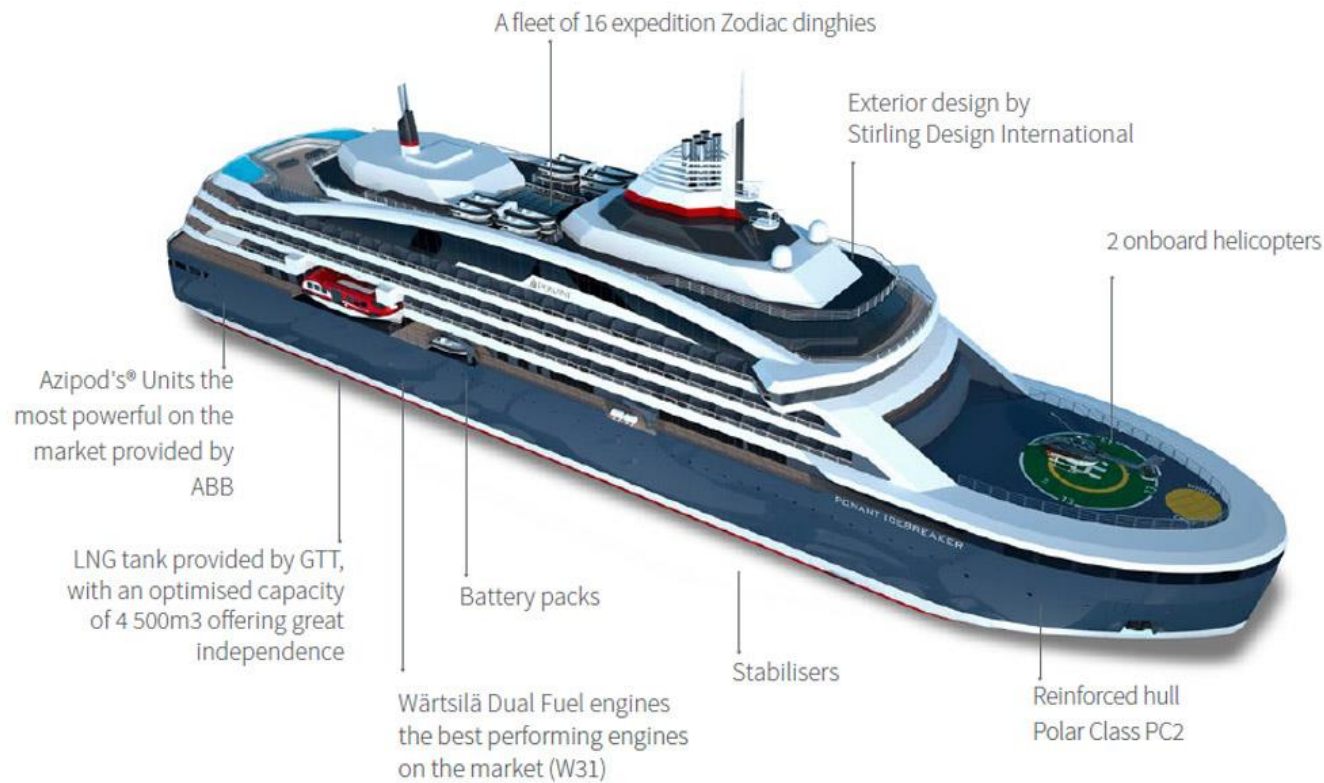


Increase in the World Tourism



First ever icebreaker cruise vessel PONANT

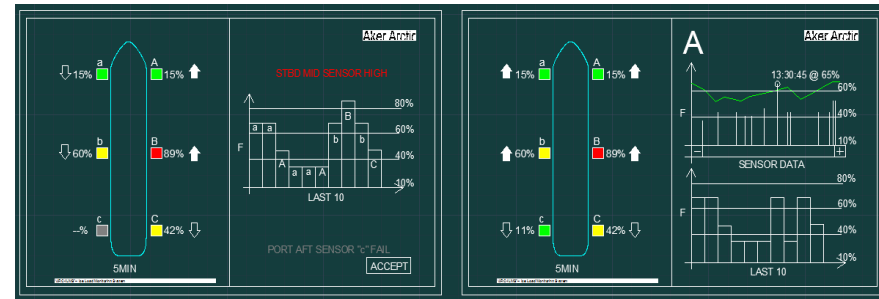
- New type of the vessel
- LNG fuel and hybrid propulsion solution
- First ever PC2 classed vessel



Aker Arctic's operational services



ILMS Tool for Real-time Forecasting in Ice Navigation



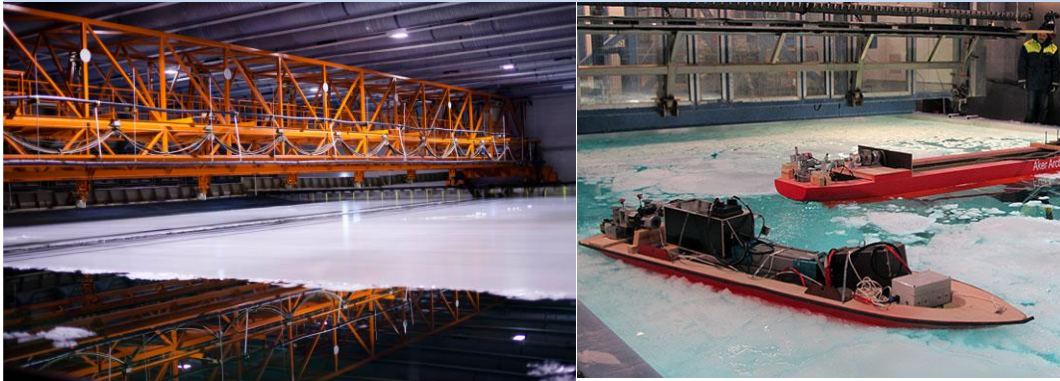
Ice model tank development

Increase in automation, DP and more sophisticated systems require new capacities in the model tests.

We have prepared for new electrical systems in the tank. It allows complicated testing for the autopilots, DP and robotic vessels.



Co-operation with Aalto Ice Tank provides unique test capability.



Aker Arctic solar power system (65 kW)

- Installed on the roof of our laboratory



Technological changes

- Digitalization
- Data and information

- Bridge command systems

- Battery and hybrid propulsion

- Intelligent ships
- Robots



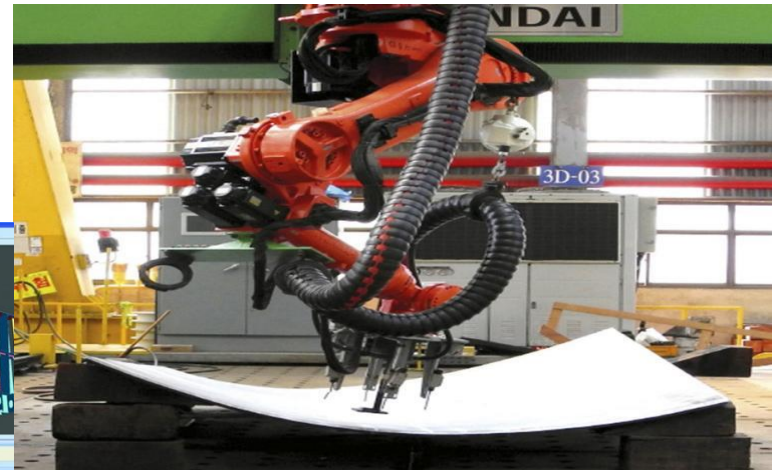
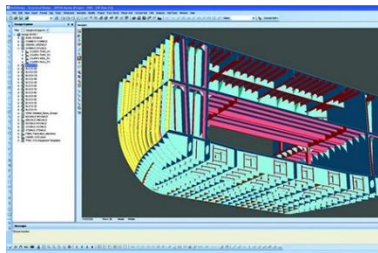
Technological changes

- Fuel (LNG)
- Wind and solar propulsion
- Digitalization
- Data and information

- Robots in the shipbuilding



Norsepower to fit LNG-fueled Viking Grace with rotor sail





Thank you for your attention