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The Oder and the Oder Transport Corridor

Key words: the Oder Waterway, cargos, fleet

The Oder Waterway is the only waterway in Poland suitable for transport. It interconnects and integrates major industrial agglomerations in Poland. OWW may constitute an important link in a transport corridor providing the shortest connection between the Scandinavian countries and the Balkans. Its transport function gains much in importance in the light of the EU transport policy. Currently, because of years of neglect, OWW cannot be fully used as a shipping route. The realization of the Program for the Oder 2006 will significantly improve the navigation conditions on the Oder but it will not lead to full integration of this waterway with Europe's system of waterways. The effectiveness of transport on the Oder can be substantially improved by building a new generation of push trains adapted to operation on shallow waters.

Odra a Odrzański Korytarz Transportowy

Słowa kluczowe: Odrzańska droga wodna, ładunki, flota

Odrzańska Droga Wodna jest jedyną drogą wodną w Polsce, która ma znaczenie transportowe. Może stanowić istotny element korytarza transportowego, będącego najkrótszym połączeniem państw skandynawskich z Balkanami. Jej transportowe znaczenie wzrasta w związku z polityką transportową UE. Obecnie, z uwagi na wieloletnie zaniedbania, ODW nie może być w pełni wykorzystana jako szlak transportowy. Realizacja Programu dla Odry 2006 znacznie poprawi warunki nawigacyjne na Odrze. Nie doprowadzi to jednak do pełnej integracji tej drogi wodnej z systemem dróg wodnych Europy. Efektywność transportu na Odrze można znacznie poprawić budując nową generację zestawów pchanych dostosowanych do eksploatacji na wodach pływających.

Introduction

A transport corridor is a passage along which a concentrated cargo mass moves. A corridor connects major industrial and administrative centres located on the territory of several countries. A transport corridor is also a route along which transport by many means of transport is possible. This implies integration and cooperation between the main transport systems: road transport, rail transport and inland navigation. Transport corridors are a way to reduce: the adverse environmental impact, the number of traffic accidents and the external costs of transport. The above factors underlie the creation of transport corridors in Europe. The creation of corridors, investments in their development are inherent in the EU transport policy. According to the settlements of the 2nd and 3rd Pan-European Transport Conference (Crete 1994, Helsinki 1997), the following four transport corridors pass through Poland:

- corridor 1: Tallinn – Riga – Warsaw
- corridor 2: Berlin – Warsaw – Minsk – Moscow
- corridor 3: Berlin/Dresden – Wrocław – Lvov – Kiev
- corridor 6: Gdańsk – Poznań/Łódź/Warsaw – Żylina

None of the above corridors offers a possibility of inland shipping. By and large, they are meant for transport in the east-west direction, neglecting the potential development of transport in the north-south direction. Poland's transportation grid and its geographical situation create natural conditions for cargo streams flowing in the north-south direction through the territory of Poland. Such a corridor would provide the shortest route between Scandinavia, the Mediterranean Sea basin and the Black Sea basin and significantly reduce the congestion in the Alpine passes. The Oder River axis would be a natural part of the corridor. Major rail and road transport routes run along this axis. An additional, or rather the main, argument for the creation of an Oder transport corridor is the Oder Waterway (OWW). Even in the present hydrotechnical conditions it is possible to considerably increase the efficiency of transport on this waterway provided that a new-generation fleet adapted for navigation on very shallow waters is built. The feasibility of such a venture has been demonstrated by a research project (completed this year) carried out as part of the 5th EU Framework Program.

The Oder and its economic importance

The Oder Riverside is a strongly developed region covering nearly 20% of the area of Poland with an even higher per cent of urban population employed in industry and living off non-agricultural activities. The Oder Riverside, particu-

larly (Upper, Opole, Lower) Silesia, is highly urbanized. The Oder axis forms international and interregional connections, also linking urban agglomerations. On the Czech side, the Ostrava district, which for many years has tried to establish a navigation link with the Oder Waterway, gravitates towards the Oder. On the German side, there is the well-developed Neisse Riverside and the Oder Riverside with Frankfurt on the Oder. The Oder is a natural arterial waterway constituting a transport base for Berlin. One should mention here the importance of the Oder for the delivery of coal to the power plants providing electricity for the Berlin agglomeration. The Oder on the territory of Poland interconnects 6 agglomerations:

- the Katowice agglomeration,
- the Opole agglomeration,
- the Wrocław agglomeration,
- the Legnica-Głogów agglomeration,
- the Zielona Góra agglomeration,
- the Szczecin agglomeration.

Thus the Oder axis determines the main directions of transport and the geographic, economic and social factors associated with it form a basis for the development of this region. Industrial areas with large production plants looking for alternative means of transport, have developed along the Oder. The large number of ports and transshipment quays hold out vast possibilities for the development of transport, including multimode transport. It is not without significance that the Oder constitutes a natural base for the Szczecin-Świnoujście port complex. It is from this area that a large proportion of the country's export (about 70% of the total cargo turnover) and import (about 45% of the total cargo turnover) cargos originate. The percentages of the import and export directions in Poland are shown in table 1 [6]. They indicate that inland navigation should play a major role.

Table 1

Percentage of foreign trade shipment directions
Kierunki przewozu w handlu zagranicznym w % ogółu

Shipment directions	Year					
	1995		2000		2002	
	Import	Export	Import	Export	Import	Export
Belgium, the Netherlands, France, Germany, Switzerland	40.3	50.6	37.8	48.8	39,2	46,8
The Czech Republic, Slovakia, Hungary, Austria, Italy	16.7	12.5	16.5	15.6	17,1	15,2
Denmark, Sweden, Finland, Norway, the UK	13.7	11.7	11.5	11.7	11,1	13,8
Russia, Ukraine	7.7	8.8	10.4	5.2	8,8	5,7

Major transport routes run along or cross the Oder. The Oder is an integral part of the Pan-European Oder Valley Transport Corridor which meets all the relevant EU criteria. Most important, it is fully multimodal: there is a line and point infrastructure for all kinds of transport and Pan-European: there are good connections with the transport network of the EU countries and the countries of Central and East Europe. In addition, the Oder Corridor provides the shortest and cheapest link between the Scandinavian countries and Central Europe, the Italian Peninsula and the Balkans. The Oder Transport Corridor has the following functional domestic and international basic transport infrastructure:

1. The Szczecin – Świnoujście port complex;
2. AGC railway lines (the European Agreement on the Main International Railway Lines) in the North-South and East-West directions:
 - E 59: Świnoujście – Szczecin – Poznań – Wrocław – Chałupki;
 - E 30: Zgorzelec – Wrocław – Katowice – Cracow – Przemyśl – Medyka;
 - E 26: Wrocław – Warsaw – Kuźnica Białostocka.

From among the above, one line, i.e.

- C-E 30: Zgorzelec – Wrocław – Katowice – Cracow – Przemyśl – Medyka

is covered by the AGTC agreement (the European Agreement on Major International Combined Transport Lines and Associated Structures) which also covers two more railway lines:

- C-E 59/2: Wrocław – Międzyzlesie;
- C-E 59: Świnoujście – Szczecin – Zielona Góra – Wrocław – Opole – Chałupki.

3. Motorways and expressways (belonging to an international road system) which are to run within the Corridor:

- A4: Zgorzelec/ Olszyna – Wrocław – Katowice – Cracow – Rzeszów – Medyka,
- S8: Wrocław – Łódź – Warsaw,
- S3: Szczecin – Zielona Góra – Legnica – Lubawka.

According to the national transport development strategy for 2004-2006, route C-E59 and road S3 are to be modernized.

Several power utilities: the Upper Oder Power Plant, the heat & power plants in Wrocław, the Lower Oder Power Plant and the Szczecin Heat & Power Plant are located along the Oder or in its vicinity. The above and smaller power utilities consume about 8 M t of coal coming from the Silesian mines gravitating towards OWW. Only one heat & power plant in Wrocław is supplied with coal

(about 0.8 M t per annum) wholly by waterway. If the demand from the Berlin power utilities (about 4 M t per annum) and the transshipment of coal in the Szczecin-Świnoujście port complex (about 6.067 M t handled in 2004) are added up this gives nearly 18 M t of coal. This amount of cargo naturally gravitates towards the Oder. Waterway transport in this situation will be the cheapest and most environmentally friendly system. The current coal transport to Berlin (by rail to Szczecin and by waterway to the destination) is over twice as expensive as the feasible Silesia-Berlin waterway transport [5]. Coal is not the only cargo gravitating towards OWW. About 3.7 M t of other bulk cargos and over 27 thou. TEU containers were handled by the Szczecin-Świnoujście port complex in 2004. In 2003 the entire transshipment there amounted to 21.6 thou. containers [8]. A large proportion of the cargos gravitating towards OWW are hazardous cargos manufactured in large chemical plants located on the Oder and having their own (unused) transshipment quays. From among the many chemical plants one should mention:

- the Rokita Chemical Plant in Brzeg Dolny,
- the Chemical Plant in Police,
- the Kędzierzyn-Koźle Chemical Plant.

A considerable proportion of their production is earmarked for export to the countries of Western Europe, with Germany being the principal customer country. The Kędzierzyn-Koźle Chemical Plant exports to Western Europe such products as: ammonia, ammonia water and sodium nitrate. The Rokita Chemical Plant exports mainly soda lye, caustic soda, hydrochloric acid and chlorobenzene (28% of the export goes to Germany). The Opole area is a cement manufacturing region and so cement is another potential cargo to be transported by waterway.

OWW can also be a convenient way for transporting oversized and RO-RO cargos. In the latter case, the main client is the motor industry: the Opel Plant in Gliwice, the Volvo Plant near Wrocław and the Volkswagen Plant in Polkowice.

The Oder as waterway

According to the EU policy [7], inland waterways are an important element of the Pan-European transport networks. In the 1999 TINA report [3], the key importance of the Polish waterways in two strategic directions: North-South and East-West is highlighted. The report states that 1213 km of waterways and 16 river ports in Poland belong to important inland transport routes. The Oder is the only waterway in Poland which is connected with the system of waterways in West Europe and the only waterway in Poland suitable for transport.

Although highly varied, OWW is and will remain practically the only waterway in Poland of major importance for transport. OWW is characterized by diverse hydrotechnical development, different technical specifications and generally, a considerable degree of wear of its structures. Taking into account:

- the different technical specifications of the particular stretches of the waterway,
- the different hydrological conditions,
- the waterway's functions,
- the navigation needs and the possibilities of improving the navigation conditions in selected stretches of the waterway,

the Oder waterway is divided into:

1. the Gliwice Canal,
2. the canalised Oder,
3. the Oder freely flowing from Brzeg Dolny to the mouth of the Lusatian Neisse,
4. the Oder freely flowing from the mouth of the Lusatian Neisse to the mouth of the Warta,
5. the Oder freely flowing from the mouth of the Warta to Szczecin.

Considering only the hydrotechnical conditions, OWW's stretch which limits and determines transport is the stretch between Brzeg Dolny and the mouth of the Lusatian Neisse. It is here that the shallowest transit depths, which make operation on the entire waterway simply impossible, occur. Until the planned investments are completed, the navigation conditions along this stretch of the Oder can be considerably improved by continual dredging so that shallow stretches and places do not restrict navigation. A typical distribution of minimum, transit and average depths is shown in fig. 1. The data come from the longitudinal sounding of the Oder carried out in the years 1980-2003 [4].

It is generally thought that the primary goal of the Program for the Oder 2006 is the adaptation of the Oder to transport needs. But it turns out that the main tasks to be carried out as part of this Program are flood protection and environment protection in the broad sense. The tasks relating to the waterway, except for the construction of two barrages, have been assigned secondary importance. The waterway modernization investment share amounts to less than 14%. The Program's principal transport objective is formulated as: 'action aimed at upgrading the Oder Waterway to the class 3 specifications, taking into account the regional needs and capabilities, and upgrading selected stretches of the River to the international standards'.

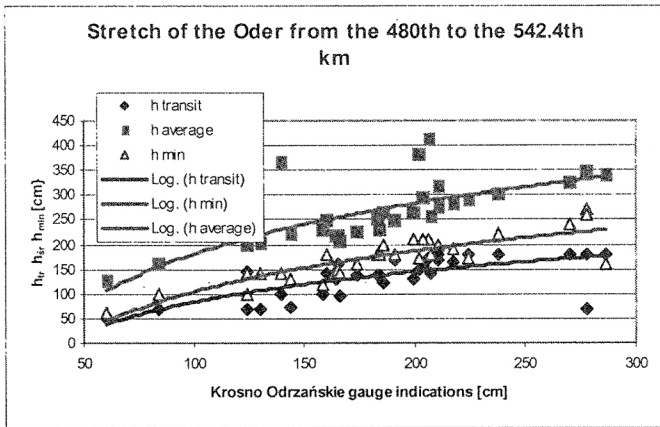


Fig. 1. Average and minimum transit depth versus river gauge indications for considered stretch. (transit, average, min., Krosno Odrzańskie gauge indications [cm])

Rys. 1. Zależność głębokości tranzytowej, średniej i minimalnej, od wskazań wodowskazu dla danego odcinka

In order to achieve the above objectives, the following additional undertakings are planned as part of the Program for the Oder 2006:

- completion of the Malczyce barrage and the building of a barrage in Lubiąż,
- completion of the modernization of the Chróścice weir and the mouth-of-the-Neisse weir,
- reconstruction and upgrading of the shipping lane regulation on the free flowing Oder,
- upgrading the locks on the Gliwice Canal and the long locks on the canalised stretch of the Oder.

Although there are no plans to straighten the River, the realization of the Program for the Oder 2006 will result in a considerable improvement in navigation conditions along the stretch downstream from Brzeg Dolny as the Malczyce barrage is completed and a new barrage is built in Lubiąż. It is anticipated that the realization of the Program for the Oder 2006 will ensure a transit depth of 1.3 m with an 85% guarantee.

But even when the investment projects are carried out, some negatives will still remain, i.e. OWW will:

- remain a waterway with varied hydrotechnical parameters (the Gliwice Canal, the canalised Oder, the free flowing Oder);
- be not up to the EU standards, particularly with regard to transit depths (the minimum depth on the EU waterways is 2 m);

- be not adapted to the new developing transport technologies: container transport and RO-RO transport (shallow depths, small bridge clearances and unreliability);
- not conform to the Polish class 3 waterway requirements (a large number of waterway bends with a less than 500 m radius);
- be not adapted for 24-hour navigation because of the lack of navigational aids and the operated fleet's inadequate equipment.

The Program for the Oder 2006 transport projects does not lead to the integration of the Polish transport system with that of the EU. This goes against the European Commission's recommendations contained in the White Paper [7].

The main bases for the navigation on the Oder Waterway are: 11 public ports and 18 company ports and transshipment quays, greatly differing in their facilities and use.

Because of the directions in which cargos flow in Poland and the gravitation of the Czech Republic's industrial centres towards the Oder [1], the possibility of connecting the Oder and the Danube has been investigated for years. Taking into account the possible increase in transport along the direction: Scandinavia – the countries of Southern Europe, the construction of such a canal is economically feasible, the more so that the Oder transport corridor would be the shortest connection between Scandinavia and the Balkan countries. Unfortunately, this idea has not been put into practice yet because of the lack of sufficient political will on the part of the interested countries which should participate in the realization of this project. Recently, a proposal which limits the project to the Oder–Danube connection has been put forward. This version of the project is easier to carry out because of the smaller difference of levels involved. Canalising the Váh, Slovakia has put forward a new concept of connecting the Oder with the Danube (fig. 2). According to the adopted timetable, the project is to be implemented in four stages:

- Stage I 1993 – 2002: canalisation of the 75 km long Komarno – Sereď stretch,
- Stage II 1998 – 2007: canalisation of the 124 km long Sereď – Puchov stretch,
- Stage III 2005 – 2010: the 51 km Puchov – Žyľina stretch,
- Stage IV 2010 – 2020: the 98 km long Žyľina – the Oder stretch.

Eleven locks with dimensions (110x24 m) conforming to the class 4a waterway requirements are to be built on the stretch to Žyľina.

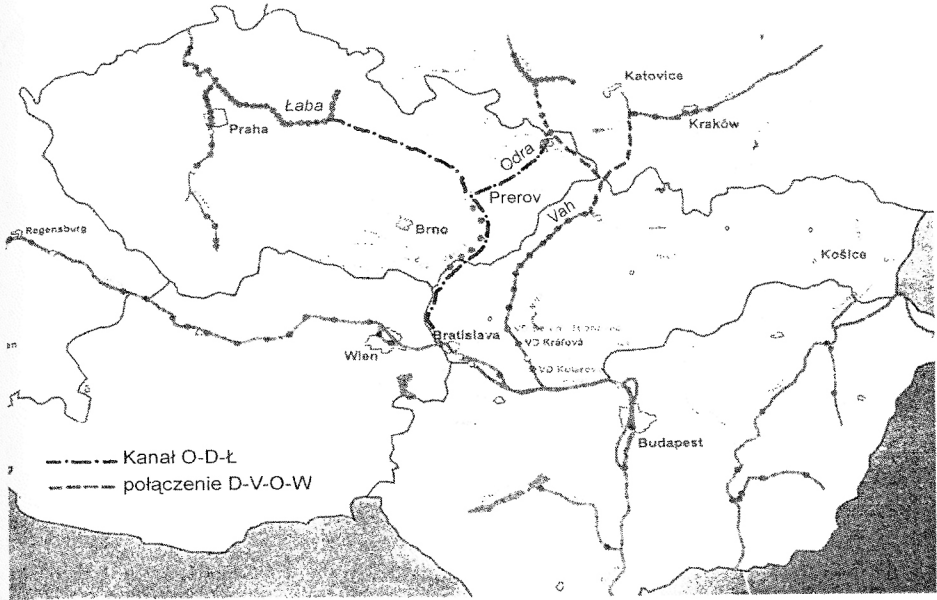


Fig. 2. O-D-E and D-V-O-V connections
 Rys. 2. Połączenie O-D-L i D-V-O-W

At the last meeting of the Oder–Koźle–Ostrava Organization a concept of making the Oder navigable up to the Polish-Czech border was put forward. This stretch is meant to be the first stage of the Oder–Danube–Elbe canal. The fact that the canal will be directly connected with a broad-gauge railway line makes the investment even more attractive. The Oder will have a direct connection to the railway transport system of Ukraine and Russia. A version of the canalisation of the Oder from Koźle to Ostrava is shown in fig. 3 and one of the considered versions of the canalisation of the Olza and the location of industrial zones, including the planned ports, is shown in fig. 4. The latter version does not exclude a connection with the Váh and provides for the development of Gorzyczka (on the Polish side) and Dolni Lutyni (on the Czech side) industrial zones.

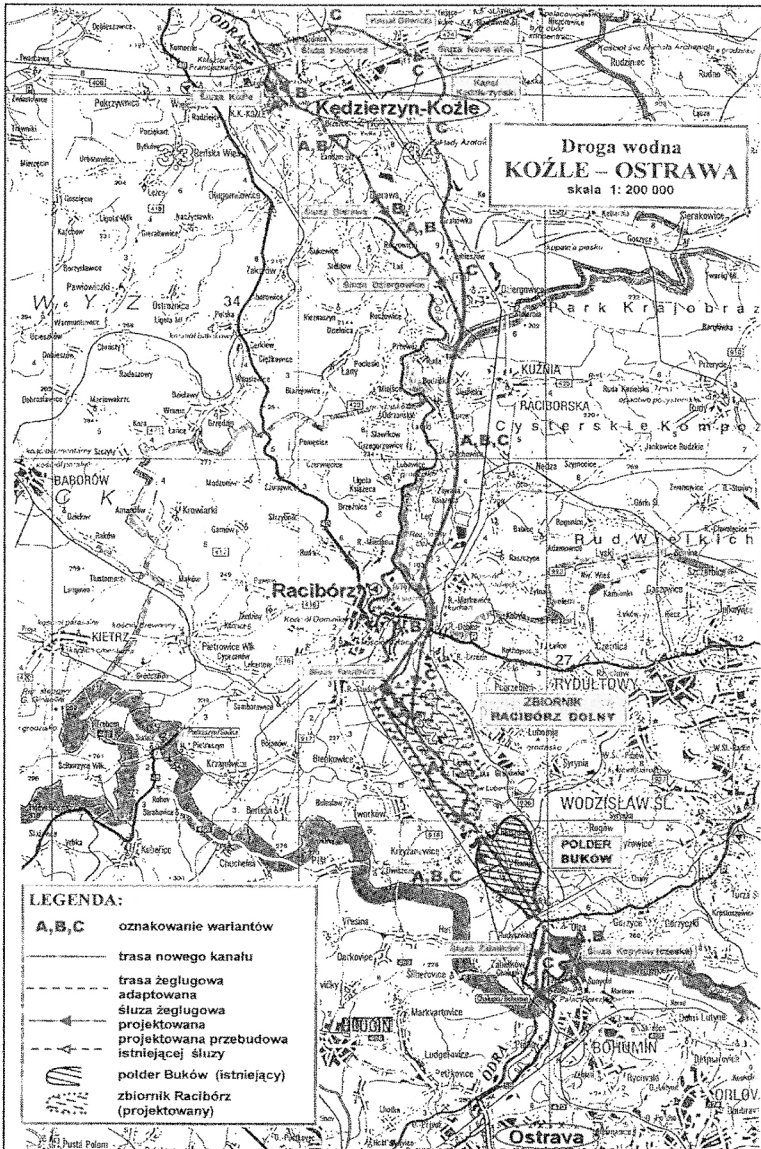


Fig. 3. Planned Koźle-Ostrava waterway
Rys. 3. Projektowana droga wodna Koźle-Ostrava



Fig. 4. Concept of making the Oder and the Olza navigable
Rys. 4. Koncepcja użegłowania Odry i Olzy

The Oder fleet

The basic vessels operated on the Oder were designed as long ago as in the 1950s (motor cargo boat BM-500) and in the early 1960s (pusher BIZON). The vessels have been developed over years, but changes have been made mainly to the outfit. Also different models of the main engines have been used. The hull shape and structure and the division of cargo space have not changed. The shipping companies have a fleet with a cargo carrying capacity of 220 thou. t and an installed power of 160 thou. hp. This potential is not fully used. The main drawbacks of the currently operated fleet are: too heavy weight and the fact that it has not been adapted to container transport. There are no vessel for RO-RO and large-size cargo transport.

As part of the 5th Framework Program a research project referred to as INBAT (Innovative Barge Trains for Effective Transport on Shallow Waters) was carried out. Its aim was to develop a new generation of push trains for very shallow waters. The Oder and the Elbe are the main target sailing region for such trains. The pushers are shown in fig. 5 [2].

The following results (in comparison with the currently operated fleet) have been achieved:

- an increase in cargo carrying capacity by 31% and 26% for respectively the Oder and Elbe conditions,
- a 32% reduction in the operating costs,
- an improvement in overall effectiveness by 25.4% and 20.5% for respectively the Elbe and the Oder,
- a reduction in power per shipping work unit from 27 kWh per 1000 tkm to 20 kWh per 1000 tkm.

The results have been achieved by reducing the barge design weight and increasing transport effectiveness at very shallow (below 1.1 m) barge draughts. The barges can transport both bulk cargos and containers. The results show that even for bad navigation conditions transport effectiveness can be significantly increased. Analyses have shown that at a draught as shallow as 0.9 inland transport is profitable for shipowners.

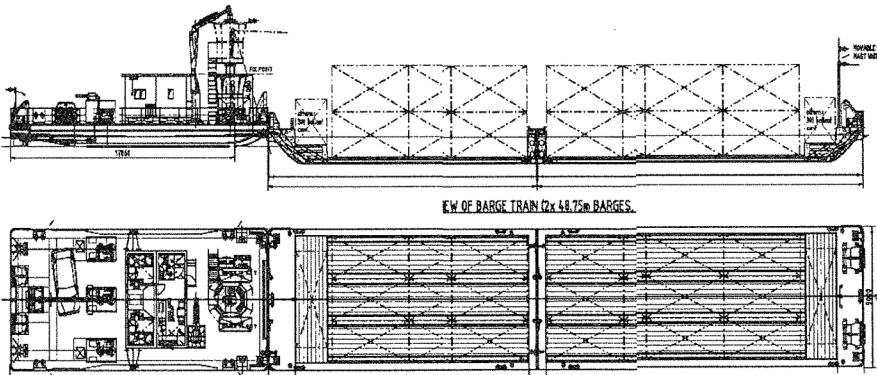


Fig. 5. View of INBAT push train
Rys. 5. Widok zestawu pchanego INBAT

Conclusion

The Oder links three countries. It can perform an integrating function if one looks at the River as a whole, not selectively or from a particularist point of view. Attempts to segment the Oder into incohesive stretches sooner or later will lead to the degradation of the whole waterway. Because of historical factors, the Oder should perform the function of a transport corridor essential for each of the countries which the Oder interconnects. Major industrial and admin-

istrative centres have developed along the Oder axis over the history. Now there are conditions conducive to the return to the interrupted historical process whose axis should be the Oder with its transport function vital for the regions situated on or adjacent to the Oder.

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