

New Swedish Icebreakers

Briefing at Arctic Passion
Seminar

February 16th 2023, Helsinki



SJÖFARTSVERKET





ATLE, FREJ & YMER

Built 1974-77

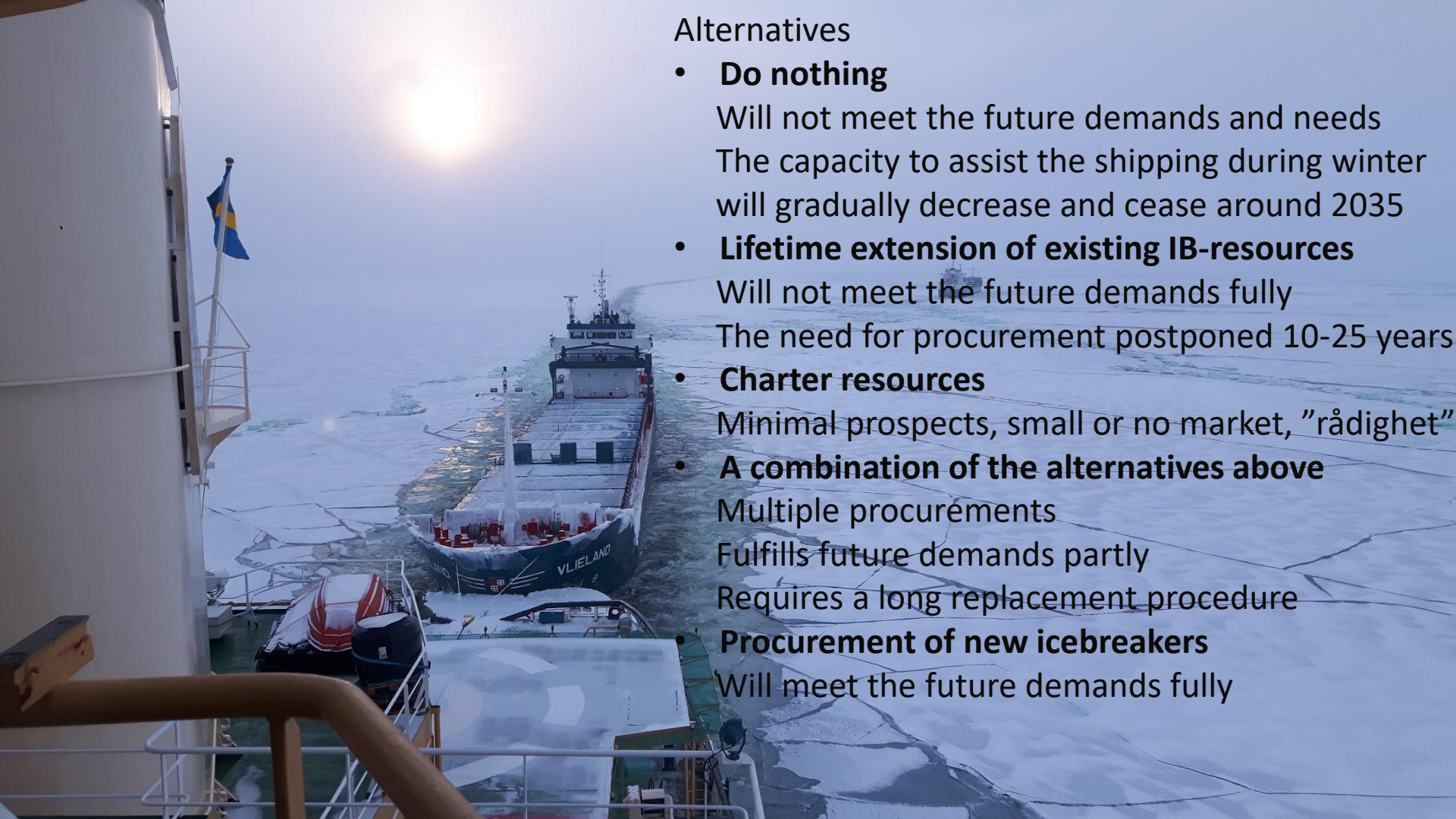
Length 104m Beam 23,8m

Shaft output 16200 kW

Replacement of Swedens ageing Icebreakers.



- The existing large icebreakers have as individuals a theoretical lifespan until approximately 2030. However, we came to the conclusion that it was not possible to keep all of them as regular icebreaker resources until then.
- Parts and systems got older and suppliers have ceased to provide with spare parts or support.
- Environmental demands were continually increasing and enforced on ships' emissions.



Alternatives

- **Do nothing**

Will not meet the future demands and needs
The capacity to assist the shipping during winter will gradually decrease and cease around 2035

- **Lifetime extension of existing IB-resources**

Will not meet the future demands fully
The need for procurement postponed 10-25 years

- **Charter resources**

Minimal prospects, small or no market, "rådighet"

- **A combination of the alternatives above**

Multiple procurements
Fulfills future demands partly
Requires a long replacement procedure

- **Procurement of new icebreakers**

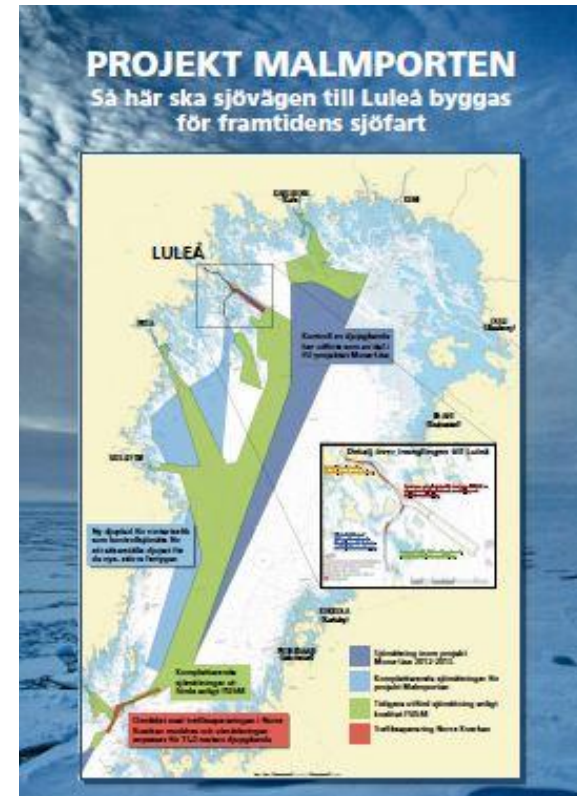
Will meet the future demands fully

Structural changes



General transition to larger ships

Export of iron ore – Project Malmporten



Environmental regulations affects the ice-going ability of merchant ships as for an example EEDI.

The Malmporten (Iron ore gate) project in Luleå started off with the ambition to meet the demand for larger vessels to call the port. The planned measures will increase capacity in the port from 12 to +30 million tonnes per year. The improved capacity in the fairways will reduce the vessels fuel consumption with up to 40%, environmental emissions with up to 40% & and shipping costs with up to 40% as well.





Here is an example of a Panmax vessel assisted by a 24m beam icebreaker.

Functional requirements, part 1

- Dimensioning criterias for primary tasks
- The icebreaker's duties, primary and secondary
- Dimensioning tonnage
- Operational areas
- Ambient conditions, Hydro/Met/Ice
- Operational profile, service life
- Performance, ahead and astern
- Organization and cooperation with others
- Supplies; crew, spares, garbage, shore connections, etc.
- Maintenance
- Environment



<https://www.Sjofartsverket.se>

4 Del 2 – IB 2020 Teknisk specifikation

4.1 Huvuddata

Nedanstående tabell identifierar isbrytarens dimensionerade värden:

Beskrivning	Bedömda mått/dimensioner	Styrande kriterier	Ska – bör krav
Skrovform	Isbrytare	Mono hull	Ska
Skrovmaterial		Stål	Ska
Kylsystem dimensionerat för maxuttagen effekt under isbrytning. Årstidsberoende kunna förflyttas med 100% effektuttag upp till 1500 nm.			Ska Ska
Maskinrumstemperatur Inomhus, boende, kontor, mässar, bryggan: Temperatur vintertid	+5° / +45° +20.0° till +24.0°C	Min / Max Min/Max	Ska Ska
Temperatur sommartid	+20.0° till +26.0°C		
Luftfuktighet vid lägsta utomhustemperatur -35° och högsta utomhustemperatur +30° vid luftfuktighet 60%	35-60% COMF-C(1) eller likvärdigt	Allt enligt flaggstats och klassregler	
Omställningstid på propelleraxe effekt från full effekt fram till full effekt back (Ex. DE-maskineri):	15 sekunder	Max	Ska
Bredd:	27.0 m	Max	Bör
Djupgående vid isbrytning:	8.3 m	Från	Ska
Djupgående vid dockning:	7.0 m	Max	Ska
Längd (LPP) i vattenlinjen (vågbildningsmotståndet):	108 m	Max	Ska
Bryggans höjd över kvl:	22 m	Min	Ska
Displacement:	8000 ton	Min	Ska
Bollard pull:	200 ton	Min	Ska
DWT:	Ca 3000 ton	Min	Ska

Beskrivning	Bedömda mått/dimensioner	Styrande kriterier	Ska – bör krav
Air draught: Fartyget ska i alla konditioner kunna passera under Sandöbron	38 m	Max	Ska
Depth from main deck:	11 m	Min	Ska
Livslängd	50 år	Min	Ska
Isbrytaren skall vara anordnat för drift med obemannat maskinrum	E0 eller likvärdigt.		Ska
Förläggning för ordinarie isbrytarbesättning	16 hytter	Min	Ska
Förläggning för elever. Möjlighet till dubbel förläggning	8 hytter	Min	Ska
Förläggning för övrig personal/gäster inkl FM och KBV personal. Möjlighet till dubbel förläggning	12 hytter	Min	Ska
Konferensrum	Arbetsplats för 10 personer samtidigt med förläggning i närhet.	Min	Ska
Design och utformning av bryggan	NAUT(AW) eller likvärdigt		Ska

4.2 Egenskaper

Beskrivning	Bedömda mått/dimensioner	Styrande kriterier	Ska – bör krav
Högsta fart (fart i fritt vatten med 90 % maskineffekt och vid konstruktionsdjupgående)	17 knop (Vs)	Min	Ska
Ekonomifart (fart i fritt vatten vid maskineffekt för optimal bränsleförbrukning och vid konstruktionsdjupgående)	12 knop		Ska
Naturlig krängningsperiod	12 sek	Min	Ska



Part 3 - THE PROCURERS' ASSESSMENTS ON DESIGN AND DESIGN SOLUTIONS

- General dimensions
- Class notations
- Hull & main features above deck
- Towing equipment
- Functionalities on each deck
- Crew areas
- Machinery
- SAR functionality

External pre-studies and reports IB2020

- Technical and economical feasibility
- Battery hybrid investigation
- Quality assurance of channel width
- Options for propulsion and breaking of wide channel
- Alternative propulsion machinery
- Options for alternative fuels
- Rules - Overall and Class
- Stainless steel ice belt
- Lifetime extension Atle-class
- HVAC
- LCC/LCA Engine and propulsion system

Isbrytare 2020

Förstudie – Slutrapport 1

“An upgrade of the current icebreaker fleet is a prerequisite to achieve the strategic goal in the icebreaking services of a long-term operational and financial stability and at the same time work for reduced climate and environmental impact. The upgrade of the fleet aims to ensure long-term availability, appropriate capacity and that Sweden is not without this ,for the society, so important resource.”



SJÖFARTSVERKET







Boden/Luleå



Luleå



Sundsvall



Umeå

Finland and Sweden have agreements about cooperation at different levels concerning winter navigation.



The purpose of the study was to evaluate different vessel concepts for a Baltic icebreaker for escorting Panamax-sized bulk carriers with a beam of 32 m. The following concept alternatives were evaluated in the study:

- Oblique icebreaker
- 32 m wide icebreaker
- Removable bow
- Normal icebreaker
- Bow reamers
- Stern reamers

