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The EU as a shipping actor in the Arctic

Characteristics, interests and perspectives

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Abstract

The European Union (EU), being one of biggest trading actors in the world largely depends on shipping. This defines a considerable immanent interest in increased shipping capacities and a large historical potential and expertise in different shipping activities.

Trade patterns between Asia and Europe are of major importance for the EU. Therefore, new shipping routes towards and from Asian markets may support future trade and contain the possibility to substitute or accompany the existing route via the currently used Suez Canal.

This paper identifies the current and future role of the EU and (relevant) EU Member States in shipping activities in and across the Arctic region. First, the general character of the EU as a shipping actor will be analysed in order to categorize whether and in what specific sector of the shipping industry the EU may follow future proactive shipping activities. Second, existing economic assessments on the potentials of Arctic shipping will be compared in order to analyse range and uncertainty of possible costs and benefits of the Northern Sea Route (NSR). As a result, the EU's future shipping potential in the Arctic is seen in its dominant role as trading partner attracting seaborne trade and for all technology-related issues, e.g. research, surveillance and monitoring.

1. Introduction

Globally, maritime trade accounts for up to 90% of global merchandise trade,[1] summing up to €11 trillion[2] in 2010,[3] as it still reflects the cheapest and most efficient way of transport compared to rail and air cargo.[4] Overall, seaborne trade is strongly correlated to economic growth and trade.

As the world economic crisis led to negative economic growth rates and to a collapse of merchandise trade of -13.6%, seaborne trade went down by nearly 4% in 2009.[5] Yet, due to the recovery of the economic situation seaborne trade regained the same level in growth rates (7%) as soon as 2010 as prior to the crisis.[6] The maritime dimension of trade is essential for the European Union (EU) as 90% of its foreign trade and 40% of its internal trade are seaborne.[7] Especially the trade patterns between the growing markets in Asia and Europe are of major importance for the EU.

The evolution of shipping has followed different steps and was always linked directly to technological progress and economic development:[8] after a maximum in global economic growth in the 1950s and 1960s seaborne trade increased by nearly 8% per decade.[9] Notwithstanding, the youngest past is influenced by the financial and economic crisis:

- The world economic crisis led to negative growth rates of GDP by -2.1% in 2009. This was followed by a collapse of merchandise trade of -13.9% and of seaborne trade of nearly -4%.
- The recovery of the economic situation since 2010 is reflected by a global growth rate of 3.9% in 2010 and a respective increase in merchandise trade by 16.2%. Seaborne trade regained the same level in growth rates of 7% as prior to the crisis.

[1] The calculation of this share depends on the used database and data quality. Some authors only refer to 70%, *see* Wally Mandry, *Measuring Global Seaborne Trade*, International Maritime Statistics Forum, May 2009.
[2] All values refer to exchange rate of 15 November 2010.
[3] WTO, *World Trade 2010. Prospects for 2011*, PRESS/628, 2011.
[4] Martin Stopford, *Maritime Economics*, New York, 2009, p. 24.
[5] UNCTAD, *Review of Maritime Transport 2011*, 2012, p. 6 and 7. Available at: http://unctad.org/en/docs/rmt2011_en.pdf.
[6] Ibid., p. 7.
[7] Ibid.
[8] Martin Stopford, *Maritime Economics*, New York, 2009, p. 3ff.
[9] UNCTAD, *Review of Maritime Transport 2011*, 2012, http://unctad.org/en/docs/rmt2011_en.pdf.

Globally, the major type of seaborne trade is dry cargo with a share of nearly 70%. Within this category five major bulks are typically traded: iron ore, grain, coal, bauxite/alumina, phosphate.[10]

[10] UNCTAD, *Review of Maritime Transport 2011*, 2012, p. 16 et seq.

2. The potential of new Arctic shipping routes

During the last decade the Arctic region has been undergoing extraordinary environmental and developmental changes.[11] Global climate change, an undeniable fact of today's world, will continue to decisively affect the region, leading to unprecedented ecological changes and risks. Yet, the on-going reduction of Arctic sea ice – its extent set a new all-time record low on September 16, 2012[12] – will undoubtedly extend the seasonal period of marine access to the Arctic Ocean. The region has already become an area of considerable economic opportunity, opening up increased potentials for shipping, fishing, hydrocarbon resource exploration and tourism.

The prospective establishment of new international maritime trade routes and the significant reduction in sailing distances from (northern) Europe to (northern) Asia and America prominently lead the current public and academic debate on Arctic shipping development. Compared to today's traditional routes, the use of the Arctic routes would result in a decrease of days at sea and consequently have a positive impact on related fuel costs.[13] In that regard three Arctic shipping routes, the Northern Sea Route (NSR), the Northwest Passage (NWP) and the Transpolar Sea Route (TSR)[14] have the theoretical potential to transform global commercial shipping. In addition, the Arctic Bridge, an envisaged shipping route linking the Arctic seaports of Murmansk (Russia) and Churchill (Canada) could also be incorporated into future (Arctic) shipping considerations (*see* graph 3).

As types of possible Arctic voyages the Arctic Marine Shipping Assessment (AMSA) differentiated between the four categories in 2009: destinational transport, intra-Arctic transport, trans-Arctic transport and cabotage.[15] Trans-Arctic shipping, defined as the use of the Arctic Ocean as a marine link between the Pacific and the Atlantic Ocean (or *vice versa*) is considered the one most prominent in public perception. However, the often positively perceived potential of the new maritime corridors does not only depend on the continuous melting of Arctic sea ice and the

[11] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, p. 8. Available at:http://arcticportal.org/uploads/4v/cb/4vcbFSnnKFT8AB5lXZ9_TQ/AMSA2009Report.pdf.
[12] NSIDC (National Snow & Ice Data Center), *Arctic sea ice shatters previous low records; Antarctic sea ice edges to record high*, Press release, 2 October 2012. Available at: http://nsidc.org/news/press/20121002_MinimumPR.html.
[13] Yet, navigational risk with regard to significant draft and beam restrictions and the lack of knowledge of the Arctic seabed also determine the speed of Arctic transit.
[14] For an analysis on the potential of the Transpolar Sea Route, see Malte Humpert, Andreas Raspotnik, 'The Future of Arctic Shipping along the Transpolar Sea Route', in: Lassi Heininen, Heather Exner-Pirot, Joël Plouffe. (eds.), *Arctic Yearbook 2012*, 2012. Available at: http://www.arcticyearbook.com/images/Articles_2012/Humpert_and_Raspotnik.pdf.
[15] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, p. 12.

mentioned reduction in sailing distances, but will be decisively influenced by economic parameters, legal aspects and geopolitical/geostrategic considerations. Projections on the future of Arctic shipping include a number of highly variable factors, making it difficult to comprehensively predict related developments. The cost competitiveness of the respective Arctic routes may be constrained by different dimensions of newly arising costs: insurance and permits, lack of infrastructure and means of surveillance[16] (*see* chapter 3.2.2). Hence this paper assumes that for the foreseeable future trans-Arctic shipping will not serve as a substitute for existing shipping routes but rather provide additional capacity for a growing global transportation volume. Future commercial shipping in the Arctic will remain the transport of commodities between Arctic ports (intra-Arctic shipping), rather than (a number of) commercially viable crossings of the northern polar passages. The envisaged exploitation of European Arctic oil and gas fields could intensify regional-related destinational traffic as well and result in an improved integration of the Arctic economy in global trade patterns. Especially the NSR could become a global energy corridor between Norway/Russia and East Asia.[17]

[16] Charles Emerson, Glada Lahn, *Arctic Opening: Opportunity and Risks in the High North*, Lloyds Report. London 2012, p. 31. Available at: http://www.lloyds.com/~/media/Files/News%20and%20Insight/360%20Risk%20Insight/Arctic_Risk_Report_20120412.pdf.
[17] Ibid, p. 31.

3. The EU's interest: the value of new routes for the EU

A sound forecasting approach is facing huge complexity especially due to the uncertainty concerning Arctic development.[18]

Therefore, the authors will try a more general indication by first describing the EU's overall position and interests in current global shipping. Hereby, the strengths and weaknesses of the European maritime transport sector and the related EU-dependence on this sector will be identified. We assume that these dimensions influence the EU's interests in and contribution to exploring new routes in the Arctic region.

Secondly, we highlight the specific economic dimensions of a new Arctic route from the EU perspective by presenting assessments of substituting current EU-Asian trade via the Suez Canal by the NSR. As a result, we emphasize the large range of different assessments.

3.1 The current situation: The EU as shipping actor

The idea of searching for new sea routes has a long tradition in European shipping history and even the harsh Arctic areas have been explored quite early.[19] The very first Arctic shipping actor was probably the Greek navigator Pytheas who sailed northward in 325 BC and was deemed to have reached the vicinity of Iceland and perhaps even Greenland. In the 15th century the Europeans began to ascertain the possibility of the NWP in order to find a more direct route to the Orient and lucrative trade possibilities with India, Southeast Asia and China. Furthermore the NSR was also explored in the beginning of the 15th century by English, Dutch and Russian navigators. Regional shipping tourism started as early as the 19th century.
Till today Nordic and Arctic shipping remain areas symbolizing pioneering like the proud claim of the German Beluga Group shows, stating to be the first Western company to attempt to cross the NSR for shipping without assistance from ice-breaker services in 2009.[20]

[18] For all different approaches specifically for maritime forecasting *see* Martin Stopford, *Maritime Economics*, New York, 2009, p. 695ff.
[19] Arctic Council, *Arctic Marine Shipping Assessment 2009 Report*, p. 37.
[20] Beluga Shipping GmbH, *The Arctic Shortcut „Shipping in Arctic Waters"*, presentation held in Brussels, 9 December 2009.

3.1.1 Developing an integrated EU maritime policy and Arctic considerations

Wegge considers the development of the EU's Integrated Maritime Policy (IMP) as an attempt of a holistic, inter-sectoral EU maritime policy approach, the starting point of EU Arctic-related considerations.[21]

- A first explicit step towards an integrative maritime approach has been the European Commission's (hereinafter "the Commission") *Green Paper* in 2006, expressing the EU's objective to balance between the industrial, ecological and social dimension of sustainable development and creating a truly comprehensive maritime perspective.[22]
- The following *Blue Book* on "An integrated Maritime Policy for the European Union" of 2007 further specified relevant and required activities for all related maritime sectors including transport, port policy, the infrastructure of the hinterland, climate effects' mitigation, migration or research. Shipping is described as backbone of the EU's maritime cluster and as vital for Europe's international and domestic trade.[23] The Commission's Communication also highlights the EU's incentive to coordinate the European maritime interests in key international fora, e.g. the International Maritime Organization (IMO), promoting an international level playing field. Yet, a related regulation (No. 1255/2011), establishing a programme to actively promote the implementation of the IMP had only been adopted by December 2011, followed by a new Maritime Agenda for growth and jobs in October 2012.[24]

The sustainable economic development of all maritime activities is an important feature of the IMP's considerations and pooled in the so-called "Blue Growth" strategy. This long-term approach "elaborate[s] the maritime dimension of the Europe 2020 strategy"[25] in order to support growth in the maritime sector. Consequently, the Commission has also adopted its latest strategy for a competitive EU transport system in March 2011. The Transport 2050 Roadmap aims to create a Single European Transport Area, putting forward 40 concrete initiatives for the next decade.[26] Maritime transport plays a significant role in these considerations,

[21] Njord Wegge, 'The EU and the Arctic: European foreign policy in the making', *Arctic Review on Law and Politics*, Vol. 3, 2012, No. 1, p. 14.
[22] European Commission, *Towards a Future Maritime Policy for the Union: A European Vision for the Oceans and Sea*, COM(2006) 275 final, 7 June 2006.
[23] European Commission, *An Integrated Maritime Policy for the European Union*, COM(2007) 575 final, 10 October 2007.
[24] European Commission, *New Maritime Agenda for growth and jobs adopted*, Press release IP/12/1081, 8 October 2012.
[25] Ecorys, *Blue Growth, Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts, Third Interim Report*, 2012, p. 8. Available at: http://ec.europa.eu/maritimeaffairs/documentation/studies/documents/blue_growth_third_interim_report_en.pdf.
[26] European Commission, *White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system*, COM(2011) 144 final, 28 March 2011.

particularly highlighting the deployment of intelligent waterborne transport management systems (e.g. the EU's maritime information systems SafeSeaNet and Long Range Identification and Tracking of vessels) and the envisaged reductions in CO_2 emissions from vessels.

Slow development of specific Arctic considerations

The Arctic region has long been regarded as a peripheral concern of little importance for the EU,[27] especially after the Greenlandic decision to formally withdraw from the then European Community (EC) in 1985. Only after the Finnish and Swedish accession to the EU in 1995 and the Finnish initiative to create the EU's Northern Dimension (ND), the Northern/Arctic region slightly returned to the EU's policy agenda.

The importance of the Arctic region for the EU was already outlined in the 2006 *Green Paper*, although it was limited to the changing climatic circumstances. The area became more prominent in the 2007 Communication when the Commission announced the publication of a report "on strategic issues relating to the Arctic Ocean".[28] Additionally a paper from the High Representative of the European Union for Foreign Affairs and Security Policy (hereinafter "the High Representative") and the Commission to the European Council in March 2008 on the influence of climate change on international security considerations highlighted the regional geo-strategic dynamics and urged for the development of a EU Arctic policy, particularly taking into account the opening of new trade routes.[29]

[27] Njord Wegge, 'The EU and the Arctic: European foreign policy in the making', *Arctic Review on Law and Politics*, Vol. 3, 2012, No. 1, p. 13.
[28] European Commission, *An Integrated Maritime Policy for the European Union*, COM(2007) 575 final, 10 October 2007, p. 13.
[29] High Representative and European Commission, *Climate Change and International Security*, S113/08, 14 March 2008.

Box 1: Milestones of official EU documents on Arctic maritime trade and transport

2006 – Commission Green Paper *Towards a future Maritime Policy for the Union*
2007 – Commission on *An Integrated Maritime Policy for the European Union*
2008 – EP resolution on ***Arctic governance***
– HR and Commission on *Climate Change and International Security*
– Commission on *The European Union and the* ***Arctic Region***
2009 – Council conclusions on ***Arctic issues***
2011 – EP resolution on a *Sustainable EU policy for the* ***High North***
2012 – Commission and HR Joint Communication on *Developing a European Union Policy towards the* ***Arctic Region***

Source: Own compilation

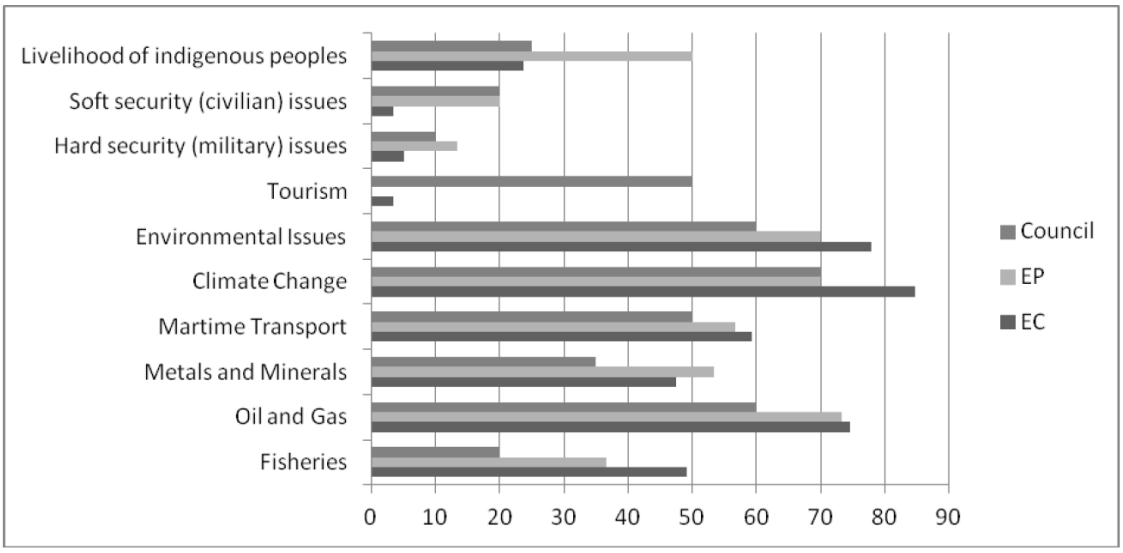
The Commission published the first explicitly Arctic-linked Communication on "The European Union and the Arctic Region" in November 2008[30], welcomed by the Council of the European Union (hereinafter "the Council") in its General Affairs and External Relations meeting on December 8, 2008. The Communication defines *transport*, in addition to *hydrocarbons*, *fisheries* and *tourism* as one of the four decisive sectors for the EU's policy objective to promote a sustainable use of the Arctic's resources. The unpredictability of the potential development of future Arctic shipping routes is already highlighted. Due to the remaining obstacles of drift ice, a lack of infrastructure, environmental risks and uncertainties regarding future trade patterns, "the development of Arctic commercial navigation will require time and effort",[31] with the EU's stated aim to *gradually* improve the conditions for Arctic commercial navigation. The Communication urges both Member States (MS) and the Union to defend the principle of freedom of navigation and the right of innocent passage as stipulated by respective international law, in particular the United Nations Convention on the Law of the Sea (UNCLOS). Additionally, then proposed policy actions included further region-related cooperation with the IMO, the improvement of maritime surveillance capabilities, the need to avoid discriminatory practices, e.g. fees, permits by the Arctic shipping routes' coastal states and the importance for European shipyards to remain a competitive leader in developing technology required for Arctic conditions.

The alleged relevance of Arctic shipping is also evident if considering a survey on the perception of relevant issues regarding the Arctic development agenda.[32]

[30] European Commission, *The European Union and the Arctic Region*, COM(2008) 763 final, 20 November 2008.
[31] Ibid., p. 8.
[32] Run in 2011 with a sample of 4000 and a final N of 300. The sample has been composed of EU 27 at EU level (EU Commission, Parliament, Council) national officials related to external policy (MPs, Ministries) and the scientific community.

Transport is among the four top concerns of future activities in the Arctic (after oil and gas, climate change and environmental issues). The maximal relevance is expressed by the Commission, the lowest by the Council.

Graph 1: Relevance of issues with regard to the Arctic perceived by representatives of the European Parliament (EP), Council, and Commission (% of expressed relevance)



Source: Own compilation, based on survey 2011 in EU-27 in the GeoNor Project's frame (N = 300).

In December 2009 the Council adopted detailed conclusions on Arctic issues in its 2985th Foreign Affairs Council meeting, welcoming "the gradual formulation of a policy on Arctic issues to address EU interests and responsibilities" and requesting the Commission to present a progress report by June 2011.[33] In addition to the Commission's effort, the European Parliament (EP) adopted its own initiative report in January 2011[34], stressing the need for a united, coordinated EU policy on the Arctic region.[35] Yet, due to its non-binding character in the traditional understanding of the EU legal framework an EP resolution in the field of foreign policy can only create a soft-law effect.

The Commission's progress report, which developed into a Joint Communication by the Commission and the High Representative (supported by the EU's diplomatic service, the European External Action Service, EEAS), was only issued on July 3,

[33] Council of the European Union, *Council conclusions on Arctic issues, 2985th Foreign Affairs council meeting*, 8 December 2009.
[34] European Parliament, *A sustainable EU policy for the High North, European Parliament resolution of 20 January 2011 on a sustainable EU policy for the High North*, 2009/2214(INI)), 2011.
[35] A first EP resolution on Arctic governance was already presented in October 2008, stressing the geopolitical and strategic importance of the Arctic region and the necessity of a future standalone EU Arctic policy, see *Arctic Governance. European Parliament resolution of 9 October 2008 on Arctic governance*.

2012; yet, it outlined the EU's perceived progress and policy steps taken since the Commission's first communication in 2008. It highlights the EU's future Arctic engagement along three key categories: "knowledge, responsibility and engagement".[36] Based on several distinctively defined elements, e.g. the fight against climate change, research and monitoring activities on the Arctic environment, the investment in sustainable development in the North, the issue of shipping and maritime safety and of the current EU's Arctic contribution, the Joint Communication indicates a rather diplomatic and pragmatic approach towards Arctic issues and its actors. In that regard the Commission and the High Representative consider the EU's Arctic engagement as an important factor for the sustainable development of Arctic shipping and an international management thereof.

Specific references to navigation in all official EU-Arctic documents are a rather coherent with only certain minor (terminological) changes and adaptations to be observed.

The full compliance with international law remains a continuous key policy objective for the EU, explicitly stressing the freedom of navigation in respective waters.[37] According to a Joint Communication accompanying Joint Staff Working Document[38] the EU urges the Arctic states to respect these principles and critically mentions the unilateral Canadian launch of its Arctic marine traffic system NORDREG and its mandatory character.

The work of IMO regarding a new Arctic mandatory shipping instrument is emphasized throughout the relevant official EU Arctic documents. Yet, the specific term of a "mandatory Polar Code" is only used for the first time in the EP's resolution and reiterated in the 2012 Joint Communication. In that regard, the EP calls the European Maritime Safety Agency (EMSA) "to concern itself to the maximum with Arctic shipping"[39] which was also subsequently addressed by the Joint Communication indicating that EMSA assists the Commission both in meetings of the IMO and the Arctic Council (AC).

All documents further develop and highlight the (allegedly) potential importance of the EU's monitoring and surveillance capabilities for communication, navigation and observation in the Arctic, e.g. Galileo and the Sentinel satellites under the Global Monitoring for Environment and Security (GMES) Programme. Another

[36] European Commission and High Representative, *Developing a European Union Policy towards the Arctic Region: progress since 2008 and next steps*, JOIN(2012) 19, final, 26 June 2012.
[37] In addition to the right of innocent passage the Council's conclusion also states the right of transit passage as stipulated in UNCLOS.
[38] European Commission and High Representative, *Joint Staff Working Document: The inventory of activities in the framework of developing a European Union Arctic Policy*, SWD(2012) 182 final, 26 June 2012.
[39] European Parliament, *A sustainable EU policy for the High North*, 2009/2214(INI), 20 January 2011.

Joint Staff Working Document on "Space and the Arctic"[40], accompanying the Joint Communication, explicitly outlines the EU's intentions in cooperating on Arctic monitoring and surveillance along the issues of climate change and environment, transport safety and security and sustainable exploitation.

The 2008 reference to stress the need to avoid discriminatory practices cannot be found that explicitly in any other official document. This could relate to recent legislative developments by the Russian Federation with regard to the NSR[41] and a related clearer legal formulation on necessary permits and accruing fees for icebreaker services. Despite an explicit reference in the Joint Communication regarding the principles of "freedom of navigation" and "the right of innocent passage" it remains rather unclear if the EU accepts a permit and fee system for the NSR or not. Nevertheless, the indicated position on the Canadian NORDREG system is a clear indication of the 2008 proposition.

Up to now the EU's Arctic policy steps taken are mostly environmental and research driven. The interaction of environmental aspects and sustainable development are stressed as the EU's major explicit Arctic added value.[42] The EU's intentions regarding the issue of transport and navigation are not per se put in second place but in comparison only vaguely formulated and primarily based on sustainability, maritime safety, research capabilities and environmental impacts. Specifically related economic considerations and calculations are lacking and can be explained by the unpredictability and potential large-scale economic unfeasibility of future Arctic shipping but also by an apparent lack of Arctic prioritization in the EU's general global considerations.[43]

In general, a step-by-step learning-by-doing process summarizes the on-going EU Arctic policy making, especially on intra-institutional coordination between the EEAS, as the main responsible body and the Commission and its most relevant DGs.[44] Arctic actors often misinterpret the complexity of the EU's decision-making apparatus with its different colliding interests and institutions, making it difficult for the EU as an external actor to substantiate its Arctic role. In order to push for a stronger involvement in Arctic affairs, the Commission currently tries to sensitize its policy steps and region-related discourse. The specific sector of transport and navigation seems to be no exception.

[40] European Commission and High Representative, *Joint Staff Working Document: Space and the Arctic*, SWD(2012) 183 final, 26 June 2012.
[41] The Russian Federation Federal Law on Amendments to Specific Legislative Acts of the Russian Federation related to Governmental Regulation of Merchant Shipping in the Water Area of the Northern Sea Route, adopted by the State Duma, 3 July 2012.
[42] European Commission and High Representative, *Developing a European Union Policy towards the Arctic Region: progress since 2008 and next steps*, JOIN(2012) 19, final, 26 June 2012, p. 4.
[43] Yet, the fast growing sector of regional cruise-ship tourism is highlighted in both the 2008 and 2012 Communication focusing on the rapid development of this segment.
[44] In particular the Directorates-General MARE, MOVE, ENER, RTD, DEVCO, ENTR and REGIO.

3.1.2 Complex setting of legal competences and relevant institutions

Range from national towards European competency

From a legal point of view the EU's IMP refers to all sea-related policies with explicitly shared legal competences between the Union and its MS. However, throughout the years the Union "has enacted extensive legislation with regard to these issues and has acquired exclusive competence on several matters".[45] In that regard a set of different competencies, as stipulated in the Treaty on the Functioning of the EU (TFEU) is relevant for different sub-issues of transports:

(1) Strong national influence via *shared competences* as part of Art. 4 refer to the following subjects, all having a potential influence on the maritime issues. Here, MS have competencies, as long as the Union is not fulfilling them:

- *Transport policy* in Art. 4 (2g) and Title VI of TFEU: respective ruling address e.g. inspections on EU ports.
- *Agriculture and fisheries,* excluding the conservation of marine biological resources (Art. 4, 2d). This may affect shipping and trade e.g. measures to support economic attractiveness of fisheries (subsidies) and thereby increase fishing activities.
- *Environmental policy* in Art. 4 (2, 4): respective measures may influence shipping e.g. by standards on emission.

(2) EU-wide approaches via exclusive competences listed under Article 3.1 of TFEU:

- *Customs Union (1(a)):* shipping can be influenced e.g. via increased imports due to lower tariffs.
- *The conservation of marine biological resources* (1(d)) under the Common Fisheries Policy covering all quantitative catching objectives.
- *Common commercial policy* (1(e)) addresses the attractiveness of the shipping and harbour sector by state aid via subsidies or publicly financed projects.

(3) *Either national or European competences* to cooperate with relevant *International Organizations* (IOs). Yet, with regard to maritime transport neither the Treaty on European Union (TEU) nor the TFEU stipulate a specific legal basis for the distribution of the EU's external competence.[46] However, the Union can exercise

[45] Jan Wouters, Sijbren de Jong, Axel Marx and Philip de Man, *Study for the Assessment of the EU's Role in International Maritime Organisations*. Final Report, Leuven, April 2009, p. 16. Available at: http://ec.europa.eu/maritimeaffairs/documentation/studies/documents/eu_role_international_organisations_en.pdf.

[46] Nengye Liu, Frank Maes, 'The European Union and the International Maritime Organization: EU's External Influence on the Prevention of Vessel-Source Pollution', *Journal of Maritime Law and Commerce*, Vol. 4, 2010, No. 4, p. 583.

its established competences externally if it adopts internal legislation on the same subject, which also holds true if the relevant competence is shared.[47]

The Union's status of participation in IOs "should ideally reflect the distribution of competences"[48] but decisively depends on the respective provisions of a particular IO concerning the possibility for Regional Economic Integration Organisation (REIO) to become a member or not. In any case, both the Union and MS should ensure coherence and consistency of the EU's respective external action by agreeing on a mutual position. In this respect, Article 34 (TEU) stipulates that MS shall coordinate their action in IOs and uphold the Union's position in such fora, e.g. the IMO as the competent UN body responsible for the global regulation of maritime transport.

These different types of competencies cause a diverging European approach – a common European position has to be followed only for some issues. However, these issues of EU-competencies refer to all more direct economic issues like attractiveness of harbours and fish catches.

3.1.3 Strengths of the European shipping economy

The character of the EU as shipping actor can be described by the following general attributes:

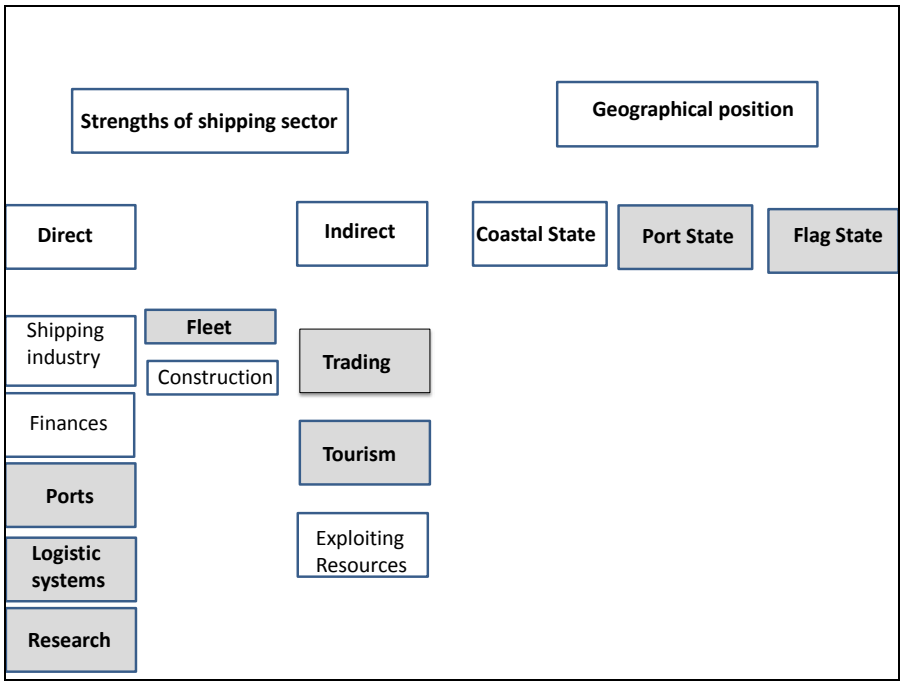
Direct shipping effects encompass the shipping industry or all port and logistic activities. This paper argues that the more important the industry is the larger the interest in increasing this industry is. Thereby, the grown expertise in this sector is larger as well.

Indirect effects mean the linked activities to shipping such as trade, tourism, fishing and the transportation of exploited hydrocarbon resources. They all contribute to the EU's economic strength. The assumption is again that the larger all these effects are the larger is the EU's interest in shipping and the larger is the grown expertise.

The dimension of the *geographical and legal position* towards the Arctic describes an actors' capability or limitation to accede maritime areas (*see* chapter 3.2.1).

[47] Jan Wouters, Sijbren de Jong, Axel Marx and Philip de Man, *Study for the Assessment of the EU's Role in International Maritime Organisations*. Final Report, Leuven, April 2009, p. 17.
[48] Ibid., p. 19.

Graph 2: Strength of the European maritime economy- single dimensions (grey: strong dimension)



Source: Own compilation

3.1.3.1 Direct Strengths: economic relevance of fleets and dockyards, financialization, ports, logistics, research and development

Direct effects of the maritime transport sector reflect the factual potential of the EU as a shipping actor. Shipping traffic relates to benefits but depends highly on the fleet size. Other benefits are linked to ship construction and thereby the economic situation of dockyards, the service and logistic activities of ship companies and all ports' activities. Other sources of income refer to technological and logistical space services like monitoring, communication, research and development.

As already pointed out in the 2006 *Green Paper*, the data availability for the EU-27 or single EU MS is very limited. Since then only some studies revealed a number of relevant data. The overall economic relevance differs a lot across MS and across sub-sectors of the marine industry (Annex A-2).

Overall macro-economic relevance: Recently facing enormous collapses but still some hot spots for regions

The contribution to *economic growth* plays on average a minor role; however, for some sub-issues and in some regions it is of high relevance: the most relevant issues regarding gross value added (GVA) in 2008 were coastal tourism (€121 million), the maritime oil, gas and methane hydrates (€120 million) as well as deep-sea shipping (€98 million).

Regarding the issue of *employment* maritime tourism is of major relevance for the EU covering 50% of all maritime employment in 2008. However, for some MS the employment in traditional maritime sectors (navigation, equipment, services, construction, ports ship building and shipping) is more important: respective shares range from 45% (France) to 69% (Germany) and 75% (Poland) (Annex A-2).

Especially in some *regions* the maritime sectors contribute dominantly to overall employment, e.g. the sectors of port management, shipbuilding and recreational boating in the German Bundesländer Schleswig Holstein, Mecklenburg-Vorpommern and Hamburg. Yet, also some inland regions like Bavaria, Baden-Württemberg and North Rhine-Westphalia have large maritime employment mainly referring to equipment manufactures.[49] In France the most relevant regions for maritime employment are Haute-Normandie and Bretagne linked to shipyards and port management and Provence-Alpes for port management and recreational boating.[50]

In the Arctic region maritime employment is yet only marginal, covering 3% of all employed EU staff worldwide. The majority is employed in the area of the North Sea and on port services, navy and coast guards and shipping.[51]

Despite of the remaining overall relevance especially in some hot spots a general threat exists due to economic depression in combination with existing overcapacities and problematic financing models. This has led to a large crisis in the shipping industry. The initiated structural changes will affect the European shipping regions differently depending on existing inefficiencies and overcapacities.

[49] Policy Research Corporation, *The role of Maritime Clusters to enhance the strength and development of maritime sectors*, Country report - Germany, 2008.
[50] Policy Research Corporation, *The role of Maritime Clusters to enhance the strength and development of maritime sectors*, Country report - France 2008.
[51] European Seas and Territorial Development Opportunities and Risks (ESaTDOR), *ESPON Applied Research Project*, Appendices to Interim Report, 2011, p. 4.

(1) Shipping industry: Fragmented sector, some fragments very relevant for some MS

Shipping traffic: Huge growth rates will be increasingly limited by ports' capacities

Especially European container shipping has faced large growth rates in the last 20 years: whereas it already grew 8% in 1991-96 it went up to 10% in 2001-06. Prognoses until 2025 expect that these growth rates may be diminished starting in 2015. This is caused mainly by capacity limitations, e.g. all ports' logistics and infrastructure may not be sufficient anymore to handle increasing shipping.[52] This will be further amended by the fact that ships sizes are increasing and only can be transferred at few possible ports in the EU. Additionally the management of distribution requires more hub ports in the future. Furthermore the available hinterland infrastructure plays a limiting role for bulk shipping if shipping trade increases.

Fleet size: Greece, Germany and Denmark under the World's Top Ten

Eleven MS are among the top 35 countries with the largest fleets: Greece is based on its tonnage by far the world's largest fleet and controls 16% of world's fleets tonnage (Annex A-3). Regarding the number of nationally owned ships however Greece owns only little more vessels then the country at the 2nd rank, Japan.

Very often ships are registered under another flag (flag of convenience), which allows for international shipping to use other countries' (potentially cheaper) labour and visa requirements. Notably examples are the usage of flags of Panama, Honduras, Liberia and the Marshall Islands. The location of the controlling duty (parent company) mostly defines the ownership of a ship.[53]

The share by which national or foreign flags are used for the tonnage gives a hint on national rules and strictness of labour conditions: the total share of foreign-flagged fleet on the overall dwt has exploded since 1980 from a share of 41% to 68% in 2011.[54] In general nearly 70% of global tonnage is shipped under foreign flags mainly in open registers. This reflects an increase of 8% per year.[55]

In Germany the bulk of ships are under foreign flags whereas it is the opposite in China where shipping is dominantly under its national flag. Germany imposed a secondary register in 1989 for international shipping: ships registered are defined as

[52] Buck Consultants International, *European Ports Policy and Current International Maritime Developments*. Study for the European Parliament, 2008, p. 17ff.
[53] UNCTAD, *Review of Maritime Transport 2011*, 2012, p. 44.
[54] Ibid., p. 46.
[55] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 34.

German flagged, if some of the leading staff is German; however, for a foreign crew foreign conditions can still be applied.

Ship construction and dockyards: Problems due to economic crisis and financing models

Like other western countries the EU's dockyards faced economic problems in the 1970s, when the oil price crises led to a reduction in ship orders and a lot of dockyards were closed. Since the end of the 1990s the situation has improved.

However, especially during the economic crises from 2008 onwards the situation has worsened again: whereas shipbuilding continued, trade and thereby demand decreased. In that regard the Baltic-Dry-Index, signifing the current freight rates decreased by 50% from 2008 to 2012.[56] Thereby the relevant earnings could not be achieved anymore to cover the costs. Additionally, costs exploded anyhow due to the building of too many ships, additionally motivated by attractive funds in the beginning (see Annex A-6).[57] As a consequence, overcapacities resulted with a degree of capacity utilization of only 75% in 2012. Yet, increasing rates are expected again for 2013.[58]

For 2009 the leading countries in terms of constructing ships were China, Korea and Japan accounting together for more than 80% of the construction market. However, Germany was ranked fourth with still 1.7% of all ships constructed in that year, followed by Italy (1.5%). Romania holds the ninth position with 0.9% followed by Poland at rank 10 (0.8%).[59]

A recent case of the German dockyard P+S in Stralsund highlights the ongoing challenges. The yard just announced insolvency despite of several public aids. The still existing ship orders worth €1 billion could not cover the very high variable costs in this sector, e.g. for labor costs around €7 million per month.[60] In the beginning of 2012 the traditional yard Beluga in Bremen also became insolvent.

Some MS have specialised in constructing special ships, e.g. in Finland, Aker Arctic Technology Inc. (AARC) and its predecessors have a long history in (European)

[56] The London-based Baltic Exchange created this index. It measures changes in the cost to transport raw materials such as metals, grains and fossil fuels by sea. The Baltic Exchange directly contacts shipping brokers to assess price levels for a given route, product to transport and time to delivery (speed). It is a composite of three sub-indexes that measure different sizes of dry bulk carriers (merchant ships). Multiple geographic routes are evaluated for each index to give depth to the index's composite measurement.
[57] Frank Bremser, 'Schiffsdämmerung', *Financial Times Deutschland*, 10 July 2012.
[58] Deutsche FondsResearch, *DRF Shipping*, Newsletter 3/2012.
[59] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 5.
[60] 'Kriselnde Branche -P+S Werften sind insolvent', *Spiegel*, 29 August 2012.

icebreaker construction. The company is said to have (partly) designed and constructed 60% of all the world's icebreakers.[61]

Shipping companies: Denmark, France and Germany in Top 15

Today 9 Asian and some European shipping companies are among the 15 largest in their respective field both in terms of number of own and chartered ships and TEU (Twenty-foot equivalent unit).[62] The world's three largest companies are the Danish Maersk Line, the Swiss Mediterranean Shipping Company (MSC) and the French Compagnie Générale Maritime joint with Compagnie Maritime d'Affrètement (CMA CGM). Additionally, the two German companies Hapag-Lloyd and Hamburg Süd belong to this list.

(2) Financialization and shipping funds: Exploding problems due to the economic crisis and problematic financing models

Developing, constructing and running ships require enormous costs long in advance of starting trading. As charter and freight rates are linked to trade and the overall economic development, returns are unstable. A sound financing mode is consequently very relevant but may bear risks. This is why several banks have founded closed shipping funds to receive large investment volumes for their credits. This design entails that investors become owners (mostly) of a single ship. The capital is bound for long periods such as 25 years after which the ship is aimed to be sold. In Germany these funds are mostly designed as limited partnership entities ("Kommanditgesellschaft") transferring the risks from financing investors to ship owners and shipping companies and additionally causing large boni for banks. German banks are prominently represented holding a ship-financing share of almost 45%.[63] In addition to the general economic pressure this leads to further problems in the German shipping industry. Recently a lot of funds are over-indebted, as ships may not cover the enormous running costs. Especially in times of collapsed trade charter, rates decrease and respective earnings are not covering the running costs. Banks demanding for redemption of loans very often leads to insolvency and thereby to problems for the involved private investors as well.[64] Since 2010 around 100 ships became insolvent, summing up to a value of €1.7 billion (Annex A-6).[65]

[61] Aker Arctic, *Aker Arctic Technology Inc - the Full Service Ice Technology Partner*. Available at: http://www.akerarctic.fi/company.htm.
[62] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 40.
[63] Henning Winter, Christian Henning and Markus Gerhard, *Grundlagen der Schiffsfinanzierung*, Bankakademie-Verlag 2007. A German specialty till 1999 made these funds very attractive for investors as they could have compensated losses by tax benefits in other branches. Since 1999 this has been prohibited.
[64] 'Schiffsfonds verlieren Millionen', *Handelsblatt*, 17 November 2011.
[65] Frank Bremser, 'Schiffsdämmerung', *Financial Times Deutschland*, 10 July 2012.

(3) Ports' capacities: Rotterdam still under the Top Ten and large use of port state aid

Capacities of ports

EU's ports play a decreasing role worldwide. Today only Rotterdam belongs to the top ten of the container harbours – which makes it together with Dubai the only port outside of Asia. Antwerp only holds position 11 and Hamburg position 13. They all were facing foregone capacities in terms of TEU as did nearly all harbours from 2008 to 2009.[66]

In 2010 the 20 major container ports roughly handled half of the global 485,886 million TEU. Chinese ports are dominant: less than half of all important ports are located outside of China. Among them are three European ports (Rotterdam, Antwerp and Hamburg).[67]

Subsidies and State Aid to ports

Public support to the maritime sector can be paid either by the EU (Cohesion Policy) or nationally by the Member States (State Aid).

As part of the EU Cohesion policy the EU has some well-established and spatially defined strategies either under the European Development Policy or under the European Neighbourhood Policy (ENP). They have both a maritime and a cross-national dimension addressing some coastal Arctic states as well: the Baltic Sea Region Programme and the North Sea Programme. In this framework an Arctic-EU-cooperation can be based on long-standing experiences.

Subsidies to maritime issues cover a broad range from port-related to fisheries support and are financed by different funds of the Cohesion policy with the European Regional Development (ERDF) being the largest of these funds. For the period 2000-2006 all transport projects got 30% of all funds, of which 5 % or €98 million were dedicated to ports.[68]

In 2007/2008 the EU spent €1.2 billion for the overall maritime policy including spendings for environmental projects.[69]

In the recent 2007-13 programming phase transport is covered under the first of the three overall Cohesion's guideline "making Europe and its regions more attractive places in which to invest and work". Specifically it is mentioned to focus

[66] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 42.
[67] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 42; Buck Consultants International, *European Ports Policy and Current International Maritime Developments*. Study for the European Parliament, 2008.
[68] Policy Research Corporation, Country files - Appendix to the Final Report, Database on EU-Funded Projects in Maritime Regions, Framework contract FISH/2007/04, Specific contract No 4, 2009.
[69] Ibid.

extensively on the 'motorways of the sea' concept and to short-sea shipping as a viable alternative to long-distance road and rail transport.[70]

The proposals for future Cohesions funds address maritime transport via the specific priority of Connecting Europe Facility for transport, energy and information and communication technology (ICT) for which €40 billion is planned for the Cohesion policy after 2013. This reflects around a tenth compared to the proposed sum of €340 billion for Cohesion policy.[71] The Commission further proposed a new "European Maritime and Fisheries Fund (EMFF)", extending the former fisheries funds by projects on integrated maritime policy (maritime surveillance, data sharing, Marine Spatial Planning (MSP) and Integrated Coastal Zone Management (ICZM)).[72]

Box 2: Different EU funding with specific shipping focus

- **Baltic Sea Region Programme** of the ERDF: Priority area 4 on clean shipping, area 11 on transport, area 13 on safety and security. 8 projects focus specifically on transport issues (Projects: Scandria, TransBaltic, EWTC II, RBGC, Baltic.AirCargo.Net, BSR InnoShip, ACL, BGLC), others refer to water pollution.
- **Cross-border Programmes of the ERDF:** IV A (Central Baltic): IV A North (Finland, Sweden, Norway), Interreg IVA Öresund-Kattegatt-Skagerrak (Denmark, Sweden, Norway)
- **ENPI for eastern partnership** supports the cooperation with Belarus and Russia. One project with maritime focus is Kolarctic (Finland, Sweden, Norway, Russia) funding e.g. projects on tourism and transport logistics.
- **North Sea Programme under the ERDF** as Transnational cooperation Programme. (UK, Sweden, Germany, Denmark, Netherlands, Flanders and as Non-EU Member State Norway)

Source: Official EU websites with project information

On *State Aid* strong rules exist to avoid unfair competition. The TFEU generally prohibits state aid unless it is justified by reasons of economic development (Article 107). Such exemptions have to be applied equally across the EU and therefore the Commission is in charge of watching over the compliance of state aid with EU rules.

[70] Council of the European Union, *Council Decision on Community Strategic Guidelines on Cohesion*, 2006/702/EC.
[71] European Commission, *Commission lays Foundations to Boost Impact of Cohesion Investments After 2013*, Press Release IP/11/1159, 6 October 2011.
[72] European Commission, *Proposal for a Regulation of the European Parliament on the European Maritime and Fisheries Fund [repealing Council Regulation (EC) No. 1198/2006 and Council Regulation(EC) No 861/2006 and Council Regulation No. XXX/2011 on integrated maritime policy*, COM(2011) 804 final, Brussels, 2 December 2011.

In general only volumes lower than the threshold of €500,000 for three years do not have to be formally checked by the Commission.[73]

The high number of checked cases in the area of port and sea infrastructure indicates that potentially high levels of state aid can be assumed.

Another indicator shows how relevant state aid to ports may be in some MS and in some specific regions,[74] with many cases brought to the Commission for being evaluated regarding their compatibility on state aid rules. Typically public financed projects are support to develop new ports (e.g. case N110/2008 on the JadeWeser port in Germany, cases N 385/2009 and C39/2009 on public financing of port infrastructure in Latvia), (preferential) conditions for distribution spots in ports (Commission Decision 2002/64/EC on the Reebok case in Rotterdam) or any fiscal measures (case C13/2009 followingN614/2008 in France).

(4) Maritime Space Logistics: EU among the key players

The sector of maritime space logistics can be divided into several sub-segments. The most relevant are the satellite manufacturing industry and the technologies for vessel tracking systems. Both sectors strongly depend on overall IT-technology.

(1) EU's satellite systems

US firms currently dominate the global satellite manufacturing industry (Lockheed Martin, Boeing); however, three European firms contribute to the sector as well: the European EADS Astrium, Thales Alenia Space (France) and OHB (Germany). Yet, for earth observation systems European firms are assessed as being very strong.[75]

The larger contribution by European companies can be observed on the market of satellite operators by DMC international imaging (DMCii) and Qintec (United Kingdom), Astrium, EAS and EUMETSAT (EU), Rapideye and DLR (Germany), E-GEOS (Italy), CNES (France), ASI (Italy).[76]

(2) Vessel tracking systems

Vessel tracking systems handle Automated Identification (AIS) and Long Range Identification and Tracking Systems (LRIT). The EU, Canada and the US are the main global players for AIS, but no single most relevant country can be identified. For LRIT the Danish firm Thrane & Thrane has been one of the leading players.

Due to the complexity of the market an estimation of its size is very difficult. It is assessed that the EU's maritime security market lies at €1.5 billion in 2008,

[73] 'Commission Regulation (EU) No 360/2012 of 25 April 2012 on the application of Articles 107 and 108 of the TFEU on to *de minimis* aid granted to undertakings providing services of general economic interest', para. 4, *Official Journal*, L 114/8, 26 April 2012.
[74] Karel Vanroye, *State Aid to EU Seaport.* Study fort the European Parliament, 2011, p. 55.
[75] Ecorys, *Blue Growth, Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts, Maritime Sub-Function Profile Report', Maritime Security & Surveillance (6.1)*, 2012.
[76] Ibid., p. 11.

predicting that it would rise to €2.5 billion by 2018. This represents about 22% of global market share.[77]

Besides these direct benefits related activities are benefitting from such systems as well, like the facilitation of trade leading to increased returns. Another example is fisheries and the new approach of measures against illegal, unreported and unregulated fisheries requiring complex monitoring systems. General improvements of integrated surveillance systems reduce respective costs as well.

(5) Shipping Research and Development: Large relevance in the EU

The budgetary relevance of maritime-related projects has been increased since the last programme phase (Annex A-5). Under the 6th Framework programme for 2002-2006, the total contribution of the Commission to marine and maritime research projects has been €612.51 million accounting for 3% of the overall research budget of €17.5 billion.[78] For the 7th Research Framework a preliminary evaluation revealed a total funding dedicated to marine and maritime projects for the years 2007 and 2008 at €424 million, which represents 17% of the overall budget in these years.[79]

For the next framework starting in 2014 the Commission's proposed an increased overall budget; however, the allocation to marine activities is not clear yet.

3.1.3.2 Indirect strengths: Trade, exploiting resources and related destinational shipping and tourism

(1) The EU as trading actor for main seaborne traded goods

The dominantly traded goods are bulks like iron ore, steel, grain, coal, bauxite/alumina and phosphate. The second largest group is composed of energy resources such as oil and gas. If these goods are a relevant trading position for an actor they are very relevant for seaborne trade, too.

Globally the EU belongs to one of the most relevant trading regions with 14% of worldwide traded goods being exported by EU MS and 15.5% being imported in 2011.[80] 90% of this European trade is seaborne.[81]

[77] Ibid.
[78] European Commission, Sixth Framework Programme.
[79] DG Research, http://ec.europa.eu/research/mmrs/funded_projects/funded_projects_en.htm.
[80] UN Comtrade Database.
[81] Stephen Jay, Sue Kidd, Lynne McGowan, David Shaw et al., *European Seas and Territorial Development Opportunities and Risks*, Applied Research 2013/1/15, Interim Report | Version 01/09/2011, p. 7, available at: http://www.espon.eu/export/sites/default/Documents/Projects/AppliedResearch/ESaTDOR/ESTaDOR-Interim_report_disclaimer.pdf.

The EU as importer of the dominantly traded bulks coal and steel

The EU's import demand for coal decreased in 2010 due to a combination of stringent environmental measures and comparatively low gas prices (21% of world coal imports in 2010).[82] Steel still is strongly being imported (13% of world steel imports);[83] hence the EU will remain a potentially large market place.

The EU's grain ex- and imports

The EU is the second largest grain exporter (14% of world exports in 2010) and fourth largest grain importer (6% of world imports in 2010).[84] This denotes the EU as a relevant market place for imports and global source of grain for exports. As a consequence thereof related shipping from and to European harbours is very significant.

The EU's oil and gas imports

In general, all energy resources have been traded in 2010 once again at the same level as prior to the collapse due to the financial crisis and the oil price explosion in 2008 and 2009. However, the forecasts especially for oil-trade are still facing uncertainties and more conservative assessments expect lower growth rates. For natural gas on the other hand increasing rates are expected as it can function as a substitute for the more expensive oil.

The EU continues to be a large consuming area of oil: the EU's dependency reaches 80% in 2011.[85] The bulk of oil comes from Russia, accounting for one third of all imports.[86] The allocation among all demanding countries may change due to increased Asian demand. Gas will be the only resource with a stable expectation of increasing future demand being a substitute for oil and gaining relevance in high prices' phases.

The EU's minerals and metals imports

The Commission identified the following, potentially Arctic relevant minerals as critical: Indium, platinum group metals[87] and rare earths.[88] For these resources the EU's market is considerably large, e.g. 21% for platinum, 14% for indium and 8%

[82] Coal, coke and briquettes, SITC Pos. 32, 2010, ExtraEU, UN Comtrade Database.
[83] Iron and steel., SITC Pos. 67, 2010, ExtraEU,UN Comtrade Database.
[84] Cereals, SITC Pos. 04, 2010, ExtraEu, UN Comtrade Database.
[85] Energiepolitik.de, September 2012, http://www.energiepolitik.de/gastbeitrag-norbert-rost-nordseeol-selbstversorgungsgrad-europas-sinkt-auf-niveau-der-1980er-jahre/.
[86] Etat, *Energy Production and Imports*, September 2012, http://epp.etat.ec.europa.eu/statistics_explained/index.php/Energy_production_and_imports,.
[87] The Platinum Group Metals consists of six different metals as platinum, rhutenium, rodhium, palladium, iridium and osmium. *See* European Commission, *Critical raw materials for the EU: Report of the Ad-hoc Working Group on defining critical raw materials*, 2010, p. 6.
[88] European Commission, *Critical raw materials for the EU: Report of the Ad-hoc Working Group on defining critical raw materials*, 2010.

for rare earths in 2010.[89] Regarding *metals* the Commission recognized beryllium, graphite and niobium as critical, also potentially available in the Arctic.[90] The EU market held - in 2010 - the considerable share of 19% of the global market for beryllium, 23% for graphite and nearly 30% for niobium.[91]

The EU's fisheries imports

On *fish* the overall EU self-sufficiency rate was 36% in 2008, indicating that 64% of the EU's demand can only be satisfied by imports.[92] Major sources are two countries that are strongly linked to the EU by the free trade zone of the European Economic Area (EEA), namely Norway and Iceland covering a fourth of all EU imports. However, Asian countries like China and Vietnam are becoming increasingly relevant.[93]

In summary, it can be stated that the EU is an important destination and an important source for trade for dominantly traded products, e.g. steel, oil and gas. For such a large maritime trader the distances between the ports are of major relevance as any potential shortening in distance may reduce transport costs.

(2) Exploiting resources and destinational shipping: Increasing interest in access to and imports of raw materials

The EU is a relevant importer for all raw materials already or potentially available in the Arctic. In the future the EU may attract either even more imports or invest in own exploitation activities depending on possible access to resources. This access depends very much on the resources and is e.g. easier for fish as fish may migrate to High Sea areas accessible for any State (*see* chapter 3.2.1 on legal competences). Both, trade and exploiting activities, will have an influence on related shipping activities as potentially exploited resources have to be conveyed to the EU's coasts:

- For *oil and gas* the offshore supply industry is important for the UK, France, the Netherlands and Denmark. The Arctic region is supposed to hold "about 30% of the world's undiscovered gas and 13% of the world's undiscovered oil"[94]. Due to legal rules on accession, limitations by physical access, economic considerations and ecological concerns only few European companies have an interest in ex-

[89] UN Comtrade Database.
[90] European Commission, *Critical raw materials for the EU: Report of the Ad-hoc Working Group on defining critical raw materials*, 2010.
[91] Ibid.
[92] 'Council Regulation (EC) No 1062/2009 of 26 October 2009 opening and providing for the management of autonomous Community tariff quotas for certain fishery products for the period 2010 to 2012 and repealing Regulation (EC) No 824/2007', *Official Journal of the European Union*, L 291, 7 November 2009, para. 1.
[93] Bettina Rudloff, *The EU as fishing actor in the Arctic. Stocktaking of institutional involvement and existing conflicts*, Berlin: SWP, July 2010 (SWP Working Paper 2010/02)
[94] Donald L. Gautier et al., 'Assessment of undiscovered oil and gas in the Arctic', *Science*, Vol. 324, 2009, No. 5931, p. 1175. Yet, the survey explicitly indicates the scant geological information its estimations are based on.

ploiting oil and gas in the Arctic up to now. The French Total has exploiting projects for gas but rejects to invest in oil exploitation due to ecological challenges.[95] The Royal Dutch Shell recently had to stop some first oil drillings due to corrosion of material.[96] Therefore, so far no large increase of shipping induced specifically by the related offshore oil and gas industry can be expected. However, in the future this may change. Yet, any energy-caused increase in shipping may be weakened if respective oil and gas supply would be carried out by pipelines instead of trading them by ships. Existing examples are the North Stream route-pipeline for gas, bringing gas from Russia to the EU (Finland, Sweden, Denmark, Germany).[97] Any future substitution effect depends on the use and capacity of such pipelines.

- For *minerals* the Arctic offers sources for many different kinds. The critical raw materials beryllium, graphite and niobium are available in Arctic regions (Annex A-7). So far China (indium, rare earths), South Africa and Russia (platinum group metals) are major sources, which may be replaced in the future by others, e.g. Greenland for rare earths and Greenland and the Russian Arctic for platinum.[98] New sources for minerals in the Arctic may become important in order to diversify imports especially if respective transport routes were to become shorter and cheaper.[99] Own exploitation and linked destinational shipping seem so far limited as minerals are assumed to be located in the respective coastal zones or territory of the Arctic's coastal states.
- For *metals* relevant sources in the Arctic are the critical raw materials rare earths (Greenland), the platinum group metals and indium (Annex A-6). Germany belongs to the top five consumers for copper, nickel and tin in 2010.[100] Major imports come from China (graphite), USA, Canada, China and Brazil (beryllium, major source changes per year) and Brazil (niobium)[101]. Like for minerals own exploitation and destinational shipping seem limited.
- Considering *fish* the recent Arctic fisheries is very low: out of worldwide catches Arctic catches only hold for 4% and the EU only catches 4% hereof.[102] If future

[95] 'Ölkonzern-Chef hält Förderung in Arktis für zu riskant', *Spiegel online*, 26.9.2012; 'Die Arktis wird überschätzt', *St. Galler Tagblatt*, 14.9.2012.
[96] Ibid.
[97] The Nord Stream consortium is owned by OAO Gazprom (51%), Wintershall Holding GmbH (15.5%), E.ON Ruhrgas AG (15.5%), N.V. Nederlandse Gasunie (9%), and GDF SUEZ (9%). 'The Nord Stream Pipeline – Bringing Russian Natural Gas to Europe', *Arctic Economics*, 14 July 2012.
[98] *European Competitiveness Report 2011*, 2011, p. 116. Available at: http://ec.europa.eu/research/innovation-union/pdf/competitiveness-report/2011/iuc2011-full-report.pdf#view=fit&pagemode=none. Ibid., p. 22.
[99] Risk & Policy Analysts Limited, *Stockpiling of Non-energy Raw Materials*, Final report for the DG Enterprise and Industry, March 2012, p. 20.
[100] Deutsche Rohstoffagentur, *DEAR Rohstoffinformationen* 2010, p. 10.
[101] U.S. Geological Survey, National Minerals Information Centre, *Minerals Information*, http://minerals.usgs.gov/minerals/index.html.
[102] Bettina Rudloff, *The EU as fishing actor in the Arctic. Stocktaking of institutional involvement and*

stocks are accessible in High Seas linked destinational shipping can possibly increase. In any case, as a major global importing market place the EU highly depends on imports related to shipping activities especially from Arctic coastal countries.

(3) Tourism Sector: Increasing relevance in the EU

Arctic tourism has its origins dating back to the 19th century, with travel guides being published specifically for angler and hunters. It was only able to start mass tourism by technological progress in inventing larger ships.[103]

Globally, tourism cruisers account for around 10% of all ships.[104] Data availability specifically on Arctic tourism is very limited: some assessments refer not only to maritime but to general tourism in the region indicating an increase from 9 million tourists in 2000 to 13 million tourists in 2007.[105] Other data refer to single destinations and indicate 370,000 cruise passengers in 2007 for Norway, double the number in 2000. More than 1 million cruise tourists visited Alaska in 2007, reflecting an increase of 7% compared to 2006.[106]

Despite the lack of solid and comparable data one may expect a further increase in tourist activities leading to enormous challenges regarding pollution as well as search and rescue activities.

The tourist sector also plays an increasing role from the EU perspective. In average both the shares in GDP and employment were 4% in 2010.[107]

3.2 The Northern Sea Route as alternative to the Royal Route

3.2.1 EU's international geographical position affecting the legal competencies

In addition to the direct economic strengths as a shipping and maritime actor in the Arctic region, the EU also has specific legal rights and duties. Currently, geographical considerations and the EU's gradually emerging Arctic policy dominate the on-going debate of a stronger and more influential involvement in

existing conflicts, Berlin: SWP, July 2010 (SWP Working Paper 2010/02), p. 11.
[103] UNEP, *Tourism in the Polar Regions - The Sustainability Challenge*, 2007, p. 12.
[104] Flottenkommando, Jahresbericht 2011, *Fakten und Zahlen der maritimen Abhängigkeit der Bundesrepublik Deutschland*, 2011, p. 42f.
[105] Michael Hall, Jarkko Saarinen, *Polar tourism: Definitions and Dimensions*, 2010, http://canterbury-nz.academia.edu/CMichaelHall/Papers/268405/Polar_tourism_Definitions_and_dimensions.
[106] John Snyder, *Arctic Tourism: Past, Present and Future. Opening the Arctic Seas: Envisioning Disasters and Framing Solutions*. Presentation at Arctic Spill summit 2009, http://www.crrc.unh.edu/workshops/arctic_spill_summit/presentations/snyder.pdf.
[107] OECD, *Tourism Trends and Policies 2010,* 2010.

Arctic matters.[108] However, none of the EU MS can act as a *coastal state* with respect to the Arctic marine area.[109] This limits the EU's direct access to many resources, as these are mainly located in offshore areas under national sovereignty (and consequently within the 200 nm Exclusive Economic Zone, EEZ).

However, the EU (and its MS) still has considerable legal capacities *as port and flag state* (and even market state in relation to its economic interests):[110]

- The UNCLOS and customary international law recognizes "a port State's wide discretion in exercising jurisdiction over its ports"[111], e.g. to empower obligations on safety, security and environmental standards via conditions to enter its ports. For example, the EU may use its ports as economically relevant bottlenecks to reduce overfishing by applying rules against illegal, unreported and unregulated fishing (IUU) or impose more stringent conditions than 'generally accepted international rules and standards' (GAIRAS) by implementing the two recommendatory IMO Guidelines for Ships operating in Arctic Ice-covered Waters and for Ships operating in Polar Waters.[112] Also port state control arrangements, in particular the Paris Memorandum of Understanding (MOU), play a decisive role in the prevention, control and reduction of maritime pollution in the Arctic region.
- UNCLOS further stipulates *a flag states* prescriptive legal power to ensure the fulfilment of safety and environmental standards during the voyage, e.g. prescriptive jurisdiction over vessel-source pollution or maritime safety in general.

3.2.2 Assessing Comparative Economics for the EU

The following cost-benefit dimensions refer to substituting the presently used route for European-Asian trade from Rotterdam to Shanghai via the Suez Canal (Royal Route).[113] This route is one of the currently most important trade routes as it covers the major important trade pattern across "the triad" North America, Europe and Asia. These trading spots accounted for 80% of both global exports and imports in 2006.[114]

[108] Timo Koivurova et al., 'The present and future competence of the European Union in the Arctic'. *Polar Record*, Vol. 48, 2012, Issue 4, p. 361.
[109] As Greenland withdrew from the European Economic Community in 1985.
[110] For a comprehensive overview on the EU's competencies affecting the Arctic, *see* Timo Koivurova et al., 'EU competencies affecting the Arctic', Study for the European Parliament Directorate-General for External Policies of the Union, 2010. Available at: http://www.europarl.europa.eu/committees/en/studiesdownload.html?languageDocument=EN&file=33381.
[111] European Commission, *Legal aspects of Arctic shipping, Summary report*, 2010, p. 7.
[112] Ibid., p. 11.
[113] Jerome Verny, Christophe Grigentin, 'Container shipping on the Northern Sea Route', *International Journal of Production Economics*, Vol. 122, 2009, Issue 1, pp. 107-117.
[114] Ibid., p. 109.

Within this triad the Europe-Asia shipping trade is of large relevance and the bulk is carried out by container ships, composed of 1.7 million TEU in 2008 equalizing 30% of global container shipping. This bilateral trade is assumed to grow and some studies expect an increase in Europe-Asian container shipping of 600% by 2030.[115]

The Suez Canal's capacity is getting more and more tied as vessels are increasingly being invented to multiply the loading capacity leading to large size and depth.

Due to this bottleneck and the expected increase in shipping the search for new routes will be intensified.

[115] See for example Wayne Talley (ed.), *The Blackwell Companion to Maritime Economics*, 2012.

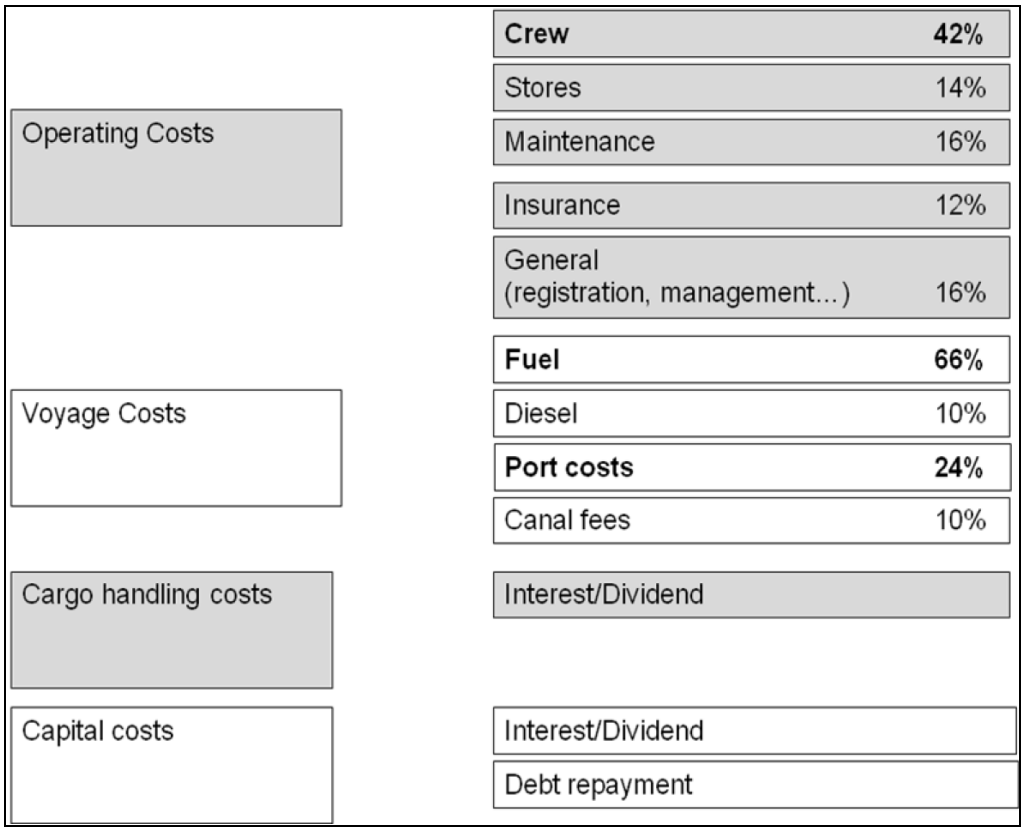
Graph 3: Different Arctic shipping routes and comparison with Royal Route (Suez)

Source: Own map of Malte Humpert, The Arctic Institute 2012

Some important categories dominate the running costs of shipping: crew, fuel and port costs. If these categories are reduced due to new Arctic routes then overall costs can be saved. Yet, as already indicated the cost competitiveness of these new routes may be constrained by different dimensions of newly arising costs as the costs of insurance and potential permits, lack of infrastructure and means of surveillance.[116]

[116] Charles Emerson, Glada Lahn, *Arctic Opening: Opportunity and Risks in the High North*, Lloyds Report, London 2012, p. 31. Available at: http://www.lloyds.com/~/media/Files/News%20and%20Insight/360%20Risk%20Insight/Arctic_Risk_Report_20120412.pdf.

Graph 4: Composition of major costs for running ships



Source: Martin Stopford, *Maritime Economics*, New York, 2009, p. 225

(1) Less distance = less transport days = less manning and fuel costs?

Most research on future Arctic shipping refers to the fact of savings due to less distance (graph 3 and Annex A-8). Indeed fuel costs account for 66% of all voyage costs and crew costs cover 42% of the operating costs.[117] The potential future *distance* differs depending on the final target port:

- If ports in North Asia (Tokyo, Busan, Shanghai or the planned new port in Qingdao (graph 3) are targeted, the distance compared to the Royal Route can be reduced by 4,500 nm (Tokyo), 3,000 nm (Shanghai), 2,800 nm (Quingdao) or only 1,748 nm (Hong Kong).
- For more southern ports the route via the Suez Canal would still remain nearer. In the case of Singapore the NSR would actually lead to additional 1,000 nm.[118]

[117] Jerome Verny, Christophe Grigentin, 'Container shipping on the Northern Sea Route', *International Journal of Production Economics*, Vol. 122, 2009, Issue 1, p. 115.
[118] Ibid., p. 113. The authors assume that a container ship foreseen for the NR faces limitations in size: due to the depth of the strait of Sannikov draught is limited to 13 m. This means that instead of the latest generation of the largest container ships (5th generation) only smaller ones (4th generation) are expected to be used in Arctic shipping. These have only half of the loading capacity (4,000 TEU) compared to the larger ships (up to 8,400).

- Translated into *shipping days* the savings for the route Rotterdam – Shanghai would be 10 days less and therefore generate
- *savings in fuel costs* of approximately €300,000 (assuming $30.000 per day at 17 knots and 50 t heavy fuel oil at a price of €600 per t) and
- *savings in crew costs* of €253,000 (assuming a 19-person crew and costs of €2,500 per day).

(2) Less pirates and terrorism threat = less insurance costs?

The re-appearing threats of piracy and terrorism make a comparatively secure transport system increasingly vulnerable. In general, shipping can be assumed as less vulnerable as air trade. The overall network of routes is much denser, e.g. a loss of a particular route may be less problematic. In the past most risks for seaborne trade were related to bad weather conditions with terrorism and piracy only recently becoming relevant.[119]

[119] Pablo Kaluza et al., 'The Complex Network of Global Cargo Ship Movements', *Interface - Journal of the Royal Society*, Vol. 7, 2010, No. 48. Available at: http://171.66.127.193/content/7/48/1093.full.

Box 3: The costs of piracy

The costs of a piracy attack are difficult to assess – different analyses cover different components or rely on different assumptions. Especially the increasing risk of piracy has led to huge costs in the recent past. The breadth of estimates reaches from 370 million to €17 billion per year reflecting the enormous uncertainty of any data.[120] In addition to the different methods of calculation another fact enhancing the uncertainty is that only part of all attacks are really claimed in order to keep insurance premiums low.[121]

The probability of being attacked can be assumed as very low – assessment defines this for the year 2008 at a rate of 0.6%. This leads to an annual risk of €0.1 billion[122] that is so far negligible compared to the value of global marine trade. A typical economic reaction on such risks is the increase in premiums. In the Gulf of Eden the premiums exploded by 350% and specific piracy-premiums increased even by 1000%.[123] Even though globally insignificant this may be a huge amount for a single vessel worth of €110 million. Globally, the increase of insurance-related costs for the Horn of Africa is assessed at €3.4 billion in 2010.

Generally the following insurance systems are relevant:

- *Marine hull and machinery insurance* ("H&M") covers physical damage to the ship, including harm from heavy seas, collision, sinking, capsizing, grounding, fire or piracy. It is estimated that piracy has doubled the cost of hull insurance.
- *Cargo insurance* addresses the goods transported. The excess premium on transiting piracy regions is estimated to have increased by between €18 and €73 per container in the past few years.
- *War insurance* is an excess charge for a vessel transiting a 'war risk area' defined e.g. by Lloyds Market Association (LMA) Joint War Committee in May 2008. The Gulf of Eden and the Street of Malacca belong to these regions. The cost of war risk premiums have increased 300 fold, from €370 per

[120] See Stormy Mildner, Franziska Gross, 'Piracy and World Trade. The Economic Costs', in: Stefan Mair (ed.), *Piracy and Maritime Security*. *Regional characteristics and political, military, legal and economic implications*. Berlin: Stiftung Wissenschaft und Politik, 2011 (RP 03/2011), p. 26; Martin Murphy, *Contemporary Piracy and Maritime Terrorism: The Threat to International Security*, London 2007 (Adelphi Paper, 388); Peter Chalk et al., *The Economic Cost of Maritime Piracy*, 2010 (One Earth Future Working Paper).

[121] Stormy Mildner, Franziska Gross, 'Piracy and World Trade. The Economic Costs', in: Stefan Mair (ed.), *Piracy and Maritime Security*. *Regional characteristics and political, military, legal and economic implications*. Berlin: Stiftung Wissenschaft und Politik, 2011 (RP 03/2011), p. 26.

[122] Probability of 0.006 times maximum damage of $ 24 billion a year.

[123] Stormy Mildner, Franziska Gross, **'**Piracy and World Trade. The Economic Costs' In: Stefan Mair, (ed.), *Piracy and Maritime Security*. *Regional characteristics and political, military, legal and economic implications*. Berlin: Stiftung Wissenschaft und Politik, 2011 (RP 03/2011), p. 27.

ship, per voyage; to up to €110,000 per ship per voyage in 2010 compared to 2008.

- *Kidnap and ransom* (K&R) covers the crew but not the vessel or cargo. Some marine insurance policies have recently expanded to include property as well. It is assessed that these premiums increased tenfold between 2008 and 2009.
- *Financial liability insurance*, which is covered by the shipping sector itself ("P&I", "property and indemnity") and covers the specific risk for creditors in case of damage.

Less piracy risk may potentially reduce insurance costs. On the contrary, liability premium ('Arctic premium') may be higher due to potentially very high damage costs like environmental expenses in case of an accident or wreck removal. The potential rates for insurance cover can decisively influence the economic viability of Arctic shipping, with key insurance issues of concern like, remoteness, lack of rescue and salvage facilities or the need of icebreaker support.[124] However, a solid indication of the accruing insurance costs would not be reliable yet.

(3) Less port fees

The Suez-route is facing steadily increasing fees. In 2005 the rate was €40 per TEU, e.g. €220,000 per 4,000 TEU- container ship.

Existing cost assessments

Only very rough estimates exist on the different shipping trade of container and bulk using a potential NSP compared to the Suez Canal.

The following data is not soundly comparable as applied to different ships, loading routes, single trips or whole fleets.

[124] Charles Emerson, Glada Lahn, *Arctic Opening: Opportunity and Risks in the High North*, Lloyds Report, London 2012, p. 49 and 50. Available at: http://www.lloyds.com/~/media/Files/News%20and%20Insight/360%20Risk%20Insight/Arctic_Risk_Report_20120412.pdf.

Altogether only very limited changes both in savings and in additional costs compared to the alternative route can be noticed: Savings were only identified for bulk cargo, additional costs for container shipping.

Table 1: Summarized cost of NSR route compared to Suez Route ($)

	Container (Rotterdam – Shanghai)	**Bulk (London – Yokohama, one way)**	
	Per month	**Mineral (per month)**	**Iron**
Charter	720,000[1]	720,000	1,156,000
Fuel	1,413,750	860,000	200,000
New charges	380,000	380,000	380,000
Insurance	138,720	125,000	125,000
Other (crew, ship…)	2,472,060	No information	No information
Sum costs	= 170,817 $ per day[2]	= 69,500 $ per day	= 23,538 $ per day
Compared to Suez	+ 85 $ per day[3]	- 843 $ per day	- 815 $ per day

Source for container: Jerome Verny, Christophe Grigentin, 'Container shipping on the Northern Sea Route', *International Journal of Production Economics*, Vol., 122, 2009, Issue 1, pp.107-117; source for bulk: Halvor Schøyen, Svein Bråthen, 'The Northern Sea Route versus the Suez Canal: cases from bulk shipping', *Journal of Transport Geography*, Vol. 19, 2011, Issue 4, pp. 977-983.

[1] As no explicit information was given the equal rate like for bulk is assumed.
[2] The calculation of Verny and Grigentin sums up to only 129 $ per day but addresses some different insurances. Data are adjusted to costs per day (30 days a month).
[3] The additional costs refer to the calculation of Verny and Grigentin identifying that the Suez route cost half of the NSR.

Especially bearing in mind the general uncertainties for future shipping routes these minor changes have to be handled very carefully – these small margins can be easily compensated if some of the considered components change slightly.

However, in principal the calculations elaborate that not only savings may appear but additional costs can arise as well. These assessments differ between ship types.

3.3 Conclusion: Challenges for the EU facing new routes and political reactions

The EU as *recent general shipping actor* can be described as an actor with remaining general strengths despite the current weakening due to the economic crisis:

- *Direct strengths* consist of globally relevant port capacities, space logistics as well as research and development capabilities. The EU contributes to global shipping in these areas. For the EU itself the maritime sector is simultaneously of large economic relevance in some regions, like in the North of Germany or France. This supports the contention that the EU has an interest in contributing to the shipping industry.
- Concerning *the indirect strengths* the dominant role as trading partner must be noticed first. As major market place for many trading a strong future attractiveness for seaborne trade towards the EU remains.
- Considering the *geographical position* of the EU and lacking jurisdictional coastal state powers, the EU still has considerable rights and duties as port and flag state, regionally affecting Arctic shipping, in particular considerations on vessel-source pollution and port state control.

With regard to future Arctic *shipping developments* respective considerations are currently limited by the prevailing uncertainties on the factual development of accessible Arctic routes and the potential exploitation of resources. Additionally, the limited seasonal window for trans-Arctic voyages must be taken into account in any future projections. Hence, any reliable (economic) outlook remains rather vague and scientifically insufficient. The few existing and uncertain calculations offer only very small margins on both possible benefits and costs. This makes a calculation even more vulnerable to uncertainty as any small change may alter the overall benefit assessment.

From today's perspective the EU's *future role* in Arctic shipping can in particular be seen on all technology-related maritime issues like monitoring and surveillance, as well as the tourism sector.[125] Additionally, the EU will adhere to its general rights and duties as port and flag state, e.g. with regard to vessel-source pollution or port state control measures. Yet, the EU's publically outlined Arctic intentions are still lacking an explicit economic angle. This can be partly explained by the unpredictability and potential large-scale economic unfeasibility of future Arctic shipping.

[125] Ecorys, *Blue Growth, Scenarios and Drivers for Sustainable Growth from the Oceans, Seas and Coasts, Annex 1 maritime economic activities data*, 2012, p. 20. Available at: https://webgate.ec.europa.eu/maritimeforum/system/files/Blue_Growth_Final_report_annex%201%20Methodology%20and%20maritime%20fu.pdf.

Annex

Box A-1: Glossary

(1) Measurement

Gross tonnage (GT): overall size of a ship

Deadweight tonnage (dwt): load of a freighter (crew, passenger and cargo)

Twenty-foot equivalent unit (TEU): to account standardized container of different size to describe capacities. 1 TEU equalizes a container of 20 feet size length (accurately it is less to make space between two containers possible).

Knot is the measure for shipping speed, i.e. nautical miles per hour, which is approximately 1,852 km/h.

Nautical mile (nm) is a measure of longitude referring to the equator's longitude of 360° compromising 60 minutes. Therefore 1 nm equalizes 1 minute or 1.5 miles at land (1nm = 1,852 m).

(2) Ships

General cargo vessels carry packaged items like chemicals, foods, furniture, machinery, motor vehicles, footwear, garments (or: Container ships).

Tankers carry petroleum products or other liquid cargo.

Dry bulk carrier: a merchant ship specially designed to transport unpackaged freight (neither pallets nor container) such as iron ore and grain.

Source: Based on UNCTAD, *Review of Maritime Transport 2011*, http://unctad.org/en/docs/rmt2011_en.pdf.

Table A-2: Employment and added value in different maritime sectors (2008)

	Traditional (Navigation, equipment, services, construction, ports, ship building and shipping)	Tourism	Fishing	Sum
Employment (persons)				
Germany	**69%**	25%	5%	287,200
France	**45%**	41%	13%	503,600
Netherlands	**67%**	28%	4,7%	190,500
Poland	**75%**	7%	13%	147,000
Spain	16%	**74%**	9%	876,400
EU	**40%**	**51%**	**9%**	**4.7 million**
Added value (Euro, Euro per person)				
EU	**66% (64,400)**	**24% (19,300)**	**8% (36,600)**	**186 million (39,900)**

Source: Policy Research Corporation, *The role of Maritime Clusters to enhance the Strength and Development of Maritime Sectors*, different Country Reports, 2008; *European Seas and Territorial Development Opportunities and Risks* (ESaTDOR), ESPON Applied Research Project, Appendices to Interim Report, 2011.

Table A-3: Number of vessels and share in total deadweight tonnage (dwt, %) (2011)

Rank/ Country	**Number of vessels**			**Dwt % of world total**
	National flag	**Total**	**% national to total**	
1 Greece	758	3,213	23	16.2
3 Germany	442	3,798	11	9.1
4 China	2,044	3,651	56	8.6
5 Korea	736	1,189	61	3.8
6 US	971	1,972	49	3.7
9 Denmark	383	975	39	2.8

Rank/ Country	Number of vessels	Dwt % of world total		Dwt % of world total
	National flag	Total	% national to total	
13 Italy	616	836	73	1.9
14 United Kingdom	366	778	47	1.8
20 Belgium	91	259	35	1
25 Cyprus	129	287	44	0.8
26 Netherlands	522	842	61	0.8
28 France	177	451	39	0.7
30 Sweden	115	301	38	0.45
32 Isle of Man	-	33	0	0.44
33 Spain	163	389	41	0.4
Total		**45,662**		**1,378 billion**

Source: UNCTAD, *Review of Maritime Transport 2011*, 2012, p. 43.

Table A-4: Budget allocation to maritime transport (ERDF, 2000 - 2006)

	% transport of ERDF budget	**% ports of transport budget**
EU total	**30 (= 98 million)**	**5**
Austria	0.1	36
France	13	22
Netherlands	5	10
United Kingdom	7	10
Malta	31	10
Germany	24	1

Source: Steer Davies Gleave, *Ex post Evaluation of Cohesion Policy Programmes 2000-2006*, Work Package 5A: Transport, 2009, p. 30ff.

Table A-5: Relevance of maritime-related research in the EU

	6th Framework 2002- 2006	**7th Framework 2007-13**	**New proposal 2014-20**
Overall budget	17 billion	50 billion	90 Bill.
Budget for maritime projects, % of overall	3%	17% (only 07- 08)	-
Priorities potentially relevant for maritime transport	• Information society and technology • Aeronautics and space • Sustainability, global change and ecosystems	• Food, Agriculture and Fisheries, and Biotechnology • Information and Communication Technologies • Transport (including Aeronautics) • Space	• Industrial Leadership (incl. eco-innovation) • Food security, Sustainable Agriculture, Marine and Maritime Research and the Bio-economy • Smart, Green and Integrated Transport

Source: Own compilation

Table A-6: Relevant German shipping funds with weak economic performance (as of October 2012)

Fond Name	**Asset (mill. Euro)**	**Ships**	**Date of Insolvency**
Identified Insolvency			
Atlantic Schifffonds	90	IMO II Produktentanker	Insolvency 2012
Castro Capital/ Castor Kapital	10.1	List	Insolvency
Conti Corona			Insolvency 2009

Dr. Peter	115	Schiffsnamen: DS Power, DS Performer	
Elbe Emissionshaus	20	Lehman Trader, Lehman Forester MS Pacific Sun GmbH& Co.KG	Insolvency 2011
Embedan	52	Adele C, Hannes C, Carl C, Jamina, John Mitchell, Lilly Mitchell	Insolvency
FAFA Capital	78	Charline, Corinne, W-O Aviva, W-O Mogba, W-O Mahalo, W-O Mubarik	Insolvency 2009
GHF	81	Evenburg, Fockeburg, Boltentor, ACS Demonstrator, Wesertor MS Phoenix Cruiser	Insolvency 2009, 2011, 2012
Hanse Capital HC Schiffsfonds		MS SCL Marie-Jeane MS SCL Margrit MS Scl Thun	Isolvency 2011
Hanseatic Lloyd		HLL Noroc	Isolvency
HCI Capital	35.9	MarCatania HCI Shipping Select 16 MS Auguste Schulte MS Karin Schulte MS Otto schulte	Insolvency 2009, 2012
KGAL	38	Ievoli Splendor	Insolvency
König & Cie. Schiffsfonds	44.3	Betsy, Heike, Henny, Ute	Insolvency
Lloyd Fonds		MS Tosa Sea, MS MS Thira Sea	Insolvency 2012
Mehrwert/Werse	7.5	WB Indic	Insolvency
MPC Capital		MS Merkur Sky	Insolvency 2012
Ownerhip	23	K-Spirit, K-Wind	Insolvency

Critical economic performance			
Bluewater Capital	No further information available.		
Buss Global Containerfonds			
CFB Fond			
Doric Asset Finance			
Fondhaus Hamburg			
GEBAB Schifffonds			
Hamburgische Seehandlung			
Hannover Leasing			
Hanse Capital HC Schiffsfonds			
HTB Hanseatische Schiffsfonds			
IGB Containerfonds			
Krögerwerft	44		
Navalis	11	Petuja	
Nordcapital Schiffsfonds	No further information available.		
Norddeutsche Vermögensanlage Schiffsfonds und Immobilienfonds			
Oltmann Gruppe			
PCE Premium Capital Emissionshaus Schiffsfonds			
Premicon AG			
Salamon Schiffsbeteiligungen			
Solvium Protect			
United Investors	15.7	Magdalena	

Source: Own compilation based on http://www.schiffsfonds.eu/ and https://www.insolvenzbekanntmachungen.de/cgi-bin/bl_suche.pl.

Table A-7: Globally relevant Arctic sources of Metals and Minerals critical for the EU (grey shadowed)

	Europe (S, Fi, Is, N)	**Greenland**	**North America**	**Russia**
Metals				
Chrome				**X**
Copper	**X**			**X**
Gold		**X**		
Indium			**X**	
Iron	**X**	**X**	**X**	**X**
Load		**X**	**X**	**X**
Mercury				**X**
Nickel	**X**			
Platinum Group	**X**	**X**		**X**
Rare Earth		**X**		
Silver				**X**
Tin				**X**
Titan	**X**			
Wolfram				**X**
Zinc		**X**	**X**	**X**
Minerals				
Apatite	**X**			
Baddeleyite	**X**			
Beryllium		**X**		
Coal		**X**		
Celestine		**X**		
Diamond				**X**
Disthene	**X**			
Glimmer	**X**			
Graphite				**X**
Lithium		**X**		
Manganese				**X**
Molybdenum		**X**		
Nepheline	**X**			
Niobium		**X**		**X**
Uranium		**X**		

Source: Deutsche Rohstoffagentur, *DERA Rohstoffinformationen* 1-4 (2012); EU Commission DG Enterprise and Industry, *Critical raw materials for the EU*, Report of the Ad-hoc Working Group on defining critical raw materials, 30 July 2010.

Table A-8: Distance savings by Northern Sea Route compared to Royal route from Rotterdam to … (in nautical miles)

…..	Tokyo	Yokohama	Shanghai	Hong Kong	Singapore
NSR	**6,600**	**7,019**	**8,026**	**8,000**	9,300
Via Suez	11,192	11,339	11,990	9,748	**8,288**
Savings in nm	**+ 41%**	**+ 39%**	**+ 32%**	+ **17%**	**- 10%**

Source: Malte Humpert, Andreas Raspotnik, 'The Future of Arctic Shipping along the Transpolar Sea Route', in: Lassi Heininen, Heather Exner-Pirot, Joël Plouffe. (eds), *Arctic Yearbook 2012*, 2012. Available at: http://www.arcticyearbook.com/images/Articles_2012/Humpert_and_Raspotnik.pdf/; Yuri Ivanov, Alexander Ushakov, 'The Northern Sea Route – Now Open', *International Challenges*, vol. 12, 1992, no. 1, p. 19; Frederic Lasserre, Badari Narayana Srinath, *Arctic Shipping. Commercial viability of the Arctic sea routes*, London 2010, Claes Lykke Ragner, *Northern Sea Route Cargo Flows and Infrastructure –Present State and Future Potential*, Lysaker, 2000 (FNI Report 13/2000), p. 1.

Table A-9: Comparative technology NSR and Royal Route (container shipping only)

Change in …	**Hamburg-Rotterdam – Shanghai**
… distance	2,500 nm
… days	-10-12 days
… speed	- 0 – 7 knots per nm
… carry capacity (TEU a 14t)	6,800
… ships per loop	5.3 ships on rotation for weekly service
… capacity	52,800 supply (TEU/year/ at weekly frequency)
… crews' size	Possibly no change (19 per 4.000 TEU ship, per route)
… maintenance costs	+ 445 (€/day)
…. piracy and terrorism risks	+ €5-8 bill. in 2010
… insurances	+ 100, 000 (€/day)
…charge rate	+ 730 (€/TEU)
…surcharge	+ 0-73 (€/TEU)

Source: Own compilation based on: Jerome Verny, Christophe Grigentin, 'Container shipping on the Northern Sea Route', *International Journal of Production Economics*, Vol., 122, 2009, Issue 1, pp.107-117; Halvor Schøyen, Svein Bråthen, 'The Northern Sea Route versus the Suez Canal: cases from bulk shipping', *Journal of Transport Geography*, Vol. 19, 2011, Issue 4, pp. 977-983; Martin Murphy, *Contemporary Piracy and Maritime Terrorism: The Threat to International Security*, London, 2007 (Adelphi Paper, 388).