The Swedish Maritime Sector – progress report
Continuing positive trend in the maritime sector

Yet another year has passed since the Swedish Maritime Administration presented its previous account of developments in the maritime sector. It is gratifying to note that the positive trend in the sector continued in 2004.

2004 was an eventful year in the sector, both in terms of transport policy issues and the maritime market. For example, a new regulatory system was introduced for maritime security; the Swedish Freight Transport Delegation, appointed in 2002, submitted its final report; and maritime infrastructure gained a greater role in the Trans-European transport network. It is also clear that the maritime industry is marked by rising optimism. The number of vessels on order for Swedish shipping companies is the highest in several decades and the trend in seaborne freight volumes continues to rise, albeit at a slower pace than in recent years.

Shipping has traditionally played a key role in the supply of transport in Sweden, but there is obvious potential for strengthening the role of shipping in enhancing the efficiency of the transport system. The presentation of the trends in the maritime sector shows quite clearly that all players involved in the sector – shipping lines, ports, the state and others – have a crucial role to play in the development of the transport sector.

Swedish transport policy is based on the requirements of transport purchasers. I think it is crucial that all players share this viewpoint, even though we have different roles in the system, and that we realise it is only by co-operating that we can effectively develop the sector.

This sector report is the third account of developments in the maritime sector drawn up by the Swedish Maritime Administration. We are pleased with the interest that sector players have shown and we look confidently towards continuing co-operation in developing the reporting of trends in the maritime sector.

Norrköping, February 2005

Jan-Olof Selén
Director-General
5 Contribution of shipping to a safe transport system ..................................................62
Shipping gives priority to personal safety ..................................................................63
Downward trend in fatalities at sea ............................................................................64
Boating accidents remain unacceptably high ............................................................65
Reporting of near-accidents .......................................................................................69
Rising demands for vessel supervision in the EU ....................................................70
Continuing research aimed at enhanced safety .......................................................70

6 The contribution of shipping to a favourable environment ....................................72
Emissions to air ............................................................................................................73
Nature, culture and the ecocycle .................................................................................79
Environmental impact of ports ................................................................................84

7 Present status of gender equality in the maritime sector ........................................88
Gender distribution in decision-making bodies .......................................................89
Gender distribution in shipping companies and maritime education .....................90
Continuing efforts in the gender equality area ........................................................91

8 Concluding comments ..........................................................................................92
Continuing positive development in the shipping market ......................................93
Accessibility, regional development and transport quality .....................................94
Maritime safety is improving in both the professional and pleasure sectors ..........96
The contribution of shipping to a favourable environment can be improved .......96
A strategy for greater equality is in progress ............................................................98
Greater need for international efforts and monitoring of developments in the maritime sector .................................................................98
The sector report is a key aspect of the agency’s sector role

**THE OVERALL OBJECTIVE** of Swedish transport policy is to ensure an economically efficient and long-term sustainable supply of transport for citizens as well as for business and industry nation-wide. In concrete terms, the overall objective has been expressed in the form of six sub-goals:

- An accessible transport system.
- High quality transport.
- Safe shipping.
- A favourable environment.
- Positive regional development.
- A transport system offering gender equality.

The Swedish Maritime Administration is responsible for submitting annual reports to the Government showing trends in the maritime sector. As opposed to the Swedish Maritime Administration’s annual report, which essentially deals exclusively with the agency’s own operations, the sector report is designed to monitor and analyse developments in the maritime sector as a whole in relation to national transport policy goals. The sector report is also meant to highlight and analyse how existing and proposed Swedish and international transport policy decisions, regulations and financial conditions influence maritime sector potential and contribute to the optimal fulfilment of the transport and industry policy goals.

Sector reports are a crucial part of the Swedish Maritime Administration’s sector role, which the Administration characterises with the key concepts of overview, overall sector monitoring, collaboration and influence. The task of the Swedish Maritime Administration is to monitor and meet the requirements and demands of external stakeholders in the maritime area and provide the Government Offices with professional expertise as a basis for decision making. In a broader sense, this means that the Swedish Maritime Administration must be proactive in social planning and participate in developments in the maritime sector, both nationally and internationally.

**THE SWEDISH MARITIME** Administration also co-operates with the parties involved in the overall maritime industry in an effort to develop favourable conditions for shipping in Sweden as well as for Swedish shipping. This involves working nationally and internationally for the transport policy goals that comply with international regulations and decisions of the state authorities. This is achieved by making agreements with the parties concerned, providing support and advice using the Administration’s expertise, paying attention to contingency planning issues, conducting and
participating in studies, providing information on the conditions and opportunities for the maritime sector and initiating research and development to achieve, for example, safer and more environmentally-compatible shipping.

Efforts to develop indicators must progress in order to highlight maritime development, particularly in the case of the transport policy goals of accessibility, transport quality and regional development. The Swedish Maritime Administration is working with other players in the sector to draw up a basis for analysing developments. As far as the Swedish Maritime Administration is concerned, the objective of this collaboration is to steadily evolve and enhance its sector reporting.

The sector report is aimed at the Swedish Parliament and Government as well as other authorities at the central, regional and local level, in addition to a broader circle of stakeholders inside and outside the maritime sector.

THE SUBSTANTIAL SHARE of maritime transport in overall international transport operations means that trading trends and policies pursued outside a country’s borders have repercussions on the composition of domestic decisions and regulations. The international character of shipping also means that the development of maritime sector regulations – both nationally and internationally – derive mostly from joint discussions in the European Union and the UN’s organisation, the International Maritime Organisation (IMO). The effects of events in the surrounding world have become evident in recent years and have had an impact on regulations adopted within various international organisations. Areas such as maritime security, maritime safety and environmental safety have been the subject of new, stricter regulations in international regulatory and legislative processes. Against this background, the Swedish Maritime Administration seeks to add a broader geographic focus that extends beyond the national arena.

THIS SECTOR REPORT has been structured so that, by way of introduction, it describes maritime traffic trends at Swedish ports and in the Swedish hinterland. This is followed by a special theme section dealing with icebreaking and international co-operation in the area of winter navigation. Subsequent chapters deal with the sector development in relation to Swedish transport policy goals. The sector report concludes with a brief outline of developments during the year.
Continuing positive trend in the shipping market
Increase in freight volumes at Swedish ports

Sweden's geographic position and its major dependence on foreign trade give shipping a dominant role in the country's international trade transport. More than 90% of all exports and imports are conveyed via cargo vessels or ferries.

Seaborne goods volumes in international trade in 2004 totalled 147.1 million tonnes. Most of this freight volume, or 113.8 million tonnes, was carried by cargo vessels. Ferry traffic (passenger vessels and rail ferries) transported a little more than 33.3 million tonnes of goods to and from Sweden in 2004. See Table 1 and 2.

Table 1: Goods volumes and number of calls, 2000–2004 (Source: Swedish Maritime Administration)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GOODS VOLUMES (1,000 tonnes)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cargo vessels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International goods</td>
<td>113,653</td>
<td>109,009</td>
<td>108,115</td>
<td>111,161</td>
<td>113,822</td>
</tr>
<tr>
<td>Of which, loaded goods</td>
<td>49,080</td>
<td>47,731</td>
<td>46,715</td>
<td>48,455</td>
<td>50,689</td>
</tr>
<tr>
<td>Of which, unloaded goods</td>
<td>64,573</td>
<td>61,278</td>
<td>61,400</td>
<td>62,706</td>
<td>63,133</td>
</tr>
<tr>
<td>Domestic loaded goods</td>
<td>10,042</td>
<td>9,682</td>
<td>9,585</td>
<td>9,744</td>
<td>9,148</td>
</tr>
<tr>
<td><strong>Total, cargo vessels</strong></td>
<td>123,695</td>
<td>118,691</td>
<td>117,700</td>
<td>120,905</td>
<td>122,970</td>
</tr>
<tr>
<td><strong>Passenger vessels and rail ferries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International goods</td>
<td>27,510</td>
<td>26,184</td>
<td>29,197</td>
<td>31,371</td>
<td>33,299</td>
</tr>
<tr>
<td>Of which, loaded goods</td>
<td>14,533</td>
<td>13,546</td>
<td>14,741</td>
<td>15,820</td>
<td>16,561</td>
</tr>
<tr>
<td>Of which, unloaded goods</td>
<td>12,977</td>
<td>12,638</td>
<td>14,456</td>
<td>15,551</td>
<td>16,738</td>
</tr>
<tr>
<td>Domestic loaded goods</td>
<td>686</td>
<td>613</td>
<td>778</td>
<td>854</td>
<td>825</td>
</tr>
<tr>
<td><strong>Total passenger vessels and rail ferries</strong></td>
<td>28,196</td>
<td>26,797</td>
<td>29,975</td>
<td>32,225</td>
<td>34,124</td>
</tr>
<tr>
<td><strong>Total international goods</strong></td>
<td>141,163</td>
<td>135,193</td>
<td>137,312</td>
<td>142,532</td>
<td>147,121</td>
</tr>
<tr>
<td><strong>Total domestic loaded goods</strong></td>
<td>10,728</td>
<td>10,295</td>
<td>10,363</td>
<td>10,598</td>
<td>9,973</td>
</tr>
<tr>
<td><strong>Goods, total</strong></td>
<td>151,891</td>
<td>145,488</td>
<td>147,675</td>
<td>153,130</td>
<td>157,094</td>
</tr>
</tbody>
</table>

Table 2: Goods volumes by type of goods, 1,000 tonnes

<table>
<thead>
<tr>
<th></th>
<th>Loaded international goods</th>
<th>Unloaded international goods</th>
<th>Loaded domestic goods</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil products</td>
<td>13,494</td>
<td>11,662</td>
<td>28,446</td>
<td>27,843</td>
</tr>
<tr>
<td>Forest products</td>
<td>9,819</td>
<td>9,679</td>
<td>10,058</td>
<td>10,273</td>
</tr>
<tr>
<td>Other than low-value goods</td>
<td>34,368</td>
<td>33,142</td>
<td>37,306</td>
<td>36,063</td>
</tr>
<tr>
<td>Low-value goods</td>
<td>7,542</td>
<td>7,680</td>
<td>1,654</td>
<td>1,863</td>
</tr>
<tr>
<td>Cars and caravans</td>
<td>2,027</td>
<td>2,113</td>
<td>2,407</td>
<td>2,214</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>67,250</td>
<td>64,276</td>
<td>79,871</td>
<td>78,256</td>
</tr>
</tbody>
</table>
In addition, in the case of domestic transport volumes, which amount annually to about 10 million tonnes, shipping continues to be of major significance. Overall, this means that Swedish ports reported a turnover of about 177 million tonnes of goods subject to charges in 2004, an increase of 2.6% from the previous year. Following the downturn in shipping conditions noted in 2001, freight volumes have increased by some 8%, or an average of 2.6% annually. Goods volumes on passenger vessels and rail ferries rose by approximately 27% and on cargo vessels by about 4%.

The table for goods volumes and vessel calls during 2000–2004 shows that total volumes have completely recovered from the downturn in 2001 and reached a record level in 2004. Ferry traffic accounts for the largest increase during the five years.

The larger freight volumes on cargo vessels are being handled by increasingly fewer calls, indicating that the average cargo volume per call during five years covered in the table above has risen from some 2,850 tonnes per call to about 3,900 tonnes per call, up almost 40%. There is a corresponding, but less pronounced, rise in loaded/unloaded goods volume per call for ferry traffic, with an increase of about 12%. In recent years, the focal point of traffic – in terms of the number of calls by vessels – has shifted towards increasingly towards ferry traffic. The trend towards using increasingly larger vessels appears set to strengthen. During the period 1998–2003, the average gross tonnage of vessels per vessel call, including ferries, rose by slightly more than 20%.

Of the total goods transported via Swedish ports in 2004, the South Coast and West Coast accounted for 63%. Growth in goods volumes in the past year occurred mainly on the West Coast, which accounts for virtually all of the

Table 3: Number of calls by geographic area

<table>
<thead>
<tr>
<th>Cargo vessels</th>
<th>Passenger vessels and rail ferries</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf of Bothnia</td>
<td>2,779</td>
<td>2,615</td>
</tr>
<tr>
<td>Sea of Bothnia</td>
<td>3,149</td>
<td>3,079</td>
</tr>
<tr>
<td>Stockholm-Mälaren</td>
<td>4,010</td>
<td>4,101</td>
</tr>
<tr>
<td>East Coast</td>
<td>3,434</td>
<td>3,938</td>
</tr>
<tr>
<td>South Coast</td>
<td>7,800</td>
<td>8,591</td>
</tr>
<tr>
<td>Lake Vänern</td>
<td>1,195</td>
<td>1,250</td>
</tr>
<tr>
<td>West Coast</td>
<td>9,123</td>
<td>8,954</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31,490</td>
<td>32,837</td>
</tr>
</tbody>
</table>

(Source: Swedish Maritime Administration)

Table 4: Goods volumes, exc. cars and caravans, distributed by geographic area, 1,000 tonnes

<table>
<thead>
<tr>
<th>Loaded international goods</th>
<th>Unloaded international goods</th>
<th>Loaded domestic goods</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf of Bothnia</td>
<td>6,786</td>
<td>6,675</td>
<td>6,206</td>
</tr>
<tr>
<td>Sea of Bothnia</td>
<td>3,973</td>
<td>3,677</td>
<td>6,006</td>
</tr>
<tr>
<td>Stockholm-Mälaren</td>
<td>4,801</td>
<td>4,532</td>
<td>9,238</td>
</tr>
<tr>
<td>East Coast</td>
<td>6,726</td>
<td>6,925</td>
<td>4,972</td>
</tr>
<tr>
<td>South Coast</td>
<td>16,294</td>
<td>16,020</td>
<td>17,235</td>
</tr>
<tr>
<td>Lake Vänern</td>
<td>1,195</td>
<td>1,250</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65,222</td>
<td>62,163</td>
<td>77,464</td>
</tr>
</tbody>
</table>

(Source: Swedish Maritime Administration)
The total increase in goods volumes at Swedish ports. The Northeast Coast also displayed higher volumes, with a rise of 2–3%. Exports from ports in the Gulf of Bothnia accounted for most of the increase. Loaded domestic freight fell by a little more than 5%. Oil products account for most of the decline, falling by almost 12% or 0.5 million tonnes.

However, the change in freight volumes does not provide a comprehensive picture of trends in regional maritime traffic. The sharp volume growth noted earlier for ports on the East Coast, as a result of rising trade with the Baltic States and Poland in particular, now appears to have levelled off. The number of vessel calls has decreased by almost 13%, while total goods volumes have fallen by almost 6%. A similar trend is noted for ports on the South Coast, with the number of calls falling by a little more than 9% for cargo vessels and by almost 6% for passenger vessels. The decline in passenger vessel traffic occurred simultaneously with a rise in freight volumes by ferry traffic by some 2 million tonnes, or about 6%.

Other changes in freight volumes in the transport system are due mainly to the ongoing trend towards greater specialisation at Swedish ports. The transportation of crude oil and oil products dominates the West Coast; container goods predominate on the West and South coasts; bulk goods prevail on the East Coast; and forest raw materials and forest products dominate traffic on the Northeast Coast. See Table 3 and 4 on page 10.

**International ferry traffic**

The ferry line network represents an effective traffic system, transporting almost 23% of Sweden’s total seaborne international trade in 2004, a share that has continually edged up from 2000, when the percentage was just under 20%. Ferry lines operate between Sweden and Denmark, Norway, Finland, Germany, Poland, Estonia, Latvia, Lithuanian and the UK.

The ferry market has stabilised following the negative effects of the removal of tax-free sales in traffic between EU countries and the opening of the Öresund Bridge.

During the period January–September 2004, the number of ferry passengers to and from Sweden remained essentially unchanged compared with the same period in 2003. Significant changes have occurred in traffic to Norway, with the number of passengers falling by almost 50%, as well as in traffic to Poland and the Baltic States, with passenger numbers rising by some 17%. Changes are marginal in terms of the number of sailings, except in the case of the UK, for which the number of sailings rose by a little more than 20% between 2003 and 2004. See Table 5.

### Table 5: Passenger vessel and rail ferry traffic, Jan.–Sept. 2003–2004, 1,000s

<table>
<thead>
<tr>
<th></th>
<th>Number of sailings</th>
<th>+/−</th>
<th>Number of passengers</th>
<th>+/−</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>36,435</td>
<td>-2.8%</td>
<td>5,974</td>
<td>1.7%</td>
</tr>
<tr>
<td>Germany</td>
<td>6,218</td>
<td>-2.2%</td>
<td>1,043</td>
<td>-5.6%</td>
</tr>
<tr>
<td>Finland</td>
<td>5,470</td>
<td>3.1%</td>
<td>3,629</td>
<td>5.2%</td>
</tr>
<tr>
<td>Norway</td>
<td>1,917</td>
<td>-2.7%</td>
<td>389</td>
<td>-42.6%</td>
</tr>
<tr>
<td>Poland and Baltic States</td>
<td>4,033</td>
<td>-1.0%</td>
<td>714</td>
<td>16.9%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>601</td>
<td>22.4%</td>
<td>52</td>
<td>0.0%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>54,674</strong></td>
<td><strong>-1.8%</strong></td>
<td><strong>11,801</strong></td>
<td><strong>0.3%</strong></td>
</tr>
</tbody>
</table>

(Source: Swedish Maritime Administration)
Travel using domestic ferry traffic

The overwhelming share of domestic ferry traffic is conducted by the Swedish Road Administration’s ferry service, which transports about 27 million passengers and 11 million vehicles annually.

Gotland traffic accounted for almost 1.5 million passengers in 2004, up by slightly more than 30,000, or 2.2%, from 2003. See Figure 1. During the period 1993–2004, passenger numbers rose a full 56%. The larger car-deck capacity of new ferries on the Gotland routes prompted an increase of 4.9% in the number of transported cars in 2004, which totalled 378,829.

Domestic maritime freight transport

While goods volumes in international maritime transport have risen steadily in recent years, goods volumes on domestic routes have not seen a similar growth rate, remaining stable at about 10 million tonnes.

However, as a percentage of total transported volumes, goods volumes in domestic transport are actually declining, with a decrease from 7.1% till 6.3% during the five-year period.

Figure 1: Number of passengers using Gotland traffic 1993–2004, 1,000s. (Source: Destination Gotland)
The East and West coasts represent the core of domestic maritime transport, accounting for 62.5% of domestic goods volumes in 2004.

Freight transport using the Gotland routes is conducted primarily using trucks and trailers, with the volume measured in linear metres. Measured in this manner, the volume in 2004 rose by 31,877 linear metres and totalled 641,772, or an increase of 5.2%. The largest increase was on the Nynäshamn–Visby route. The distribution of freight is essentially equal between the Nynäshamn–Visby route (319,229 linear metres) and Oskarshamn–Visby route (322,543 linear metres).

**Cruise traffic**

Cruise traffic in Sweden is conducted primarily at two ports, Visby and Stockholm. The cruise market shows a trend towards increasingly larger vessels, as indicated by the rising number of passengers and the decreasing number of calls.

For Stockholm, the 2004 season essentially entailed an unchanged volume of 204 calls and a total of 210,000 passengers. During 2003, 214 cruise liners called with 202,000 passengers. Cruise traffic to Visby in 2004 totalled 98 cruise liners with 68,631 passengers – a sharp fall from 2003 when passenger numbers totalled 102,500.

By way of comparison, it may be noted that in 2004 Tallinn reported 232 cruise liners and 206,000 passengers; while Copenhagen had calls from 264 cruise liners with a total of 320,000 passengers.

**Russian oil transport is adding to maritime traffic in the Baltic Sea**

Since the Baltic States gained independence in the early 1990s, Russia has invested heavily in the expansion of port capacity in the Gulf of Finland, primarily in a bid to ensure shipping capacity for its growing oil and gas exports. The
expansion of port capacity has made substantial progress, while freight volumes via Baltic and Polish ports continue to rise. Rising Russian oil exports have been facilitated by access to venture capital, which is again available following the rouble crisis in 1998. In addition, high global oil prices have stimulated output, which rose almost 9% in 2004. However, there is now a risk that the growth of the Russian economy will halt as doubts arise about the Government’s interest in reforms and its economic policy, with a need for a clarification of its approach in order to ensure continuing access to venture capital. Another threat scenario for Russian oil exports is the emergence of a lopsided focus on the oil industry, with declining expenditure in other sectors, which would have serious implications in the event of a reversal in global oil prices.

Russia’s foreign trade advanced by more than 30% in 2004 compared with 2003. Oil exports rose more than 17%, amounting to 182 million tonnes in 2004. This rapid growth rate means that the expansion of port capacity in the Gulf of Finland will not suffice to meet the need for export ports for Russian oil, especially in view of the problems associated with ice that can arise during the winter period. Consequently, Russia has far-reaching plans to expand its oil pipeline system to the Murmansk area and to the East Coast, along with a capacity increase in the pipeline through the Baltic States to the Russian port of Primorsk, which opened in December 2001. The Russian authorities have stated explicitly that the export of oil should move preferably via Russian ports rather than foreign ports. However, given the continuing rise in oil exports, we may again see a rise in the export of oil by rail – particularly via Muuga in Estonia and Ventspils in Latvia – which fell sharply following the completion of the Primorsk port, to which the oil is conveyed by pipeline.

The most extensive port developments are taking place in the Russian section of the Gulf of Finland, where the Primorsk oil port was commissioned in December 2001. As early 2002, its first year of operation, 12.4 million tonnes of oil were shipped out via the port. In 2004, the volume rose to 44.6 million tonnes. When fully developed, Primorsk is expected to have a capacity of some 60 million tonnes. The St. Petersburg port reported a goods volume of 51.2 million tonnes in 2004, a rise of about 22%. The port also handled 776,576 TEUs compared with Gothenburg’s 731,000 TEUs. Another major port project in the Gulf of Finland is the Vysotsk port, which was completed in 2004. The port at Vysotsk – constructed by Lukoil – is designed for a capacity of 10 million tonnes of light oil products. Other Russian port projects are in progress at Batareinaya, Varandeya, Bronka, Murmansk, and Vitino. In Kaliningrad, a strategic investment is underway in a new port for freight and ferry traffic and a new oil terminal was recently commissioned. A twofold increase in turnover is expected during the next five years. In 2004, the port raised its turnover by 10% to almost 14 million tonnes. It may also be noted that container handling rose by more than 60% to 72,094 TEUs.

Freight volumes in Estonian ports continued to rise in 2004. The port of
Tallinn increased freight volumes by some 300% during the past decade. Following a slight fall in total freight volumes in 2003, they rose again in 2004 by a little more than 7%. Oil accounted for 69% of the total volume. Container handling totalled 113,000 TEUs, an increase of more than 13%.

Ventspils in Latvia handled 17.7 million tonnes of oil and oil products in 2004, or 4% less than the previous year. After the Russian company Transneft halted crude oil deliveries via pipeline to Ventspils, deliveries of oil products to ports via rail increased. Riga port handled a total of 24 million tonnes of goods in 2004, up more than 10% from the previous year. The handling of coal, for which volumes surged by some 80%, was the primary contributory factor to the volume increase in the port. For example, oil products fell by 11%, RoRo freight by 29% and fertilisers by 26%. However, container handling rose 4.5% to 152,166 TEUs.

Klaipeda in Lithuania saw freight turnover fall by almost 5% to a little more than 20 million tonnes. The primary factor was the 53% decrease in bulk goods as a result of unfavourable Russian rail tariffs. Turnover for oil products declined by 3% to a little more than 6 million tonnes. However, container handling at the port rose by 14% to 174,241 TEUs.

Continuing positive trend in the shipping market
Efficient winter navigation – a prerequisite for competitive Swedish industry
As the theme chapter in this year’s sector report, we have selected winter navigation, an area that is increasingly marked by co-operation among Baltic Sea countries. The chapter is aimed at highlighting the conditions underlying icebreaking operations and describing the development of regional co-operation in icebreaking activities in the Baltic Sea. A description of operations during the 2003/04 ice season is presented in the section dealing with accessibility, regional development and transport quality.

**Icebreaker command centres balance icebreakers and traffic restrictions**

Efficient winter navigation is a prerequisite for ensuring accessibility by means of a smoothly functioning maritime transport system in the Baltic Sea region throughout the year.

In their efforts to keep sea-lanes open during the winter and ensure efficient traffic flows through the ice, the icebreaker command centres primarily have three tools at their disposal:

- **Information** to merchant shipping indicating the optimal navigational route through the ice-covered waters, which is of key importance in reducing delays due to sea ice. Sea ice moves with the winds and currents. Pressure leads to the formation of solid ice ridges. Daily information is collected from satellites, helicopter surveillance and other vessels. The information is compiled and conveyed to merchant shipping in the form of recommended routes to follow.

- **Icebreakers** and their crews are the lead players in icy seas, but when the winter navigation system begins to slow down as a result of increasingly troublesome ice formation, and icebreaker resources no longer suffice to maintain the pace in maritime traffic, the icebreaker command centres raise traffic restrictions. Only suitably strong vessels are then permitted to navigate in ice-covered waters, and maritime traffic may experience minor delays. It is important to balance the number of deployed icebreakers with traffic restrictions to attain efficient winter navigation.

- **Traffic restrictions** are used for safety and efficiency reasons. Current and planned traffic restrictions are circulated via, for example, the Internet to the shipping industry, which thus knows in good time the type of vessel that may be used for transport to and from ports. A vessel must be sufficiently robust to cope with the stresses and strains than arise in ice. The ability of the vessel to move through the ice under its own power is extremely important for winter navigation. Vessels that do not perform well in ice – as a result of inferior engine power or inappropriate hull design – require more assistance time from icebreakers than vessels with favourable ice characteristics.

Finnish-Swedish ice classifications indicate the engine output of a specific vessel for a certain ice class. A minimum requirement is that a vessel in normal weather conditions and using its own power must be able to follow after a convoy assisted by an icebreaker without getting trapped or delaying the convoy because of low speed. In the event of more difficult weather conditions,
occasionally the only solution is to tow vessels one by one, leading inevitably to delays. The number of icebreakers does not suffice to tow weak vessels in normal winter conditions.

**Costs and financing of the Swedish icebreaker service**

In a normal winter, the costs for the Swedish icebreaker service amount to about SEK 230 million. Costs during a mild winter are some SEK 190 million, while a harsh winter will boost costs to almost SEK 300 million.

*Figure 2* above shows the cost increase in the early 2000s in conjunction with the phase-out of the old icebreakers Tor and Njord and their replacement by the new icebreaking Viking vessels. Additional costs for the transition from military to civilian crewing also rose during this period. The severe ice season of 2002/2003 is also notable in the diagram.

The state-operated icebreaking service in Sweden is financed by means of fairway dues levied on merchant shipping calling at Swedish ports. The financing of icebreaking services has been a hotly debated issue in recent years. For example, in its final report, the Swedish Freight Transport Delegation, appointed in 2002, proposed that the state should provide base financing for icebreaking by means of a grant.

Most of the costs associated with icebreaking are fixed costs in the form of capital costs, crewing and so forth. The sharp rise in costs during a harsh winter is due to higher costs for the chartering of tugboats, helicopter surveillance and bunkering, etc.

**Imbalance in the distribution of icebreakers in the Baltic Sea**

One of the fundamental problems facing the icebreaking service in the Baltic Sea is the dimensioning of the icebreaker fleet, as the severity of the winter varies sharply from year to year. An icebreaker is costly to build and maintain, and thus it is important to identify solutions for alternative deployment when the vessel is not required by the icebreaking service.

Via the Swedish Maritime Administration, Sweden operates five icebreakers, Oden, Atle, Frej, Ymer and Ale, of which the last mentioned is a small icebreaker used on Lake Vänern and to conduct hydrographic surveys during the summer season. Also, as a result of a long-term contract with B&N Viking Icebreaking & Offshore AS, the Swedish Maritime Administration has access to three more icebreaking vessels whenever required during the winter period of January through March. These are otherwise active in offshore operations. The icebreaker Oden is frequently chartered out in the summer for research expeditions to the Arctic.

Finland has a total of nine icebreakers. Three of these are offshore vessels that are chartered out to offshore operations during the summer period.

Germany has built two new icebreakers that are also used in coast guard operations, fairway maintenance, emergency towing, environmental protection/oil pollution prevention and firefighting. However, these are not dimensioned for the considerably harsher ice conditions in the northern areas of the Baltic Sea. Denmark has three icebreakers and is studying the conditions for
replacing one or more of these with a multipurpose vessel for environmental protection/oil pollution prevention/fire-fighting and icebreaking. Russia has between two and four sea-going icebreakers in the Baltic Sea, depending on the severity of the ice season and the priority among other regions in Russia. Estonia and Latvia each have a sea-going icebreaker at their disposal, while Lithuania and Poland have no icebreakers. In addition, there is a variety of tugboats for port icebreaking and towing in ice channels in the Baltic Sea.

Thus, in the Baltic region there is a total of about 25 icebreakers designed for icebreaking operations at sea. This fleet is currently too large for mild winters, a little too small for a normal ice season and definitely insufficient for a harsh winter. The capacity is reasonably balanced if only Swedish requirements are taken in account, but overall icebreaking capacity in the Baltic Sea region is insufficient. The last harsh winter, with ice formation all the way from the Swedish West Coast, occurred in 1986/87. During a normal ice season, imbalance arises in icebreaking resources among the Baltic countries. There is idle icebreaker capacity in certain parts of the Baltic Sea, such as in Sweden and Denmark, while in other parts of the Baltic there is a need for extra resources. In particular, there is a shortage of icebreaking resources in the Russian section of the Gulf of Finland and in Estonian waters, where major problems frequently arise even during a normal winter. In the Bay of Riga, there is only one sea-going icebreaker. This means that winter shipping in the Bay of Riga is vulnerable and it makes Riga port completely dependent on the functioning of this single icebreaker during ice seasons.

Nordic co-operation in icebreaking

The Nordic countries have a lengthy tradition of co-operation in icebreaking operations. As early as 1961, an agreement – referred to as the Nordic Treaty – was signed covering co-operation between Finland, Sweden, Denmark and Norway. The treaty is still in force and remains largely applicable. During a meeting between the icebreaking authorities of the Baltic Sea states in 1999, the German icebreaker service declared its affiliation to the co-operation organisation. Finland, Denmark, Germany and Sweden have a joint plan aimed at maintaining navigation from the Skagerrak/Kattegat and the Kiel Canal all the way...
up to the ports in the Gulf of Bothnia during a harsh winter. However, there is not sufficient capacity to assist vessels to the ports of other countries.

Closer co-operation between all Baltic countries is a means of creating the conditions for efficient maritime transport during normal ice seasons.

The Nordic Treaty states that the particular nation's icebreaking resources are firstly to be used in its own coastal waters, but that collaboration with other countries is to proceed in line with agreements between the icebreaker command centres. For natural reasons, co-operation between Sweden and Finland has made most progress since the treaty came into force. Swedish and Finnish icebreakers co-operate and are active where they are most needed, whether this is at Swedish or Finnish ports.

A joint computerised command system for operational planning and co-ordination of assistance activities is available onboard all Finnish and Swedish icebreakers and at the icebreaker command centres in each country. The system is automatically updated via satellite with information from the AIS automatic identification system, which provides information on the merchant vessel's identity, position, speed, draught, destination, etc. Satellite coverage showing the position of drift ice is circulated to the icebreakers using the same system and is of major assistance for the icebreaker service. This information is necessary to enable a number of icebreakers to plan assistance operations jointly and efficiently.

Sweden is seeking to further extend Swedish–Finnish co-operation. The Swedish Maritime Administration has proposed that a joint study be conducted to identify how closer co-operation and efficiency gains for both parties can be achieved. Joint administration is a potential area for study. Further ahead, there is a vision of a joint Baltic icebreaker service involving all the Baltic Sea countries that benefit from winter navigation.

The major change that is currently having the greatest impact on the balance in Finnish–Swedish icebreaker co-operation is the growing maritime traffic at Torneå port in Finland. Due to the expansion of Outokumpu's output of stainless steel goods, turnover in the port in the immediate future is expected to rise from about 200,000 tonnes to about 3 million tonnes annually. In practice this means that traffic will increase from about two vessel calls per week to about two calls per day. Torneå's geographic location far up in the Gulf of Bothnia, with a lengthy fairway into the port, entails a considerable rise in icebreaker service. A rough estimate suggests that, on full capacity utilisation, the increase in maritime traffic to Torneå port will require resources equivalent to a single icebreaker.

The scope of the state-operated ice-breaking service differs between Sweden and Finland. In Finland, the state has responsibility for icebreaking all the way to the port area, while vessels in Sweden are assisted only up to waters that are protected from drift ice. When required, vessels are given further assistance through ice channels by tugboats owned or chartered by the port or industry. To ensure open fairways to Swedish ports throughout the year, winter navigation is dependent on the efficient functioning of state-operated icebreaking services and port icebreaking.

In this context it may be worth commenting on the development of the Swedish tugboat fleet. The tugboat fleet north of Stockholm consists of older vessels, with a few exceptions. The ports are concerned about the costs expected to arise when these tugboats are to be replaced. Most tugboats built in recent years are fitted with bow propulsion units, which provide excellent manoeuvrability, but are unsuitable in ice.
Baltic co-operation offers safer winter navigation

In terms of ice formation, the 2002/03 ice season was normal but also extremely troublesome along the Finnish coast, in the Gulf of Finland and in the Bay of Riga. This period also saw the commencement of the shipment of crude oil with large tankers from the Russian oil port of Primorsk in the Gulf of Finland.

More than one hundred merchant vessels were damaged in various ways in ice during the 2002/2003 ice season and many were left helpless for several weeks in the Gulf of Finland. The risk of accidents that could result from oil spills into the sensitive marine environment of the Baltic Sea led governments in countries around the Baltic, including that of Sweden, to react and decide to take measures to raise safety in winter navigation.

Within the framework of the HELCOM co-operation scheme, a policy was drawn up and new joint recommendations for ice classification of vessels and traffic restrictions were adopted by the HELCOM countries in March 2004.

New Finnish-Swedish ice class rules apply as of 1 January 2005. The change essentially means that smaller vessels require stronger engines while large vessels can cope with slightly smaller engines than in the previous rules. Hull design also influences propulsion requirements.

Considerable research is in progress in the area of winter navigation. A number of research projects are in progress and a selection of these is described in the section on maritime safety research in this report.

Special conditions for winter navigation on Lake Vänern

A vessel’s freight capacity is a key factor underlying profitability in winter navigation on Lake Vänern. Designing and building a vessel to carry the maximum load through the locks up to Lake Vänern entails giving it an inappropriate hull shape for navigation in ice, which in turn imposes far-reaching requirements on the vessel’s engine output. Following discussions with shipping companies and industry around Lake Vänern, the Swedish Maritime Administration has granted state icebreaker assistance even though vessels do not meet Finnish-Swedish propulsion requirements. A Swedish national ice class has been created for “Lake Vänern traffic” in which the requirements for hull strength are as strict as the Finnish-Swedish rules, but engine output is permitted to be lower. The reason for this is that the vessel would otherwise be unreasonably costly to build. Both the Swedish Maritime
Administration and the shipping industry are aware that the waiting time for icebreaker assistance on Lake Vänern may increase as a result of this solution.

**Baltic Sea co-operation for higher efficiency – a development area**

The problems that arose for shipping during the troublesome 2002/03 ice season, along with a series of changes in shipping, have hastened the development of co-operation in the winter navigation area in the Baltic Sea. Examples of changes in shipping that affect icebreaking include:

- The increase in the number of merchant vessels in the Baltic Sea, at the same time as vessels have become larger and more powerful and perform better in ice conditions.

- The sensitivity of industry to delays is greater today than it was during the last harsh winter 18 years ago. The “Just in time” concept in industry does not permit any major delays without substantial costs arising due to shortages of products or raw materials.

- The most recently built Swedish and Finnish icebreakers are more powerful and more efficient than those decommissioned.

- There are fewer tugboats suitable for assisting vessels in ice and which can be chartered to serve as auxiliary icebreakers.

In pace with rising Russian oil shipments, there is a greater need for large, ice-reinforced tankers. Only a limited number of such vessels are available worldwide, although new vessels are being built to serve these waters. In recent years, the Finnish company Fortum has used two very powerful icebreaking tankers to transport mainly crude oil from Russia to Finland. These two tankers usually cope without icebreaker assistance. Other shipping companies plan to build a number of large, ice-reinforced tankers specially designed for ice and Baltic Sea conditions. Longer term, there is likely to be a sufficient number of ice-reinforced vessels to transport crude oil from Russia through the Baltic Sea ice. At present, no icebreakers are dimensioned for assisting a large tanker. Any assistance in these cases requires two icebreakers working in parallel.

Currently, there is no operational co-operation between Finland/Sweden and Russia/Estonia/Latvia. As noted earlier in the chapter, the excessive imbalance in icebreaker resources means that co-operation in line with the Finnish-Swedish practice would not be beneficial for all parties. A re-balancing of icebreaker resources could contribute to overcoming the current imbalance among Baltic Sea
countries and create the conditions for greater co-operation in operations.

Within the framework of the Trans-European Transport Network – TEN-T – a working group with members from the Baltic Sea countries was set up in spring 2004 to create more efficient winter navigation in the Baltic and reduce as far as possible delays due to sea ice. Reliable, safe and efficient shipping throughout the year is a prerequisite for ensuring accessibility in the region and for dissuading freight owners from transporting goods by road to the more central parts of Europe, which further strains Northern Europe’s already highly congested road and rail networks.

Baltic Icebreaking Management, BIM, is an organisation with members from all Baltic Sea countries. BIM is an extension of the annual icebreaker forums between the Baltic Sea countries that have been held for more than 20 years. These forums offer an opportunity to exchange experience from the past icebreaking season and to discuss co-operation in icebreaking.

During the icebreaker forum of 21–22 September 2004 in Helsinki, it was decided that BIM would develop into a joint forum for work involving the development of winter navigation and icebreaker co-operation among the Baltic countries. A revised organisational concept, strategy and logo for BIM were adopted at the meeting. BIM is thus active throughout the year and not just in connection with the annual icebreaker forum. Sweden will chair the organisation until 2006.

An overriding aim of BIM is to ensure smoothly functioning navigation in the Baltic Sea throughout the year by strengthening strategic and operational co-operation among Baltic Sea countries in the icebreaking area. The goal and action plan for BIM derive originally from co-operation initiated within the framework of TEN-T and the Motorways of the Sea concept, which was adopted in April 2004. This development of BIM is a good solution, since Russia is a member of BIM, and Russian participation in icebreaker co-operation in the Baltic is of primary importance.

Within the framework of BIM and the Sea Motorways concept, an action plan for winter navigation in the Baltic Sea is in progress and a number of activities will be conducted. These include:

- A joint Baltic Sea project aimed at improving information for shipping in the Baltic Sea.
- Preparation of agreements between Baltic Sea countries to facilitate better use of existing icebreakers during normal ice seasons. For example, in autumn 2004 the Swedish Maritime Administration signed an agreement with its Estonian counterpart, which offers Estonia the potential to charter a Swedish icebreaker when it is not required in Sweden. This will considerably improve navigation to Estonia during a normal winter. In the event of a harsh winter, there are currently no plans to solve the winter shipping problems of these countries.
- A study of the potential for a joint icebreaker service in the Baltic Sea.
- A simulation of future action requirements in the form of icebreakers and traffic restrictions to cope with a particular vessel flow.
- A study of the potential to encourage shipping companies to invest in vessels with icebreaking capacity for high-frequency lines in areas under ice for protracted periods each winter.
- Model testing of a new type of high-powered icebreaker designed to assist large tankers.

As a result of higher activity in BIM and the common views among the Baltic Countries regarding efficient winter navigation and closer co-operation, there is favourable potential to jointly create more efficient winter navigation in the Baltic Sea.
Competitiveness of the Swedish merchant fleet
Northern European merchant fleet in decline

The merchant fleet controlled by Northern European interests comprised slightly more than 12,000 vessels in 2004, a decline of almost 5% in number from 2003. As noted in Figure 4, the decrease is spread over a variety of vessel types. The sharpest fall is in the container and bulker segment. However, in terms of deadweight tonnage, the reduction is less than 3%. The decline in deadweight tonnage is greatest among bulk and container vessels, which fell by 11% and 20%, respectively.

Between 2003 and 2004, the number of passenger ships declined in number, while simultaneously rising in terms of deadweight tonnage. The size of the average passenger vessel rose from an average of 1,660 deadweight tonnes to 1,800, an increase of slightly more than 8%.

In deadweight tonnes, tankers are the single largest type of vessel, representing some 40% of the total Northern European merchant fleet.

As shown by Figure 5 on the next page, in terms of deadweight tonnage, Norway, Germany, Denmark, Russia and the UK dominate the Northern European merchant fleet. The Figure also shows that only a small portion of this tonnage sails under the homeland flag. However, measured as the number of vessels, Figure 6 shows that a more significant share sails under homeland flags – in the case of Russia, the absolute majority in terms of the number of vessels. This means that the larger vessels, which are also substantially more modern, sail under other flags.

The average age of the merchant fleet operated by Northern European companies was 16.8 years in 2004. Ireland, Germany and the Isle of Man have the most modern fleets, while ships from countries such as Estonia, Lithuania, Russia and Latvia had an average age of 20 years. Half of Estonia’s merchant fleet is more than 25 years old. Estonia, Russia and Lithuania also have a smaller proportion of vessels less than 5 years old.

Container vessels have the lowest average age, that is, 8.3 years. The average age of other vessel types ranges from 15 to 20 years. The average age for tankers is 15.7 years.

Nordic shipping companies are investing heavily in new vessels, with Norwegian and Danish companies accounting for the largest investments. Of the total value of Nordic ship orders placed in

![Figure 4](Source: Swedish Institute of Shipping Analysis – SAI)
2004, the proportion placed by Swedish companies was less than 10%. See Table 5.

The number of ships on order for Swedish companies is the highest in several decades, with 59 on order in December 2004. Most of these are tankers (40), but car transport vessels (6), RoRo/Ropax/passenger ships and bulkers also appear on the order books. The scheduled delivery times for these vessels is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>22</td>
</tr>
<tr>
<td>2006</td>
<td>21</td>
</tr>
<tr>
<td>2007</td>
<td>15</td>
</tr>
<tr>
<td>2008</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
</tr>
</tbody>
</table>

These 59 ships are on order from shipyards in a number of continents. Asia dominates, accounting for about one-third of orders. The list is as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>18</td>
</tr>
<tr>
<td>Croatia</td>
<td>14</td>
</tr>
<tr>
<td>South Korea</td>
<td>9</td>
</tr>
<tr>
<td>Norway</td>
<td>4</td>
</tr>
<tr>
<td>Holland</td>
<td>3</td>
</tr>
<tr>
<td>Turkey</td>
<td>3</td>
</tr>
<tr>
<td>Finland</td>
<td>3</td>
</tr>
<tr>
<td>Poland</td>
<td>2</td>
</tr>
<tr>
<td>Russia</td>
<td>2</td>
</tr>
<tr>
<td>Italy</td>
<td>1</td>
</tr>
</tbody>
</table>

**Swedish flagged and Swedish controlled merchant fleet**

Conditions in the shipping industry are better now than in many years. As noted earlier in this chapter, this is also reflected in vessel orders and high activity at many Swedish shipping companies. However, by no means all vessels controlled by Swedish companies fly the Swedish flag. The definition of Swedish-controlled tonnage is that the vessel is owned or operated by a Swedish company, or has Swedish management.

To monitor the competitiveness of the Swedish shipping industry, the Swedish Maritime Administration has drawn up statistics of Swedish-controlled tonnage and its distribution by flag. See Table 6.

Overall, Swedish-flagged tonnage represents the lesser portion of Swedish-
controlled tonnage, in terms of the number of vessels and deadweight tonnage. Also, on average, foreign-flagged vessels are considerably larger than Swedish-flagged vessels (about 26,000 DWT compared with some 8,400 DWT).

However, a closer study of the table reveals that for passenger vessels/ferries and RoRo vessels, the Swedish-flagged fleet dominates in terms of the number of vessels and deadweight tonnage.

**Figure 8** on the next page shows trends in Swedish-controlled and Swedish-flagged tonnage. It is clear that the downward trend since the mid-1990s has reversed and has actually edged up in recent years for both Swedish-controlled and Swedish-flagged tonnage in terms of deadweight tonnage.

**Aid to shipping in the EU**

As regards the issue of state aid and competition questions, the European Commission has far-reaching authority via the Treaty. Over a protracted period, the European Commission has pursued an active maritime policy aimed at ensuring employment opportunities for EU citizens onboard and ashore.

**Table 5: Nordic investments in new vessels 2004 (USD millions)**

<table>
<thead>
<tr>
<th>Type</th>
<th>No.</th>
<th>USD M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tankers</td>
<td>120</td>
<td>5,743</td>
</tr>
<tr>
<td>Dry cargo</td>
<td>60</td>
<td>3,065</td>
</tr>
<tr>
<td>Ropax/ferries</td>
<td>20</td>
<td>1,190</td>
</tr>
<tr>
<td>Offshore, etc.</td>
<td></td>
<td>259</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>12,613</td>
</tr>
</tbody>
</table>

(Source: Scandinavian Shipping Gazette, 14 January 2005)

**Table 6: Swedish-controlled vessels by type of vessel**

<table>
<thead>
<tr>
<th>Type</th>
<th>Number</th>
<th>SWEDISH FLAG</th>
<th>OTHER FLAGS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>DWT</td>
<td>Gt</td>
</tr>
<tr>
<td>Bulker</td>
<td>16</td>
<td>67,831</td>
<td>48,186</td>
</tr>
<tr>
<td>Container</td>
<td>3</td>
<td>12,152</td>
<td>9,074</td>
</tr>
<tr>
<td>Dry cargo</td>
<td>45</td>
<td>208,030</td>
<td>17,941</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>17</td>
<td>26,625</td>
<td>34,908</td>
</tr>
<tr>
<td>Offshore</td>
<td>4</td>
<td>5,200</td>
<td>17,941</td>
</tr>
<tr>
<td>Passenger/Ferry</td>
<td>37</td>
<td>134,427</td>
<td>828,711</td>
</tr>
<tr>
<td>Reefer</td>
<td>8</td>
<td>719,325</td>
<td>648,858</td>
</tr>
<tr>
<td>RoRo</td>
<td>62</td>
<td>1,016,821</td>
<td>1,954,262</td>
</tr>
<tr>
<td>Tanker</td>
<td>74</td>
<td>640,881</td>
<td>424,950</td>
</tr>
<tr>
<td>Total</td>
<td>233</td>
<td>1,958,033</td>
<td>3,362,200</td>
</tr>
</tbody>
</table>

(Source: SAI)

*Swedish-controlled vessels by type of vessel, December 2004, Swedish and foreign flags, number and deadweight, gross and net tonnage.*
developing know-how and maritime expertise in the Union, and improving maritime safety.

In the case of state aid to shipping, there is a framework within which EU countries must work in order to avoid the risk of being summoned by the EU Court. Since these guidelines for state aid provide the framework for maritime aid in the EU countries, it is interesting to look more closely at what the regulations offer in terms of opportunities and how they are applied in the EU countries.

Adopted in 1989, the initial guidelines for state aid to maritime transport were aimed at closing the cost gap between EU-flagged vessels and vessels flying flags of convenience. New guidelines were adopted in 1997 that clarify the various types of approved state aid. The guidelines gave member states the potential to provide tax exemptions for EU-based shipping companies and primarily for vessels flagged in EU countries. Most of the EU countries have utilised the opportunity to provide state aid in line with the 1997 guidelines.

In 2003, the European Commission completed a revision of the 1997 guidelines. The new guidelines began to apply as of 17 January 2004 and extend to 2011. One innovation is the potential for aid in short sea shipping, which is defined as transport between ports within the EU. Aid may be provided in a maximum amount of 30% of the operating costs of a new operation that permits a shift of transport from road to sea. This type of support may extend for a maximum of three years.

The new guidelines clarify the rules surrounding tax exemptions for onboard employees. These guidelines permit exemptions for all onboard employees, irrespective of nationality. However, in the case of onboard employees in short sea shipping, they must be EU/EAA citizens.

It is difficult to say how the new guidelines will be applied in the various EU countries and the approach adopted among the various EU countries varies widely. For example, the guidelines are applied fully in the Netherlands, while Estonia is working for the complete

Figure 8

Swedish-controlled and Swedish-flagged merchant fleet, 1994–2004. (Source: SAI)
removal of all state aid to shipping in the EU.

Tax systems in the EU countries differ. Corporate tax varies from 12.5% in Ireland till 40-50% in countries such as Germany and Italy. Corporate tax in Estonia amounts to 15% on paid-out profits. In Greece and Cyprus, tonnage tax is the only alternative for shipping lines.

There are a number of ways in which shipping companies can receive tax exemptions:
- Aid to cover costs for those employed onboard
- Tonnage tax
- Accelerated depreciation of vessels
- Tax-free reserves for capital gains

Aid to cover costs for onboard employees is a significant portion of aid to shipping in the various EU countries. Aid takes different forms in the various EU countries. The most extensive form of state aid for onboard employees is the “net model”. The net model is used in Belgium, Italy, Portugal, Netherlands and Sweden. Other EU countries apply the net model to a limited extent or have other forms of aid for payroll costs for onboard employees.

In brief, the system of tonnage tax is based on shipping companies paying tax on the basis of tonnage instead of actual earnings. The details of the tonnage tax system vary among the various EU countries. The most common model was adopted by the Netherlands in 1996 and is based on the shipping company’s income being calculated in the form of a standard income based on the net tonnage operated by the company. The company then pays conventional corporate tax on the calculated standard income. This also entails that the El Grau in Valencia is the fastest expanding port in Spain.
company need not report capital gains for tax purposes from the sale of vessels, for example.

In the case of tonnage tax, the guidelines require that the vessels be flagged in an EU country. If the shipping company has less than 60% of its tonnage flagged within the EU, it must retain an equally large tonnage under an EU flag as it had in January 2004. Otherwise, flagged vessels are taxed in line with normal corporate tax rates.

Most EU coastal countries have now introduced tonnage tax in one form or other. In Sweden, a commission has been appointed to study the issue of tonnage tax.

Application of the models using accelerated depreciation of vessels and tax-free reserves for capital gains was common before the system of tonnage tax was introduced. Up to 1991, Sweden used a system based on vessel funds.

**Swedish state aid for shipping**

The Swedish Parliament’s objective for an industry-oriented shipping policy, most recently expressed in Parliamentary Bill 2000/01:127 Shipping Aid, states that the Swedish maritime industry must be given similar competitive terms as our closest competitor countries.

Looking at the competitiveness of the Swedish-controlled portion of the Swedish merchant fleet, it may be noted that more than 40% of the number of vessels carry the Swedish flag. On the basis of deadweight tonnage (DWT), the proportion of Swedish-flagged tonnage is less than 20%. As regards the flagging of Swedish-controlled tonnage, competing countries are primarily outside the EU, but also within the EU to a certain extent. The top 10 flags flown by the number of Swedish-controlled vessels include the Netherlands, Italy and Cyprus; while in terms of DWT, the Netherlands and United Kingdom are among the top 10.

Following the decision of Parliament in autumn 2001, in conjunction with (Bill 2000/01:127) “Shipping Aid”, the existing aid for onboard employee payroll costs was widened to include the ferry sector and was extended so that it now covers income tax and all payroll charges for seafarers working on Swedish-registered vessels. The TEA (Temporary Employment Aid) agreements – which entail that a certain portion of employees onboard freight vessels in international traffic may be foreign citizens covered by special collective agreements – have contributed to reducing manning costs to a competitive level. At year-end 2004, a total of 746 TEA employees worked on Swedish vessels. Of these, 243 were officers (102 engineering officers and 141 nautical officers) and 503 deckhands. The Swedish merchant fleet has a total about 12,000 onboard employees. The 746 TEA employees make up about 6% of these. TEA employees currently on Swedish vessels are exclusively of Philippine nationality.

The competitiveness of Swedish shipping in the years ahead requires the bridging of the future generation shift for ship’s officers. During the next ten years, about 900 deck officers and some 650 engine-room officers at sea will retire. 35% of ship’s officers are 50 years of age or older. The corresponding portion of engine-room officers is 40%.

The shipping industry has long sought a system of tonnage tax for Swedish shipping lines. The argument has been based on competitive neutrality vis-à-vis competing countries and the fact that vessel orders by Swedish companies have not been so high for many decades. On 25 November 2004, the Government decided to appoint a commission to study the introduction of a tonnage tax, which will present its report no later than November 2005.
Competitiveness of the Swedish merchant fleet
The contribution of shipping to higher accessibility, regional development and transport quality
The transport policy sub-goals of higher accessibility, positive regional development and high transport quality mean that maritime transport policy must be configured in a manner that satisfies the basic transport requirements of citizens and business operations; and that the maritime transport system offers high transport quality, reduces the disparities in the potential of various parts of the country to develop, and counteracts the disadvantages of large transport distances.

**Development of a measurement system and indicators in progress**

It is not very easy to gauge fulfilment of the goals of accessibility, transport quality and regional development. Nonetheless, the Swedish Maritime Administration – in co-operation with other players in the sector and users of the sector’s services – is seeking the steady development of indicators for goal fulfilment, and which all parties involved find meaningful and informative.

The indicators are designed to contribute to an understanding of how well Swedish transport policy succeeds in meeting the goals set up by the state authorities. If this functions, the reporting of the development of indicators may also offer a basis to evolve significant transport policy areas.

According to current transport policy, the indicators for the three goals should be increasingly configured to reflect a transport buyer’s perspective rather than an infrastructure perspective. It is important that the development that reflects a transport buyer’s perspective can also be linked to sector activities and can be influenced by sector players.

The Swedish Maritime Administration believes that the development of indicators must have a realistic and, initially, limited target level.

In view of the growing importance of container transport, a container-oriented account may be viewed as an important aspect of the transport policy goals. Prices and times for container transport per TEU between various locations in Sweden and the rest of the world could offer an interesting indicator for both the accessibility target and positive regional development. A comparison could be made for individual relationships, as well as some type of composite of an area’s relationships with all international regions studied. A follow-up relating to the regional development goal could be based on a comparison of a number of Swedish locations. Work involved in developing methods for measuring the proposed container indicator is in progress. Subsequently, other types of goods, such as oil products and forest raw materials, could represent significant indicators of goal fulfilment.

**Supply of maritime transport**

The supply of maritime transport is highly flexible and adaptable and is governed by market forces in terms of capacity and function, for example. Transport does not only involve the movement of goods but also increasingly includes a service aspect. Thus it is not only the supply of maritime transport that is adapted and differentiated but also the transport service itself. Development is fuelled by customers’ specific wishes and logistics requirements as well as by a more extensive and integrated approach to logistics chains. Developments in information and communications technology have contributed considerably to this development.

Regional structures are subject to continual development and the supply of transport capacity is a mirror image of this. The adjustment of capacity to regional demand is a continual process and rapid adjustment always indicates superior functioning of the transport market.

Measured on the basis of freight vessel
calls, capacity amounted to 186 million deadweight tonnes (DWT) in 2003. The theoretical maximum capacity in both directions is double this figure or 372 million DWT, when capacity in both directions is counted. For practical purposes, the capacity ceiling is somewhere in between. The capacity calling at port is not necessarily equal to the available capacity.

The total capacity per freight tonne thus amounts to 2.7 DWT calling capacity, including ferry traffic. However, if capacity in both directions is calculated, capacity amounts to 5.4 DWT per goods tonne, with considerable variations among regions, however.

For freight vessels, most of the transport capacity is represented by tanker and bulk cargo vessels, accounting for almost 50%, and a smaller portion, or about 30%, is represented by container and RoRo vessels. Regional differences in capacity calling at ports in terms of various types of cargo vessels reflect the composition of goods for the various regions. See Table 7.

The concentration of containers and trailer flows, as well as certain types of bulk loads, is substantial and one or two regions account for between 80% and 97% of the flows. As regards the handling of containers and trailers, the concentration is due to the fact that flows through ports in the region derive not only from the particular hinterland but also include national and, to certain degree, international flows. The supply of vessel capacity, distributed by vessel type, in 2003 was as follows:

<table>
<thead>
<tr>
<th>Segment</th>
<th>Bulker</th>
<th>Tanker</th>
<th>Container</th>
<th>Dry cargo</th>
<th>RoRo</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of vessels</td>
<td>526</td>
<td>611</td>
<td>110</td>
<td>1,006</td>
<td>236</td>
<td>84</td>
<td>2,573</td>
</tr>
<tr>
<td>No. of vessels, %</td>
<td>20.4</td>
<td>23.7</td>
<td>4.3</td>
<td>39.1</td>
<td>9.2</td>
<td>3.3</td>
<td>100</td>
</tr>
<tr>
<td>No. of calls</td>
<td>3,548</td>
<td>6,066</td>
<td>1,753</td>
<td>9,894</td>
<td>3,950</td>
<td>483</td>
<td>25,694</td>
</tr>
<tr>
<td>No. of calls, %</td>
<td>13.8</td>
<td>23.6</td>
<td>6.8</td>
<td>38.5</td>
<td>15.4</td>
<td>1.9</td>
<td>100</td>
</tr>
<tr>
<td>Total, DWT, mill.</td>
<td>22.9</td>
<td>67.3</td>
<td>17.1</td>
<td>36.2</td>
<td>40.4</td>
<td>2.1</td>
<td>186.0</td>
</tr>
<tr>
<td>Total, DWT, %</td>
<td>12.3</td>
<td>36.2</td>
<td>9.2</td>
<td>19.5</td>
<td>21.7</td>
<td>1.2</td>
<td>100</td>
</tr>
</tbody>
</table>

(Source: SAI)

Gothenburg port.

- **Bulker traffic** – Capacity calling at ports amounts to 23 million DWT, of which 86% is distributed among four regions and dominated by the Lake Mälaren region (31%).
- **Tanker traffic** – Capacity calling at ports amounted to a total of 67 million DWT, of which 84% of the capacity is distributed among three regions and is dominated by the West Coast (40%).
- **Container traffic** – Capacity calling at ports amounted to a total of 17 million DWT, of which 92% of the capacity is distributed among three regions and is dominated by Gothenburg (62%).
- **Dry cargo traffic** – Capacity calling at ports amounted to a total of 36 million DWT, of which 83% of the capacity is distributed among five regions and is dominated by Southern Sweden (23%) and the Lake Mälaren region (22%).
- **RoRo traffic** – Capacity calling at ports...
amounted to a total of 40 million DWT, of which 87% of the capacity is distributed among four regions and is dominated by Gothenburg (57%).

**Ferry traffic** – Capacity calling at ports amounted to a total of 186 million DWT. Ferry traffic is heavily concentrated to a few Swedish regions, of which Southern Sweden dominates with 70% of capacity calling at ports in terms of DWT, followed by the Lake Malaren region with 17% and Gothenburg with 10%. See Figure 9.

The ferry traffic market encompasses Scandinavia and Northern Europe. Consequently, traffic is very frequent and offers substantial capacity. Transport capacity is as large as that offered by cargo vessel traffic, but with only 90 vessels as opposed to 2,600 cargo ships.

Volumes in the most significant goods segments are highly concentrated to a few regions. The regions are also more or less specialised in terms of industrial output and freight flows. This is influenced by regional industrial structures as well as by developments in the various transport markets. If, instead, the supply of capacity is presented on the basis of the various regions in Sweden, the following profile emerges for 2003:

The dominance of crude oil and oil products on the Northwest Coast, and especially in Brofjorden, is also reflected by tanker capacity. In addition, a relatively large number of freight segments make up the market for bulk, dry cargo and RoRo traffic.

The Gothenburg region has four dominant types of freight. The largest is crude oil and oil products, but goods on vehicles also account for a sizeable portion. RoRo vessels dominate capacity, although ferry traffic is also extensive.
Dry cargo and bulk vessels considerably dominate Lake Vänern.

Truck-borne freight represents by far the largest segment in Southern Sweden. Along with rail-borne goods, the proportion of freight on wheels is 60%. After ferries, dry cargo vessels make up the largest segment in terms of capacity. They are also highly frequent.

Bulk and forest products are the primary goods segment in Eastern Central Sweden. Capacity is totally dominated by bulk and dry cargo vessels.

The Lake Mälaren region has a highly differentiated freight structure. The larger share is bulk goods. This is reflected in the capacity in the region, which is dominated by dry cargo and bulk vessels. In addition, ferries account for sizeable transport capacity.

Northern Sweden is highly diversified in terms of the freight segments. Most of the segments are linked to the forest industry’s incoming and outgoing shipments. In terms of capacity, bulk, dry cargo and RoRo vessels dominate the picture. RoRo vessels and their capacity are of major significance for many of the goods segments.

Supply of regular liner traffic
“Liner traffic” is a special form of shipping service. Liner shipping companies market a regular and frequent transport service open to all shippers wishing to ship their load with the company. The customer books space and leaves the goods at the disposal of the shipping line in accordance with its instructions. Customers need only charter the amount of
transport capacity required for the specific shipment. Thus, liner carriers offer a collective consignment function, thus also offering access to the maritime transport system for freight owners with small volumes.

The traditional core service for a liner company is to sell maritime transport between two geographic market areas. A number of ancillary services can be added to this core service, depending on the strategy deployed. Liner companies also provide freight vehicles, with operations configured to ensure a minimum of no load transport runs. The liner company’s undertaking may extend from door-to-door or quay-to-quay, depending on customer requirements. Variations depend on such factors as shipping company policy, customer structure or market areas. Peripheral services may be conducted by independent sub-suppliers on behalf of the shipping company or by the company using its in-house resources.

Liner operations are more complex and require a larger onshore organisation compared with other shipping services. In the countries/ports in which the liner company is not represented via its own office, contracted agents take charge of sales and the administration of the liner company’s traffic within a demarcated geographic market area.

Mainly ferry traffic and container traffic, as well as some RoRo and dry cargo traffic, is conducted in the form of liner traffic.

Although in many respects liner transport may be characterised as relatively fixed, regular traffic, this market also takes on a substantial and growing dynamism over time. Traffic is reconfigured, ports of call are added or removed, operations are consolidated and change name, headquarters are relocated, functions outsourced, and sub-suppliers (agents) take charge of marketing, etc. In short sea shipping – especially in the Baltic Sea – there has been a number of newly started but short-lived liner operations over the years. Expectations of high market growth, plus a large supply of capacity and operators, and perhaps also low entry barriers for the start-up of a liner operation, may contribute to excess capacity.

The liner shipping company must appraise demand trends and capacity requirements. The market can experience sharp fluctuations in volumes and if the shipping company is to maintain a balance, it must assess this trend and find ways to adjust capacity in the most cost-effective manner by chartering some of the capacity. However, flexibility is limited in liner traffic, since customers must be guaranteed capacity over a year or longer. Longer-term contracts can dampen price variations; but, on the other hand, the carrier must assume the risk of capacity not being fully used.

Container operators offer door-to-door transport and the high-frequency regional feeder system feeds the global lines via very large transit ports. This makes it possible to serve several regions using direct traffic if the flows are sufficiently large. However, traffic using trans-oceanic vessels is being increasingly concentrated to the few extremely large hubs in the liner network. The
high-capacity trans-oceanic container vessels in global traffic return 2 – 4 times annually (in the case of Gothenburg) while the feeder vessels in short sea shipping make as many as 100 calls annually.

Feeder lines offer a frequency of 2 to 4 calls weekly. The lower frequency applies to ports in which the available volumes do not warrant more frequent calls. The largest operators in container feeders are UniFeeder and Teamlines with traffic to continental transit ports (Hamburg, Bremerhaven, Rotterdam and so on).

The sizeable fleet of conventional dry cargo vessels has the capacity to deal with several cargo categories and a large number can also handle containers. Generally, these liner operations cover a transport requirement for goods, markets and volumes that do not warrant more costly technical alternatives.

Frequency in these systems varies highly among destinations, from weekly services to one call a month.

Essentially all transport areas and a large number of ports are served by some form of liner traffic. Liner traffic forms a very dense and flexible network of global and regional transport operations – with complementary systems and, of course, competition in certain goods segments.

Container feeder traffic using vessels specialising exclusively in containers is highly concentrated to the Gothenburg and Malmö/Helsingborg transport areas, which account for a combined 76% of revenue. In the Baltic Sea, the volumes are concentrated to the Södertälje/Norrköping, Norrtälje/Nynäshamn and Hudiksvall/Gävle transport areas, which account for an additional 15% overall.
The remaining volumes are distributed over the other transport areas. Liner traffic serving these regions offers highly differentiated services in terms of tonnage, geographic market areas and frequency.

**Frequency – a function of market and navigational areas**

Demand from transport buyers for ever-higher frequency is true essentially of all maritime segments, since actual transport costs represent an increasingly smaller portion of total logistics costs. Higher frequency cuts the overall lead-time from order to delivery. Smaller shipment sizes also have positive effects on logistics costs.

Continually rising frequency requirements lead to the need for a higher traffic scale, meaning more and larger vessels, to maintain cost efficiency. This is the driving force underlying higher volume concentration.

Individual vessel frequency is more dependent on the navigational area, meaning the distance covered, the total time for a round-trip (time at sea and time in port) and, of course, whether vessels are at all included in recurring traffic.

High-frequency vessels serve mainly the European market, which is also the market for the dominant portion of Swedish freight volumes.

Tables 8 and 9 show the average frequency per type of vessel. Most vessels (65%) in the fleet make fewer than six calls per year on average. Viewed in terms of various vessel types, there are small discrepancies, possibly apart from bulkers (75%) and “Miscellaneous”.

In the case of containers and RoRo vessels, there is also a group with very high frequency (24 calls or more calls per year). Dry cargo vessels (39% of the total fleet) are also well represented among the most frequent vessels, notably in the interval of 6–24 calls per year.

### Table 8: Frequency and fleet by shipping segment

<table>
<thead>
<tr>
<th>Type of vessel</th>
<th>A &lt;6</th>
<th>B 6–11</th>
<th>C 12–24</th>
<th>D 24+</th>
<th>Total vessels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulker</td>
<td>75%</td>
<td>11%</td>
<td>5%</td>
<td>8%</td>
<td>100% 526</td>
</tr>
<tr>
<td>Tanker</td>
<td>64%</td>
<td>15%</td>
<td>11%</td>
<td>10%</td>
<td>100% 611</td>
</tr>
<tr>
<td>Container</td>
<td>60%</td>
<td>8%</td>
<td>15%</td>
<td>17%</td>
<td>100% 110</td>
</tr>
<tr>
<td>Dry cargo</td>
<td>59%</td>
<td>19%</td>
<td>11%</td>
<td>11%</td>
<td>100% 1,006</td>
</tr>
<tr>
<td>RoRo</td>
<td>67%</td>
<td>10%</td>
<td>4%</td>
<td>18%</td>
<td>100% 236</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>77%</td>
<td>12%</td>
<td>6%</td>
<td>5%</td>
<td>100% 84</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65%</td>
<td>15%</td>
<td>9%</td>
<td>11%</td>
<td>100% 2,573</td>
</tr>
</tbody>
</table>

(Source: SAI)

### Table 9: Frequencies – a comparison among shipping segments

<table>
<thead>
<tr>
<th>Type of vessel</th>
<th>A &lt;6</th>
<th>B 6–11</th>
<th>C 12–24</th>
<th>D 24+</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulker</td>
<td>24%</td>
<td>16%</td>
<td>12%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>Tanker</td>
<td>24%</td>
<td>24%</td>
<td>27%</td>
<td>22%</td>
<td>24%</td>
</tr>
<tr>
<td>Container</td>
<td>4%</td>
<td>2%</td>
<td>7%</td>
<td>7%</td>
<td>4%</td>
</tr>
<tr>
<td>Dry cargo</td>
<td>35%</td>
<td>49%</td>
<td>48%</td>
<td>39%</td>
<td>39%</td>
</tr>
<tr>
<td>RoRo</td>
<td>9%</td>
<td>6%</td>
<td>4%</td>
<td>15%</td>
<td>9%</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>4%</td>
<td>3%</td>
<td>2%</td>
<td>1%</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

| Total no. of vessels | 1,674 | 382 | 239 | 278 | 2,573 |

(Source: SAI)

### Figure 10

Frequency of container traffic in Swedish feeder and European traffic. (Source: SAI)
Supply of maritime transport to Gotland
Gotland is served daily via two lines: Nynäshamn–Visby and Oskarshamn–Visby. The transit time for Nynäshamn–Visby is 3 hours, 15 minutes, while the transit time for Oskarshamn–Visby is 2 hours, 50 minutes. The traffic, which is procured by Rikstrafiken (National Public Transport Agency), is currently conducted using three high-speed ferries: M/S Visby and M/S Gotland (capacity: 1,500 passengers, 500 cars/1,800 trailer meters) and the HSC Gotlandia (capacity: 700 passengers, 145 cars).

The agreement between Rikstrafiken and Destination Gotland governs the transport supply, which during weekdays in winter should essentially comprise two sailings in each direction on the Visby–Nynäshamn line and one sailing in each direction on the Visby–Oskarshamn line.

Transport supply in the Swedish archipelagos
Stockholm county accounts for more than half of the sailings. A new generation of large archipelago boats was introduced in 2004 by Waxholmsbolaget, which will maintain traffic on the most extended lines throughout the year. Among other counties, traffic in Västra Götaland county is the largest, followed by Blekinge county.

During the summer, Waxholmsbolaget serves almost 250 jetties in the Stockholm archipelago, from Arholma in the north to Landsort in the south. The equivalent figure in wintertime is 145. The number of islands served in the Stockholm archipelago is 130. These figures have been rather stable during the past 5-10 years. The number of departures from Strömkajen quay in Stockholm totalled almost 3,300 during 2004, of which a large share was during the summer season. For example, the number of departures from Strömkajen quay during July was almost 800, while the number of departures in November was 160. Waxholmsbolaget publishes a brochure, “The Archipelago for Everybody” showing accessibility in the Stockholm archipelago, by boat and destination.

Driving forces underlying changes in the merchant fleet
The market primarily governs changes in the composition of the merchant fleet, since most new procurement is conducted on the basis of long-term freight contracts that specify the type of vessel. Market requirements vary in terms of ship capacity, size and equipment.

Generally speaking, vessel prices fell from the mid-1990s up to 2003, which led to a rapid rise in the average size of newly ordered vessels in essentially all ship segments. Other technical changes for new vessels include a general rise in speed capacity, as well as superior navigation and manoeuvrability.

Meanwhile, stricter public environmental and safety requirements have eliminated a good deal of inferior tonnage from the market. For example, since 1991 all new tankers have double hulls. Also, as of 1 April 2005, it is forbidden to transport heavy oil in single-hulled vessels within the EU, which means that a large number of single-hulled vessels will be removed from the market. A reduction in the age limit for tankers will also contribute to tanker turnover during the next 10-year period. Parallel with the renewal of the tanker fleet, there is a slow, although rising turnover in bulk and dry cargo vessels, including RoRo vessels.

Average vessel size in gross tons (GT)
The average size of deliveries and orders during the period 1993-2003 has risen in relation to the existing fleet. The major changes have occurred among the smallest vessels (<10,000 GT) and the largest (>100,000 GT) as well as among the types of vessels in which ordering activity is highest, meaning container vessels and tankers. The average size per call has been rising sharply for bulkers, container vessels and passenger vessels/ferries.

However, the average size per call is not rising quite as much for dry cargo vessels, tankers and RoRo vessels. This is because these vessels are also expected to be able to serve small ports and terminals. See Figure 11.

Distribution of traffic among various vessel types
The increase in average vessel size per

Figure 11
Change in average vessel size by type of vessel, 2000–2003, gross registered tons.
(Source: SAI)

Sovereign Maersk uses Post-Panamax cranes in the Skandia port in Gothenburg. Maersk’s S-class ships are the largest container ships worldwide, with a capacity of 6,600 TEU-containers.
call noted above may conceal significant differences in trends for vessels of various size categories. As shown by the Figure 12, in terms of the number of calls, traffic in the Scandinavian-Baltic Sea area during 2000–2003, increased insignificantly. The number of calls in the category 0–10,000 GT has, however, declined while a definite increase in the number of calls is noted especially for vessels in the size category 20,000–50,000 GT.

**Differences between various vessel types**

There are, however, substantial differences among vessel types in terms of trends in the number of calls by vessel size in the various size categories.

Among **bulk vessels**, the number of calls for the smallest vessels (<10,000 GT) fell by 12%, while the number of calls by large bulkers rose by 13%. The size category 10,000–20,000 GT, saw a particularly sharp rise in the number of calls, notably in the Baltic Sea, which were up almost 40%.

Among **container vessels**, an increase of 18% was noted for the smallest size category, while the rise for the large size categories was 38%. In the size category 10,000–20,000 GT, the increase in calls was slightly more than 50%, with a rise of more than 70% in the category 50,000–100,000 GT. Container traffic is marked by rapidly rising intercontinental traffic using post-Panamax vessels, which can only serve the very largest container ports. Meanwhile there is a shortage of mid-sized container vessels, which are increasingly replacing the smaller feeder vessels.

Among **tankers**, the increase in the number of calls was notably large within the size categories 20,000–50,000 GT and >100,000 GT, at about 50%. In the latter case, however, this involved only 124 calls.

Calls by **RoRo vessels** rose during the period by 6%, but the increase within the size category 20,000–100,000 GT totalled 20%.

Because of the sharp rise in average size of the smallest tonnage (<10 000 GT), plus a steep increase in the number of calls by large vessels, the average size per call rose sharply during the period 2000–2003. The average size for all size segments rose almost 20%, in terms of gross units. This may be compared with the average size of vessels trafficking the continent and the British Isles, where the increase in size was about 13%.

**Changes in average size of vessels in terms of length, draught and beam**

In the case of changes in length, draught and beam (width), the trends are slightly different compared with call-based average data.

As regards length, there is a strong growth trend in container and RoRo vessels, while a weaker tendency is noted among other types of vessels. As regards draught, container vessels show the most distinct growth trend, while the growth trend in other vessel segments is weak and is actually negative among tankers. Almost all types of vessels show a trend.
towards a broader beam, notably in a comparison between vessels on order and the existing fleet. The weakest growth trend is noted among reefers and tankers.

**Trends in the merchant fleet’s ice characteristics**

The proportion of ice-reinforced vessels among ships owned by European shipping companies is almost 50%. The highest proportion of ice-class vessels is found among those operating in regional traffic in the Baltic Sea, that is, those of less than 20,000 GT. In this size category, the proportion of ice-reinforced vessels is between 50% and 65%. Among tankers, the proportion of ice-reinforced vessels is 73% in the size category 10,000–20,000 GT. Contracting of ice-reinforced vessels has declined since 1998, when 191 of a total of 384 ice-class vessels were ordered. During 2003 only 36 of a total of 598 vessels had an ice-class.

**Improvements in ports and fairway systems**

As noted in an earlier section, the supply of maritime transport is flexible, but what about port operations? In several contexts, a port is viewed as a geographically fixed location designed to handle seaborne goods from/to industry in its hinterland. But, at the same time, the market for ports has developed towards an increasingly dynamic and globalised reality. Like other business operations, ports are run in competition, both nationally and internationally. In line with conditions, goals and strategies, new opportunities are continually emerging to operate and develop port and terminal operations, their organisation and services. Port hinterland and competitiveness are highly dynamic factors, which means that current structures cannot be taken for granted in a slightly longer perspective.

The municipal port authorities and the fairways system and accompanying services developed by the state via the Swedish Maritime Administration are generally well developed. Apart from certain bottlenecks and minor extension requirements, the existing infrastructure can be used for substantially higher transport volumes without major capital expenditure. Compared with the road transport system, the maritime transport system imposes only modest demands on infrastructure investments in relation to its transport performance capacity.

**Port investment plans**

The Swedish Maritime Administration and the Swedish Ports Association conduct a regular, annual inventory of planned investments for the next five years in port infrastructure and superstructure (mainly load handling equipment). This type of survey can never be exact and it is only natural for plans to be steadily revised and adjusted. Nevertheless, the material is deemed to have a value in the general discussion of future investments in the transport sector. Not least, it is important to draw attention to the strategic role of ports as natural hubs and terminals in which goods, people and various transport modes interact and in which effective logistics solutions need to be developed. In other words,
the port is of common interest for a number of players in the transport chain, for which overall function is paramount.

As usual, investment plans show a strong focus on the major ports on the West and South coasts with international ferry and other traffic, but investments are also planned for East Coast ports as a result of the expected positive trend in the Baltic Sea region. See Table 10 and Figure 14.

Port investment in recent years has been about SEK 1.0 billion annually. Planned investment volume of about SEK 6 billion for the period 2005-2009 does not differ significantly from the investment level to date.

In most ports, the municipality owns land and buildings and usually finances major investments in the facilities. In these cases, the port company pays for the use of the facilities, as governed by agreement. But there are exceptions, such as in the case of Gothenburg where Göteborgs Hamn AB owns the land
and buildings. Port-related investments take place in a larger context in the form of an investment package in which – in addition to the port company – the municipality, region or perhaps other players also contribute. State participation in the form of investments in connecting infrastructure in the form of fairways as well as investments in roads and railways may appear in this context. Connections from the shore side, for example, in the form of road links, frequently contribute to a general upgrading of the transport system for the port and many other users. In the rail sector, Banverket (Swedish rail track operator) invests in strategic freight branch lines to link up the rail system with key ports.

**Targets for capital investments**
Continual investments are in progress in the ports and related infrastructure from both the shore and sea directions. The presentation below shows a selection of investments in ports registered in the port investment surveys conducted by the Swedish Maritime Administration and Ports of Sweden.

**Brofjorden’s** port is Sweden’s second largest port in terms of freight volumes. However, as a dedicated industrial port it is not included in the annual inventory of port investment plans, but deserves attention nevertheless. One of Sweden’s largest industrial investments in many years is now in progress in Brofjorden, where Preemraff is building a new facility for the desulphurisation of vacuum gas oil. This project includes quay extensions.

**Gothenburg’s** role as a central transoceanic port has been boosted by the upgrading of its fairways, which was completed in 2004 after a number of years. Also, the port rail link was electrified and substantial infrastructure improvements were made in the port itself. This will be followed by investments in another car and RoRo terminal, a rail bridge and new cranes. Three cranes are on order from Shanghai for

Malmö port is seeking to extend the fairway to the oil port in an effort to compete for rising volumes of transit oil.
delivery in 2006. The outreach of these super-postpanamax cranes enables them to work ships with 23 container rows. These will be sited in the Skandia port.

**Malmö port**, which is part of Copenhagen-Malmö port, has plans for major investments in new quay facilities. In addition, the Swedish Maritime Administration and the port are discussing an upgrade of the fairways to the oil port in an effort to enhance maritime safety and permit the port to compete for growing volumes of transit oil.

In **Trelleborg**, plans are moving ahead for new rail-based RoRo facilities with ramps, plus new parking spaces for trucks and trailers, parallel with the construction of a new combi-terminal. The Swedish Road Administration's national plan for road transport for the period 2004-2015 proposes that the E6 between Trelleborg and Vellinge be reconfigured as a super-highway. Trelleborg's port was granted an EU grant from the budget for the Trans-European Transport Network (TEN-T) in the amount of EUR 1.95 million for investments in the port.

In **Ystad** plans are in progress for the expansion and extension of the outer port. The Swedish Road Administration is planning measures for connections to the E65 motorway.

What is referred to as the “Norrköping package” represents the basis for overall long-term national, regional and municipal infrastructure investments to create effective links to **Norrköping port** from both land and sea. A key sub-project in the “Norrköping package” is a new rail link to the port area from the trunk line, a new road connection from the E4 and the deepening and widening of the fairway to the port.

As early as 2003, the Swedish Maritime Administration – in co-operation with the Lake Mälaren stakeholders’ organisation – conducted a market and socio-economic appraisal of various alternatives for the expansion of the lock and canal at **Södertälje**. The project is deemed to offer some socio-economic gains, but the results are surrounded by substantial uncertainty. The issue of investment financing now rests with the Government for a decision. Meanwhile, the Swedish Maritime Administration is planning regular maintenance work on the lock in Södertälje.

In the **Stockholm region**, surveys are in progress to create a common approach to port structure, including possible future forms of co-operation among ports in the functional port region for the Central East Coast. Among other projects, the Ports of Stockholm are planning to relocate container, bulk and RoRo traffic to a new port, Norvik, in Nynäshamn and thus replace certain operations in Stockholm. The Swedish Road Administration has decided to develop fully road 73 between Stockholm and Nynäshamn. The Norvik facility also requires contributions from rail traffic. The Swedish Maritime Administration and the Ports of Stockholm are working on upgrading the fairways to Stockholm, including the fairway at Garpen. An environmental decision is awaited for the Horstensleden fairway. The Swedish Road Administration is planning an extension of the Northern Link in an effort to improve road connections to Värta Port.

**Gävle** port is investing in a new container port, for which infrastructure and dredging costs will be borne by the municipality, while the private sector will take charge of the costs associated with cranes, computer systems and so forth. An action programme for the Holmuddsrännan fairway to Gävle port is being discussed with the Swedish Maritime Administration.

Plans are also in progress for investments in other areas nation-wide. In **Piteå port/Haraholmen**, Bottenvikens Stuveri is investing in a new crane, valued at SEK 25 million, as part of efforts to permit container handling. Consider-
ing the size of the port – approximately 1.5 million tonnes annually – the investment is relatively substantial.

**Quality assurance of the Swedish fairways system**

Based on the transport policy goals, the Swedish Maritime Administration must continually adapt the fairways system to changes in traffic patterns, nautical requirements and technical development. In addition, effective maintenance must be conducted on existing markings by means of checks and accompanying measures regarding fairway dimensions. During spring 2005, all Swedish fairways will be reviewed and their maritime safety equipment appraised. Among other things, the report will show the need for fairway service on the basis of the level of priority and utilisation area.

Hydrographic surveys in Swedish waters and action programmes in fairways are conducted with priority for the most significant coastal lanes for merchant shipping and approach fairways to the TEN-A ports and in the special route system pursuant to the HELCOM declaration from 2001. All hydrographic surveys are conducted in accordance with the internationally agreed IHO S-44 standard.

The proportion of Swedish waters – totalling 160,000 km² – surveyed according to IHO S-44 is 10%. Of this total, 25% of the priority fairways, or 57,000 km², have been surveyed. See Figures 15 and 16.

The publication of navigational charts forms part of efforts to attain the goal of high transport quality and safe shipping. Last year, the Swedish Maritime Administration completed the digitisation of all Swedish paper navigational charts and during 2005 it is planned to deliver all charts as electronic navigational charts (ENCs). This represents an acceleration of the schedule compared with the original plan. The standard for ENCs was set by the International Hydrographic Organization (IHO), which is an inter-government organisa-
tion handling issues affecting navigational charts and other hydrographic issues.

The production of ENC's covering the HELCOM fairways has been prioritised to date and is now complete.

Access to the official ENC's varies widely among the various regions worldwide and is best in the areas around Europe, Japan and North America.

Least access to ENC's is found in areas along Africa's coasts and some of South America's coasts and in the area around the Indian Ocean. See Figure 17 on the preceding page.

Updating of the official ENC cells is done continually and transferred to PRIMAR, which is a regional centre for the compilation of the digital navigational charts of the participating countries. According to PRIMAR's customer register, currently about 170 vessels use the official Swedish ENC's, an increase of some 70% since 2003. Considering that some 2,700 vessels navigate Swedish waters each year, there is a great deal to be done.

The goal, however, is that all vessels navigating in Swedish waters shall have access to the current official Swedish ENC's.

Changes in the fairways system or in coastal waters occur frequently and may be of a temporary or permanent character. An unexpected occurrence can present an immediate hazard for shipping, or the development may have been planned, such as the deepening of a fairway or the construction of a new quay.

Information on changes affecting safety onboard must be circulated as soon as possible. Urgent information is transmitted as navigational warnings on VHF and NAVTEX (international text messaging system). If the information is of a less urgent nature, it is published as a notice in the Swedish Maritime Administration's journal "Swedish Notices to Mariners" (NtM). If the change is permanent, the navigational chart is updated and it appears in the new navigational chart when it is next published or as a correction in the digital navigational chart.

During 2004, slightly more than 400 Swedish navigational warnings were issued via VHF, of which a little more than 100 were also sent via NAVTEX. During a trial period in the latter part of 2004, NtM notices were also published in the Swedish Maritime Administration's website on the Internet. The Internet service will be in permanent operation during spring 2005.

**TEN-T and the Motorways of the Sea concept**

A lack of regularity and punctuality, shortcomings in infrastructure, and bureaucratic administrative procedures, etc. can curtail the development of maritime transport. Extensive work is in progress within the European Commission and member countries to improve conditions so that short sea shipping can gain a greater role in the transport chain.

When the Trans-European Transport Network (TEN-T) was introduced in the early 1990s, the European dimension highlighted infrastructure planning. The role of shipping in the transport chain was enhanced in 2001 when coastal ports were included in TEN-T. The Motorways of the Sea concept, which has been included in the revised guidelines for TEN-T since 2004, further underscores the role of maritime infrastructure in the development of an effective, safe and environmentally friendly transport system.

The Motorways of the Sea concept is aimed at strengthening cohesion and accessibility of the EU's peripheral regions and reducing pressure on the Union's road network. One strategy aimed at attaining these goals is to concentrate goods flows and create sustainability and frequent maritime transport between EU countries and the rest of the world. Via the Motorways of the Sea concept, maritime transport is to be efficiency-enhanced through the develop-
The contribution of shipping to higher accessibility...

Since April 2004, the Motorways of the Sea concept has been included in the new guidelines for TEN-T. The concept is aimed at strengthening cohesion and access to peripheral regions in the EU, as well as adding to the efficiency of the Union’s transport system.

The contribution of shipping to higher accessibility...

ment of infrastructure in the form of, for example, icebreaking, traffic information systems, port infrastructure and connections to ports from both shore and sea. Since the Motorways of the Sea is a new concept, work involving it is still in progress at the European Commission and in the various Sea Motorway regions (Baltic Sea, Western Europe, Western Mediterranean and Eastern Mediterranean) in giving it tangible form and developing it. The Baltic Sea countries have been active in giving the concept a tangible form in the Baltic Sea. A task force has been established, which consists of representatives from the EU countries around the Baltic Sea along with the European Commission and Norway. The Group functions as a reference group and pursues co-operation in the region involving TEN-T and the Motorways of the Sea concept. In order to deal with certain special issues, a number of working groups have been set up within the framework of the task group, which are led by various countries:

- Infrastructure (Poland)
- Financing issues (Germany)
- Winter navigation/Icebreaking (Sweden)
- Information systems (Finland)
- Maritime safety and security (Estonia)

A study of goods flows and infrastructure in the Baltic Sea region is being prepared and will provide an important base in continuing work in developing the transport system in the Baltic Sea region. In the area of winter navigation, active efforts are in progress to enhance the efficiency of icebreaking operations by means of greater co-operation among the Baltic Sea countries. This work was previously described in the theme chapter dealing with winter shipping.

Major infrastructure projects are unlikely to be undertaken in the near future within the framework of the Motorways of the Sea concept. However, it is time for all parties involved to prepare and give tangible form to their
investment requirements and study the extent to which these fit into TEN-T and the Motorways of the Sea concept. There is, of course, some joint financing available for projects that are favourable from the socio-economic perspective. In this context, the ordinary TEN-T programme must not be ignored and investments in ports are part of this.

It may also be worth mentioning that the Motorways of the Sea concept is also one of the measures within the proposal for a new Marco Polo programme (Marco Polo II) that is being prepared by EU institutions. The purpose of the programme is to reduce congestion, conduct joint improvement of the freight transport system's environmental performance and facilitate intermodal transport in a bid to create an efficient and sustainable transport system.

Within the framework of the ongoing Marco Polo-programme, the Finnish RG-Line received EU aid of EUR 600,000 in 2004 for its investment in a new ferry for traffic between Umeå in Sweden and Vasa in Finland.

Port service directive

In autumn 2004, the European Commission presented a new proposal for the Port Services Directive. The directive is aimed at increasing competition, not just within a port, but also between ports. A system of authorisation encompasses all operators active within a port. As regards pilotage, which is included in the proposed directive, each member country can decide how it will be organised.

Proposal for the establishment of strategic port regions

The Swedish Freight Transport Delegation 2002 (FTD 2) presented its final report on July 2004 “Freight Transport – nodes and links in interaction”. FTD 2 called for greater co-ordination of infrastructure planning on land and at sea, and that the state should assume greater responsibility for links to strategically key ports. FTD 2 proposed that a number of strategic geographic port regions be identified and given special status in the prioritisation of state infrastructure investments.

The following three port regions are identified by FTD 2:

- **Central East Coast** (Ports from Gävle in the north to Norrköping in the south, including the Lake Mälaren ports)
- **Western Sweden** (Gothenburg, Varberg and Uddevalla)
- **Southern Sweden** (Malmö, Helsingborg, Trelleborg and Ystad)

In addition, it stated that the ports in the Blekinge region are attractive and offer development potential, especially in view of EU enlargement with the
The contribution of shipping to higher accessibility...

inclusion of the Baltic States and Poland.

FTD 2 notes that the Swedish port sector includes a large number of ports of varying size and with different operational focus and ownership structures and that they must be viewed in the context in which they operate. The development of the ports and the efficiency-enhancement of their operations – with the development of the ports into logistics centres to provide greater integration of the various transport modes – is necessary in order to attain goals through increased intermodality and higher efficiency in the transport chain.

FTD 2 proposes that the state, via a special negotiator, initiates and participates in discussions with the parties involved in each region concerning the division of roles among the various ports, the terms and conditions of the state’s involvement and issues such as accessibility.

As noted by FTD 2, the purpose of identifying strategic port regions is that this creates the conditions for a more efficient division of social resources and a superior co-ordination of infrastructure investments among state transport agencies, regional and local players and the ports themselves. However, FTD 2 does not believe that the state authorities should select individual ports. The development of the transport function, the organisation of the ports and co-operation among ports established within certain regions, and which has occurred on a commercial basis, should continue to play a major role in development.
Maritime security measures have been introduced – extended port security is pending

Effective 1 July 2004, the new regulations governing maritime security came into force internationally. The regulations were set by the IMO via a new code, the ISPS Code. At the same time, new Regulation of the European Parliament and of the Council (EC) No 725/2004 governing enhanced maritime security onboard vessels and in ports came into effect. The provisions governing maritime security are aimed at protecting shipping against unlawful acts such as terrorist attacks by means of preventive measures in port facilities and onboard vessels. The term “port facilities” is defined as the location where ship/port interface takes place, which is frequently a limited section of the port area.

Almost 300 port facilities in Sweden and 200 Swedish-registered vessels have security plans approved by the Swedish Maritime Safety Inspectorate. Since the legal changes and ordinance were not completed until early June 2004, this added pressure to an already strained time schedule for ports and shipping companies. No Swedish port was compelled to terminate its international traffic.

The most visible sign of the new regulations is that fences have been set up around many quay areas. Certain types of goods and traffic can result in limited access and passage control is conducted already at security level 1, meaning normal circumstances. It is no longer possible to stroll along or fish from port quays. Other sections of the port, with less risk-exposed operations, remain open, at least in conditions applying to security level 1. The current regulations governing maritime security do not impose absolute demands on hermetic sealing; instead, it is the underlying threat and risk analysis that are meant to lead to any curtailment of access.

Whether or not there are fences, various types of area surveillance are conducted and it should be possible to check all people wishing to enter the port facility.
Goods control procedures in ports have been tightened. Enclosed carriers are no longer allowed to be parked without being sealed and having accompanying freight documentation. Neither may goods be placed in a port without a confirmed loading date. Co-operation with the customs authorities has been extended and some 15 ports are in the process of gaining certification in accordance with the Swedish Customs’ StairSec module. The StairSec module is part of the Swedish Customs Service Stairway programme and is aimed at enhancing the security level in conjunction with the international transport of containers by means of quality assurance through a more detailed threat profile and risk analysis and the use of container X-ray devices in the port.

The European Commission has submitted proposals for a directive on enhanced port security (COM(2004) 0076). The proposal was made in an effort to attain comprehensive cover for the maritime sector by including the entire port area in the security programme. In connection with the Commission’s proposal for EU Regulation for enhanced maritime security, it was stated that upgraded port security was a necessary second step as regards security for ports and co-ordination among ports and the continuing transport chain.

In October 2004, the Government assigned the Swedish Maritime Safety Inspectorate to study how the proposed directive on enhanced port security can be implemented appropriately via Swedish legislation.

The new vessel reporting system (VRS) will provide superior monitoring of maritime transport. All vessels calling ports in the EU must now report their arrival electronically. The photo shows a typical web-based questionnaire.

Administrative streamlining for the shipping industry through the development of information systems

There is an increasing desire and demand for around-the-clock accessibility, for geographic independence, for a reduction in the flora of documents as well as for measures to add to efficiency and simplify the handling of information required by various authorities and organisations. The vision is summed up in the term “one-stop-administrative shops”. Technological development in recent years has added major impetus to efforts to simplify administrative procedures and is expected to continue doing so.

Transport system users are also demanding simplification of procedures, leading to several initiatives at national and international levels in a bid to encourage and implement streamlining in the administrative area in individual transport modes and among transport modes. For shipping, there is an element of this streamlining work in, for example, the initiatives for short sea shipping taken by the European Commission.

The Swedish Maritime Administration has also made a contribution in this respect through its efforts over a number of years, which were crowned by the launching of a system of electronic services on 1 January 2005. The underlying idea has been to create a system that is user-friendly and in which various information requirements can be satisfied through the use of data submitted to the Swedish Maritime Administration by shipping companies, brokers and
The launch of the Swedish Maritime Administration’s e-service was prompted by the introduction of directives 2000/59/EC and 2002/59/EC and other factors. These directives emerged following two major accidents involving the oil tankers Erika and Prestige off the European Atlantic Coast, which turned the focus on maritime and environmental safety. For example, there was a need at the EU level to improve safety for vessels carrying hazardous goods through the implementation of a monitoring and information system for maritime traffic. According to the above EU directives, all vessels exceeding 300 gross tons must report their call to a port or an anchoring area no later than 24 hours ahead of the call. The EU has implemented a central information system, SafeSeaNet, to which each member country is to transfer information from the national system. In Sweden, the Swedish Maritime Administration is responsible for compiling information and thus it, in turn, has developed a computer system for this type of reporting – Vessel Reporting System (VRS) – to which information on each ship call is to be reported.

A large share of the information that is to be reported to VRS is similar to the data required by the Swedish Maritime Administration to invoice fairway dues. Over a number of years, the Swedish Maritime Administration has also worked with efficiency-enhancement programmes in its vessel traffic services (VTS) and pilotage. More efficient and simpler administration can be attained through maximum joint use of information reported to VRS and the data required for invoicing fairway dues and ordering pilots. VRS is also designed to handle the EU directive on vessel-generated waste (2000/59/EC) in which the reports primarily affect port requirements for data in order to plan the appropriate reception services.

Further ahead, the Swedish Maritime Administration plans that all information relating to a vessel call will be submitted to a single location, irrespective of the authority requiring it.

In a longer perspective, the EU’s vision is to establish a joint European system for monitoring ship traffic and information processing in conjunction with this. A pan-European project, MARNIS, has been established for this purpose. The Swedish Maritime Administration is participating as a project partner.

**Technical development and navigation systems**

More effective monitoring of maritime traffic and a greater exchange of maritime traffic information, among vessels as well as between vessels and shore, is one of the tools for preventing accidents at sea. In this context, the Automatic Identification System (AIS) is of special interest.

The UN’s maritime organisation, IMO, earlier adopted AIS as mandatory onboard equipment. The requirement of
having AIS equipment onboard vessels is being introduced by stages, and started on 1 July 2002. For vessels in international traffic, AIS has been mandatory since 1 January 2005, while in the case of vessels engaged in national traffic it has to be available no later than 1 July 2007. The EU has dealt with the implementation of the AIS-system via directive 2002/59/EC. In this context it is particularly relevant to note that the directive binds EU member states to acquire the equipment and the shore-based facilities required to receive, process and exchange AIS information among the national systems of member states no later than 31 December 2007.

The agreed development of national AIS networks, pursuant to HELCOM, is in progress in the Baltic Sea region. Complete AIS systems or sections of AIS-systems are now in operation in all countries around the Baltic Sea, apart from Latvia. The exchange of AIS information is already underway between Sweden, Norway, Denmark, Poland, Russia and Finland. According to agreement, the national systems are to be connected up no later than 1 July 2005. See Figure 18.

AIS-information may currently be used as a resource and source of information in combating oil spills, maritime traffic management, icebreaking, maritime search and rescue, and vessel inspections. In addition, port authorities can utilise information from the system in filtered form. The AIS-system can also contribute to improving insight into vessel traffic and traffic patterns, as well as providing a superior statistical base. 2005 will see the commissioning of a system in which AIS information from all HELCOM countries is compiled for the further distribution of an overall traffic profile to member countries and for the production of joint traffic statistics. The HELCOM secretariat in Helsinki will co-ordinate this follow-up.

The development of the new satellite navigation system Galileo is in progress in the form of a co-operative venture between the EU and the European Space Agency (ESA). The first trial transmissions were conducted in 2004 and the system will be operational no later than 2008. The purpose of Galileo is to offer greater accuracy and reliability than the two systems currently available.

The EU transport ministers meeting in December 2004 decided to move to the next phase of the project, which involves the building of satellites and terrestrial stations. The detailed design of system services remains unclear in certain respects, since the aim is to involve the ultimately selected operator in service design. Galileo will provide position accuracy of four metres horizontally and eight metres vertically. The signals will include information on system status and provide a warning within six seconds if the tolerance limits are exceeded. Combined with GPS, which is also being developed for higher accuracy and greater safety, Galileo will offer shipping excellent potential to determine positions. This new system should primarily be viewed as an opportunity to gain greater safety and there are currently no plans to replace existing navigational aids.

Cost of maritime infrastructure and related services
Port income during the period 1999–2003 rose 22.5% while the Swedish Maritime Administration’s income from activities such as infrastructure maintenance and maritime traffic services during the same period increased by about 12%. However, the increase must be viewed in relation to the volume change in maritime traffic for the same period,
since this is the primary – and almost entire – income base for port companies and the Swedish Maritime Administration. During the period 1999–2003, the number of calls rose by about 1.5%, while freight volumes for the same period rose by almost 4%.

Between 2002 and 2003, port income rose a little more than 5%, while the Swedish Maritime Administration’s income increased by almost 3%. The number of calls rose by about 1.5%, while freight volumes rose almost 4%.

Income for the Swedish Maritime Administration, but to an even greater degree for port companies, per call and freight volume, has risen sharply. Meanwhile, stricter requirements are being imposed on infrastructure and service development in an effort to boost efficiency in the transport chain, which per se raises costs. For the Administration and the ports alike, higher requirements in terms of, for example, maritime safety, search and rescue, environmental programmes and maritime security impose upward pressure on costs. A similar effect results from the rising requirements imposed on the Administration’s participation in regional co-operation for shipping in the Swedish hinterland and within EU co-operation. See Figures 19 and 20.

Exemptions from mandatory pilotage
The Swedish Maritime Administration may grant exemptions from the mandatory use of pilots in certain fairways, referred to as Pilot Exemption Certificates (PEC). A PEC normally extends for two years after the issuance date. A more general exemption from the mandatory use of pilots may be granted for a number of fairways within a geographic area, which is referred to as a
general exemption. There is now the possibility to receive a fairway permit for all Swedish fairways, based on examination in English. The number of fairway PECs and general exemptions have risen in recent years. However, the figure does not match the levels seen in the mid-1990s. During the period 2001–2004, the increase totalled 8%. A sharp rise in the number of fairway permits based on examination in English is in progress. The increase between 2003 and 2004 was a little more than 100%. See Figure 21. In many cases, masters and mates with fairway PECs based on examinations in English are involved in ferry traffic. However, the English-based fairway PECs within the Stockholm-Lake Mälaren region apply solely to Södertälje and Nynäshamn. No English language-based fairway PEC has been issued for fairways through the Stockholm archipelago. See Figure 22.

![Image of a marina with text: Figure 22: Distribution of fairway permits among the Swedish Maritime Administration’s traffic areas. (Source: Swedish Maritime Administration)]
The 2003–2004 ice season in brief

The 2003/04 icebreaking season in Swedish waters may be characterised as mild, although maximum ice formation in the Baltic Sea was normal. Ice formation started at a rather normal pace but then halted. Brief cold periods, followed by mild windy weather, gave rise to two periods with almost normal ice formation. However, ice formation was short-lived, with thin ice in the southern section. The ice melted relatively fast in the southern sections, while compact expanses of ice remained for some time in the Northern Gulf of Bothnia and thus ice melting proceeded rather slowly in May.

By about 20 May, there was mainly open water, also in the Gulf of Bothnia’s archipelago. However, the remains of old drift ice and brash blocks remained until 28 May, by which time ice has normally disappeared.

All of the Swedish Maritime Administration’s icebreakers were involved in icebreaking operations to varying degrees. None of the Viking icebreakers were chartered in for the 2003/04 season. The Swedish Maritime Administration’s works ships Baltica and Fyrbygaren were used during brief periods in the winter. Charterd tugboats were used primarily in the northern section of the Gulf of Bothnia, on Lake Vänern and on the Göta Älv river. Individual operations were also conducted in the Sea of Bothnia and in Lake Mälaren. In addition, tugboats and work vessels were chartered in as assistant icebreakers during a period of 182 working days and assisted 196 vessels.

Technological progress has resulted in a reduction in ice surveillance using helicopters compared with previous winters. Ice information from satellite pictures has improved in terms of resolution and quality compared with the past. The need for helicopter-based ice surveillance during the past winter was also particularly low due to the mild ice conditions.

The number of assistance operations conducted during an ice season varies sharply, depending on how harsh the winter is. During the severe winter of 1986/87, about 4,000 vessels were assisted, while during the mild winter of 1991/92 a mere 100 vessels received assistance.

**Table 11: Swedish icebreaker operations during the 2003/04 ice season**

<table>
<thead>
<tr>
<th>Icebreaker</th>
<th>Time period</th>
<th>Number of work days</th>
<th>Work area</th>
<th>Vessel assistance operations</th>
<th>...of which, towing</th>
<th>Number of vessels assisted</th>
<th>Number of monitorings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ale</td>
<td>28/1–16/2</td>
<td>6</td>
<td>Lake Vänern</td>
<td>8</td>
<td>0</td>
<td>8</td>
<td>101</td>
</tr>
<tr>
<td>Atle</td>
<td>8/1–9/4</td>
<td>57</td>
<td>Gulf of Bothnia/North Quark</td>
<td>192</td>
<td>2</td>
<td>193</td>
<td>601</td>
</tr>
<tr>
<td>Frej</td>
<td>20/1–19/2</td>
<td>17</td>
<td>Gulf of Bothnia</td>
<td>19</td>
<td>0</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>26/2–16/3</td>
<td>17</td>
<td>Gulf of Bothnia</td>
<td>54</td>
<td>0</td>
<td>73</td>
<td>34</td>
</tr>
<tr>
<td>Oden</td>
<td>6/2–5/5</td>
<td>68</td>
<td>Gulf of Bothnia</td>
<td>159</td>
<td>8</td>
<td>160</td>
<td>166</td>
</tr>
<tr>
<td>Ymer</td>
<td>19/12–25/2</td>
<td>44</td>
<td>Gulf of Bothnia</td>
<td>58</td>
<td>2</td>
<td>58</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>17/3–17/5</td>
<td>54</td>
<td>Gulf of Bothnia</td>
<td>81</td>
<td>9</td>
<td>131</td>
<td>43</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>19/12–17/5</strong></td>
<td><strong>263</strong></td>
<td><strong>5781</strong></td>
<td><strong>21</strong></td>
<td><strong>642</strong></td>
<td><strong>997</strong></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Swedish Maritime Administration)

**Table 12: Number of vessel calls requesting icebreaker assistance during the 2003/04 ice season, distributed by port**

<table>
<thead>
<tr>
<th>Port</th>
<th>Assistances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlsborg</td>
<td>2</td>
</tr>
<tr>
<td>Luleå</td>
<td>112</td>
</tr>
<tr>
<td>Haraholmen/Piteå</td>
<td>95</td>
</tr>
<tr>
<td>Skellefteåharn</td>
<td>80</td>
</tr>
<tr>
<td>Holmsund</td>
<td>110</td>
</tr>
<tr>
<td>Rundvik</td>
<td>2</td>
</tr>
<tr>
<td>Husum</td>
<td>19</td>
</tr>
<tr>
<td>Örnsköldsvik</td>
<td>7</td>
</tr>
<tr>
<td>Hamnösand/Angermanålen</td>
<td>4</td>
</tr>
<tr>
<td>Sundsvall</td>
<td>11</td>
</tr>
<tr>
<td>Söderhamn</td>
<td>2</td>
</tr>
<tr>
<td>Norrsundet</td>
<td>2</td>
</tr>
<tr>
<td>Gävle</td>
<td>6</td>
</tr>
<tr>
<td>Vänerhamn</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>458</strong></td>
</tr>
</tbody>
</table>

(Source: Swedish Maritime Administration)

**Figure 23**

Ice formation in the Baltic Sea 1900–2004. (Source: Swedish Maritime Administration)
assistance. During the normal winter of 2002/03, about 2,000 vessels were assisted and during the past ice season of 2003/04, assistance was provided for 600 vessels. See Figure 23 and Table 11.

A total of 458 vessels calling Swedish ports requested icebreaker assistance during the ice season. See Table 12.

Waiting time for icebreaker assistance during the 2003/04 ice season
The goal of the executive boards of both the Finnish and Swedish icebreaker service — irrespective of the severity of the winter — is that merchant shipping should not have to wait longer for assistance than an average of four hours. However, due to lower speeds through the ice, transit times during winter can be substantially longer than during the ice-free period.

The average waiting time for icebreaker assistance in 2003/04 was 3 hours and 18 minutes, which may be compared with the 2002/2003 ice season when the average waiting time was 4 hours and 15 minutes.

Traffic restrictions for winter navigation
The mild ice season of 2003/04 resulted in abnormally few traffic restrictions for shipping at Swedish ports. See Table 13.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Karlsborg</td>
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<td>30/11–22/5</td>
<td>23/12–21/5</td>
</tr>
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<td>30/11–22/5</td>
<td>23/12–21/5</td>
</tr>
<tr>
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<td>30/11–18/5</td>
<td>23/12–17/5</td>
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<td>23/12–4/5</td>
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</tr>
<tr>
<td>Ångermanälven river</td>
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<td>26/1–23/3</td>
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<td>29/12–13/4</td>
<td>26/1–23/3</td>
</tr>
<tr>
<td>Hudiksvall</td>
<td>-</td>
<td>29/12–13/4</td>
<td>26/1–23/3</td>
</tr>
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<td>Söderhamn</td>
<td>-</td>
<td>29/12–13/4</td>
<td>26/1–23/3</td>
</tr>
<tr>
<td>Norrsundet</td>
<td>-</td>
<td>29/12–13/4</td>
<td>26/1–23/3</td>
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<td>Gävle</td>
<td>-</td>
<td>29/12–13/4</td>
<td>26/1–23/3</td>
</tr>
<tr>
<td>Hallstavik</td>
<td>-</td>
<td>13/1–31/3</td>
<td>-</td>
</tr>
<tr>
<td>Lake Mälaren</td>
<td>4/1–5/3</td>
<td>16/12–30/3</td>
<td>21/1–13/4</td>
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<tr>
<td>Lake Vänern</td>
<td>4/1–19/3</td>
<td>24/12–31/3</td>
<td>24/1–19/3</td>
</tr>
</tbody>
</table>

The 2003/04 ice season was mild, despite normal ice formation in the Baltic Sea.

Table: 13: Traffic restrictions at Swedish ports 2001/02, 2002/03 and 2003/04
(Source: Swedish Maritime Administration)
Availability for the functionally impaired

Like other traffic agencies, the Swedish Maritime Administration’s goal is to raise public access to the transport system. The Government commissioned the Administration to draw up material to show how large a share of the functionally impaired and other groups with special requirements currently use or would be able to use the maritime transport system. An annual study has been undertaken among the functionally impaired and other groups to identify their potential to use the transport system and highlight areas requiring improvement. The survey – based on about 2,000 interviews – was conducted in 2002, 2003 and 2004.

Among the functionally disabled, 52% say they never travel by ship, which is a fall of more than 4 percentage points from 2003. However, the percentage is on par with results for 2002. Compared with the control group made up of travellers who are not functionally disabled, the percentage that never travels by ship is 4.5 percentage points higher. The slight difference may indicate that onboard accessibility is not the sole factor discouraging maritime travel. See Figure 24.

Overall, it is estimated that 64% of the functionally impaired could travel by ship with no trouble, while another 22% could travel with some bother. The remaining 14% state they cannot travel by ship under any circumstances. A certain increase in this group is noted compared with the past two surveys. Differences are small among the groups with various functional impairments. There is a slightly higher share among the visually impaired who cannot travel (27%), with this group accounting for the increase among all functionally impaired during 2004.

Reasons why the functionally impaired cannot travel

The ranking of the latest trip by functionally impaired travellers using maritime transport is relatively favourable. Changes among the years are marginal. The study shows that the most common factor discouraging the functionally impaired from travelling is the need for company throughout the trip. This reason is cited by the visually impaired, hearing impaired and mobility impaired alike. Crowding and the environment (stairways, rocking movements) lead many to feel the trip is too tedious, prompting them not to travel. Also, mobility-impaired people state that it can be difficult to find good seating, leading to a certain degree of anxiety. Tobacco smoke and scents present obstacles for allergic people.

Proposals by the functionally impaired for improvements

The survey provided several proposals for improvements. This type of report...
does not permit a comprehensive list of suggestions; however, a selection is shown below.

**Visually impaired**
Signs and other information should be made more visible, preferably using larger letters and sharper contrasts between bright and dark tones. Lighting presents a problem for visually impaired passengers, and warning signs near stairs are important. Lifts should have signals indicating the floor at which the lift has stopped.

**Hearing impaired**
Onboard telecom loops is a common request. Also, the PA system needs to be improved. Information via the PA system should be supplemented with lightboards so that everybody can use the information. Announcements via the PA system should be clearer, louder and be spoken slowly.

**Mobility impaired**
Stairways are troublesome for mobility-impaired passengers and lifts are sometimes over-crowded. Boarding can prove difficult due to high thresholds between the terminal and the ferry. Some wheelchair lifts would be desirable. Also, in certain cases, toilet seats tailored for the mobility impaired are required.

**Asthmatic/allergic**
Smoking seems to be particularly troublesome, especially on ferries to/from Denmark. More smoke-free seating is required. Smoking in public access areas, such as stairways and lifts, should be banned totally, as well as at entrances/exits. Wall-to-wall carpeting should be removed to reduce dust and scents. Personnel should not smoke or use scent.

**New rules will improve conditions for the functionally impaired onboard passenger ships**
At year-end 2004, new regulations were introduced to adapt conditions to suit the functionally impaired onboard Swedish vessels. The stipulations, SJÖFS 2004:25, apply to all new and refurbished passenger ships. The regulations are based on article 6b of Directive 2003/24/EC of the European Parliament and Council on safety rules and safety standards for passenger ships. These set the guidelines for the design of passenger vessels to ensure they meet the needs of elderly people and the functionally impaired.

**Adjustments to suit the functionally impaired in the Stockholm archipelago**
In recent years, the Archipelago Foundation has opened up many islands in the Stockholm Archipelago to the functionally impaired. Pathways have been broadened and levelled out, and benches and rain shelters set up. Access to more restaurants in the archipelago has been improved.

In addition, in the southern part of the Gothenburg archipelago, ground work has been conducted in an effort to raise access to destinations.
Contribution of shipping to a safe transport system
The transport policy sub-goal of a safe transport system focuses entirely on personal safety. The long-term objective – which is similar for all transport modes – is that there should be no fatalities or serious injuries as a result of traffic accidents and that the configuration and functioning of the traffic system must be adapted to the resulting requirements.

**Shipping gives priority to personal safety**

For shipping and other transport modes, one milestone target is that the number of fatalities and serious injuries resulting from traffic accidents should continually decrease. Action programmes to improve child safety in traffic should have priority. Traffic safety should be developed through, for example, greater deployment of safety-enhancing technology.

In its letter of appropriation to the Swedish Maritime Administration for 2004, the Government detailed the safety goals in the following points:

- In the case of merchant shipping, the goal is that the number of fatalities and serious injuries as a result of accidents should be halved during the period 1998–2007.
- For traffic involving fishing and pleasure craft, the goal is again that the number of fatalities and serious injuries resulting from accidents should be halved during the period 1998–2007.
- No serious accidents should occur in ferry traffic and other passenger shipping.
- Priority should be given to measures aimed at raising safety for children in traffic.
- Greater deployment of technology that promotes safe maritime transport.

- A vessel must arrive at the accident location within three hours after an accident alarm if the accident occurs in Swedish territorial waters and within six hours if the accident occurs in some other location in an agreed Swedish maritime search and rescue region.

Programmes implemented by the Swedish Maritime Administration are aimed at preventing accidents on and involving vessels as well as pollution by vessels. Nonetheless if accidents occur, their effects must be minimised. These efforts are conducted, in part, through the development of the fairways system and the introduction of new aids for navigation, such as AIS, and new systems for evacuating people from ships, and in part through the promotion of maritime safety research, the development of safety standards and inspection activities to ensure these standards are upheld. Responsibility for ensuring that vessels and shipping companies fulfil the prescribed standards lies with the shipping company.

In recent years, the Swedish Boating Safety Council has sharpened its focus on safety for children in pleasure craft and on influencing children’s behaviour.
Extensive programmes have been conducted to make it a habit to wear a life-jacket, which are expected to have a significant impact on the number of fatalities in pleasure boat traffic in the years ahead. Along with the Swedish Life-Saving Society, the Swedish Boating Safety Council has conducted a campaign focusing on the dangers presented by ice.

**Downward trend in fatalities at sea**

Accidents involving personal injuries or fatalities are reported for all Swedish registered merchant and fishing vessels, irrespective of their location at the time of the accident, as well as for all shipping in Swedish waters. However, reporting covers all accidents and near-accidents, including those in which no person was injured or killed.

In the case of Swedish waters, a total of 2,400 accidents and near-accidents were reported during the period 1993–2004 (incl. personal accidents onboard), of which 69 involved sinkings. A total of 55 people were killed during the period. Of these, 24 people died in conjunction with maritime accidents (collisions, grounding or other maritime accidents), plus 31 fatalities in connection with personal accidents onboard ship. The number of injuries during the period was 166 (6 in connection with maritime accidents and 160 in connection with personal accidents onboard ship). In addition, 70 people were affected by illness, or involved in suicide or disappearances.

*Table 14* shows the trend over time in the number of serious maritime accidents, meaning sinking and occurrences deemed to be serious, involving Swedish and foreign merchant and fishing vessels in Swedish waters during the period.
1993–2004. The table also shows the number of fatalities or injuries resulting from these maritime accidents.

The trend indicates that the goal of halving the number of fatalities and serious injuries due to accidents in merchant shipping during 1998–2007 may be met. Looking at the growth in merchant shipping during the period, this positive trend becomes even clearer. One major accident may have a substantial effect on accident figures for a particular year.

Table 15 summarises personal injuries or fatalities onboard Swedish and foreign merchant and fishing vessels in Swedish waters during the period 1993–2004. However, these accidents do not involve, for example, collisions between vessels, grounding or other maritime accidents. The Table also summarises the number of persons affected by some form of illness, or who have committed suicide onboard vessels. See Figure 25.

**Boating accidents remain unacceptably high**

The safety goal of halving the number of fatalities and serious injuries in pleasure craft traffic will probably not be achieved by 2007. However, the long-term trend is towards a reduction in the number of fatalities in pleasure craft traffic.

Following an increase in 2001, the number of accidents has decreased in recent years but nevertheless remains unacceptably high. The rise in the number of fatalities between 2000 and 2001 was partly due to the fine summer weather, but also because a larger number of accident types were categorised as pleasure craft accidents as of 2001 (such as canoeing accidents and accidents involving moored craft).
Maritime search and rescue operations decreased 10% between 2003 and 2004.

Four of the fatalities in 2004 occurred in connection with kayaks or canoeing. Three people died in diving accidents. The diving accidents occurred although diving was undertaken in the company of other divers. See Figure 26.

The number of marine search and rescue operations may also serve as an indicator of maritime safety. However, one must remember that most accidents occur in inland lakes, rivers and ports and are thus handled by the local rescue service, not by the state maritime search and rescue service. See Figure 27.

During the period 1993–2004, the number of maritime search and rescue operations declined by 45%. From 2003 to 2004, the number of maritime search and rescue missions fell by about 10%. The number has declined in recent years, thanks largely to the rise in mobile telephony, making it easier for people to make contact. There has also been a clearer demarcation between maritime search and rescue and commercial assistance. Two thirds of maritime search and rescue missions involve pleasure craft traffic and the clearly dominant factors underlying calls for maritime rescue operations for pleasure craft traffic in 2004 were grounding or engine/propeller trouble.

At year-end 2003, the Swedish Maritime Administration presented a report showing how maritime search and rescue is conducted. The report proposed that the Swedish Maritime Administration set a new target based on the individual’s perspective and vulnerability in a life-threatening situation. The goal was formulated so that, using air or surface-based resources, in 90% of all cases those in distress could be rescued within 90 minutes after the distress call is received by the maritime search and rescue coordination centre. The proposed goal is reflected in the Government’s letter of appropriation for 2005 as a tangible “safe shipping sub-target” for transport policy.

The defence cutbacks approved by Parliament in autumn 2004 may affect maritime search and rescue through the

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**Background info**

**Pleasure craft accidents 2004**
- 32 fatalities (39 in 2003) in pleasure-craft-related accidents
- 30 (37) were men
- 20 (23) were over 50 years of age
- 29 people fell overboard in connection with various activities and were unable to get back onboard or make it to land.
- Most victims had no buoyancy aid.
possible reduction in helicopter contingency resources in certain parts of Sweden. This alarmed a good deal of people and prompted a public debate. In December 2004, the Government commissioned the Swedish Maritime Administration to study the implications of cutbacks in the Defence Forces' basic organisation for helicopter services in connection with maritime search and rescue operations. A report is due no later than 28 February 2005.

The Swedish Boating Safety Council information campaigns have also focused on inland water areas in recent years, where the need for boating know-how has proved to be substantial. An information DVD, “Boating and Maritime Safety” was prepared towards the end of 2004. The disc includes reports and a discussion platform from the Swedish Boating Safety Council and is aimed primarily at boat clubs and boating instructors.

During 2004 the Swedish Maritime Administration conducted a study on perceived environmental and safety problems in boating activities in the Stockholm archipelago. The problem categories identified included noise pollution, speed and safety, backwash as well as attitudes, know-how and lack of consideration for others.

An important factor underlying trends...
in the safety area is that new pleasure craft are increasingly capable of speeds exceeding 30 knots.

**CE marking – obligatory rules for pleasure craft**

Effective 16 June 1998, all newly manufactured pleasure craft between 2.5 and 24 metres long must be CE marked pursuant to a product directive from the EU, or what is referred to as the “Recreational Craft Directive”. The purpose of the directive is to promote maritime safety and to contribute to a reduction of emissions from pleasure boat traffic.

To be able to CE mark a pleasure boat, the manufacturer must test or have the boat tested vis-à-vis some thirty overall safety requirements in the directive and about fifty standards. The results of the tests must be documented and stored by the manufacturer.

The new CE marking regulations for pleasure craft came into effect on 1 January 2005. The regulations are mandatory as of 1 January 2006.

- To be able to circulate freely in the EU, a pleasure craft from a country outside the EU/EES area and which is not CE marked must fulfil the same requirements as boats manufactured within the Community. It is irrelevant as to whether the boat is second-hand or if other examples of the boat type are already available within the EU/EES.
- A “registered organisation” must participate in the testing and CE marking of the boats, irrespective of boat size.
- Boat engines must be tested for exhaust and noise emissions and CE marked.
- Water scooters are covered by the new legislation and thus must also be tested and CE marked.
Reporting of near-accidents

The usefulness and value of a near-accident reporting system is obvious. There have long been demands for similar reporting in shipping, too. Maritime legislation speaks of the obligation to report in the case of accidents, which is hardly an innovation, but also near-accidents are to be reported according to the Investigation of Accidents Act.

For a number of years, the Swedish Maritime Safety Inspectorate, in cooperation with the Swedish Shipowners’ Association and employee organisations, has been in charge of development programmes for a database – referred to as Insjö – for the shipping industry as a whole, which is aimed at compensating for shortcomings. Interest in and support for such a system has been particularly substantial in the industry, especially so because the system’s design permits all stakeholders to gain the immediate benefits offered by the system. However, the apparent interest has not gained an impact in the form of a greater willingness to report incidents to the system.

Since Insjö was placed on the Internet in summer 2002, more than 1,000 reports have been submitted (January 2005), of which more than 100 reports were received during 2004. This is far short of the expectation of 1,000 reports annually. However, a greater willingness to report near-accidents to Insjö was noted during the latter half of 2004. The problem in getting reports may be attributed to the natural unwillingness of onboard personnel to recount what “almost went wrong”. However, by means of joint efforts, the shipping companies, trade union organisations and the authorities should have a good chance of raising the level of reports submitted. In order to encourage reporting, the shipping company and vessel are de-identified. A number of shipping companies have also developed systems within the framework of the ISM code, which greatly simplify reporting to Insjö.

Insjö has attracted interested in Europe and a number of foreign authorities and organisations have displayed considerable interest in the system. In the Netherlands, Norway, Denmark and notably in Finland, interested parties have contacted the Swedish Maritime Safety Inspectorate with a view to future co-operation.

The system has also been demonstrated for EMSA – the EU’s maritime safety agency – but EMSA works primarily with the development of a European database for accidents and near-accidents. At year-end 2004, EMSA, selected the Swedish Maritime Safety Inspectorate’s “SjöOlycksSystem” (Maritime Accident System) as the basis for its accident data system for all EU member countries. “SjöOlycksSystem” is a database in which all reported maritime accidents in Swedish waters – as well as accidents involving Swedish-flagged vessels in foreign waters – are stored. Over a period of one year, the Swedish Maritime Safety Inspectorate, along with the consultancies SSPA and ICC – the company responsible for running Insjö – will work on the development of the European maritime accident database.
Rising demands for vessel supervision in the EU

Port State Control
The purpose of Port State Control is to check foreign vessels. Such activities are governed by the EU’s Port State Control Directive (95/21/EC) and the “Paris Memorandum of Understanding on Port State Control” – an inter-governmental accord among 20 countries. According to both of these, Sweden – via the Swedish Maritime Safety Inspectorate – is to inspect 25% of foreign vessels arriving in Sweden. Statistics drawn up in 2003 within the Paris MoU show that British ships performed best in port state controls. Swedish vessels were ranked second. Although the results for port state controls are only a rough gauge, they indicate that safety standards on Swedish ships are very high by international comparison. A higher number of detention orders for Swedish vessels abroad – from five in 2003 (all within the Paris MoU) to eleven in 2004 (with nine within the Paris MoU) – is not a source of concern, as such a small figure is statistically difficult to interpret, but must nonetheless be noted. See Tables 16 and 17.

Continuing research aimed at enhanced safety
The ongoing maritime safety programme remains a key part of Swedish maritime safety research work. In 2004, a total of SEK 22 million was invested in programme projects, to which the Swedish Maritime Administration contributed some SEK 2.5 million.

Notable projects included the “The Vessel as Its Own Lifeboat”; the development and handling of rescue equipment; and behavioural-science research focusing on the link between man and machine. The Government has decided to extend the programme for another three years.

A number of projects that may shape IMO regulations are also ongoing. A study of the safety aspects of free-fall lifeboats was conducted. The background to this is that the frequency of near-accidents during exercises focused attention on the considerable stresses and strains on people during evacuation. Another project involved fire extinguishing in engine rooms using water mist, the results of which showed that current rules need to be changed and more relevant criteria introduced.

The Winter Navigation Research Board granted funds for a number of studies in 2004, including long-term studies of climate and ice formation. Other interesting areas are the development of new icebreaker designs, and the effect of low temperatures on ship systems and safety.

New insight into the strains on vessel hulls navigating in sea ice is important for safety in the Baltic Sea, notably in view of the greater presence of large tankers. SAFEICE is an EU project that began in 2004 and – deploying technical measurements – is designed to document the strains on a vessel’s hull as it moves through sea ice and ice ridges.

IRIS (Ice Ridging Information for Decision-Making in Shipping Operations) is another EU-financed research project aimed at identifying and measuring ice areas that are difficult to navigate. Optimal route planning reduces energy consumption and thus also environmental impact.
Contribution of shipping to a safe transport system
The contribution of shipping to a favourable environment
As far as shipping is concerned, the transport policy’s goal of a favourable environment means that the maritime transport system must be adapted to meet the requirements for a sound and healthy living environment for everybody and one that promotes the efficient management of natural resources. Configuration of the maritime transport system should contribute to the attainment of the quality goals of environmental policy.

**Emissions to air**

**Environmentally differentiated dues**

The Swedish Maritime Administration’s revised fairway dues system was drawn up in 2004 and introduced on 1 January 2005. The revised system includes greater incentives for shipping to cut nitric oxide and sulphur emissions. Shipping companies that install and use equipment to reduce nitric-oxide emissions and can certify that they use only low-sulphur oil now receive a larger discount on fairway dues. Moreover, environmental differentiation now covers more vessels than in the past.

The number of discount levels for low sulphur content in fuel has been reduced to four for all types of ships. The levels are as follows: less than 0.2% sulphur content by weight; between 0.2 and 0.5; between 0.5 and 1; and exceeding 1% sulphur content by weight. The incentive level has been increased by a total of 20% in the case of sulphur.

According to the prevailing EU Directive (1999/32/EC) – referred as the Sulphur Directive – marine diesel oil or marine gas oil may not be used in Swedish territorial waters if the sulphur content exceeds 0.2%. The directive does not cover heavy fuel oil or the fuel in a ship’s tanks passing the border of Sweden and non-EU countries. The Swedish Maritime Administration grants a certain discount to vessels using marine fuel covered by the directive in an effort to discourage vessels from switching to heavy fuel oil. Moreover, a certain stimulus must be given to vessels not covered by the directive.

The scale for nitric-oxide discounts has been extended all the way down to 0 g/kWh, thereby strengthening the incentive to cut NOx emissions from auxiliary engines. The upper limit has been reduced from 12 g/kWh to 10 g/kWh. Changes in the dues system mean that the financial incentive has been boosted by a total of 4% for nitric oxides.

The current dues system is a better reflection of the socio-economic marginal cost than the previous system and the aim is make dues more equitable and effective in relation to the environmental impact of shipping. Firstly, previously dues-free cruise vessels will pay for one call per cruise as of 2006. Secondly, passenger vessels now pay for up to five calls per month, thus a maximum 60 calls per year instead of the first 18 calls during a year. But the cost incurred by vessels has not changed dramatically, since the dues have been reduced by more than 50%. Vessels other than cruise and passenger ships now pay for up to two calls per month, thus a maximum of 24 per year, instead of the previous 12 per year. However, since dues have been halved there is no cost difference compared with the previous system unless vessels make fewer than 24 calls, in which case it will be less costly.
Reporting

The Swedish Maritime Administration continues to participate in the design of a national reporting system for the emission of greenhouse gases in accordance with the Kyoto Protocol. The system is scheduled for completion in October 2005. The Swedish Environmental Protection Agency, which has been commissioned to develop and establish the entire system in consultation with several other agencies, has proposed that the Swedish Maritime Administration take charge of drawing up emission factors for gauging emissions from maritime traffic that uses Swedish fuel. Data sources and calculation methods are to be quality tested and be capable of being checked by a third party. The requirements governing reporting and quality assurance have been set in the Kyoto Protocol for the Climate Convention, which will come into effect in February 2005.

Reporting in line with the Kyoto Protocol does not suffice in following up the transport policy goal of a favourable environment and the Swedish national environmental goals. For example,
reporting does not encompass all emissions from shipping within the Swedish area, since a large share of maritime traffic bunkers its fuel abroad. Consequently, there is also a need to calculate emissions within Swedish territorial waters or economic zone. This division provides a profile of the real emissions near Sweden, which corresponds with the portion of maritime traffic that can be most influenced through control and dues systems. For 2001, emissions in Swedish inshore waters as well as between inshore and territorial water boundaries were calculated but only for vessels calling at Swedish ports. The various borders used in the calculations were selected to suit the particular issue prompting the calculations. Generally speaking, the smaller the area demarcated, the greater is the significance of the shipping that navigates primarily in the smaller area. Thus, the selected borders have major significance for the results and must be carefully analysed when they are to be used as a decision-making base, for instance. An example of the results from the two aforementioned territorial divisions is reported in the section covering emissions of nitric oxides.

The technical conditions for calculating emissions in a certain area are improving considerably. The automatic identification system (AIS) permits registration of a merchant vessel’s routes, which may be used for emission gauging. The Administration’s Internet-based vessel reporting system (VRS), which was commissioned in January 2005, permits more effective compilation of statistics for ships calling at Swedish ports. The Administration has commenced efforts to develop more effective, more usable and quality assured calculation methods. The calculation methods used by the agency to date have been accompanied by major difficulties in terms of, for example, the extent of traffic in Swedish areas and the quality of the fuel used. Although the methodology problem makes it difficult to draw conclusions regarding progress over the years, the results are nevertheless reported in the following sections.

Emissions of carbon dioxides, nitric oxides, sulphur dioxide, hydrocarbons and particles from maritime traffic have been calculated by MariTerm AB on a commission from the Swedish Maritime Administration in an effort to monitor progress vis-à-vis the national environmental goals for the entire transport
sector. All parameters except particles are reported in the tables in the following sections, in which the amounts for “Swedish fraction” have been used for the follow-up of transport policy goals, which SIKA is conducting on behalf of the Government.

Greenhouse gases

Emissions of greenhouse gases from shipping are reported in various ways. There are several emissions in flue gases from vessels that affect the climate directly or indirectly. Carbon dioxide, methane and nitrous oxide have a direct greenhouse effect while nitric oxides and emissions of sulphur have indirect climatic effects. All the various parameters are reported internationally by Sweden but – particularly as a result of major uncertainties in the calculation of various parameters – this presentation shows only carbon dioxide emissions in certain areas.

The amount of emissions compared with the Swedish national goal for the entire transport sector “Swedish fraction” in Table 18, is substantially larger than that reported by Sweden internationally, namely 669,000 tonnes of carbon dioxide in 2002, which provides an idea of how large the difference can be between emissions from national shipping using fuel bunkered in Sweden and emissions in Swedish areas. A recent estimate by the Swedish Maritime Administration of fuel consumption for domestic professional shipping indicates that carbon dioxide emissions in 2003 were about 750,000 tonnes.

The variation in emissions between the years should essentially track the trend in the volume of maritime traffic, technical progress in maritime traffic and freight loads carried by vessels.

### Table 18: Emissions of carbon dioxide (CO₂) from maritime traffic in various areas in the Swedish hinterland

<table>
<thead>
<tr>
<th>Year</th>
<th>North Sea and Baltic Sea</th>
<th>Baltic Sea area</th>
<th>Baltic Sea calls at SE</th>
<th>“Swedish fraction”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>27,000,000</td>
<td>14,000,000</td>
<td>5,700,000</td>
<td>3,000,000</td>
</tr>
<tr>
<td>2001</td>
<td>32,000,000</td>
<td>15,000,000</td>
<td>4,700,000</td>
<td>2,600,000</td>
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<tr>
<td>2002</td>
<td>35,000,000</td>
<td>17,000,000</td>
<td>5,200,000</td>
<td>2,800,000</td>
</tr>
<tr>
<td>2003</td>
<td>35,000,000</td>
<td>16,000,000</td>
<td>4,600,000</td>
<td>2,500,000</td>
</tr>
</tbody>
</table>

The contribution of shipping to a favourable environment

According to the Kyoto Protocol, the national undertaking includes only emissions from national maritime traffic. Emissions from international traffic should instead be handled through the IMO. To date, the IMO has been unable to reach a consensus as to whether or not developing countries (so-called non-annex I states pursuant to the Kyoto Protocol) are to be exempted from undertakings regarding decreased emissions. Only when the IMO has made a decision on the issue can progress be made on measures to reduce emissions of climate-influencing gases from shipping.

Nitric oxides

The emission of nitric oxides from maritime transport in various areas, as presented in Table 19, has been used to monitor the trend vis-à-vis the Swedish national goals for the entire transport sector. However, the data underlying the calculations have shortcomings that make it impossible to draw any conclusions regarding the trend over time. On the other hand, the data required to calculate the reduction in emissions for vessels on which emissions have been dealt with is considerably better. This is because the Swedish Maritime Administration’s environmentally differentiated fairway dues require a certificate detailing the emission characteristics of each vessel.

A year ago it was estimated that 37 vessels certified as having nitric-oxide abatement technology had reduced emissions over an entire year by 36,000 tonnes. A similar calculation at the latest year-end indicated a reduction of more than 41,000 tonnes of nitric-oxide emissions from 38 vessels. The revised, environmentally differentiated fairways dues are expected to provide an additional reduction.

Table 19: Emission of nitric oxides (NOₓ) from maritime traffic in various areas in the Swedish hinterland

<table>
<thead>
<tr>
<th>Year</th>
<th>NOₓ (tonnes)</th>
<th>North Sea and Baltic Sea</th>
<th>Baltic Sea area</th>
<th>Baltic Sea calls to SE</th>
<th>“Swedish fraction”</th>
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<tbody>
<tr>
<td>2000</td>
<td>560,000</td>
<td>270,000</td>
<td>100,000</td>
<td>54,000</td>
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<tr>
<td>2001</td>
<td>700,000</td>
<td>320,000</td>
<td>93,000</td>
<td>51,000</td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>750,000</td>
<td>350,000</td>
<td>100,000</td>
<td>56,000</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>760,000</td>
<td>340,000</td>
<td>95,000</td>
<td>51,000</td>
<td></td>
</tr>
</tbody>
</table>

Many people view pleasure craft traffic as a disturbance.

For 2001, emissions to air within inshore waters and between inshore and territorial water boundaries were also measured, but solely for vessels calling at Swedish ports. The emission of nitric oxides was then 3,911 tonnes and 5,897 tonnes, respectively, that is a total of 9,808 tonnes within territorial water boundaries.

Sulphur dioxide
In 2004, as a result of environmentally differentiated fairway dues, the Swedish Maritime Administration received 1,200 certificates confirming the use of low-sulphur fuel. Sulphur-dioxide emissions from vessels with certificates had fallen over an entire year by some 50,000 tonnes compared with the use of “normal sulphur content” fuel. No change occurred during the year, but the revised, environmentally differentiated fairway dues, which came into effect on 1 January 2005, are expected to provide an additional reduction.

Total sulphur emissions from all maritime traffic in certain areas, as shown in Table 20, have been used to monitor the trend vis-à-vis Swedish goals for the entire transport sector, as well as for other purposes.

Hydrocarbons
Pleasure craft, notably those with two-stroke engines, give rise to substantial emissions of unburned hydrocarbons, as shown in the Swedish Environmental Protection Agency’s report 3993, “Environmental Impact of Pleasure Craft, Fishing and Work Vessels”. Consequently, emissions from pleasure craft have been added to the total hydrocarbon emissions from all shipping in certain areas, as shown in Table 21, when the trend is compared with the national goals for the entire transport sector. The total for 2002 was 13,800 tonnes of hydrocarbons. Information on hydrocarbon emissions from pleasure craft needs to be highlighted and updated.

In Sweden the “Pleasure Craft Directive” (2003/44/EC) is applied by the

<table>
<thead>
<tr>
<th>Year</th>
<th>North Sea and Baltic Sea</th>
<th>Baltic Sea area</th>
<th>Baltic Sea calls at SE</th>
<th>“Swedish fraction”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>260,000</td>
<td>110,000</td>
<td>36,000</td>
<td>19,000</td>
</tr>
<tr>
<td>2001</td>
<td>320,000</td>
<td>140,000</td>
<td>35,000</td>
<td>19,000</td>
</tr>
<tr>
<td>2002</td>
<td>350,000</td>
<td>160,000</td>
<td>42,000</td>
<td>22,000</td>
</tr>
<tr>
<td>2003</td>
<td>350,000</td>
<td>150,000</td>
<td>37,000</td>
<td>20,000</td>
</tr>
</tbody>
</table>

Swedish Maritime Safety Inspectorate by checking that newly manufactured, imported and refurbished pleasure craft meet the requirements of the directive in terms of noise and emissions. The proportion of more effective two-stroke engines and four-stroke units is increasing, resulting in reduced emissions by engine output: but the increasing number of pleasure craft – frequently with more powerful engines – counteracts the positive technical trend. Current data do not permit any conclusions regarding the increase or decrease of emissions from pleasure craft.

**Noise**

In line with the national environmental quality goal: “A sea in balance as well as living coasts and archipelagos”, Parliament has set sub-goals for noise, which state that “Noise and other disturbances from boat traffic shall be negligible in particularly sensitive areas and in earmarked archipelagos and coastal areas by 2010”. The sub-goal is aimed at limiting disturbances from boat traffic in certain areas by regulating speed, noise, access, etc.

The EU’s pleasure craft directive has been supplemented with requirements in respect of exhaust emissions and noise from pleasure craft. The new directive also encompasses water scooters. The noise requirement is detailed in the Swedish Maritime Administration’s regulations (2004:16) governing certain safety and environmental requirements for pleasure craft, etc., which apply as of 1 January 2005.

A 2004 survey by the Swedish Maritime Administration of pleasure craft in the Stockholm archipelago revealed that noise is perceived to be the primary environmental problem. Loud noise from powerful engines or prolonged irritating noise from water scooters or water skiing, for example, are described as the most common noise disturbance factors.

**Nature, culture and the ecocycle**

**The Baltic Sea is protected in various ways**

The Baltic Sea area has long been categorised as a special sea area in a number of annexes to the Marpol Convention 73/78 drawn up by the IMO. This has led to measures aimed at reducing the impact of oil, chemicals and solid waste. Annex VI of the Marpol Convention applies as of 19 May 2005. One of the implications of this is that the Baltic Sea becomes a sulphur-emission control area with regulations governing the maximum sulphur content for ship engine fuel after 19 May 2006.

In March 2004, the IMO decided in principle to approve the Baltic Sea as a Particularly Sensitive Sea Area (PSSA). The PSSA classification permits stricter emission regulations, the introduction of a route system to avoid sensitive areas, or other measures such as mandatory pilotage. The Swedish Maritime Administration has been assigned the task of co-ordinating the Baltic Sea countries and promoting the final classification of

### Table 21: Emissions of incompletely burned hydrocarbons (HC) from shipping in various areas in the Swedish hinterland

<table>
<thead>
<tr>
<th>Year</th>
<th>North Sea and Baltic Sea</th>
<th>Baltic Sea area</th>
<th>Baltic Sea calls at SE</th>
<th>“Swedish fraction”</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>21,000</td>
<td>10,000</td>
<td>4,400</td>
<td>2,300</td>
</tr>
<tr>
<td>2001</td>
<td>25,000</td>
<td>12,000</td>
<td>3,600</td>
<td>2,000</td>
</tr>
<tr>
<td>2002</td>
<td>27,000</td>
<td>13,000</td>
<td>4,000</td>
<td>2,200</td>
</tr>
<tr>
<td>2003</td>
<td>27,000</td>
<td>12,000</td>
<td>3,500</td>
<td>1,900</td>
</tr>
</tbody>
</table>

Emissions of sulphur dioxide from vessels have fallen sharply since this photo was taken. The incentive provided by new, environmentally differentiated dues has cut emissions by 50,000 tons per year compared with the use of fuel with a “normal” sulphur content.

the Baltic Sea no later than March 2006. The assignment means that the agency must also work actively in drawing up supplementary maritime safety measures noted in the IMO application. Russia participated as an observer in working meetings during the autumn.

Proposed supplementary maritime safety measures include improved traffic separation in the southern Baltic, a new deep-water channel for maritime traffic south of Gotland for large vessel traffic, and a ban on traffic across the two outer-sea banks, Norra Midsjö bank and part of the Hoburg bank.

Waste
Programmes to prevent pollution from vessels and for the management of waste onboard ships and in ports are governed by regulations described in the annexes to the Convention on the Prevention of Pollution from Ships (MARPOL 73/78), as well as by Directive 2000/59/EC governing reception facilities in ports for ship-generated waste and cargo residues and in the Helsinki Convention. In Sweden, the substance of the directive and convention is transformed into regulations drawn up by the Swedish Maritime Administration.

Regulations governing waste reception in pleasure craft ports and other ports are aimed at creating incentives for delivering waste to shore facilities rather than dumping it at sea. Thus, observance of the regulation prohibiting ports from charging a special fee for waste deposits is important. Costs incurred by ports for waste management are to be paid by all vessels regardless of whether or not they deposit waste. The fee principle – “No special fee” – is interpreted in different ways by various countries around the Baltic Sea. Differing interpretations may reduce the incentive to deposit vessel-generated waste on shore instead of dumping it at sea. Different interpretations also entail the risk of Swedish ports accepting waste that should have been deposited in a foreign port.

The ports are to draw up a waste management plan showing the volume and types of waste they receive. The Swedish
The contribution of shipping to a favourable environment

Maritime Administration checks that the ports have such plans and requests annual reports. These show the volumes of each waste category received by the ports. The total for waste in the reports received for 2003 are shown in Table 22. The waste totals correspond to 93,860 vessel calls at a total of 157 ports.

The waste statistics show the approximate waste quantities received each year by Swedish ports. Among other factors, this is because the amounts for the various types may prove difficult to measure or calculate and that it is also difficult to aggregate waste data.

The amounts of sludge, chemical residuals and toilet waste are registered onboard each vessel according to the regulations of the MARPOL 73/78 Convention. The ports subsequently pass on these data. The collection of solid waste onboard vessels is governed by MARPOL 73/78, Annex 5. This states that solid waste is to be sorted and documented in six categories, whose quantities can prove difficult to calculate. In addition, uncertainty arises when the amounts of the various categories of solid waste are to be totalled. Ports frequently report the amounts of solid waste as the number of containers of a certain volume, irrespective of whether or not the waste is deposited in compressed form, which affects how much waste that a container can hold. Moreover, there are other types of solid waste, such as fluorescent lighting tubes or filters, which are always indicated in numbers rather than volume.

Vessels must make prior notification to the port of the categories and estimated amounts of waste they intend to deposit on shore. Normally, notification must be made 24 hours ahead of arrival. To facilitate notification of waste, the Swedish Maritime Administration has provided the opportunity to give notification via the Internet-based vessel reporting system (VRS), as described in the section on administrative streamlining for the shipping industry through the development of information systems.

### Oil spills

According to information from the Swedish Coast Guard on oil spills, the number of confirmed spills within the Swedish area of responsibility decreased up until 2001. Subsequently, the number has varied around 200 annually.

Within HELCOM, member states have monitored oil spills throughout the Baltic Sea since 1998 using aircraft. The number of observed spills fell from 488 in 1999 to 292 in 2003, although maritime traffic and the number of monitoring flight hours have increased. Moreover, other monitoring methods have improved. The differences among the years in the areas monitored and other differences lead to somewhat uncertain conclusions, but the trend appears clear and in harmony with the trend in the Swedish area of responsibility in line with the Coast Guard information. Refer to Figure 28.

#### Table 22: Waste volumes received in Swedish ports

<table>
<thead>
<tr>
<th>Sludge</th>
<th>Solid waste</th>
<th>Chemical residuals</th>
<th>Other cargo residuals</th>
<th>Toilet waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>76,104 m³</td>
<td>27,666 m³</td>
<td>9 m³</td>
<td>10,400 m³</td>
<td>329,609 m³</td>
</tr>
</tbody>
</table>

(Source: Waste reports from ports submitted to the Swedish Maritime Safety Inspectorate.)

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Number of observed illegal oil spills in the Baltic Sea and the number of monitoring flight hours.

(Source: HELCOM home page on the Internet)
Ship recycling

Conditions at shipyards in India, Taiwan, Pakistan and Bangladesh, for example, where vessels are recycled are frequently substandard, especially from the work environment viewpoint. Ships are often broken up directly on beaches, making it difficult to handle spillages of any environmentally hazardous substances from the vessels. In Europe, the break up of vessels stopped as early as 1970s and no yard in Sweden conducts ship-scrapping operations.

Taking a ship’s entire life cycle into account considerably improves ship recycling. One step in this direction has been taken through the IMO’s guidelines for ship recycling (resolution A.962(23) “Guidelines on Ship Recycling”).

The guidelines encompass the entire life cycle from design and construction through to utilisation and recycling. Guideline implementation is voluntary, but there are moves in progress within the IMO to make at least some of them mandatory. Avoiding the inclusion of environmentally hazardous materials in vessel construction and carefully documenting the materials that must nevertheless be used, and where they are installed, facilitates environmentally compatible ship recycling. All this requires a functioning system so that the documentation accompanies the vessel until the recycling company breaks it up.

In Sweden, the Swedish Maritime Safety Inspectorate participates at an early stage of the process of new ship
construction and adds a recycling perspective to the work involved.

**Biological diversity and organic growth prevention systems**

Plant and shell growths on ships' hulls increase water resistance. Consequently, surface treatment is frequently applied that prevents organisms from growing on the hull. Surface treatment often contains poisonous substances. The international Convention on the Control of Harmful Anti-fouling Systems on Ships was adopted at a diplomatic conference arranged by the IMO on 5 October 2001, but has not yet been enforced. Nonetheless, pending its enforcement, EC-ordinance 782/2003 banning organotin compounds on ships applies in Sweden, irrespective of vessel size or traffic patterns. As of 1 January 2008, there will be a total ban on the application of organotin compounds on Swedish vessels. The spread of organisms appears to be increasing in line with ever-tighter restrictions on the use of poisonous hull paints.

**Biological diversity and ballast water**

On 13 February 2004, the IMO adopted a new convention, the Ballast Water Convention, to reduce the risk of spreading dangerous organisms via ship ballast water and sediment. Via the Swedish Maritime Administration – in consultation with the Swedish EPA – Sweden is studying the requirements for ratification and implementation of the convention. Among other points, the convention prescribes that vessels must have management plans and keep a log on how they handle their ballast water. Work is progressing within the IMO on evolving the thirteen guidelines that make up the basis of the Ballast Water Convention. When enforced, the Ballast Water Convention will impose requirements to the effect that vessels in international traffic must have systems for treating ballast water onboard. During the transition period, the replacement of ballast water is permitted only if sea depth is more than 200 metres and if replacement can be undertaken sufficiently far from coastlines. The aforementioned transition rule may not be used within the Baltic Sea, since the water depth does not suffice for ballast water replacement. Moreover, it is impossible in a short space of time to develop technological solutions for the treatment of ballast water for all types of ships. Consequently, it currently appears difficult to apply the Ballast Water Convention in its entirety in the Baltic Sea.

**Backwash waves**

Erosion problems as a result of backwash from ships have been the subject of many studies. One study from 2003, “Ship traffic and strand erosion in the Stockholm archipelago”, (Report 2004:39, County Administrative Board in Stockholm County) compared the situation with a study from 1990. The comparison shows clearly that the erosion problem due to heavy ferry traffic has gradually declined, while the erosion problem is increasing sharply along fairways in the central archipelago.
Environmental impact of ports

The Swedish Maritime Administration’s sector responsibility also covers ports and their environmental impact. Consequently, the agency has initiated a study of port environmental impact and how ports conduct environmental work, as well as analysing the content of environmental reporting. The study is aimed at providing a basis for reporting the ports’ environmental impact work as part of the annual follow-up of the national environmental goals. The study covers ten ports of varying size and location nation-wide. The following description is based on a partial report of the assignment, which will be reported in full in May 2005.

Environmental work

It is only recently that many ports have begun to work conscientiously with environmental issues. The ports studied take environmental issues seriously and are working actively to improve their routines, control, gauging methods and the description of their environmental programmes. Work involving permit applications and environmental impact assessment (EIA) has added to insight into the environmental effects of port activities. A number of ports pursue structured, internal environmental work based on standardised environmental management systems. Of the ten ports studied, seven are certified in line with ISO 14001 and another port is preparing for certification.
Environmental data and reporting

Data covering emissions to air and water and other effects on the environment are available from all ports. Among other things, information is published in environmental reports to the authorities, in environmental impact assessments (EIA), permit applications and decisions regarding permits.

All ports submit environmental reports to the supervisory authority. The scope of the reports differs depending on the control programme adopted and the demands imposed by the supervisory authority in respect of reports. The ports calculate emissions in different ways and thus it is difficult to compare emission data. Neither is there any compatibility as regards the reporting of waste fractions and waste volumes. This makes environmental report data difficult to compare and it is seldom possible to compare environmental work among the ports using the data provided. The quality of the gauging methods and reported values vary, in part, among the ports and, in part, among the various problem areas. There is a substantial need for more reliable methods, primarily in respect of the reporting of emissions to air. In addition, it seems reasonable to seek compatibility in subdivision into waste fractions.

Port reports indicate that there are favourable routines for avoiding emissions to recipients as a result of accidents or via surface water.

Emissions to air

Direct emissions to air from port operations originate from working machinery, heating and transport within the port area. Hydrocarbons can also derive from oil separators and the leaching of waste detergents. Other emissions originate from calling vessels, vessels at the quayside and any contractors active in loading or unloading at the port or who otherwise conduct operations within the port area. Dust can present problems during loading and unloading and in goods storage.

At the local level, nitric oxides, particles and hydrocarbons from the port constitute the primary problem, since they can affect human health. Large ports in densely populated areas can contribute to the breaching of environmental quality norms. In a number of cases, however, the contribution of ports to total emissions is relatively small.

It is interesting to gain a picture of the extent of emissions from port operations in relation to other emissions in the surrounding area. In the case of hydrocarbons, the Port of Gothenburg states that operations release 28 tonnes annually, while emissions from other operations at
the oil port and oil depot (primarily leakage from cisterns, etc.) amounts to more than 1,000 tonnes. The Port of Västerås has an oil depot from which about 25 tonnes of hydrocarbons are released, whereas emissions from the port’s working machinery are estimated to be one tonne. In Halmstad, it is estimated that vessels tied up at the quay give rise to more than 150 tonnes of nitric oxides each year, while working machinery accounts for 44 tonnes. Also in Gothenburg and Västerås, it is estimated that emissions from vessels at the quayside account for a substantially larger share of emissions than working machinery.

**Emissions to water**

The water environment in ports is affected primarily by emissions from oil and oil-polluted water. Oil emissions can result in serious environmental effects. There are also emissions from loaded or unloaded goods and freight stored in the port. Organic materials contribute to excess fertilisation. Metals or other toxins contribute to disturbances in the ecosystem. Maintenance dredging can give rise to problems that result in temporary water turbidity (cloudiness).

Various substances are released from the ship’s hull into the water, resulting primarily in the leaching of copper and organo-tin compounds. In addition, propeller shaft-casing oils and so forth can leach from the vessel to the water environment.

Locally, the continual emission of small amounts of oil and metals can affect the water environment in the harbour and its surroundings. The greatest risk, however, is represented by accidental emissions through which large amounts of oil may be released. The ports handle hazardous goods, which may lead to accidental emissions of various chemicals and/or fertilising substances.

The ports are working actively to reduce their emissions to the water environment. The figures reported for emissions to water are frequently precise in terms of the amounts deriving from port operations, since they are measured in
The contribution of shipping to a favourable environment

In accordance with various control programmes. In general, small amounts are released into the water environment, at an annual rate of 10–200 kg oil and 10–20 kg copper per port, depending on the focus and size of the port. This may be compared with the estimated emissions from ships hulls, which are estimated to be about 1,000 kg annually in Västerås, for example.

Waste
All ports included in the study accept ship-generated waste. Sorted-at-source waste may be deposited at all ports. Hazardous waste is also accepted. The ports publish annual waste reports and submit them to the Swedish Maritime Administration. Also, environmental reports submitted to the local environmental supervisory authority show the port waste volumes, divided up into various fractions. Frequently, the amounts are detailed, but in certain cases only estimates are indicated.

Although all ports handle hazardous goods, the environmental reports indicate that accidental emissions of chemicals or other hazardous goods are unusual. Incidents involving oil leaks are the primary occurrence.

Sludge containing oil is made up of engine room waste and it should have reduced water content. However, the ports indicate that the water content is frequently too high. There is a general consensus that vessels should put the fluid engine room waste through their separators to reduce water content. In addition, a number of ports complain that vessels deposit larger amounts of sludge than what they themselves could have generated since their latest port of call. The Port of Gothenburg states that the average water content is 70%, while the Port of Halmstad states that water content is 70–90%. Other ports do not indicate water content. It is not unusual for sludge and bilge water to be pumped over to the same tanker truck, which also results in high water content in the waste.

Noise
Noise is perceived as a problem in many ports. This usually derives from working machinery, auxiliary engines in ships and fans. Noise also arises during loading and unloading, from ramps and during the process of moving goods. Noise from port operations is deemed more dominant than that generated by vessels.

The ports do not gauge noise continually but certain noise measurements have been conducted to provide a basis for permit application and for other reasons. All ports note any complaints in their environmental reports and, among the ports studied, three had registered complaints about noise in 2003. Low frequency noise from port operations is not included in the environmental reports. However, low frequency noise has an extensive range and may present a problem in the future.
Present status of gender equality in the maritime sector
Based on the transport policy’s sub-goal of an “a transport system offering gender equality”, the state authorities strive to attain an equitable maritime transport system designed to meet the transport requirements of men and women alike. Women and men must have similar potential to influence the creation, configuration and administration of the maritime transport system, and the values of both genders must carry equal weight.

In the past, there was a lack of knowledge and strategy in terms of gender equality in the transport sector. As a result, the Swedish Maritime Administration – in co-operation with other traffic agencies and SIKA (Swedish Institute for Transport and Communications Analysis) – participated in a survey to chart gender distribution throughout the maritime sector, within decision-making organisations as well as among employees in Swedish shipping and in educational organisations for various maritime occupations.

**Gender distribution in decision-making bodies**

In autumn 2004, a major study was conducted of the representation of women and men in decision-making bodies in the transport sector. The study concentrated on the distribution of women and men in chief executive positions and on company boards in the shipping sector and the authorities concerned. The eight shipping companies taking part in the study have only male chief executives but there are two women chairpersons among the boards. The total proportion of women in corporate governance (chief executives and boards) for the shipping companies included in this study amounts to 21%.

Of the approximately 60 port companies that are members of the Ports of Sweden, three ports have a female chief executive. In addition, there is a small number of women in leading executive positions in a number of large ports, such as the Port of Gothenburg. The figures do not differ much among shippers and in research and maritime education. However, men have essentially total domination in the shipbuilding industry.

In the Swedish Maritime Administration.
tion, the percentage of women board members is 40%. The proportion of women at the managerial level in the Swedish Maritime Administration is almost 20%, while among administrators the percentage of women is a mere 10%.

Moreover, at the highest political level, which is in the Parliamentary Standing Committee on Communications (TU), the proportion of women is low, with women making up less than 30% of the members. Even when deputy members are included, female representation is just about 35%. Those sections of the Ministry of Industry, Employment and Communications handling transport issues have a relatively equal gender distribution at the executive level. This suggests that equality issues will gain considerable attention at the highest executive level in the years ahead, which is an advantage if continuing efforts are to provide results.

**Gender distribution in shipping companies and maritime education**

As noted above, the Swedish Maritime Administration has surveyed gender equality in Swedish shipping and in maritime education. The primary purpose of the survey was to outline the distribution of women and men in Swedish-flagged shipping by various occupational groups onboard ship and the trend in gender distribution in maritime education. The surveys provided a deeper insight into the status of gender equality.

Nine shipping companies, primarily ferry lines, out of a total twelve canvassed responded to the questionnaires, and the results show that male domination is almost total on deck and in engine rooms, while in procurement there is equal gender distribution on the basis of the principle that no gender may account for more than 60%. For deck and engine room personnel, the proportion of men averages 97% and 99%, respectively. See Figure 29.

The survey also shows that passenger ships have a higher percentage of women than freight vessels, which is, of course, due to the fact that these vessels have considerably larger service operations.

In maritime education, there is a slightly larger proportion of women than onboard ship. At the Chalmers Lindholmens Master Mariner course, women account for 13%, 7% of the Chief Engineers programme, and 17% of the Shipping and Logistics programme, while 17% are engaged in the Deck Officer Class VII programme. The percentage of women is lower at the Kalmar Maritime Academy, with 5% women registered for the Master Mariners course and 3% for the Chief Engineers course. In maritime studies at the higher secondary level, 4% of pupils are women.

The results are hardly surprising. Male domination is very evident in Swedish shipping and maritime education. This is also reflected in the number of pilot exemptions and pilot exemption certificates issued by the Swedish Maritime Administration. Of the 85 general pilotage exemptions, one is held by a woman. Of some 900 fairway exemptions, one is held by a woman.

![Image of shipping companies and personnel](image_url)
Continuing efforts in the gender equality area

No underlying material points to any major inequality in the use of the maritime transport by men and women. The national travel survey, RES 2001, drawn up by Statistics Sweden on a commission from SIKA (Swedish Institute for Transport and Communications Analysis) and the transport agencies, indicates that, in the case of long distance travel, maritime transport is used mainly for leisure trips. Here, the percentage of men and women differs only marginally, with a slight edge for male passengers.

As regards work on the transport policy’s gender equality goal for the potential of men and women to influence the maritime transport system, there is, however, a great deal to achieve throughout the transport sector, but the shipping sector in particular offers major improvement potential.

As yet, no target-oriented strategies have been drawn up to increase equality in the maritime sector. Using the insight provided by the above surveys, the Swedish Maritime Administration aims to work further in developing strategies to improve equality in the maritime sector. Since this is an overriding issue for all transport modes, strategic efforts will be pursued with other transport agencies such as SIKA.

However, efforts by public authorities regarding the equality issue do not suffice. What is required is a change of mindset and that the entire transport sector – at all levels – realises the potential for greater equality and diversity and works forcefully in the required direction.

Present status of gender equality in the maritime sector

70% women and 30% men – this is the gender distribution in the Future Skills Council, which has been established by the Swedish Maritime Administration to attract young employees and to level out the gender distribution at the agency. Front row, from left: Katrin Sundholm, Bachelor of Laws; Åsa Ihrjö Ström, Website Technical Manager; Linda Gustafsson, Engineer, Navigational Chart Unit; and Jeanette Nilsson, VTS Operator, Malmö. Second row: Mette Strand, IT; Sanja Todorovic, Engineer, Navigational Chart Unit; and Susanna Westerberg, VTS Operator, Trollhättan. Back row: Lars Hansson, Project Leader, Future Skills Council; Joakim Lindström, Maritime Safety Inspectorate; and Richard Enström, Pilot, Visby. The Council also includes Anders Brödje, Operations Supervisor Södertälje; Zineth Karlsson, VTS Operator, Gävle; and Bruno von Sicard, who represents the Maritime Safety Inspectorate in the Future Skills Council.
Concluding comments
Continuing positive development in the shipping market

Seaborne freight volumes in international traffic totalled 147.1 million tonnes in 2004, up 3.2% from the previous year. Freight volumes have now completely recovered from the drop in 2001, with record levels in 2004.

Freight volume growth during the past year occurred mainly on the West Coast, while the strong volume growth noted for ports on the East and South coasts in recent years, − especially as a result of higher trade with the Baltic States and Poland − now appears to have levelled off. The number of freight vessel calls fell by 13% on the East Coast, while total goods volumes declined by almost 6%. A similar negative trend was noted among ports on the South Coast, where the number of calls fell slightly more than 9% for freight ships and by almost 6% for passenger ships.

Domestic maritime transport remains stable at about 10 million tonnes. The East and West coasts represent the focal points in domestic maritime transport, accounting for 62.5% of domestic freight volumes in 2004.

The ferry market has stabilised following the negative effects of the removal of tax-free sales among EU countries and the construction of the Öresund Bridge. During the period January − September 2004, the number of ferry passengers to and from Sweden remained essentially unchanged from the same period in 2003.

Gotland traffic carried almost 1.5 million passengers in 2004, with an increase of slightly more than 30,000 passengers, or 2.2% from 2003. In cruise traffic, 2004 essentially entailed an unchanged volume for Stockholm, while Visby saw a sharp fall of more than 30% from 2003.

Accessibility, regional development and transport quality

Shipping makes a major contribution to an accessible transport system and about
90% of Swedish foreign trade is transported in some part or other of the transport chain by sea. Highly developed liner shipping operates in the Baltic Sea, with ferry traffic and regular freight liner traffic. These services offer companies with small freight volumes the potential for efficient transport solutions.

The most substantial port development is taking place in the Russian section of the Gulf of Finland, where the Primorsk oil port was commissioned in December 2001. Since its opening, volumes in Primorsk have risen sharply and amounted in 2004 to 44.6 million tonnes, up 150% from 2003. When fully developed, Primorsk is expected to have a capacity of about 60 million tonnes. Generally speaking, an increase in freight volumes at Baltic State ports has been noted. A significant feature is that the increase primarily involves containerised freight.

The rising share of containerised freight and a continual increase in frequency requirements has led to a need for larger scale traffic, meaning a simultaneous increase in the number and size of vessels, in an effort to maintain cost effectiveness. This is the driving force behind the increase in volume concentration.

Vessels with high frequency calls to Sweden primarily serve the European market, which is also the market for the dominant share of Sweden’s freight volumes.

While tanker, RoRo and container ships dominate capacity in Western Sweden, bulkers dominate in East Central Sweden, dry cargo and RoRo vessels in Northern Sweden, while other regions have a less distinctive profile. Ferry traffic shows a very high concentration in
Southern Sweden, the Lake Mälaren region and Gothenburg, which essentially account for the entire calling capacity.

Effective icebreaking operations are paramount in ensuring accessibility in the maritime transport system throughout the year. For Swedish waters, the 2003-2004 icebreaking season may be described as a mild ice season. Only 458 vessel calls to Swedish ports required icebreaker assistance. Given greater Baltic Sea co-operation in the icebreaking area and the common attitude among Baltic Sea countries regarding the importance of effective winter shipping, there is good potential to ensure and improve accessibility in the maritime transport system in the Baltic Sea throughout the year.

Investments in ports and connecting infrastructure are continually in progress from both the sea and shore directions. Port-related investments frequently take place in a broader context in the form of an investment package to which – apart from the port company – the municipality, region and other players contribute. As usual, port investment plans reflect a strong concentration to the major ports with international and other traffic on the West and South coasts, but also on the East Coast as a result of positive development in the Baltic Sea region.

Port investments in recent years amounted to about SEK 1 billion annually. The planned investment volume for the period 2005-2009 does not differ from the investment level to date, totalling about SEK 6 billion for the period.

The Swedish Maritime Administration, which is responsible in Sweden for fairways, and other facilities, continually adapts the fairway system to changing traffic patterns, nautical requirements and technological progress. Fairway quality assurance is ensured through activities such as hydrographic surveys and is done in line with international agreements.

In an effort to follow up the transport policy sub-goals of increased accessibility, high transport quality and positive regional development, the Administration is co-operating with other sector players and service users in the gradual development of goal fulfilment indicators that all parties can find meaningful and interesting.

The ranking of the sector by functionally impaired passengers is relatively favourable. The changes between 2002 and 2004 are marginal. However, the ranking has declined slightly as regards the ordering of escorts and personal service. Movement onboard and being able to use available information continue to present problems. The most difficult problem is providing places suitable for those suffering from allergies. See Figure 30.

**Maritime safety is improving in both the professional and pleasure sectors**

The trend indicates that the goal of halving the number of fatalities and serious
injuries from accidents in merchant shipping during the period 1998-2007 will be fulfilled. The positive trend is even more distinct when growth in shipping during the period is taken into account.

The safety goal of halving the number of fatalities and serious injuries in pleasure craft traffic is unlikely to be met by 2007. During 2004, 32 fatalities resulted from accidents involving pleasure craft. However, the long-term trend is towards a decline in fatalities in pleasure craft traffic.

The raising of the goal for maritime research and rescue via the target of assisting those in distress – using surface or airborne resources – within 90 minutes of the distress call being received by the maritime search and rescue centre is more ambitious than the previous goal and reflects the hope that it will lead to a continuing increase in efficiency in maritime search and rescue activities to the benefit of merchant shipping, fishing and small vessels.

The contribution of shipping to a favourable environment can be improved

Rising maritime traffic requires higher maritime safety that also reduces the risk of environmental accidents. The environmental characteristics of ships from cradle to grave are based considerably on regulations governing ship construction and onboard equipment. Regulations governing enhanced maritime safety and for minimising environmental impact caused by vessels evolve primarily at the international level. This is because special national rules distort the conditions for players from various states and should therefore be avoided. Regulations reduce environmental impact only in the long term, since it takes considerable time to shape internationally acceptable rules and it also takes a long time to replace fleets with vessels offering new and superior environmental characteristics. Thus, it is important to work continually and actively with the development of international regulations.

In the short term, other measures may also reduce the environmental impact of shipping. At the latest year-end, Sweden introduced environmentally differentiated fairway dues that immediately raised the incentive to cut atmospheric emissions to levels below those of current regulations. Appropriate financial incentives are deemed to be the most effective tool in achieving rapid change. Efforts are continually in progress to improve the protection of the marine ecosystem. Waste management onboard ship will be improved and waste is to be accepted at
ports in the smoothest way possible. Attempts to prevent the illegal emission of water containing oil from vessels are making progress but major improvements in supervision remain to be achieved. Port environmental work is increasingly target-oriented. Efforts to prevent the spread of undesirable organisms to the Baltic Sea area via ballast water or ships’ hulls have reached an intensive stage.

Parallel with the increasingly resource-intensive short and long-term programmes to decrease the environmental impact of shipping, there are also stricter requirements regarding the reporting and communication of the environmental impact of shipping. Calculation methods are being developed and quality assured in line with technological progress and the greater need for information. Communicating the environmental impact of shipping and the potential to reduce it promotes keener awareness among a larger number of people in the maritime sector and throughout society of the requirements for ecologically sustainable development. Highlighting environmental issues is one of the key tools in attaining a sustainable society from the ecological, social and economic perspective.
In brief, one can readily conclude that greater resources must be invested in environmental programmes in the maritime sector in the immediate future if development is to move in line with the environmental quality goals that Sweden has set for itself.

**A strategy for greater equality is in progress**

In terms of the utilisation of the maritime transport system by men and women, no available underlying material points to major inequality. However, as regards the efforts involved in the transport policy’s equality goal for the potential of men and women to influence the maritime transport system, there is major improvement potential, not just in the shipping sector but throughout the entire transport sector.

However, it is not enough to pursue equality issues solely from official quarters. What is required is a change in mindset and that all levels of the entire transport sector see the potential for greater equality and diversity and that everybody works actively and enthusiastically in that direction.

**Greater need for international efforts and monitoring of developments in the maritime sector**

International developments during 2004 continued to influence trends in shipping. The development of the Trans-European Network in the form of the new Sea Motorways concept, new regulations for maritime safety, maritime security, environmental protection and proposals for a port service directive and so forth are having a considerable impact on the maritime sector and transport policy goals.

For Sweden’s part, we have made good progress in giving tangible form to the established transport goals and their fulfilment. Our potential to meet these goals is considerably influenced by developments in the surrounding world.

All players in the sector must adopt a constructive approach to these developments and, together, we can utilise the opportunities offered by international developments. Sweden is a small country, located in the northern “periphery” of Europe. However, we have made more progress than many others in certain issues such as maritime safety, environmental protection and accessibility for the functionally impaired. As regards these issues, we have a good deal to offer international co-operation programmes, while we ourselves have a substantial need to develop efficient transport solutions to transcend our considerable transport distances and thus contribute to strengthening the competitiveness of Swedish industry.

Greater international co-operation, combined with the continuing development of effective monitoring systems for evolving and improving the maritime transport system, is one of the working areas that we at the Swedish Maritime Administration take with us from 2004 and within which we hope for the continuing participation of players inside and outside the maritime sector.