Baltic Sea Icebreaking Report
2015-2016
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1. Foreword

Efficient navigation in the Baltic Sea all year round, in spite the additional challenges caused by sea ice, is an important factor for the functioning of the North European transport system. This is the reason why Baltic Sea countries share a common interest to winternavigation and icebreaking which is vital and integrated part of the regions maritime infrastructure.

Efficient winter navigation requires cooperation between the icebreaking authorities in charge on the Baltic Sea countries. Therefore, they all are working together with regions industry and other cargo interests for improved winter navigation through more efficient icebreaking services in the Baltic Sea.

New Baltic Icebreaking.org web site was published on 17.th of June 2015. Although the region has recently been blessed with mild and easy winters and related low additional icebreaking and transport cost, the new web-site has achieved very positive response from the industry. It helps cargo interests to more accurately plan their operations hence reducing costs and delays caused by sea ice.

Climate change will most probably make future winters by average easier, however the variation between winters will stay and environmental regulation will make future merchant vessels even less capable to independently proceed through ice. As mitigation measure for hard winters and required icebreaking capacity predictions BIM has started to prepare a study and action plan how icebreaking authorities in charge could cooperate even more efficiently when a hard winter hits Baltic Sea. Results will be reported as the work proceeds.

You hold in your hand the tenth joint “Annual Baltic Sea Icebreaking Report”. The report is an attempt from BIM’s side to provide annual reporting on winter navigation and icebreaking beyond the national waters and to provide joint information about the progress and news within the area of winter navigation. This is a step towards the long-term vision of BIM to create a joint Baltic Icebreaking Service.

Helsinki 2016

Jarkko Toivola
Chairman of the BIM
2. Introduction

Baltic Icebreaking Management, BIM is an organization with members from all Baltic Sea states. BIM is a development of the annual meeting between Baltic Sea States icebreaking authorities which have assembled since 1982. The member countries of BIM are Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia and Sweden.

After the difficult winter navigation season of 2002/2003 a project was started up within the framework of HELCOM, aiming at improving the safety of winter navigation in the Baltic Sea. The HELCOM – recommendation 25/7 on the safety of Winter Navigation in the Baltic Sea Area was adopted in March 2004.

Within the EU concept Motorways of the Sea, which is one priority project in the trans-European network, the Baltic Sea countries established a working group with the aim of creating more efficient winter navigation by cooperation between the Baltic Sea countries. The icebreaking authorities around the Baltic Sea decided in Helsinki meeting 2004 that this work shall continue within the framework of BIM, where also non EU-member states are taking part. BIM should function all year round and its strategy should be to develop safe, reliable and efficient winter navigation between the Baltic Sea countries. The overall objective of BIM is to assure a well-functioning maritime transport system in the Baltic Sea all year round by enhancing the strategic and operational cooperation between the Baltic Sea countries within the area of assistance to winter navigation.

January 10th 2007, the Joint Baltic web service on winter navigation www.baltice.org was launched. In June 17th 2015, new version of the Joint Baltic web service on winter navigation www.balltice.org was launched.

April 11th 2007, the DVD of training in ice navigation for seafarers was launched.

15th November 2007, HELCOM adopted a new recommendation 28E/11. Further measures to improve the safety of navigation in ice conditions in the Baltic Sea; BIM was acting an “ice advisor” in this recommendation.

In 2008 the pamphlet “The Word Icebreaker, Icebreaking Supply and Research Vessel Fleet” were presented and updated 2011.

In April 2009 a computer based training program, based on the DVD, was introduced. After completing the course, the student’s gets a certificate over earned skills. One important task of BIM is to inform stakeholders in the maritime sector and policy makers about winter navigation and icebreaking. There is a need for information about winter navigation and icebreaking that covers the whole Baltic Sea region.

Several Baltic Sea countries prepare information about the winter navigation and icebreaking in their respective national waters. There has been a need to coordinate this country-specific information, improve the information and to distribute it to a wider target group by “Joint Annual Baltic Icebreaking Report”.

This report gives an overview of the winter navigation season 2014/2015 for the Baltic Sea area. National reports can be found on site: www.baltice.org. The report will also describe organizational changes in the icebreaking authorities or changes in icebreaking resources and provide a progress report of the Baltic Sea Icebreaking cooperation and the development of BIM.
3. Overview of the icebreaking season (2015-2016) and its effect on the maritime transport system in the Baltic Sea region

According to the Finnish Ice Service of the Finnish Meteorological Institute the Baltic Sea ice season 2015-2016 was mild and clearly shorter than average winter. The peak of the ice winter was reached on 22\textsuperscript{nd} of January, when ice covered an area of 110,000 km\(^2\).

Figure 1. The maximum ice extent of the ice season 2015-2016 was reached on 22\textsuperscript{nd} of January 2016.
The freezing started from inner bays of the Gulf of Bothnia in late November. December was exceptionally warm and at the end of December, the sea water was up to three degrees warmer than average. Around the turn of the year, the weather got colder clearly and ice formation began. Icebreaker KONTIO started her assistance work.

January began cold and cold weather continued for three weeks. January was unusually cold. In the end of the cold period, January 22nd, achieved the largest ice extent. At that time, the ice appeared in 110 000 km² area.

![Development of the Ice Season 2015-16](image)

Figure 2. The development of ice season 2015-16 compared to seasons 2006-2015.

Then weather turns mild and the winds become stronger. At the end of January, the ice extent was 66 000 km². February and March were warmer than average and the extent of ice area remained almost unchanged. The extent of the ice varied between 70 000 km² and 55 000 km².

Also in April was warmer than usual. The Gulf of Finland became ice-free on 16 April. The rest of the ice melted during the beginning of May and the Baltic Sea was ice-free on 14 May. The Baltic Sea was ice-free for about two weeks earlier than average.
**Ice conditions in the eastern part of the Gulf of Finland in 2015-2016**

The ice formation processes in the winter of 2015/2016 were those of a mild winter. Ice formation in the coastal shallow zone of the eastern part of the Gulf of Finland begins in early January.

By the beginning of January 2016, the fast ice 5 to 10 cm thick was in the Nevskaya Guba, 5 to 10 cm in the Gulf of Vyborg, 10 to 15 cm in the Bjorkesund passage. The edge of drift ice 5–15 cm thick reached the longitude of the lighthouse Shepelevskiy.

From the beginning of January 2016 the weather in the Gulf of Finland became cold. In some areas the night temperatures reached minus 30 degrees, and during daytime did not exceed minus 15. The continuous negative temperatures caused the heavy ice formation and at the end of the month the water surface of the seaport "Big port of Saint-Petersburg" was completely covered with ice, the thickness of which was up to 15-35 cm. In the Northern part of Vyborg Bay, in the Strait of Bjorkezund and in the waters of the port of Primorsk the fast ice of 30 cm thickness was observed. In the waters of the seaport of Ust-Luga the ice thickness was about 10-15 cm. The ice edge was observed five miles West of the Rodsher island.

From January 25 the temperature increased to + 1 – + 4 degrees, it was raining. The ice began to crumble.

By mid-February the weather had not changed. For this reason, the compact ice cover in the Eastern part of the Gulf of Finland was absent, the main part of the water area of the Gulf was free of ice. In the waters of the Luga Bay no ice was observed.

In March in the daytime the temperatures were mostly 2-4 degrees above zero, and the night temperatures were a little bit below zero. During the whole month the moderate winds of Western directions were dominated. Under the influence of wind and sunlight, the ice cover continued to destruct. The ice was only observed in the Vyborg Bay.

In early April the Nevskaya Guba was cleared of ice. On April 9, 2016 in the sea ports "Big port of St.-Petersburg and Passenger port of Saint-Petersburg" the periods of icebreaking were completed, and before April 15 the icebreaking periods were completed in all Russian ports of the Gulf of Finland.

**Ice conditions in the southern part of the Baltic Sea**

November and December 2015 were warm, with mean/average temperature plus 8. In the first half of January 2016 the mean temperature was minus 8, but in the second half of the month temperature of the air went slowly up. The first ice formation has appeared on 5th of January 2016.

On the 5th of January 2016 the coverage of ice was 100 %. The thickness of ice was 5 to 10 cm. This ice field was an obstacle to navigation.

February was warm with the average temperature plus 6.

On 3rd of February 2016 ice has finally disappeared.
Figure 3. The maximum ice coverage in ice winters 1961-2016. The average of 1961-2011 (51 years) is 187 000 km². Severities of the season are indicated using colours from mild to severe (lightest blue to darkest blue respectively).

The maximum thickness of the fast ice was 35-55 cm in the Bay of Bothnia, 20-35 cm in the Sea of Bothnia and 30-40 cm in the Gulf of Finland. The thickness of the pelagic ice was 15-40 cm in the Bay of Bothnia and 5-20 cm in the Gulf of Finland.

Figure 4. Number of days when traffic restrictions were in force in the different sea areas.
For safety reasons, the Baltic Sea countries have within HELCOM agreed on a joint policy when traffic restrictions shall be issued. For efficiency reasons, the icebreaking authorities can demand a lowest limit on vessels’ engine power as well. Smaller vessels like buoy tenders and tugs with strong engines and hull are used as port icebreakers and for icebreaking mission in waters protected from drifting sea ice. In open sea areas that are affected by drifting sea ice with ridges and ice pressure, big sea icebreaker is required.

Figure 5. The total number of icebreakers in operation each week in the Baltic Sea during this season.
According to statistics from the Baltic Sea icebreaking authorities, 2316 vessels received assistance from icebreakers this season. These figures can be again compared with season 2012-2013, which was a normal winter, when 7 861 vessels were assisted.

Figure 6. A total of 2316 vessels where assisted by icebreakers during the icebreaking season in the Baltic Sea.
The longest sailing distance in sea ice is to the northernmost ports in the Bay of Bothnia.

But due to the big number of vessels in the shorter fairway to the easternmost ports in the Gulf of Finland, the traffic is more affected by sea ice in this area, especially during periods with strong westerly winds when the icebreakers must tow many vessels one by one.

Figure 7. Sailing distance from ice edge during maximum ice extension, 22\textsuperscript{nd} of January 2016: to Kemi 144 nautical miles in two parts (64 nautical miles and 80 nautical miles) and to St. Petersburg 122 nautical miles.
4. Accidents and incidents in sea ice
The Technical University of Helsinki collects information on accidents related to navigation in ice. Shipowners and others within winter navigation are requested to report accidents, incidents and damages that are ice-related to icedamage@tkk.fi or to

Ice Damage Database
Helsinki University of Technology
Ship Laboratory
PL 5300
02151 TKK
FINLAND

Only two incidents were reported this season, one collision and one damaged propeller. In comparison, about 100 vessels reported damages due to the severe ice conditions ten years ago in the year 2003.

5. Winter Navigation Research
Winter navigation research is carried out in co-operation between Finland and Sweden. Funds for research projects are allocated by the Winter Navigation Research Board, which consist of representatives of the Finnish Transport Agency, Finnish Transport Safety Agency, Swedish Transport Agency and Swedish Maritime Administration. Published research reports can be found on www.trafi.fi. (http://www.trafi.fi/tietopalvelut/julkaisut/talvimerenkulun_tutkimusraportit)

6. Costs of Icebreaking services in the Baltic Sea

6.1 Finland
In Finland the costs of icebreakers stand-by and operational costs were near 38,5 million EUR in period 2015-2016. Bunker costs were 8,0 million EUR. This season was again quite easy and the total amount of operating days was 506. The Finnish Transport Agency (FTA) has also contracts with Swedish Maritime Administration to charter one Atle-class icebreaker and contract with Alfons Håkans to charter msv Zeus. Above mentioned costs includes all FTA chartered ice breakers. The FTA has also contracts with private tugboat companies for minor operations. The costs of the Finnish icebreaking services vary normally from 30 to 50 million EUR depending on winter

6.2 Sweden
In Sweden the costs for the stand-by period for our own icebreakers is approximately 12 million EUR, additional operational costs are 5 million EUR, and fuel costs to 2.5-9 million EUR. The total cost for the Swedish icebreaking services including external recourses varies from 20 to 40 million euros depending on the winters’ severity. The costs this winter are estimated to be 24,5 million euros. This is the government’s costs, costs for the different ports and industries are not included.
6.3 Russia

In accordance with the orders of the FTS of Russia dated 20.12.07 No. 522-t/1 and from 18.11.2014 No. 262-t/5 and by order FAS of Russia from 06.06.2016 No. 711/16 new rates of icebreaking dues in the Russian ports of the Gulf of Finland are established as follows:

**Icebreaking dues:**

1. Icebreaking dues are applied for incoming, out coming or transiting the port area.
2. For the cargo ships engaged in liner services, which are officially declared, to the rates of the icebreaking dues the factor of 0.8 is applied.

*From icebreaking dues are released:*

- vessels of ice class **ARC7** (according to classification of the Russian Maritime Register of Shipping or classes of other classification societies corresponding to it);
- passenger vessels.

Upon the announcement by the Harbour Master of winter (summer) navigation before the target date, and also after the prolongation of its duration, icebreaking dues are paid as per corresponding rates from the date of announcement to a date of completion (inclusive), corresponding to the period of winter navigation.

Rates for ships engaged in an international trade rub/1 GT (for Bolshoy port of Saint-Petersburg)

<table>
<thead>
<tr>
<th></th>
<th>All vessels except Ro-Ro, Ro-Flow, container ships and tankers</th>
<th>Container ships</th>
<th>Ro-Ro, Ro-Flow</th>
<th>Tankers</th>
</tr>
</thead>
<tbody>
<tr>
<td>The summer rate</td>
<td>6.65</td>
<td>4.64</td>
<td>2.67</td>
<td>7.28</td>
</tr>
<tr>
<td>from May, 1st till November, 30th</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The winter rate</td>
<td>16.55</td>
<td>11.58</td>
<td>6.36</td>
<td>18.14</td>
</tr>
<tr>
<td>from December, 1st till April, 30th</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During the period from May, 1st till November, 30th the following vessels are released from payment of icebreaking dues:

- arriving to the port from inland waterways of Russia or from the Saimaa canal and sailing back within current year;
- arriving to the port from other Russian ports situated in the eastern part of the Gulf of Finland.

During the period from December, 1st till April, 30th the vessels with ice class **ARC5** and **ARC6** (according to classification of the Russian Maritime Register of Shipping or classes of other classification societies corresponding to it) are subject to icebreaking dues multiplied by factor 0.75.

6.4. Estonia

In Estonia, the total cost of icebreaking in the 2015-2016 season amounted to approximately 6.3 million EUR, with about 450 000 EUR accounting for the costs in the Pärnu Bay and 5.85 million EUR for the Gulf of Finland. This is the Governmental costs.
6.5 Latvia, Lithuania, Poland and Germany
There was no cost information for icebreaking operations in this season 2015-2016.

6.6 Denmark
In 2015/2016 the cost of the Danish ice service was approximately € 0,34 mill. The reason for the low cost is that, Denmark only operates chartered tugs with icebreaking capacity in four readiness areas, East and Western Limfjord, the waters south of Funen and Smålundsfarvandet south of Zealand.

6.7 Norway
During the winter 2015/16, the total costs of ice breaking service in Norwegian waters were approximately EUR 1.0 million.
7. Winter navigation in the different parts of the Baltic Sea

7.1 Bay of Bothnia

Traffic restrictions were initiated on 2\textsuperscript{nd} of January on the Bay of Bothnia, the ice-breaking operations began on December 29\textsuperscript{th} when icebreaker Kontio was ordered to start this year’s ice-breaking season.

Kontio had responsibility for both the Swedish and Finnish ports in the northern parts of Bay of Bothnia.

The first assistance of the merchant vessels was conducted on the 6\textsuperscript{th} of January. At the end of December there were one liner icebreaker in operation in the Bay of Bothnia. When the ice extension was at its peak on week 10 there were 6 liner icebreakers in operation at the same time.

The highest level of ice restrictions IA and 4000 dwt were reached on the 3\textsuperscript{rd} of February in the northern and on 20\textsuperscript{st} of January IA and 2000 dwt in the southern parts. The icebreaking season ended in the Bay of Bothnia on the 10\textsuperscript{th} of May when the last restrictions were cancelled. Icebreaker Kontio was the last icebreaker to leave the Bay of Bothnia.

Assistance activity has been going on from January 6\textsuperscript{th} until to May 2\textsuperscript{nd}. During this winter 1433 vessels were assisted in the Bay of Bothnia.

Assistance has been conducted to following ports:
- Karlsborg
- Tornio
- Luleå
- Kemi
- Haraholmen
- Oulu
- Skelleftehamn
- Raahe
- Kalajoki
- Kokkola
- Pietarsaari

7.2 Sea of Bothnia and the Quark

Traffic restrictions were introduced in the northern part on January 10\textsuperscript{th} and in the southern part on the 25\textsuperscript{th} of January.

Icebreaker Ale was stationed there and used jointly by the Swedish and Finnish icebreaking service.

This winter was a mild winter so in the southern part there was no need for any assistance activities.

Assistance activity has been going on from January 16\textsuperscript{th} to 25\textsuperscript{th} March. During this winter just 4 vessels were assisted in the Sea of Bothnia.

Assistance has been conducted to following ports:
- Holmsund
- Husum
- Vaasa
- Kaskinen
- Pori
- Rauma
7.3 Gulf of Finland

For the Finnish parts of Gulf of Finland, the first traffic restrictions I,II 2000 were initiated on 13th of January in Loviisa, Kotka and Hamina. The highest restrictions were raised to IA,IB 2000 / IC,II 3000 in the above mentioned ports on 18th of January. On 20.1. rest of the ports in the Gulf of Finland got restrictions I,II 2000, which were the only restrictions for this season.

All restrictions were cancelled on 29th of March.
There was only one operating Finnish icebreaker, Voima in the Gulf of Finland.

The first traffic restrictions initiated 12 January 2016 in St. Petersburg. The restrictions cancelled 11 April 2016. All vessels, which needed icebreaker assistance, were bound for Russian ports. During the largest ice cover, the Russians had three sea (liner) icebreakers and seven minor (port) icebreakers in use. The icebreaking season lasted from 30 December 2015 to 15 April 2016 in the Russian territorial water.

For Estonian part of Gulf of Finland traffic restrictions were not initiated due to extremely mild winter. No assistance for Estonian ports in Gulf of Finland. IB TARMO and BOTNICA were stand-by in the port of Hundipea.

During the winter there were 786 ships assisted in the Gulf of Finland.

Assistance was conducted in following ports:
Vyborg               Vysotsk
Primorsk             St. Petersburg
Hamina

7.4. Gulf of Riga

The Estonian Meteorological and Hydrological Institute assessed the winter of 2015/2016 as mild.
The traffic restrictions were initiated 14th of January being IC-1600 kW in Pärnu.
From 28th March traffic restrictions were cancelled.
The icebreaking season lasted from 08th of January to 28th of March and 93 ships were assisted by icebreaker multi-purpose-vessel EVA 316. Due to the mild winter there were no need for assistance to the Port of Riga.

Assistance has been conducted to following ports:
Pärnu
7.5 Central Baltic

Traffic restrictions were not imposed on the Baltic Sea this winter. No assistance activities were carried out this winter.

7.6 Southern Baltic

East Coast Area. Ports of Gdańsk and Gdynia

There were no difficulties for shipping caused by ice. The ice on inner waters of the ports was easy to break by tugs or by berthing / unberthing vessels.

There was no need to engage icebreaking tugs on the approaches to the ports. There was only one ice breaking action in port of Gdańsk in the area of Martwa Wisla and it has lasted for 2,5 hours on the 19th January 2016.

West Coast Area. Ports of Szczecin and Świnoujście

I. Preparatory action

The buoyage on the approach to Świnoujście and on the main fairway Świnoujście - Szczecin was partly removed and partly replaced by special winter buoys shortly before winter season.

II. Winter season

November and December 2015 were warm, with mean/average temperature plus 8. In the first half of January 2016 the mean temperature was minus 8, but in the second half of the month temperature of the air went slowly up. The first ice formation has appeared on 5th of January 2016.

On the 5th of January 2016 the coverage of ice was 100 %. The thickness of ice was 5 to 10 cm. This ice field was an obstacle to navigation.

February was warm with the average temperature plus 6.

On 3rd of February 2016 ice has finally disappeared.

III. Actions

1. As the first ice formation appeared, VTS Szczecin has started publishing on the Internet ice statements for regions: Zatoka Pomorska, Świnoujście, Dziwnów, Zalew Szczeciński and small ports of Zalew Szczeciński and port of Szczecin. Those „ice news” included:

   - percentage of ice coverage
   - thickness / rafting of ice
- ice restrictions

The publishing ended on 3rd of February 2016.

2. Restrictions

- From 6th of January the main fairway Świnoujście - Szczecin and port of Świnoujście and Szczecin were not available for wooden and laminate hull small vessels. This restriction was suspended on 3rd of February 2016.

- From 8th of January till the 12th of February 2016 the main fairway Świnoujście - Szczecin and port of Świnoujście and Szczecin have been available for vessels with ice class L-4 PRS (or equivalent class of other Classification Society) and main engine power above 1700KW

3. One-way traffic was established on the fairway between Gate No I and Gate No IV from 7th of January till 31st of January 2016

4. Ice breaking

There were no ice breaking actions.

Summary

Winter season 2015/2016 was mild over Polish coast. The tugs engaged as icebreakers didn’t have much work.

7.7 Danish waters, Swedish West coast, Germany and Norwegian waters

The Icebreaking Service was on readiness from December 15th. The temperature during the 2015/2016 season was higher than the average winter in Danish waters.

The water temperature dropped slowly and by the end of January, the water temperatures were about 3°C. From the middle of February the water temperatures was between 2 and 3°C.

The readiness of icebreaking was subsequently ended as of March 1st.

In the season 2015/2016 there were only one incident where a vessel needed icebreaking assistance and that were in the middle part of Limfjorden.

Due to the mild winter the ice on the Swedish South and West Coast were not of the dignity that some traffic restrictions have to be imposed and there was no need for icebreaker assistance.

The 2015-2016 was a mild ice winter in Norwegian Waters. No traffic restrictions had to be imposed during the winter season. The Oslo fjord never froze during the winter, partly due to favourable wind direction. Private companies conduced active ice breaking service in Drammen fjord 09-27 January. Halden 07 january-19 February. Tønsberg and Kragerø 15 January- 06 march.

Neither Norwegian Coast Guard, nor Norwegian Coastal Administration has conducted any additional ice breaking or assistance this winter.

Germany

There was only sporadic icebreaking in the inshore waters.
8. Description of organizations and icebreakers engaged during the season 2015 - 2016

8.1 Finland

The Finnish Transport Agency (FTA) is the national authority responsible for the assistance of winter navigation, its coordination, development and management nation-wide. The actual icebreaking services have been contracted out.

The FTA develops Finland’s icebreaking policy, taking into account the requirements of its clients (mainly the Finnish industry). Essential for the industry are as short waiting times as possible for traffic. The FTA decides on the length of the assistance period, exemptions and traffic restrictions.

The traffic restrictions are normally made more stringent than the minimum HELCOM safety recommendations, as the objective is, besides safety, to assure an efficient and safe maritime traffic flow. Only vessels fulfilling the criteria of daily traffic restrictions are given assistance.

The icebreaking services are purchased from Arctia Icebreaking Ltd., Svenska Sjöfartsverket, Alfons Håkans AS, and also from the private companies for minor operations (mainly tugboat services for ice breaking in light ice-conditions in harbour entrances and in Lake Saimaa).

FTAs’ Winter navigation unit in general and VTS centres and area coordination responsible coordination IB-masters locally are responsible for the management and daily operation of the icebreaking services to all winter ports.

The demands as to the standard of service are included in the freight contract. The main requirement is that vessels should not have to wait for an icebreaker for more than 4 hours on an average. Another goal for the Finnish icebreaker service standard is that 90 % to 95 % of vessels navigating in the ice field could get through without waiting for icebreaker assistance.

The average icebreaker waiting time for all Finnish sea areas in this season was 3.48 hrs. and 98% of all port calls did not have to wait for icebreaker assistance at all.

In Finland no special fee is collected for the icebreaker service. All ships pay fairway fees based on ship size and ice class. The fairway dues are used to cover the costs of fairway maintenance and icebreaking services.

New state agreement between Sweden and Finland further developed decade’s long co-operation in winter navigation activities between these two countries. Optimal usage of "common" IB resources lower total costs and grants more reliable service to customers.

Icebreakers engaged by the Finnish Transport Agency 2015/2016:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Propulsion power</th>
</tr>
</thead>
<tbody>
<tr>
<td>SISU</td>
<td>Icebreaker</td>
<td>16 200 kW</td>
</tr>
<tr>
<td>OTSO</td>
<td>Icebreaker</td>
<td>15 000 kW</td>
</tr>
<tr>
<td>KONTIO</td>
<td>Icebreaker</td>
<td>15 000 kW</td>
</tr>
<tr>
<td>FREJ/ATLE</td>
<td>Icebreaker</td>
<td>18 400 kW</td>
</tr>
<tr>
<td>NORDICA</td>
<td>Icebreaker</td>
<td>15 000 kW</td>
</tr>
</tbody>
</table>
The Swedish icebreaker Frej was chartered to FTA during the period 20.1.2016 - 26.4.2016 and icebreaker Zeus for period 21.1.2016 - 10.3.2016. On top of this FTA used tugboats for assistance in different ports during this season.

### 8.2 Sweden

Icebreaking operations are managed by the Icebreaking Management of the Swedish Maritime Administration in Norrköping and are based on the Swedish icebreaking regulation (2000:1149). It allocates icebreakers to work areas, issues traffic restrictions, monitors the operational situation and informs the shipping stakeholders of ice conditions and the traffic situation. Sweden controls six icebreakers, of which the Swedish Maritime Administration owns five and has one on long-term charter from a private ship owner. All Swedish icebreakers are manned by a private shipping management company.

Sweden, Finland and Estonia use a jointly developed IT based on-line system, IB-Net (Icebreaker Net) for coordination of the joint icebreaking operations. IBNet contains information about the weather, ice conditions and traffic situation, and transmits the information between the different connected units (icebreakers, coordination centres, VTS etc.)

In addition to the icebreakers, ice strengthened buoy tenders of the Swedish Maritime Administration and private tugboats are also engaged in the icebreaking service. Helicopters are chartered and used for ice reconnaissance and personnel transport in order to reduce time expenditure for icebreakers. Cooperation with the tugboats in ports is common around the coastline.

The governmental funding’s and fairway dues cover the costs for the icebreaking operations and no vessel that receives assistance from icebreaker is charged.

**Icebreakers engaged by the Swedish icebreaking service 2015/2016:**

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALE</td>
<td>Icebreaker</td>
<td>3500 kW</td>
</tr>
<tr>
<td>ATLE</td>
<td>Icebreaker</td>
<td>18400 kW</td>
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</tr>
<tr>
<td>YMER</td>
<td>Icebreaker</td>
<td>18400 kW</td>
</tr>
<tr>
<td>ODEN</td>
<td>Icebreaker</td>
<td>18000 kW</td>
</tr>
<tr>
<td>SCANDICA</td>
<td>Buoy tender</td>
<td>2610 kW</td>
</tr>
</tbody>
</table>

During the winter the Administration also has engaged 9 different tugboats for icebreaking operations.
8.3 Russia

The Harbour Master of the Port has the power to impose ice restrictions in the port and approaching, based on actual ice conditions (according to article Nos. 74 & 76, Russian Federal Law No. 81-FZ, Russian Merchant Marine Code, 30.04.1999).

The ice navigation assistance is conducted by the state-owned icebreakers and covers the seaports: Bolshoy port of St. Petersburg, Primorsk, Vyborg, Vysotsk and Ust-Luga. The state-owned icebreakers assist the inland transit navigation via Saimaa Canal both ways.

The icebreaker fleet consists of the following icebreakers:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERMAK</td>
<td>Icebreaker</td>
<td>30 400 KW</td>
</tr>
<tr>
<td>CAPTAIN SOROKIN</td>
<td>Icebreaker</td>
<td>18 300 KW</td>
</tr>
<tr>
<td>CAPTAIN NIKOLAEV</td>
<td>Icebreaker</td>
<td>18 000 kW</td>
</tr>
<tr>
<td>MOSKVA</td>
<td>Icebreaker</td>
<td>16 000 KW</td>
</tr>
<tr>
<td>SAINT-PETERSBURG</td>
<td>Icebreaker</td>
<td>16 000 KW</td>
</tr>
<tr>
<td>VLADIVOSTOK</td>
<td>Icebreaker</td>
<td>17 400 KW</td>
</tr>
<tr>
<td>MURMANSK</td>
<td>Icebreaker</td>
<td>17 400 KW</td>
</tr>
<tr>
<td>MUDYUG</td>
<td>Icebreaker</td>
<td>9 100 KW</td>
</tr>
<tr>
<td>KARU</td>
<td>Icebreaker</td>
<td>6 450 KW</td>
</tr>
<tr>
<td>SEMIYON DEZHENVE</td>
<td>Icebreaker</td>
<td>4 000 KW</td>
</tr>
<tr>
<td>IVAN KRUSENSTERN</td>
<td>Icebreaker</td>
<td>4 000 KW</td>
</tr>
<tr>
<td>YURI LISYANSKY</td>
<td>Icebreaker</td>
<td>4 000 KW</td>
</tr>
<tr>
<td>CAPTAIN ZARUBIN</td>
<td>Icebreaker</td>
<td>3 300 KW</td>
</tr>
<tr>
<td>CAPITAN M. IZMAILOV</td>
<td>Icebreaker</td>
<td>3 240 KW</td>
</tr>
<tr>
<td>CAPITAN PLAKHN</td>
<td>Icebreaker</td>
<td>3 240 KW</td>
</tr>
</tbody>
</table>

The icebreaker assistance, as a rule, is conducted as follows:

1. Independent ice navigation following icebreaker recommendations and strictly under her supervision.
2. Icebreaker assistance in a convoy.
3. Individual icebreaker assistance behind an icebreaker.

Icebreaker assistance render to the ships, which do not fall under the acting restrictions in the ports of their destination. Icebreaker assistance for the traffic coming from the sea is conducted from the point where the convoy is formed to the inner road of the port, and the ships leaving the port are assisted from the inner road to the area next to the convoy forming point (CFP).

All ships coming from the sea are prohibited from entering the ice east of the convoy forming point (CFP) without permission of the icebreaker. The Masters of the ships sailing independently upon receiving the permission of the icebreaker are to report to the icebreaker while passing the established control points of the recommended route and inform of the ice situation in the area. If such a ship gets stuck, the icebreakers are to release them and correct their recommended route or get them in the convoy for
further motion. The Masters of the ships are not recommended to rely on data regarding recommended
routes received from other ships and not confirmed by the Master of the icebreaker.

When the ice thickness over the approach fairways leading to Russian ports in the eastern part of the Gulf
of Finland becomes considerable, the Harbour Master of seaport imposes restrictions on ships the ice
class of which are not sufficient for navigation under prevailing circumstances.

8.4 Estonia
The responsible organization for icebreaking in Estonia is the Estonian Maritime Administration. The
Director-General of the Estonian Maritime Administration decides on traffic restrictions and directives on
winter navigation. The icebreaking coordination Centre consisted of 9 members in 2015, chaired by the
Head of the Maritime Safety Division of the Maritime Administration, and acts as an advisory board for
the Director-General in icebreaking issues.

Ports that are serviced by state ice-breakers are Muuga Harbour, harbours of Tallinn and Kopli Bay,
Paldiski North Harbour, Paldiski South Harbour, Kunda Harbour, Sillamäe Harbour and Pärnu Harbour.

Estonia has two icebreakers, TARMO and BOTNICA, to operate in the Gulf of Finland area, and the multi-
purpose vessel EVA-316 to operate in the Pärnu Bay. Icebreaking to the port of Pärnu was carried out by
multi-purpose vessel EVA 316. Icebreakers engaged by the Estonian Maritime Administration 2015/2016:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVA 316</td>
<td>Multi-Purpose Vessel</td>
<td>3 x 1 717 kW</td>
</tr>
</tbody>
</table>

8.5 Latvia
There is one icebreaker, the VARMA, which is owned and operated by the Freeport of Riga Fleet, Ltd.

No icebreakers were engaged by the Latvia 2015/2016.

8.6. Lithuania
The port of Klaipeda is the northernmost ice free port in the eastern Baltic coast.
Klaipeda State Seaport Authority is the responsible organisation for icebreaking in Klaipeda harbour areas.
The Lithuanian fairways are open all year round.

There are no demand and necessity for icebreaking service in the Lithuanian coastal waters. During severe
winters private tugboats carry out needed icebreaking.

8.7 Poland
Eastern part:
The winter season was very moderate and no ice formation appear in area. There was no need to engage
icebreaking tugs on the approaches to the ports.

Western part:
The Winter season 2015/2016 November and December 2015 were warm, with mean/average
temperature plus 8. In the first half of January 2016 the mean temperature was minus 8, but in the
second half of the month temperature of the air went slowly up. The first ice formation has appeared on
5th of January 2016.

On the 5th of January 2016 the coverage of ice was 100 %. The thickness of ice was 5 to 10 cm. This ice
field was an obstacle to navigation.
February was warm with the average temperature plus 6.

On 3rd of February 2016 ice has finally disappeared.

8.8 Germany

The Federal Waterways and Shipping Authority, Northern Region Office in Kiel coordinates according to an overall plan the icebreaking service for the harbour entrances, coastal- and sea regions in German parts of the Baltic Sea.

The German ice service plan is set up annually by the responsible authority, listing all available vessels which are able for icebreaking, giving information on the respective areas of icebreaking service, the expected ice situation etc.

Vessels available for icebreaking operations:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEUWERK</td>
<td>Multi-Purpose vessels</td>
<td>8 400 kW</td>
</tr>
<tr>
<td>MELLUM</td>
<td>Multi-Purpose vessels</td>
<td>6 620 kW</td>
</tr>
<tr>
<td>ARKONA</td>
<td>Multi-Purpose vessels</td>
<td>3 700 kW</td>
</tr>
</tbody>
</table>

In addition to that, a number of smaller tugboats and river icebreakers are available for the inner coastal waters and harbours.

8.9 Denmark

Rules and regulations for icebreaking in Danish waters is described in ”Act on the amendment of the National Ice Service Act”. Upon consultation with the Ice Service Council the minister of defence lays down the rules for the establishment of the icebreaking service in Danish waters for certain areas, named readiness areas.

The icebreaking service for readiness areas is financed by 25% from the requiring vessel and 75 % by the Ice Service. The Ice Service will collect an annual fee from port administrations calculated on the basis of the volume of goods passing through the individual ports. In the new Act a state-controlled icebreaker shall be understood as icebreaking resources chartered by the state and other vessels used for icebreaking by the Ice Service.

When the ice situation so demands, assistance can be requested against payment. On Danish Defence homepage, ship owners with icebreaking capacity have the possibility to lay down information on these capacities and contact information to the company. If in any doubt or help needed, the Maritime Assistance Service at the Joint Operation Centre can be contacted.

The Ice Service recommends that the necessary precautionary measures are taken in areas where experience shows that ice may make navigation very difficult.

8.10 Norway

Norwegian waters, the Norwegian Coastal Administration is responsible of all ice breaking in the main fairways. Since 2014 this includes approaches to ports, which earlier has been conducted by the local port authority.
Governmental vessel with ice breaking capability:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>VILLA</td>
<td>Buoy tender</td>
<td>935 kW</td>
</tr>
<tr>
<td>SVALBARD</td>
<td>Coast Guard vessel</td>
<td>13 500 kW</td>
</tr>
</tbody>
</table>

Private vessel with ice braking capability:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAMSETUG</td>
<td>Tug</td>
<td>3564 kW</td>
</tr>
<tr>
<td>TOR III</td>
<td>Harbour Tug</td>
<td>1052 kW</td>
</tr>
<tr>
<td>TUG FRIER</td>
<td>Harbour Tug</td>
<td>883 kW</td>
</tr>
<tr>
<td>SKILSØE</td>
<td>Harbour Tug</td>
<td>932 KW</td>
</tr>
</tbody>
</table>

9. Progress report of BIM (Baltic Sea Icebreaking Management)

One important topic is to find solutions for how the existing Baltic Sea icebreakers can be utilized in other nations’ icebreaking service and as previously mentioned, the long term vision of the BIM is a common icebreaker fleet in the Baltic Sea.

The Nordic countries have an agreement for cooperation that was signed in the early sixties.

Between the governments in Finland and Sweden an agreement was signed 2011. In that agreement the states emphasizes the importance of well-functioning winter navigation for industry and trade.

In the Sea and Bay of Bothnia the two countries icebreaker fleets works as a common fleet, this cooperation can also be extended to other areas as the Gulf of Finland and the Baltic. This may serve as a model for other countries in terms of cooperation within icebreaking.

One other important project was the modernization of the joint website [http://www.baltice.org](http://www.baltice.org) which has been operational since 2007, the modernization was completed before winter season 2015-2016.

Within the Trans-European Transport Network (TEN-T) have a project started called “WINMOS II” Winter navigation Motorways of the Sea. The WINMOS II project is a continuity for WINMOS project, which was completed in spring 2016. WINMOS II aims to develop the maritime navigation system, improve environment performance and secure ice breaking resources in the Baltic.

[www.baltice.org](http://www.baltice.org)