Deliverable

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Icebreaker Co-operation on the Motorway of the Baltic Sea

Final Publishable Report

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Background

Shipping and ship calls to the ports of the Baltic Sea have increased strongly during the last years. The increase in transportation has been strongest in the Gulf of Finland through from Russian and Estonian ports. The increase, even in the short run, makes new demands on the icebreaking assistance of the winter navigation. Particularly in the conditions of hard, but also even normal, ice winter the waiting times of merchant vessels will increase and results in ever-worsening congestion in the strait winter routes.

Traffic restrictions have to be imposed in the Baltic Sea every winter. In the Bay of Bothnia the need for icebreaking assistance is managed in co-operation with Finland and Sweden. The attained experiences from the co-operation are worthwhile.

Otherwise each of the coastal states by oneself manages the icebreaker assistance for merchant vessels navigating to and from the ports of each state. As to the optimal and reasonable sizing and placing of the resource of the icebreakers it is wise to consider the need for icebreaking assistance as the entirety in the area of the Baltic Sea.

In the project a strategic simulation tool has been developed for describing the need for icebreaking assistance. By means of the tool the comparison data of indicators will be obtained. The indicators describe the need for assistance and the level of service in different circumstances.

By means of the tool, sea transports to/from ports of Finland, Sweden, Estonia and Russia in the conditions of different ice winters, restrictions and traffic volumes have been simulated. The ice winters are classified as light and hard.

Alternative reviews have been carried out by varying the number of icebreakers. The simulation period has covered the entire ice winter, from the beginning of November to the end of May.

Results and conclusions

Traffic simulations were done with mild winter ice conditions (as they were in 2004-05) and with hard winter ice conditions (as they were in 1986-87). Simulations included icebreaker operations as separately by the national icebreaking fleets or operating all icebreakers with international co-operation. From the simulations the average waiting time for the cargo vessels could be calculated. Maximum 4 hours average waiting time is considered as sufficient service level for merchant vessels.

When looking at the mild winter case, the need for icebreaker assistance in eastern direction (Gulf of Finland) is 5 icebreakers to guarantee less than 2 hours average waiting time for assisted ships. For the northern direction 5 icebreakers are needed for similar service level. This is the need for icebreakers if they work in co-operation, meaning in eastern direction Finnish, Estonian and Russian icebreakers and in northern direction Finnish and Swedish icebreakers.

If the traffic volume is raised to estimated levels of the year 2020, and winter being mild, 6 icebreakers are needed in both directions for accepted waiting times, assuming that the icebreakers work in co-operation. This would require 12 icebreakers in total. In case icebreakers operate only within national boundaries, corresponding total need for icebreakers is 15. Thus by changing the current way of operation to international co-operation three icebreakers can be saved.

In hard winter scenario, with the traffic of 2004-05, 11 icebreakers are needed to maintain 4 hour average waiting time for assisted ships in the eastern direction. For northern direction 24 icebreakers are needed to maintain 4 hour waiting time. This makes a total number of icebreakers 35. If icebreakers are operating only nationally without co-operation, the total need of icebreakers for corresponding waiting times would be 40. In hard winter conditions the icebreaking service can be managed with five icebreakers less with international co-operation.

Ships icebreaking capabilities have significant effect on the icebreaking need. For evaluating the scenario where merchant ships icebreaking capabilities are improved the traffic was restricted with two options in hard winter conditions. If all the vessels would have minimum ice class IA the icebreaker need would decrease from 11 to 7 icebreakers. Further restricting the vessels to 1ASuper only the need for icebreakers would decrease to 4 in eastern direction. Correspondingly in northern direction decrease would be from initial 24 to 18 icebreakers (with minimum IA restriction) and to 14 icebreakers (with 1ASuper restriction). So the total number of icebreakers would be 25 when traffic is restricted to minimum IA ice classed ships and 18 when restriction allows only 1ASuper ships to navigate into winter ports. So by improving merchant vessels ice going capabilities the icebreaker need from 35 could be reduced to 25 or even 18 icebreakers.

At the end time of the project icebreaker fleets without harbour icebreakers were following: Finland 8, Sweden 7, Estonia 1 and Russia 3 (in Gulf of Finland) icebreakers, counting in total 19 icebreakers. Russia had just then 2 icebreakers under construction.

Simulation results revealed that resources of icebreakers can be utilised more effective if icebreaking operations could be managed co-operatively. In Gulf of Finland in conditions of hard ice winter there is a possibility to achieve the same level of service by 1-2 icebreakers less than in a situation where every country Finland, Russia and Estonia separately manages icebreaking operations. This must be a very attractive signal towards closer co-operation in icebreaking issues in the Baltic Sea area.