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1. 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 at 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.

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

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

On 15 November 2007, HELCOM adopted a new recommendation 28E/11 outlining 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 World Icebreaker, Icebreaking Supply and Research Vessel Fleet” was presented and updated in 2011.

In April 2009, a computer based training program, based on the DVD, was introduced. After completing the course, the student 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 2016/2017 for the Baltic Sea area. National reports can be found on the 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.
2. Overview of the icebreaking season (2016-2017) 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 2016-2017 was mild. The maximum ice extent, 88 000 km², was reached on 12 February.

Figure 1. The maximum ice extent of the ice season 2016-2017 was reached on 12 February 2017.
The freezing started from inner bays of the Gulf of Bothnia in early November. December was exceptionally warm and at the end of December, the extent of sea ice was only 10 000 km². Icebreaker KONTIO started her assistance work on 10 December.

January began cold but cold weather continued less than two weeks. At the end of January ice extent was 44 000 km². Again at the beginning of February the weather was quite cold. The peak of the ice winter was reached on 12 February, when the ice extent was 88 000 km².

Then the weather turned mild and the winds became stronger. At the end of February the ice extent was 77 000 km². Quickly changing and mild weather continued in March. At the end of March the extent of the ice was only 29 000 km².

April was colder than usual and ice melting was slow. At the end of April the extent of ice was 15 000 km². Also May was colder than normal and ice melting was very slow – the last icebreaker started her voyage home as late as on 25 May.

**Ice conditions in the eastern part of the Gulf of Finland in 2016-2017**

The ice formation processes in the winter of 2016/2017 were those of a mild winter. Ice formation in the coastal shallow zone of the eastern part of the Gulf of Finland began in the second decade of November. By mid-December, the entire water surface of the seaport “Big port of Saint-Petersburg” was completely covered with ice, the thickness of which was from 5 to 20 cm.
By mid-January due to the lowering of air temperature solid ice with thickness up to 15 cm spread from the Cape Shepelevskii to the Western Birch Island and reached Rondo Island. In Vyborg Bay and on the waters of Neva Bay fast ice with thickness from 15 to 40 cm was observed.

In February, the area of the ice cover gradually increased. By mid-month the ice edge passed from Toila village (Estonia) in the South, through the Western extremity of Powerful Island and Nerve Island to the village of Hamina (Finland) on the Northern shore of the Gulf of Finland. By the end of February nilas ice had spread to the Meridian of Hogland Island.

In March, air temperatures were noted around zero degrees, the wind blew mainly from the West and South-West directions. Under the influence of winds solid ice began to shift to the Northern shore of the Gulf of Finland. Ice formation in the Eastern part of the Gulf had slowed, and since the second half of the month it was to be a gradual destruction and melting of ice. The water area of the port of Ust-Luga was cleared of ice.

In April, the ice cover continued to break down. In spite of the fact that air temperatures were below the average, the water area of Neva Bay became completely ice free by 10 April. The icebreaking period in the seaport of Ust-Luga was completed on 21 April 2017, and on 25 April 2017 the icebreaking periods in all Russian ports of the Gulf of Finland were completed too.

Figure 3. The maximum ice coverage in ice winters 1961-2017. 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 fast ice was 30-70 cm in the Bay of Bothnia, 30-45 cm in the Sea of Bothnia and 25-50 cm in the Gulf of Finland. The thickness of pelagic ice was 40-60 cm in the Bay of Bothnia and 10-35 cm in the Gulf of Finland.

For safety reasons, the Baltic Sea countries have agreed within HELCOM on a joint policy when traffic restrictions are 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 icebreakers are 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, 4302 vessels received assistance from icebreakers this season. These figures can be compared with season 2012-2013, which was an average winter, when 7861 vessels were assisted.
Figure 6. A total of 4302 vessels were assisted by icebreakers during the icebreaking season 2016-2017 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 on 12 February 2017: to Kemi 202 nautical miles and to St. Petersburg 124 nautical miles.
3. 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 TTK
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.

4. 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 consists 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).

5. Costs of Icebreaking services in the Baltic Sea

5.1 Finland
In Finland the stand-by and operational costs of icebreakers were nearly 49.5 million euro in the period 2016-2017. Bunker costs were 6.0 million euro. This season was again quite easy but it lasted longer than the past two years and the total number of operating days was 620. The Finnish Transport Agency (FTA) had a contract with the Swedish Maritime Administration to charter one Atle-class icebreaker and a contract with Alfons Håkans to charter MSV ZEUS; MSV ZEUS was replaced by MSV THETIS. The abovementioned costs include 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 around 60 million euro, depending on the winter.

5.2 Sweden
In Sweden the cost for the stand-by period for our own icebreakers is approximately 12 million euro, additional operational costs are 5 million euro, and fuel costs 2.5-9 million euro. The total cost for the Swedish icebreaking services including external recourses varies from 20 to 40 million euro, depending on the severity of the winters. The costs this winter are estimated to be 24.5 million euro. This is the government’s costs; costs for the different ports and industries are not included.
5.3 Russia
In accordance with the orders of the FTS of Russia dated 20 December 2007 No. 522-t/1 and 18 November 2014 No. 262-t/5, and by order FAS of Russia of 06 June 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 coming in, coming out or transiting the port area.
2. For the cargo ships engaged in liner services, which are officially declared, the factor of 0.8 is applied to the rates of the icebreaking dues.

**From icebreaking dues are exempted:**
- 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>Period</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 from 01 May to 30 November</td>
<td>6.65</td>
<td>4.64</td>
<td>2.67</td>
<td>7.28</td>
</tr>
<tr>
<td>The winter rate from 01 December to 30 April</td>
<td>16.55</td>
<td>11.58</td>
<td>6.36</td>
<td>18.14</td>
</tr>
</tbody>
</table>

During the period from 01 May to 30 November, the following vessels are exempted from payment of icebreaking dues:
- arriving at the port from inland waterways of Russia or from the Saimaa canal and sailing back within the current year;
- arriving at the port from other Russian ports situated in the eastern part of the Gulf of Finland.

During the period from 01 December to 30 April, 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.

5.4. Estonia
In Estonia, the total cost of icebreaking in the 2016-2017 season amounted to approximately 6 million euro, with about 565 000 euro accounting for the costs in Pärnu Bay and 5,4 million euro for the Gulf of Finland. This is the Governmental costs.

5.5 Latvia, Lithuania, Poland and Germany
There was no cost information for icebreaking operations in the season 2016-2017.
5.6 Denmark
In 2016/2017 the cost of the Danish ice service was approximately 0.35 million euro. The reason for this is that Denmark only operates chartered tugs with icebreaking capacity in four readiness areas, East and Western Limfjord, the waters south of Funen and Smålandsfarvandet south of Zealand. The chartered tugs are only brought into operation when necessary.

5.7 Norway
During the winter 2016/17, the total costs of ice breaking service in Norwegian waters were approximately EUR 1.0 million.

6. Winter navigation in the different parts of the Baltic Sea

6.1 Bay of Bothnia, Sea of Bothnia and the Quark
Traffic restrictions where initiated on 10 December in the Bay of Bothnia, the icebreaking operations began on 8 December when icebreaker OTSO was ordered to start this year’s icebreaking season.

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

The first time assistance was given to merchant vessels was on 10 December. At the end of December there were two liner icebreakers in operation in the Bay of Bothnia. When the ice extension was at its peak in 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 8 February in the northern part and IA and 2000 dwt on 3 March in the southern part. The icebreaking season ended in the Bay of Bothnia on 29 May when the last restrictions were cancelled. Icebreaker OTSO was the last icebreaker to leave the Bay of Bothnia.

Assistance activity went on from 10 December until 24 May. During this winter 1725 vessels were assisted in the Bay of Bothnia.

Assistance was conducted to the following ports:

Karlsborg  Tornio
Luleå  Kemi
Haraholmen  Oulu
Skelleftehamn  Rahe
Haraholmen  Kalajoki
Kokkola
Pietarsaari

6.2 Gulf of Finland
During the winter there were 2393 ships assisted in the Gulf of Finland.
For the Finnish parts of the Gulf of Finland, the first traffic restrictions I, II 2000 were imposed on 17 January in Kotka and Hamina. The highest restrictions were raised to IA, IB 2000 / IC, II 3000 in the abovementioned ports on 11 February. Only Kotka, Hamina and Loviisa got restrictions this year in the Gulf of Finland.

All restrictions were cancelled on 3 April. There was only one operating Finnish icebreaker, the VOIMA in the Gulf of Finland.

The first traffic restrictions were imposed on 01 December 2016 in St. Petersburg. The restrictions were cancelled on 11 April 2017. All vessels which needed icebreaker assistance were bound for Russian ports. During the largest ice cover, the Russians had six sea (liner) icebreakers and five minor (port) icebreakers in use. The icebreaking season lasted from 01 December 2016 to 25 April 2017 in the Russian territorial water.

For the Estonian part of the Gulf of Finland traffic restrictions were imposed on 01 January 2017. Restrictions were cancelled on 21 March 2017. Icebreaker BOTNICA assisted 9 ships in Estonian ports in the Gulf of Finland. Icebreaker TARMO was on stand-by at Hundipea Harbour.

Assistance was conducted in the following ports:
Vyborg Vysotsk
Primorsk St. Petersburg
Ust-Luga Hamina
Kotka Loviisa
Sillamäe

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

6.4 Southern Baltic
E. 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 berthing/unberthing vessels.
There was no need to engage icebreaking tugs on the approaches to the ports.

West Coast Area. Ports of Szczecin and Świnoujście
I. Winter season
The months November and December 2016 were mild with regard to temperatures, with mean temperature 5 degrees above zero.

The first ice formation appeared on 15 January 2017. It was 100% coverage of ice with thickness about 8 cm in the area within the ports of Świnoujście and Szczecin. Navigation in the area was difficult when ice became thicker, about 10 cm, and due to the winds the ice was a little ridged and heaped up. The third decade of January was warmer, with temperatures above zero and the ice started to melt, but in February winter returned and ice became stronger again. The second part of February was definitely warmer, and ice started to melt. But ice floes heaped up constituted an obstacle to navigation, still. On 28 February 2017 ice disappeared and water was free of ice in the area.

II. Actions

1. Putting into force ice restrictions by the Harbour Master of Świnoujście / Szczecin, in their area of responsibility:
   - The first restriction was put into force on 16 January 2017 and it was said that the main fairway Świnoujście - Szczecin and the ports of Świnoujście and Szczecin were not available for wooden and laminate small vessels. This restriction was suspended on 28 February 2017.
   - From 16 January 2017 to 25 February 2017 the main fairway Świnoujście - Szczecin and the port of Szczecin were available for vessels with ice class L-4 PRS (or an equivalent class of other Classification Societies) and main engine output above 1200 kW.

2. Special statements by the Harbour Master of Świnoujście/Szczecin.

   Statements issued by the Harbour Master of Szczecin:
   - From 19 January 2017 to 20 February 2017 one way traffic was established on the water fairway between Gate No I and Gate No IV.

Summary

1. The winter season 2016/2017 was mild over the Polish coast causing some difficulties to navigation in the west area only.

   There was no icebreaking action.

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

   The Icebreaking Service was on readiness from 15 December. The temperature during the 2016/2017 season was generally 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 were between 1.5 and 2°C. The readiness of icebreaking was subsequently ended as of 01 March.

   In the season 2016/2017 no vessels needed icebreaking assistance.

   The 2016-2017 was a mild ice winter in Norwegian waters. No traffic restrictions had to be imposed during the winter season. The inner part of the Oslo Fjord only froze for a week in the end of January during the winter. In January-February private companies conducted active icebreaking service 2 days in Halden, 23 days in Tønsberg area and 20 days in Kragerø. Neither Norwegian Coast Guard, nor Norwegian Coastal Administration has conducted any additional icebreaking or assistance this winter.
Germany
There was only sporadic icebreaking in the inshore waters.

7. Description of organizations and icebreakers engaged during the season 2016-2017

7.1 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. 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 icebreaking in light ice-conditions in harbour entrances and in Lake Saimaa). FTA’s winter navigation unit in general and VTS centres and IB masters 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 3.91 hrs and 9.3% of all port calls did not have to wait for icebreaker assistance at all.

In Finland no special fee is collected for icebreaker services. 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. A new state agreement between Sweden and Finland further developed co-operation in winter navigation activities. Optimal usage of “common” icebreaker resources lowers total costs and grants more reliable service to customers.

Icebreakers engaged by the Finnish Transport Agency in 2016/2017:

<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 200kW</td>
</tr>
<tr>
<td>URHO</td>
<td>Icebreaker</td>
<td>16 200kW</td>
</tr>
<tr>
<td>POLARIS</td>
<td>Icebreaker</td>
<td>19 000kW</td>
</tr>
</tbody>
</table>
The Swedish icebreaker FREJ was chartered to FTA during the period from 12 February 2017 to 15 April 2017 and icebreaker THETIS for the period from 13 February 2017 to 20 March 2017. On top of this FTA used tugboats for assistance in different ports during this season.

7.2 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 and Finland use a jointly developed IT based on-line system, IBNet (Icebreaker Net) for coordination of the joint icebreaking operations. It 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 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 in 2016/2017:

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Engine power</th>
</tr>
</thead>
<tbody>
<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>FENNICA</td>
<td>Icebreaker</td>
<td>15 000 kW</td>
</tr>
<tr>
<td>VOIMA</td>
<td>Icebreaker</td>
<td>10 200 kW</td>
</tr>
<tr>
<td>ZEUS</td>
<td>Icebreaker</td>
<td>6 000 kW</td>
</tr>
<tr>
<td>THETIS</td>
<td>Icebreaker</td>
<td>8 004 kW</td>
</tr>
</tbody>
</table>

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

The Harbour Master of the Port has the power to impose ice restrictions in the port and approach channels, based on actual ice conditions (according to articles Nos. 74 & 76, Russian Federal Law No. 81-FZ, Russian Merchant Marine Code, 30 April 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 the 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>30400 kW</td>
</tr>
<tr>
<td>CAPTAIN SOROKIN</td>
<td>Icebreaker</td>
<td>18300 kW</td>
</tr>
<tr>
<td>CAPTAIN NIKOLAEV</td>
<td>Icebreaker</td>
<td>18000 kW</td>
</tr>
<tr>
<td>MOSKVA</td>
<td>Icebreaker</td>
<td>21000 kW</td>
</tr>
<tr>
<td>SAINT-PETERSBURG</td>
<td>Icebreaker</td>
<td>21000 kW</td>
</tr>
<tr>
<td>VLADIVOSTOK</td>
<td>Icebreaker</td>
<td>17400 kW</td>
</tr>
<tr>
<td>MURMANSK</td>
<td>Icebreaker</td>
<td>17400 kW</td>
</tr>
<tr>
<td>MUDYUG</td>
<td>Icebreaker</td>
<td>7000 kW</td>
</tr>
<tr>
<td>KARU</td>
<td>Icebreaker</td>
<td>5600 kW</td>
</tr>
<tr>
<td>SEMION DEZHENIE</td>
<td>Icebreaker</td>
<td>4500 kW</td>
</tr>
<tr>
<td>IVAN KRUZENSTERN</td>
<td>Icebreaker</td>
<td>4500 kW</td>
</tr>
<tr>
<td>YURI LISYANSKY</td>
<td>Icebreaker</td>
<td>4000 kW</td>
</tr>
<tr>
<td>CAPTAIN ZARUBIN</td>
<td>Icebreaker</td>
<td>3300 kW</td>
</tr>
<tr>
<td>CAPITAN M. IZMAILOV</td>
<td>Icebreaker</td>
<td>4000 kW</td>
</tr>
<tr>
<td>CAPITAN PLAKHIN</td>
<td>Icebreaker</td>
<td>3240 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 is rendered to 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.

7.4 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 it 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 Pärnu Bay. Icebreaking to the port of Pärnu was carried out by the multi-purpose vessel EVA 316. Icebreakers engaged by the Estonian Maritime Administration 2016/2017:

<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>5150 kW</td>
</tr>
<tr>
<td>BOTNICA</td>
<td>Icebreaker</td>
<td>15000 kW</td>
</tr>
</tbody>
</table>

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

No icebreakers were engaged by Latvia in 2016/2017.

7.6. 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 is no demand and necessity for icebreaking service in the Lithuanian coastal waters. During severe winters private tugboats carry out the necessary icebreaking.

7.7 Poland
No icebreaking was necessary this season.

7.8 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 capable of 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>8400 kW</td>
</tr>
<tr>
<td>MELLUM</td>
<td>Multi-Purpose vessels</td>
<td>6620 kW</td>
</tr>
<tr>
<td>ARKONA</td>
<td>Multi-Purpose vessels</td>
<td>3700 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.

7.9 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 be taken in areas where experience shows that ice may make navigation very difficult.

7.10 Norway

In Norwegian waters, the Norwegian Coastal Administration is responsible for all icebreaking in the main fairways. Since 2014 this includes approaches to ports, which earlier has been conducted by the local port authority.

Governmental vessels with icebreaking 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 vessels with icebreaking 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>
8. 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 emphasize the importance of well-functioning winter navigation for industry and trade.

In the Sea and Bay of Bothnia the two countries’ icebreaker fleets work as a common fleet; this cooperation can also be extended to other areas, such 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 www.baltice.org which has been operational since 2007; the modernization was completed before the winter season 2015-2016.

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

www.baltice.org