A 2.1 – IWT Bottleneck Describtion in the BSR

Intermediate Report

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EMMA – Report

This document represents the intermediate Report of the EMMA Activity 2.1. It concludes one of the first activities in this project: a collection of bottlenecks and possible solutions how to solve them.

A bottleneck is described as an existing permanent obstacle for inland navigation in the partner countries. Since the inputs towards this report are researched and elaborated by the EMMA partners, some readers might miss individual bottlenecks. However the project did not aim at covering the entirety of all possible bottlenecks, but at covering everything of relevance regarding projects requirements. The requirements for this activity are set to cover all parts of all countries except for Germany: Since a coverage of the project is the Baltic Sea Region (BSR), Germany is analysed by its north eastern part: From the River Weser via the river Elbe up to the river Oder at the German-Polish Border. The named rivers run more or less in a north/south direction, in order to cover the region, all waterways between the Weser and the Oder more or less connecting these fairways in an east/west direction, are part of the research.

The research was done using a questionnaire in a table format was created, containing 28 data fields with open and multiple choice questions. This document covers the outcome of the questionnaire with accompanying information about the countries characteristics to set a context. Please find the complete questionnaire with hints but without answers in the annex of this document.

A total of 39 bottlenecks were collected in the countries Finland, named parts of Germany, Lithuania, Poland and Sweden. The number per country is very different: The most information was collected in the parts of Germany – since Germany has already a well-developed IWT system with a long tradition and history. Second highest number of bottlenecks (eleven) were identified in Poland with a rather low use of IWT, Sweden reported four bottlenecks, Finland two and Lithuania one. These different amounts can be observed when reading through the individual country information: for Sweden, Finland and Lithuania each bottleneck is describes whereas for Poland and Germany a summary is given.

The terms “Inland navigation” or “inland water transport” (IWT) is used throughout this document also with respect to lake sea navigation. The sequence of countries in this report is according to alphabetical order.

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1 FINLAND

Finland is a country with about 16 200 km coastal routes and inland waterways, of which about 4 000 km are used commercially. The most important fairway is the Lake Saimaa area with a length of about 772 km and 1 200 vessels calling per year.

1.1 The Saimaa Canal

Both bottlenecks in Finland described below are connected with the Saimaa Canal. This canal was opened in 1856 and connects Lake Saimaa with the Gulf of Finland. It connects many lakes and was always of strong interest for the Finnish wood industry. The canal is located on finish and Russian territory. The dimensions of the Saimaa canal defines its own vessel sizes separate from the UN ECE Blue book, this type is called Saimax[1].

The canal currently contains eight locks. By enlarging all locks by 8 to 10 m in length would benefit the traffic in Saimaa inland waterway by increasing the vessel fleet from approximately 30 to 90 and thus increased efficiency and reliability of this IWT.

Another issue is the possibility to increase the water level in the Saimaa Canal by 10 cm if necessary. This measure is possible by the permission of water court. Decisions should to be made in order to raise water levels of the lake Saimaa. In addition, a solution to stabilise the dams in the Canal is needed. However, legal obstacles prevent a permanent increase, but the measure would also enhance efficiency and reliability of this waterway.

Figure 1.1 shows a map[2] of Finland with the approximate location of the Saimaa Canal between the Gulf of Finland as part of the Baltic Sea and Lake Vänern.

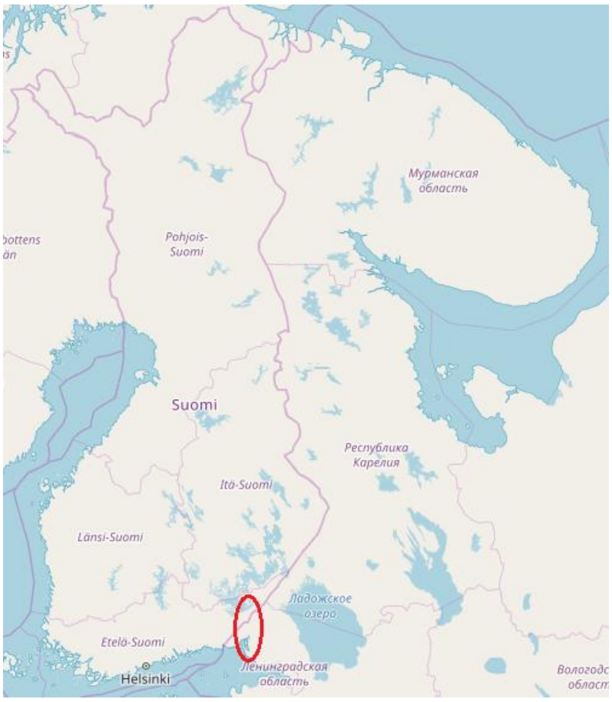

Figure 1.2 Map of Finland

[1] https://www.liikennevirasto.fi/web/en/waterways/canals-and-bridges/the-saimaa-canal/navigation-in-the-saimaa-canal-and-lake-saimaa
[2] Based on https://www.openstreetmap.org/

2 GERMANY

Germany has a large amount of navigable inland waterways and more inland ports than any other EU country. The German inland waterway network is used today to a great extent by industry.

The bottleneck collection from Germany brought up 19 different obstacles to Inland Waterway Transport in affected part of Germany, basically from the river Weser to the east, involving river Elbe and Oder and the connecting waterways; whereas the river Peene rather a single waterway. The river Weser is connected to the river Elbe via the Mittelland Canal. The river Elbe is connected to the river Oder via several waterways creating a network of waterways instead of rather unconnected waterways as described in the other countries in this document. Since the river Oder is also named in the polish section (see below) the issues of this particular river can be seen as cross border issues. The range of bottlenecks found includes lock restrictions (3), length and width restrictions (3), clearance height (5) and draught restrictions (5). Three general obstacles are also observed: from an IWT shipper's and associations' point of view, the Port of Hamburg misses mooring areas for inland waterway vessels. Another issue reported is the limited availability of River Information Services (RIS) since parts of rivers under maritime regulations (e.g. river Elbe from Port of Hamburg downstream) are covered by systems which are restricted or only available commercially, whereas inland waterways are free of charge. The third issue is located at the Scharnebeck twin ship list at the Elbe Lateral Canal. The lift operates 24 hours a day but if for certain operations additional pusher tugs are needed, waiting times up to 16 hours can apply since the tug operator work only 8 hours a day.

2.1 River Weser and the Mittelland Canal

The river and the canal connect Germany's second largest seaport with the river Elbe, where downstream Germany's largest seaport is located, as well as and der Western German canal system. This route might be used as an alternative for container transport instead of using the North Sea avoiding the issue of very large vessels on the river Elbe between the port and the open sea. Currently this route on the river suffers from length and width restrictions from the lock in Bremen Hemelingen for about 150 km upstream and the canal allows a one level container transport only.

2.2 Rivers Elbe and Saale, Elbe-Lübeck Canal, Elbe Lateral Canal and Elbe-Havel-Canal

The river Elbe and the rivers and canals might be seen as the most frequented inland waterway in the centre in northern Germany. Connections are made to the west (e.g. Weser), to the open sea in the north (North Sea, Baltic Sea) and to the east (e.g. Oder).

The most issues in this report are concerned with the river Elbe and adjacent river and canals. The Elbe itself suffers currently at some parts from draught restrictions (e.g. between Mühlberg and the mouth of Saale for about 170 km) but also multiple times from height restrictions caused by low bridges (e.g. road bridges Roßlau and Schönebeck). The river Saale has also draught restrictions between Calbe and Halle/Trotha.

The Elbe-Lübeck Canal connects the Elbe south-east of Hamburg at Lauenburg with the Baltic Sea. The whole canal has a maximum allowed draught of 2.00 m and a minimum height under bridges of 4.40 m restricting cargo transport, the most cargo transport limiting factor are six locks which may be used from Vessels up to 80m. These locks will be reneved. At the Elbe Lateral Canal, running from the

Mittelland Canal to the Elbe at Artlenburg, the Scharnebeck twin ship lift at km 106.16 lifts vessels about 38 m vertically. The usable length is 100 m, but vessels of AGN class VIb might operate the canal but are unable to be lifted, convoys might be decoupled and lifted separately. More to the south, the Elbe-Havel-Canal links the Elbe at Magdeburg with the river Havel near Berlin. The lock Wusterwitz is currently being expanded with a second lock, but occurred construction defects delay the opening from initially 2014 to some undetermined instant in the future.

2.3 River Oder and the Spree-Oder-Waterway and the Havel-Oder-Waterway

From Berlin eastward towards the river Oder the Havel-Oder-Waterway (HOW) is the connection in a north-eastern direction towards Sczeczin (PL) with the Oder-Havel-Canal (OHK) as part of it. Another canal, the Spree-Oder-Waterway (SOW) connects Berlin with the Oder in a south-eastern direction at Eisenhüttenstadt (DE). The HOW and the OHK suffer currently from length and width restrictions at most parts of the canals, even the Niederfinow Boat Lift at OHK km 76.24 to 76.40 is affected. At the SOW the double lock Fürstenwalde allows vessels with a length of max. 67 m to pass, allowing AGN Vessel class III to use the whole canal, whereas to and from the boat lift AGN class IV is usable. The river Oder suffers on the German bank from outdated regulating structures (groins), resulting in sedimentary deposition in the fairway thus reducing the draught. Additionally the missing regulatory function may lead to ice shifting and ice congestion.

2.4 River Peene

This river in the north-eastern part of Germany has a navigable length of about 96 km. Several parts have currently a draft restriction between 1.30 m and 1.90 m due to insufficient maintenance.

Figure **3.1** shows a map[3] of Germany with approximate locations of the river Weser and the Mittelland Canal in the north centre part of Germany (red), the rivers Elbe and Saale and adjacent canals more to the east (green) and the river Oder and adjacent canals to the east (blue). The river Peene is located near the Baltic Sea in the north-eastern part of Germany (orange). The connection between the green and the blue selections (mainly Elbe – Oder) is in and around Berlin, without bottlenecks reported.

Figure 3.1 Map of Germany

[3] Based on https://www.openstreetmap.org/

3 LITHUANIA

This country has rather short navigable inland waterways and a few inland ports. Rail and road transport play a greater role for the industry than IWT.

3.1 River Nemunas

The bottleneck observed in Lithuania is located on the river Nemunas. The river has a total length of 914 km, the obstacle described is located between Klaipeda and Kaunas, at a length of 275 km. One general issue is ice: the river is closed from end of November until end of March. A more complex issue is length, draft and width restrictions. The draft between Jurbarkas and Kaunas may fall down to 1.1 m only. This obstacle might be solved by increasing the depth by use of dams or dredging, but the Lithuanian Environmental Law does not allow this measure.

Figure 3.1 shows a map[4] of Lithuania with the approximate location of the river Nemunas between Klaipeda and Kaunas to the right.

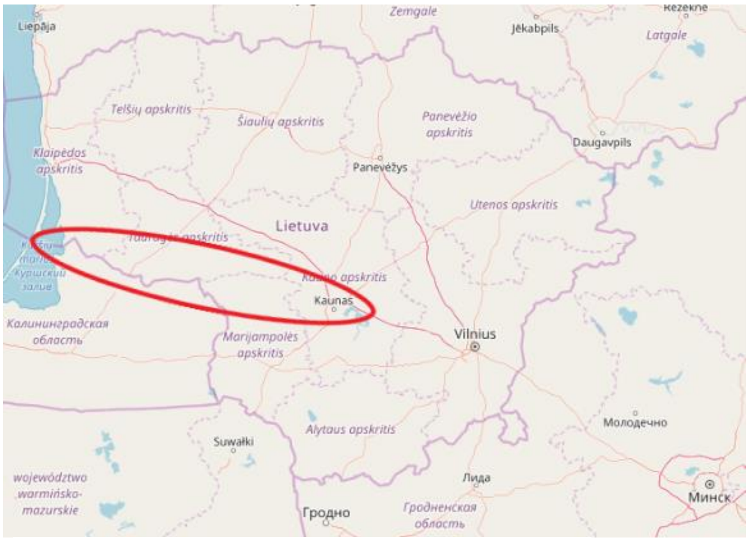

Figure 3.1 Map of Lithuania

[4] Based on https://www.openstreetmap.org/

4 POLAND

Poland has an inland waterway network of 3 655 km of which 214 km were navigable using international standards in 2015. Due to the current quality of fairways and enhancable navigable parameters 0.4% of all freight is transported on waterways. The identified eleven bottlenecks are concerned with the two largest rivers in Poland: Vistula and Oder. These two rivers are connected via the river Brda, the river Wartha and river Notec and the 24.7 km Bydgoszcz Canal. This connection is usable since end of the 18th century.

The range of bottlenecks are mainly length and width restrictions of vessels (4), as well as draught (3) and clearance height (1) restrictions. These bottlenecks apply to the natural waterways, whereas lock restriction (1) and insufficient maintenance (2) was named at manmade canals.

4.1 Rivers Vistula, Brda and Lower Notec and the Bydgoszcz Canal

The bottlenecks reported for these rivers and canal are all close to the city of Bydgoszcz. Vessels on the river Vistula suffer from draft restrictions, whereas 3.1 km apart of the mouth of the river Breda flowing into the Vistula, the clearance height is restricted by the Most Portowy (the Harbour Bridge) which is the lowest bridge on the channelized Brda river. Additionally the canal suffers from the aging Okole Lock (build 1910-1914, opened 1914, currently closed due to breakdown 08 July 2016) and the need of additional dredging and cutting off water plants to ensure transit depth.

4.2 River Oder

The river Oder suffers from length and width restrictions at many parts of the river, two out of four examples named are: a reach of 75 km between the mouth of the river Lusatian Neisse to the mouth of the river Warta and another reach of 60 km from the mouth of the Warta to Oder Havel Channel. The latter is an important part of the Polish-German cross border IWT. Draft restrictions are named twice and apply for some hundred kilometres: from the lock in Brzeg Dolny to the mouth of the Lusatian Neisse, where also many narrow curves and low bridges hinder transportation. The second draft restriction applies at the barrage of Malczyce (currently under construction), where even small boats hook in stones and tree trunks lying on the bottom of the river. Another issue is improper use and lack of maintenance of the Gliwice Canal with a reduced depth to 1.80 m and usable length of the locks is a single barge or a set of one barge and towboat.

Figure 4.1 shows a map[5] of Poland with the approximate locations of the river Oder in the western part of Poland and the river Vistula and Brda in the centre of the country.

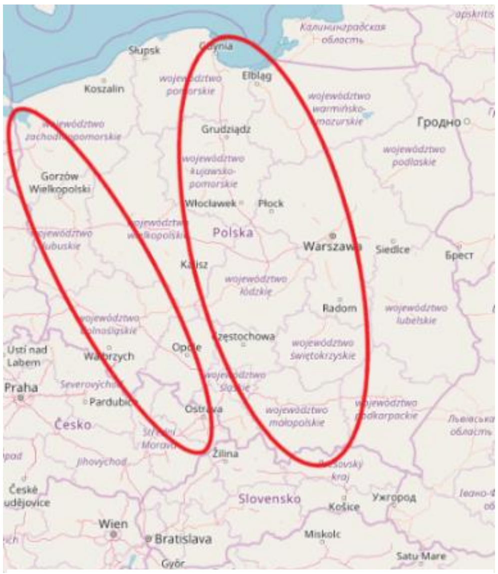

Figure 4.1 Map of Poland

[5] Based on https://www.openstreetmap.org/

5 SWEDEN

In Sweden an IWW regulation was established in 2014. Previously all areas were seen as open sea fully equipped (e.g. AIS[6], ECDIS[7], VTS[8]) and operated by the Maritime Administration[9]. Sweden has a few navigable inland waterways, one of them is the Göta alv between Gothenburg and Lake Värnern.

5.1 River Göta alv

In the Gothenburg area industry and cargo and passenger traffic by road, rail and vessel meet. Bridges over the river are partly lift- or turn-bridges. Since there are conflicts between river traffic and passing train and roadways, earlier RIS-pilot (GOTRIS[10]) showed a need for traffic synchronization between different modes. The new bridge over Göta Älv in the centre of Göteborg has legal prerequisites to be followed by some sort of traffic management system addressing insufficient River Information System applications. When this bottleneck is overcome, better usage of the river infrastructure, less waiting time for vessels at bridges (openings), lower emissions, better energy efficiency, less waiting time for public transport is expected in general and an increased efficiency and reliability of IWT in particular.

Another issue is the new bridge in the centre of Göteborg across the river. This one will have a clearance height of 12 m, compared to today's existing bridge of 18 m. This bottleneck cannot be changed since the Gothenburg government already concluded to build the new bridge and construction works are in progress.

The river Göta and the Trollhätte Canal is currently equipped with six locks between Göteborg and Lake Vänern. All locks used today have been built about 120 years ago. 2030 is said to be the end of use for the locks despite constant maintenance with costs rise each year. If locks are not rebuild and opened before a closedown of current locks, passenger and cargo traffic will come to a standstill and cargo is moved using road or rail.

Legal obstacles currently prevents to create more inland waterways in order to enlarge inland waterway transportation. In order to turn unused waterways into navigable waterways, a classification is needed. In Sweden in the two lakes of Mälaren and Vänern and the river from the high bridge at the entrance to Göteborg to lak, up to Lake Vänern are navigable. Further study, especially regarding wave height, will be needed by Swedish Transport Agency[11], and probably limited sea surveying plus some additional fairway marking by SMA. Cost cannot be determined at the moment, rather an ongoing study is needed, taking potential needs of the industry into account.

Figure 5.1 shows a map[12] of Sweden with the river Göta alv and the Trollhätte Canal.

Figure 5.1 Map of Sweden

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[6] https://www.marinetraffic.com/
[7] https://www.marineinsight.com/marine-navigation/what-is-electronic-chart-display-and-information-system-ecdis/
[8] https://www.logisticsglossary.com/term/vts/
[9] http://www.sjofartsverket.se/en/
[10] http://gotris.se/
[11] https://transportstyrelsen.se/en/About-us/
[12] Based on https://www.openstreetmap.org/

6 CONCLUSIONS

The bottlenecks collected show a great variety, the most bottlenecks refer to infrastructural issues. Since Finland, Lithuania and Sweden are isolated countries without EMMA Partners in neighbouring countries, these countries are separated. The two countries Germany and Poland are neighbours with the river Oder as part of the international border. After many years of separation, the situation got better and led to a use of the river for cross-border cargo transport, also manifested in a regulation between Poland and Germany about common enhancement waterways in the German-Polish border region[13].

6.1 Vessel Classes

Different vessel classes hinder often the efficient use of inland waterways. The countries, in which the EMMA partners did the research, multiple classes are existent. Please refer to annex A, Section 8.2 for the classes used. The different vessel sizes and interrelated different sizes needed for mooring areas, locks, draft, and clearance height create difficulties to continuous vessel use if vessels are also able to navigate in the Baltic Sea. A common classification and mandatory implementation within a foreseeable future might provide continuous cargo transport throughout the countries. Less unprofitable procedures might be avoided.

6.2 Border Rivers

The river Oder is partly the border between Germany and Poland with the political boundary right in the centre. This relict of the new border between Germany and Poland resulting from WW2 includes that each state is responsible for the individual river bank. Bottlenecks can be minimised with co-operation more effectively than by each individual state alone. Basic requirements might be same vessel classes and same bank structures and installation e.g. to avoid complicated or double signposting.

6.3 Maintenance Works

Many waterways described in this research suffer from missing maintenance works, e.g. dredging to maintain depth to allow vessels a guaranteed draft. This leads to less cargo transported upon each vessel and rising cost per unit.

6.4 Infrastructure

A lot of parts of the infrastructure is aging or quite old (e.g. SE: Trollhätte Locks: 120 years, PL: Okole Lock: 105 years). The vessel sizes and the cargo volume 100 years ago were quite different to todays or predicted cargo volume in times of globalisation. Such infrastructural bottlenecks prevent effective cargo flow. Planning of new infrastructure should not be made on today's numbers and vessel sizes, but on expectations of the future.

[13] http://www.thb.info/rubriken/single-view/news/bilateraler-vertrag-zum-oder-ausbau.html German

7 ANNEX A: THE QUESTIONNAIRE

Template for analysis of main IWW infrastructure bottlenecks

Template version as of: 2016.07.313final

Definition to identify applicable "bottlenecks" within the EMMA project:
a) A bottlneck on (a stretch of) a waterway and or canal exist, if it does not meet the proposed characteristics of its classification according to UNECE AGN Blue Book.
and, or:
b) the elemination of a bottleneck would result in more competitive inland waterway transport on the actual classified waterway and or canal.

Bottleneck Unique identification in EMMA	*E.g. DE-001* *(Pls use two digits country abbreviation and three digit serial number)*
Inland waterway's official name	*E.g. river's or canal's name, preferable in english lanuage*
Identification of river's or canal's section effected by bottleneck (River kilometer / GPS-coordinates)	*From – to (if applicable)*
Type of bottleneck	
Substantial bottleneck which needs to be lifted.	*Could apply e.g. for a lock located at the entry or exit point of a waterway or canal. If the lock is to small and will not be replaced by modern one, all other defined measures on bottleneck eleminations on the same waterway or canal would have no effect.* *This is a substantial bottleneck which you should describe here. Otherwise please fill in "no".*
Description of bottleneck	*Description of the bottleneck including possible realisation barriers or supporting issues like (non-) compliance of a section with CEMT-class standards, legal obstacles or political opposition,*
If applicable: Known restrictions	*Bottleneck applies to vessel dimensions/classes, draught, congestion, ...*
If applicable: Known closures	*May apply to Locks: Operating Hours, closure due to weather conditions (low water, ice, ...)*
UNECE AGN Blue Book (actual status of IWW)	
Status of bottleneck elemination	
Part of TEN-T corridor	*Core or comprehensive TEN-T network + name of corridor*
Part of national transport plan	*ID number and priority*
IWW Supervised by Public Authority Name	*E.g. river autority*
Operated by	*E.g. lock operator*
Existing RIS Name, hosted by	*Please include name of the system available and by whome it is hosted if applicable. Otherwise fill in "No RIS"*
Stakeholders responsible for bottleneck elemination	*Please fill in who is in charge for the infrastructure the bottleneck is linekd to.*
Date of editing	*Date of editing, e.g. June, 16, 2016*
Editor	*Who submitted this bottleneck information, e.g.* *Marcus Engler* *ISL - Institute of Shipping Economics and Logistics* *Universitätsallee 11-13, 28359 Bremen / Germany* *Phone: +49(0) 4 21/2 20 96-25* *Email: engler@isl.org*

How to overcome / good practice example	*Is there already an idea or a (good practice) example existent, which is applicable to the issues as given above.* *Maybe attach a link to the solution if already published.*
Cost estimation for elemination	*Preferably official figures from existing studies or national investment plans. If no figures exist please fill in "not available".*
If applicable: duration between closure and re-open	*E.g. please indicate if closing of the waterway for IWT applies during the elemination of the bottleneck (periode of time: from - to)*
If applicable: extra limitations during elemination	*E.g. please indicate if specific limitations apply to IWT during the elemination of the bottlenech like smaller vessels might only pass construction site*
Assumed positive effects on inland waterway transport according to existing studies	*Please fill in estimated additional transport volume by IWT, estimated additional handling capacity in locks or similar information from official studies (incl. source of information).*
Economic feasibility / Cost - benefit ratio	*Preferably integrate existing cost-benefit ratio for described bottleneck and quote the source of information. If such information is not available please anticipate economic feasibility maybe by a rough calculation, which has priority over"no information on cost-benefit*
Existing project for bottleneck elemination	*Please describe the existing project incl. source of information, should a project for the bottleneck elemination exist. Otherwise please fill in*
Expected effect after bottleneck elemination for the river or canal	
Date of editing	*Date of editing, e.g. June, 16, 2016*
Editor	*Who submitted this bottleneck information, e.g.* *Marcus Engler* *ISL - Institute of Shipping Economics and Logistics* *Universitätsallee 11-13, 28359 Bremen / Germany* *Phone: +49(0) 4 21/2 20 96-25* *Email: engler@isl.org*

Figure 7.1 The Questionnaire used for EMMA Bottleneck Collection

The first part of the questionnaire starts with an EMMA-identification since identification in each single country is different. Then the official name is given, and the section where the bottleneck is located. A type of bottleneck is asked for as multiple choice. This is followed by a description as well as known restrictions and closures. Then the actual status of the IWW is asked for, referring to the UNECE AGN Blue Book[14] classes. Since not all countries of the EMMA partners did already sign into the AGN, this supposed to be multiple choice became an open question. Next multiple choice is the status of bottleneck elimination, followed by the open question about if the waterway is already part of a TEN-T[15]-corridor. Next part is the supervising and operation authority or company. Then the information if a river information system (RIS) is already in place and the information which stakeholders are probably responsible for the elimination of the bottleneck.

The second part is mainly about ideas how to overcome this particular bottleneck, estimated cost for elimination, maybe extra limitations when construction work is performed, assumed effects, a rough estimated cost-benefit ratio, an existing project and the expected effect for the measure.

Both parts also contain the date of editing and the editor.

7.1 Type of Bottleneck

The multiple choice question Type of Bottleneck allowed following answers:

1. Draught restrictions
2. Length and width restrictions
3. Clearance height restrictions (e.g. low bridge heights)
4. Lock restrictions
5. Insufficient maintenance measures
6. Insufficient River Information System applications
7. Soft measure not infrastructure related (e.g. restrictions in lock operating hours)
8. Reliability (e.g. ice restrictions)
9. other (pls explain in bottleneck description)

7.2 Vessel Classification

Initially the European Agreement on Main Inland Waterways of International Importance[16] (AGN)-Classes was used for classification of vessels in the questionnaire, but the results show that additional classification on the rivers and canals are used today.

7.2.1 UNECE Blue Book / AGN

The multiple choice question Vessel Classes copied the classes of the AGN Blue book, the allowed classes were Class I up to Class VIc. However, this applies to countries which signed the agreement (Finland, Germany, and Lithuania)[17].

[14] https://www.unece.org/trans/main/sc3/bluebook_database.html
[15] https://ec.europa.eu/transport/themes/infrastructure_en
[16] https://www.unece.org/fileadmin/DAM/trans/conventn/agn.pdf
[17] https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XI-D-5&chapter=11&clang=_en

7.2.2 Poland

Poland assessed the AGN on 17 March 2017, but also use a classification of vessel based on (Polish) Regulation of Council of Ministers as of 07 May 2002 on classification of IWW. Classes are divided into classes of regional importance (class Ia, Ib, II and III) and international importance (class IV, Va and Vb).[18]

7.2.3 Finland

Finland signed the AGN on 23 Jun 1997, but in this country an own class for the Saimaa-Canal (Saimax) exists. Dimensions are max. Length of 82.5 m, a width of 12.6 m and a draft of 4.35 m in the canal.[19]

7.2.4 Sweden

This country uses for the transport of cargo between Gothenburg and Lake Vänern the Vänermax-Class. These vessels have a maximum length of 89 m, a maximum width of 13.4 m and a draft of 5.4 m.[20]

7.3 Status of bottleneck elimination

Another multiple choice question was about this status of the bottleneck described. Following answers were possible:

1. Not on a wide political agenda
2. On political agenda but realisation not planned yet
3. Realisation not yet started
4. In building procedure
5. Legal obstacles

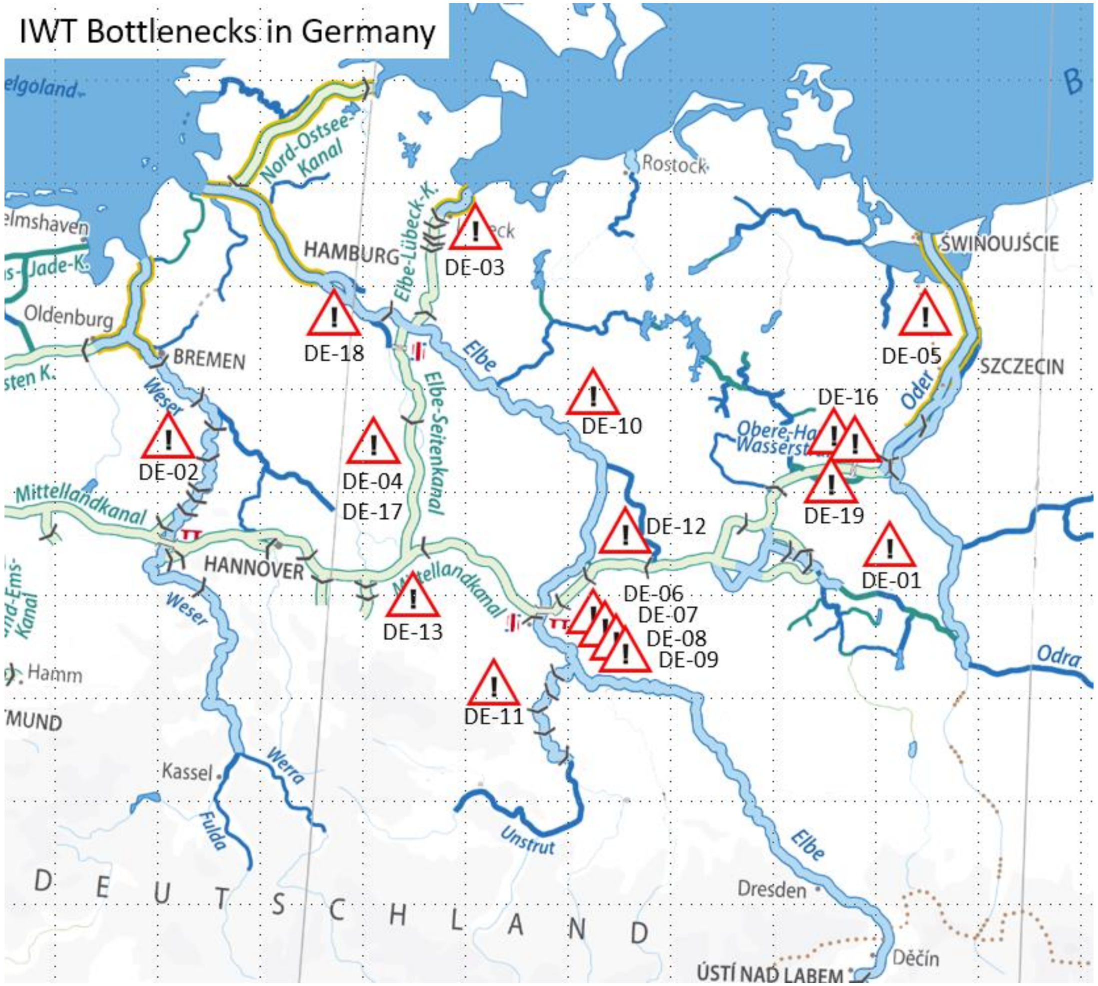
7.4 Expected Effect

The forth multiple choice question was about the expected effect after bottleneck elimination for the river or canal with the following choice:

1. Increased efficiency of IWT
2. Increased reliability of IWT
3. Increased efficiency and reliability of IWT
4. Upgrade of the AGN class (whole waterway)

[18] https://www.czasopismologistyka.pl/artykuly-naukowe/send/319-artykuly-na-plycie-cd-6/5521-artykul
[19] https://www.liikennevirasto.fi/web/en/data
[20] http://www.sjofartsverket.se/pages/47582/fritidsthnkanal2014.pdf

8 ANNEX B – VISUALISATION OF BOTTLENECKS



DE-01 Spree-Oder-Waterway → Lock restriction

- The double lock Fürstenwalde is the last bottleneck on the whole relation of the SOW. An upgraded / replaced lock would enable the waterway class to be upgrade from III to IV. The result would then also be to fulfil the minimum requirements of the internattional waterway E-17 according to AGN. Only allows vessels of max. 67 m length to pass through. Vessels of class III can only be used on entire SOW due to this.
- How to overcome: There is a concrete suggestion in the framework of a PPP that is still under investigation.
- NOT part of TEN-T

DE-02 River Weser → Length and width restrictions

- At multiple locations the river is not suitable for certain vessel classes (largest allowed vessel length 110m, breadth 11.45m, reduced loading draft 2.50m instead of 2.80m) to pass each other in opposite directions. Masters of vessels have to get in contact via radio and arrange sequence and where to pass each other in order not to block the waterway. Support is given by the mandatory use of AIS allowing masters to get into direct contact.
- A breakdown of a single vessel or convoy at these locations might completely block the waterway and disable vessel traffic completely.
- Not all mooring areas are suitable for largest allowed vessels.
- Conditions should be established for fully exploiting the economies of scale of inland navigation (upgrade of the waterway from Class IV to Va) and allow the passage of vessels with a length of 110 m and a width of 11.45 m on the Middle Weser.
- North-Sea Baltic Corridor
- **DE-03 Elbe-Lübeck Canal → Draught restrictions**
- The whole canal is suitable for class IV vessels and convois but with restrictions: maximum allowed draught is 2.00m, minimum height under bridges is 4.40m. In order to fully accomodate class IV draught and air draft must be enhanced. Also the 6 locks need to be modernized
- Renewal of locks and extending the draught is planned and manifested in the Federal Infrastrucutre Plan 2030 (838 mil. EUR investments for all measures)
- North-Sea Baltic Corridor

DE-04 Elbe Lateral Canal → lock restrictions

- Twin ship lift Lüneburg in Scharnebeck has a maximum usable length of 100m and by that limit the entire IWW system to this ship size. Further the ship lift is going to reach its constructed lifetime in 2025 and needs to be replaced.
- In order to use bigger vessels from beginning to end of the channel, the ship lilt will be replaced by a new lock, which was manifested in the Federal Infrastructure Plan 2030 (CBR 0,9) In future ships of class IVb can pass the canal
- NOT part of TEN-T

DE-017 Elbe Lateral Canal → usability restrictions (soft measure)

- If just one of the two troughs of the twin ship lift is usable (the other is closed e.g. for refurbishment) additional pushing equipment for convoys is required. The lift operates 24hrs a day but pusher tug operate 8 hours a day. Thus the convoy shipper has to wait up to 16 hrs to use the lift.
- This bottleneck could be overcome by enlarging operating hours of the pusher tug service, e.g. from 5am to 11pm. This might be realised by one additional working shift using the same equipment and quays.

DE-05 River Oder → Insufficient Maintainance of Groynes (River Regulation Structures)

- groynes are not up to scratch anymore, resulting in sedimentary deposition in the fairway. These sections are bottlenecks due to the reduced draught. Additionally the missing regulatory function can lead to ice ice shifting and ice congestion.
- Restauration works on the Oder for the re-establishment of groynes
- NOT part of TEN-T

DE-06 River Elbe Mühlberg to Mouth of Saale → Insufficient Maintainance of Groynes (River Regulation Structures)

- Wrosion of riverbed lead to malfunction of existing regulation system (groins etc.), aggravated by absent groins;
- Maintenance by dumping of bed load; planning of adjustment of regulation system is needed (in scope of "Master Plan Elbe“ which was decided in 2017)
- No information on cost-benefit available but a pilot project in Klöden (km 170 - 198,5) was executed.

- Orient-East-Med Corridor

DE-07 River Elbe Bridge Roßlau → Clearance high restriction

- Height restriction for container transports in 3 layers - only in case of high water (5,45 m over HSW - highest navigable water level)
- lifting in case of bridge replacement (not planned in the moment) to increase IWT efficiency
- Orient-East-Med Corridor

DE-08 River Elbe Bridge Schönebeck → Clearance high restriction

- Height restriction for container transports in 3 layers - only in case of high water (5,04 m over HSW - highest navigable water level)
- lifting in case of bridge replacement (not planned in the moment) to increase IWT efficiency
- Orient-East-Med Corridor

DE-09 River Elbe Bridge Magdeburg → Clearance high restriction

- Height restriction for container transports in 3 layers - only in case of high water (5,05 m over HSW - highest navigable water level)
- lifting in case of bridge replacement (not planned in the moment) to increase IWT efficiency
- Orient-East-Med Corridor

DE-10 River Elbe Dömitz to Hitzacker → Draught restriction

- Missing groins along the so called "Reststrecke"; non-completion of river regulation as from mouth of river Havel up to Lauenburg
- The adjustment of the regulation system is in scope of "Master Plan Elbe"
- Orient-East-Med Corridor

DE-11 River Saale → Draught restriction

- A missing lock at Klein Rosenburg (km 9.6) to realize a continuous draught between Calbe (mouth into Elbe) up to Halle/Trotha
- The project was included in the Federal Transport Infrastructure Plan 2030 within the category "additional need", no. 3. However, due to the category and low CBR a potential realization is not obvious
- Cost estimation: 134 mil. EUR, CBR 0,2
- NOT part of TEN-T

DE-12 Elbe-Havel-Canal → Lock restriction

- The existing lock "Wusterwitz" had to be replaced. The new replacement lock showed building damage, that results in a delay for the finalization of bottleneck.
- Further procedure is unclear as well as re-opening.
- NOT part of TEN-T

DE-14 missing AIS at certain waterways

- This bottleneck is fixed already by waterway administration

DE-13 Mittelland-Canal → clearance high restrictions

- Currently a 2-layor container transportis only limited possible on the stretches Magdeburg-Hannover-Minden.
- Lifting of several bridget and further measures have been decided to increase efficiency of IWW transport. This will allow IWW vessels up to 180m length and up to 2,000ts (motor barge) respectively 3,500ts loading capacity (push barge convoy) to ship on the canal stretch.
- Planned costs 1,2 billion EUR and Cost-Benefit-Ratio of 0,08. The project is included in the Federal transport Infrastructure plan.
- North-Sea-Baltic Corridor

DE-15 River Peene → Draught restrictions

- Several parts have a draught restriction between 1,30m and 1,90m which are mainly caused by unsificcient maintenance (dragging and bushing)

- How to overcome: dredging or flushing of several short parts.
- Costs are estimated at 200,000 EUR
- NOT part of TEN-T

DE-16 Oder-Havel Canal at the Port of Eberswalde

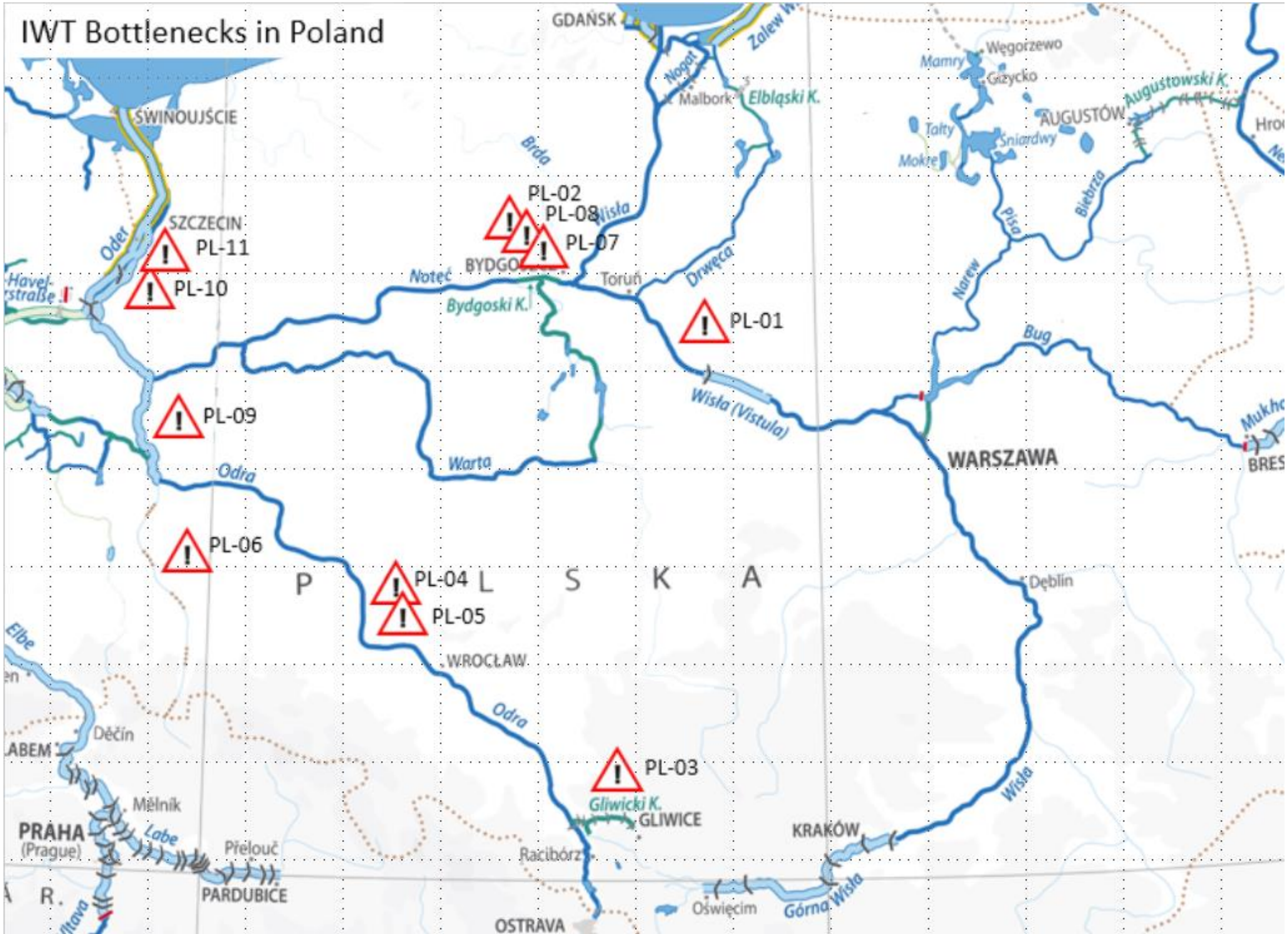
- The OHK is part of the Havel-Oder-Waterway and following bottleneck occur :
- At the port of Eberswalte there is not enough space for vessels Class 5a (vessels >80m length) to turn around in order to navigate into the opposite direction after loading or unloading. Vessels have to navigate to a place to turn upstream for about 10 km to the next boat lift (Niederfinow) to turn around.
- Responsible authorities like to enlarge the place to turn at the boat lift when refurbishing the lift whereas the shipping industry likes to have a place to turn at the port.
- Orient-East-med Corridor

DE-18 missing mooring areas in the Port of Hamburg

- Orient-East-med Corridor

DE-019 Havel-Oder-Waterway → Length and Width Restrictions

- To extend the canal for classed IV vessel it has to be widen up and deepened (4 m bright and 3,5 depth on the whole canal profile needed)
- Costs are estimated to 500 mil EUR
- Orient-East-med Corridor


IWT Bottlenecks in Poland
PL-01
PL-02
PL-03
PL-04
PL-05
PL-06
PL-07
PL-08
PL-09
PL-10
PL-11
GDAŃSK
ŚWINOUJŚCIE
SZCZECIN
BYDGOSZCZ
Toruń
Malbork
Elbląski K.
Węgorzewo
Giżycko
Mamry
AUGUSTÓW
Augustowski K.
Tałty
Śniardwy
Mokre
Pisa
Biebrza
Narew
Bug
WARSZAWA
Wisła (Vistula)
Noteć
Bydgoski K.
Brda
Drwęca
Oder
Odra
Warta
Havel-
P L S K A
WROCŁAW
Dęblin
Gliwicki K.
GLIWICE
KRAKÓW
Racibórz
Oświęcim
Górna Wisła
OSTRAVA
PRAHA
(Prague)
Mělník
Labe
Přelouč
PARDUBICE
Děčín
Elbe

PL-01 Vistula River – low water levels on river canal's section 684-772 km

- The whole stretch described suffers from problems related to the restricted transit depth of 1.4 m and lower. The transit depth is only guaranteed for about 10 per cent of the navigation period on the Vistula. There is no stream engineering, which meanders from its one side to the other. Sandbanks are additional difficulty, moving down the river, depending on the hydrological situation, from 150 to 900 m in a year. The persisting negative level of river is caused by the fact there is only one operating barrage on the lower Vistula (1 out of 9 barrages planned), with the idea to build the others being abandoned. Nowadays the central government is aiming at solving the problem with a comprehensive programme of waterways development. Please note: there are procedures under way concerning the ratification by the Polish State of the European Agreement on Main Inland Waterways of International Importance (AGN Convention)
- A project called The Lower Vistula Cascade should be implemented, which provides for constructing 9 barrages on the stretch Warsaw - Gdańsk. Only the construction of subsequent barrages will retain water and ensure appropriate sailing conditions.
- The estimated benefits of the project amount to about PLN 100 bln. The sum predominantly consists of transport benefits (PLN 43.7 bln), limiting the risk of flooding (PLN 21.8 bln), income from tourism (PLN 17 bln), hydroenergetics (PLN 9.7 bln), as well as agriculture and forestry (PLN 7.9 bln). The added value will include immeasurable benefits such as the increase of employment in the widely understood water management, mainly the management of waterways transport.
- NOT part of TEN-T yet but PL government would like to include Vistula river

PL-02 River Brda – birdge clearance

- Most Portowy (the Harbour Bridge) is the lowest bridge on the channelized Brda river. The height of the clearance on the high navigable water is about 3.2 m. The width of the navigable span is 12.
- The potential elimitation of the "bottleneck" will result in the navigation lane being blocked for the period of the repair works. The estimated time of the works is one year.
- Part of Baltic-Adriatic Corridor TEN-T Corridor

PL-03 Gliwice Channel – lack of maintainance

- Lack of maintenance has led to the siltation of the channel and reduced the depth to 180. The length of Gliwice Canal locks allows the operation of a single barge or a set consisting of one barge and towboat. Currently operated pushed sets need to be undone while passing through the locks, which is a serious obstacle to shipping

- Part of Baltic Adriatic TEN-T Corridor

PL-04 Brzeg Dolny (km 281.6) to the mouth of the Lusatian Neisse (km 542.4)

- Banks regulated with groynes
- The Oder here has the lowest depth, but the most difficult stretch for navigation is directly below the barrage in Brzeg Dolny, where as a result of the progressive erosion of the riverbed, a significant part of the depth of the navigation season fall below 1.0 m.
- Within the section, all river bends with a radius of less than 400.0 m have been rebuilt, but there is still 43 curves awaiting repair with a radius of less than 600 m.
- Out of the 14 bridges crossing the Oder River within the stretch 5 bridges has a vertical clearance of less than 4.0 m with one particularly limiting navigation road bridge in Krosno Odrzańskie(Km 514.1), with its navigable span of 3.28 meters in height.
- How to overcome: Build 15 water barrages, conduct adjustment works in order to adapt to new hydraulic condition,rebuild the river bends with a radius of 650m or perform bypass through lock channels
- Part of Baltic Adriatic TEN-T Corridor

PL-05 Malczyce barrage – draught restriciton

- Buliding the construction of the new barrage at Malczyce would improve the conditions of navigation.
- Currently there is sometimes so shallow that even small boat hook in stones and tree trunks lying on the bottom of the Odra river.
- Construction Malczyce barrage is a key investment for the improvement of navigation conditions on the Odra waterway. The location of the extent to 300 km of the river decided, among others, best engineering-geological conditions, reducing flooding adjacent areas with minimal stacking, possibility of building a degree beyond the river bed which facilitates manufacturing and reduces construction costs and low interference with the natural environment.
- Part of Baltic Adriatic TEN-T Corridor

PL-06 Lusatian Neisse (km 617.6) –Warta (km 542.2)

- The entire section is characterised by a bad influence of the regulation structures (groyne) on the morphology of the river, forming numerous tedious grinds lowering the depth of the transit.The bottom of the regulatory river bed ranges there from 64.0 to 80.0 m.There are 4 meander bends of of radius R = 600 m
- There are 5 bridges located on this stretch with one railway bridge limiting the navigation (Kostrzyn on Oder 615,1km) the vertical clearance is 3.67m at the state of high navigable water
- Part of Baltic-Adriatic Corridor TEN-T Corridor

PL-07 Bydgoszcz Canal – insufficient maintenance

- Okole lock – technical state decreases from year to year. The lock was put into operation in 1914. Due to the lack of means for renovation (last preservative renovation was done in 1995) the condition of the lock from year to year deteriorates, that at the same time threatens safety in exploitation.
- Lock requires total renovation (overhaul). Currently a contractor is selected for investment: Modernization/improving of engineering structures of Bydgoszcz Canal. Okole lock with buildings.
- Government plans to include the canal in the Baltic-Adriatic Corridor

PL-08 Bydgoszcz Canal and Lower Notec – insufficient maintenance

- Transit depth is not guaranteed in some places (eg. river mouth of Łobzonka - km 57,300 and Stara Notec Rynarzewska - km 39,200). In summer growth of water plants is observed, that limits flow of river. Dredging works and cutting works (of water plants) are performed every year however due to limited financial means the range of works is not sufficient to ensure full capacity of waterway.
- Goal is to restore waterway parameters of class II. The scope of works: e.g. development of revitalization project, restoration of correct shoreline, elimination of not proper curvature, rebuilding of technical infrastructure, restoration of correct transverse parameters of river bed through dredging works and arrangement/organizing vegetation, strengthening revetments with natural materials, development of technical infrastructure in awanports (outports).Timetable of works should ensure protection periods for e.g. hatching birds.
- Government plans to include the canal in the Baltic-Adriatic Corridor

PL-09 Kostrzyn on Oder-Hohensaten (section from the mouth of the Warta to Oder Havel Channel)

- The geometric shape of the riverbed is characterized by large widths what leads to the variability of the river current. Additional difficulties are caused by outwashes located at the mouth of the Warta river.On this stretch there are two bridges including 4,14m railway bridge at 653,9 km (Siekierki) limiting the vertical clearance.
- How to overcome: Unification of regulatory width for individual sections, rebuild of low bridges
- Total estimated for the stretch (617,6km-683km): 353,6m,however the final cost depends on mutual agreements with Germany
- Part of Baltic-Adriatic Corridor TEN-T Corridor

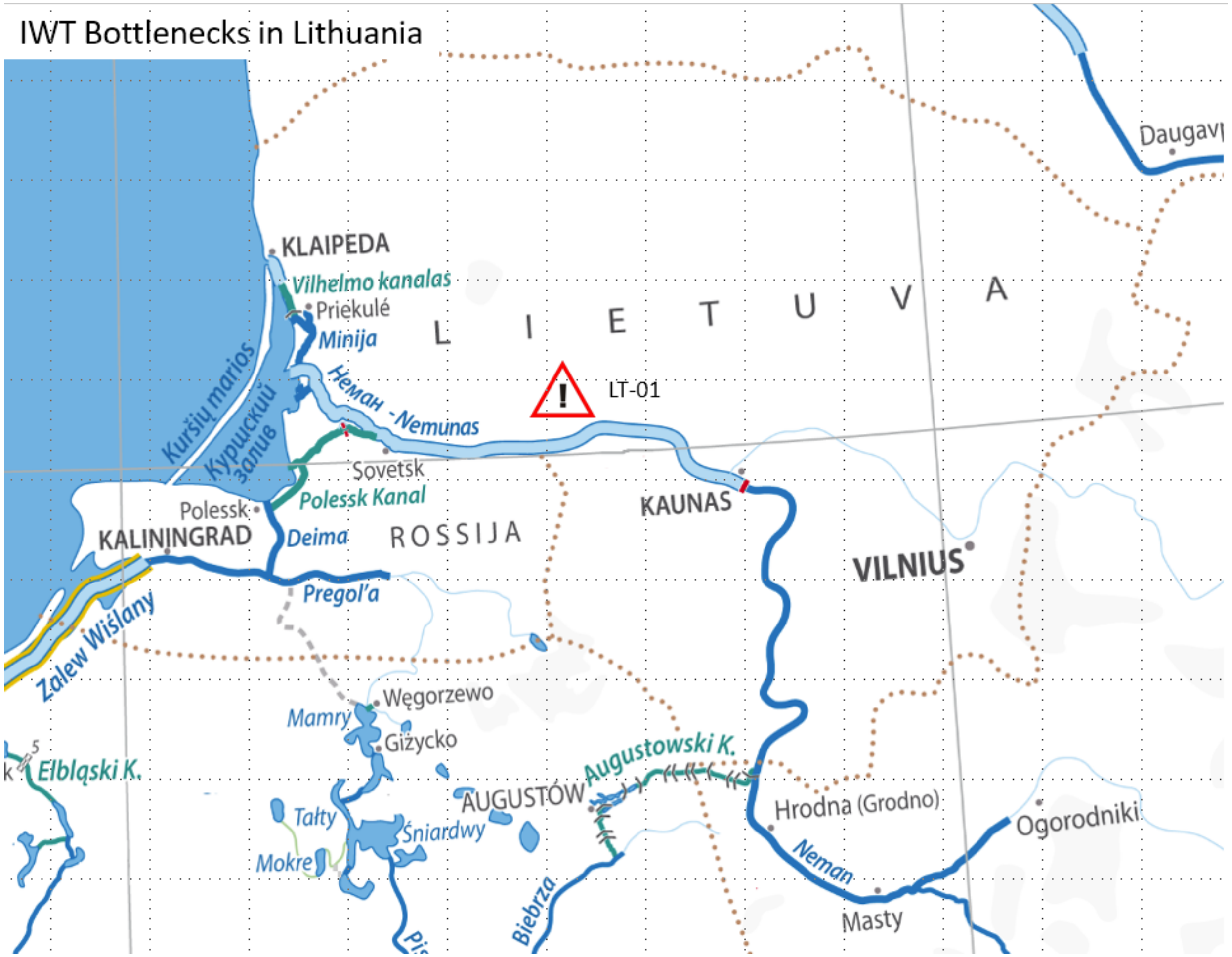
PL-10 Hohensaten (Oder Havel Channel) to Widuchowa

- The stretch from 667,2km to 683km regulated by groynes on both sides. After 683km there is a sudden collapse of the land slope to as low as 3cm/km. The change of the hydraulic flow conditions causes sedimentation of rubble being dragged downstream. Problem with the transit depths occurs within the first 16 km of the stretch, however, limits the whole route to Szczecin.
- How to overcome: The change of the parameter of the groyne systems. The use of a mixed system of regulation(lateral and longitudinal groynes). Construction and repair of seawalls of the river banks below 683km.
- Part of Baltic-Adriatic Corridor TEN-T Corridor

PL-11 Widuchowa –Szczecin (Oder mouth to Dąbie Lake)

- Within this stretch in the Szczecin Floodway System there are 3 bridges:
- (1) The railway drawbridge over Oder Regalica in Szczecin (734km) on the line between Szczecin Central Port and Gryfino, close to the station of Szczecin Podjuchy. This is the only one in Europe viaduct with mechanically lifted span for barges. It is it is a historic bridge built in the nineteenth century. It undergoes continuous breakdowns and when the wind blows in excess of 15 per second bridge could not be raised. Despite a number of repairs it still causes major difficulties in the Oder inland navigation.
- (2) The railway drawbridge located near the Szczecin main train station with clearance of 3,49m
- (3) The road drawbridge called "Long bridge" with clearance of 3,10m.
- Apart from Oder Regalica the other two bridges and after further repairs are operated as fixed bridges.

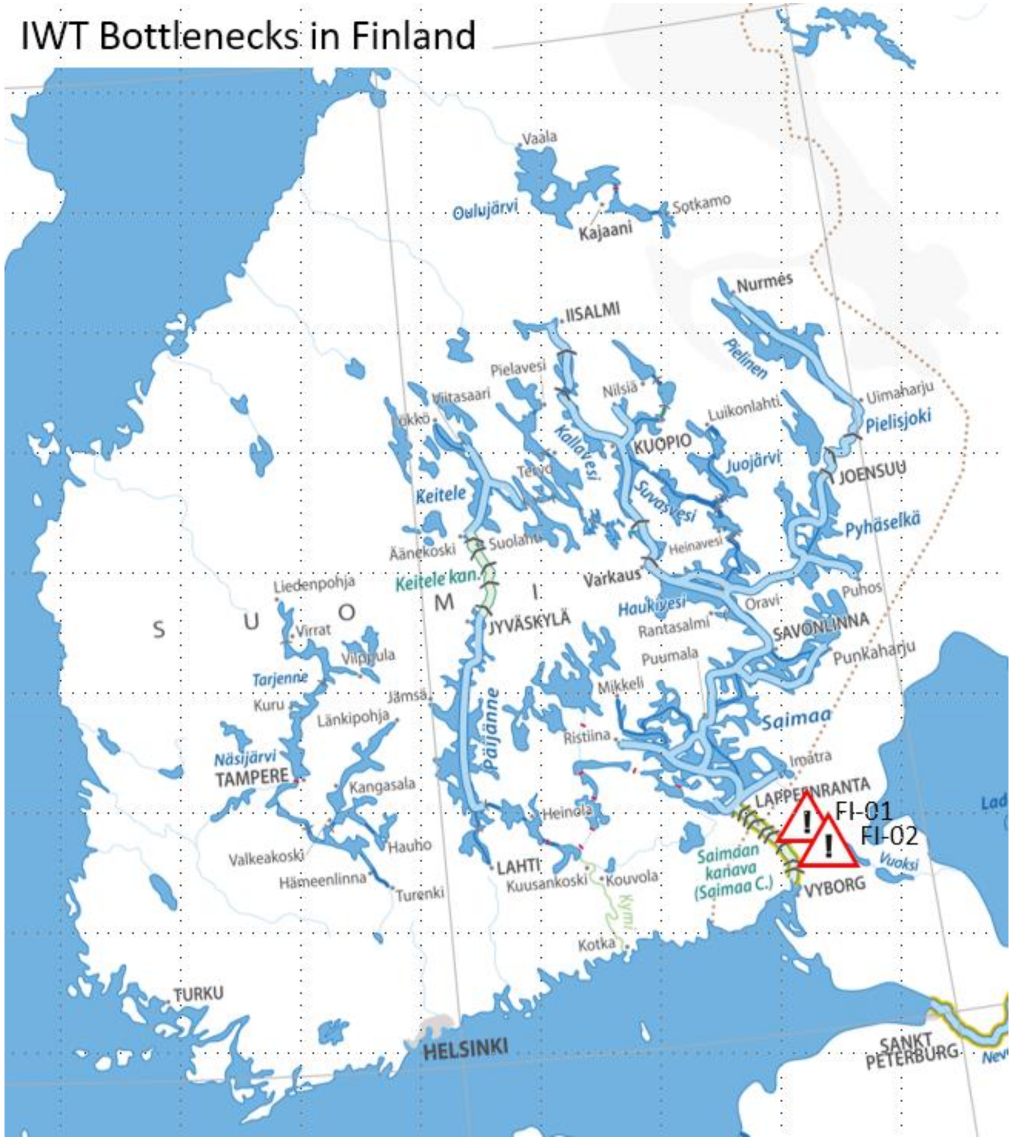
- The Oder Regalica bridge needs to be rebuilt and the cost estimation is around 200 million PLN
- Part of Baltic-Adriatic Corridor TEN-T Corridor



LT-01 Buy Kursiu river Nenunas

- Nenunas river in general is not well maintained for IWW services: Ships draft limit (max 1,1 m in the section Jurbarkas - Kaunas), maintenance dredging, not available damp construction according Lithuania Environmental low.
- Effects: Increased efficiency and reliability of IWT
- NOT part of TEN-T corridor

IWT Bottlenecks in Finland



FI-01 Renewing Locks in Saimaa Canal

- Dimensions of the 8 lock in Saimaa Canal does not meet the requirements of commercial shipping now and in the future
- The maximum dimensions allowed for a ship transiting the canal are: Length: 82.0 m (269.0 ft), Beam (width): 12.2 m (40 ft), Draft: 4.35 m (14.3 ft), Height of mast: 24.5 m (80 ft)
- Lengthening all 8 locks in Saimaa Canal by 8-10 meters would benefit the commercial traffic in Saimaa inland waterway by increasing the vessel fleet from approximately 30 to 90. Extension of fleet would give Saimaa inland waterway vessels that have better ice class and give them better maneuverability in ice conditions resulting shorter closing period in winter. Shorter closing period would benefit supply chains, because could they would not have to diverse supply chains to sea ports because waterway is closed for 2,5 months in winter time when this type of traffic is needed. Bigger vessels capacity to take cargo would also be better.
- Construction of new locks should be made without closing the vessel and road traffic. Mainly constructions would be made during winter break which is about 2,5 months. If it is necessary this closure can be extended with 2 months more. It is estimated that all the constructions cannot be made in previous mentioned time. Construction is implemented to 2-3 years, which means 2-4 locks construction at the same time.
- Cost estimation: 50 million Euros
- Saimaa Canal is not part of TEN-T corridor but only way to reach lake Saimaa inland waterway which is part of TEN-T network

FI-02 Draught in Saimaa Canal

- Draught for vessel in Saimaa Canal is limited to 4,35m. It is possible to increase the water level in Saimaa Canal with 10cm if necessary. This measure is possible by permission of water court. Things that have to be solved that the water levels in sea and in lake Saimaa enables increasing water level in Saimaa Canal. Also it have to be solved that the dams in Canal will bear.
- By increasing the draught in Saimaa Canal with 10cm increases vessels loading capacity by 50 – 100 tons
- Saimaa Canal is not part of TEN-T corridor but only way to reach lake Saimaa inland waterway which is part of TEN-T network


IWT Bottlenecks in Sweden
Smedjebacken
Fagersta
Strömsholms K.
Mälaren
Arboga
Hjälmare K.
SE-04
ÖREBRO
Örebro K.
Hjälmaren
Södertälje K.
STOCKHOLM
Gläfsfjorden
Forshaga
KARLSTAD
Byälven
Halden K.
Halden
Säffle K.
Säffle
Dalslands K.
SE-04
Sjötorp
Göta K.
NORRKÖPING
Motala
Göta K.
Söderköping
SE-03
Trollhättan
LINKÖPING
Vättern
SE-01
Kinda K.
Hycklinge
Göta
GÖTEBORG
Jönköping
Västervik
SE-02
Gotland
Bolmen
Åsnen
Öland

All SE bottlenecks are not part of any TEN-T Core Corridor.

SE-01 Göta River from Göteborg (Göta River Bridge) to Vänersborg → Insufficient River Information System applications

- Since there are conflicts between river traffic and passing train and roadways, earlier RIS-pilot (GOTRIS) showed a need for traffic synchronization between different modes of traffic. New bridge over Göta River in the center of Göteborg have legal prerequisites to be followed by some sort of traffic management system addressing issues above.
- The GOTRIS concept was developed and piloted in 2014 showing how the identified issued could be resolved. Decision for implementing a similar system is pending the decision of reinvestments of locks. Initiative for a pre-implementation through CEF instrument is being discussed.
- Positive effects: Better usage of the river infrastructure, less waiting time for vessels at bridges (openings), lower CO2 emissions, better energy efficiency, less waiting time for public transport
- Task force instigated (SMA, STA, City of Göteborg) to address the issue. Initiative through CEF instrument to do a pre-implementation (SMA,STA)

SE-02 New Göta Älv bridge → Clearance height restrictions (e.g. low bridge higts)

- New bridge in central of Göteborg over the river will have clearance height of 12 m, compared to existing bridge of 18m
- Restrictions Mon-Fri, 06-09, 15-18) for vessels with height clearance over 12 m. (Compared to todays 18 m)

SE-03 Trollhättan-locks

- The locks are approaching end of economic and technical lifetime. Should WIT still be possible in future six locks need to be replaced before 2030.
- Costs: Preliminary estimated to be about Euro300 million. Ongoing study by Trafikverket in cooperation with SMA.
- Effects: Larger capacity, shorter time to pass, lower number of locks, higher reliability

SE-04 Inaccessible areas for IWW traffic – legal obstacles

- The limited coverage of the area classified as IWW is a bottleneck. In Sweden only the two lakes of Mälaren and Vänern, including Göta river from the high bridge at the entree of Göteborg to Lake Vänern.

- More areas outside of the mentioned needs to be classified, even if as Category 1, but to be able to connect industries and ports that are to be found in the region outside of the mentioned lakes.

Effects: Extended area of operation for a future IWW fleet, leading to an extended reach and access to more cargo as well as opportunities.