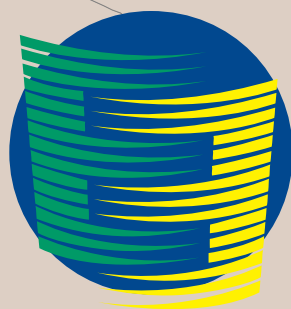


OIL FLOWS AND EXPORT CAPACITY IN THE CASPIAN SEA AND BLACK SEA REGIONS

MAY 2008



ENERGY CHARTER SECRETARIAT

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FOREWORD

The Caspian region holds substantial oil reserves, which are larger than the reserves of the North Sea or the US. However, most of these reserves are landlocked and need transit to access international markets. In addition, oil transported to the Black Sea then has to pass the increasingly congested Turkish Straits and add to the risks linked to tanker traffic through this highly frequented waterway.

Several pipeline projects are under consideration to bring the Caspian oil to the markets. This report is a detailed review of various oil production scenarios for the Caspian region and their comparison with the export capacity that would be created by various pipeline projects in the Caspian and Black Sea regions.

This report is a valuable contribution to a comprehensive, fact-based understanding of the various export options under discussion in the region.

The report was prepared by Baurzhan Valiyev, during his secondment from KazMunayGas to the Energy Charter Secretariat from May 2007 to April 2008, under the supervision of Ralf Dickel, Director for Trade and Transit. It benefited from a discussion with the representatives of the Energy Charter member governments during the Trade and Transit Group meeting in February 2008.

This report is made publicly available under my authority as Secretary General of the Energy Charter Secretariat and without prejudice to the positions of Contracting Parties or to their rights or obligations under the Energy Charter Treaty or the WTO agreements.



André Mernier
Secretary General
Brussels, May 2008

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EXECUTIVE SUMMARY

This study focuses on oil flows in the Caspian Sea region and their influence on oil flows in the Black Sea.

Increasing exploration and development in the region lead to more oil production, and the large amount of oil available for export from the Caspian countries is increasing.

The landlocked nature of the Caspian region makes transportation of oil from the region to the world markets a major challenge, which requires the use of existing oil pipelines and building new transportation infrastructure.

The lack of an adequate export infrastructure and sufficient throughput capacity has been and still is probably the most difficult problem facing the Caspian region countries. In this relation, expansions of existing pipelines and building of new pipelines have been proposed and planned, and some have already been constructed.

The expected increase in oil exports from the Caspian region will strongly influence oil flows in the Black Sea region and will also lead to an increase in tanker traffic through the shallow and congested Bosphorus Strait. There are a number of proposed and planned pipelines to bypass the Turkish straits of which the most prominent projects are also reviewed in the study.

In general, the main issue looked into in this report is how Caspian oil can find its way to export markets. This report considers the impact that the increased oil production in this region should have on oil flows across the Black Sea and the Turkish straits depending on various existing and envisaged oil transportation routes.

This paper also provides estimates of the existing and potential oil flows up to 2015. It examines the options for oil pipelines expansion, and looks at the competition between different pipeline projects in the Black Sea area.

1. INTRODUCTION

Much of the world's interests focus on the huge oil reserves onshore and offshore of the Caspian Sea region. Contracts worth billions of dollars were signed and many joint ventures were formed to develop the region's oil fields. The break-up of the Soviet Union brought initial instability in some countries, but by the late 1990s the region was relatively stable politically, and a number of countries made significant progress in attracting investments into their oil and gas sectors.

The littoral countries of the Caspian Sea are Azerbaijan, Iran, Kazakhstan, Russia and Turkmenistan. However, in the context of developing oil reserves, it is important to consider the region's geological structure: the North Caspian, Middle Caspian, South Caspian and North Ustyurt Basins spread through Azerbaijan, Turkmenistan, northern Iran, western Kazakhstan, the Caspian region of Russia and the western part of Uzbekistan. And it is in this sense (rather than in the strictly geographical sense) that the terms 'Caspian region' and 'Caspian Basin' are used in this report for the analysis of oil production and exports.

Sizeable oil production growth has come primarily from the north Caspian states of Kazakhstan and Azerbaijan. Development of the Caspian oil resources has been led by three major projects: Tengiz and Karachaganak in Kazakhstan, and Azeri, Chirag, and deepwater Guneshli field in Azerbaijan. Expected oil production growth in the region is mainly caused by the development of Kashagan oil field in Kazakhstan.

Caspian oil presents a lot of opportunities for world oil markets and for the region itself:

- The emergence of new production sources would diversify world oil supplies. Significant quantities of Caspian oil would ease the pressure on the Persian Gulf production capacity and provide an additional hedge against oil supply disruptions.
- Profits from oil exports could stimulate economic growth and improve the standard of living in the Caspian energy-producing states. The availability of Caspian energy supplies in world markets will likewise enhance the prospects for economic growth and political stability in the key countries surrounding the region.

Nevertheless, the importance of Caspian energy resources to global energy supplies and energy security should not be overstated. Caspian oil will be expensive and technologically difficult to find and develop. Indeed, there are numerous obstacles that must be overcome if these countries are to transport their oil to external markets.

This paper investigates how Caspian oil can find its way to international markets, and what influence it should have on the Black Sea region – a transit crossroads between a major oil supply area and some important export markets. The report also outlines some basic information on the most prominent considered pipeline projects for bypassing the Turkish Straits.

2. RESERVE BASE

The prospect of potentially enormous hydrocarbon reserves is part of the allure of the Caspian Sea region which includes Azerbaijan, Kazakhstan, Uzbekistan, Turkmenistan, and the regions of Iran and Russia that are near the Caspian Sea.

Although the Caspian region is unlikely to become ‘another Middle East’, most observers consider that its resources will be of the same order of magnitude as those of the United States or the North Sea. The recent estimates by the Oil and Gas Journal of total proven reserves¹ of the countries which have a ‘share’ in the Caspian Basin, amount to 32 billion tons² (235 billion barrels). The Energy Information Administration’s estimates of proven oil reserves in the Caspian Basin itself vary between 2,356 and 6,807 million tons (17 to 50 billion barrels).

Based on the analysis of this data, the estimates of proven oil reserves of the Caspian Sea region assumed in this paper are shown in Table 1.

Table 1. Total proven oil reserves of Caspian region countries³ and proven oil reserves of the Caspian Basin

Country	Countries’ total proven reserves*	Proven reserves of the Caspian region**		Author’s estimates for the Caspian region
		Low	High	
Azerbaijan	959	959		959
Iran	18,667	14		14
Kazakhstan	4,110	1,232	5,479	1,232÷4,110
Russia	8,129	41		41
Turkmenistan	82	75	233	75÷82
Uzbekistan	81	41	81	41÷81
Total	32,028	2,362	6,807	2,362÷5,287

* Source: *Oil and Gas Journal, World Proven Reserves of Oil, January 2007*

** Source: *EIA, Caspian Sea region, Survey of Key Oil and Gas Statistics and Forecasts, July 2006*

As we see, proven oil reserves for the Caspian region are estimated in the range of 2.4÷5.3 billion tons. Most of Azerbaijan’s oil resources (proven, as well as possible reserves) are located offshore, and perhaps 30-40% of the total oil resources of

¹ Proven reserves are defined by the Energy Information Administration of the US Department of Energy (EIA) as those volumes of oil that geological and engineering data show with reasonable certainty to be economically recoverable under existing economic and operating conditions.

² Assumed conversion coefficient from barrels to tons is equal to 7.3.

³ Hereinafter, total proven oil reserves of Caspian region countries include the reserves of the Caspian Basin and in all other parts of these countries.

Kazakhstan and Turkmenistan are offshore as well. Uzbekistan's oil resources are located onshore.

However, it is important to note that while the amount of proven reserves certainly plays a role in estimating a region's production and export potential, the determining factor is the development, production and export plans and strategies actually in place.

Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan have all ratified the Energy Charter Treaty (ECT), which came into force in April 1998. Russia has signed but not ratified the Treaty, it applies the ECT on a provisional basis.

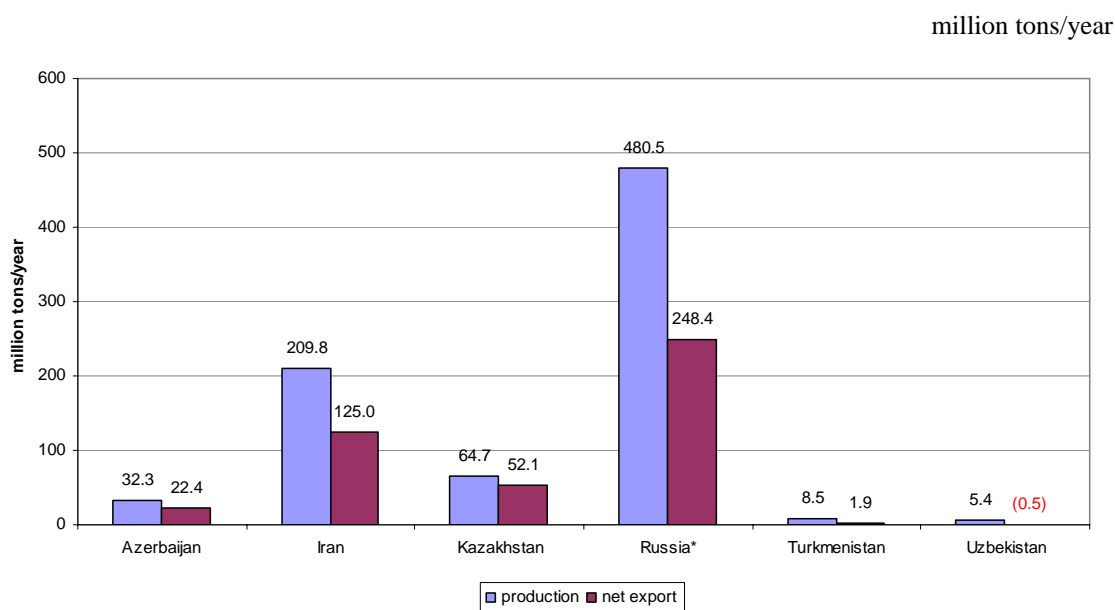
Part III of the Energy Charter Treaty covers the promotion and protection of investment by companies from other member states, which include most OECD countries (except New Zealand, the Republic of Korea, the US and Canada) and many non-OECD countries. The Treaty applies to all investments in 'exploration, extraction, refining, production, storage, land transport, transmission, distribution, trade, marketing or sale of energy materials or products'. It requires the Treaty members to treat investors from other member states no less favourably than its own investors and the investors of any other country. In this regard, Azerbaijan and Kazakhstan have made significant strides in creating an attractive investment climate.

3. OIL PRODUCTION AND EXPORTS

3.1. ESTIMATES FOR 2007

Oil production of countries in the Caspian Basin in 2006 was more than 800 million tons. All countries except Uzbekistan exported oil. During that year, total net oil exports from these countries amounted to more than 450 million tons, while Uzbekistan had imported 0.5 million tons.

Figure 1. Total oil production and exports by country in 2006



* In calculating Russia's exports of Caspian oil, approximately 7 million tons were estimated based on the difference between reported CPC⁴ flows and actual flows from Kazakhstan

Source: RPI, BP Statistical Review 2007

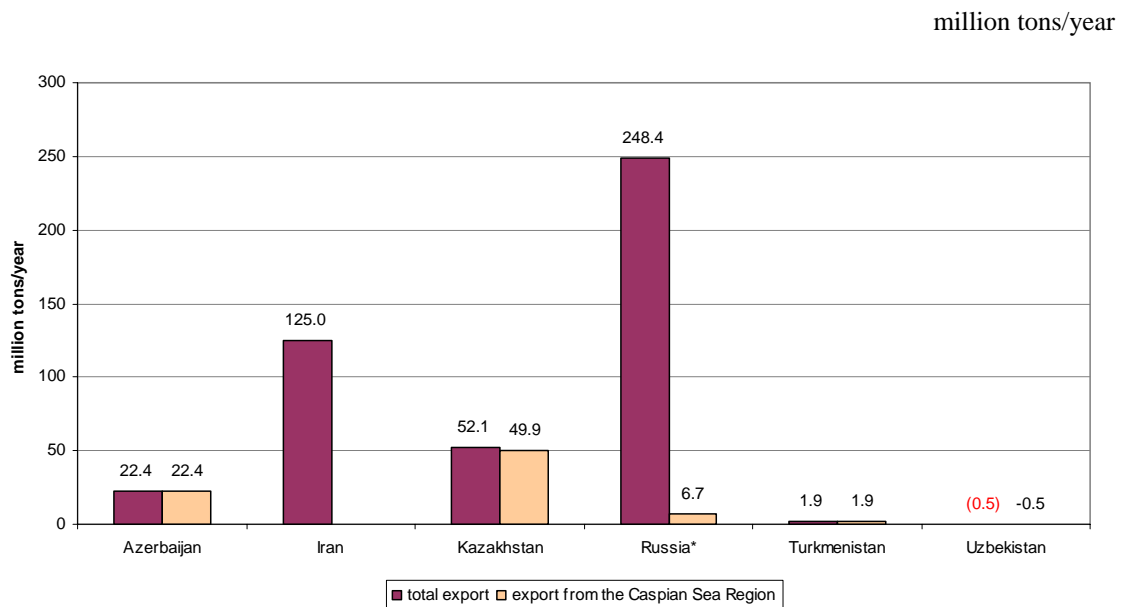
The largest exporter of oil is Russia, whose exports in 2006 amounted to more than 248 million tons. The largest exporter in relative terms is Kazakhstan, whose 2006 exports of more than 52 million tons of oil constituted more than 80% of its production. In this paper the term 'oil' includes crude oil and gas condensate, but in the case of Kazakhstan oil export figures do not include the gas condensate exported to the Orenburg gas processing plant in Russia (2.4 million tons), since it is used for the production of gas and is delivered through the gas transportation infrastructure.

Azerbaijan produced 32.3 million tons and exported more than 22 million tons of oil in 2006. Oil production in Iran during the same year amounted to almost 210 million tons, and oil exports – around 125 million tons.

Figure 2 compares the amount of oil exported from the Caspian Basin to total oil exports from the Caspian region countries in 2006.

⁴ CPC – Caspian Pipeline Consortium.

Figure 2. Oil exports from the Caspian region vs. total oil exports from Caspian region countries in 2006



* In calculating Russia's exports of Caspian oil, approximately 7 million tons were estimated based on the difference between reported CPC flows and actual flows from Kazakhstan

Source: RPI, KazMunayGas, CPC

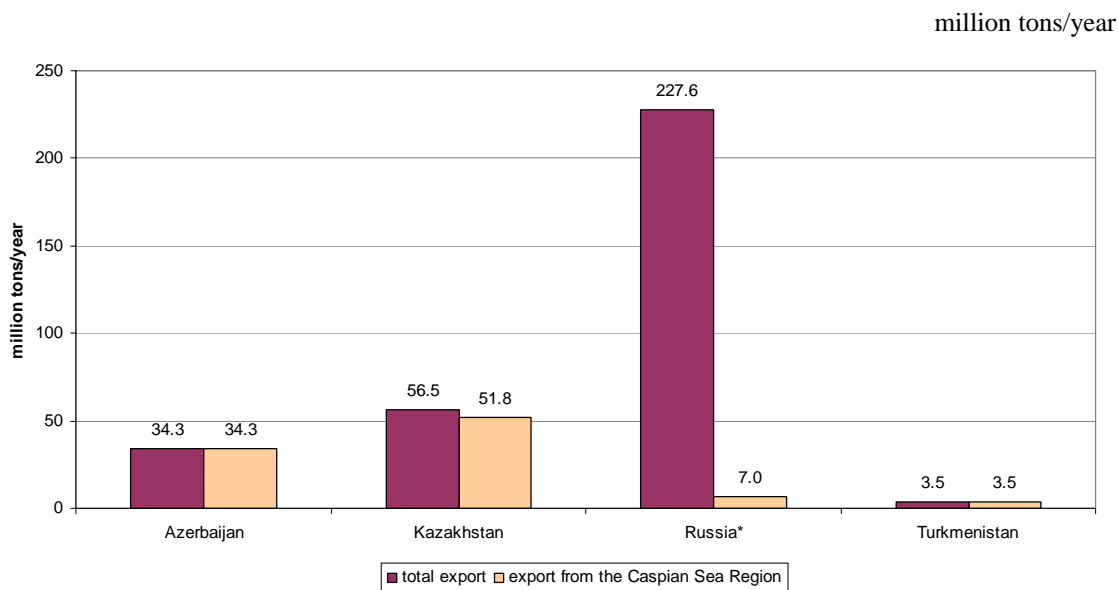
The largest exporter of Caspian oil is Kazakhstan, whose exports have exceeded 52 million tons in 2006. This amounted to 96% of total Kazakh oil exports, only 4% came from the Turgay Basin (this oil was delivered to China). The second largest Caspian oil exporter is Azerbaijan – its exports in 2006 have exceeded 22 million tons.

When calculating Russia's exports of Caspian oil, approximately 7 million tons were estimated based on the difference between reported CPC flows and actual flows from Kazakhstan. Even if these volumes originated from other parts of Russia (basically, Siberia), they were shipped through the CPC pipeline according to the shareholders' commitments. As these are effectively Russia's commitments, either these or other volumes are shipped together with the Caspian oil and directly influence the Caspian oil flows. Therefore, these volumes were also assumed as flows from the Caspian Sea region.

Iran did not export oil from its Caspian region in 2006, while Uzbekistan ended up importing some volumes. Currently it is difficult to expect that these two countries should become large producers of Caspian oil in the near future. At the same time, there was no reliable publicly available information on the prospects of Caspian oil production in these countries, so they were excluded from further analyses in this report.

At the time of writing, 2007 data was not yet available for all Caspian region countries, therefore, the Caspian oil export volumes demonstrated in Figure 3 are estimates based on various publications.

Figure 3. Estimated total oil exports and oil exports from the Caspian Basin by selected country in 2007



* In calculating Russia's exports of Caspian oil, approximately 7 million tons were estimated based on the difference between reported CPC flows and actual flows from Kazakhstan

Source: APA Economics, KazMunayGas, Kaztransoil

For 2007, the calculation of Russia's Caspian oil exports also includes 7 million tons estimated based on the difference between reported CPC flows and actual flows from Kazakhstan.

Kazakh oil exports in 2007 amounted to more than 56 million tons, of which almost 52 million tons came from its Caspian reserves.

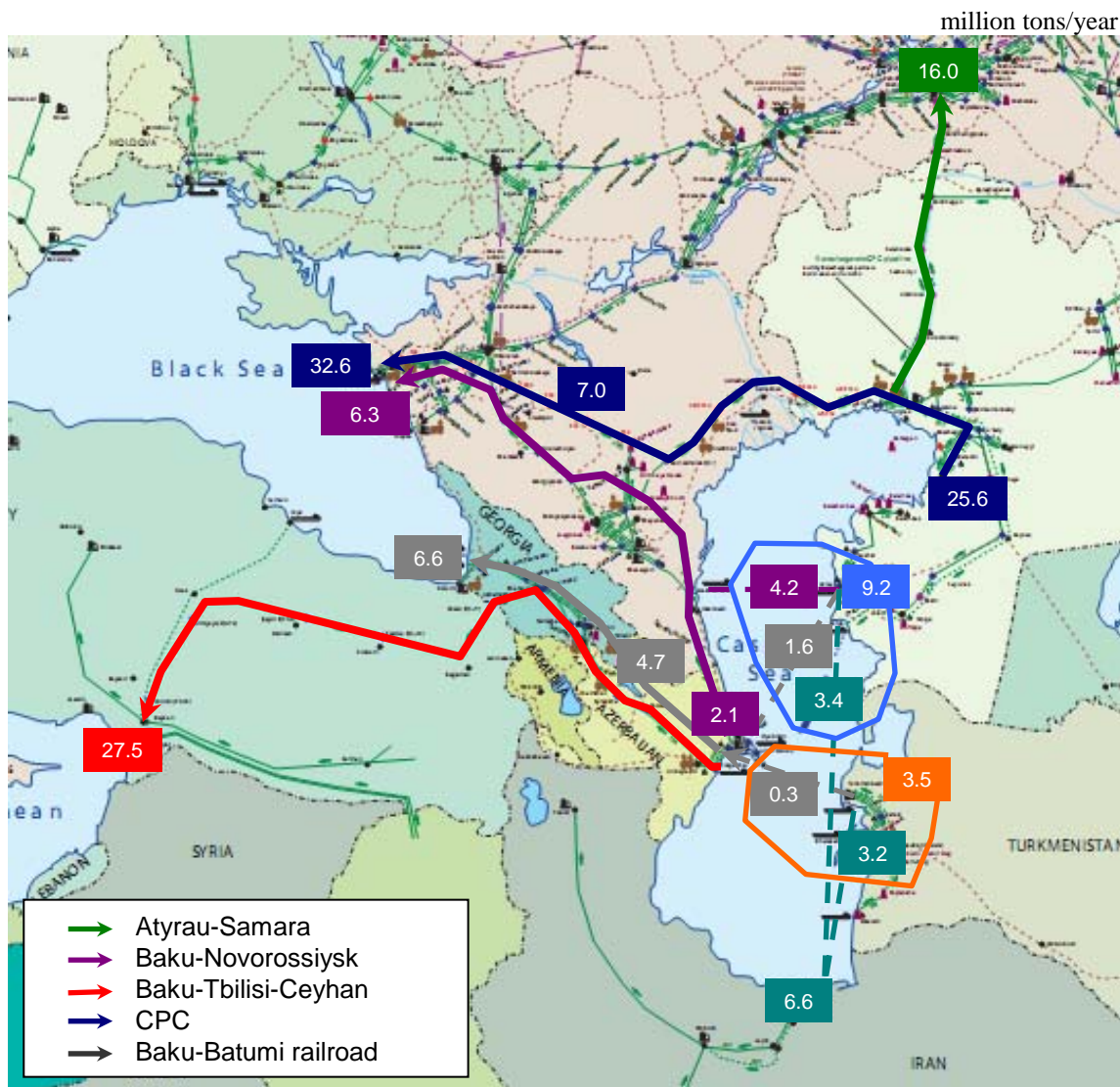
Azerbaijan sent abroad over 34 million tons,⁵ while Turkmenistan's oil exports stood at 3.5 million tons in 2007.

In general, there are no significant changes compared to 2006: Russia remains the total largest oil exporter, and the largest exporter of Caspian oil is Kazakhstan.

Figure 4 illustrates the estimated breakdown of Caspian oil exports by route in 2007. These estimates are based on the information from the Argus CIS Crude Report, the CPC and KazMunayGas.

⁵ Different sources report different volumes of exported Azeri oil: from 30 to 35 million tons in 2007.

Figure 4. Oil flows from the Caspian Basin in 2007 (estimation)*



* Based on maps provided by the Centre of Global Energy Studies (CGES)

The largest volumes of crude oil – almost 33 million tons – were transported via the CPC pipeline. Around 26 million tons came from Kazakhstan and 7 million tons – from Russia.

The second most utilised route was the Baku-Tbilisi-Ceyhan pipeline, which transported more than 27 million tones of crude that consisted only of Azeri oil.

In third place in terms of exported volumes was the Atyrau-Samara pipeline, which delivered 16 million tons of Kazakh oil to Russia’s Transneft pipeline system.

Kazakhstan exported 9.2 million tons through the Caspian Sea port of Aktau. Then these volumes were split in three directions: 4.2 million tons went to Makhachkala (Russia), 1.6 million tons – to Baku (Azerbaijan) and 3.4 million tons – to Neka (Iran).

Turkmenistan also split its oil export volumes: 3.2 million tons was transported to Neka (Iran) and some 0.3 million tons were shipped to Baku (Azerbaijan).

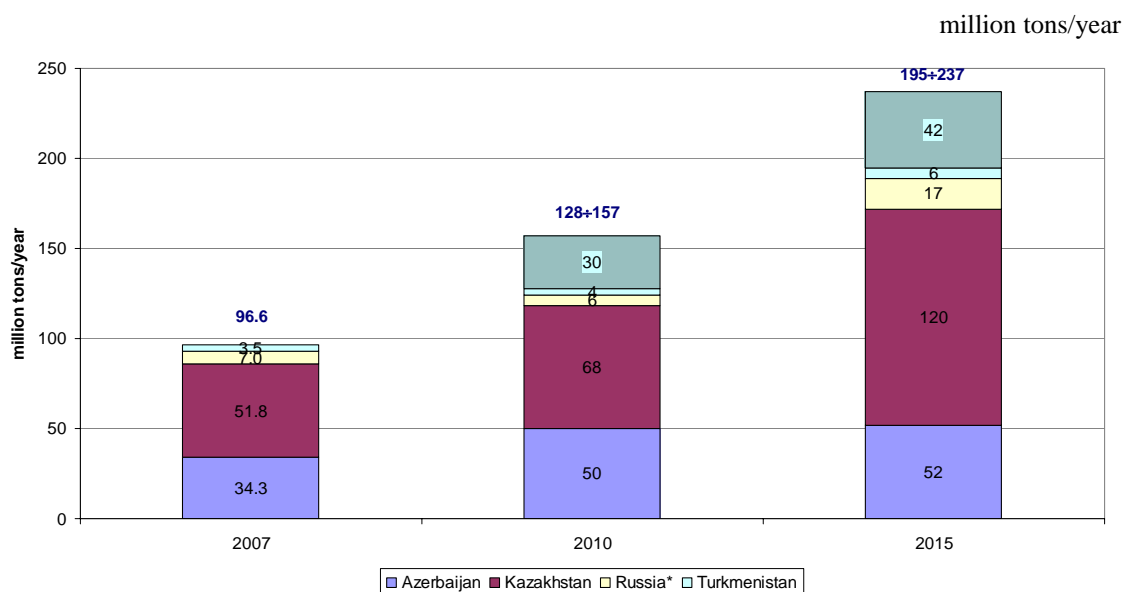
In 2007, the Baku-Supsa pipeline was not operational due to technical reasons related to a landslide in the Caucasus Mountains. The pipeline is expected to resume operations in the second quarter of 2008 according to SOCAR⁶ officials, and some 7 million tons of oil will be transported through this pipeline annually.

3.2. FORECASTS FOR 2010 AND 2015

Oil production and exports will depend on a number of factors, including the development of additional transportation routes.

Nevertheless, all the countries of the Caspian region have ambitious plans for increasing oil exports. Figure 5 compares the 2007 oil export estimates for the Caspian Basin with the forecasts for 2010 and 2015.

Figure 5. Estimation of Caspian Basin oil exports for 2007 and forecasts for 2010, 2015



* Russian volumes were estimated as a difference between Kazakh plans to transport oil through the CPC pipeline and expected pipeline capacity changes

Source: RPI, EIA, KazMunayGas, Ministry of Oil and Gas Industry of Turkmenistan

Russian volumes were estimated as a difference between Kazakh plans to transport oil through the CPC pipeline and expected pipeline capacity changes.

The forecast figures for Turkmenistan used in Figure 5 date back to 2004, when the Turkmen Oil and Gas Industry Ministry announced its official plans to increase the country's oil exports to 34 million tons by 2010 and to 48 million tons by 2015.

⁶ SOCAR – State Oil Company of the Azerbaijan Republic.

At the same time, the historical data and the current level of oil production and exports from Turkmenistan suggest lower forecast volumes. The EIA oil production forecasts for the country are 10.5 and 13 million tons per year (0.21 and 0.26 barrels/day) for 2010 and 2015 respectively.⁷ Assuming that the oil processing level at domestic refineries will at least remain at the current level of 7 million tons/year, Turkmenistan's export volumes could be around 4 and 6 million tons in 2010 and 2015 respectively.

This report took both forecasts into consideration and used them as a basis for a low and a high case scenario for Turkmenistan's Caspian oil outflows: in 2010 – from 4 to 34 million tons, in 2015 – from 6 to 48 million tons. A likely scenario will be somewhere below the average of this range, from the author's point of view.

Thus, total oil exports from the Caspian region in 2010 are estimated with the range of 128 to 157 million tons, and in 2015 – 195 to 237 million tons. These figures represent a 33 to 63% increase by 2010, and a 102 to 145% increase by 2015, compared to the 2007 oil export level of 97 million tons.

⁷ US-Turkmenistan Energy Roundtable of September 24, 2007.

4. CASPIAN SEA REGION

4.1. EXPORT CAPACITY

The original oil pipeline system to transport oil from the Caspian region was designed and established during the Soviet era as part of the overall system to serve the energy needs of the Soviet Union. All these pipelines inherited from the Soviet Union passed through the Russian territory. After gaining independence and having undergone important economic and political changes, the former Soviet countries turned to developing a new oil export infrastructure with a focus on increasing throughput capacity and reaching new markets.

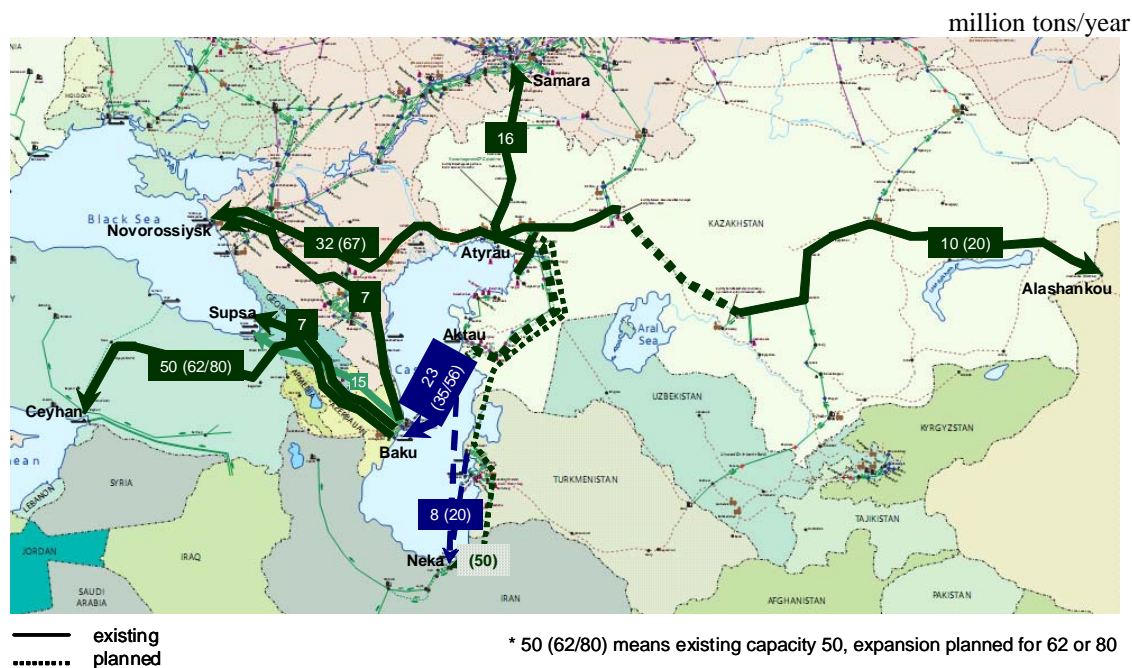
Only two oil pipelines existed for Caspian oil in the Soviet Union: Atyrau-Samara and Baku-Novorossiysk. The current pipeline infrastructure for Caspian oil exports was built comparatively recently and now also includes the following pipelines:

- Baku-Supsa – 1999;
- Caspian Pipeline Consortium (CPC) – 2003;⁸
- Baku-Tbilisi-Ceyhan (BTC) – 2006.

Among the different modes of transportation currently used by the Caspian countries for exporting oil, the pipeline system is of primary importance since it is both the most economical and the most efficient.

Figure 6 demonstrates the existing capacity and planned options for exporting oil from the Caspian region to mature and rapidly developing energy markets.

Figure 6. Oil export options for Caspian oil*



* Based on maps provided by the CGES

⁸ First oil was loaded onto a tanker in 2001, but the first phase of the project became fully operational in 2003.

This picture should slightly change if the KCTS (Kazakhstan Caspian Transportation System) is implemented across the Caspian Sea and if Kazakhstan and Turkmenistan increase their oil swap operations with Iran.

Table 2 illustrates our assumptions concerning the changes to Caspian oil transportation capacity over time.

Table 2. Assumed capacity changes along Caspian oil export routes

	million tons/year			
	2007	Before 2010	2010-2015	Beyond 2015
Existing:				
Atyrau-Samara	16	16	16	16
Baku-Novorossiysk	7	7	7	7
BTC	28	50/62	50/62	50/62/80
Baku-Supsa	-	7	7	7
CPC	32	32	40÷67	67
Iran Oil Swap	8	10	10	10/20
Baku-Batumi rail	15	15	15	15
Planned:				
KCTS	-	-	23/35	35/56
Kazakhstan-China (phase II)	-	-/20	20	20
Proposed:				
Kazakhstan-Turkmenistan-Iran	-	-	-	50
Central Asian (Kazakhstan-Turkmenistan-Afghanistan-Pakistan)	-	-	-	50

Source: KazMunayGas, Transneft, CPC

Currently, the designed capacity of the BTC pipeline is 50 million tons/year, and in 2007 its available capacity was at approximately 28 million tons/year. The BTC pipeline capacity could increase to 62 million tons/year by 2009 and to 80 million tons/year by 2012-2013 according to the statement of BTC Turkey management in March 2008 and earlier statements of the President of Azerbaijan. Our assumptions include optimistic and conservative plans for such increases over time.

Even if there is no final decision to expand the CPC pipeline, we assume that it could increase to 40÷45 and 67 million tons/year by 2012 and 2015 respectively, as there is a joint interest of all the participants of the Consortium to increase the pipeline's throughput capacity.

Iran intends to play an important role in the transportation of Caspian oil. According to statements by Iranian officials, Iran will be ready to transfer up to 10 million tons/year by 2010 and 20 million tons/year by 2015.

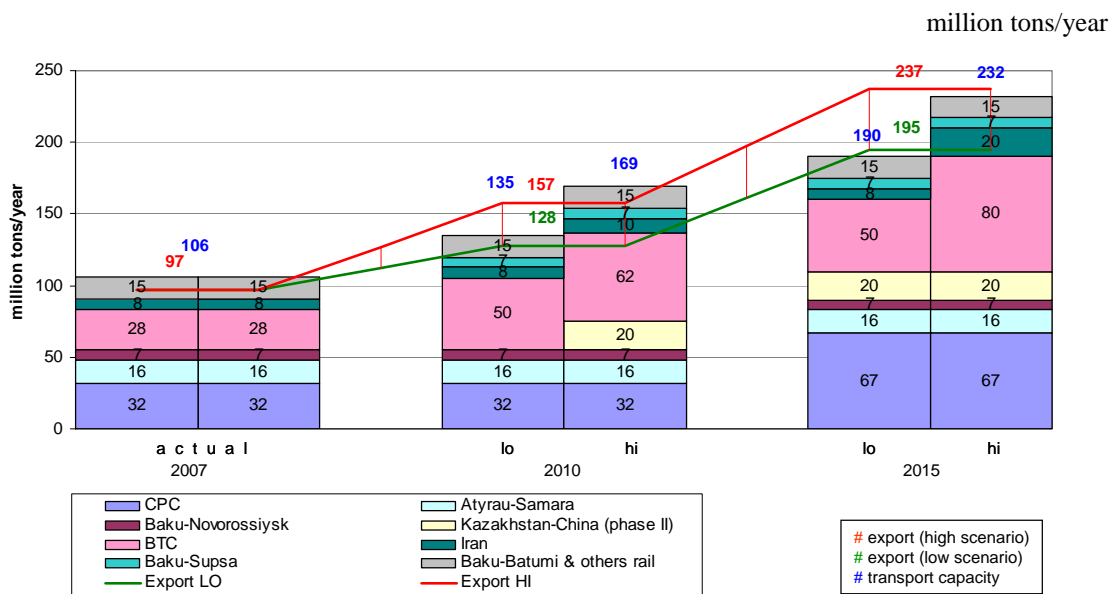
As for other transportation routes, there is no available information on possible capacity changes. There were certain plans to expand the throughput capacity of the Atyrau-Samara pipeline, some upgrades were even done by Kaztransoil. But negotiations between Kaztransoil and Transneft were suspended and there is no information on the development of such plans.

In addition, Kazakhstan is working on two major export projects which involve building new transportation routes: KCTS (23 to 56 million tons/year) and phase II of the Kazakhstan-China pipeline (20 million tons/year).

KCTS is intended to link the oil fields in Western Kazakhstan to the BTC pipeline, and in fact it will be considered more as a regional oil redistribution system, rather than as an export route for Caspian oil. At the same time, phase II of the Kazakhstan-China pipeline is certainly a new export option for Kazakhstan's Caspian oil and it will definitely play an important role in the allocation of Caspian resources.

Figure 7 compares forecasted Caspian oil flows with the transport capacity which should be available according to our estimations.

Figure 7. Caspian Sea region estimates: oil flows vs. available capacity



The bars on the left represent low scenarios, while the bars on the right represent a high scenario of the expansion of export capacity.

The green line in the chart represents a low export scenario, and the red line – a high export scenario.

As we see, in 2007 the Caspian oil export capacity was used at 92%. In 2010 and 2015, the high scenario of export capacity expansion should cover both low and high export scenarios, while the low capacity expansion scenario fits only with the low export scenario.

However, creating new export capacity for Caspian oil, especially through expanding the existing pipelines (except for phase II of Kazakhstan-China pipeline), could be done relatively quickly.

Thus, export capacity in 2010-2015 could meet the Caspian region's oil export needs:

- 135 to 169 million tons/year of export capacity for volumes of 128 to 157 million tons/year in 2010, and
- 190 to 232 million tons/year of export capacity for 195 to 237 million tons/year in 2015 (designed pipeline capacity can be easily increased to accommodate small surpluses, such as 5 million tons/year, by adjusting the oil transportation technology).

4.2. ALLOCATION OF FLOWS

Even if the available capacity should be sufficient for exporting increased volumes of oil, pipelines will be not used equally as they are not equally attractive for oil producers. There are a number of factors that could influence the producers' choice:

- Commercial interests: transportation costs (transportation tariffs, loading/unloading, dispatching, blending, storage, etc.), quality bank and a quality premium, market price at the place of destination;
- Political factors: country's policy, company's policy;
- Risks: access and reliability of routes, predictability of scheduling and safety.

The Caspian oil flows from Azerbaijan, Turkmenistan and Russia could be predicted to a certain extent, namely:

- Azeri oil would use the Baku-Tbilisi-Ceyhan pipeline and then the Baku-Supsa link if available, and then – Baku-Novorossiysk;
- Russian oil would be transported by the CPC;
- Turkmen oil could go to Iran and Azerbaijan.

However, Kazakhstan's oil export flows from the Caspian region are much more complicated and their allocation will also be related to the participation of oil producers in the transportation projects.

Table 3 represents the shares of major oil producers in Kazakhstan's upstream projects and their shares in westward pipelines.

Table 3. Shares in selected upstream and westward pipeline projects in the Caspian region

Shareholder	Kashagan	Karachaganak	Tengiz	BTC	CPC
BG		32.50			2.00
ExxonMobil	16.81 ¹		25.00		7.50
Lukoil		15.00	2.70 ²		6.75 ²
Shell	16.81 ¹				3.68 ³
Total	16.81 ¹			5.00	
ConocoPhillips	8.40 ¹			2.50	
Inpex	7.55 ¹			2.50	
BP			2.30 ²	30.10	5.75 ²
Chevron		20.00	50.00	8.90 ⁴	15.00
Eni	16.81 ¹	32.50		5.00	2.00 ⁵
KazMunayGas or its shareholders	16.81 ¹		20.00		19.00
Total	100.00	100.00	100.00	54.00	61.68

- ¹ as Agip KCO
- ² as LukArco
- ³ as Shell/Rosneft
- ⁴ as former Unocal
- ⁵ as Agip International

Source: CPC, Agip KCO, LukOil, Kaztransoil

Highlighted in orange are the oil producers that participate in the CPC, BTC pipeline participants are highlighted in green. BP, Chevron and Eni participate both in the CPC and BTC pipeline. KazMunayGas participates only in the CPC, but it is also working on the KCTS, which should be linked to the BTC pipeline. Also through its subsidiary Kaztransoil, KazMunayGas has a 100% share in the Batumi oil terminal and, therefore, would be interested in transporting oil via the Baku-Batumi railroad.

Thus, oil transported through the CPC pipeline, the Baku-Supsa pipeline and via the Baku-Batumi railroad would come to the Black Sea region, while volumes allocated to the BTC pipeline would get directly to the Mediterranean Sea.

At the same time, some oil producers, which have Chinese participation, may be interested in an eastward direction of oil flows (Table 4).

Table 4. Shares in selected upstream and eastward pipeline projects in the Caspian region

Production company	Shareholder	Share,%
Aktobemunaygas	CNPC	88
North Buzachi	CNPC	50
Karazhanbasmunay	CITIC Group	50
SazanKurak	Sinopec	85

Source: CERA

In addition to respecting China's political considerations, CNPC also has a commercial interest in Caspian oil projects as it owns 49% of the Kenkiyak-Atyrau pipeline and 50% of the Atasu-Alashankou pipeline.

In 2007, the total oil production of companies with the participation of CNPC, CITIC Group and Sinopec was 10.2 million tons, of which the Chinese companies' share was 7.5 million tons. Therefore, it can be concluded that the volumes of oil that would probably be allocated for the eastward direction should be quite significant.

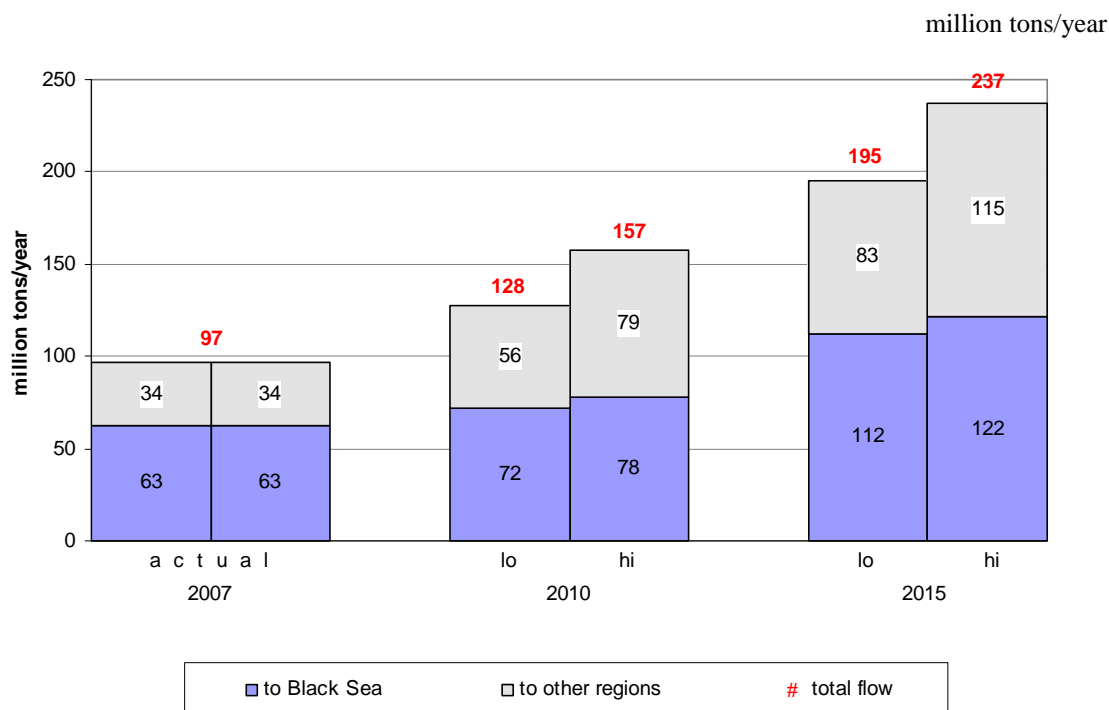
5. BLACK SEA REGION

5.1. EXPORT CAPACITY

As the world’s attention is focused on oil transportation through the Turkish Straits, and because of the importance of the Black Sea region’s location between a major oil supply area and a large market, oil outflows to the Black Sea area are analysed in more detail.

Figure 8 illustrates the estimated Caspian oil outflow to the Black Sea area to 2015.

Figure 8. Estimated allocation of oil from the Caspian region



In this estimation, ‘Caspian oil’ includes all oil of Caspian origin, counting shipments through the Transneft system to Novorossiysk and Odessa, as well as the Kazakh volumes shipped to Primorsk that are, in fact, internal swap operations within the Transneft system.

As we can see, in 2007, 63 million tons (65%) of Caspian oil was allocated to the Black Sea region. In 2010 and 2015 this ratio should change to 50 to 57% respectively. This is due to the planned implementation of phase II of the Kazakhstan-China pipeline, the proposed expansion of the BTC pipeline and swap operations with Iran.

It should be noted that currently there are no plans to expand the capacity of transportation routes from the Caspian Sea to the Black Sea, except for the CPC pipeline. If Turkmen oil production volumes increase significantly, Turkmenistan will face problems with exporting its oil as it doesn’t have transportation agreements with Russia or Azerbaijan for such volumes. The main solution in this case would be swap arrangements

with Iran. This would use up to 60 to 80% of the capacity of the Iranian Caspian Sea port in 2010, and 75 to 90% in 2015 according to the low and high scenarios respectively.

Figure 9 illustrates the oil flow routes to the Black Sea area from the Caspian as well as other regions, namely other regions of Russia.

Figure 9. Black Sea region: oil inflow routes*



* Based on maps provided by the CGES

As we can see, the main oil inflow ports are:

- Novorossiysk (Transneft system and CPC);
- Odessa (Odessa-Brody⁹ and the Ukrtransnafta system linked to the Transneft system);
- Tuapse (Transneft system);
- Supsa;
- ports linked to the Baku-Batumi railroad.

The available inflow capacity and our assumptions on its expansion are presented in Table 5.

⁹ Initially, the Odessa-Brody pipeline was designed to transport oil from Odessa to Brody. However, currently the pipeline works in reverse mode and brings oil from Brody to Odessa. There are plans to use the pipeline in the designed flow direction from 2012 as agreed between Azerbaijan, Georgia, Lithuania, Poland and Ukraine.

Table 5. Assumptions on available inflow capacity changes in the Black Sea region

	million tons/year			
	2007	Before 2010	2010-2015	Beyond 2015
Novorossiysk	50	50	50	50
Novorossiysk (CPC)	32	32	40÷67	67
Odessa	12	12	12	12/15
Odessa (OBP) ⁹	9	9	9	9
Tuapse	6	6	6	6
Supsa	-	7	7	7
Baku-Batumi rail	15	15	15	15
Total	124	131	139÷166 130÷157⁹	166/169 157⁹/160⁹

The administration of the Odessa port also has plans to expand the terminal's capacity to 15 million tons/year some time in the future.

It should also be noted that currently there are no official expansion plans for the Odessa (OBP) port (Pivdenny), while the designed capacity of the Odessa-Brody pipeline is 14.5 million tons/year.

As we see, the total inflow capacity in the Black Sea region in 2007 was equal to 124 million tons/year. By 2010 it could reach 131 million tons/year, and by 2015 it could rise to 166 million tons/year if the Odessa-Brody pipeline continues working in its current direction, or to 157 million tons/year if it ends up delivering oil from the Black Sea to far inland areas.

Figure 10 graphically illustrates the low and high scenarios of the discussed capacity expansion estimates to 2015.

Figure 10. Estimated Caspian oil inflow and total inflow capacity in the Black Sea region

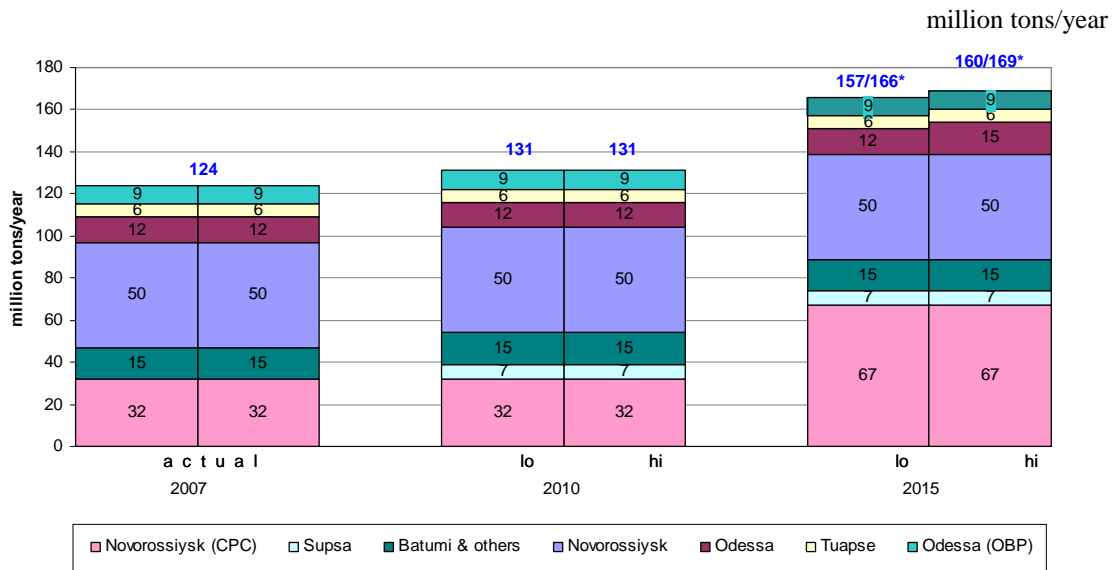
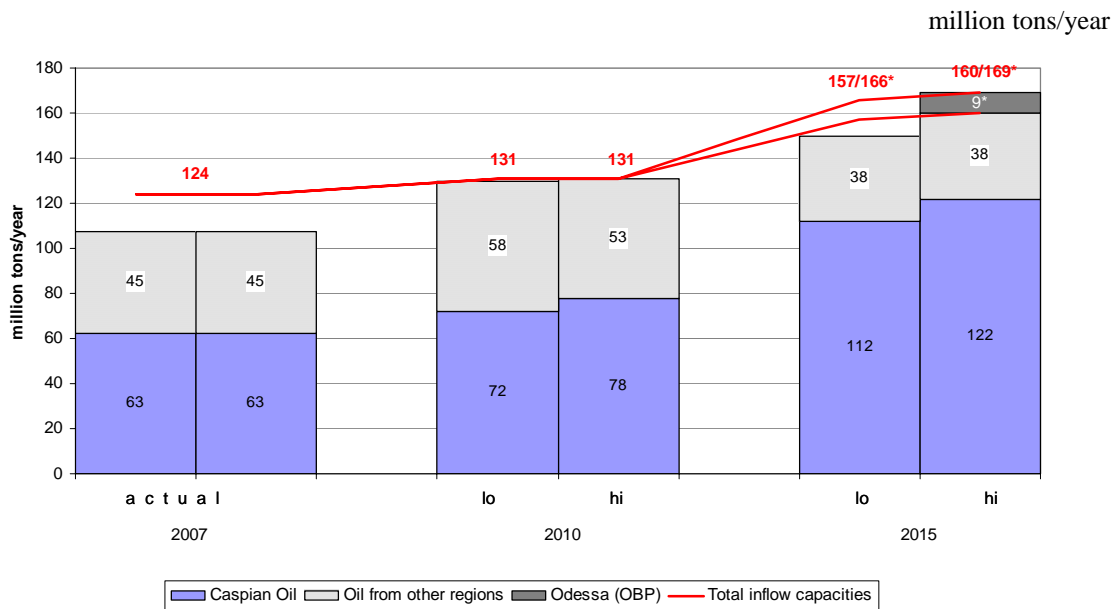


Figure 11 compares the estimated oil flows and the inflow capacity in the Black Sea region to 2015.

Figure 11. Estimated total oil inflow and inflow capacity to the Black Sea



The bars on the left represent the low scenario, the bars on the right are for the high scenario of oil inflow and the red line represents the inflow capacity in the Black Sea region.

As was mentioned earlier, ‘Caspian oil’ accounts for all oil of Caspian origin, which is transported through dedicated pipelines, while ‘oil from other regions’ is mainly oil from various regions of Russia not related with the Caspian region.

The total flows for 2007 were estimated based on reported volumes from the ports of Novorossiysk, Tuapse and Odessa, and from reports made by Argus Petroleum. The figures for 2010 and 2015 are based on a forecast made by BAPLine JV, except for where the BAPLine JV oil flow estimates exceed the author’s estimates concerning available export capacity for the respective period. In such cases the author limits the forecast to available capacity estimates.

As we can observe, in 2007 total inflows amounted to 108 million tons/year and used 87% of available capacity (124 million tons/year). In 2010-2015 inflow capacity should be fully or almost fully used except in case of a low 2015 scenario where the utilisation rate could be around 90%.

5.2. ALLOCATION OF FLOWS

As was mentioned earlier, the oil producers’ choice of export route depends on a number of considerations, including the factor of their participation in other projects. Table 6 demonstrates the share of selected oil producers in the refineries located in the Black Sea area, and the crude oil capacity of these refineries as of end 2007.

Table 6. Share of selected oil producing companies in the refineries of the Black Sea region

Black Sea Port	Shareholder	Refinery	Share, %	Capacity, mln tons/year
Burgas (Bulgaria)	LukOil	LukOil Neftochim Burgas	93.16	8.8
Constanta (Romania)	KazMunayGas	Rompetrol Group	75.00	5.3
Constanta / Midia (Romania)	LukOil	Petrotel LukOil	93.00	2.4
Total				16.2

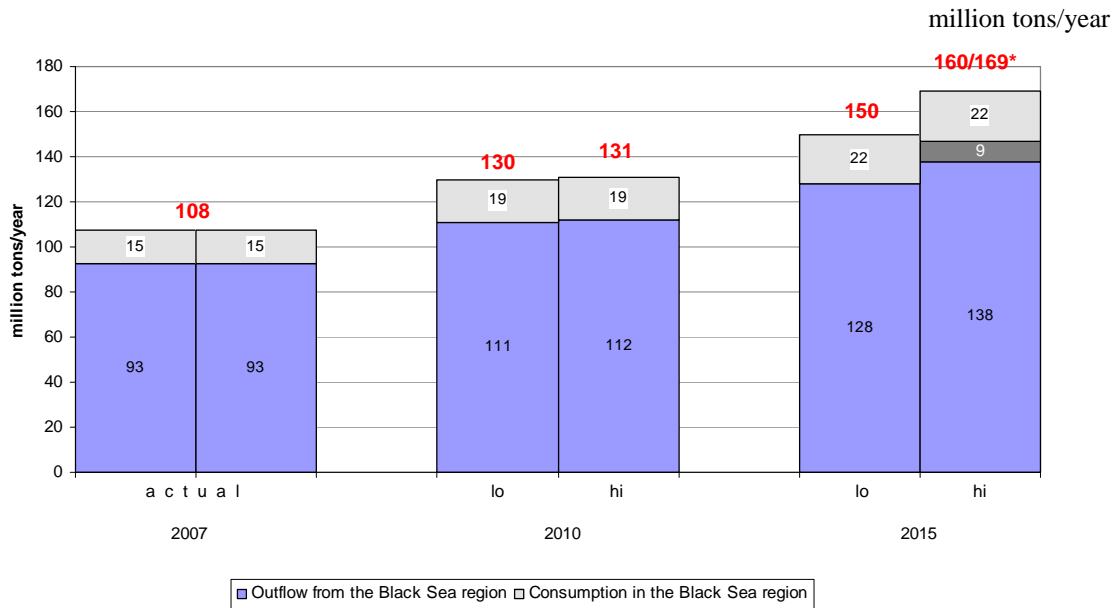
Source: LukOil, KazMunayGas

Therefore, we can assume that these producers would be interested in transporting a certain portion of their oil to these refineries. Both LukOil and KazMunayGas produce various crudes of differing quality, and they are also able to swap oil with other producers. Therefore, the refineries’ oil quality requirements should not be a major issue. LukOil has a 100% share in the Odessa refinery, with a capacity of 2.8 million tons/year, and in case the direction of the Odessa-Brody pipeline changes, some volumes of LukOil’s oil could be redirected to its refinery located on the Black Sea coast.

Total oil consumption in the Black Sea region according to the estimates of the Balkan and Black Sea Petroleum Association (BBSPA) and LukOil, should rise from 15 million tons/year in 2007 to 19 and 22 million tons/year in 2010 and 2015 respectively.

Figure 12 illustrates oil allocation estimates in the Black Sea region to 2015.

Figure 12. Estimated oil allocation in the Black Sea region



As we can see, in 2007, 14% of oil coming to the Black Sea was consumed within the region, and the outflow amounted to 93 million tons. In 2010, the outflow is expected to be in the range of 111 to 112 million tons, and in 2015 – 128 to 138 million tons should there be a change in the direction of the Odessa-Brody pipeline, and 128 to 147 million tons if the Odessa-Brody pipeline continues to operate as today.

6. TURKISH STRAITS BYPASS PROJECTS

As can be observed, the expected increase in oil exports from the Caspian region would also influence oil flows in the Black Sea region. The growing traffic of container ships leads to massive congestions and increased waiting time to pass through the Bosphorus. This also increases the danger of accidents, which would have a severe impact on the Turkish population and environment, as well as on other areas of the Mediterranean. The expected rise in oil tanker traffic due to the greater inflow of oil into the Black Sea region from the Caspian, without any additional pipeline capacity to bypass the Bosphorus, would further increase such a risk.

There exist several projects aimed at bypassing the Bosphorus. The most prominent projects are illustrated in Figure 13.

Figure 13. Turkish Straits bypass projects*



* Based on maps provided by the CGES

Table 7 is an overview of the main parameters of the selected bypass projects.

Table 7. Main parameters of Turkish Straits bypass projects

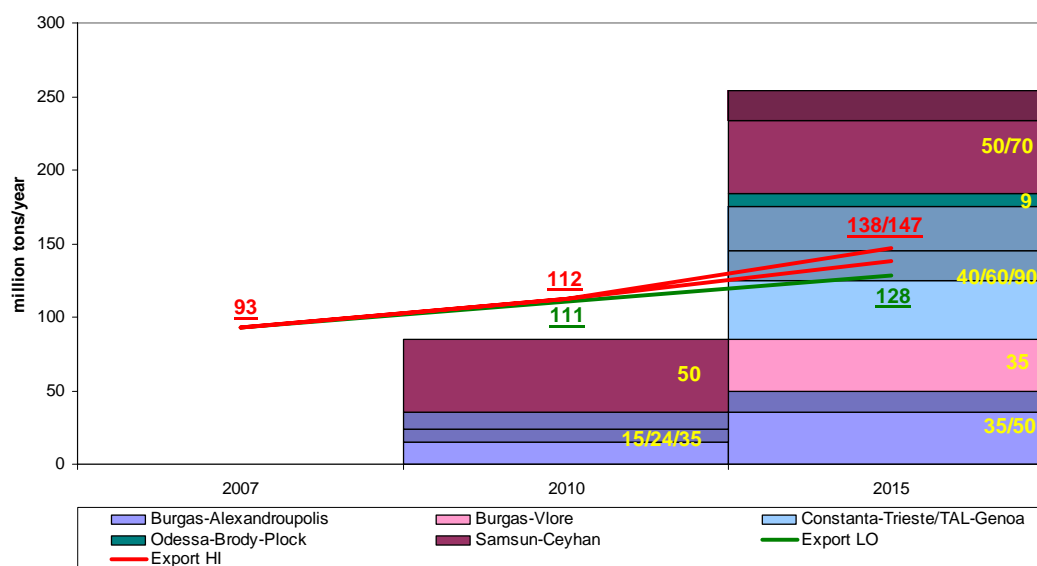
Project	Capacity, mln tons/year	Length, km	Estimated costs
Burgas-Alexandroupolis pipeline (BAP)	15/24/35/50	285	€1 billion ¹⁰
Burgas-Vlore pipeline (AMBO)	35	894	\$1.5 billion
Constanta-Trieste/TAL-Genova pipeline (PEOP)	40/60/90	1,856	€3 billion ¹¹
Odessa-Brody-Plock pipeline	9	490 ¹²	\$400-500 million ¹²
Samsun-Ceyhan pipeline (Trans-Anatolian, TAP)	50/70	555	\$2 billion

Source: Transneft, KazMunayGas, Çalık Enerji

It should be noted that Slovenia has officially reported that it “has no national interests in the PEOP project and that it supports this project only within the framework of the common European energy policy.”¹³

The comparison between the estimated oil flows from the Black Sea region to the Mediterranean and the designed pipeline capacity to 2015 is illustrated in Figure 14.

Figure 14. Turkish Straits bypass projects: pipeline capacity vs. flows



¹⁰ Costs are estimated for the capacity of 35 million tons/year.

¹¹ Costs are estimated for the capacity of 60 million tons/year.

¹² For the Brody-Plock section.

¹³ Official website of the Ministry of Economy of the Republic of Slovenia: <http://www.mg.gov.si/nc/en/splosno/novice/cns/news/article/11987/5549/>.

Figure 14 illustrates only pipeline capacity, and as in 2007 there was no available pipeline, the whole amount of 93 million tons of oil was transported through the Turkish Straits by tanker.

The first two expected Bosphorus bypasses – the Burgas-Alexandroupolis pipeline (BAP) and the Trans-Anatolian pipeline (TAP) between Samsun and Ceyhan – are supposed to become operational by 2010 with a combined capacity of between 65 and 85 million tons/year as compared to the expected outflow from the Black Sea of 111 to 112 million tons/year. This would leave a flow of between 26 and 47 million tons/year to pass the Turkish Straits by tanker.

By 2015 the total Bosphorus bypass capacity could rise up to 254 million tons/year if all planned projects are realised, while the projected oil flow from the Black Sea region will be in the range of 128-147 million tons/year.

These comparisons highlight the upcoming competition between planned pipeline projects, which will lead to strong competition for resources, i.e., for oil producers.

7. CONCLUSION

The transport capacity in the Caspian Sea area should allow to export all planned crude oil volumes from the region and should be fully used for the period up to 2015.

Total oil inflows to the Black Sea region are likely to use almost all available capacity, and the share of Caspian oil in the Black Sea area should rise from 60% to 70-75% by 2015.

Total oil outflows from the Black Sea are estimated to be in the range of 111 to 112 million tons in 2010 and 128 to 147 million tons in 2015, of which 2/3 should be Caspian oil originating from Kazakhstan.

If all the Bosphorus bypass projects are realised, their combined capacity will exceed the volumes to be transported from the Black Sea further on to international markets.

Therefore, there is competition between various pipeline projects for sufficient throughput commitments. The success of particular pipeline projects will, therefore, mainly depend on their backing by oil producers.

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ACRONYMS AND ABBREVIATIONS

AMBO	Albania-Macedonia-Bulgaria Oil pipeline, also known as Burgas-Vlore pipeline
BAP	Burgas-Alexandroupolis oil pipeline
BBSPA	Balkan and Black Sea Petroleum Association
BTC	Baku-Tbilisi-Ceyhan oil pipeline
CERA	Cambridge Energy Research Associates
CGES	Centre for Global Energy Studies
CPC	Caspian Pipeline Consortium
ECS	Energy Charter Secretariat
EIA	Energy Information Administration of the United States Department of Energy
FSU	Former Soviet Union
IEA	International Energy Agency
PEOP	Constanta-Trieste/TAL-Genova pipeline, also known as Pan-European pipeline
TAP	Trans-Anatolian pipeline, also known as Samsun-Ceyhan oil pipeline