
# Long-term measures for safe, efficient and environmentally friendly icebreaking


# UNPREDICTABLE ICE

**Debate on global warming is continuously ongoing and some people think that, there will be no ice in the Baltic Sea in the future. It is therefore important to underline the fact that sea ice is expected to occur during the foreseeable future and will not disappear within many generations. Long periods with mild winters have happened before, e.g. between 1930 and 1940.**

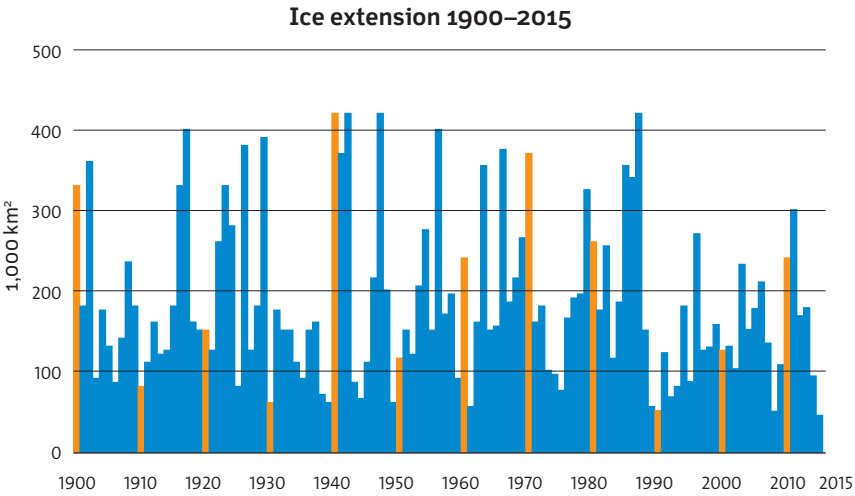
It is impossible to forecast ice extension for next coming years why we must always be prepared for severe winters. It's also very important to bear in mind that winters with lesser ice coverage are not easy from merchant vessels' perspective. During these winters the winds are

typically stronger, causing heavy ridging, and pressurised and drifting ice-fields in the fairway entrances. Most often these are either impossible or at least not safe for the merchant vessels to pass through without icebreaker assistance, hence making icebreaking a necessity in the region even during mild winters.

Ice coverage in the Baltic Sea varies between winters. During severe winters even the Danish straights freeze. The annual cost of icebreaking services depends on how difficult the winter is but during average winter the cost of icebreaking in the Baltic Sea for Sweden, Finland and Estonia is about 86M €. The cost of the whole winter navigation is much greater. Icebreakers' operational season is usually between December and May but on a severe winter it can start as early as October.

Modern logistic standards require predictability in the transport system, all the year around, why the winter navigation system must continuously be developed and meet the trading countries' requirements.

Ice extension varies greatly between mild and severe winters. Pictures present typical ice situation during mild, average and severe winters (from left to right).

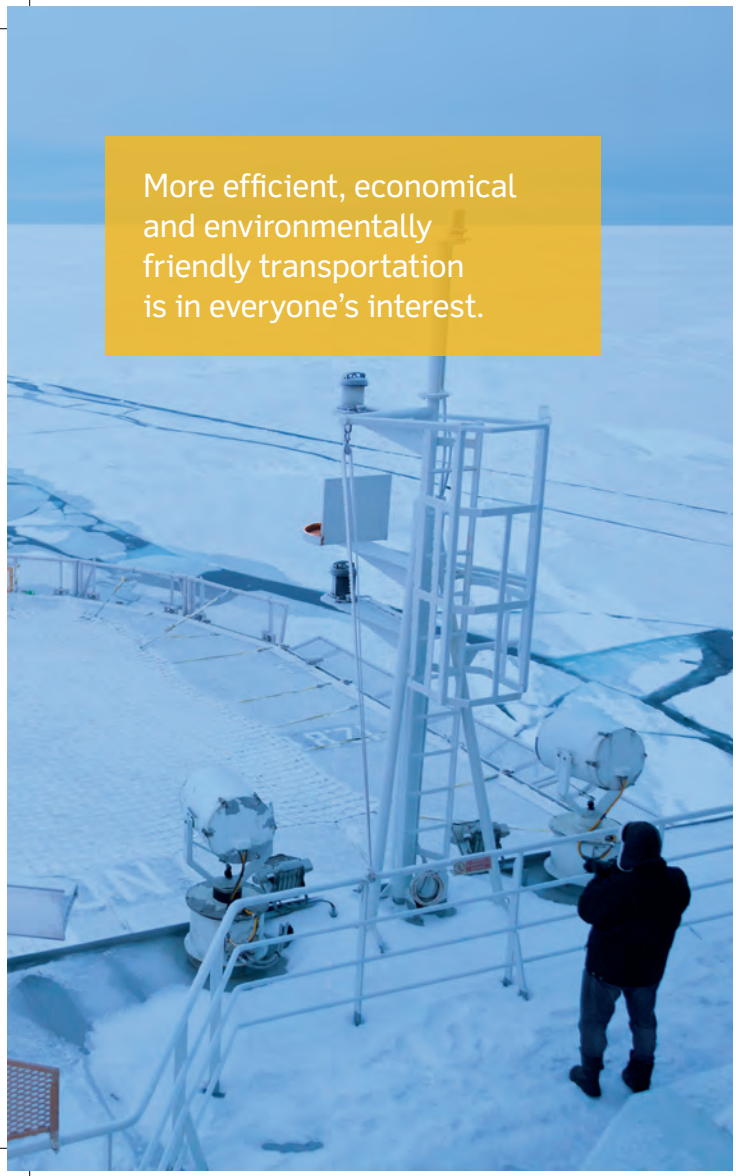


# ONGOING DEVELOPMENT OF WINTER NAVIGATION

The main objectives of WINMOS II project are to further develop and enhance the maritime winter navigation system and its safety by enhanced cooperation between Baltic Sea states and to safeguard required icebreaking recourses for the future by developing new options as well as improving the old capacity to modern environmental standards.

A Memorandum of Understanding regarding enhanced co-operation within icebreaking services between Finland, Sweden and Estonia was signed in Brussels 2015. In this MoU all participating countries agree to jointly study and develop existing and new ways and methods to overcome challenges caused by sea ice to maritime transport in the European northernmost waters. Methods include for example co-operation in operating the icebreaker fleets, co-operation in planning and renewal of icebreaker capacity.

More efficient, economical and environmentally friendly transportation is needed due to increasing traffic volumes, demands for sustainable development and more demanding environmental laws also during winters without forgetting the training of how to work and operate in the cold icy conditions.




## Environmental benefits, reduction of fuel and emissions

Tightening environmental regulations are forcing also the stakeholders in icebreaking to take action to reduce fuel consumption and therefore produce less emissions. Further development of the Common rail fuel injection system and testing of battery hybrids are contributing to these requirements.

## Life extensions and alternative options

Ongoing and planned life extension works on existing icebreakers in WINMOS II will give them more years in operation.Life extension works are rather time and cost efficient way to meet today's needs. The new LNG fuelled icebreaker Polaris, built in the first WINMOS project, will not be enough to secure the needed icebreaking resources in the future and as the life extensions only give limited extra operational years to the old ones newbuildings will be necessary during coming decades as well.

WINMOS II further studies a removable-bow concept which is an innovation from the first WINMOS project. The concept can be an economical solution for mid-size and small icebreaking capacity and contribute to the winter navigation system. The idea is to transform ice strengthened vessels and larger tugboats to icebreakers during winter time by using an icebreaking removable-bow equipped with engines and propellers. With reduced investment cost this concept would give more flexibility to the fleet and be of great assistance in terms of extra resources during extremely hard winters.


## More efficient use of resourses

Modern day standards mean more efficient use of all resources. WINMOS II implements a browser based IBNext system which shares icebreaking related information between stakeholders. Benefits of IBNext are primarily realised as time savings in icebreaker assistance tasks and savings in route length and time for vessels and icebreakers. Operational costs of winter navigation will therefore be reduced.

A contingency plan for the whole Baltic Sea for severe winters will be drawn up based on simulation model study on severe winter. The effects on service level, such as waiting times for cargo, throughout the ports in all Baltic countries are especially considered. The plan acts as a tool for all national icebreaking authorities when allocating resources during severe winters.

Training of crew how to operate in icy conditions and ice covered waters is  extremely important both onboard merchant vessels and icebreakers. Invaluable tacit knowledge from senior icebreaker officers will be collected to be utilized in planning of training course for icebreaker officers.

## Statistics about Baltic Sea:

- Vessels in the area at any given time: 2,000
- Tonnes of cargo per year: 639,000,000
- Percentage of world's maritime transport: 6,5%
- Cost of icebreaking per winter (between SWE, FIN and EE): ~ 86M €
- Number of icebreakers: 16
- Icebreaking season on average winter: December–May

## Activities:

- Implementation and further development of IBNext
- Battery hybrid for safer and more environmentally friendly operation
- Further development of the Common Rail system
- Life extension of Finnish icebreakers
- Pilot study on the removable-bow concept
- Development of icebreaker training
- Study on life extension works of Estonian icebreakers
- Study on adequacy of icebreaking capacity and level of service in Baltic Sea during severe winters
- Project management and dissemination


Life-extensions are cost-efficient way to maintain icebreaking capacity.

**Partners:**

Liikennevirasto
Finnish Transport Agency

SWEDISH MARITIME ADMINISTRATION

ARCTIA

NOVIA
UNIVERSITY OF APPLIED SCIENCES

Aalto University

Photos: Jarmo Vehkakoski


**Contact information:**

Chief Project Manager
Ms Emmi Huvitus
Finnish Transport Agency
emmi.huvitus@fta.fi
+358 40 659 2465
www.winmos.eu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Winter Navigation Motorways of the Sea

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EU STRATEGY
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